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Banerjee, Sudeshna and Wodon, Quentin and Diallo,
Amadou and Pushak, Taras and Uddin, Elal and Tsimpo,
Clarence and Foster, Vivien

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BACKGROUND PAPER 2

AFRICA INFRASTRUCTURE COUNTRY DIAGNOSTIC

Access, Affordability, and Alternatives: Modern Infrastructure Services in Africa

Sudeshna Banerjee, Quentin Wodon, Amadou Diallo,
Taras Pushak, Helal Uddin,
Clarence Tsimpo, and Vivien Foster

February 2008

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About AICD

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



AICD will produce a series of reports (such as this one) that provide an overview of the status of public expenditure, investment needs, and sector performance in each of the main infrastructure sectors, including energy, information and communication technologies, irrigation, transport, and water and sanitation. The World Bank will publish a summary of AICD's findings in spring 2008. The underlying data will be made available to the public through an interactive Web site allowing users to download customized data reports and perform simple simulation exercises.

QuickTime™ and a TIFF (Uncompressed) decompressor are needed to see this picture.



The first phase of AICD focuses 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 are: Benin, Burkina Faso, Cape Verde, Cameroon, Chad, Congo (Democratic Republic of Congo), Côte d'Ivoire, Ethiopia, Ghana, Kenya, Madagascar, Malawi, Mali, Mozambique, Namibia, Niger, Nigeria, Rwanda, Senegal, South Africa, Sudan, Tanzania, Uganda, and Zambia. Under a second phase of the project, coverage will be expanded to include additional countries.



AICD is being 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 AICD is provided by a multi-donor trust fund to which the main contributors are the Department for International Development (United Kingdom), the Public Private Infrastructure Advisory Facility, Agence Française de Développement, and the European Commission. A group of distinguished peer reviewers from policy making and academic circles in Africa and beyond reviews all of the major outputs of the study, with a view to assuring the technical quality of the work.



This and other papers analyzing key infrastructure topics, as well as the underlying data sources described above, will be available for download from www.infrastructureafrica.org. Free-standing summaries are available in English and French.

Inquiries concerning the availability of datasets should be directed to vfoster@worldbank.org.

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Acronyms and abbreviations

AICD	Africa Infrastructure Country Diagnostic
CPI	Consumer Price Index
DHS	Demographic and Health Survey
GDP	Gross Domestic Product
JMP	Joint Monitoring Program
LCU	Local Currency Unit
LSMS	Living Standards Measurement Survey
LPG	Liquid Petroleum Gas
MDG	Millennium Development Goals
MICS	Multi-Indicator Cluster Survey
ODA	Official Development Assistance
OECD	Organization for Economic Co-operation and Development
PPI	Private Participation in Infrastructure
PPP	Purchasing Power Parity
UNICEF	United Nations Children's Fund
VIP	Ventilated Improved Pit
WDI	World Development Indicators
WHO	World Health Organization
WSS	Water Supply and Sanitation

Summary

Africa lags well behind other developing regions in access to infrastructure services. Limited gains made in the 1990s continued in the early 2000s, and there is now clear evidence that many countries are failing to expand services fast enough to keep up with rapid demographic growth and even faster urbanization. If present trends prevail, Africa is likely to fall even further behind other developing regions, delaying universal access for a half century or more in many countries.

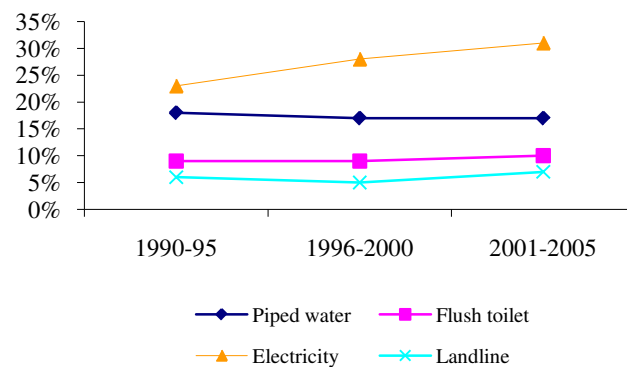
This report reviews recent trends in household access to infrastructure services and associated budgetary expenditures in Africa. It is based on a pooled database that draws upon the entire body of household surveys conducted in Africa in the last 15 years. The database includes 67 Demographic and Health Surveys (DHSs) conducted by the Measure DHS Program of MACRO International in the least-developed countries, as well as related surveys. Covering 32 countries, including 24 at more than one point in time, this collection of survey data provides a sound basis for analyzing historic trends in access to services. The report also draws on 30 household expenditure surveys of various kinds that provide information on the structure of the household budget, and in particular spending on infrastructure services. Our findings on water supply and sanitation are broadly consistent with those of the Joint Monitoring Program (JMP) managed by the United Nations Children's Fund (UNICEF) and World Health Organization (WHO), although they are based on a different statistical method, and the JMP statistics include all African countries, whereas only a subset in Sub-Saharan Africa is covered here.

Shrinking access to modern infrastructure services

Recent trends in access suggest that coverage of most basic services in Africa has remained stable or increased slightly since 2000 (figure 1). Trends picked up by the DHS show modest improvements in access to all services between the early and late 1990s to early 2000s. In the case of piped water and flush toilets, coverage levels in urban areas in the early 2000s are significantly below what they were in the early 1990s: 39 percent versus 50 percent for piped water, and 27 percent versus 32 percent for flush toilets.

Figure 1 Network infrastructure services in Africa, 1990–2005

Percentage of population with access to service (population weighted)



Source: AICD DHS/MICS Survey Database, 2007.

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The overall trend is driven largely by declining access in urban areas, while the situation in rural areas has improved. Access to improved water sources has declined across the period in urban areas. Access to improved sanitation has held steady in urban Africa.

Access to infrastructure services is more limited in Africa than in any other region of the developing world. Official estimates suggest that electricity is available to little more than 20 percent of Africa’s population, versus 33 percent in South Asia, the next-lowest region. Access to an improved water source is 56 percent (versus 78 percent in East Asia), while access to a piped water connection is just 12 percent. Access to improved sanitation, at 37 percent, is comparable to that in South Asia, but well behind the 50 percent reported for East Asia. Moreover, access to a flush toilet (connecting to a sewer or septic tank) is only 6 percent.

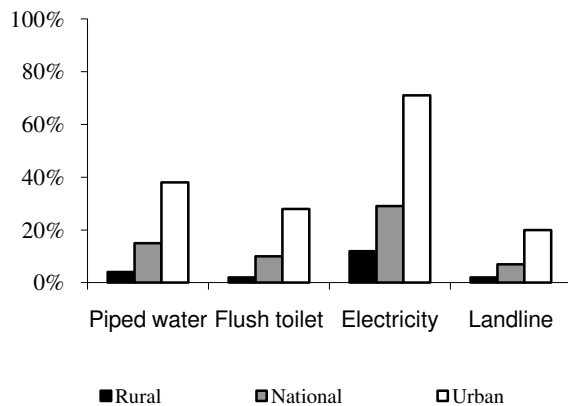
Telecommunications is the exception to the general pattern of stasis or decline. In telephone density (landlines and cellular telephones), Africa is somewhat ahead of South Asia, with 64 versus 56 subscribers per thousand people. Landline coverage increased dramatically to reach more than 7 percent of households in the early 2000s, while cellular telephones came from nowhere to reach 10 percent of households today. Except in South Africa, almost all cellular telephones in Africa are first telephones, as opposed to second telephones for households that already have landlines.

Coverage rates in urban areas are an order of magnitude higher than those in rural areas (figure 2a). In fact, Africa’s low overall access rates are partly explained by negligible service coverage in rural areas, where the bulk of the population still resides. When broader measures of improved water and sanitation are considered, the discrepancies are still large and stark. Thus, about 63 percent of the urban population has access to an improved water source, compared with about 14 percent of the rural population. Moreover, about 42 percent of the urban population has access to improved sanitation versus about 7 percent of the rural population.

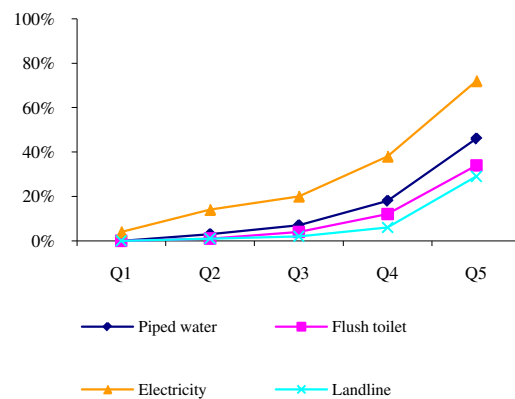
Figure 2 Patterns of access to modern infrastructure services in low-income countries of Africa

Population-weighted average, percent, latest available year

(a) By geographic area



(b) By asset quintile



Source: AICD DHS/MICS Survey Database, 2007.

Access to modern infrastructure services is almost entirely confined to the upper-income quintiles (figure 2b). In the first three quintiles of the wealth distribution, access to modern

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infrastructure services is well below 10 percent, access for the fourth quintile is typically 10–40 percent, while access for the richest quintile is typically 30–50 percent. The implication is that around 80 percent of those currently connected to modern infrastructure services are in the top 40 percent of the distribution of wealth. In most countries, moreover, inequality of access has increased over time, suggesting that new connections have tended to go predominantly to more affluent segments of the population.

In contrast to the general concentration of service among the wealthy, a handful of countries stand out as having reached significant levels of access to electricity (5–15 percent) among the poorest quintile. They are Gabon (17 percent), Nigeria (10 percent), South Africa (10 percent), Ghana (8 percent), and Republic of Congo (5 percent). It is striking that even among the top quintile, coverage is far from universal and highly variable across countries, ranging from around 20 percent in Chad and Central African Republic to almost 100 percent in Cote d' Ivoire, Gabon, Namibia, South Africa, and Zimbabwe.

That only a minority even of rich households has access to the full suite of modern infrastructure services poses the question of whether access rates are limited by what is locally available. The latter seems to be the case in Africa. Only 10 percent of all households have access to both piped water and electricity. Just 1 percent of households have piped water, electricity, a flush toilet, *and* a telephone.

What is keeping access low?

Despite isolated successes, the fact remains that the trendline of service coverage is static or modestly increasing for the region as a whole. A number of explanations can be identified.

First, the income and urbanization levels of the country are major drivers of access to modern infrastructure services. Middle-income countries have access rates to piped water, flush toilets and telephone landlines that are three times as high as those found in low income countries, and electricity access rates that are twice as high. More highly urbanized countries have access rates to piped water, flush toilets and telephone landlines that are twice as high as those found in less urbanized countries, and electricity access rates that are three times as high. Relatively few of Africa's countries are in the middle income, highly urbanized bracket.

Second, Africa's high demographic growth rates provide one explanation for falling levels of coverage. Demographic growth in Africa is 2.2 percent per year (compared with the next-highest rate of 2.0 percent in the Middle East and North Africa). Moreover, urban populations in Africa are growing at 3.6 percent per year (compared with the next-highest rate of 3.1 percent per year in East Asia). The analysis shows that a significant number of African countries are not increasing access rapidly enough to keep up with demographic growth, particularly in urban areas. Indeed, if historic rates of expansion continue, only a handful of countries can be expected to attain universal coverage by the year 2050.

Third, decreasing household size is a second factor that frustrates coverage expansion. There is evidence that the average household size in Africa is falling over time as incomes rise. Thus, the total number of households is actually growing even faster than the total population. (The

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estimated rates are 3.2 percent per year for households as opposed to 2.5 percent for population.) Thus access needs to expand by 50 percent more to maintain constant coverage rates than if household size remained unchanged.

Fourth, even within the group of low income countries, there is a wide diversity of performance with respect to coverage. Countries such as Ethiopia, Kenya, Madagascar, Mali stand out as already having relatively good rates of coverage for some services, in spite of their low levels of income and urbanization. Another set of low income countries stand out as having achieved relatively high growth rates increasing the number of connections by between 5 and 10 percent per year for services such as water and electricity. Successful examples include Burkina Faso, Mali, Chad, Ethiopia and Senegal (water), and Lesotho, Madagascar, and Burkina Faso (electricity).

Finally, gaps in the supply of services are just part of the explanation for low access. Millions of Africans living near networked services still lack access to them, either because the services are not affordable or because consumers prefer alternatives.

To identify interventions that might be capable of speeding up the rate of expansion of access, we divided the unserved urban population into two groups: (1) individuals who live close to an infrastructure network and could be reached through relatively inexpensive programs to increase service density, and (2) those who live far away from such a network and could be reached only by extending the network.

Our results are surprising. Some 70–90 percent of the urban population lives in physical proximity to piped water and electricity networks, even though coverage rates are 20–40 percentage points lower than their proximity would suggest. In other words, many people who live near the network choose not to connect to it.

Affordability of infrastructure services

These findings suggest that affordability may be a barrier to further expansion of access. Most African households live on very modest budgets and spend more than half of their resources on food. The average African household has a budget of no more than \$180 per month; urban households are about \$100 per month better off than rural households. Household budgets range from around \$50 per month in the lowest quintile to no more than \$400 per month in the highest income quintile, except in middle-income countries, where the richest quintile has between \$600 and \$1,200 per month. Even the most affluent households spend about half of their monthly budget on food—among the poorest that share rises toward 65 percent.

Infrastructure spending—particularly on power and transport—weighs heavily on household budgets. Spending on utilities, transport, and rubbish disposal typically absorbs 10–20 percent of the household budget, and this can rise to as much as 40 percent in some countries. Electricity and transport each absorbs 5–10 percent of the household budget in most countries. Spending on water is typically no more than 5 percent of the household budget. Spending on telecommunications varies widely across countries. It is not unusual for infrastructure spending to

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absorb 40 percent of the *nonfood budget* of the household, and as much as 80 percent in some cases.

To test the affordability of utility services priced at a level sufficient to allow the utilities to recover their costs, we calculated the percentage of urban households that would need to spend more than 5 percent of their income to purchase a subsistence level of any given utility service. The finding is that the countries fall into three groups. In most countries, between one- and two-thirds of the urban population would face difficulties in covering the cost of service.¹ In eight countries, at least 70 percent of urban households would be unable to afford a monthly expenditure of \$10 for water or electricity. Only in the remaining seven countries would most urban households be able to afford a monthly expenditure sufficient to allow the utility to meet its costs.

Given the limited means of most African households, service providers will not be able to expand services—or even to sustain them in some cases—based solely on actual and potential revenues from customers. To connect all unserved customers to water or electricity services, the average African government would have to provide a one-time capital subsidy equal to about 1 percent of GDP for 10 years on average. Some governments would have to provide twice that amount. The cost of a recurring consumption subsidy would be slightly higher than the costs of subsidizing new connections.

Some of the necessary subsidies are already being paid—but not efficiently. Existing consumption subsidies for electricity and water appear to be poorly targeted in African countries. This is because poor households tend to live in areas without electricity and water service; thus it is impossible for them to benefit from the subsidies. In addition, even where access to the network is available to the poor, many remain unconnected, often because the cost of connecting to the network and purchasing the equipment required for electricity and water use is too high.

The traditional “inverted block tariff” structures used in many countries are particularly poorly targeted. First, these tariff structures spread subsidies to all households connected to the network, so that even those who consume high amounts of electricity benefit from a subsidy for the part of their consumption that falls in the lower blocks of the tariff structure. In addition, the lower blocks tend to be too generous in terms of consumption (in kWh per month) to target the poor well. And finally, the differences in unit prices between the various blocks may not be large enough.

Nonpayment for infrastructure services is as a major issue, even among affluent households. Among those reporting access to piped water, electricity or telephone services, close to half did not report paying a bill during the month of the service. While nonpayment rates tend to be higher among the poorer segments of the population, 20 percent of the top quintile report not paying for electricity, and 40 percent of the top quintile report not paying for water.

¹ By our best estimates, most households in most countries should be able to afford monthly charges of around \$2 for any given infrastructure service, but charges of \$10 a month are prohibitive for the majority.

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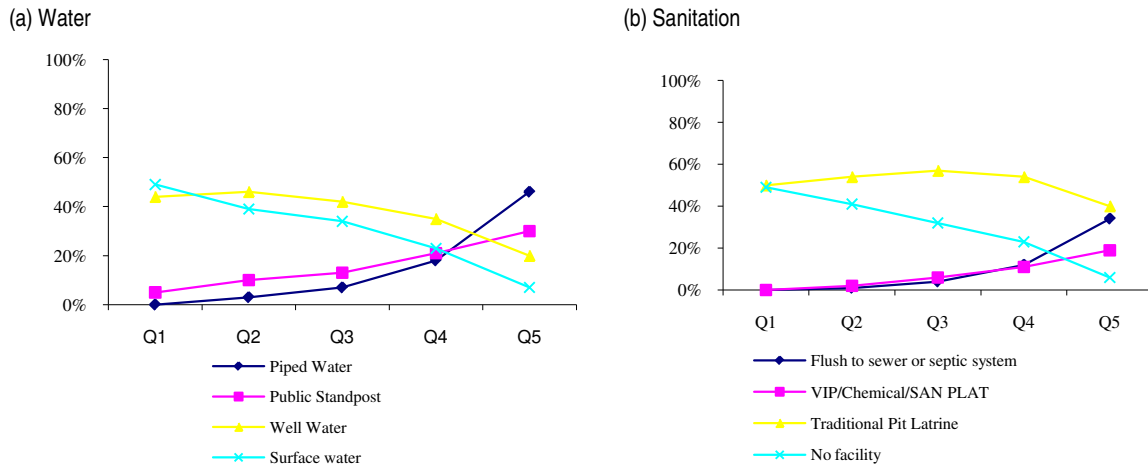
Even if subsidies could be better targeted and collection rates improved, the ability of African households to pay for infrastructure services is almost certainly not sufficient to permit providers to expand services without additional capital and operating subsidies.

Alternative ways of meeting infrastructure needs

With networked infrastructure services unavailable or too costly, millions of African households will continue to resort to traditional alternatives to modern infrastructure services. It is important that policy makers understand these alternatives. In some cases, promoting greater use of second-best alternatives may be a good way to expand access in an affordable way. Some second-best options are viable substitutes for networked services but even access to these second-best alternatives is still comparatively skewed toward the upper-income groups, indicating substantial room for growth in access to these forms of service.

Figure 3 Patterns of access to alternative water and sanitation services

Population-weighted average, percent, latest available year



Source: AICD DHS/MICS Survey Database, 2007.

Among the main alternatives to household connections to piped water are standposts and water vendors, particularly in urban areas, and wells and boreholes, which predominate in rural areas. The coverage of standposts—at 16 percent for our sample and around 27 percent of the urban population—is only slightly higher than the coverage of private piped-water connections. While somewhat more equitably distributed than piped-water connections, public standposts are still regressive in their pattern of incidence. About 37 percent of African households rely on wells and boreholes for their water supply, a share that is relatively constant across the income distribution. Those with no other alternative must resort to surface water of questionable quality—this amounts to 30 percent of the population overall and about 50 percent of the poorest.

In a few countries, water vendors play a significant role in urban water supply, supplying around 4 percent of the urban water market; and in Mauritania that share exceeds 30 percent. Interestingly, even though water vendors charge higher unit prices for water, those purchasing water from vendors do not necessarily spend more on buying water than those purchasing water from the public utility—they simply lower the quantity they consume. In many cases, overall

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spending levels are similar; where they differ those purchasing from vendors are just as likely to spend more or less per month relative to the clients of the utilities.

The overall prevalence of improved latrines (such as VIP, chemical, or SAN PLAT) in Africa, at around 8 percent of the population, is scarcely higher than the prevalence of flush toilets and is equally concentrated in the upper-income segments of society.

Several countries stand out as having 30–50 percent of their populations covered by flush toilets or improved latrines. Even in those countries, however, about half of the population relies on traditional pit latrines, by far the most widely used form of sanitation in Africa. In Malawi, Tanzania, and Uganda as much as 80 percent of the population is served by traditional pit latrines. As with boreholes, the share of the population using pit latrines is relatively constant across the income distribution, but, in some countries, a large share of the population lacks even that form of sanitation. In Benin, Burkina Faso, Chad, Niger, and Togo, more than 80 percent of the rural population lacks any form of sanitation.

The sharing of water and sanitation facilities among multiple families is common in urban areas. At least 16 percent of urban households share their water supply facilities with other households, while more than 40 percent typically share their toilet facilities.

The average African household spends 45–50 minutes per day collecting water from sources outside the household. The time spent collecting water has remained almost unchanged over the last 15 years. Most African households that lack private water connections live within one kilometer of their water source. In the case of urban households, the average distance is estimated to be just over 500 meters, while in the case of rural households 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.

The vast majority of the population cooks with traditional solid fuels and relies on kerosene for lighting. For cooking, around 80 percent of the population relies on wood, charcoal, or a substitute. Although reliance on traditional fuels is significantly higher in rural areas (close to 93 percent of households), their use in urban areas remains quite high (more than 70 percent of households in many cases).

More than half of the African households dump, burn, or bury their household waste. Only 10 percent of households (but about 30 percent of urban households) have access to an advanced waste collection option such as collection by the government, a private company, or a nongovernmental organization.

Conclusions and policy directions

Despite the overall decline in African's access to water and sanitation particularly in the urban areas since 2000, a significant number of countries have succeeded in expanding coverage by an annual average of 5–10 percent, a rate fast enough to make substantial coverage gains within a reasonable time frame. Further investigation is warranted to explain what determines their superior performance.

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The finding that a significant share of the unserved urban population lives close to infrastructure networks but chooses not to connect suggests the need for greater efforts on the demand side—and that extending networks is not a sufficient condition for achieving higher access. The low uptake rate of services in African cities means that the financial and economic return to prior network expansion has been much lower than might be expected, leaving a relatively small customer base to cover the fixed costs of a relatively expensive network. It is therefore necessary, once the phenomenon of low uptake is thoroughly understood, to accompany further expansion with demand-side measures explicitly designed to reduce uptake barriers, such as subsidization of connection charges, which tend to be high relative to household incomes and no doubt play a role in the low uptake of available services. Urban development factors, such as insecure household tenure, may also be playing an important role, discouraging both supply and demand.

Low incomes represent an absolute constraint on the rate of expansion of modern services. The average African household has little more than \$30 per month to spend on all utilities and transport. Utility bills on the order of \$6 per month for a service such as water or power may be affordable for most households in all but the poorest countries, but once bills reach \$10 per month they are unaffordable for a substantial share of the population.

The fact that most Africans rely either on alternatives to networked infrastructure services or simply do without services altogether has important implications. Given the slow rate of growth in coverage for many services in many countries, this situation is likely to persist for years. For that reason, in addition to focusing on improving the performance and expanding the ambit of formal providers of modern infrastructure services, it is important to consider what might be done to improve the lot of the unserved through alternative services. There is clearly substantial potential for second-best options such as standposts and improved latrines to reach a larger share of the population.

While the results reported above provide insights into the nature of household usage of infrastructure services in Africa, they also raise many questions that cannot be immediately answered. Why is the variance in access so high across countries, even within the same income band? Why is the variance in access so high across services, and how is it that a new service such as cellular telephony made such major inroads so quickly?

To find answers to many of these questions, it is necessary to dig deeper into the institutional organization and the performance of service providers in each country. Such an analysis is already underway in other components of the Africa Infrastructure Country Diagnostic. When all the work has been completed, it will be possible to revisit the findings of this study and make greater sense of the variations that have been observed.

1 The African context

Policy makers around the world face the challenge of providing reliable and affordable infrastructure services to their people.² One billion people do not have access to safe water; two billion people lack electricity and safe sanitation facilities; and three billion have never used a telephone. Most of these people reside in Sub-Saharan Africa (hereinafter Africa) or South Asia (Brook and Smith 2001).

A strong network of public infrastructure is a precondition for national and regional economic growth and a channel through which private enterprise invests in developing countries. Infrastructure directly affects productivity and output by enlarging the size of product and labor markets (Prud'homme 2004). Infrastructure supports pro-poor growth by enhancing overall growth, removing barriers that hurt poor people, and encouraging poor people's participation in the growth process (OECD 2006). And infrastructure stock positively affects growth, while superior quality and quantity of infrastructure reduces income inequality (Calderon and Serven 2004).

In the early 1990s, when infrastructure gaps were recognized as obstacles to growth and welfare improvements, it was widely hoped that the private sector would step into the breach by investing in infrastructure. Between 1995 and 2005, the private sector invested almost \$37 billion in infrastructure in Africa, according to the World Bank's database of private participation in infrastructure (PPI), while official donors retreated from infrastructure investments. In recent years, however, the private sector's appetite for infrastructure investments has declined because of difficulties of recovering costs and several failed and renegotiated infrastructure transactions.

The Millennium Development Goals (MDGs)—together with renewed emphasis on the direct and indirect relationships of growth, equity, and infrastructure—have made investments in infrastructure a priority again. Multilateral lending institutions and bilateral donors within the Organization for Economic Co-operation and Development (OECD) have repositioned their infrastructure business, and infrastructure figures prominently in government action plans to reduce poverty and improve growth. Official development assistance (ODA) for infrastructure to Africa has been on the order of \$27 billion annually for the past 10 years. In addition to traditional sources of aid, infrastructure has been attracting high volumes of finance from emerging players such as China, India, and oil-exporting nations in the Middle East. The rising tide of financial resources will be needed to bring the continent to parity with other regions of the world.

Presently, Africa lags behind all other regions in coverage of water and sanitation (WSS) services. To meet the MDGs, Africa must achieve 75 percent access to improved water supply by 2015 and 66 percent access to improved sanitation by 2015—but the continent is not on target to do so. Africa is the only world region in which the share of people without access to water and sanitation *increased* between 1990 and 2004—by 23 percent and 30 percent respectively (JMP 2006).

² In this study, infrastructure refers to economic infrastructure—water supply, sanitation, energy, rubbish disposal, and transport.

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Monitoring progress in WSS has been a significant by-product of adoption of the MDGs. WSS is the only infrastructure sector that corresponds directly with one of the goals—“halve the number of people without access to safe drinking water and basic sanitation by 2015.” The Joint Monitoring Program (JMP), sponsored by WHO and UNICEF, is entrusted with tracking access to improved WSS.

Despite these recent monitoring efforts, little is known about household demand for infrastructure in Africa. This study aims to remedy this situation by contributing to the knowledge base on infrastructure coverage in Africa. The study documents access trends for infrastructure over time, looks at expenditure trends for a significant sample of countries, and analyzes the distributional incidence of subsidies for a smaller subset of countries. The systematic analysis of household surveys across a broad swathe of countries in Africa should help inform infrastructure policy decisions in several areas. By documenting access trends over time, the household surveys help to identify countries that have been relatively successful in scaling-up infrastructure coverage. By documenting affordability of infrastructure services, the household surveys can make a significant contribution to the debate about cost recovery and subsidy design for infrastructure services.

This introductory section provides a brief overview of the main trends. Section 2 explains the methodological approach in greater depth. Section 3 examines the prospects for African countries to reach universal access to modern infrastructure services based on the experience of the last 15 years. Section 4 considers whether modern infrastructure services are affordable to the mass of the population, and considers the cost and efficacy of subsidy measures designed to promote affordability. Section 5 explores the alternatives to modern infrastructure services on which a large segment of the population rely.

Coverage of basic infrastructure services in Africa

The starting point is to put Africa’s situation in the wider context of the developing world. Official estimates from World Development Indicators (WDI) suggest that that electricity is available to just 20 percent of Africa’s population (versus 33 percent in South Asia, the next-lowest region). Access to an improved water source is 56 percent (versus 78 percent in East Asia), while access to a piped water connection is just 12 percent.³ Access to improved sanitation, at 37 percent, is comparable to that in South Asia, but well behind the 50 percent reported for East Asia. Moreover, access to a flush toilet (which includes both water-borne sewerage and septic tanks) is only 6 percent. The only exception to this pattern is telephone density (fixed plus mobile), where Africa is somewhat ahead of South Asia; with 64 versus 56 subscribers per thousand people. We find similar results using the methodology described in the next chapter. The unweighted averages of infrastructure coverage⁴ levels indicate that Africa lags far behind other regions in the provision of modern infrastructure services. Only South Asia comes close at the current levels. The results presented in figure 1.1 only capture the poorer countries⁵; it consequently underestimates the coverage in all the regions. Even among poorer countries, the coverage rates in Africa

³ The Joint Monitoring Program (JMP) of the United Nations Children’s Fund estimated that 56 percent of Africans had “access to improved water” in 2004. The comparable figure using AICD data during the period 2000–05 is 32 percent. Similarly, the JMP estimated that 37 percent of Africans had “access to improved sanitation” in 2004. The corresponding AICD figure is 18 percent. The discrepancy is explored in chapter 2.

⁴ The unweighted averages are simple averages—not weighted by population.

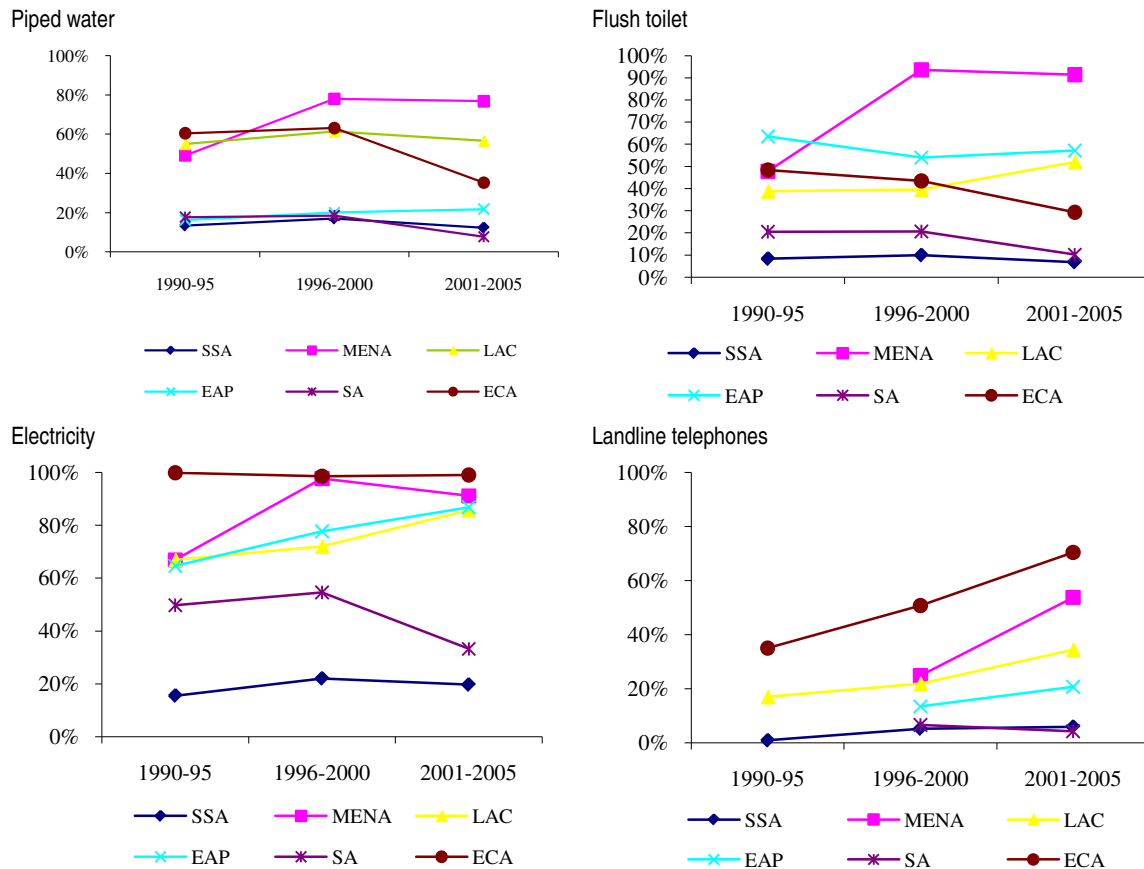
⁵ DHS has a mandate to collect data from the poorest countries in the world.

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are much lower; the difference is particularly striking in electricity and landlines where some regions have more than three-quarter coverage. Recent access trends suggest that while coverage of some basic services in Africa have improved slightly over the last decade, this has not been the case for others. The decline in infrastructure service provision has primarily been in the urban areas and the rural Africa has experienced an upsurge in all modern infrastructure services.

Figure 1.1 Comparison of network infrastructure services in Africa with other regions

Percentage of population with access to service (unweighted)



Source: AICD DHS/MICS Survey Database, 2007.

Note: The results presented here capture only the poorer countries because the DHS surveys on which they are based have a mandate to collect data from the poorest countries in the world. The figure thus underestimates coverage in all regions by excluding richer nations.

Historic trends picked up through the DHSs show modest improvements in coverage of electricity and flush toilets, but by only a few percentage points of the population, while coverage of piped water has declined slightly. Access to improved water sources has also remained stable across the period at 32 percent, while access to improved sanitation has increased from 16 percent to 18 percent in the past decade. The exception to this pattern of limited progress or decline is telecommunications, where not only landline coverage increased, but in addition cellular telephones coverage came from nowhere to reach 10 percent of households as of today. It is interesting that (with the exception of South Africa) almost all cellular telephones in Africa are first telephones, as opposed to second telephones for households that already have landlines.

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Table 1.1 Coverage of network infrastructure services in Africa

Population weighted averages, percent

	Piped water			Electricity			Flush toilet			Landline telephone			Improved water			Improved sanitation		
	1990 -95	1996 -2000	2001 -05	1990 -95	1996 -2000	2001 -05	1990 -95	1996 -2000	2001 -05	1990 -95	1996 -2000	2001 -05	1990 -95	1996 -2000	2001 -05	1990 -95	1996- 2000	2001 -05
National	18	17	17	23	28	31	9	9	10	6	5	7	32	32	32	15	16	18
Urban	50	43	39	72	73	71	32	29	27	18	16	19	82	76	64	42	41	41
Rural	4	4	4	6	10	13	1	1	2	1	1	2	14	14	16	5	6	8

Note: The numbers underlying these data can be found in the cross-country annex.
Source: AICD DHS/MICS Survey Database, 2007.

Coverage rates in urban areas are an order of magnitude higher than those in rural areas. In fact, Africa's low overall access rates are partly explained by negligible service coverage in rural areas, where the bulk of the population still resides. Whereas just 12 percent of the rural population has access to electricity and 3 percent to cellular telephones, and less than 5 percent have piped water, a flush toilet, or a landline, the corresponding figures for the urban population are 71 percent with access to power, 22 percent to cellular telephones, 38 percent to piped water, 28 percent to flush toilets, and 20 percent to a landline telephone. When broader measures of improved water and sanitation are considered, the discrepancies are still large. Thus, around 63 percent of the urban population has access to an improved water source versus around 14 percent of the rural population. Moreover, around 42 percent of the urban population has access to improved sanitation versus around 7 percent of the rural population. In Zimbabwe, 93 percent of urban residents have access to piped water, but rural coverage is only 4 percent, a stark example of the urban-rural divide. In Benin, Cote d'Ivoire, Gabon, Lesotho, Senegal, South Africa, Togo, and Zimbabwe, more than half of the urban population use piped supply to meet their drinking water needs; the numbers in rural areas are far lower.

Africa's national capitals and other major cities have made faster gains in expanding infrastructure coverage than have small towns and rural areas.⁶ Benin, Cameroon, Ethiopia, Gabon, Ghana, Guinea, Madagascar, Senegal, South Africa, and Zimbabwe, about three-fourths of the residents in capitals and other major cities have electricity. More than half of the population in the large cities of Ethiopia, Kenya and South Africa have landline telephones. In Benin, Senegal, Zimbabwe, and South Africa, more than 90 percent of large-city households are covered by piped water supply. More than three-quarters of large-city dwellers in Senegal, South Africa, and Zimbabwe have modern sewerage systems to meet their sanitation needs. Namibia's capital Windhoek and other large cities are exceptional in their coverage—96 percent of households had piped water, 97 percent had a flush toilet, and 88 percent had electricity.

Several other trends are worth noting. WSS coverage in urban areas declined in the past decade (table 1.1). In the mid-1990s, some 43 percent of urban Africans had piped supply, but by 2005, the coverage had declined to 39 percent. Similarly, 27 percent of Urban Africans have flush toilet in the early part of this decade compared to 29 percent in late 1990s. The fact that the national coverage rate has not declined

⁶ We could not always distinguish capital cities from other major cities. Some surveys permit such a disaggregation, but most merge the capital city and other major cities into one category. Consequently, in our discussion of infrastructure services, the category "large cities" includes capital and other major cities.

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to the same extent is due to a higher proportion of the population living in urban areas over time. Electricity coverage has remained stable in urban areas and increased in the rural areas in the last 10 years. The coverage of telephone services has dramatically improved in the past 15 years, with one-quarter of urban Africans having either a cell phone or a landline.

Given that all of the modern infrastructure services present major coverage gaps, it is relevant to ask whether there is a privileged minority of households that has access to all of these services, or whether different households have access to different services depending on what is locally available. The latter seems to be the reality in Africa. Only 10 percent of households have access to both piped water and electricity based on the estimates using PPP method. As additional services are added the percentage of households with access to all of them falls dramatically, down to just 1 percent of households that have piped water, electricity, a flush toilet, *and* a telephone (table 1.2b). In the rural areas, negligible proportion of the population has three or four modern infrastructure services (table 1.2a). Even among the rich, only a minority of households have access to the full suite of modern infrastructure services. Indeed, in a substantial number of the countries studied, more than 80 percent of the population does not have access to *any* of the modern infrastructure services.

Table 1.2 Coverage of combinations of network infrastructure services in Africa

a. Population weighted method, latest available year

	National	Rural	Urban	Q1	Q2	Q3	Q4	Q5
Coverage of any one service	33	15	76	4	17	23	44	78
Coverage of any two services	17	4	47	0	2	7	19	56
Coverage of any three services	9	1	28	0	0	3	11	32
Coverage of any four services	4	0	12	0	0	1	4	16

b. Purchasing power parity method, 2002

	Electricity	Piped water	Flush toilet	Telephone	Electricity & water	Electricity and flush toilet	Electricity and telephone	Electricity, piped water, flush toilet	Electricity, piped water, telephone	Piped water, flush toilet, telephone	All four services
Total	23.6	20.0	12.1	7.2	10.7	6.0	2.1	4.0	1.6	5.5	1.1
Rural	8.8	6.1	1.5	1.1	2.1	0.5	0.2	0.3	0.1	0.2	0.1
Urban	61.4	50.2	34.4	20.2	32.6	19.5	7.5	13.1	6.2	16.6	4.4

Source: AICD Expenditure Survey Database, 2007.

Income and modern infrastructure coverage are positively related in Africa (figure 1.2), as elsewhere (Komives, Whittington, and Wu 1999). Richer segments of the population have broader access to modern infrastructure services in their home or within a short distance. In the coverage ladder for water supply, rising income is associated with piped water and public standposts and a declining dependence on wells, boreholes, and surface water. In sanitation, the use of flush toilets and so-called VIP/chemical latrines is negligible among the bottom 40 percent of Africa's population. The number of households with no sanitation facility declines steeply with increasing income, with household dependence on the traditional pit latrine increasing up to the third quintile before declining. Among the poorest 20 percent of Africa's population, only 4 percent use electricity for lighting purposes and 90 percent depend on "dirty fuels," chiefly wood or charcoal, for cooking. Electricity use increases with rising income. The landline and cell-

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phone coverage in the highest quintile is almost similar at about 30 percent. The cell phone coverage in the lower quintiles is more evenly distributed with 2 percent of the lowest quintile in African using cell-phones. Coverage of landline telephones sharply increases above the fourth quintile with negligible coverage in the bottom two quintiles.

Access to modern infrastructure services is highly concentrated in the upper-income quintiles. In the first three quintiles of the wealth distribution, access to modern infrastructure services is well below 10 percent, access for the fourth quintile is typically 10–20 percent, while access for the richest quintile is typically 30–50 percent. The implication is that around 80 percent of those currently connected to modern infrastructure services are in the top 40 percent of the distribution of wealth. Nevertheless, it is striking that even among the top quintile coverage is far from universal and highly variable across countries, ranging from around 20 percent in Chad and Central African Republic to almost 100 percent in Cote d'Ivoire, Gabon, Namibia, South Africa, and Zimbabwe. In addition, a handful of countries stand out as having reached significant levels of access to electricity (5–15 percent) among the poorest quintile. They are Gabon (17 percent), Nigeria (10 percent), South Africa (10 percent), Ghana (8 percent), and Republic of Congo (5 percent).

Further analysis shows that in the vast majority of cases the distribution of infrastructure access is subject to even greater inequality than the distribution of income, and hence contributes to exacerbating inequalities in society as a whole (Diallo and Wodon, 2005). Furthermore, analysis of the distribution of new connections that have resulted from service expansion in recent years shows that these are also more inequitably distributed than income. It appears, therefore, that the benefits of access and access expansion tend to accrue to the better-off., tending to exacerbate inequalities This may be because current access rates remain low even among the wealthier segments of the population, so that this is where utilities initially concentrate their expansion efforts.

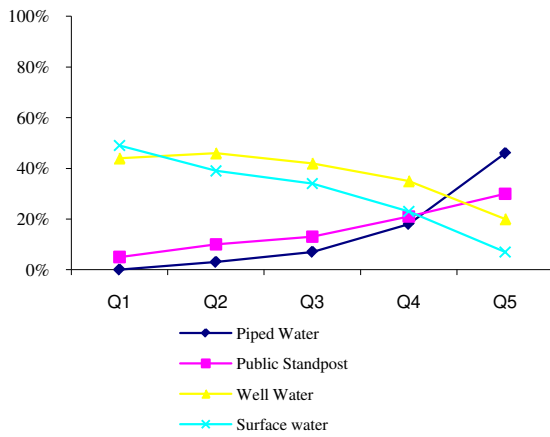
The data on infrastructure coverage poses the challenge of designing home-grown solutions that can work in Africa in order to improve access much faster than is currently the case. To identify such solutions, we must first understand the interplay of supply and demand as they relate to infrastructure services. In many cases, networks are limited, denying access to many. But even if they are expanded, how many people can afford to pay for service? And if they cannot pay, how can network services be expanded without recourse to investment and consumption subsidies? In the meantime, what second-best solutions might exist between the unacceptable status quo and the distant goal of universal coverage? Should service levels and quality be seen as a continuum from which households might choose based on their means? We tackle these questions in the rest of the report.

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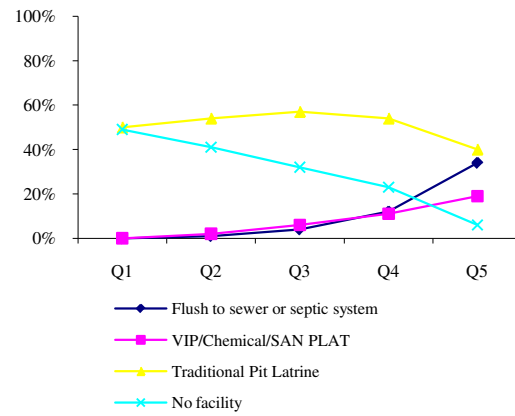
Figure 1.2 Infrastructure coverage and income

Population-weighted average, percent, latest available year

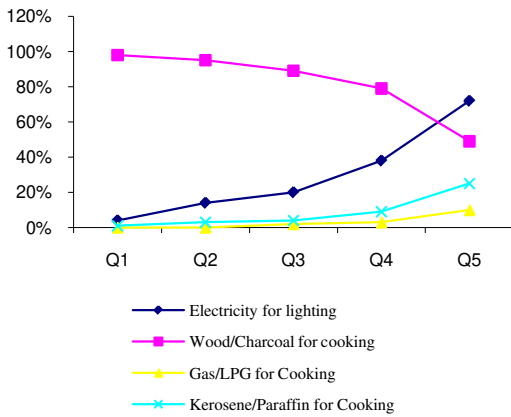
(a) Water supply



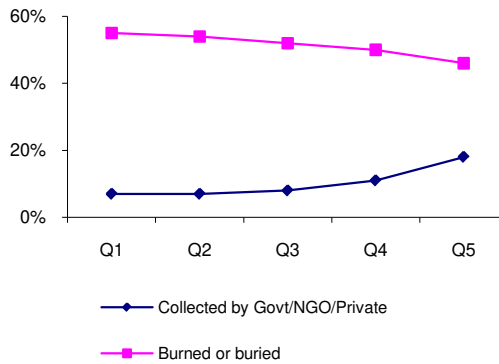
(b) Sanitation



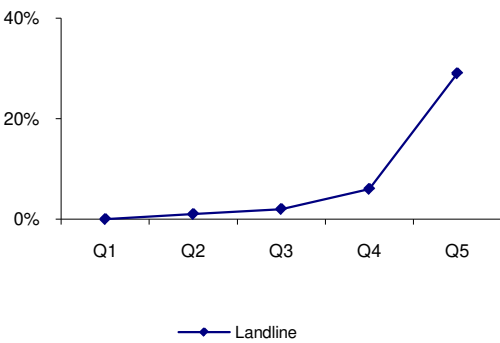
(c) Energy



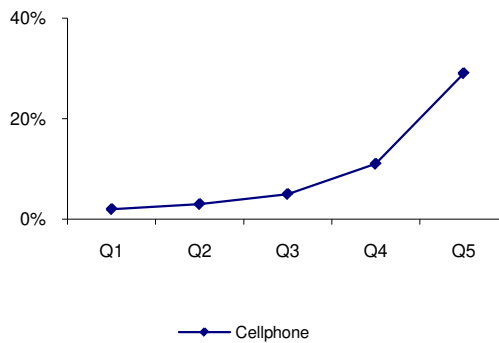
(d) Refuse collection



(e) Landline telephone



(f) Cellular telephone



Note: The numbers underlying these graphics can be found in the cross-country annex.

Source: AICD DHS/MICS Survey Database, 2007, AICD Expenditure Survey Database, 2007.

2 Building a continental database

Household surveys have long been used to explore poverty, inequality, and the welfare of vulnerable groups. Their use in understanding access to and affordability of infrastructure is more recent but already essential. Household surveys are the only quantitative instrument that can establish relationships between the use of infrastructure services (nuanced with socioeconomic variables) and government subsidy policies (Lobo, Foster, and Halpern 2000). The inclusion of several infrastructure-related questions in the recent Demographic and Health Survey (DHS) series, conducted by the MeasureDHS Program of MACRO International in the least developed countries, is a significant boost to understanding access and use of services. With support from the World Bank and other international agencies, other income/expenditure surveys have been undertaken in the past decade that allow investigators to study patterns of household spending on infrastructure services. Although the coverage of the infrastructure sectors in these surveys is not always as comprehensive as might be wished, the scope and depth of coverage of infrastructure issues has gradually improved over time and by now represents a substantial body of knowledge—as reflected in this report.

There have been previous attempts to use household surveys to understand access trends and affordability patterns for infrastructure from a cross-country perspective, particularly in Latin America and Eastern Europe. A global infrastructure study by Komives, Whittington, and Wu (1999) was one of the first attempts to use the World Bank’s living standards measurement surveys (LSMS) for 15 countries to present access trends and to evaluate the relationship between access to infrastructure and household income. Only three countries from Sub-Saharan Africa were represented in the study, however. A more recent evaluation by Estache and Wodon (2007) presents evidence on infrastructure and access and affordability trends for 10 African countries. Building on these earlier efforts, this study presents a more comprehensive picture of access and spending on infrastructure in Africa.

To document access, we created a cross-national meta-database based on the DHSs and Multi-Indicator Cluster Surveys (MICS). The new database is called the AICD DHS/MICS Survey Database and is referred to throughout this report. The DHSs collect comparable information across countries on health, HIV, and nutrition. Because they are conducted every few years, it is possible to track similar indicators over time. Thirty countries in Africa have had at least one DHS conducted since 1990; 22 are covered by at least two DHS data points between 1990 and 2005. Togo, the Central African Republic, Comoros, the Republic of Congo, Gabon, and Lesotho are among those countries with only one data point during this period. In a few countries such as the Democratic Republic of the Congo, Lesotho, and Sudan where data is not available at all or only for a year, we use MICS as a substitute. Implemented by UNICEF, MICS was designed to report on the health of women and children. These surveys are closer to DHS than other survey series with respect to sampling strategy but it only covers WSS questions. Nevertheless, because of problems of comparability, we have used MICS results sparingly (annex table A1.1.1).

The DHSs implemented in Africa since 1990 make it possible to analyze the following service categories: water supply, sanitation, electricity, fuels for cooking, and landlines. The DHSs are conducted in phases; there have been five phases since 1990. New questions are added in each phase, and the

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questions posed in each phase are relatively well harmonized across surveys. Questions on water supply, sanitation, and cooking fuels are available since 1990, while questions on electricity, rubbish disposal, and cell phones are more recent. In fact, even now, only five countries in the sample include questions on cell phone use. This makes it difficult to track improvements over time in cell phone use. The poor coverage of infrastructure modules in the DHS is not surprising, as the objective of the surveys is to gather information on infrastructure that has *direct* relevance to health and nutrition.

The DHSs do not collect any household income or spending information. So to establish a correlation between access to infrastructure and income, we had to construct a household welfare measure. Given the high correlation between income and ownership of assets, such a measure can be assembled using information on ownership of assets. One problem is that the asset variables available for the construction of an index vary across countries and time periods. Thus, an asset index that was completely consistent would have to ignore data available for a significant number of surveys. Following Diallo and Wodon (2005), the asset index is constructed using principal components analysis based on the maximum amount of asset information available for each country. Typically, these variables are housing attributes and use of water, electricity, and other infrastructure.⁷ Using the asset index, we created ranges of assets owned and asset quintiles.

To document the affordability of infrastructure we used expenditure surveys. Known by different names in different countries (annex table A1.1.2), these surveys are carried out by country governments to reflect local nuances and priorities. Therefore their infrastructure modules often are not harmonized or comparable. Nevertheless, these surveys, most modeled after the LSMS, provide a wealth of information on use of and payment for infrastructure services, in addition to providing data on assets and expenditure patterns of households. These surveys contain information on coverage of rubbish disposal and cell phone services for a higher number of countries than the DHS. For this purpose, the expenditure surveys are the primary source of information for understanding rubbish disposal and cell phone use in Africa. They make it possible to draw inferences about spending patterns and the affordability of infrastructure for people at different income levels. We mined expenditure surveys for 30 African countries covering the period between 1997 and 2005. The resulting database is called the AICD Expenditure Survey Database and is referred to throughout this report.

Together, the two databases—the AICD DHS/MICS Survey Database and the AICD Expenditure Survey Database—cover household surveys from 39 African countries, of which Gabon and South Africa are upper-middle-income; Angola, Cameroon, Cape Verde, the Republic of Congo, Lesotho, Morocco, and Namibia are lower-middle-income; and the rest are low-income. All the countries included in the databases are in Sub-Saharan Africa, except that the AICD Expenditure Survey Database also covers Morocco. The combined sample size of the pooled data is between 91,823 households in the early 1990s and 206,625 households in the early 2000s for the DHS/MICS Survey Database, while for the Expenditure Survey Database the total size of the combined sample is 267,711 households. Summary characteristics for the households surveyed can be found in annex table A1.1.3.

⁷ The asset index constructed for this report includes the following variables (the available variables differ by country): source of drinking water, type of toilet facility, type of main floor material, has electricity, has radio, has TV, has refrigerator, has bicycle, has car/motorcycle, has livestock, has farmland/other land, number of persons sleeping per room, has car/truck, has telephone, type of cooking fuel, has bed net for sleeping, shares toilet with other households/individuals, time to reach water source.

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The coverage figures reported throughout this report are population weighted. In other words, they report population's coverage of any specific infrastructure service. The expenditure figures are household weighted because infrastructure payments are usually made at the household level.

Two methods are used to adequately understand the pan-African coverage of infrastructure services: population-weighted averages and averages based on purchasing power parity (PPP). The pan-African coverage figures using the former method has been primarily reported in this report.

- *Population-weighted averages.* Average coverage for each service, by location and quintile, is weighted by the population of that category in the survey year. The drawback of this approach is that it assumes that the poorest quintile in one country is the same as in another. The advantage is that each country gets as much weight as its population and is adequately representative.
- *PPP averages.* We transformed reported expenditures into PPP terms⁸ using 2002 dollars to ensure comparability among different surveys and to present a pooled pan-African picture. The PPP figures were computed by converting expenditures in local currency units (LCU) into 2002 LCUs using the local consumer price index (CPI). Thereafter, the 2002 LCUs were transformed into 2002 international dollars using the PPP conversion factor available in World Development Indicators (World Bank 2007). In this way, all Africans could be divided into five income quintiles. In practice, this means that all households in South Africa can fall into the richer pan-African quintiles, while all those in Niger can fall into the poorer pan-African quintiles.

Self-reported data can present problems. Data on infrastructure spending can be fraught with inaccuracies, as the data are self-reported by the surveyed households. The questions are based on actual payments, rather than billed amounts, and it is difficult to distinguish between arrears and current payments. Furthermore, the surveys do not ask questions on metering, so it cannot be known if the household's payments are based on its consumption or on some other form of assessment based on property values, number of rooms, or diameter of pipe. The wording of the survey questions can also be confusing. The survey may ask respondents to declare the payment they made "last month," even though payments are not due monthly in many cases. Merging household data with utility data could provide a comprehensive picture of consumption and spending dynamics among different consumer groups. But we did not attempt to do this here since our study covers too many countries and survey years. In addition, the common field to merge the two datasets is usually the address of the household, which is often not very well documented in Africa. Therefore, merging utility data with household data is not common in researching infrastructure in Africa, although it is prevalent in other regions (Lampietti et al, 2007).

To achieve comparability of different surveys across different time periods, variables had to be aggregated. The infrastructure categories used in the DHSs and expenditure surveys vary widely. Our solution was to standardize the infrastructure and socioeconomic variables relevant to this study into

⁸ The reference year has been selected as 2002. The reason for this selection is manifold. It is necessary that the reference year be a year with maximum number of surveys yet is close to the present day. There are 5 surveys each for 2000 and 2002 and finally, 2002 was selected as the reference year as it is closer to the present year. In addition, it allows this exercise to be comparable to the inequality study in Africa recently undertaken by the World Bank (Milanovic, 2003). The income and expenditure variables in local currency units across different years and different countries were converted from local currency to U.S. dollars using the official exchange rate in the survey year and then adjusted to the year 2002 using US CPI figures. This made it possible to compare expenditure among countries.

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categories that allow comparison across surveys. Although many nuances are lost in the resulting aggregation, it is the only approach that allows cross-country comparability. The standard categories of the infrastructure variables (see annex table A1.1.4), were applied to both the DHSs and the expenditure surveys. While standardizing categories, we also used the disaggregated sources in WSS to compute access to improved and unimproved sources—an MDG indicator. “Access to safe drinking water” is defined in the MDG as the “percentage of the population using improved sources” and is monitored by the JMP, using household survey data. However, infrastructure categories are added and changed in each survey phase, which makes it difficult to track the same category over time. Therefore, in addition to the improved/unimproved categorization adopted in the JMP, this study proposes a categorization based on modern, intermediate, and basic service options (Komives, Whittington, and Wu 1999).

Table 2.1 Definition of access and standardized categories of infrastructure services

<i>Main source of water supply</i>	JMP category	AICD category 1	AICD category 2
Piped water into dwelling or yard	Improved	Improved	Modern
Public tap or communal standpipe	Improved	Improved	Intermediate
Wells or boreholes, hand pumps, or rainwater	Improved/Unimproved	Unimproved	Intermediate
Surface water (e.g. lake, river, pond, dam, spring)	Unimproved	Unimproved	Basic
Vendors or tanker trucks	Unimproved	Unimproved	Basic
Others (e.g., bottled water)	Unimproved	Unimproved	Basic
<i>Main source of lighting/cooking</i>			
Electricity			Modern
LPG or natural gas			Modern
Kerosene or paraffin or petrol or oil			Intermediate
Wood or charcoal			Basic
Crop residue or animal dung or leaves			Basic
Other			Basic
<i>Toilet facility</i>			
Flush toilet to network or septic tank	Improved	Improved	Modern
VIP latrine, San Plat, or chemical toilet	Improved	Improved	Intermediate
Traditional pit latrine	Improved/Unimproved	Unimproved	Intermediate
Bucket or other container	Unimproved	Unimproved	Basic
Other	Unimproved	Unimproved	Basic
No facility, nature, or bush	Unimproved	Unimproved	Basic
<i>Rubbish disposal</i>			
Collected from rubbish bin by government, private firm, or NGO			Modern
Rubbish pit			Intermediate
Rubbish heap			Intermediate
Thrown away, burned, buried, or dumped			Basic
Other			Basic

Source: JMP 2006 and authors.

The findings presented here are broadly consistent with those of JMP, although they are based on a different aggregation method. There is no reason to expect our results to coincide with the trends in progress toward the Millennium Development Goals reported by the JMP because the methodology underlying the two sets of numbers differs significantly (table 2.1). First, the JMP statistics include all

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African countries, whereas only a subset is covered here. Second, the JMP statistics are based on a survey of surveys (including assessment questionnaires sent to UNICEF field representatives), whereas our results are based solely on DHS data. Third, JMP statistics apply some standardized parameters in order to be able to separate protected and unprotected wells/boreholes to estimate 'improved water', and to determine to what extent traditional pit latrines can be considered 'improved sanitation'. Our analysis reports only what can be directly supported from the DHS data. Owing to these methodological differences, there is no reason for JMP and AICD figures to be exactly the same, however, they should not be too far apart either particularly in piped supply. For instance, the urban and rural access to piped water is reported to be 40 percent and 4 percent respectively in JMP; the corresponding numbers in this study 39 percent and 4 percent. A detailed comparison of both sets of estimates can be found in annex table A.1.1.5.

Information on the quality of service provision is negligible. In Eastern Europe and Central Asia, household surveys in some countries report the quality of service delivery. Elsewhere, however, surveys tell us whether services are available and affordable, but not whether they are reliable or responsive to consumer needs. Sometimes, spending patterns reflect reliability problems. For example, households and businesses incur tremendous losses from unreliable and infrequent electrical service, often obliging them to spend funds for alternative sources of energy. Or households connected to piped water supply may receive water for just a few hours a day, forcing them to spend on alternatives. Such information, where available, has significant policy implications.

3 Reaching the goal of universal access to services

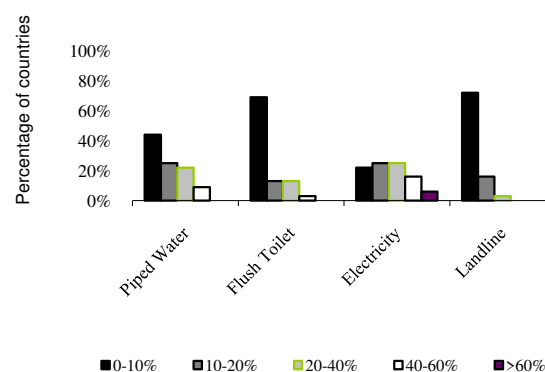
The introductory section highlighted the overall patterns of access to modern infrastructure services in Africa, including the low levels of service coverage to be found on the continent, as well as the large divergence between urban and rural access rates and across the socioeconomic spectrum. A key finding of that section was the relatively stagnant trend in access expansion; particularly since the year 2000. This section looks beyond the aggregate regional trend to uncover the diversity of experiences across different African countries and examines what this can tell us about the feasibility of attaining universal service coverage on the continent. *The detailed country-by-country numbers underlying the analysis presented here can be found in Part II of the Cross-Country Annex Volume. The overall profile for each country can be found in the Country Annex Volume.*

Making sense of the dispersion in current access levels

The broad continental trends reported in chapter 1 do not adequately convey the dispersion of experiences that exists across Africa. Figure 3.1 illustrates that the vast majority of countries have coverage rates of less than 10 percent for piped water, flush toilets, and telephone landlines. However, with respect to electricity, there is a much wider variation of coverage levels across the whole range from 0 to 100 percent; even if the modal coverage lies in the 10 to 40 percent range. What might explain this divergence of coverage across countries?

It is known that coverage of modern infrastructure services is strongly correlated with income and urbanization. Higher incomes make services more affordable, while the greater population densities associated with urbanization help to reduce the cost of expanding services. Most of the countries in the sample are low-income countries with GDP per capita below US\$1,000 per year. However, there are also a number of middle-income countries, including 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—with the average around 35 percent.

Figure 3.1 Dispersion in current access levels across Africa



Source: AICD DHS/MICS Survey Database.

As illustrated in table 3.1 below, this pattern is clearly visible across Africa. Access to electricity is twice as high in middle income countries as in low income countries, while for landlines the rate is three times as high, and for piped water and flush toilets the difference is four times. However, there are important exceptions to this general pattern. For example, countries such as Nigeria, Uganda, and Tanzania have a relatively high income but low infrastructure coverage, whereas countries such as Zambia and Zimbabwe have a relatively low income but relatively high infrastructure coverage. With

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respect to urbanization, coverage rates for all services are two to three times as high in countries with high levels of urbanization as those with low levels of urbanization.

Table 3.1 Patterns of access to modern infrastructure services

Latest available year		Population weighted	Total	Rural	Urban	Q1	Q2	Q3	Q4	Q5
Piped water	By country income									
	Middle	44	17	69	2	16	47	69	86	
	Low	11	3	32	0	1	3	13	41	
	By urbanization level									
	Low	7	2	33	0	0	1	5	31	
	Medium	17	4	42	0	2	3	20	64	
High	21	7	39	1	6	17	32	49		
Flush toilet	By country income									
	Middle	33	4	58	0	2	22	61	78	
	Low	7	2	22	0	1	2	6	29	
	By urbanization level									
	Low	3	1	13	0	0	1	2	13	
	Medium	7	1	19	0	1	1	7	27	
High	19	5	38	0	1	9	25	61		
Electricity	By country income									
	Middle	55	27	81	7	28	59	86	97	
	Low	26	11	69	3	12	15	32	68	
	By urbanization level									
	Low	11	3	56	0	0	1	4	52	
	Medium	15	3	48	0	1	2	11	60	
High	52	30	83	8	32	45	79	94		
Landline telephones	By country income									
	Middle	19	4	32	0	1	6	28	59	
	Low	6	2	17	0	1	1	3	25	
	By urbanization level									
	Low	5	2	24	0	0	1	2	24	
	Medium	6	1	18	0	0	1	4	25	
High	10	2	19	0	1	3	11	34		

Source: AICD DHS/MICS Survey Database, 2007.

Not only do these patterns hold overall, but they also hold across urban and rural service segments, and across the different quintiles of the distribution of expenditure. Thus, in more highly urbanized countries even the rural population is substantially better off in terms of coverage. Nevertheless, even in middle income and urbanized countries the benefits in terms of access are largely confined to the top three quintiles of the distribution, with the bottom two quintiles seeing relatively little benefit.

Even within higher and lower income or urbanization groups, there is still significant variance in coverage. The existence of outliers within each respective income and urbanization category suggests that

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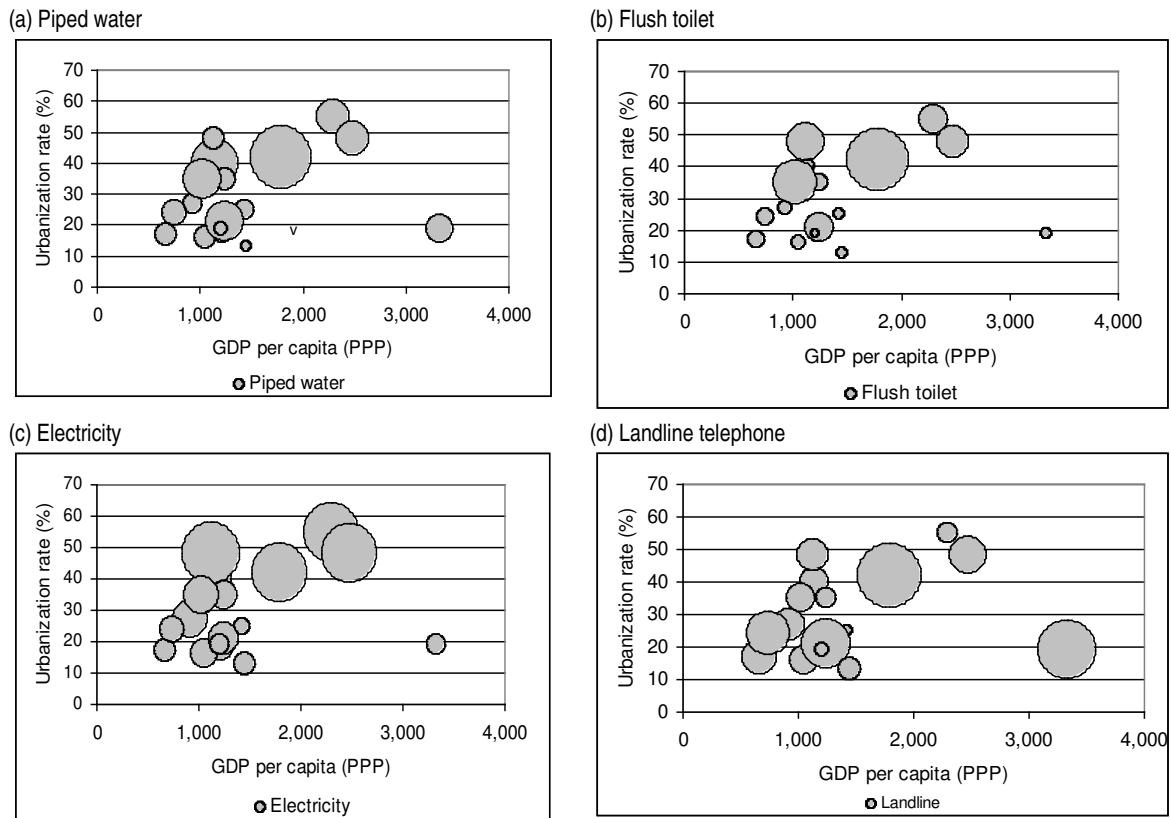
other factors (for example, linked to the organization of the sector) may also be exerting an influence that leads a country to over or under-perform relative to its peer group.

To make this visible, in figure 3.2 countries are ordered according to income level and urbanization and the size of the bubble represents the coverage rate for the different infrastructure services. As might be expected, there is a strong correlation between income and urbanization with most countries lining-up along a 45 degree line. The one exception is Lesotho, which has a much higher level of income than is typical for countries at similarly low rates of urbanization. Given the strong correlation between income, urbanization and service coverage, one would generally expect countries in the southwest quadrant of the graph to have smaller bubbles than countries in the northeast quadrant of the graphs. Countries that do not follow this trend are worthy of note and can thus be identified as outliers that are doing comparatively well (or poorly) in access terms given their level of income and urbanization.

Some interesting patterns emerge from these figures. Cameroon and Ghana are the two highest income and most urbanized countries in the sample at the far northeast of the graphs. These countries present relatively small levels of coverage (bubbles) for piped water, flush toilets and landlines, suggesting under-performance with respect to these services. Nevertheless, for electricity their coverage rates are close to what might be expected. Occupying a central position in the graph, Senegal stands out as having levels of coverage that are relatively high and compare favorably with those 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 coverage relative to comparable peers for all services except electricity. Immediately underneath, Benin stands out as being a strong performer on piped water access, though its performance on other services is less remarkable. Immediately beneath again, Zambia performs reasonably well on access to piped water and flush toilet, but its performance on access to electricity and landlines is more lack-luster.

Turning to the southwestern quadrant of the graphs, Kenya stands out as being consistently the strongest performer in this group, with coverage levels substantially above its close peers across all the services. Otherwise, the countries in the southwestern quadrant perform uniformly poorly with respect to piped water and flush toilet coverage. However, with respect to electricity, countries such as Ethiopia and Madagascar do relatively well given their low income and urbanization levels. The same can be said for countries such as Ethiopia, Malawi and Tanzania with respect to their level of landline coverage. Mali also performs relatively well on water, sanitation and electricity. Occupying an isolated position in the southeast quadrant, Lesotho performs poorly for its income level on coverage of all services, with the notable exception of landline telephones.

Figure 3.2 Dispersion of coverage rates by urbanization and income categories



Source: AICD DHS/MICS Survey Database, 2007.

How far away is universal access?

Beyond this static picture of where things stand today, it is relevant to ask how rapidly different countries are moving towards the ultimate goal of universal access to modern infrastructure services. Once again, there is a wide dispersion, both across countries and services.

The overall average annual growth rates of population covered by the different services across the continent is 5 percent for electricity, 1 percent for piped water, 7 percent for flush toilet, and 12 percent for landline telephones during the period 1996–2005 (figure 3.3)

It is striking that for piped water and flush toilets, around a quarter of countries do not show any evidence of positive growth, while a further third of the countries report modest growth rates of 0–4 percent per year. The strongest performers in terms of service expansion are Benin, Burkina Faso, Chad, Ethiopia, Mali and Senegal, all showing growth rates of 4–8 percent per year. A significant minority of countries are expanding flush toilet service at a rate in excess of 12 percent per annum. These are in fact a subset of those countries that are performing well with respect to piped water service expansion: Burkina Faso, Chad, Ethiopia and Mali. However, this growth is taking place from a very tiny base, and hence does not amount to a great deal in absolute terms.

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The rate of expansion of electricity services is somewhat more encouraging, with almost half of the countries reporting average annual growth rates in the 4-8 percent bracket. The names of the fast expanding countries, once again, shows considerable overlap with that of the countries registering rapid expansion of piped water service: Benin, Burkina Faso, Chad, Lesotho, Madagascar, Mali, Senegal and Tanzania.

The most rapid rates of coverage expansion are for landline service, where about half of the countries are expanding at over 12 percent per year, albeit from a very low base. The list of high performing countries is somewhat different in this case: Ethiopia, Ghana, Guinea, Kenya, Madagascar and Mali. The household surveys do not yet provide a time series for cellular telephones; however it is known from sector statistics that the rate of expansion for that service is even very much higher than for landlines.

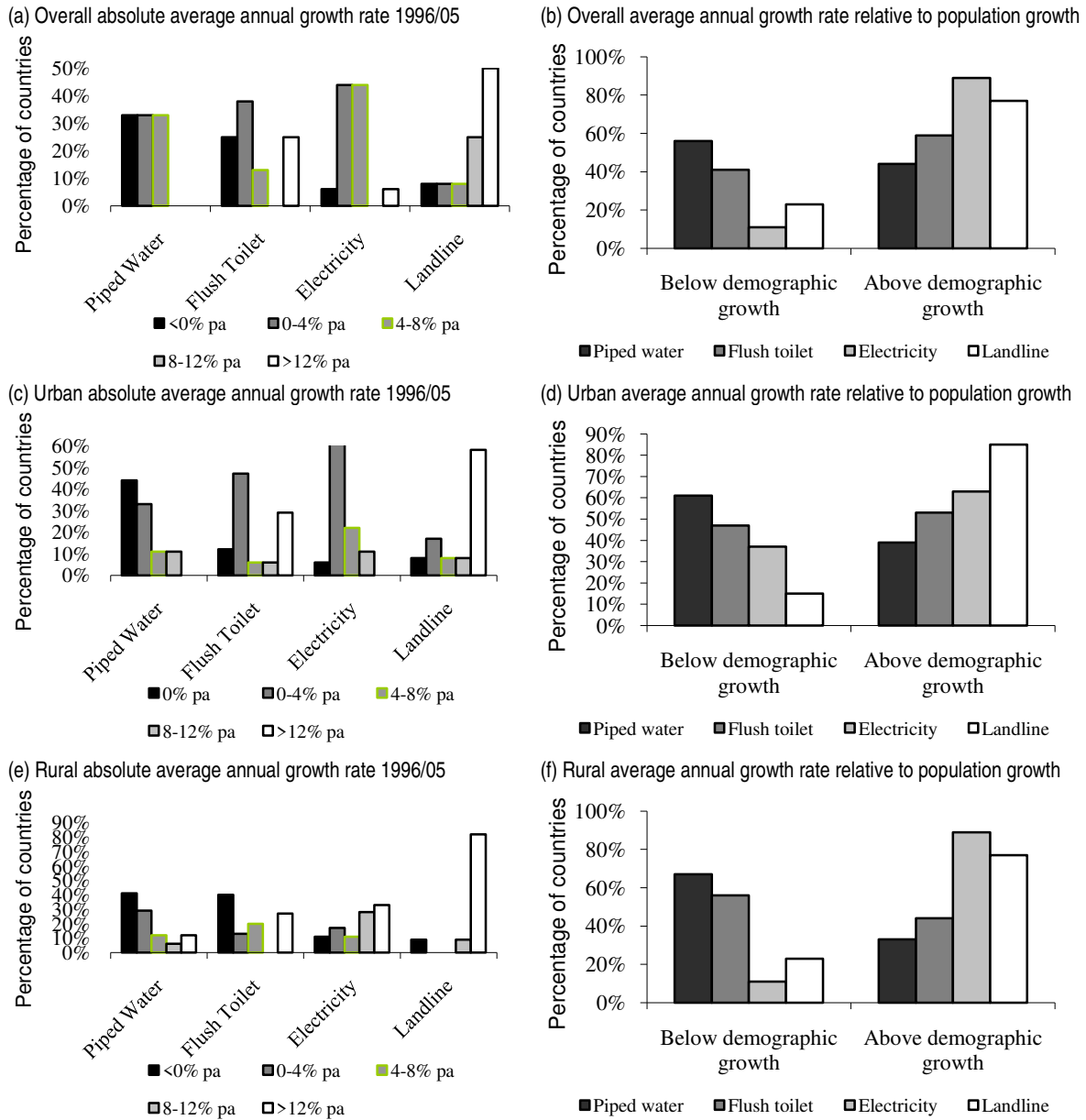
Considering expansion trends in urban and rural areas separately, overall we find that service expansion in urban areas has been proceeding at a slower rate than for rural areas (figure 3.3c through 3.3f). Specifically, for urban areas, the overall average annual growth rates of population covered by the different services is 3 percent for electricity, 2 percent for piped water, 5 percent for flush toilet, and 11 percent for landline telephones during the period 1996-2005. The equivalent figures for rural areas are 9 percent for electricity, 3 percent for piped water, 10 percent for flush toilet, and 19 percent for landline telephones.

The strongest performers on service expansion in urban areas are Burkina Faso, Chad, Ethiopia and Mali for piped water, Burkina Faso, Chad, Ethiopia, Mali, and Senegal for flush toilets, and Benin, Chad, Mali, Tanzania for electricity. The strongest performers on service expansion in rural areas are Benin, Ethiopia, Mali, and Senegal for piped water, Burkina Faso, Guinea, Mali and Senegal for flush toilets, and Burkina Faso, Madagascar, Ethiopia, Mali for electricity.

Overall, a significant percentage of the African countries surveyed are failing to ensure that service expansion keeps pace with population growth, and hence will get gradually *further* away from universal access until this trend can be reversed. The situation is most acute with respect to piped water and flush toilet, where close to half of the countries are expanding too slowly to keep pace with demographic growth. For electricity and landline telephones, on the other hand, around 80 percent of the countries are managing to expand coverage faster than they are expanding population. One country that stands out as falling behind demographic growth in expansion of all its modern infrastructure services is Zambia, which reports a negative growth rate for piped water, flush toilet and less than one percent growth in electricity.

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Figure 3.3 Frequency distribution of average annual growth rates in service coverage



Source: AICD DHS/MICS Survey Database, 2007.

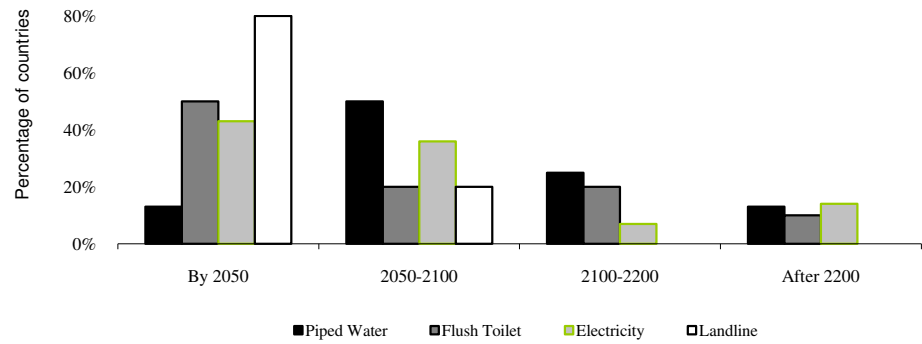
On this basis it is possible to project the year in which each country would reach universal access for each of the modern infrastructure services, based on the assumption of continued expansion at ‘business as usual’ rates (figure 3.4). The projections indicate that under ‘business as usual’ conditions fewer than 20 percent of countries would reach universal access for piped water by 2050, while fewer than 45 percent of countries would reach universal access to electricity by the same year. However, in approximately one third of the African countries surveyed, universal service for piped water and flush toilets (if historic trends continue) would not be reached during the current century.

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The projections for flush toilet and landlines are less credible in the sense that both services are currently experiencing very high growth rates from very low base levels, and these growth rates are bound to slow down as penetration increases, particularly given the high cost of these services relative to the purchasing power of the population.

Even so, this analysis is probably overly optimistic in that it fails to take into account an additional trend that is further complicating the achievement of universal access for network infrastructure services: namely that of shrinking households.

Figure 3.4 Estimated year of universal coverage under business as usual



Source: AICD DHS/MICS Survey Database, 2007.

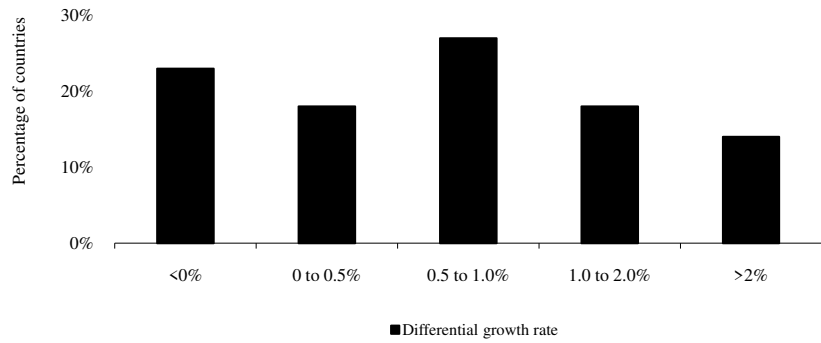
In addition to population growth, decreasing household size frustrates coverage expansion. The average African household appears to be getting smaller as incomes rise. At work here is urbanization, declines in fertility, and greater economic resources, which allow nuclear families to disengage from extended households, because they no longer need the economies of scale provided by larger households. Because shrinking household size exerts such a strong effect on the need for new connections, countries with higher GDP per capita may not necessarily expect a smaller increase in connection needs than poorer countries, because the gains from lower population growth are more than offset by the changes in household sizes.

For the African sample as a whole, the average rate of population growth is 2.5 percent, and the average increase in the number of households is 3.2 percent, so that the impact of 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). The full results are reported in annex table A1.1.6. In a few countries, household size has increased. Typically this occurs during hard times, as households combine forces to cope with deterioration in their living conditions. But these are exceptions. In most cases, household size has decreased between surveys. In Benin, for example, the average household size decreased from 6.0 in 1996 to 5.2 in 2001. Nevertheless, there is a wide cross-country dispersion in the relative growth rates of population versus the number of households (figure 3.5)

Figure 3.5 Difference between average annual growth rate in number of households versus population

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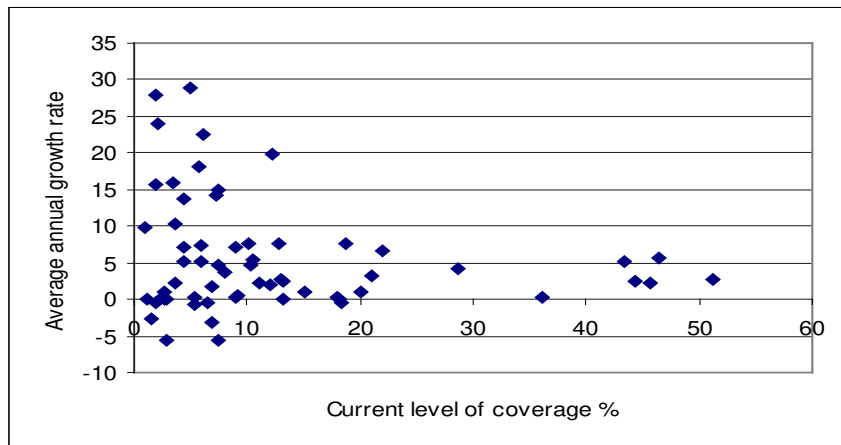
Finally, it is relevant to examine to what extent coverage is converging across the different countries within Africa. If convergence is taking place, then one would expect to see countries with the lowest coverage rates experiencing the fastest rate of average annual growth in connections. If on the other hand, those countries with the highest coverage rates are also experiencing the fastest rate of average annual growth in connections, then the gap between the strongest and weakest performers will only get larger over time.



Source: AICD DHS/MICS Survey Database, 2007.

Figure 3.6 presents the evidence by pooling data on current coverage levels and recent average annual growth rates across all countries and services. The figure illustrates that there is a small cluster of countries with low current access but high average annual growth rates, and these relate largely to flush toilet services in countries such as Chad, Ethiopia, and Mali. Similarly, there

Figure 3.6 Relationship between current coverage levels and rate of coverage growth (all services pooled)



Source: AICD DHS/MICS Survey Database, 2007.

is a second small cluster of countries with high current access and relatively low average annual growth rates, and these relate primarily to electricity in countries such as Cameroon, Ghana, Nigeria, and Senegal. Otherwise, the highest concentration of points can be found in the bottom left-hand corner of the graph, indicating a preponderance of countries in a stagnant situation, with both low current access rates and low average annual growth rates. There is thus no systematic evidence of convergence. For a more detailed analysis of the convergence issue, see box 3.1.

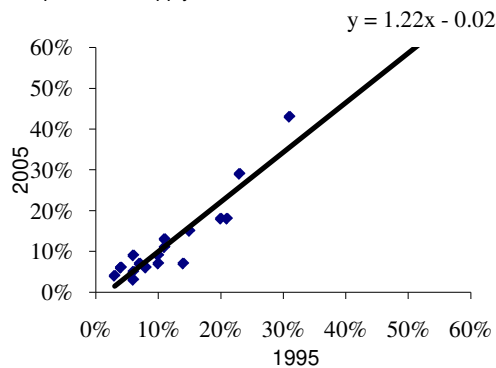
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Box 3.1 Evolution of access to services, 1995–2005

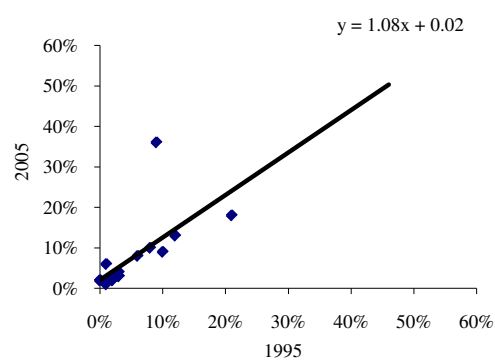
By plotting rates of access in 1995–2000 against 2001–05, it is possible to visualize the rate of access expansion across countries and sectors. Those countries above the 45 degree line have made significant strides in access across this period, while those on the line itself have had only stagnant coverage. In general, one might expect convergence of access rates among countries with those starting from low levels of access experiencing the highest levels of progress, and vice versa for countries starting with high levels of access. This would suggest that a regression line fitted to the data might be expected to have a positive intercept and a slope less than one. In practice, regression coefficients are slightly greater than one and intercepts are close to zero, suggesting that overall there has been a slight improvement but with no particular evidence of convergence trend across countries. However, more detailed analysis shows the intercept term for coverage of all the infrastructure services is higher for the urban population than for the rural, suggesting some degree of convergence between urban and rural coverage rates.

In the graphs that follow, the coverage rate circa 1995 is plotted on the horizontal access, and the coverage rate for the same service circa 2005 is plotted on the vertical access. Points that appear above the line are experiencing an increase in service coverage, while those that appear below the line are experiencing a reduction. Points on the line are maintaining a constant access rate over time.

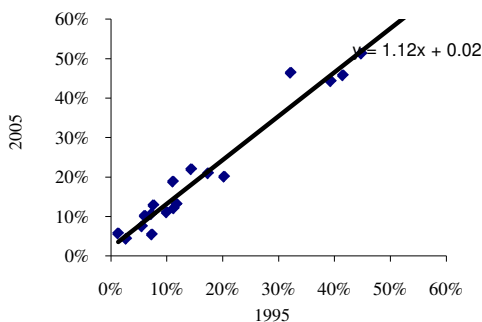
a. Piped water supply



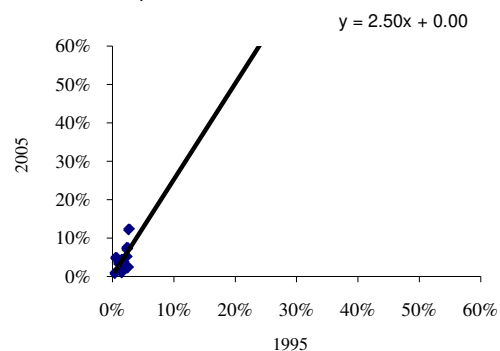
b. Flush toilet



c. Electricity



d. Landline telephone



What needs to be done to reach universal access?

The challenge of reaching universal access is typically understood as a supply-side problem of rolling out infrastructure networks to increasingly far flung populations, entailing major investments. However, Africa's relatively low coverage rates even in densely populated urban areas suggest that even where infrastructure is physically present, service coverage is by no means guaranteed. Part of the access deficit

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therefore also seems to be related to demand-side barriers that prevent households from hooking-up to the service, even when the networks may be passing right in front of their dwellings. Demand-side barriers can take a variety of forms including high connection charges that make hook-ups unaffordable, illegal tenure that disqualifies households from connecting, and a variety of other social and economic factors that may deter households from becoming utility clients.

Household survey 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 lacking access to infrastructure live in clusters where infrastructure is available indicated by the fact that some of their immediate neighbors are hooked-up to the service. 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 basic concepts used to analyze this issue are defined in box 3.2. The main novelty is that we decompose the traditional measure of household *coverage* into two components (as per Foster and Araujo, 2004 and Komives and others, 2006). The first, which we call *access*, gives 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 there could be an opportunity to connect. The second, which we call *hook-up*, gives the percentage of the population living in clusters where the service is available that actually make a connection, and hence take-up that opportunity. Using these two concepts it is possible to 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 further rollout takes place) versus a demand-side deficit (meaning that something other than distance from the network is preventing them from taking-up the service).

Box 3.2 Coverage, access, and hook-up rates: some 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

Hook-up rate = Number of households using the service / Number of households living in communities where service is available

Coverage = Access rate x hook-up 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 hook-up rate

Mixed demand and supply side gap = supply side gap x (100 – hook-up 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.

The policy conclusions in each case are very different, and hence the interest in making this distinction. The solution to a supply-side deficit is to make further investments to rollout the geographic reach of infrastructure networks. The solution to a demand-side deficit is to make policy changes that help to address potential barriers to service take-up, such as high connection charges or illegal tenure.

For various reasons, it could be questioned whether absolutely everyone in a geographic cluster with some coverage really has the opportunity to connect. First, although the geographic clusters are relatively

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small in urban areas, the distances may still be such as to prohibit connection. Second, even though the infrastructure is present, it 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, they may choose not to connect simply because they have an acceptable alternative (such as a borehole) rather than due to any demand-side barriers with the service itself.

Diallo and Wodon (2007b) use a statistical approach to try and correct for these problems. They simulate the maximum connection rate obtainable in any PSU based on that of the richest households in that PSU. If less than 100 percent of the richest households are connected, it suggests that something other than demand-side barriers is at work. Table 3.2 presents results for the demand-side deficit both with and without this statistical adjustment. The methodology is less applicable to rural areas because the PSUs tend to be larger and population densities much lower.

Table 3.2 Proportion of infrastructure coverage deficit in urban Africa attributable to demand- and supply-side factors

Percentage, population-weighted average		Decomposition of coverage			Proportion of deficit attributable to demand-side factors	
		(1) Access	(2) Hook-up	(1) x (2) Coverage	Unadjusted	Adjusted
Piped water	By country income level					
	Low	68	42	31	58	14
	Middle	91	74	69	61	36
	By urbanization level					
	Low	76	42	33	65	20
	Medium	76	56	46	63	8
High	71	49	34	55	45	
Electricity	By country income level					
	Low	93	73	69	82	50
	Middle	95	86	81	67	61
	By urbanization level					
	Low	87	60	53	75	15
	Medium	86	58	52	76	37
High	97	85	53	81	71	

Source: AICD DHS/MICS Survey Database, 2007.

Note: The data pertain to urban areas only.

The first point that emerges is that for piped water and electricity in urban areas of Africa *access* rates exceed *coverage* rates by between 20 to 40 percentage points. Indeed, access rates are as high as 70–90 percent; meaning that the vast majority of the urban population even in low-income countries lives in relatively close geographic proximity to existing water and electricity networks. The reason for this discrepancy is the comparatively low service hook-up rates. However, it is striking that hook-up rates for electricity at 60–90 percent are substantially higher than hook-up rates for piped water at 30–70 percent. Hook-up rates are significantly higher in middle income than in low income countries, particularly for the piped water service.

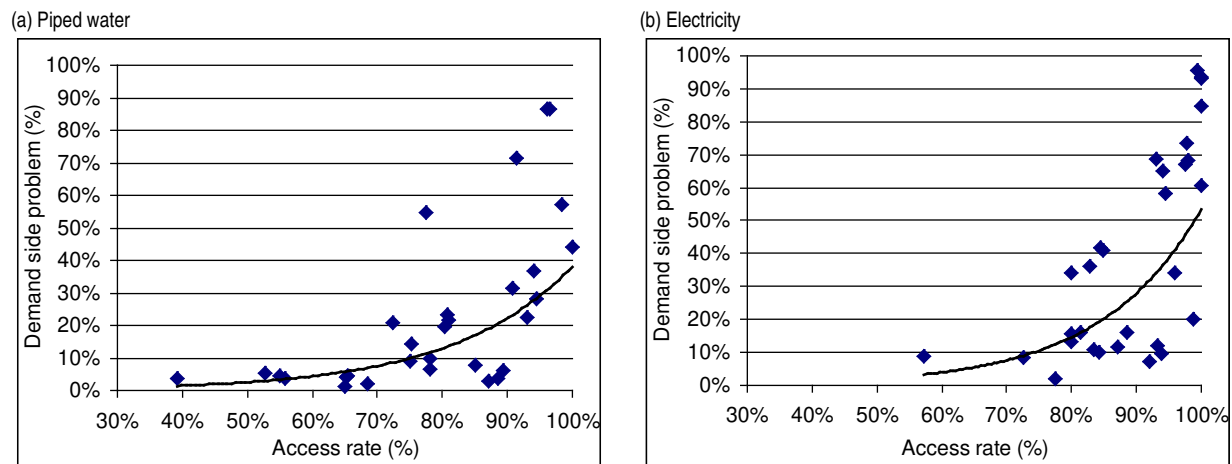
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As a result, the estimates of the proportion of the coverage deficit due to demand-side factors are large when no statistical adjustment is made (table 3.2). Demand-side factors account for 55-65 percent of the coverage deficit in piped water and 65-85 percent of the deficit in electricity. However, these estimates fall substantially when the above statistical adjustments are made. This is particularly true for piped water where the proportion of the coverage deficit due to demand-side factors falls to between 15-35 percent. In the case of electricity, around 50-60 percent is still due to demand-side factors even when the statistical adjustments are made. The level of the demand-side deficit for electricity rise steeply with the rate of urbanization from 15 percent in the low urbanization countries to over 70 percent in the high urbanization countries.

Examining the results at the country level, shows a very strong relationship between the level of access (that is the share of the population living in areas where the service is available) and the size of the demand-side deficit (figure 3.7). The relationship is even stronger for electricity than for piped water.

Overall, there is huge variation in the size of the adjusted demand-side deficit across countries (see cross-country annex tables A.2.14 and A.2.17 for more details). For piped water, the range is from less than 5 percent in countries such as Burkina, Central African Republic, Chad, Ethiopia, Mozambique, Rwanda, Tanzania, Uganda, to over 50 percent in countries such as Republic of Congo, Cote d'Ivoire, Gabon, Senegal and Zambia. In the case of electricity, the adjusted demand-side deficit ranges from less than 10 percent in countries such as Burkina Faso, Central African Republic, Chad, Niger, and Rwanda to more than 60 percent in Cameroon, Comoros, Republic of Congo, Cote d'Ivoire, Ghana, Namibia, Nigeria, and Senegal. Thus, the relative importance of supply and demand-side considerations in policy formulation for universal access needs should be sensitive to the situation in each specific country.

Figure 3.7 Country scatter-plot of demand-side deficit versus current access rates for electricity and piped water



Source: AICD DHS/MICS Survey Database, 2007.

In conclusion, this section has illustrated the diversity of infrastructure service coverage across different African countries. Overall, a strong association was found between infrastructure service coverage and the income and urbanization level of the country. Nevertheless, even controlling for income and urbanization, some countries stand out as having much higher (or lower) levels of coverage than

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might be expected, and these cases merit closer study with a view to identifying the causes of this over (or under) performance.

Based on historic trends, it is possible to project the time it would take to reach universal access under business as usual conditions. The results are sobering. Very few countries are expected to reach universal access in any service before 2050. In a number of countries, the coverage trend (particularly for water and sanitation) is actually negative in absolute terms or at least lower than the rate of population growth. Access to electricity is expanding more rapidly, with most countries outstripping demographic growth and a significant number expanding at 4-6 percent per annum.

Finally, in order to shed light on the kinds of interventions needed to speed-up the rate of access expansion, the unserved urban population is divided between those that live physically close to an infrastructure network (and hence could be reached through relatively low cost densification programs) versus those that are physically distant (and can only be reached by more costly network rollout). While the majority of the unserved can only be reached through further roll out of infrastructure networks, there is a substantial minority that have ready physical access to the service but face some kind of demand-side barrier. This is truer to a greater extent for electricity than it is for piped water. Moreover, in some of the middle income and better-off low income countries, a majority of unserved urban customers appear to be reachable through relatively low cost (but policy-intensive) measures on the demand-side.

The finding that a significant share of the unserved population in urban areas live close to infrastructure networks, suggests that affordability may be an important barrier to service uptake. This is the topic of the next section.

4 Keeping services affordable

We have established that coverage of network infrastructure in Africa is very low. But to improve the situation, it is essential to know why. One possibility is that coverage is low because network services are not available. Another is that services are available but not affordable. Still another is that services are both available and affordable but not taken up because alternatives are preferred.

This section addresses the issue of affordability in greater depth. Stipulating tariff levels high enough to allow providers of infrastructure services to recover their costs (and thus to justify investments in expanded networks), we ask what share of the population would be able to afford those payments. Moreover, in the case that a significant share of the population cannot afford the service, we ask whether the state can afford to subsidize them, and whether it has effective means at its disposal for doing so.

The detailed country-by-country numbers underlying the analysis presented here can be found in Part 3 of the Cross-Country Annex Volume. The overall profile for each country can be found in the Country Annex Volume.

African household budgets

Most African households live on very modest budgets and spend more than half of their resources on food. The average African household survives on no more than \$180 per month; urban households are about \$100 per month better off than rural households (table 4.1). Household budgets range from around US\$50 per month in the lowest quintile to no more than \$400 per month in the highest income quintile; except in middle-income countries, where the richest quintile has between \$200 and \$1,300 per month.

Table 4.1 Monthly household budget

	Total household budget (2002 US\$)								Food expenditure as a share of total household budget (percent)							
	Nat'l	Rural	Urban	Q1	Q2	Q3	Q4	Q5	Nat'l	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: AICD Expenditure Survey Database, 2007.

The total budget envelope is important in understanding the ability of African households to pay for infrastructure. Around the monthly average household expenditure of \$180, the national budget envelope on the continent ranges from \$57 in Ethiopia to \$539 in South Africa (2002 US\$). The monthly budget of the poorest quintile ranges between \$18 per household in Burundi and \$160 in Morocco. The poorest quintile has a median budget of about \$50; that of the richest is about \$240, drawn upward by South Africa and Morocco. Nevertheless, although the amount available for each household to spend is very small, the aggregate size of the low-income market is an estimated \$429 billion each year. The water and energy spending of the poorest 250 million Africans are estimated at \$2.5 billion and \$12 billion per year respectively (Hammond and others, 2007).

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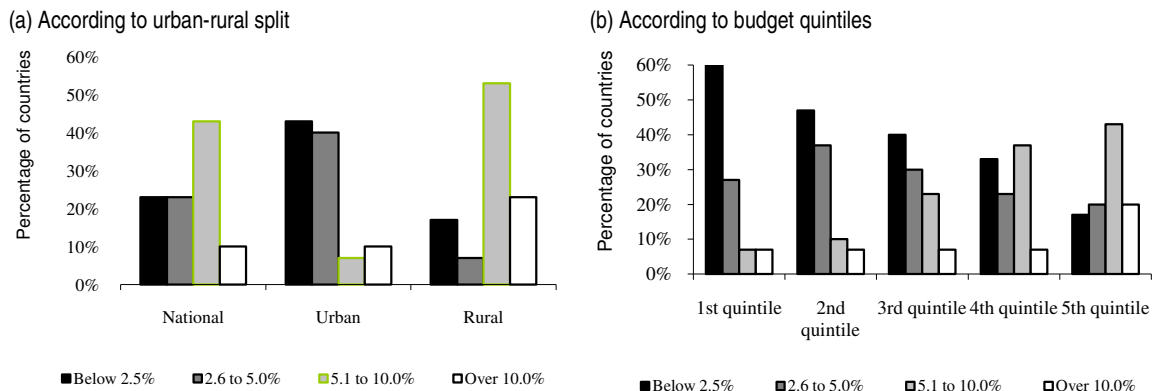
On average, Africans spend more than half of their household budget on food; not much is left over for anything else—including infrastructure. Even the most affluent households spend about half of their monthly budget on food; whereas the bottom four quintiles all devote around 60 percent of their budgets to food. The share of food in total household expenditure ranges from 28 percent in the Republic of Congo to 72 percent in Burundi. Households in Cameroon, the Democratic Republic of Congo, Madagascar, Niger, Sao Tome and Principe, Tanzania and Zambia spend more than 60 percent of their budget on food. In the poorest quintile, less than one-third of the budget is left over for nonfood items in Zambia, Sao Tome and Principe, Rwanda, Madagascar, Kenya, the Democratic Republic of Congo, and Burundi.

Data on payment patterns for infrastructure services are often noisy and unreliable, and it is difficult to distinguish between no payment, missing payments, and no information on payment. In this study, only those households that reported access to the four network infrastructure services of water supply, sewerage, electricity, and telephones are included in our evaluation of spending patterns. For transport, all households are included to allow us to distinguish between those that use transport facilities and those that do not, which has implications for spending.

Given that only a tiny minority of households has access to the full range of modern infrastructure services, total expenditure on the aggregate infrastructure category can be a little misleading since most households only register expenditure on some of the services. Nevertheless, it is interesting to examine the overall budget share dedicated to all infrastructure services and examine its variation across urban-rural areas and expenditure quintiles. This includes expenditure on utilities, transport and rubbish disposal.

On average, total infrastructure spending absorbs about 7 percent of the household budget. For most countries, the overall infrastructure budget share falls in the 5-15 percent range, and this can rise to more than 25 percent in some countries. Thus, it is not unusual for infrastructure spending to absorb 40 percent of the *nonfood* budget of the household, and as much as 80 percent in some cases.

Figure 4.1 Frequency distribution of overall household budget share devoted to infrastructure services



Source: AICD Expenditure Survey Database, 2007.

Absolute levels of infrastructure spending by rural households are not that different from those made by urban households. However, given lower overall household expenditure in rural areas, budget shares

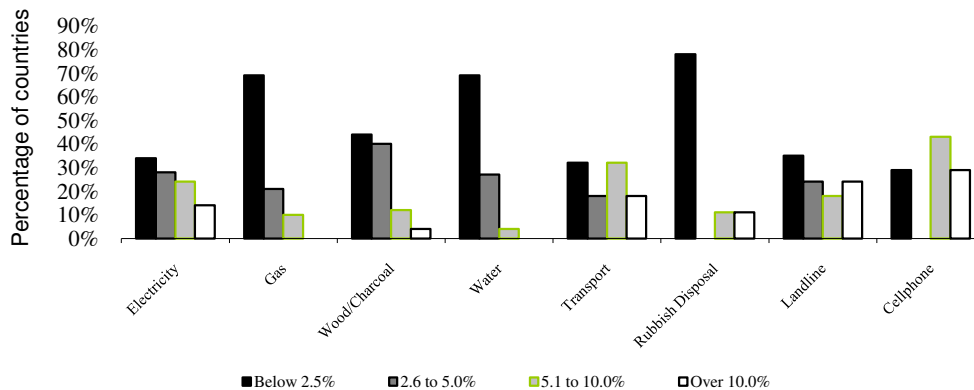
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are considerably higher. Whereas, in most countries urban households spend less than 5 percent their budgets on all infrastructure services combined, in rural areas the budget shares going to infrastructure are well over 5 percent in most countries.

The share of household budgets spent on infrastructure is similar across the quintiles, though (if anything) increasing slightly in the upper quintiles. On average, connected customers spend between 5 and 6 percent of their budget for network (piped water, electricity, and landline) infrastructure services. In some countries, however, the share is larger. Network infrastructure spending constitutes more than 10 percent of the total spending of households in South Africa, Sao Tome and Principe, Rwanda, Mozambique, Mauritania, Gabon, and Burkina Faso. The average is highest in South Africa, at 23 percent.

Considering individual infrastructure services, the highest budget shares are found for cellular telephony at around 14 percent on average (for the handful of countries with available evidence). Malawi is an outlier with disproportionate spending on cell phones. Aside from Malawi, the pan-African average spending on cell phones is 9 percent. This is followed by electricity and transport, each of which absorbs 6 percent of the household budget on average (figure 4.2). Households also spend about 3 percent of the budget on LPG, primarily used for cooking. Spending on water amounts to 2 percent of household budgets on average, and rarely exceeds 3 percent in any one country. Only in Cameroon, Mauritania, and Rwanda, the water expenses are more than 5 percent of household budget. Spending on landlines amounts to 2 percent of household budgets on average but shows a very high degree of variation across countries. In general, rubbish disposal constitutes a negligible share of total household expenditure, with some notable exceptions such as Sierra Leone and Rwanda.

Figure 4.2 Frequency distribution of overall household budget share devoted to specific infrastructure services



Source: AICD Expenditure Survey Database, 2007.

Nonpayment as an indicator of affordability

The discussion so far has focused on formal utility customers that report paying a utility bill. However, 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 (table 4.2). First, there are those that do not have a connection but nonetheless register expenditure because they are accessing the network through some secondary source, usually a neighbors tap or power line or a public

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telephone facility. Second, there are those that do have a connection but do not register any expenditure, whether because they are in arrears or because the connection itself is a clandestine one.

Table 4.2 Consumers of infrastructure services, differentiated by connection and payment status

	Consumer pays for service	Consumer does not pay for service
Consumer is connected or owns service	Traditional customers	Customers in arrears or disconnected (e.g., for nonpayment); illegal connections
Consumer is not connected or does not own service	Neighbor's phone, public phone, illegal connections, neighbor's yard tap, public tap, vendors, community latrines	Unserved consumers

Source: Author's elaboration.

Table 4.3 provides evidence on the relative importance of each category of consumer according to service. As we know from chapter 3, most Africans are unserved consumers. They are not connected to, nor do they pay for, formal services (table 4.3). The proportions range from 61 percent in the case of piped water, to 87 percent for cell phone service. However, what the table really serves to clarify is that for all services the traditional customers that connect and pay are actually a minority of those who use the service. Across all services, the population that connects but does not pay is almost as high as the percentage that connects and pays. Moreover, for piped water and landline telephone services 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. Interestingly, public telephone usage seems to be largely confined to landlines, with only 1 percent of the population reporting expenditure on cellular telephones without owning a cellular telephone themselves.

Nonpayment for infrastructure services is a major issue, one that bears directly on the ability of utilities and other service providers to expand networks and improve services by undermining their financial strength. By comparing the connected who do not pay against the total connected group, it is possible to calculate non-payment ratios.

Table 4.3 Consumers of selected network infrastructure services, by connection and payment status

Percent	Percent			
	Connected and pay	Connected and do not pay	Unconnected and pay	Unconnected and do not pay ¹
Electricity	14	11	7	67
Piped water	13	12	14	61
Landline	5	4	6	86
Cell phone	6	7	1	87

Source: AICD Expenditure Survey Database, 2007.

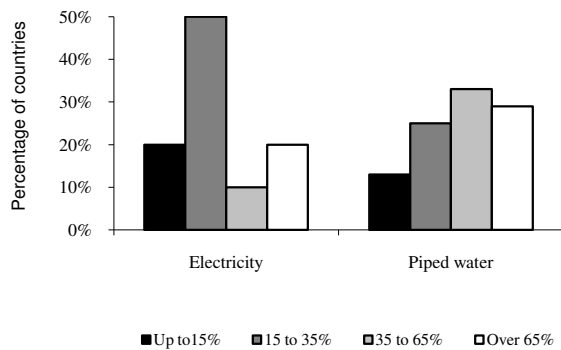
Note: Rows and columns may not add to 100 because of rounding.

Overall, around 40 percent of those connected to infrastructure services do not appear to be paying for them in any given month. The fraction is relatively similar across all of the services considered. The variation across countries is substantial however. Nonpayment rates in excess of 65 percent of customers can be found in 20 percent of countries for electricity and 30 percent for piped water (figure 4.3). Countries such as Chad, Kenya and Zambia perform consistently poorly in this respect. At the other end of the spectrum, countries such as Ethiopia and Senegal record nonpayment rates of less than 10 percent.

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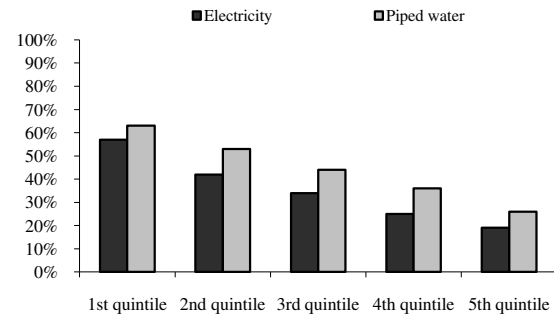
To the extent that nonpayment is higher among the poorest, it can be taken as an indicator that households are facing affordability problems. Figure 4.4 reports nonpayment ratios by quintile for electricity and piped water services. The pattern is strikingly consistent across the two services, although nonpayment is systematically slightly worse for piped water than it is for electricity. In the first quintile, the nonpayment ratio amounts to around 60 percent of households, and this declines steadily to around 20 percent of households in the fifth quintile. This pattern indicates that nonpayment does to some extent represent an affordability issue given the decline as household budgets rise across the distribution. Nevertheless, the existence of a significant nonpayment rate, even among 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).

Figure 4.3 Nonpayment rate in water and electricity



Source: AICD Expenditure Survey Database, 2007.

Figure 4.4 Nonpayment rate in water and electricity by quintile



Source: AICD Expenditure Survey Database, 2007.

Can African households afford to pay full cost-recovery tariffs?

Utilities will not invest in expanding their networks before establishing demand for their services—and ability to pay. From a practical and policy standpoint, therefore, it is important to know how much unserved beneficiaries can afford to pay for infrastructure.

Based on a relatively small sample of African countries, Foster and Yepes (2006) conclude that 70 percent of households in Africa will have difficulty paying internationally comparable cost-recovery tariffs. This analysis is extended and deepened here to understand the limits of affordability of cost-recovery tariffs for piped water and electricity in the African context.

Affordability is typically measured by the whether the share of infrastructure spending in the total household budget exceeds a set threshold (Frankhauser 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 WHO, for example, uses a 5 percent affordability threshold for water and sanitation services in developing countries. The evidence presented on current expenditure patterns above suggests that households spend 5-10 percent of their budgets on infrastructure services overall, while for individual services most of the countries pay between than 2-5 percent. In the discussion that

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follows, 5 percent and 3 percent are used as reference affordability thresholds. The discussion can either be interpreted as referring to a single infrastructure service or to a package of infrastructure services.

In order to estimate the percentage of African households likely to face affordability problems for modern infrastructure services, two elements are needed.

First, some indicative values of the true cost of infrastructure services are needed as a reference point. Based on different assumptions about subsistence household consumption and the tariff applied, the absolute cost of the total monthly bill can be computed (table 4.4). For piped water service, subsistence consumption ranges between 4 cubic meters per month—based on an absolute minimum consumption of 25 liters per capita per day for a family of five—and 10 cubic meters 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 between US\$0.40 to US\$0.80 per cubic meter depending on whether operating or full capital cost recovery is envisaged. For electricity, subsistence consumption ranges from 25 kilowatt-hours per month (supporting use of two 100-watt light bulbs for four hours each day) to 50 kilowatt-hours per month (supporting limited use of an additional appliance, such as a radio). The indicative tariff ranges between US\$0.08 to US\$0.25 per kilowatt-hour, reflecting the variation that exists between relatively low cost hydro-power dominated systems and those based on diesel generators in landlocked countries with high import costs. In either case, the lower-bound monthly bill coincides at around US\$2.00. The upper-bound monthly bill is around US\$8 for piped water and \$12 for electricity. This also suggests that at the lower bound a household could purchase both basic piped water and electricity services for around US\$4 per month, which would rise to around US\$20 per month at the upper bound.

Table 4.4 Reference points for true cost of infrastructure services.

	Piped water	Reference	Electricity	Reference
Lower bound	Subsistence household consumption	4 m ³	Subsistence household consumption (kWh)	25 kWh
	Tariff (operating cost recovery) US\$/m ³	\$0.40/m ³	Tariff (low-cost country) US\$/kwh	\$0.08/kWh
	Total monthly bill (US\$)	\$2.00	Total monthly bill (US\$)	\$2.00
Upper bound	Subsistence household consumption	10 m ³	Subsistence household consumption	50 kWh
	Tariff (capital cost recovery) US\$/m ³	\$0.80/m ³	Tariff (high-cost country) US\$/kwh	\$0.25/kWh
	Total monthly bill (US\$)	\$8.00	Total monthly bill (US\$)	\$12.00

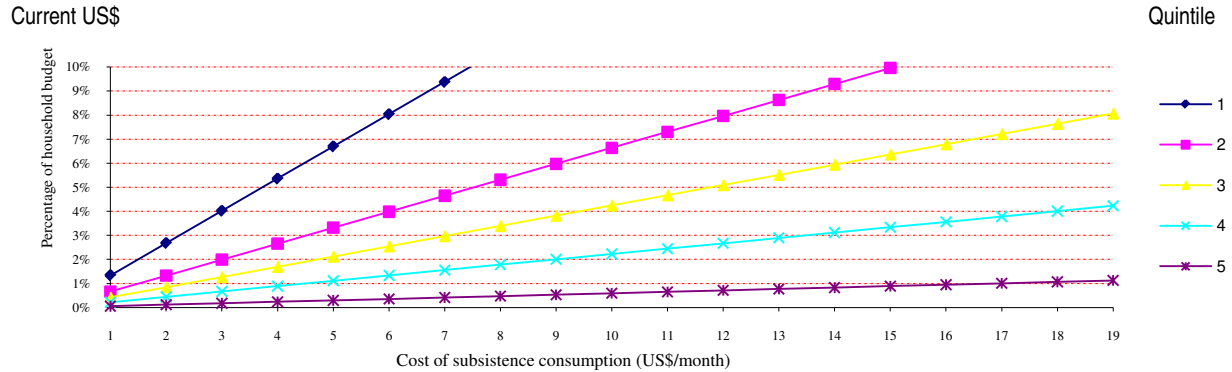
Second, the household survey data on budget expenditures across households is used to estimate what percentage of households would hit the 5 percent affordability thresholds at different levels of absolute expenditure. For example, a household with a monthly budget of US\$100 would hit the affordability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

By pooling all African households together 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. For the average household in each of the continental income quintiles, figure 4.5

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plots the share of their budget that would be required to meet increasing levels of spending on infrastructure services.

Figure 4.5 Share of average urban household budget required to purchase subsistence amounts of piped water and electricity, by continental income quintiles



Source: AICD Expenditure Survey Database, 2007.

Thus, the average household in the first quintile hits the 5 percent affordability threshold around US\$4 per month, which would be enough to pay for both piped water and electricity services under the lower-bound assumptions detailed above. The average household in the second quintile hits the 5 percent affordability threshold around US\$7 per month, and so once again could afford only piped water and electricity under the lower-bound scenarios. The average third quintile household hits the 5 percent affordability threshold at around US\$12 per month and hence could only afford one of the two services if upper bound conditions were applied. The average fourth quintile household hits the 5 percent affordability threshold at around US\$20 per month, and hence would be able to pay for both piped water and electricity services even under the upper bound scenarios. Households in the fifth quintile do not face any affordability constraints within the range of service baskets considered here.

From these findings one can infer that very modest consumption baskets priced at levels compatible with recovery of operating costs would appear to be affordable across the full range of household budgets in Africa (table 4.5). Nevertheless, around 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. In particular, this is because almost all of the households in the poorer countries may be in the bottom quintile for Africa as a whole, while almost all of the households in the more affluent countries may be in the uppermost quintile for Africa as a whole. Therefore, table 4.5 provides a similar type of analysis at the country level, calculating the percentage of households in each country that would fall beyond the 5 percent affordability threshold at any particular absolute monthly cost of service.

Table 4.5 Share of urban households whose utility bill would exceed 5 percent of the monthly household budget at various prices

Percent

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Group		Monthly bill (US\$)							
		\$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
	Cote d'Ivoire	0	0	1	2	3	5	7	10
	Congo, Rep. of	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
	Sao Tome	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
	Niger	1	11	28	55	70	79	89	93
3	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: AICD Expenditure Survey Database, 2007.

The countries divide into three groups. At one extreme is Group 1 (see table 4.5) comprising Cape Verde, Morocco, Senegal, Cameroon, Cote d'Ivoire, Congo, and South Africa, where a majority of urban households can afford a monthly expenditure of US\$12 (and indeed much higher). At the other extreme is Group 3, comprising Burundi, the Democratic Republic of Congo, Ethiopia, Guinea-Bissau, Malawi, Niger, Tanzania and Uganda, where the vast majority of urban households (at least 70 percent and in some cases over 90 percent of households) would be unable to afford a monthly expenditure of US\$8 or \$12 for water or electricity. All the remaining countries fall into Group 2 where a substantial share of the urban population—between one- and two-thirds—would face difficulties covering an upper-bound monthly expenditure.

Can African governments afford to subsidize infrastructure services?

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 towards universal access will create burgeoning liabilities for the state that must step in and meet the difference between the tariffs that the public can afford to pay and the real cost of service provision. The same analytical framework developed above can be used to estimate the aggregate value of these subsidies of the countries concerned. This gives us a sense of whether the strategy of subsidizing services to reach universal coverage is itself an affordable strategy at the country level. Once again, there is no absolute scientific method to 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.

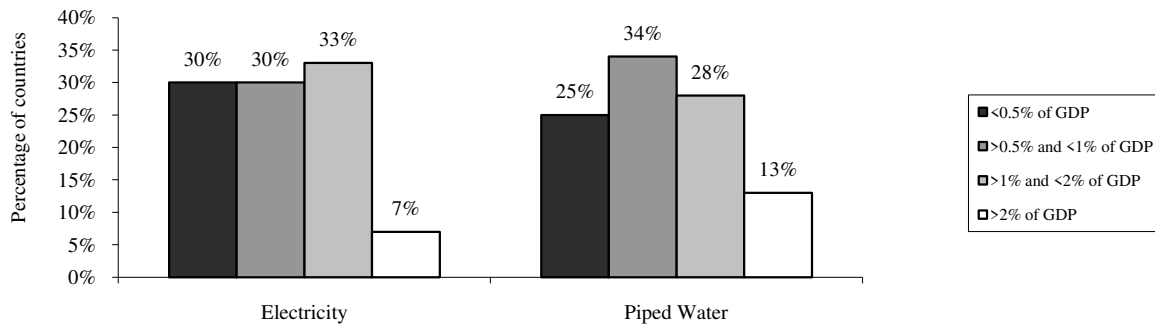
Two types of subsidies for electricity and piped water are considered, based on highly simplified assumptions for illustrative purposes. First, a one time capital subsidy of US\$200 per unserved household to cover the costs of connection of all these households spread over a period of 10 years. Second, an ongoing subsidy of US\$2 per month respectively for water and electricity to ensure that these services remain affordable to households once connected. The operating subsidy is calculated assuming the households can afford at least the minimum subsistence quantities of electricity and water.

With regard to the capital subsidy for water or electricity, we find that overall this would cost around 1 percent of African GDP for the countries included in the sample. Around 60 percent of the countries would face costs in excess of 1 percent of GDP. In particular, this policy would cost more than 2 percent of GDP in Ethiopia, Malawi, Congo, Dem. Rep. and Sudan. The highest burden on fiscal resources will be for the Democratic Republic of Congo, which has to spend about 18 percent of GDP on piped water connections. The spending envelopes are similar for piped water and electricity. Nevertheless, in more affluent countries, such as Gabon, the cost of this policy would amount to no more than 0.02 percent of GDP.

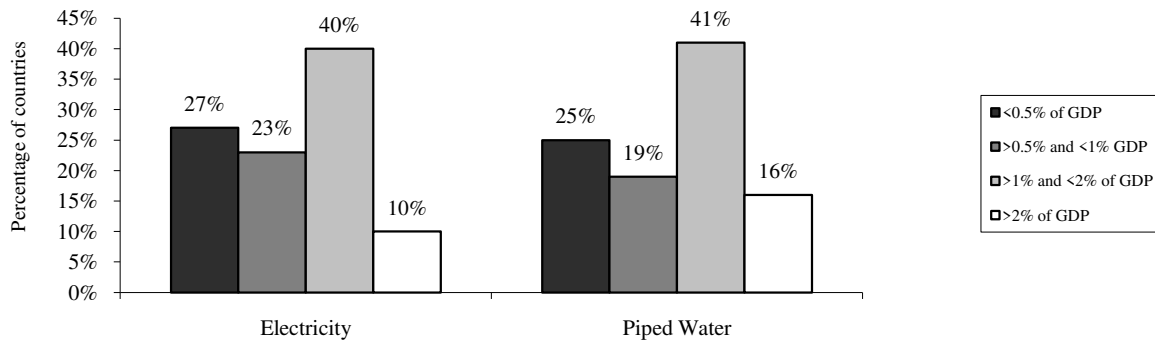
With regard to the ongoing subsidy of \$10 per month for the unserved customers, we find that the burden on government resources would be similarly onerous. For 40 percent of the countries, providing a monthly subsidy of \$2 for electricity or water would amount to spending between 1 and 2 percent of GDP. The maximum 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 and electricity services. Like the capital subsidy, this operating subsidy comes out to be 1.1 percent of African GDP for water or electricity for the countries included in the sample (figure 4.6).

Figure 4.6 Subsidy needed to maintain affordability of water and electricity

a. Capital subsidy



b. Operating subsidy



Source: AICD DHS/MICS Database, 2007.

But do utility subsidies really work in practice?

Irrespective of the arguments advanced above, concerns about affordability are already a pervasive reality in the water and power sector in Africa. The evidence amassed through the household surveys provides a rare opportunity to evaluate how effectively existing subsidies perform, and to glean lessons for improved subsidy design in the future. When combined with information about the nature of tariff structures for power and water services in Africa, it becomes possible to unravel the pattern of subsidy incidence across different households.

Customers receive substantial subsidies in most African countries as residential electricity and water tariffs tend to be below utility costs. The working assumption is that the price per kWh 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 Angel-Urdinola and Wodon (2006), a simple framework can be used not only to analyze the targeting performance of electricity and 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

electricity and/or water) and subsidy design factors (who benefits from subsidies and by how much among users).⁹

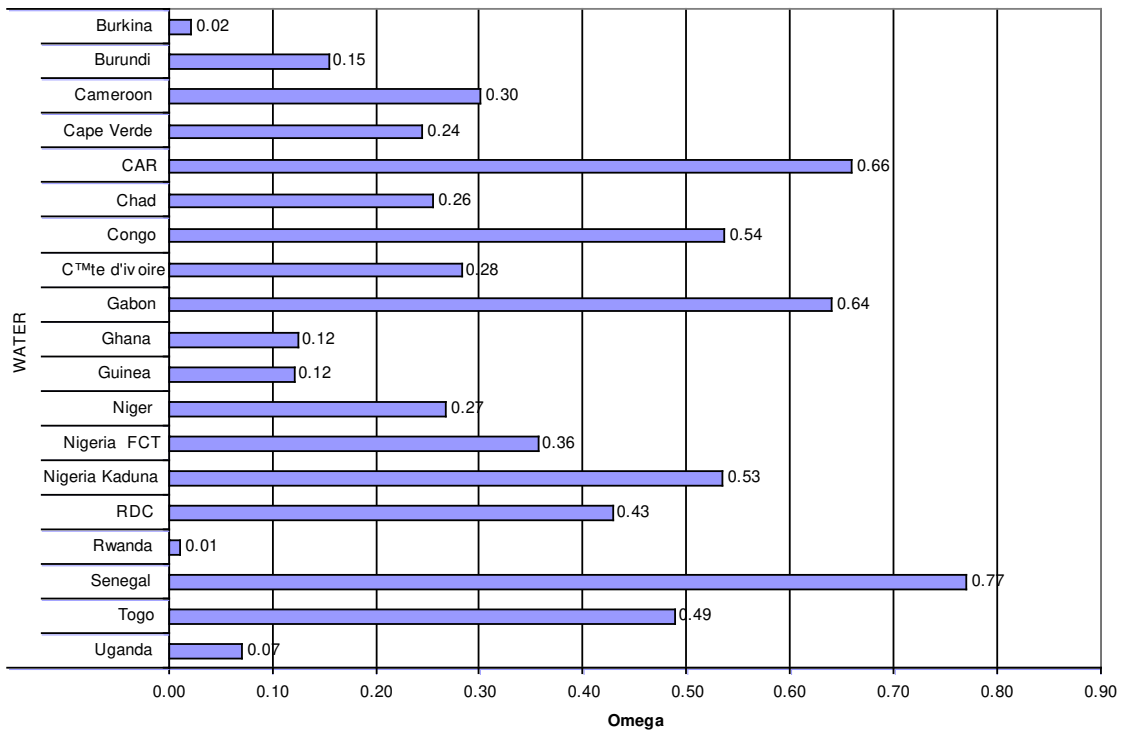
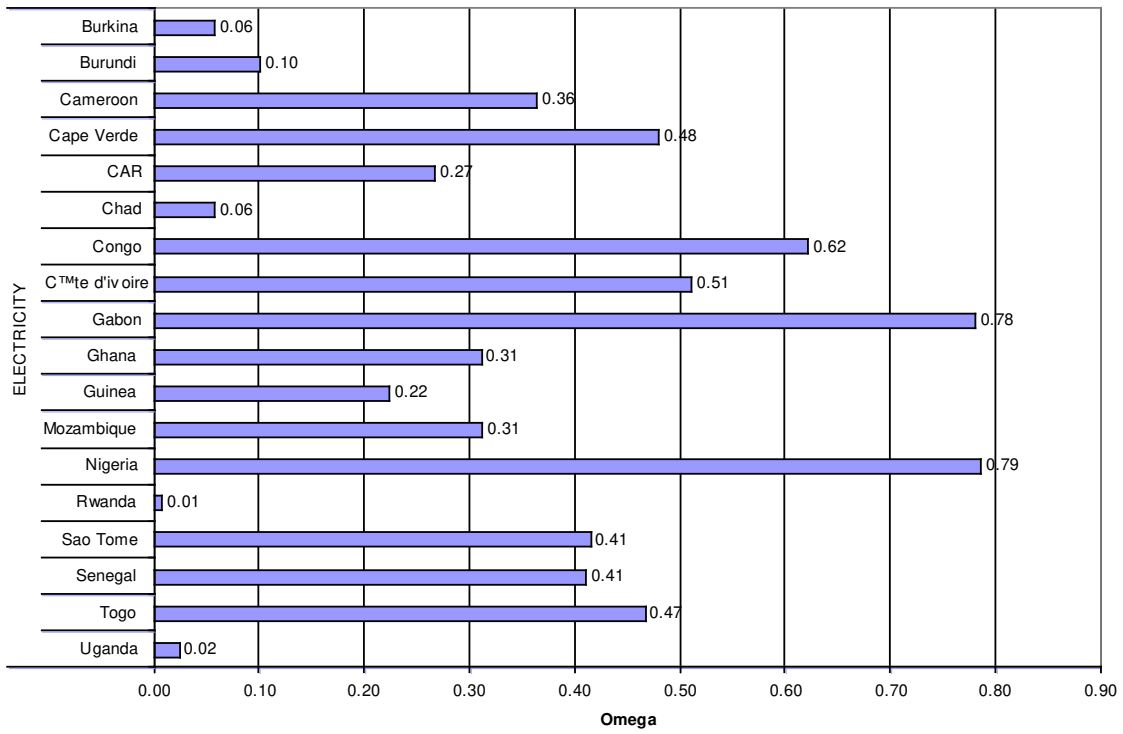
The targeting performance indicator used in the analysis, denoted by Ω (Omega), is simply the share of the subsidies received by the poor divided by the proportion of the population in poverty. In other words, a value of one for Ω implies that the subsidy distribution among the poor is proportional to 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 its share in the total population. For instance, suppose that 30 percent of the population is poor and that they obtain 60 percent of the subsidy benefits. In such case, Ω would equal to two, meaning that the poor are receiving twice as much subsidies as the population on average. As shown in Figure 2, in none of the countries is the targeting indicator superior to one, and for both electricity and water, it is often well below one. While there are some comparability issues between countries, the message is clear: utility subsidies tend to be very poorly targeted, with on average the poor benefiting only from a fourth to a third of what a household randomly selected in the population would get.

While most indicators of targeting performance are silent as to why subsidies are targeted the way they are (they only give an idea a whether the subsidies reach the poor or not and to what extent), the framework used here allows for analyzing both “access” and “subsidy design” factors that affect targeting performance. Access factors are those related to the availability of electricity and water service in the area where a household lives and to the household’s choice 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. Subsidy factors are more susceptible to policy design, such as changes in tariff structures affecting who is targeted to receive the subsidies, as well as the rates of subsidization and the quantities of electricity and water consumed by the households that benefit from the subsidies. It turns out that most electricity and water subsidy mechanisms are poorly targeted, essentially because most of the poor lack access to the electricity and water network and therefore cannot benefit from electricity and water subsidies, but also because the existing tariff structures are not designed in a way to target subsidies to the poor.

⁹ See also Komives and others 2005.

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Figure 4.7 Overall targeting performance (Ω) of utility subsidies, African countries



Source: Wodon and others (2007a, 2007b).

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This can be seen clearly in figure 4.8, which decomposes the value of the targeting indicator into access and subsidy design factors, so that $\Omega = (\text{access factors}) \times (\text{subsidy design factors})$. The value of access factors are on the horizontal axis, and the value of the subsidy design factors are represented on the vertical axis. The curves added to the graphs represent combinations of values for the access and subsidy design factor that result in the same value for Ω . The further a country is located to the upper right of the graphs, the better the targeting performance, since again Ω is the product of the access and subsidy design factors.

The two variables used to compute the access factors are first, whether a household lives in an area served by the electricity and water network, and second whether when a household is in such an area, it is actually connected or not to the network, i.e., whether the household actually takes up the service. The value of the access factors is simply the rate of connection among the poor to the network (which depends on access and uptake when there is access) divided by the rate of connection in the population as a whole. As is clear in figure 4.8, and as expected, the access factors are much lower than one for all countries, simply because the poor have much lower connection rates than the population as a whole, on average.

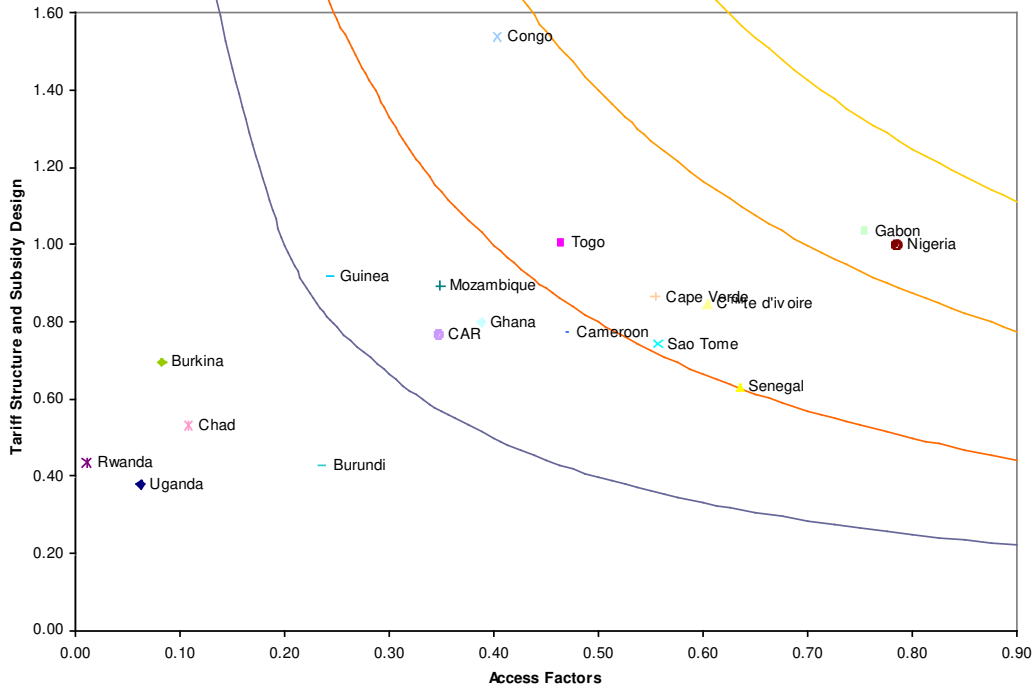
The second variable affecting the value of the targeting parameter is the Subsidy Design Factors, which take into account who benefits from subsidies among households connected to the network, and how large the subsidies are. What this Subsidy design factor represents is the ratio of the average benefit 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 non-poor. Surprisingly, in many countries, the subsidy design factors are also below unity, thereby also limiting targeting performance. The main explanation is that while the rate of subsidization of the poor (i.e., the discount versus the full cost of providing electricity and 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.

Several clear messages emerge from the empirical analysis of the targeting performance of electricity subsidies presented above. Consumption subsidies for electricity and water appear to be poorly targeted in African countries. Several reasons explain this poor targeting performance. First, access factors are important in determining the potential beneficiaries of consumption subsidies. As poor households tend to live in areas without electricity and water service, it is impossible for them to benefit from the subsidies. In addition, even when there is potential access to the network where the poor live, many among the poor remain not connected to the networks, either because they live still too far from the electric lines or water pipes, or because the cost of connecting to the network and purchasing the equipment to required to use electricity and water is too high. In order to compensate for the negative impact of access factors on targeting performance, good subsidy design mechanisms are required. Unfortunately, the traditional Inverted Block Tariff structures that prevail in many countries tend to be poorly targeted. First, these tariff structures spread subsidies to all households connected to the network, since even those that consume high amounts of electricity 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 tend often to be too high in terms of consumption (in kWh per month) to target the poor well. And finally, the differences in unit prices between the various blocks may not be large.

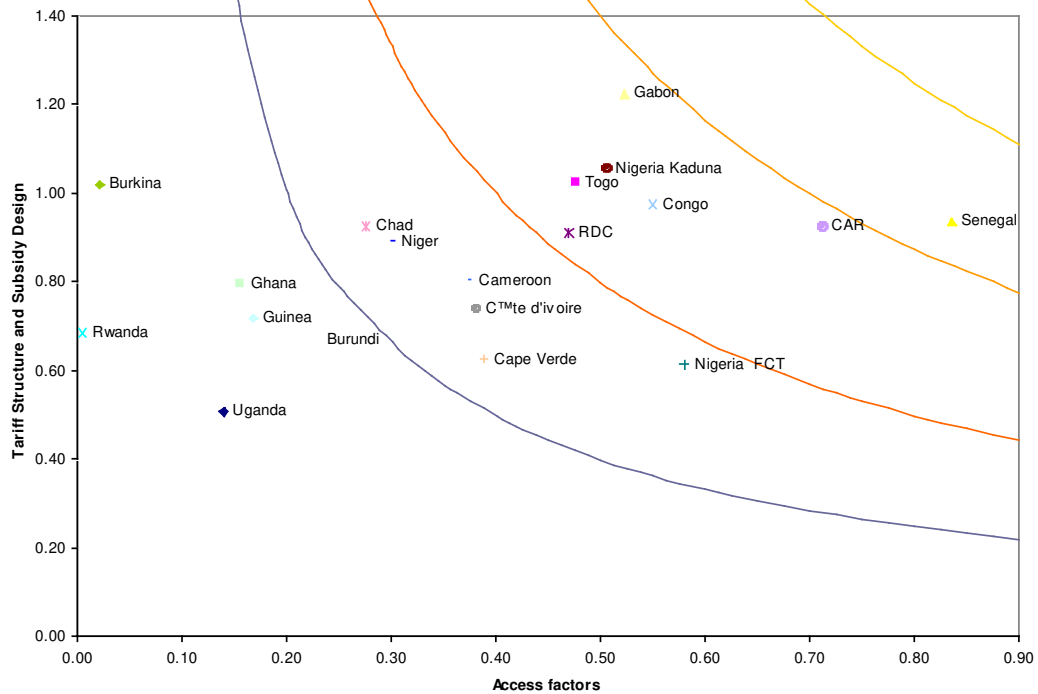
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Figure 4.8 Access factors and subsidy design factors affecting targeting performance

(a) Electricity



(b) Water



Source: Wodon and others (2007a, 2007b).

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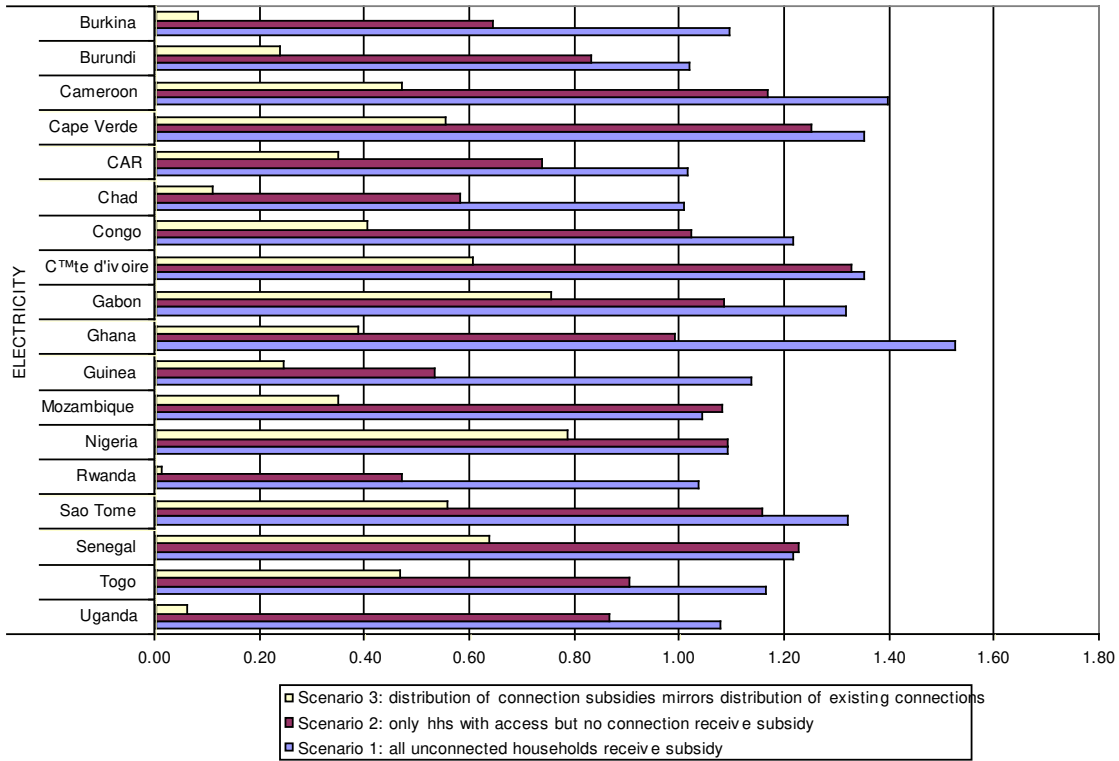
One possible alternative is to provide connection as opposed to consumption subsidies, assuming that the generation or production capacity is sufficient to expand the network. Figure 4.9 provides the potential targeting performance of connection subsidies under the three scenarios. First, we assume that connection subsidies will be distributed in the same way as existing connections. This is a pessimistic assumption from a distributional point of view since 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 are currently not connected, but live 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 assumption given that many of these households do not live in neighborhoods where access is available. As shown in figure 4.9, and as expected, the value of Omega is largest under the assumption that new connections benefit households that are selected randomly from the population without access. In all countries, for both water and electricity, Omega 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 non-served households living in those areas where there is already access to the network. The values of Omega, while 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 in order 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 in reducing the cost of service for users (as compared to street vendors for water for example), while also bringing in positive externalities in areas such as education and health.

Finally, it is often argued that any removal of utility subsidies would be detrimental to power. Again, the household survey evidence provides an opportunity to test this hypothesis. For most countries, over the population as a whole electricity and water spending represents only a tiny fraction of total consumption, often well below 1 percent. Among households connected to the network and consuming electricity and/or water, the fraction is much higher, typically between three and five percent. This is turn is directly related to the impact of a proportional increase in electricity and water tariffs on poverty. For simplicity, relative poverty measures can be used whereby the poverty line in each country is set at half the mean level of per capita consumption. At the national level, the impact of a 50 percent increase in tariffs, or even of a doubling of the tariffs, is truly marginal, with in many countries the national 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. Indeed, there is rarely an increase in the share of households in poverty larger than one or two percentage points, and in addition, because the households that benefit from a connection tend not to be poor as compared to 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 an impact does not have a negative impact on those hit by it. But it means that if subsidies were reduced, and the funds were used in a different, more pro-poor way, there would be a gain for poverty reduction that could be substantial.

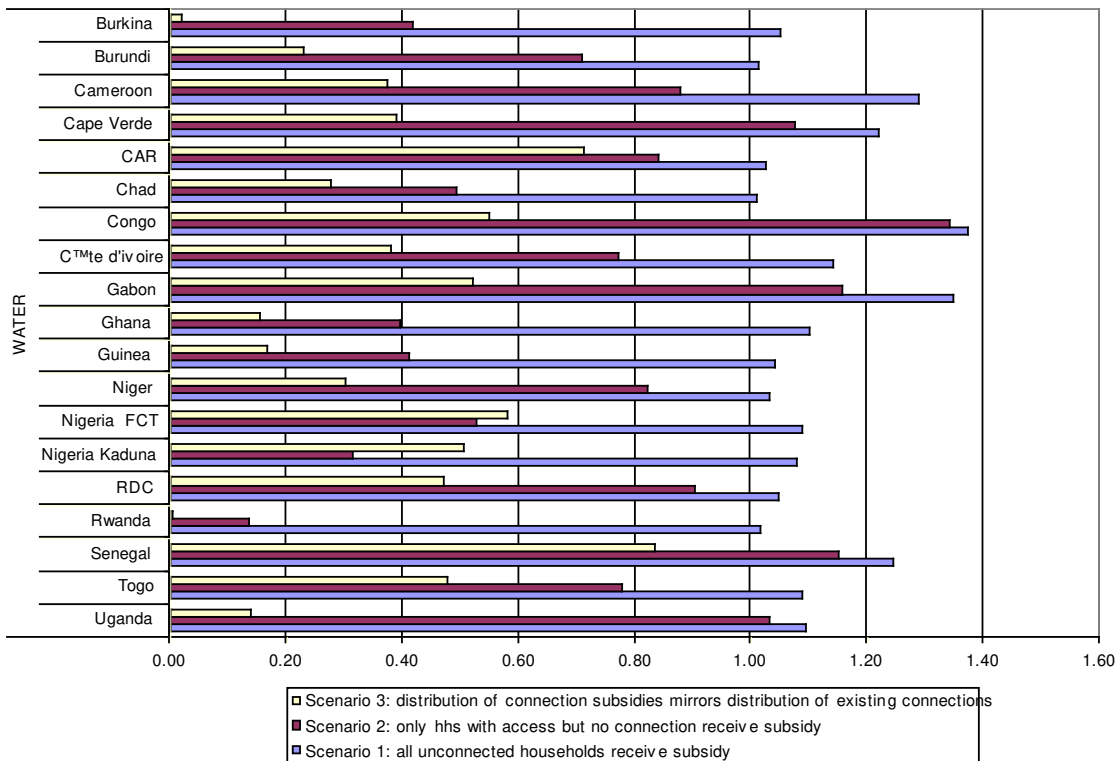
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Figure 4.9 Potential targeting performance of connection subsidies under various scenarios

a. Electricity



b. Water



Source: Wodon and others (2007a, 2007b).

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In conclusion, African households (including the wealthier ones) survive on relatively modest household budget, and spend at least half of that budget on food. Infrastructure spending is an important component of the non-food budget. Overall, African households spend 7 percent on all infrastructure services. The average budget share for households reporting some kind of access to individual infrastructure services is as follows: 6 percent for energy and transport, 2 percent for water; the corresponding figure for cellular telephones is 14 percent although based on a limited sample of countries. Given that few households enjoy multiple infrastructure services, the budget share for all infrastructure services is relatively low compared to that for individual services.

Two tests of affordability of services are used. The first relates to patterns of non-payment. The results show that around 40 percent of those with power and water connections report not having paid for the service in the month preceding the survey. This ratio ranges from 60 percent in the first expenditure quintile to 20 percent in the uppermost expenditure quintile. The second test of affordability is based on an examination of the distribution of expenditure across households. A significant proportion of African households can afford to pay very modest consumption baskets priced at levels compatible with operating cost recovery. Nevertheless, except in the richest countries, a substantial share of the population cannot afford to pay full capital cost recovery tariffs.

The implication that a significant percentage of the population would require some kind of government subsidy for access to modern infrastructure services raises questions about the feasibility of this. A very simple simulation exercise is performed to gauge the aggregate magnitude of subsidies potentially required to support a universal access policy. We find that even if a one-time capital subsidy is provided to the unserved population, affording it on a long-term basis through an ongoing subsidy of \$10 per month is a costly proposition. For majority of Governments in Africa, enabling sustainable service provision will cost less than 1 percent of GDP. In addition, historic experience with public subsidies shows that these have been woefully inadequate at reaching the poor, partly due to low service coverage among the poor, but also reflecting certain design flaws in the corresponding tariff structures.

5 Alternatives to modern infrastructure services

The coverage of network infrastructure in Africa is so low and universal access still so far away that the vast majority of Africans will continue to depend on alternate sources to meet their demand for the foreseeable future. These alternatives can be grouped according to the level of service that they provide (table 5.1). In most cases four levels can be distinguished going from modern infrastructure services, to intermediate alternatives, to basic alternatives, to nothing at all. The level of service provided by the intermediate options, although it falls well short of the modern level, is nonetheless typically a substantial improvement on the basic service both in terms of convenience and avoidance of the worse health risks. Even the basic level of service, though still far from adequate, offers some advantages over not having any service at all.

Table 5.1 Different levels of service for infrastructure

Modern service	Intermediate service	Basic service	No service
Electricity connection	Street lighting	Kerosene/candles	No artificial light
Piped water connection	Shared connections, stand-posts or boreholes	Surface water	n.a.
Sewerage	Shared flush toilets, or VIP, Chemical, SAN PLAT latrines	Traditional pit latrines	No sanitation
Landline or cellular telephone	Public telephone	Letter mail	No post or telecommunications

n.a. = not applicable.

These observations highlights the importance—from a policy standpoint—of identifying measures to move people up across all rungs of the ladder, without focusing exclusively on moving people into private connections. Accordingly, this section turns the spotlight on the three lower service levels and asks what can be learnt in policy terms from the household survey evidence about these alternatives.

The detailed country-by-country numbers underlying the analysis presented here can be found in Part IV of the Cross-Country Annex Volume. The overall profile for each country can be found in the Country Annex Volume.

Alternatives to piped water

Boreholes are by far the most widely used form of water supply in Africa (37 percent overall). However, the dominance of boreholes is driven largely by the rural areas. In the urban areas they account for no more than 24 percent of supply, and utilities—whether through private taps (38 percent) or standposts (27 percent)—are the dominant source of water. The overall coverage of stand-posts is only slightly higher than the coverage of private piped water connections. While somewhat more equitably distributed than the latter, public stand-posts are still regressive in their pattern of incidence. In urban areas, standpost coverage is significantly lower than private taps, whereas in rural areas the opposite is true. Those with no other alternative must resort to surface water of questionable quality—this amounts to 30 percent of the population overall and about 50 percent of the poorest.

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Table 5.2 Patterns of access for alternatives to piped water

Percentage of households using alternative	Population weighted average				
	Piped water	Standposts	Well/Boreholes	Surface water	Vendors
By time period (national)					
• Early 1990s	18	15	37	41	1
• Late 1990s	17	15	38	31	1
• Early 2000s	17	16	41	33	2
By location (latest available year)					
• Rural	4	10	43	41	1
• Urban	38	27	24	7	4
By quintile (latest available year)					
• First	0	5	44	49	1
• Second	3	10	46	39	1
• Third	7	13	42	34	2
• Fourth	18	21	35	23	2
• Fifth	46	30	20	7	2
By income group (latest available year)					
• Low-income countries	11	15	40	32	2
• Middle-income countries	44	22	13	18	1
By subregion (latest available year)					
• East Africa	10	17	30	43	0
• West Africa	12	13	52	18	4
• South Africa	29	17	32	20	0
• Central Africa	14	17	21	48	0

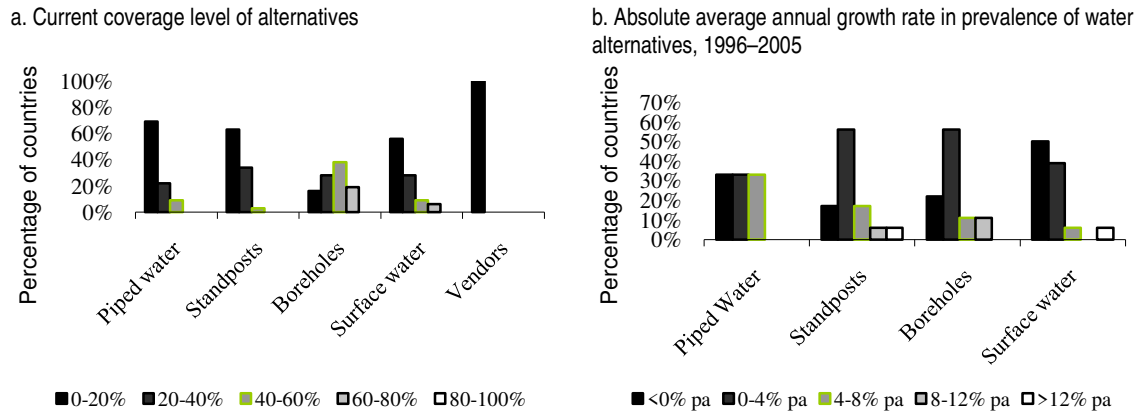
Source: AICD DHS/MICS Survey Database, 2007.

In most countries there is a wide diversity of water sources in use (figure 5.1a). Typically, piped water, standposts, surface water, and vendors each account for well under 20 percent of the population. The balance is made up by boreholes, whose contribution varies widely from 20 to 80 percent of the population. The countries most reliant on boreholes are Burkina Faso, Chad, Malawi, Mali, Niger and Uganda. In Ethiopia, as much as two thirds of the population report surface water as their primary source.

The overall average annual growth rate for alternative water services has been 1 percent for piped water, 3 percent for standposts, 3 percent for boreholes, -6 percent for vendors, and 0 percent for surface water (figure 5.1b). In most countries, the modal growth rate in standposts and boreholes is 0 to 4 percent per annum, which is slightly lower than the modal growth rate for piped water in the 4 to 8 percent range. This suggests that the share of piped water connections is increasing over time. While most countries have experienced very low or negative growth rates in the prevalence of surface water usage, in a handful of cases reliance on this form of water has been expanding rapidly.

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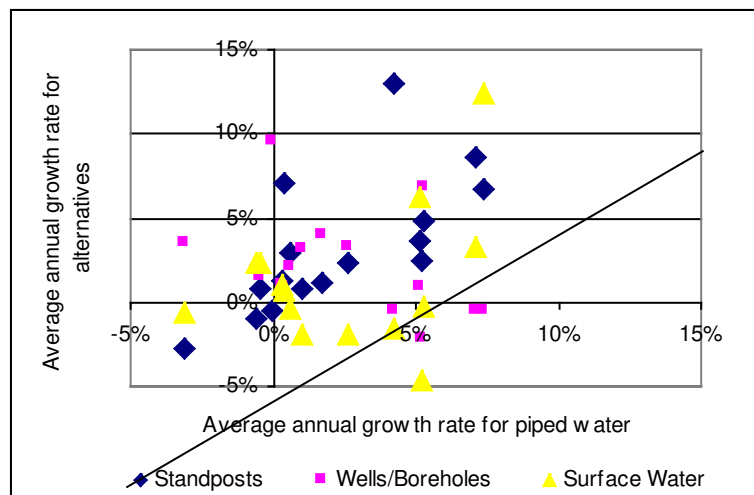
Figure 5.1 Country frequency distribution for alternatives to piped water



Source: AICD DHS/MICS Survey Database, 2007.

In order to examine the extent to which countries may be shifting between alternative forms of water service over time, a cross-plot is made between the average annual rate of growth of piped water and the average annual rate of growth of the alternatives, that is standposts, boreholes and surface water (see figure 5.2). The analysis groups the countries into a number of clusters. In the first cluster, which lies well below the 45 degree line, are found countries such as Cameroon, Chad, Mozambique, and Senegal that have rapid expansion of piped water but that register substantially slower progress on standposts.

Figure 5.2 Scatter plot of average annual growth rate of piped water service against alternatives



Source: AICD DHS/MICS Survey Database, 2007.

In the second cluster, which lie well above the 45 degree lines, are found countries such as Guinea, Madagascar, Mali, Rwanda, and Zambia that register much faster expansion in standposts than in piped water, and Ethiopia, Lesotho, and Rwanda that registers much faster expansion in boreholes than in piped water. In the third cluster are found countries such as Burkina Faso, Ghana, Ethiopia that are registering simultaneous rapid expansion of piped water and standposts. In the third cluster, which lies close to the origin, are found countries such as Malawi, Nigeria, and Lesotho that are not experiencing rapid expansion in any area. Overall, there is significant correlation between the rate of expansion of piped water and that of standposts (0.6). On the other hand, there is a substantial negative correlation between the rate of expansion of wells/boreholes and piped water (-0.5)

On average across countries, the percentage of households without access to piped water in their dwelling or yard fell slightly from 86 percent in the first half of the 1990s to 82 percent in the second half of the 1990s, only to rise back to 87 percent in the first half of the 2000s. Fetching water from outside the

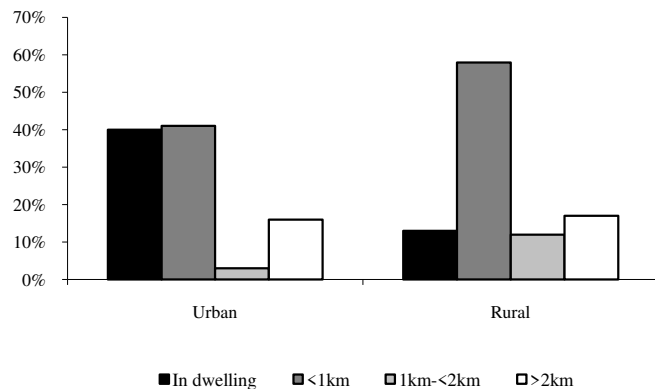
home is an activity dominated by women and girl children. Blackden and Wodon (2006) compute that out of 6 million hours spent in Ghana in 1992 on fetching water; more than two-thirds was spent by women. Traveling outside the home to fetch water has a cost in time that might be spent on education or other productive purposes. Providing African households with reasonable access to water would bring significant gains in productivity, health, and welfare.

Most households that lack private water connections live within one kilometer of their water source. In the case of urban households, the average distance is estimated to be just over 500 meters, while in the case of rural households 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.

Patterns of access vary from country to country, but, on average, a much higher proportion of urban households have ready access to water than do rural households (figure 5.3). For instance, 53 percent of rural households in Tanzania live more than two kilometers from their water source. On the other extreme are households in South Africa, Nigeria, and Madagascar, where fewer than 2 percent of rural households live more than two kilometers away. In Sierra Leone, no household has water in its dwelling, either in rural or urban areas. 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 Republic of Congo, the Democratic Republic of Congo, Ethiopia, Morocco, Niger, Nigeria, South Africa, Uganda, and Zambia live more than two kilometers from their water source.

The 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 45–50 minutes (roundtrip). 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.

Figure 5.3 Distance of households from water source in selected countries



Source: AICD Expenditure Survey Database, 2007.

In some countries, water vendors play a significant role in urban water supply, catering to those that lack any other alternative (figure 5.4).¹⁰ The presence of these operators signals a failure of the formal market to supply water. In several countries water vendors operating with tanker trucks or through small

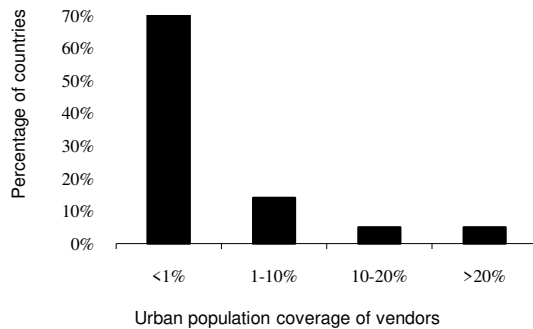
¹⁰ Small-scale service providers are also active in the electricity market, where they may be independent of the network, developing their own power, or dependent on the formal network, and reselling to consumers via a mini-grid, mobile distributors, or fixed-location vendor (Kariuki and Schwartz 2005).

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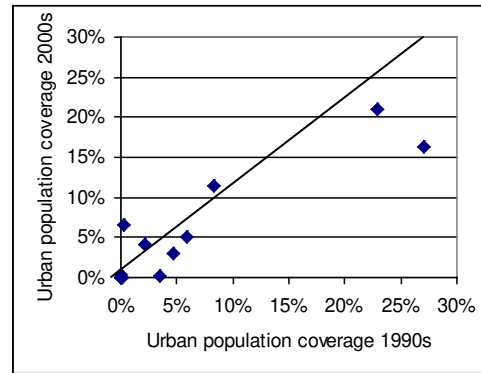
piped systems supply around 5 percent of the urban water market (Burkina Faso, Chad, Niger, Nigeria, and Tanzania). More generally, the percentage of the urban population covered by water vendors is highly skewed across countries. Whereas in two thirds of the countries surveyed, vendors accounted for less than one percent of the urban population; in a small minority of countries vendors account for more than 20 percent of the urban population. The two salient cases are Niger (21 percent) and Mauritania (32 percent). Comparing the situation in the 1990s with that in the early 2000s reveals that the market share of vendors has changed markedly in a number of countries. Thus, vendors' market share has fallen substantially in Chad (27 to 16 percent) and Rwanda (3 to 0.1 percent). At the same time, vendors' market share has increased substantially in Nigeria (8 to 11 percent) and Tanzania (0.3 to 6 percent) These findings suggest that vendors constitute a fairly flexible segment of the market that reacts quite rapidly to changes in broader market conditions, be they positive (for example emergence from conflict) or negative (for example pressures of urbanization).

Figure 5.4 Dependence on water vendors in urban Africa, 1990–2005

a. Frequency distribution of urban population coverage 2000s



b. Evolution of urban population coverage from 1990s to 2000s



Source: AICD DHS/MICS Survey Database, 2007

In a study of 10 cities in Sub-Saharan Africa, Collignon and Vezina (2000) find that \$5–40 million is generated in each of these local markets, amounting to 1–3 percent of the cities' total domestic product. Consumers of vendor water are not necessarily poor. The rich may also count on water vendors as their primary source or to supplement another source. However, the poor are more likely to depend on them, as they are least served by the piped water supply.

Kariuki and Schwartz (2004) compare the prices charged by vendors to formal network prices. They show that small-scale piped network operators charge 1.5 times the formal network price, point sources charge 4.5 times, and mobile distributors can charge up to 12 times as much as the formal utility tariff. In a recent survey of Nairobi, Accra, and Dar es Salaam, McGranahan and others (2006) find that the price of piped water ranges from \$0.5 to \$1.5 per cubic meter, whereas small water enterprises charge between \$4 and \$6. Further data on prices, quantities, and expenditures relating to small water enterprises are available in comprehensive case studies (Whittington 1989; Collignon and Vezina 2000); through social assessments linked to World Bank project preparation in cities in Lesotho, Mozambique, and Zambia; and in detailed studies commissioned by the U.K. Department for International Development on Ghana, Kenya, Sudan, and Tanzania.

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Interestingly, even though water vendors charge higher unit prices for water, those purchasing water from vendors do not necessarily spend more on buying water than those purchasing water from the public utility, but simply adjust the quantity consumed. Data from the AICD expenditure survey database for 10 countries in Africa reveal that payments to water vendors in many cases exceed amounts paid to the water utility (table 5.3). In Ghana the poorest quintile of households pays a very high price to vendors.

Table 5.3 Ratio of payment of vendors to piped supply by consumer groups

	Cape Verde	Congo, Rep.	Congo, Dem. Rep.	Ghana	Mauritania	Morocco	Mozambique	Nigeria	Rwanda	Sierra Leone
By location										
National	0.6	0.9	1.1	2.3	0.7	0.8	0.3	0.8	0.5	0.3
Rural	1.1	1	1.2	8.7	2.2	1.9	0.1	0.4	0.6	0
Urban	0.5	0.9	1.1	1.8	0.5	0.7	0.5	1.2	0.7	0.4
By quintile										
First	1	0.9	1.1	27.5	2.6	1.2	0.4	0.7	n.a.	1
Second	0.9	0.8	1.1	5	1	1	0.4	0.7	0.9	0.4
Third	0.9	0.9	1.1	4.7	0.6	1.1	0.7	0.8	1.9	0.2
Fourth	0.6	0.9	1.1	3.6	0.8	0.8	0.4	1	1.5	0.2
Fifth	0.5	0.9	1.1	1.5	0.7	0.8	0.3	0.8	0.7	0.5

Source: AICD Expenditure Survey Database, 2007.

Note: In Rwanda, there is no payment for piped water in quintile 1, therefore the ratio between piped water and vendor water payments is undefined.

n.a. = not applicable.

Alternatives to modern sanitation services

Traditional pit latrines are by far the most prevalent form of sanitation in Africa accounting for 51 percent of the population; a share that remains remarkably constant between urban and rural areas and across the socioeconomic spectrum of households. In Malawi, Tanzania, and Uganda as much as 80 percent of the population is served by traditional pit latrines. The second most prevalent situation is to have no sanitation at all (31 percent), although these cases are heavily skewed towards rural areas (41 percent), and the bottom two quintiles of the expenditure distribution (40 to 50 percent).

In urban areas, 92 percent of the population has some form of sanitation, however rudimentary (table 5.4). In Benin, Burkina Faso, Chad, Niger, and Togo, more than 80 percent of the rural population lacks any form of sanitation. At the other end of the spectrum are Republic of Congo, Comoros, Cameroon, and Rwanda, where fewer than 10 percent of any households are without access to some form of sanitation. In most countries, the share of the population served by a flush toilet or an improved latrine is well below 20 percent of the total (figure 5.5a). The difference is made up to varying degrees by traditional pit latrines or no sanitation facilities.

Table 5.4 Patterns of access flush toilet and alternatives

Percentage of households, population weighted average				
By time period (national)	Flush toilet	VIP/Chemical/ SANPLAT	Traditional latrine	No facility
Early 1990s	9	6	50	46

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The overall average annual growth rate for sanitation services has been 7 percent for flush toilets, 11 percent for VIP/SAN PLAT/Chemical toilets, -0.3 percent for traditional pit latrines, and 0.3 percent for no facility. In a number of countries (Ghana, Kenya and Tanzania), the proportion of households unserved by modern sanitation actually *rose* in the past decade (figure 5.5b). However, a more typical situation for most countries was to be experiencing modest average annual growth rates of 0 to 4 percent for traditional pit latrines. A few outliers are experiencing double digit growth in the expansion of improved latrines (Benin, Burkina Faso, Kenya, Mali and Zambia).

In order to examine the extent to which countries may be shifting between

alternative forms of sanitation over time, a cross-plot is made between the average annual rate of growth of flush toilets and the average annual rate of growth of the alternatives; that is VIP and traditional latrines (figure 5.6). The analysis groups the countries into three main clusters. In the first cluster, which lies well below the 45 degree line, are found countries such as Chad, Mali and Senegal that have rapid expansion of flush toilets but that register substantially slower progress on alternative services. In the second cluster, which lies well above the 45 degree lines, are found countries such as Kenya, Malawi, Mozambique, Rwanda, Tanzania, and Zambia that register much faster expansion in alternative forms of sanitation than in flush toilets. Finally, countries such as Madagascar sit close to the origin on the 45 degree line, indicating that there has not been much progress either in modern or alternative forms of sanitation.

Overall, however, there is slightly negative correlation between the rate of expansion of flush toilets and that of improved latrines (-0.1) and between that of VIP and traditional latrines (-0.5). On the other hand, there is a substantial positive correlation between the rate of expansion of flush toilets and traditional latrines (0.3). It is very striking that this classification of countries is almost identical to that found for the water sector in figure 5.2, suggesting that the balance of effort across modern and more basic alternatives is common across services in any given country.

Late 1990s	9	7	49	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
South Africa	23	11	36	28
Central Africa	3	13	65	18

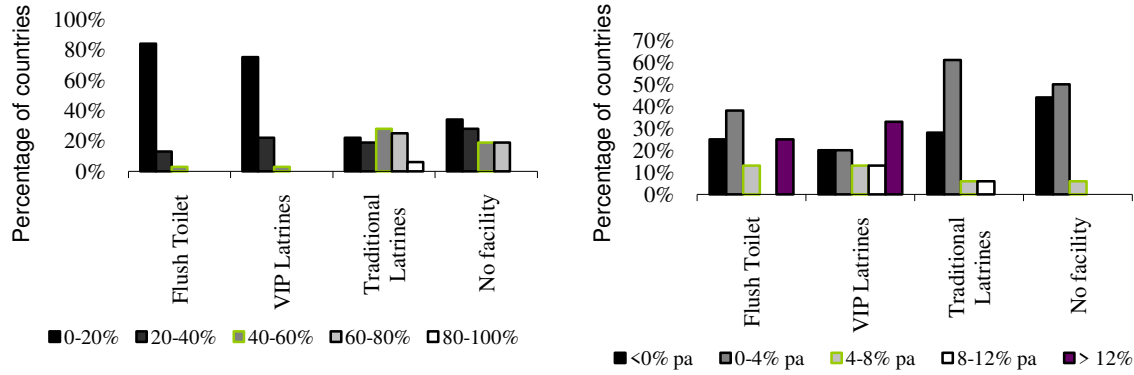
Source: AICD DHS/MICS Survey Database, 2007.

Figure 5.5 Country frequency distribution of alternative forms of sanitation

a. Current coverage level of alternatives

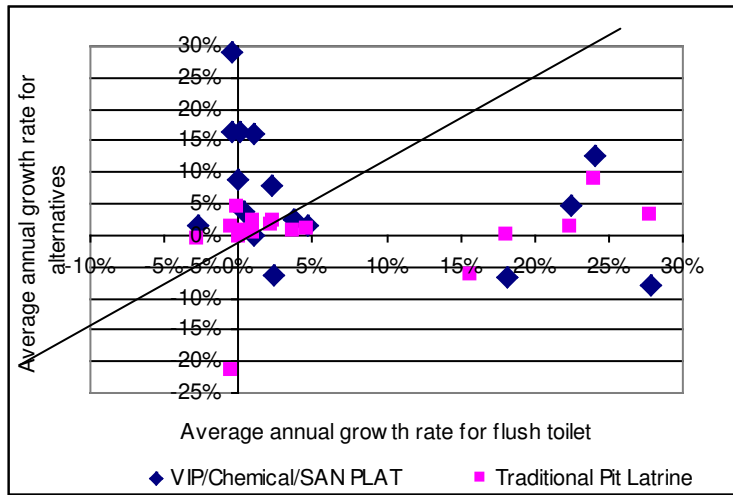
b. Absolute average annual growth rate in prevalence of alternatives, 1996–2005

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Source: AICD DHS/MICS Survey Database, 2007.

Figure 5.6 Scatter plot of average annual growth rate of flush toilet service against alternatives



Source: AICD DHS/MICS Survey Database, 2007.

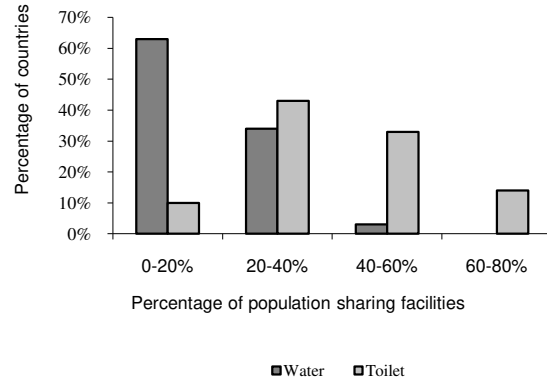
Sharing of water and sanitation facilities

Sharing of water and sanitation facilities among multiple families is common in urban areas. At least 16 percent of households share their water supply facilities with other households, while more than 40 percent typically share their toilet facilities (figure 5.7). The household surveys focus only on formal communal provision through standposts and these figures underestimate the informal sharing of installations through household reselling which is now considered as significant source of primary water supply in Africa. In addition, the sharing of water in public or communal wells/boreholes is also not captured as it is difficult to disaggregate public from private wells/boreholes. Indeed, in Benin, Burkina Faso, Republic of Congo, Ghana, Guinea, and Madagascar, more than half of households share toilet facilities, while in Lesotho about half share their source of water.

Figure 5.7 Current country frequency distribution for percentage of population sharing water and toilet facilities

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In Ghana and other countries of West Africa compound housing is a common way of living. In Ghana, for example, 80 percent of the population shares their dwelling with other families. Under such circumstances it is common for water and sanitation facilities to be shared. Shared forms include a neighbor's yard tap, community or public taps, standposts, public wells and boreholes, public hand pumps, and community toilets.



Source: AICD DHS/MICS Survey Database, 2007.

Sharing with other households not only implies that household members lose time in accessing these facilities, but also that they may pay more than in the formal network. Owners and operators of yard taps, standposts, and toilets may charge exorbitant amounts that depend on several factors, including distance to and quality of alternate sources and the availability and cost to connecting to the formal network.

Alternative fuels for cooking and lighting

The majority of Africa's population cooks with traditional solid fuels and relies on candles or kerosene for lighting. For cooking, around 83 percent of the population relies on traditional solid fuels, such as wood and charcoal. Though this trend is prevalent across the population, it is more pronounced among the poor. In Ethiopia, Guinea, Lesotho, Mozambique, Tanzania, Zambia, Zimbabwe, all the surveyed households in the bottom quintile reported using wood or charcoal for cooking. In all other countries except South Africa, more than 90 percent of households in the bottom quintile depend on dirty fuels to meet their cooking needs. The situation is somewhat better in Gabon and South Africa (where some 30 percent of people still use traditional fuels), as well as Lesotho and Senegal (around 60 percent). Elsewhere, around 90 percent of the population cooks with traditional fuels. Although reliance on traditional fuels is significantly higher in rural areas (close to 100 percent of households), their use in urban areas remains quite high (more than 70 percent of households in many cases).

Kerosene is the most common lighting fuel in countries with sparse electricity coverage. In fact, for lighting purposes, kerosene is the only fuel that can be considered as an alternative to electricity. There are a few exceptions. In Guinea Bissau, 30 percent of households depend on natural gas or liquefied propane gas for lighting. Not surprisingly, dependence on kerosene is prevalent in rural areas and in the poorest households. An overwhelming proportion of rural households in Kenya, Sierra Leone, Tanzania, and Uganda use it, as do more than three-quarters of the poorest households in Benin, Burkina Faso, Cameroon, Republic of Congo, Ghana, Kenya, Madagascar, Niger, Senegal, Sierra Leone, Tanzania, and Uganda. In some low-income countries, poor households also use charcoal and wood for lighting. This practice is found in Burundi, Democratic Republic of Congo, Ethiopia, Mozambique, and Rwanda. The use of kerosene is not limited to the poor population. In Benin, Chad, Ethiopia, Kenya, Niger, Tanzania, and Uganda, more than 60 percent of the richest households use it.

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Table 5.5 Patterns of access to electricity and alternatives

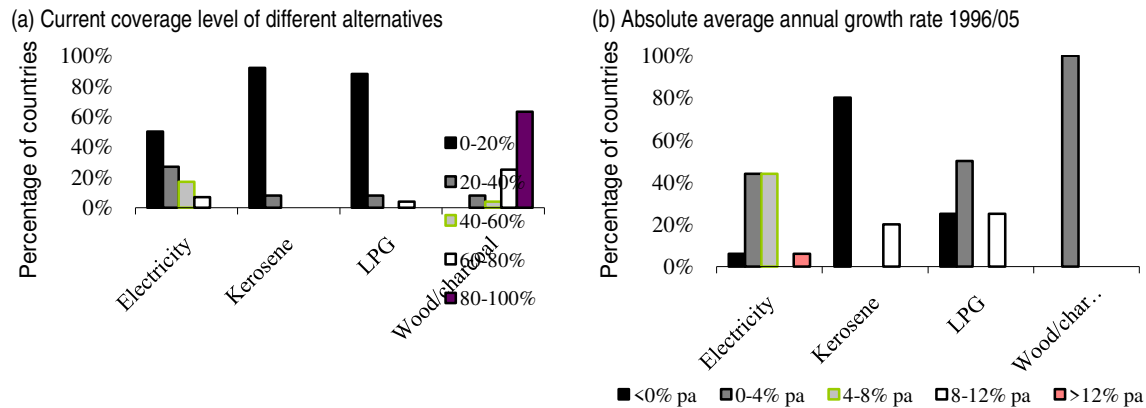
Percentage of households, population weighted average				
	Electricity (lighting)	Kerosene (cooking)	LPG (cooking)	Wood/charcoal (cooking)
By time period (national)				
Early 1990s	23			
Late 1990s	28	9	3	80
Early 2000s	31	8	3	74
By location				
Rural	12	3	1	93
Urban	71	21	8	58
By quintile				
First	4	1	0	98
Second	14	3	0	95
Third	20	4	2	90
Fourth	38	9	4	79
Fifth	72	23	13	49
By country income group				
Low	26	7	3	87
Middle	55	15	8	52
By subregion				
East Africa	12	3	2	92
West Africa	38	13	4	80
South Africa	33	8	3	71
Central Africa	31	4	14	80

Source: AICD DHS/MICS Survey Database, 2007.

The overall average annual growth rate for energy services has been 5 percent for electricity, -5 percent for kerosene, 4 percent for LPG, and 2 percent for wood or charcoal. Africans primarily use wood and charcoal for cooking and most of the countries are growing between 0-4 percent in the use of these fuels. The only other alternatives for cooking are kerosene and LPG which are sparingly used. The only countries where there is kerosene used for cooking by more than 10 percent of households is in Lesotho and Nigeria. LPG, which is a clean fuel, is used for cooking by 60 percent of the households in Gabon. The other countries where fuel is relatively important are Senegal and Mauritania. Most of the countries have exhibited a growth rate of less than 4 percent in LPG coverage in the past ten years.

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Figure 5.8 Country frequency distribution of alternative forms of energy

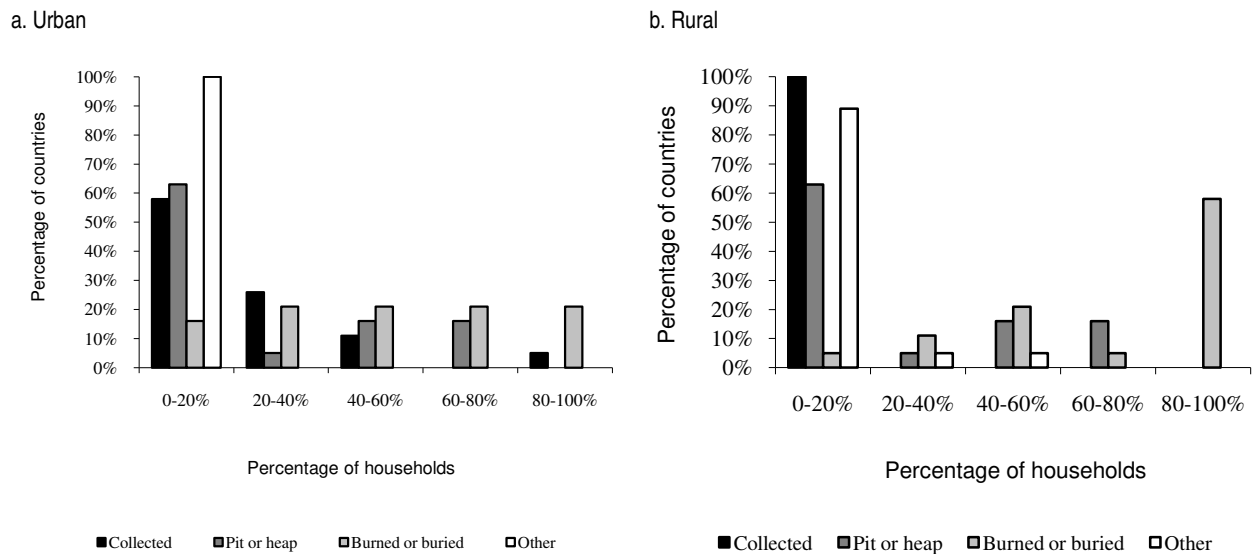


Source: AICD DHS/MICS Survey Database, 2007.

Alternatives to modern rubbish disposal

More than half of the African households dump, burn, or bury their household waste. Only 30 percent of urban households have access to an advanced waste collection option such as collection by the government, a private company, or a nongovernmental organization (table 5.6). Only 1 percent of rural Africans have their household waste collected by a formal authority. In rural areas, burning or burying is the most dominant mode of disposal, while in urban areas dumping is another widely used method (figure 5.9).

Figure 5.9 Current country frequency distribution for modes of rubbish disposal



Source: AICD Expenditure Survey Database, 2007.

In Ghana, Rwanda, Madagascar, and Sierra Leone, more than 90 percent of the households dump their household garbage. Only in Morocco did more than half of the households surveyed report that their waste was collected. In urban Morocco, waste is collected from 86 percent of households. In urban Chad,

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Cameroon, Cote d'Ivoire, Republic of Congo, Mauritania, and Nigeria waste is collected from more than one-quarter of households. Not surprisingly, the situation is much worse in rural Africa. There is no collection system in rural Congo, Rwanda, or Ghana, where everyone dumps their household garbage. More than 90 percent of households in rural Benin, Cameroon, Cote d'Ivoire, Mauritania, Madagascar, and Sierra Leone dispose of their household waste in informal, unregulated dumps.

	Collected	Pit/Heap	Burned or buried
By location			
Rural	1	29	57
Urban	30	26	40
By quintile			
First	7	27	55
Second	7	29	54
Third	8	29	52
Fourth	11	29	50
Fifth	18	28	46
By country income group			
Low	8	31	50
Middle	37	0	59
By subregion			
East Africa	3	22	52
West Africa	8	12	23
South Africa	5	36	52
Central Africa	6	36	47

Alternatives to personal telephones

The main alternative to owning a telephone remains using public telephone. There is no direct survey evidence on the use of public telephones. However, the limited evidence available suggests that use of public telephones is not particularly widespread and confined mainly to landlines. This insight comes from identifying households that report telecommunications expenditure but do not report owning a telephone. On this basis, it was found that around 6 percent of the population reported expenditure on a landline telephone, even though they did not own one, while less than 1 percent of the population reported expenditure on a cellular telephone even though they did not own one. While this indirect evidence cannot be regarded as firm, it does suggest that the percentage of the population using public telephone services is much lower than the percentage of the population owning a private telephone. It also suggests that public telephone services are being provided primarily through landline telephones, as opposed to retailing of air time on mobile networks. Nevertheless, at present there are very few household surveys that incorporate questions on cellular telephony, so the evidence on this remains very partial.

In conclusion, the vast majority of African households relies and for the immediate future will continue to rely on second best alternatives to modern infrastructure services. The growth rate of second best alternatives has been at least as high as that for modern infrastructure services. Thus, while the population with access to piped water has been growing at 1 percent per year, the population with access

to standposts has been growing at 3 percent per year. In the case of sanitation, the overall average annual growth rate of the population with access has been at 7 percent for flush toilet and 12 percent for VIP latrines.

Extending services through shared connections and public access

What is striking from the household surveys is the extent to which formal or informal sharing of connections and public forms of access provide a way of leveraging the benefits of the network across a broader section of the population. For one thing, the percentage of the urban population living within range of infrastructure networks is substantially higher than the coverage rate for private household connections (table 5.7). The difference between these two rates provides a first order estimate of the potential for communal use of network services that ranges between 20 and 40 percent depending on the service.

Thus, in the case of water, at least 27 percent of urban households share public standposts, compared with a potential level of 35 percent. While it is well known that household resellers have emerged as a significant alternate provider of water supply, it is not possible to identify the share of households that depend on household resellers from the household surveys, because that share is hidden among households who use piped water supply as their primary water source. In the case of sanitation, 50 percent of households report sharing sanitation facilities, compared with a potential level of 38. In the case of electricity and telephones, 22 percent of urban households live in electrified areas even if they do lack electricity connections, as such they can (or at least potentially could) benefit from services such as public street lighting. In the case of telephony, 48 percent of the urban population lives in areas where telephone service is available, and therefore can (or at least potentially could) benefit from public telephony or resale of telephone services.

Table 5.7 Importance of communal modes of access in urban areas

Percentage of households				
	Coverage rate (C)	Access rate (A)	Rate for potential communal use (A – C)	Evidence of sharing
Electricity	71	93	22	None; no data on street lighting
Piped water	38	73	35	26 percent of urban households share their connection through public tap or standposts
Flush toilet	31	69	38	50 percent of urban households share their facilities
Telephone	20	68	48	Evidence on public telephone usage too sketchy to provide firm conclusions.

6 Conclusions and policy implications

Africa lags well behind other developing regions in infrastructure access; the limited gains of the 1990s appear to have prevailed in the early 2000s. The overall picture on access to infrastructure services in Africa is a very sobering one. There is clear evidence that many countries are failing to expand services fast enough to keep ahead of rapid demographic growth and even faster urbanization. As a result, if present trends continue, Africa is likely to lag even further behind other developing regions, and universal access will be more than 50 years away in many countries.

However, the wide diversity of performance across countries suggests that there are valuable lessons to be learned. These aggregate statistics conceal substantial variation in performance across countries; even *within* the low and middle income brackets. A significant number of countries have succeeded in expanding the population served with water, electricity and sanitation by an annual average of 5-10 percent, which is fast enough to make substantial coverage gains within a reasonable time frame. Further investigation is warranted to explain what determines the superior performance of these countries.

Moreover, the very positive experience of cellular telephony in the last decade highlights the possibility of making rapid progress under the right circumstances. The rapid expansion of cellular telephony to come from almost nowhere in the late 1990s to reaching a substantial number of African households as of today provides considerable food for thought. Much of the explanation lies in factors that are unique to cellular technology, including the relatively low fixed investments, the novel and high value nature of the service, and the commercial innovation in terms of low entry charges and prepayment facilities. While not all of these things can be directly applied to other infrastructure services, they nonetheless provide pointers in terms of directions for change that could help to support faster access in other services. These include lowering capital costs, reducing up-front connection charges, and providing alternative more flexible payment methods to the traditional monthly bill.

The finding that a significant share of the un-served urban population lives close to infrastructure networks suggests the need for greater efforts on the demand side. The low take-up rate of infrastructure services in urban areas indicates that rolling out networks is a necessary but far from sufficient condition for achieving higher access. It also suggests that the financial and economic return of network rollout in African cities has been much lower than might be expected, leaving a relatively small customer base to cover the fixed costs of a relatively expensive network. It is therefore necessary to improve our understanding of the low uptake phenomenon, and second to accompany network rollout with demand-side measures explicitly designed to reduce uptake barriers. An important issue to explore is the magnitude of connection charges, which in Africa tend to be high relative to household incomes. Urban development factors, such as insecure household tenure, may also be playing an important role in blocking infrastructure uptake.

The fact that the majority of the African population rely either on self-supply or simply do without services altogether, also has important implications. Although formal electricity and water service providers play an important role in urban areas—reaching about half the population with electricity and around three quarters with a combination of private and public taps—overall they reach only about 30

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percent of the population. The remaining two-thirds of African households either makes do without safe water, sanitation and lighting or supply themselves from boreholes, traditional pit latrines and candles. Given the slow rates of coverage growth, this situation is likely to persist for some time to come. However, most policy efforts focus on improving the performance and expanding the ambit of the formal infrastructure providers. While this is valid, it would also be important to consider what measures, if any, could be taken to improve the lot of this large segment of the population pending the expansion of modern infrastructure services.

“Second best options” such as stand posts and improved latrines still have a long way to go in reaching a substantial share of the population. The coverage of “second best options” for water and sanitation is surprisingly low, and remains relatively skewed toward the upper income echelons. There is clearly substantial potential for these services to be expanded further.

The low levels of household income represent an absolute constraint on the rate of expansion. The average African household survives on a modest budget of US\$180 per month, of which more than half is absorbed by food expenditures. Typically, about 20 percent of household budgets (or 40 percent of the household non-food budget) is spent on infrastructure services, mainly power and transport. In absolute terms, this translates to little more than US\$30 per month on all utilities and transport. Utility bills of the order of US\$6 per month for a service such as water or power is therefore likely to be affordable for most households in all but the poorest countries. However, utility bills of the order of US\$10 per month start to become unaffordable for a substantial share of the population. At the same time, connection charges of the order of US\$100-200 would clearly be beyond the reach of all but the wealthiest households.

Finally, the results presented in this paper perhaps raise as many questions as they answer, demanding further investigation. While the results reported above provide many insights in to the nature of household usage of infrastructure services in Africa, they also raise many questions that cannot be immediately answered. Why is the variance in access so high across countries, even within the same income band? Why is the variance in access so high across services, and how can a new service such as cellular telephony made such major inroads in so brief a period? Why do many households fail to connect to modern infrastructure services, even when these are physically close at hand? In order to find answers to many of these questions, it is necessary to dig deeper into the supply side, including the institutional organization and the performance of the service providers in each of the countries. Such an analysis is already underway in other components of the broader Africa Infrastructure Country Diagnostic study. When all the work has been completed, it will be possible to revisit the findings of this study and make greater sense of the variations that have been observed.

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Annex 1 Cross-country tables

Part I Methodological issues

Part II Access to modern infrastructure services

Part III Expenditure on infrastructure services

Part IV Access to infrastructure alternatives

Note:

— = not available

n.a. = not applicable

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Part I Methodological issues

Table A1.1.1 Overview of DHS, MICS and expenditure surveys included

Table A1.1.2 Sectoral coverage of expenditure surveys

Table A1.1.3 Standardization of socioeconomic and housing characteristics

Table A1.1.4 Overview of socioeconomic and housing quality characteristics

Table A1.1.5 Methodology for estimation of trends in access to infrastructure services

Table A1.1.6 Comparison of AICD and JMP data on improved access

Table A1.1.7 Population growth and average household size

Table A1.1.8 Methodology for calculating year of universal coverage of infrastructure services

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Table A1.1.1 Surveys from which data were drawn to produce the tables in this annex

	Country	Income group	Urbanization level	Subregion	DHS Surveys	MICS Surveys	Expenditure Surveys
1	Angola	LMI	3	S			2000
2	Benin	LI	2	W	1996, 2001		2002
3	Burkina Faso	LI	1	W	1993, 1999, 2003		2003
4	Burundi	LI	1	E			1998
5	C. African Rep	LI	2	C	1995		
6	Cameroon	LMI	3	C	1991, 1998, 2004		2001
7	Cape Verde	LMI	3	W			2001
8	Chad	LI	1	C	1997, 2004		2004
9	Comoros	LI	2	S	1996		
10	Congo, Rep.	LMI	3	C	2005		2005
11	Cote d'Ivoire	LI	3	W	1994, 1999		2002
12	Congo, DRC	LI	2	C		1995,2001	2005
13	Ethiopia	LI	1	E	2000, 2005		2000
14	Gabon	UMI	3	C	2000		2005
15	Ghana	LI	3	W	1993, 1998, 2003		1998/99
16	Guinea	LI	2	W	1999, 2005		
17	Guinea-Bissau	LI	2	W			2002
18	Kenya	LI	1	E	1993, 1998, 2003		1997
19	Lesotho	LMI	1	S	2005	2000	
20	Madagascar	LI	1	S	1992, 1997, 2004		2001
21	Malawi	LI	1	S	1992, 2000, 2004		2003
22	Mali	LI	1	W	1996, 2001		
23	Mauritania	LI	3	W	2001		2000
24	Morocco	LMI	3	N			2003
25	Mozambique	LI	2	S	1997, 2003		2003
26	Namibia	LMI	2	S	1992, 2000		
27	Niger	LI	1	W	1992, 1998		2005
28	Nigeria	LI	3	W	1990, 1999, 2003		2003
29	Rwanda	LI	1	E	1992, 2000, 2005		1998
30	Sao Tome and Principe	LI	3	W			2000
31	Senegal	LI	3	W	1993, 1997, 2005		2001
32	Sierra Leone	LI	2	W			2003
33	South Africa	UMI	3	S	1998		2000
34	Sudan	LI	2	E		2000	
35	Tanzania	LI	1	E	1992, 1999, 2004		2000
36	Togo	LI	2	W	1998		
37	Uganda	LI	1	E	1995, 2001		2002
38	Zambia	LI	2	S	1992, 1996, 2002		2002
39	Zimbabwe	LI	2	S	1994, 1999		
	Total				63	4	30

Note: LI: Low Income, LMI: Low Middle Income, UMI: Upper Middle Income (Source: WDI, 2007)

LU: Low (0-30); MU: Medium (30-40); HU: High (More than 40)

C: Central Africa; E: East Africa; N: North Africa; S: South Africa; W: West Africa

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Table A1.1.2 Sectoral coverage of expenditure surveys

	Country	Type and Year of Survey	Sample Size	Lighting fuel	Cooking fuel	Water supply	Sani-tation	Landline	Cell phone	Transport
1	Angola	Integrated Expenditure Survey 2000	10,116	Yes	Yes	Yes	No	No	No	No
2	Benin	Core Welfare Indicators Questionnaire 2002	5,350	Yes	Yes	Yes	Yes	No	No	No
3	Burkina Faso	Core Welfare Indicators Questionnaire 2003	8,500	Yes	Yes	Yes	Yes	Yes	No	Yes
4	Burundi	Priority Survey 1998	6,668	Yes	Yes	Yes	No	No	No	Yes
5	Chad	Enquête sur la consommation et le secteur informel au Tchad, 2002	10,992	Yes	Yes	Yes	Yes	Yes	Yes	Yes
6	Cameroon	Enquête Camerounaise aupres des menages II 2001	4,584	Yes	Yes	Yes	Yes	Yes	Yes	Yes
7	Cape Verde	Integrated Expenditure Survey 2001		Yes	Yes	Yes	Yes	Yes	Yes	Yes
8	Cote D'ivoire	Integrated Expenditure Survey 2002	5,002	Yes	Yes	Yes	Yes	Yes	Yes	Yes
9	Congo, Rep.	Enquête Congolaise aupres des menages pour l'evaluation de la pauvreté, 2005	12,097	Yes	Yes	Yes	Yes	Yes	No	Yes
10	Congo, DRC	Integrated Expenditure Survey 2005	10,801	Yes	Yes	Yes	Yes	Yes	Yes	Yes
11	Ethiopia	Welfare Monitoring Survey 2000	16,672	Yes	Yes	Yes	Yes	No	No	Yes
12	Gabon	Core Welfare Indicators Questionnaire 2005	7,902	Yes	Yes	Yes	Yes	No	Yes	Yes
13	Ghana	Ghana Living Standards Survey 1998/99	5,991	Yes	Yes	Yes	Yes	No	No	Yes
14	Guinea-Bissau	Core Welfare Indicators Questionnaire 2002	3,216	Yes	Yes	Yes	Yes	No	No	Yes
15	Kenya	Welfare Monitoring Survey 1997	10,874	Yes	Yes	Yes	Yes	Yes	No	Yes
16	Madagascar	Enquete prioritaire des menages 2001	5,081	Yes	Yes	Yes	Yes	Yes	Yes	Yes
17	Malawi	Integrated Household Survey 2003	11,280	Yes	Yes	Yes	Yes	Yes	Yes	Yes
18	Mauritania	Enquête permanente sur les conditions de vie des menages 2000	5,865	Yes	Yes	Yes	Yes	Yes	No	Yes
19	Morocco	Integrated Household Survey 2003	5,129	No	No	Yes	Yes	Yes	Yes	No
20	Mozambique	Inquérito aos agregados familiares sobre orçamento familiar 2002/3	8,703	Yes	Yes	Yes	Yes	Yes	Yes	Yes
21	Niger	Integrated Household Survey 2005	6,690	Yes	Yes	Yes	Yes	No	No	Yes
22	Nigeria	Nigeria Living Standards Survey 2003	19,158	Yes	Yes	Yes	Yes	No	No	Yes
23	Rwanda	Enquête integrale sur les conditions de vie des menages (avec module budget et consommation) 1999	6,420	Yes	Yes	Yes	Yes	Yes	No	Yes
24	Sao Tome and Principe	Enquête sur les conditions de vie des menages 2000	6,594	Yes	Yes	Yes	Yes	No	No	Yes
25	Senegal	Integrated Expenditure Survey 2001	2,418	Yes	Yes	Yes	Yes	No	No	Yes
26	Sierra Leone	Integrated Household Survey 2003	3,713	Yes	Yes	Yes	Yes	Yes	No	Yes
27	South Africa	Integrated Expenditure Survey 2000	26,263	No	No	Yes	Yes	Yes	Yes	Yes
28	Tanzania	Household Budget Survey 2000	22,207	Yes	Yes	Yes	Yes	Yes	No	Yes
29	Uganda	National Household Survey 2002	9,710	Yes	Yes	Yes	Yes	Yes	Yes	Yes
30	Zambia	Living Conditions Monitoring Survey 2002	9,715	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Total		267,711	28	28	30	28	19	13	27

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Table A1.1.3 Standardization of socioeconomic and housing characteristics

Education		Wall Material	Type
1. No education/pre-school		1) Cement/Concrete	Improved
2. Primary		2) Wood/cardboard/hardboard	Improved
3. Secondary		3) Iron sheets/tiles/ asbestos/plastic	Improved
4. Vocational/Specialized training		4) Bamboo/pole/pole and dagga Grass/straw	Unimproved
5. Tertiary (BA, MA, Ph.D)		5) Mud/earth/mud brick	Unimproved
		6) Burnt brick/stone	Improved
		7) Other	Unimproved
Floor Material		Roof Material	
1) Sand, earth, mud, dung, straw	Unimproved	1) Iron Sheets/Plastic Sheets/Asbestos Sheets	Improved
2) Smoothed mud, grass/bamboo/broken bricks	Unimproved	2) Clay tiles/Asbestos Tiles	Improved
3) Cement/concrete/stone/bricks	Improved	3) Cement/concrete/bricks	Improved
4) Wood/tile / linoleum/vinyl or Ashphalt strips/Wood planks	Improved	4) Grass or straw / wood / mud / mud bricks/bamboo	Unimproved
5) Other	Unimproved	5) Other	Unimproved

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Table A1.1.4 Overview of socioeconomic and housing quality characteristics

Country	Household size	Head with more than secondary education (percent)	Households living in own dwelling (percent)	Households living in houses with improved roof (percent)	Households living in houses with improved wall (percent)	Households living in houses with improved floor (percent)
Angola	6.2	57.0	63.3	10.8	85.6	66.3
Benin	4.9	49.7	56.5	80.1	0.5	60.3
Burkina Faso	6.4	55.2	85.3	41.9	11.7	33.0
Burundi	4.9	4.0	94.9	nav	nav	nav
Chad	5.9	16.4	81.0	14.7	0.0	2.6
Cameroon	2.9	21.1	53.1	77.8	29.4	49.7
Cape Verde	4.9	16.3	68.0	97.8	55.1	95.3
Cote d'Ivoire	5.3	34.2	53.1	78.0	61.1	82.9
Congo	5.1	62.6	74.2	nav	58.1	58.8
DRC	5.3	66.3	75.7	35.5	17.6	18.7
Ethiopia	4.9	5.4	86.2	25.5	85.0	nav
Gabon	4.6	21.1	nav	98.7	83.0	80.0
Ghana	4.3	22.7	41.6	78.1	47.4	86.0
Guinea-Bissau	7.6	11.7	74.1	48.3	0.3	nav
Kenya	4.6	28.1	72.8	68.1	27.2	32.8
Madagascar	4.7	29.9	81.8	1.4	12.2	55.2
Malawi	4.5	18.4	80.9	25.7	2.3	19.6
Mauritania	6.5	44.3	77.4	nav	nav	nav
Morocco	5.9	5.2	69.6	nav	nav	nav
Mozambique	4.8	11.2	91.2	24.8	51.5	nav
Niger	6.4	17.9	87.1	7.2	7.3	nav
Nigeria	4.7	34.8	67.3	73.5	48.8	66.2
Rwanda	5.0	2.6	90.0	83.8	6.7	14.7
Sao Tome and Principe	4.6	23.5	67.3	98.6	96.4	98.4
Senegal	9.8	14.6	75.7	nav	nav	nav
Sierra Leone	6.2	41.2	53.0	66.5	26.0	36.7
South Africa	3.8	nav	66.0	93.7	25.1	nav
Tanzania	4.8	8.8	84.3	43.4	11.5	25.0
Uganda	5.1	27.3	77.4	64.6	1.9	26.3
Zambia	5.4	38.3	78.0	37.8	22.8	35.7

Source: AICD Expenditure Survey Database, 2007

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Table A1.1.5 Methodology for estimation of trends in access to infrastructure services

One of the difficulties in estimating the Africa-wide trend in access rates stems from the fact that the panel of countries/surveys is not balanced. Some countries have observations from some years, while others have observations for other years. For this reason, three alternative methods can be used to estimate overall access trends.

Method 1: The first method includes only the 11 countries for which we have data in all three time periods.

Method 2: Under the second method, if data are available for only one time period, then those data are used for all three time periods, assuming no change over time in access; if data are available for two periods, the annual growth rate in coverage between the two periods is used to extrapolate forward or backward in order to get an estimate for the third period.

Method 3: The third method works in a similar way, but with one caveat: we assume that coverage cannot drop by more than population growth. That is, given population growth, if coverage in the third period drops by more than what would be observed assuming no growth in the total number of connections, then instead of using the observed value in the survey for the third period, this value is replaced by the coverage rate in the second period times the ratio of the population in the second period divided by the population in the third period.

In the next section, the reported figures on coverage of infrastructure services in the three time periods are computed according to Method 3.

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Table A1.1.6 Comparison of AICD and JMP data on access to improved water and sanitation

	Improved water supply						Improved sanitation					
	JMP			AICD			JMP			AICD		
	Total	Rural	Urban	Total	Rural	Urban	Total	Rural	Urban	Total	Rural	Urban
Benin	67	57	78	43	30	66	33	11	59	16	5	35
Burkina Faso	61	54	94	19	4	86	13	6	42	20	7	78
Cameroon	66	44	86	22	2	49	51	43	58	14	19	9
Chad	42	43	41	39	12	67	9	4	24	35	14	57
Comoros	86	82	92	11	2	45	33	29	41	5	1	20
Congo, Rep. of	58	27	84	49	40	73	27	25	28	24	16	42
Côte d'Ivoire	84	74	97	49	8	86	37	29	46	20	4	35
Ethiopia	22	11	81	51	34	80	13	7	44	26	10	53
Gabon	88	47	95	22	13	89	36	30	37	3	2	12
Ghana	75	64	88	73	20	92	18	11	27	47	13	58
Guinea	50	35	78	36	10	72	18	11	31	33	12	62
Kenya	61	46	83	22	3	66	43	41	46	5	2	11
Lesotho	79	76	92	27	17	70	37	32	61	17	9	50
Madagascar	46	35	77	59	52	89	32	26	48	22	17	47
Malawi	73	68	98	23	12	64	61	61	62	51	45	74
Mali	50	36	78	19	9	75	46	39	59	5	2	20
Mauritania	53	44	59	29	18	61	34	8	49	17	10	36
Mozambique	43	26	72	32	18	51	32	19	53	6	0	13
Namibia	87	81	98	24	5	63	25	13	50	5	0	13
Niger	46	36	80	58	38	98	13	4	43	33	10	80
Nigeria	48	31	67	19	7	69	44	36	53	13	2	60
Rwanda	74	69	92	16	8	32	42	38	56	16	7	33
Senegal	76	60	92	28	22	57	57	34	79	30	26	55
South Africa	88	73	99	61	41	88	65	46	79	46	25	74
Tanzania	62	49	85	78	55	98	47	43	53	46	6	80
Togo	52	36	80	33	22	67	35	15	71	6	2	22
Uganda	60	56	87	35	18	74	43	41	54	18	12	33
Zambia	50	27	86	9	1	62	44	31	63	4	2	20
Zimbabwe	81	72	98	34	7	83	53	47	63	20	3	49
Congo, DR of	46	29	82	27	5	65	30	25	42	11	0	30
Sudan	70	64	78	29	15	49	34	24	50	6	1	14
Overall total	56	42	80	29	14	63	37	28	53	18	7	42

*AICD: Improved Water coverage includes piped supply and standpost supply. Improved Sanitation coverage includes flush toilet and VIP/SAN PLAT/Chemical toilet

Note: JMP data is from 2004 and AICD data is for the latest available year. JMP figures acknowledge that open pit latrine and traditional pit, pit latrine are terms often used interchangeably and cannot be considered as 'improved'. Therefore, only 50 percent of traditional pit latrine users are considered improved. In AICD, all the traditional pit latrine users are considered 'unimproved'.

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Table A1.1.7 Population growth and average household size

Country	DHS survey year	Average household size	Cumulative population growth index (base = 1.00)	Annual population growth (percent)	Cumulative growth in number of households (base = 1.00)	Annual growth in number of households (percent)	Annual household minus pop. growth (percent)
Burkina Faso	1993	6.65	n.a.	n.a.	n.a.	n.a.	n.a.
	2003	6.47	1.34	2.93	1.37	3.22	0.29
Benin	1996	5.99	n.a.	n.a.	n.a.	n.a.	n.a.
	2001	5.18	1.16	3.02	1.34	6.05	3.03
Cote d'Ivoire	1994	6.21	n.a.	n.a.	n.a.	n.a.	n.a.
	1999	6.17	1.14	2.70	1.15	2.86	0.16
Cameroon	1991	5.59	n.a.	n.a.	n.a.	n.a.	n.a.
	2004	4.76	1.34	2.27	1.57	3.54	1.27
Ethiopia	2000	4.82	n.a.	n.a.	n.a.	n.a.	n.a.
	2005	5.03	1.11	2.08	1.06	1.23	-0.85
Ghana	1993	3.76	n.a.	n.a.	n.a.	n.a.	n.a.
	2003	4.03	1.26	2.34	1.18	1.65	-0.69
Guinea	1999	6.62	n.a.	n.a.	n.a.	n.a.	n.a.
	2005	6.09	1.14	2.18	1.24	3.61	1.43
Kenya	1993	4.79	n.a.	n.a.	n.a.	n.a.	n.a.
	2003	4.35	1.27	2.43	1.40	3.43	0.99
Madagascar	1992	5.17	n.a.	n.a.	n.a.	n.a.	n.a.
	2004	4.62	1.42	2.96	1.59	3.93	0.97
Mali	1996	5.60	n.a.	n.a.	n.a.	n.a.	n.a.
	2001	5.32	1.15	2.85	1.21	3.88	1.03
Malawi	1992	4.46	n.a.	n.a.	n.a.	n.a.	n.a.
	2004	4.38	1.28	2.11	1.31	2.27	0.16
Mozambique	1997	4.62	n.a.	n.a.	n.a.	n.a.	n.a.
	2003	4.85	1.14	2.17	1.08	1.34	-0.83
Nigeria	1990	6.28	n.a.	n.a.	n.a.	n.a.	n.a.
	2003	4.97	1.39	2.57	1.75	4.42	1.85
Niger	1992	6.27	n.a.	n.a.	n.a.	n.a.	n.a.
	1998	5.93	1.22	3.36	1.29	4.32	0.96
Namibia	1992	6.00	n.a.	n.a.	n.a.	n.a.	n.a.
	2000	5.05	1.26	2.94	1.50	5.16	2.23
Rwanda	1992	4.97	n.a.	n.a.	n.a.	n.a.	n.a.
	2005	4.57	1.41	2.70	1.54	3.37	0.66
Senegal	1993	8.83	n.a.	n.a.	n.a.	n.a.	n.a.
	2005	8.69	1.35	2.51	1.37	2.66	0.14
Chad	1997	5.33	n.a.	n.a.	n.a.	n.a.	n.a.
	2004	5.35	1.26	3.41	1.26	3.35	-0.06
Tanzania	1992	5.31	n.a.	n.a.	n.a.	n.a.	n.a.
	2004	4.87	1.34	2.46	1.46	3.21	0.75
Uganda	1995	4.75	n.a.	n.a.	n.a.	n.a.	n.a.
	2001	4.80	1.20	3.11	1.19	2.94	-0.17
Zambia	1992	5.61	n.a.	n.a.	n.a.	n.a.	n.a.
	2002	5.24	1.25	2.29	1.34	2.98	0.70
Zimbabwe	1994	4.67	n.a.	n.a.	n.a.	n.a.	n.a.
	1999	4.19	1.07	1.45	1.20	3.70	2.25

Source: Diallo and Wodon (2007), estimation using DHS data. Population data are from the World Bank's database.

Table A1.1.8 Methodology for calculating the year of universal coverage of infrastructure services

The population in the year of reference is Y^r and it is assumed that the population grows at a steady growth rate G_p . The covered population on the same year is assumed to be known and it increases at a constant rate G_{cp} .

On the year $Y^r + 1$;

- The population is given by the formula: $P(Y^r + 1) = G_p \times P(Y^r)$
- The covered population is given by the formula: $P^C(Y^r + 1) = G_{CP} \times P^C(Y^r)$

The rate of coverage on the year $Y^r + 1$ is as follows:

$$\frac{P^C(Y^r + 1)}{P(Y^r + 1)} = \frac{G_{CP}}{G_p} \times \frac{P^C(Y^r)}{P(Y^r)}$$

Therefore the rate of coverage increases¹¹ (or decreases) at a rate G_{CP}/G_p .

The rate of coverage on any year Y (such that $Y > Y^r$) is given by:

$$\frac{P^C(Y)}{P(Y)} = \left(\frac{G_{CP}}{G_p} \right)^{Y-Y^r} \times \frac{P^C(Y^r)}{P(Y^r)}$$

Universal coverage corresponds to a rate of coverage equal to 1 (or 100 if we carry out our analysis in percentage terms but then the previous formulas for the rate of coverage have to be expressed in percentages):

$$\frac{P^C(Y)}{P(Y)} = 1$$

but from the previous formula that translates to:

$$\left(\frac{G_{CP}}{G_p} \right)^{Y-Y^r} \times \frac{P^C(Y^r)}{P(Y^r)} = 1$$

Therefore the year of full coverage Y^{UC} is given by the following formula¹²:

$$Y = Y^r + \frac{\text{Log}\left(\frac{P(Y^r)}{P^C(Y^r)}\right)}{\text{Log}\left(\frac{G_{CP}}{G_p}\right)}$$

¹¹ There is a net increase in the coverage if (and only if) G_{cp} is greater than G_p , otherwise if the population increases at a higher rate than the covered population there are no chances for full coverage to occur.

¹² $\left(\frac{G_{CP}}{G_p} \right)^{Y-Y^r} \times \frac{P^C(Y^r)}{P(Y^r)} = 1 \Rightarrow \left(\frac{G_{CP}}{G_p} \right)^{Y-Y^r} = \frac{P(Y^r)}{P^C(Y^r)} \Rightarrow (Y - Y^r) \times \text{Log}\left(\frac{G_{CP}}{G_p}\right) = \text{Log}\left(\frac{P(Y^r)}{P^C(Y^r)}\right)$

Part 2 Access to modern infrastructure services

Table A1.2.1	Piped water
Table A1.2.2	Improved water
Table A1.2.3	Flush toilet
Table A1.2.4	Improved sanitation
Table A1.2.5	Electricity
Table A1.2.6	Landline telephone
Table A1.2.7	Cellular telephone
Table A1.2.8	Refuse collection by Government, Private Company or NGO
Table A1.2.9	Coverage of any one modern infrastructure services
Table A1.2.10	Coverage of any two modern infrastructure service
Table A1.2.11	Coverage of any three modern infrastructure service
Table A1.2.12	Coverage of any four modern infrastructure service
Table A1.2.13	Access, Hook-up, Coverage of piped water (Urban)
Table A1.2.14	Adjusted Access, Hook-up, Coverage of piped water (Urban)
Table A1.2.15	Access, Hook-up, Coverage of flush toilet (Urban)
Table A1.2.16	Access, Hook-up, Coverage of electricity (Urban)
Table A1.2.17	Adjusted Access, Hook-up, Coverage of electricity (Urban)
Table A1.2.18	Access, Hook-up, Coverage of landline telephone (Urban)

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Table A1.2.1 Piped water

Percentage population	By time period (national)			By location		By expenditure quintile				
	Early 1990s	Late 1990s	Early 2000s	Rural	Urban	1st	2nd	3rd	4th	5th
By country										
Benin	—	23	29	11	60	0	8	10	37	89
Burkina Faso	6	4	6	0	33	0	0	0	0	34
C. African Rep	3	—	—	0	6	0	0	0	0	13
Cameroon	12	11	13	2	24	0	0	4	11	49
Chad	—	3	4	0	22	0	0	0	0	22
Comoros	—	23	—	15	43	0	38	14	21	46
Congo, Rep.	—	—	26	3	46	0	0	5	34	90
Cote d'Ivoire	24	28	—	7	65	0	2	3	38	98
Ethiopia	—	4	6	0	48	0	0	0	0	30
Gabon	—	43	—	9	55	0	7	30	78	100
Ghana	14	15	15	2	34	1	2	2	11	60
Guinea	—	10	9	1	28	0	0	0	2	44
Kenya	16	20	18	10	50	0	1	4	22	62
Lesotho	—	11	11	2	50	0	0	0	3	50
Madagascar	5	6	5	2	17	0	0	0	2	24
Malawi	6	8	6	2	32	0	1	0	1	30
Mali	—	6	9	2	29	0	1	1	4	38
Mauritania	—	—	17	10	28	0	0	5	25	57
Mozambique	—	7	7	0	20	0	0	0	0	34
Namibia	31	37	—	16	79	0	2	17	68	100
Niger	5	6	—	0	31	0	0	0	5	26
Nigeria	11	10	7	2	15	0	1	4	11	18
Rwanda	2	6	3	1	16	0	0	0	1	13
Senegal	27	31	43	18	77	1	9	36	75	96
South Africa	—	59	—	25	88	3	25	72	97	100
Tanzania	10	14	7	3	22	0	0	0	7	30
Togo	—	18	—	3	51	1	2	5	17	63
Uganda	2	—	2	0	14	0	0	0	0	10
Zambia	31	21	18	3	46	0	0	0	15	77
Zimbabwe	27	33	—	4	93	0	11	7	49	99
Congo, Dem. Rep.	21	—	15	0	40	0	0	0	7	59
Sudan	—	21	—	10	37	0	0	5	45	77
By income group										
Low income	14	13	14	3	32	0	1	3	13	41
Middle income	50	45	42	17	69	2	16	47	69	86
By urbanization										
Low	6	7	8	2	33	0	0	1	5	31
Medium	25	23	22	4	42	0	2	3	20	64
High	7	8	22	7	39	1	6	17	32	49
By subregion										
East	10	9	11	3	37	0	0	2	12	39
West	15	15	15	3	28	0	2	5	16	38
South	34	34	29	8	65	1	10	26	42	67
Central	18	14	16	1	34	0	0	2	9	53
Overall	18	17	17	4	38	0	3	7	18	46

Note: Location and Expenditure Quintile Data is for the Latest Available Year

Source: AICD DHS/MICS Database, 2007

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Note: The shaded 'Trends in Access' figures are based on Method 3 (Refer to Annex A1.1.5)

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Table A1.2.2 Improved water

Percentage population	By time period (national)			By location		By expenditure quintile				
	Early 1990s	Late 1990s	Early 2000s	Rural	Urban	1st	2nd	3rd	4th	5th
By country										
Benin	—	29	43	29	66	14	26	30	53	91
Burkina Faso	16	12	19	4	86	0	0	5	17	81
C. African Rep	22	—	—	2	49	0	2	10	36	60
Cameroon	34	35	39	12	67	0	17	33	60	85
Chad	—	9	11	2	45	0	1	7	7	41
Comoros	—	49	—	40	73	69	46	39	36	53
Congo. Rep. of	—	—	49	8	86	4	12	51	84	96
Cote d'Ivoire	45	51	—	34	80	24	34	32	68	98
Ethiopia	—	16	22	13	89	0	4	18	20	67
Gabon	—	73	—	20	92	14	62	93	98	100
Ghana	32	37	36	10	72	3	24	19	46	87
Guinea	—	21	22	3	66	0	0	5	18	87
Kenya	27	29	27	17	70	3	6	15	37	76
Lesotho	—	63	59	52	89	55	43	56	58	81
Madagascar	17	17	23	12	64	0	0	6	36	74
Malawi	26	24	19	9	75	0	1	7	24	65
Mali	—	17	29	18	61	1	13	29	33	72
Mauritania	—	—	32	18	51	0	24	24	46	68
Mozambique	—	24	24	5	63	0	3	6	29	86
Namibia	50	58	—	38	98	13	32	55	91	100
Niger	17	19	—	7	69	0	0	0	37	57
Nigeria	24	24	16	8	32	4	8	13	25	32
Rwanda	23	36	28	22	57	0	3	51	24	61
Senegal	45	48	61	41	88	20	42	60	88	98
South Africa	—	78	—	55	98	34	72	89	98	100
Tanzania	31	34	33	22	67	12	15	20	44	72
Togo	—	35	—	18	74	9	14	25	45	84
Uganda	6	—	9	1	62	0	0	1	3	42
Zambia	49	37	34	7	83	0	3	14	60	94
Zimbabwe	35	40	—	12	99	1	20	17	65	99
Congo, Dem. Rep.	28	—	27	5	65	0	3	8	30	83
Sudan	—	29	—	15	49	8	10	14	52	83
By income group										
Low income	27	28	28	12	58	4	9	15	33	66
Middle income	74	67	63	41	90	24	53	72	87	95
By urbanization										
Low	19	19	23	13	72	3	5	15	27	66
Medium	39	39	35	10	66	3	7	12	42	86
High	41	40	38	19	58	11	25	33	49	62
By subregion										
East	33	32	33	14	68	4	7	16	30	69
West	32	32	32	13	49	6	13	17	35	56
South	53	53	46	22	87	13	30	39	62	89
Central	30	26	29	6	66	0	7	16	37	79
Overall	32	32	32	14	63	6	13	21	38	69

Source: AICD DHS/MICS Database, 2007.

Note: Location and expenditure quintile data is for the latest available year. Shaded 'Trends in Access' figures are based on Method 3 (Annex A1.1.5)

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Table A1.2.3 Flush toilet

Percentage population	By time period (national)			By location		By expenditure quintile				
	Early 1990s	Late 1990s	Early 2000s	Rural	Urban	1st	2nd	3rd	4th	5th
By country										
Benin	—	0	2	0	6	0	0	0	1	11
Burkina Faso	1	1	2	0	8	0	0	0	1	9
C. African Rep	1	—	—	0	2	0	0	0	0	5
Cameroon	7	6	8	1	16	0	0	0	2	38
Chad	—	0	2	0	7	0	0	0	1	8
Comoros	—	3	—	1	8	0	0	0	1	14
Congo, Rep.	—	—	5	0	10	0	0	0	2	24
Cote d'Ivoire	14	12	—	2	30	0	0	0	2	60
Ethiopia	—	0	2	1	8	0	0	1	4	6
Gabon	—	25	—	4	32	0	1	5	22	95
Ghana	6	8	10	2	23	0	2	1	4	43
Guinea	—	3	3	1	8	0	0	0	1	12
Kenya	8	10	9	1	39	0	0	0	2	43
Lesotho	—	2	2	0	8	0	0	0	0	8
Madagascar	3	2	2	0	7	0	0	0	1	8
Malawi	3	3	4	1	18	0	1	0	1	16
Mali	—	1	6	3	15	0	0	7	6	18
Mauritania	—	—	2	0	4	0	0	0	0	8
Mozambique	—	3	3	0	8	0	0	0	0	14
Namibia	27	31	—	7	79	0	0	2	52	99
Niger	1	1	—	0	5	0	0	0	2	3
Nigeria	8	12	13	6	28	0	0	1	10	54
Rwanda	1	1	1	0	6	0	0	0	0	5
Senegal	11	9	36	14	65	1	7	37	57	78
South Africa	—	46	—	6	80	0	4	36	93	100
Tanzania	1	2	3	0	10	0	0	0	1	13
Togo	—	0	—	0	0	0	0	0	0	0
Uganda	2	—	2	0	11	0	0	0	1	7
Zambia	27	21	18	2	47	0	0	1	14	76
Zimbabwe	26	31	—	2	95	0	11	6	43	99
Congo, Dem. Rep.	2	—	1	0	4	0	0	0	0	6
Sudan	—	6	—	1	14	0	0	1	7	31
By income group										
Low income	6	7	8	2	22	0	1	2	6	29
Middle income	38	33	31	4	58	0	2	22	61	78
By urbanization										
Low	2	1	3	1	13	0	0	1	2	13
Medium	12	16	10	1	19	0	1	1	7	27
High	17	18	19	5	38	0	1	9	25	61
By subregion										
East	10	10	11	1	15	0	0	1	3	17
West	7	9	11	4	26	0	1	3	9	44
South	27	27	22	2	57	0	3	13	39	59
Central	5	5	6	0	9	0	0	0	1	14
Overall	9	9	10	2	28	0	1	4	12	34

Source: AICD DHS/MICS Database, 2007.

Note: Location and expenditure quintile data is for the latest available year. Shaded 'Trends in Access' figures are based on Method 3 (Annex A1.1.5)

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Table A1.2.4 Improved sanitation

Percentage population	By time period (national)			By location		By expenditure quintile				
	Early 1990s	Late 1990s	Early 2000s	Rural	Urban	1st	2nd	3rd	4th	5th
By country										
Benin	—	1	16	5	35	0	1	4	13	63
Burkina Faso	2	1	20	7	78	0	1	3	21	83
C. African Rep	14	—	—	19	9	16	28	13	7	8
Cameroon	7	30	35	14	57	0	1	25	65	84
Chad	—	8	5	1	20	0	0	0	2	21
Comoros	—	24	—	16	42	0	0	18	25	76
Congo, Rep.	—	—	20	4	35	0	1	8	21	72
Cote d'Ivoire	37	26	—	10	53	0	1	11	31	87
Ethiopia	—	1	3	2	12	0	0	1	4	10
Gabon	—	47	—	13	58	2	14	43	75	100
Ghana	19	29	33	12	62	1	24	19	43	79
Guinea	—	3	5	2	11	0	1	4	3	16
Kenya	14	16	17	9	50	0	0	6	14	64
Lesotho	—	20	22	17	47	0	1	25	35	51
Madagascar	33	7	51	45	74	0	20	66	78	90
Malawi	3	4	5	2	20	0	1	0	1	22
Mali	—	9	17	10	36	0	1	15	23	46
Mauritania	—	—	6	0	13	0	0	0	4	24
Mozambique	—	4	5	0	13	0	0	0	0	24
Namibia	27	33	—	10	80	0	0	9	59	99
Niger	13	13	—	2	60	0	0	0	5	61
Nigeria	8	18	16	7	33	0	1	3	15	61
Rwanda	1	10	30	26	55	0	0	4	76	72
Senegal	33	32	46	25	74	8	24	47	67	85
South Africa	—	46	—	6	80	0	4	36	93	100
Tanzania	3	3	6	2	22	0	0	0	2	30
Togo	—	18	—	12	33	0	4	7	32	48
Uganda	3	—	4	2	20	0	0	1	3	17
Zambia	29	21	20	3	49	0	0	2	18	78
Zimbabwe	47	56	—	37	97	7	35	64	79	100
Congo, Dem. Rep.	12	—	11	0	30	0	0	0	2	46
Sudan	—	6	—	1	14	0	0	1	7	31
By income group										
Low income	12	14	17	7	36	0	3	7	16	48
Middle income	40	41	39	9	71	0	3	30	79	93
By urbanization										
Low	7	4	12	7	34	0	2	7	15	37
Medium	28	32	26	5	30	1	4	7	13	46
High	21	27	26	9	50	1	5	15	38	74
By subregion										
East	14	15	19	4	23	0	0	2	9	29
West	15	20	21	8	40	1	4	8	21	64
South	34	32	33	15	66	1	8	30	56	75
Central	14	22	24	3	37	1	2	6	16	51
Overall	15	16	18	7	42	0	3	10	23	53

Source: AICD DHS/MICS Database, 2007.

Note: Location and expenditure quintile data is for the latest available year. Shaded 'Trends in Access' figures are based on Method 3 (Annex A1.1.5).

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Table A1.2.5 Electricity

Percentage population	By time period (national)			By location		By expenditure quintile				
	Early 1990s	Late 1990s	Early 2000s	Rural	Urban	1st	2nd	3rd	4th	5th
By country										
Benin	—	14	22	6	51	0	1	3	24	82
Burkina Faso	6	6	10	1	54	0	0	1	2	57
C. African Rep	5	—	—	1	11	0	0	0	1	25
Cameroon	31	42	46	16	77	1	14	37	78	98
Chad	—	3	4	0	20	0	0	0	0	21
Comoros	—	30	—	21	54	0	7	17	48	84
Congo, Rep.	—	—	35	16	51	5	14	20	47	88
Cote d'Ivoire	39	50	—	27	90	4	19	41	87	100
Ethiopia	—	11	12	2	86	0	0	1	3	56
Gabon	—	75	—	31	91	17	69	93	98	99
Ghana	28	39	44	21	77	8	39	28	57	90
Guinea	—	17	21	3	63	0	0	4	18	83
Kenya	9	12	13	4	51	0	0	1	7	57
Lesotho	—	—	6	1	28	0	0	0	1	27
Madagascar	9	11	19	10	52	0	0	1	11	82
Malawi	4	6	7	2	34	0	1	0	3	34
Mali	—	8	13	3	41	1	3	2	5	54
Mauritania	—	—	23	3	51	0	2	5	29	81
Mozambique	—	10	11	1	30	0	0	1	4	51
Namibia	20	32	—	10	75	1	1	6	51	100
Niger	6	8	—	0	41	0	0	0	4	36
Nigeria	26	45	51	35	84	10	37	40	78	91
Rwanda	2	7	5	1	27	0	0	1	1	25
Senegal	25	32	46	19	82	4	12	46	76	94
South Africa	—	63	—	36	86	10	36	74	98	100
Tanzania	6	7	11	2	39	0	0	0	3	50
Togo	—	15	—	2	44	0	0	2	10	62
Uganda	7	—	8	3	47	0	0	2	2	38
Zambia	23	20	20	3	50	0	0	0	15	84
Zimbabwe	23	34	—	7	90	0	12	12	50	97
Congo, Dem. Rep.	—	—	—	—	—	—	—	—	—	—
Sudan	—	—	—	—	—	—	—	—	—	—
By income group										
Low income	17	24	27	11	69	3	12	15	32	68
Middle income	59	55	53	27	81	7	28	59	86	97
By urbanization										
Low	8	8	11	3	56	0	0	1	4	52
Medium	24	30	28	3	48	0	1	2	11	60
High	37	47	51	30	83	8	32	45	79	94
By subregion										
East	17	24	27	2	60	0	0	1	3	53
West	25	37	43	20	78	6	23	27	55	80
South	36	37	35	13	66	4	14	28	42	77
Central	25	28	29	8	66	1	11	20	47	76
Overall	23	28	31	12	71	4	14	20	38	72

Source: AICD DHS/MICS Database, 2007.

Note: Location and expenditure quintile data is for the latest available year. Shaded 'Trends in Access' figures are based on Method 3 (Annex A1.1.5).

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Table A1.2.6 Landline telephone

Percentage population	By time period (national)			By location		By expenditure quintile				
	Early 1990s	Late 1990s	Early 2000s	Rural	Urban	1st	2nd	3rd	4th	5th
By country										
Benin	—	—	4	1	10	0	0	0	4	18
Burkina Faso	—	2	4	0	20	0	0	0	0	21
C. African Rep	1	—	—	0	3	0	0	0	0	7
Cameroon	—	3	2	0	5	0	0	1	1	10
Chad	—	0	1	0	4	0	0	0	0	4
Comoros	—	3	—	1	9	0	0	0	1	15
Congo, Rep.	—	—	1	0	2	0	0	0	1	4
Cote d'Ivoire	—	7	—	2	15	0	0	0	1	32
Ethiopia	—	2	4	0	35	0	0	0	0	22
Gabon	—	15	—	2	20	0	1	8	18	48
Ghana	—	2	8	1	17	0	1	1	4	31
Guinea	—	2	7	0	24	0	0	0	4	32
Kenya	—	3	12	6	37	0	1	3	8	49
Lesotho	—	—	17	11	46	0	1	5	22	57
Madagascar	—	1	5	3	12	0	0	0	1	23
Malawi	—	—	6	2	27	0	1	0	2	27
Mali	—	1	3	0	13	0	0	0	1	17
Mauritania	—	—	4	0	8	0	0	0	1	16
Mozambique	—	1	2	0	6	0	0	0	0	11
Namibia	—	17	—	4	44	0	0	2	15	70
Niger	—	1	—	0	5	0	0	0	1	4
Nigeria	—	2	5	2	12	0	1	0	3	21
Rwanda	—	2	1	0	6	0	0	0	0	5
Senegal	—	—	20	7	36	0	3	20	25	51
South Africa	—	27	—	5	45	0	2	9	41	84
Tanzania	—	—	10	3	31	0	0	1	6	42
Togo	—	—	—	—	—	—	—	—	—	—
Uganda	1	—	3	1	18	0	0	0	0	15
Zambia	—	—	4	1	11	0	0	0	5	17
Zimbabwe	—	7	—	1	19	0	3	2	8	23
Congo, Dem. Rep.	—	—	—	—	—	—	—	—	—	—
Sudan	—	—	—	—	—	—	—	—	—	—
By income group										
Low income	3	3	6	2	17	0	1	1	3	25
Middle income	22	20	18	4	32	0	1	6	28	59
By urbanization										
Low	3	3	6	2	24	0	0	1	2	24
Medium	4	4	4	1	18	0	0	1	4	25
High	9	8	10	2	19	0	1	3	11	34
By subregion										
East	3	3	6	2	33	0	0	1	3	32
West	3	3	6	1	14	0	1	1	4	23
South	15	13	12	3	31	0	1	3	18	46
Central	3	2	2	0	8	0	1	1	3	12
Overall	6	5	7	2	20	0	1	2	6	29

Source: AICD DHS/MICS Database, 2007.

Note: Location and expenditure quintile data is for the latest available year.

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Table 1.2.7 Cellular telephone (%)

By Country	National	Rural	Urban	Q1	Q2	Q3	Q4	Q5
Angola	—	—	—	—	—	—	—	—
Benin	—	—	—	—	—	—	—	—
Burkina Faso	—	—	—	—	—	—	—	—
Burundi	—	—	—	—	—	—	—	—
Chad	6.35	5.16	11.09	4.50	3.64	5.78	6.63	11.21
Cameroon	7.61	0.77	16.95	0.24	1.48	3.26	8.35	24.72
Cape Verde	19.14	9.85	26.72	4.20	7.49	15.30	24.56	44.20
Cote d'Ivoire	15.35	2.26	32.58	0.85	3.33	9.15	19.63	43.81
Congo, Rep.	—	—	—	—	—	—	—	—
DRC	10.86	1.43	32.43	2.13	3.86	6.54	12.37	29.43
Ethiopia	—	—	—	—	—	—	—	—
Gabon	63.97	27.89	70.75	24.98	47.85	63.86	75.96	82.27
Ghana	—	—	—	—	—	—	—	—
Guinea-Bissau	—	—	—	—	—	—	—	—
Kenya	—	—	—	—	—	—	—	—
Madagascar	1.75	0.97	4.40	0.00	0.00	0.06	0.00	8.72
Malawi	3.51	1.13	22.06	0.05	0.11	0.34	1.39	15.66
Mauritania	—	—	—	—	—	—	—	—
Morocco	0.69	0.18	1.12	0.17	0.00	0.00	0.70	2.58
Mozambique	6.22	0.95	15.05	0.07	1.04	1.04	3.79	20.74
Niger	—	—	—	—	—	—	—	—
Nigeria	—	—	—	—	—	—	—	—
Rwanda	—	—	—	—	—	—	—	—
Sao Tome & Principe	—	—	—	—	—	—	—	—
Senegal	—	—	—	—	—	—	—	—
Sierra Leone	—	—	—	—	—	—	—	—
South Africa	23.00	11.52	31.65	4.05	7.81	13.95	26.73	62.54
Overall	10.10	2.88	22.38	1.57	3.05	5.48	10.97	29.02
By income group								
LIC	5.8	2.2	25.4	0.3	0.7	1.6	5.1	21.3
MIC	30.6	13.2	37.9	10.8	20.6	28.4	36.2	46.9
By urbanization								
Low	4.74	3.17	20.14	1.80	1.51	2.51	3.62	14.25
Medium	5.91	0.79	15.35	0.12	0.95	1.23	4.01	20.27
High	17.73	7.86	22.26	3.76	7.68	13.13	21.39	40.67
By subregion								
East	6.64	3.23	28.02	0.02	0.42	1.13	5.84	25.82
West	15.25	2.50	31.28	1.05	3.51	9.33	19.51	42.89
South	6.17	1.63	14.50	0.22	1.12	1.40	4.10	20.65
Central	28.06	11.98	32.38	10.09	18.61	25.69	32.91	44.53

Source: AICD Expenditure Survey Database.

Note: The data are from the most recent IES/LSMS.

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Table A1.2.8 Rubbish disposal-collected by government, NGO or private company (%)

By Country	National	Rural	Urban	Q1	Q2	Q3	Q4	Q5
Benin	13.0	9.9	17.4	6.3	6.7	8.9	12.9	21.9
Burkina Faso	6.3	0.3	29.5	0.5	0.7	1.4	4.1	17.4
Cote d'Ivoire	22.4	0.8	49.3	4.0	9.7	13.9	23.7	42.5
Cameroon	17.6	0.4	41.5	2.4	6.4	10.2	17.1	31.5
Congo, Rep.	18.9	0.0	33.3	8.0	13.5	13.7	17.8	33.1
Ethiopia	2.6	0.1	17.7	0.7	1.1	1.2	2.2	6.3
Ghana	4.2	0.4	10.7	0.3	0.5	2.4	3.5	9.3
Morocco	49.7	2.5	85.1	26.7	38.4	53.6	63.3	78.6
Madagascar	8.3	5.8	16.1	0.3	2.7	4.8	5.9	21.4
Mauritania	12.0	1.1	27.2	2.1	2.5	7.2	13.8	25.6
Malawi	2.9	1.0	16.5	0.7	1.1	1.4	1.8	7.1
Nigeria	14.8	2.3	30.0	18.2	11.4	10.9	13.9	18.2
Rwanda	3.2	0.3	29.2	0.2	0.4	0.9	1.2	11.9
Sierra Leone	2.7	0.7	6.7	0.7	1.0	1.2	1.9	9.2
Chad	5.9	2.4	19.6	2.8	3.1	2.7	5.8	11.5
Tanzania	3.1	0.5	12.4	0.9	1.6	1.1	2.1	7.0
Uganda	3.2	0.5	16.1	1.1	1.7	3.0	4.4	8.4
DRC	2.3	0.1	8.2	0.4	0.6	1.0	2.0	5.5
Zambia	3.6	0.9	9.0	0.9	2.0	2.6	3.5	7.1
Overall	10.6	1.3	29.8	7.2	6.8	8.1	10.9	17.6
By income group								
LIC	7.8	1.2	22.6	6.1	4.7	5.1	7.2	13.0
MIC	36.7	1.5	67.4	17.2	26.0	36.2	44.5	59.6
By urbanization								
Low	3.8	0.9	17.2	0.8	1.5	1.8	3.1	9.4
Medium	3.5	1.1	9.2	1.1	1.4	1.9	3.2	7.5
High	19.0	1.9	38.6	16.0	13.7	16.1	20.2	27.4
By subregion								
East	2.9	0.3	15.9	0.8	1.3	1.5	2.6	7.2
West	8.0	0.8	22.7	6.4	5.6	6.6	8.5	11.9
South	5.3	3.0	13.5	0.6	2.0	3.1	4.0	13.1
Central	6.2	0.4	19.3	1.4	2.5	3.4	5.8	12.0

Source: AICD Expenditure Survey Database.

Note: The data is from the most recent IES/LSMS

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Table A1.2.9 Coverage of any one modern infrastructure service

Percentage population	By time period (national)			By location		By expenditure quintile				
	Early 1990s	Late 1990s	Early 2000s	Rural	Urban	1st	2nd	3rd	4th	5th
By country										
Benin	—	27	34	14	68	0	9	12	48	97
Burkina Faso	8	7	12	1	58	0	0	1	4	62
C. African Rep	6	—	—	1	14	0	0	0	1	31
Cameroon	32	42	49	20	79	1	16	43	84	99
Chad	—	4	7	1	33	0	0	0	1	36
Comoros	—	43	—	33	70	0	44	29	59	92
Congo, Rep.	—	—	41	17	63	5	15	24	65	98
Cote d'Ivoire	42	52	—	29	91	4	20	44	94	100
Ethiopia	—	11	13	3	88	0	0	2	6	59
Gabon	—	77	—	33	92	17	72	96	99	100
Ghana	29	41	46	21	80	8	39	29	60	94
Guinea	—	20	23	4	68	0	0	4	20	90
Kenya	19	24	26	15	66	0	3	8	32	85
Lesotho	—	—	22	12	66	0	1	5	24	79
Madagascar	10	13	19	10	53	0	0	1	12	84
Malawi	7	9	11	5	46	0	1	1	4	50
Mali	—	10	18	7	50	1	4	10	14	62
Mauritania	—	—	30	12	54	0	2	10	48	90
Mozambique	—	12	13	2	35	0	0	1	4	60
Namibia	33	43	—	21	86	1	3	25	86	100
Niger	8	10	—	1	48	0	0	0	6	42
Nigeria	28	46	52	36	85	10	39	41	80	92
Rwanda	3	9	8	3	36	0	0	2	2	35
Senegal	34	39	62	39	92	13	36	69	93	99
South Africa	—	71	—	43	94	12	51	92	100	100
Tanzania	12	16	16	6	51	0	0	1	12	68
Togo	—	24	—	5	67	1	2	7	25	83
Uganda	8	—	10	3	52	0	0	2	3	43
Zambia	35	26	25	4	63	0	0	1	25	100
Zimbabwe	29	38	—	10	99	0	12	13	68	100
Congo, Dem. Rep.	—	—	—	—	—	—	—	—	—	—
Sudan	—	—	—	—	—	—	—	—	—	—
By income group										
Low income	21	28	31	13	74	4	14	17	38	76
Middle income	66	61	59	34	88	9	38	72	91	99
By urbanization										
Low	11	11	15	6	64	0	1	3	11	62
Medium	36	40	36	5	58	0	2	4	20	71
High	40	50	55	34	86	10	37	50	83	95
By subregion										
East	21	28	31	6	68	0	1	3	13	65
West	30	41	46	22	80	7	26	30	59	83
South	42	43	39	16	74	5	19	36	46	84
Central	27	30	33	10	72	1	12	23	56	82
Overall	27	32	35	15	76	4	17	23	44	78

Source: AICD DHS/MICS Database, 2007.

Note: Location and expenditure quintile data are for the latest available year. Shaded 'Trends in Access' figures are based on Method 3 (Annex A1.1.5).

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Table A1.2.10 Coverage of any two modern infrastructure services

Percentage population	By time period (national)			By location		By expenditure quintile				
	Early 1990s	Late 1990s	Early 2000s	Rural	Urban	1st	2nd	3rd	4th	5th
By country										
Benin	—	10	18	3	44	0	0	1	13	74
Burkina Faso	4	3	7	0	37	0	0	0	0	38
C. African Rep	2	—	—	0	5	0	0	0	0	11
Cameroon	12	12	27	4	51	0	2	10	39	86
Chad	—	2	3	0	14	0	0	0	0	15
Comoros	—	12	—	4	31	0	1	1	10	47
Congo, Rep.	—	—	21	2	37	0	0	2	18	83
Cote d'Ivoire	23	27	—	5	64	0	0	1	34	99
Ethiopia	—	4	7	0	56	0	0	0	0	35
Gabon	—	45	—	8	58	0	5	35	86	100
Ghana	13	16	18	2	39	0	3	3	12	70
Guinea	—	8	11	1	35	0	0	0	2	52
Kenya	8	11	13	4	51	0	0	1	4	61
Lesotho	—	—	8	1	38	0	0	0	2	36
Madagascar	5	5	7	4	22	0	0	0	2	35
Malawi	3	5	6	2	30	0	1	0	1	29
Mali	—	4	8	1	29	0	0	0	2	39
Mauritania	—	—	12	1	26	0	0	0	7	52
Mozambique	—	5	6	0	17	0	0	0	0	30
Namibia	26	32	—	9	78	0	0	2	59	100
Niger	4	5	—	0	25	0	0	0	3	21
Nigeria	13	16	17	6	39	0	1	4	19	63
Rwanda	1	5	4	1	24	0	0	0	1	21
Senegal	20	26	49	21	85	3	11	47	85	97
South Africa	—	56	—	19	86	0	14	66	99	100
Tanzania	5	6	9	2	31	0	0	0	3	40
Togo	—	9	—	0	29	0	0	0	2	42
Uganda	2	—	3	0	23	0	0	0	0	17
Zambia	27	21	19	3	49	0	0	0	11	84
Zimbabwe	26	32	—	3	96	0	11	6	47	100
Congo, Dem. Rep.	—	—	—	—	—	—	—	—	—	—
Sudan	—	—	—	—	—	—	—	—	—	—
By income group										
Low income	10	12	14	3	41	0	1	2	11	51
Middle income	47	42	43	13	73	0	9	45	76	94
By urbanization										
Low	4	4	7	1	39	0	0	0	1	37
Medium	18	23	20	1	39	0	1	1	8	47
High	24	25	27	8	53	0	4	17	38	76
By subregion										
East	10	12	14	1	45	0	0	0	2	41
West	14	16	18	4	41	0	1	4	17	59
South	32	32	28	7	60	0	5	25	40	64
Central	11	11	18	2	52	0	4	6	30	70
Overall	15	16	17	4	47	0	2	7	19	56

Source: AICD DHS/MICS Database, 2007.

Note: Location and expenditure quintile data are for the latest available year. Shaded 'Trends in Access' figures are based on Method 3 (Annex A1.1.5).

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Table A1.2.11 Coverage of any three modern infrastructure services

Percentage population	By time period (national)			By location		By expenditure quintile				
	Early 1990s	Late 1990s	Early 2000s	Rural	Urban	1st	2nd	3rd	4th	5th
By country										
Benin	—	0	5	1	12	0	0	0	3	21
Burkina Faso	1	1	3	0	16	0	0	0	0	16
C. African Rep	1	—	—	0	3	0	0	0	0	6
Cameroon	6	6	11	1	22	0	0	1	5	51
Chad	—	1	1	0	4	0	0	0	0	4
Comoros	—	3	—	1	9	0	0	0	0	15
Congo, Rep.	—	—	5	0	9	0	0	0	1	23
Cote d'Ivoire	11	13	—	2	32	0	0	0	0	65
Ethiopia	—	1	4	0	31	0	0	0	0	19
Gabon	—	26	—	4	33	0	0	4	27	97
Ghana	5	7	9	1	21	0	2	1	3	41
Guinea	—	3	5	0	15	0	0	0	1	22
Kenya	5	7	9	1	39	0	0	0	2	42
Lesotho	—	—	4	0	23	0	0	0	1	20
Madagascar	2	2	3	1	9	0	0	0	1	14
Malawi	2	3	4	1	21	0	1	0	1	19
Mali	—	1	4	0	14	0	0	0	0	19
Mauritania	—	—	3	0	8	0	0	0	0	17
Mozambique	—	3	3	0	8	0	0	0	0	15
Namibia	18	27	—	5	70	0	0	0	35	100
Niger	1	1	—	0	7	0	0	0	2	5
Nigeria	4	6	6	2	14	0	0	1	3	25
Rwanda	1	2	2	0	13	0	0	0	1	10
Senegal	8	8	38	12	71	0	3	30	65	91
South Africa	—	44	—	6	76	0	1	28	93	100
Tanzania	1	1	4	1	15	0	0	0	1	19
Togo	—	0	—	0	0	0	0	0	0	0
Uganda	1	—	1	0	11	0	0	0	0	7
Zambia	19	15	13	1	34	0	0	0	8	58
Zimbabwe	21	28	—	1	84	0	11	6	28	95
Congo, Dem. Rep.	—	—	—	—	—	—	—	—	—	—
Sudan	—	—	—	—	—	—	—	—	—	—
By income group										
Low income	4	5	7	1	21	0	0	1	4	25
Middle income	36	32	31	4	57	0	0	18	61	81
By urbanization										
Low	2	1	4	0	23	0	0	0	1	20
Medium	9	13	11	1	23	0	1	1	4	27
High	14	14	15	3	31	0	0	7	22	43
By subregion										
East	4	5	7	0	27	0	0	0	1	23
West	4	5	8	2	18	0	0	2	5	24
South	24	25	22	2	49	0	0	11	37	52
Central	5	5	7	1	31	0	3	2	10	49
Overall	8	8	10	1	28	0	0	3	11	32

Source: AICD DHS/MICS Database, 2007.

Note: Location and expenditure quintile data are for the latest available year. Shaded 'Trends in Access' figures are based on Method 3 (Annex A1.1.5).

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Table A1.2.12 Coverage of any four modern infrastructure services

Percentage population	By time period (national)			By location		By expenditure quintile				
	Early 1990s	Late 1990s	Early 2000s	Rural	Urban	1st	2nd	3rd	4th	5 th
By country										
Benin	—	0	1	0	4	0	0	0	0	7
Burkina Faso	0	0	1	0	4	0	0	0	0	4
C. African Rep	0	—	—	0	1	0	0	0	0	2
Cameroon	0	1	6	0	12	0	0	0	1	28
Chad	—	0	0	0	1	0	0	0	0	1
Comoros	—	1	—	0	3	0	0	0	0	5
Congo, Rep.	—	—	0	0	1	0	0	0	0	1
Cote d'Ivoire	0	5	—	1	12	0	0	0	0	24
Ethiopia	—	0	2	0	13	0	0	0	0	8
Gabon	—	10	—	1	13	0	0	1	4	46
Ghana	0	2	4	0	10	0	1	0	1	20
Guinea	—	1	1	0	4	0	0	0	0	7
Kenya	0	2	5	1	22	0	0	0	1	23
Lesotho	—	—	1	0	6	0	0	0	0	6
Madagascar	0	0	1	0	4	0	0	0	1	5
Malawi	0	0	3	1	18	0	1	0	0	15
Mali	—	0	1	0	5	0	0	0	0	7
Mauritania	—	—	1	0	2	0	0	0	0	3
Mozambique	—	1	1	0	3	0	0	0	0	5
Namibia	0	15	—	2	41	0	0	0	7	69
Niger	0	0	—	0	2	0	0	0	1	1
Nigeria	0	1	1	0	2	0	0	0	0	3
Rwanda	0	1	1	0	6	0	0	0	0	5
Senegal	0	0	25	6	48	0	1	21	32	69
South Africa	—	24	—	2	43	0	0	3	36	83
Tanzania	0	0	1	0	5	0	0	0	0	6
Togo	—	0	—	0	0	0	0	0	0	0
Uganda	0	—	1	0	5	0	0	0	0	3
Zambia	0	0	3	0	8	0	0	0	4	12
Zimbabwe	0	6	—	1	19	0	3	1	6	22
Congo, Dem. Rep.	—	—	—	—	—	—	—	—	—	—
Sudan	—	—	—	—	—	—	—	—	—	—
By income group										
Low income	0	1	2	0	7	0	0	1	1	10
Middle income	18	17	17	2	31	0	0	2	23	62
By urbanization										
Low	0	0	2	0	11	0	0	0	0	9
Medium	0	2	3	0	7	0	0	0	1	8
High	5	6	7	1	14	0	0	2	8	25
By subregion										
East	0	1	2	0	12	0	0	0	0	11
West	0	1	3	1	6	0	0	1	2	9
South	11	10	10	1	26	0	0	1	14	37
Central	1	1	3	0	10	0	1	1	2	17
Overall	2	3	4	0	12	0	0	1	4	16

Source: AICD DHS/MICS Database, 2007.

Note: Location and expenditure quintile data are for the latest available year. Shaded 'Trends in Access' figures are based on Method 3 (Annex A1.1.5).

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Table A1.2.13 Access, hook-up, coverage of piped supply (latest available year) – urban areas

	Access	Hook-up	Coverage	Unserved Population	Pure demand side gap	Supply side gap	Pure supply side gap	Mixed demand and supply side gap	Share of deficit attributable to demand side factors only	Share of deficit attributable to supply side factors only	Share of deficit attributable to both supply and demand side factors
Benin	81	75	60	40	21	19	14	5	52	36	12
Burkina Faso	87	38	33	67	54	13	5	8	81	7	12
C. African Rep	39	16	6	94	33	61	10	51	35	10	55
Cameroon	80	30	24	76	56	20	6	14	74	8	18
Chad	68	32	22	78	47	32	10	22	60	13	28
Comoros	81	53	43	57	38	19	10	9	66	18	16
Congo, Rep.	91	51	46	54	45	9	4	4	84	8	8
Cote d'Ivoire	96	67	65	35	32	4	2	1	90	7	3
Ethiopia	88	55	48	52	40	12	6	5	78	12	10
Gabon	96	57	55	45	41	4	2	2	91	5	4
Ghana	72	47	34	66	38	28	13	15	58	20	22
Guinea	78	36	28	72	50	22	8	14	70	11	19
Kenya	78	64	50	50	28	22	14	8	57	28	16
Lesotho	94	53	50	50	44	6	3	3	89	6	5
Madagascar	65	26	17	83	48	35	9	25	58	11	31
Malawi	85	38	32	68	53	15	6	9	78	8	14
Mali	75	39	29	71	46	25	10	15	65	14	22
Mauritania	75	37	28	72	48	25	9	16	66	12	22
Mozambique	55	36	20	80	35	45	16	29	44	20	36
Namibia	91	87	79	21	12	9	8	1	56	39	6
Niger	89	35	31	69	58	11	4	7	85	5	10
Nigeria	53	29	15	85	37	47	14	33	44	16	40
Rwanda	56	29	16	84	40	44	13	32	47	15	37
Senegal	98	78	77	23	22	2	1	0	93	5	1
South Africa	94	93	88	12	6	6	5	0	52	45	3
Tanzania	65	34	22	78	43	35	12	23	55	15	30
Togo	93	55	51	49	42	7	4	3	86	8	6
Uganda	65	22	14	86	51	35	8	27	59	9	32
Zambia	78	60	46	54	31	22	13	9	58	25	17
Zimbabwe	100	93	93	7	7	0	0	0	100	0	0
Overall	73	48	38	62	34	27	10	18	59	18	23
By income											
LIC	68	42	31	69	37	32	11	21	58	15	27
MIC	91	74	69	31	22	9	5	4	61	32	7
By urbanization											
Low	76	42	33	67	43	24	9	15	65	14	21
Medium	76	56	46	54	30	24	10	14	63	17	20
High	71	49	34	61	32	29	10	19	55	20	24
By region											
East	76	46	36	64	40	24	10	14	64	16	20
West	65	39	28	72	37	35	11	24	56	15	29
South	84	72	65	35	20	16	8	8	58	30	12
Central	78	34	28	72	50	22	6	16	71	9	20

Source: AICD DHS/MICS Database, 2007

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Table A1.2.14 Adjusted access, hook-up, coverage of piped supply (latest available year) – urban areas

	Access	Hook-up	Coverage	Unserviced Population	Pure demand side gap	Supply side gap	Pure supply side gap	Mixed demand and supply side gap	Share of deficit attributable to demand side factors only	Share of deficit attributable to supply side factors only	Share of deficit attributable to both supply and demand side factors
Benin	81	85	60	40	9	31	26	5	22	67	12
Burkina Faso	87	40	33	67	2	65	26	39	3	39	58
C. African Rep	39	24	6	94	3	90	22	68	3	23	73
Cameroon	80	49	24	76	15	61	30	31	20	39	41
Chad	68	34	22	78	2	77	26	51	2	33	65
Comoros	81	69	43	57	13	44	31	14	23	53	24
Congo, Rep.	91	93	46	54	38	15	14	1	71	26	2
Cote d'Ivoire	96	99	65	35	31	5	5	0	87	13	0
Ethiopia	88	57	48	52	2	50	28	21	4	55	42
Gabon	96	98	55	45	39	6	6	0	86	13	0
Ghana	72	66	34	66	14	52	35	18	21	52	27
Guinea	78	42	28	72	5	67	28	39	6	39	54
Kenya	78	70	50	50	5	45	32	14	10	63	27
Lesotho	94	68	50	50	14	36	24	11	28	49	23
Madagascar	65	32	17	83	4	79	25	54	5	31	65
Malawi	85	44	32	68	5	63	27	35	8	40	52
Mali	75	48	29	71	6	64	31	34	9	43	48
Mauritania	75	50	28	72	10	62	31	31	14	43	43
Mozambique	55	42	20	80	3	77	32	44	4	40	55
Namibia	91	95	79	21	7	14	13	1	31	65	4
Niger	89	40	31	69	4	65	26	39	6	37	57
Nigeria	53	38	15	85	4	80	30	50	5	36	59
Rwanda	56	34	16	84	3	81	27	54	3	33	64
Senegal	98	92	77	23	13	10	9	1	57	39	4
South Africa	94	98	88	12	5	8	8	0	37	62	1
Tanzania	65	38	22	78	3	75	29	46	4	37	59
Togo	93	67	51	49	11	38	25	13	22	52	26
Uganda	65	24	14	86	1	85	20	65	1	23	76
Zambia	78	98	46	54	29	24	24	1	55	44	1
Zimbabwe	100	96	93	7	3	4	4	0	44	54	2
Overall	73	58	38	62	8	54	24	30	19	42	39
By income											
LIC	68	51	31	69	7	62	27	35	14	40	46
MIC	91	86	69	31	10	21	13	8	36	53	11
By urbanization											
Low	80	61	41	59	9	50	26	24	20	45	36
Medium	59	42	22	78	5	74	29	45	8	37	55
High	96	87	72	28	12	16	11	5	45	47	9
By region											
East	76	50	36	64	3	61	28	33	5	47	48
West	65	50	28	72	8	64	27	37	16	38	46
South	84	80	65	35	6	29	15	14	30	52	18
Central	78	54	28	72	17	55	25	31	28	33	39

ACCESS, AFFORDABILITY, AND ALTERNATIVES:
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Source: AICD DHS/MICS Database, 2007

Table A1.2.15 Access, hook-up, coverage of flush toilet (latest available year) – urban areas

	Access	Hook-up	Coverage	Unserviced Population	Pure demand side gap	Supply side gap	Pure supply side gap	Mixed demand and supply side gap	Share of deficit attributable to demand side factors only	Share of deficit attributable to supply side factors only	Share of deficit attributable to both supply and demand side factors
Benin	41	15	6	94	35	59	9	50	37	9	54
Burkina Faso	61	14	8	92	52	39	5	34	57	6	37
C. African Rep	22	11	2	98	19	78	9	69	20	9	71
Cameroon	69	23	16	84	53	31	7	24	63	8	28
Chad	37	19	7	93	30	63	12	51	32	13	55
Comoros	63	12	8	92	55	37	4	33	60	5	35
Congo, Rep.	75	13	10	90	65	25	3	22	72	4	24
Cote d'Ivoire	81	37	30	70	51	19	7	12	72	10	17
Ethiopia	48	17	8	92	40	52	9	43	43	9	47
Gabon	95	33	32	68	63	5	2	3	92	3	5
Ghana	63	36	23	77	40	37	13	24	52	17	31
Guinea	42	18	8	92	35	58	10	48	37	11	51
Kenya	72	54	39	61	33	28	15	13	55	25	21
Lesotho	46	18	8	92	38	54	10	44	41	11	48
Madagascar	53	13	7	93	47	47	6	41	50	6	44
Malawi	69	26	18	82	51	31	8	23	62	10	28
Mali	60	24	15	85	45	40	10	30	53	12	36
Mauritania	35	12	4	96	31	65	8	58	32	8	60
Mozambique	40	20	8	92	32	60	12	48	35	13	52
Namibia	91	86	79	21	12	9	8	1	58	37	6
Niger	32	14	5	95	28	68	10	58	29	10	61
Nigeria	76	36	28	72	48	24	9	15	67	12	21
Rwanda	41	15	6	94	35	59	9	50	37	10	53
Senegal	98	66	65	35	34	2	1	1	95	3	2
South Africa	87	92	80	20	7	13	12	1	33	62	5
Tanzania	53	19	10	90	43	47	9	38	48	10	42
Togo	—	—	—	—	—	—	—	—	—	—	—
Uganda	50	21	11	89	39	50	11	39	44	12	44
Zambia	71	66	47	53	24	29	19	10	45	36	19
Zimbabwe	100	95	95	5	5	0	0	0	100	0	0
Overall	69	40	31	69	38	31	9	22	56	18	26
By income											
LIC	66	34	24	76	42	34	9	25	58	12	30
MIC	82	68	58	42	23	18	10	8	45	43	12
By urbanization											
Low	54	23	13	87	40	46	10	37	47	12	41
Medium	57	42	33	68	25	43	10	32	49	14	36
High	78	47	14	62	40	22	9	13	60	21	18
By region											
East	54	26	15	85	39	46	10	35	47	13	40
West	72	35	26	74	46	28	9	19	64	12	25
South	76	68	57	43	18	24	11	14	44	38	18
Central	63	21	13	87	49	37	7	30	58	8	34

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Source: AICD DHS/MICS Database, 2007

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Table A1.2.16 Access, hook-up, coverage of electricity (latest available year) – urban areas

	Access	Hook-up	Coverage	Unserved Population	Pure demand side gap	Supply side gap	Pure supply side gap	Mixed demand and supply side gap	Share of deficit attributable to demand side factors only	Share of deficit attributable to supply side factors only	Share of deficit attributable to both supply and demand side factors
Benin	83	61	51	49	32	17	11	7	65	21	13
Burkina Faso	92	58	54	46	38	8	5	3	83	10	7
C. African Rep	57	19	11	89	46	43	8	34	52	9	39
Cameroon	94	82	77	23	17	6	5	1	74	21	5
Chad	77	26	20	80	58	23	6	17	72	7	21
Comoros	100	54	54	46	46	0	0	0	100	0	0
Congo, Rep.	98	52	51	49	47	2	1	1	96	2	2
Cote d'Ivoire	100	90	90	10	10	0	0	0	100	0	0
Ethiopia	99	87	86	14	13	1	1	0	92	7	1
Gabon	100	91	91	9	9	0	0	0	100	0	0
Ghana	98	79	77	23	21	2	2	1	90	8	2
Guinea	89	72	63	37	25	11	8	3	69	23	9
Kenya	80	64	51	49	29	20	13	7	59	27	15
Lesotho	87	32	28	72	59	13	4	9	82	6	12
Madagascar	80	65	52	48	28	20	13	7	58	27	15
Malawi	84	40	34	66	50	16	6	9	76	10	14
Mali	81	51	41	59	40	19	9	9	68	16	16
Mauritania	85	60	51	49	34	15	9	6	69	18	12
Mozambique	80	37	30	70	50	20	7	13	71	11	18
Namibia	93	80	75	25	18	7	6	1	72	22	5
Niger	94	43	41	59	53	6	3	4	90	5	6
Nigeria	98	86	84	16	14	2	2	0	86	12	2
Rwanda	72	37	27	73	45	28	10	17	62	14	24
Senegal	99	82	82	18	17	1	0	0	97	2	1
South Africa	95	91	86	14	8	5	5	0	60	37	3
Tanzania	83	47	39	61	45	17	8	9	73	13	14
Togo	96	46	44	56	51	4	2	2	92	3	4
Uganda	93	51	47	53	46	7	3	3	87	7	6
Zambia	84	59	50	50	34	16	9	6	69	19	13
Zimbabwe	100	90	90	10	10	0	0	0	100	0	0
Overall	93	75	71	29	22	7	4	3	79	15	6
By income											
LIC	93	73	69	31	24	7	4	3	82	12	6
MIC	95	86	81	19	13	5	5	1	67	29	4
By urbanization											
Low	87	60	53	47	34	13	7	6	75	14	11
Medium	86	58	52	48	34	14	6	8	76	13	12
High	97	85	53	17	14	3	3	0	81	16	2
By region											
East	89	65	59	41	30	11	6	5	77	13	9
West	96	80	78	22	18	4	3	1	86	11	3
South	90	75	69	31	21	10	6	4	67	26	8
Central	90	64	60	40	30	10	4	6	77	14	9

Source: AICD DHS/MICS Database, 2007

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Table A1.2.17 Adjusted access, hook-up, coverage of electricity (latest available year) – urban areas

	Access	Hook-up	Coverage	Unserviced Population	Pure demand side gap	Supply side gap	Pure supply side gap	Mixed demand and supply side gap	Share of deficit attributable to demand side factors only	Share of deficit attributable to supply side factors only	Share of deficit attributable to both supply and demand side factors
Benin	83	83	51	49	18	31	26	5	36	53	11
Burkina Faso	92	62	54	46	3	43	27	16	7	57	35
C. African Rep	57	33	11	89	8	81	27	54	9	30	61
Cameroon	94	98	77	23	15	8	8	0	65	34	1
Chad	77	28	20	80	1	79	22	57	2	27	71
Comoros	100	82	54	46	28	18	15	3	61	32	7
Congo, Rep.	98	86	51	49	33	16	13	2	68	27	4
Cote d'Ivoire	100	99	90	10	10	1	1	0	93	7	0
Ethiopia	99	90	86	14	3	11	10	1	20	72	8
Gabon	100	99	91	9	9	1	1	0	94	6	0
Ghana	98	95	77	23	15	8	7	0	67	31	2
Guinea	89	78	63	37	6	31	24	7	16	66	18
Kenya	80	72	51	49	6	42	31	12	13	63	24
Lesotho	87	42	28	72	8	64	27	37	12	37	51
Madagascar	80	86	52	48	16	32	27	5	34	56	10
Malawi	84	48	34	66	7	59	29	31	10	43	47
Mali	81	62	41	59	9	49	31	19	16	52	32
Mauritania	85	84	51	49	20	29	24	5	41	49	10
Mozambique	80	51	30	70	11	59	30	29	16	43	41
Namibia	93	99	75	25	17	8	8	0	69	31	0
Niger	94	49	41	59	6	54	26	27	9	45	46
Nigeria	98	98	84	16	12	4	4	0	73	26	1
Rwanda	72	46	27	73	6	67	31	36	8	42	49
Senegal	99	100	82	18	17	1	1	0	95	5	0
South Africa	95	100	86	14	8	6	6	0	58	42	0
Tanzania	83	55	39	61	7	54	30	25	11	49	40
Togo	96	66	44	56	19	37	24	12	34	44	22
Uganda	93	58	47	53	6	46	27	20	12	51	37
Zambia	84	84	50	50	21	29	24	5	42	49	9
Zimbabwe	100	99	90	10	8	2	1	0	85	15	0
Overall	93	87	71	29	11	18	12	6	52	37	11
By income											
LIC	93	84	69	31	11	21	13	7	50	37	13
MIC	95	98	81	19	11	7	7	1	61	38	1
By urbanization											
Low	87	67	53	47	6	41	24	17	15	56	29
Medium	86	73	52	48	13	35	22	14	37	42	21
High	97	98	83	17	12	5	5	0	71	28	1
By region											
East	89	71	59	41	5	36	23	14	15	60	26
West	96	93	78	22	12	10	8	2	67	29	5
South	90	87	69	31	10	20	14	7	48	41	10
Central	69	80	60	40	15	25	12	13	53	30	17

Source: AICD DHS/MICS Database, 2007

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Table A1.2.18 Access, hook-up, coverage of landline telephones (latest available year) – urban areas

	Access	Hook-up	Coverage	Unserviced Population	Pure demand side gap	Supply side gap	Pure supply side gap	Mixed demand and supply side gap	Share of deficit attributable to demand side factors only	Share of deficit attributable to supply side factors only	Share of deficit attributable to both supply and demand side factors
Benin	59	17	10	90	49	41	7	34	55	8	37
Burkina Faso	85	23	20	80	65	15	3	11	82	4	14
C. African Rep	26	13	3	97	23	74	10	64	24	10	66
Cameroon	42	11	5	95	37	58	7	52	39	7	54
Chad	37	11	4	96	33	63	7	56	34	8	58
Comoros	67	14	9	91	57	33	5	29	63	5	32
Congo, Rep.	36	6	2	98	34	64	4	60	35	4	61
Cote d'Ivoire	57	26	15	85	43	43	11	32	50	13	37
Ethiopia	84	42	35	65	49	16	7	9	75	10	14
Gabon	87	23	20	80	67	13	3	10	84	4	12
Ghana	59	29	17	83	42	41	12	29	51	14	35
Guinea	78	30	24	76	55	22	7	15	71	9	20
Kenya	94	40	37	63	57	6	2	4	91	4	6
Lesotho	99	46	46	54	53	1	1	1	98	1	1
Madagascar	55	22	12	88	43	45	10	35	49	11	40
Malawi	90	30	27	73	63	10	3	7	86	4	10
Mali	58	22	13	87	45	42	9	33	52	11	37
Mauritania	54	15	8	92	46	46	7	40	50	8	43
Mozambique	42	14	6	94	36	58	8	49	39	9	53
Namibia	89	49	44	56	46	11	5	6	81	9	10
Niger	37	13	5	95	32	63	8	55	34	9	58
Nigeria	63	18	12	88	52	37	7	30	58	8	34
Rwanda	39	16	6	94	33	61	10	52	35	10	55
Senegal	98	37	36	64	62	2	1	1	97	1	2
South Africa	82	56	45	55	36	18	10	8	66	19	15
Tanzania	88	36	31	69	56	12	4	8	82	6	11
Togo	—	—	—	—	—	—	—	—	—	—	—
Uganda	79	24	18	82	60	21	5	16	74	6	20
Zambia	60	19	11	89	49	40	7	33	55	8	37
Zimbabwe	80	24	19	81	61	20	5	15	75	6	19
Overall	68	27	20	80	47	32	7	25	61	9	29
By income											
LIC	67	24	17	83	50	33	7	26	62	8	30
MIC	70	41	32	68	37	30	9	22	59	14	27
By urbanization											
Low	76	31	25	75	51	24	6	18	70	8	22
Medium	60	20	13	87	47	40	7	33	55	8	37
High	66	27	25	81	46	34	8	27	59	10	31
By region											
East	84	37	31	69	53	16	5	11	78	7	15
West	64	21	14	86	50	36	7	28	59	8	32
South	72	39	30	70	42	28	9	19	62	14	25
Central	42	11	5	95	37	58	6	52	39	7	54

Source: AICD DHS/MICS Database, 2007

Part 3 Expenditure on infrastructure services

- Table A1.3.1 Total household monthly budget**
- Table A1.3.2 Food expenditure budget and share in household budget**
- Table A1.3.3 Water expenditure budget and share in household budget**
- Table A1.3.4 Electricity expenditure budget and share in household budget**
- Table A1.3.5 Kerosene expenditure budget and share in household budget**
- Table A1.3.6 LPG expenditure budget and share in household budget**
- Table A1.3.7 Wood/charcoal expenditure budget and share in household budget**
- Table A1.3.8 Transport expenditure budget and share in household budget**
- Table A1.3.9 Refuse disposal expenditure budget and share in household budget**
- Table A1.3.10 Landline Telephone expenditure budget and share in household budget**
- Table A1.3.11 Cell-phone expenditure budget and share in household budget**
- Table A1.3.12 All infrastructure expenditure budget and share in household budget**
- Table A1.3.13 Affordability analysis at continental level**
- Table A1.3.14 Affordability analysis at country level**

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Table A1.3.1 Total household monthly budget (2002 US\$)

By country	Year	National*	Rural	Urban	Q1	Q2	Q3	Q4	Q5
Angola	2000	220	245	63	38	94	149	224	501
Benin	2002	88	74	108	41	59	71	85	137
Burkina Faso	2003	121	102	197	48	67	85	111	222
Burundi	1998	66	59	209	18	37	50	69	122
Cameroon	2004	112	99	163	48	70	88	115	186
Cape Verde	2001	123	84	177	63	81	99	106	185
Chad	2001	335	206	433	97	152	214	298	654
Congo	2002	216	138	313	70	116	149	191	400
Cote d'Ivoire	2005	229	164	279	83	139	181	239	398
DRC	2005	110	97	146	45	68	88	111	184
Ethiopia	2000	57	53	82	32	42	50	60	87
Gabon	2005	446	259	492	95	318	427	500	632
Ghana	1999	169	138	222	64	109	142	184	254
Guinea-Bissau	2005	149	137	176	72	102	118	146	252
Kenya	1997	140	116	231	55	81	103	137	231
Madagascar	2001	282	236	425	93	139	184	261	576
Malawi	2003	70	61	130	33	44	54	67	119
Mauritania	2000	224	175	294	92	135	184	232	378
Morocco	2003	444	310	544	159	267	377	535	1,052
Mozambique	2003	65	45	113	23	33	43	55	143
Niger	2005	123	106	208	49	70	88	115	229
Nigeria	2003	86	72	102	30	52	69	89	143
Rwanda	1998	101	76	331	30	50	66	92	241
Sao Tome & Principe	2000	210	156	254	75	108	132	175	420
Senegal	2001	227	154	315	102	134	166	225	394
Sierra Leone	2003	108	82	161	43	65	84	111	251
South Africa	2000	539	258	697	81	140	191	299	1,305
Tanzania	2000	60	53	86	28	40	50	62	92
Uganda	2002	80	68	137	26	47	67	99	232
Zambia	2002	99	80	135	37	58	74	95	182
Overall		177	130	241	59	97	128	169	340
Income									
LIC		139	109	208	53	80	103	135	258
MIC		300	199	350	79	155	211	282	609
Urbanization									
Low		132	106	220	48	73	94	126	255
Medium		94	76	133	38	57	72	91	180
High		250	173	301	77	136	181	240	480
Region									
East		84	71	179	31	50	64	86	168
West		177	135	234	71	107	138	181	332
South		201	145	255	56	88	118	167	434
Central		244	160	309	71	145	193	243	411

* Sample Average

Source: AICD Expenditure Survey Database, 2007

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Table A1.3.2 Food expenditure budget and share in household budget

By country	Year	National*	Expenditure Budget (2002 US\$)							Share in Household Budget (%)							
			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	46	59	58	59	57	54	39
Benin	2002	48	45	54	26	38	44	51	66	55	61	50	62	64	62	60	48
Burkina Faso	2003	58	55	70	33	44	53	62	80	48	54	36	68	66	62	56	36
Burundi	1998	47	45	91	13	29	39	54	81	72	77	43	72	77	78	78	66
Cameroon	2004	69	65	85	31	46	58	76	106	62	66	52	64	66	66	66	57
Cape Verde	2001	62	59	68	43	52	61	61	75	51	69	38	68	65	62	57	41
Congo	2002	60	40	85	20	39	49	63	96	28	29	27	29	34	33	33	24
DRC	2005	79	64	117	33	50	65	83	126	71	67	80	73	74	74	75	68
Gabon	2005	175	150	181	34	164	202	215	205	39	58	37	36	51	47	43	33
Ghana	1999	94	83	113	41	67	85	105	131	56	60	51	64	62	60	57	51
Guinea-Bissau	2005	81	72	103	35	55	65	81	138	54	52	59	49	54	55	55	55
Kenya	1997	87	81	109	42	62	77	97	119	62	70	47	77	76	75	71	52
Madagascar	2001	173	157	220	69	106	135	184	294	61	67	52	74	76	74	70	51
Malawi	2003	39	37	59	20	27	33	40	61	57	60	45	62	62	62	61	51
Mauritania	2000	114	88	150	55	79	102	125	169	51	50	51	60	58	55	54	45
Morocco	2003	191	168	209	84	138	183	237	375	43	54	38	53	52	48	44	36
Niger	2005	84	78	112	31	47	61	79	155	68	73	54	63	67	69	69	68
Nigeria	2003	43	42	45	17	32	42	50	59	50	57	44	56	61	61	57	41
Rwanda	1998	57	51	116	22	37	47	61	108	57	67	35	72	73	72	67	45
Sao Tome & Principe	2000	127	110	141	58	81	95	120	217	61	71	55	78	76	72	69	52
Sierra Leone	2003	55	52	61	27	42	52	61	97	51	63	38	62	64	61	55	39
Tanzania	2000	39	36	51	20	29	36	42	56	66	69	59	72	71	71	69	61
Zambia	2002	62	60	67	26	42	54	67	99	63	75	50	71	72		70	54
Overall		85	76	102	35	59	75	93	135	55	61	48	63	64	63	60	48
Income																	
LIC		76	68	99	33	51	64	80	121	59	64	50	67	68	66	64	52
MIC		110	99	111	39	83	106	129	175	45	54	42	51	55	52	50	38
Urbanization																	

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Low	74	68	103	32	48	61	78	$\frac{12}{2}$	61	65	48	68	69	69	66	54
Medium	61	55	75	28	43	54	65	97	60	66	54	67	69	66	65	52
High	104	92	111	40	75	96	$\frac{11}{7}$	$\frac{16}{3}$	49	56	45	56	58	56	53	42
Region																
East	58	53	92	24	39	50	64	91	64	71	46	73	74	74	71	56
West	87	77	102	41	61	77	94	$\frac{14}{2}$	53	60	47	62	63	61	58	46
South	94	91	96	34	58	77	$\frac{10}{3}$	$\frac{16}{2}$	57	62	51	66	68	64	64	49
Central	96	80	117	30	75	94	$\frac{10}{9}$	$\frac{13}{3}$	50	55	49	50	56	55	54	45

* Sample average

Source: AICD Expenditure Survey Database, 2007

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Table A1.3.3 Water expenditure budget and share in household budget

By 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	0	0	0	0	0	0	
Benin	2002	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Burkina Faso	2003	0	2	0	2	2	2	0	0	0	2	0	5	3	3	0	
Burundi	1998	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Cameroon	2004	7	10	5	1	2	2	3	10	6	10	3	2	2	2	5	
Cape Verde	2001	2	1	2	2	2	2	2	2	2	1	1	3	2	2	1	
Chad	2001	9	4	11	3	4	6	8	14	3	2	3	3	3	3	2	
Congo	2002	2	1	4	1	1	2	2	4	1	1	1	1	1	1	1	
Cote d'Ivoire	2005	4	2	4	3	4	4	4	5	2	1	2	3	3	2	1	
DRC	2005	2	1	3	1	1	1	2	3	2	1	2	2	2	1	2	
Ethiopia	2000	1	1	1	1	1	1	1	1	1	2	1	2	2	2	1	
Gabon	2005	11	6	11	1	8	9	13	12	2	2	2	1	2	2	3	
Ghana	1999	1	0	2	0	1	1	1	2	1	0	1	0	1	0	1	
Guinea-Bissau	2005	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Kenya	1997	2	1	3	1	1	1	2	3	2	1	1	2	2	1	1	
Madagascar	2001	1	1	1	3	0	1	1	1	0	0	0	4	0	0	0	
Malawi	2003	0	0	3	0	0	0	0	1	1	0	3	0	0	0	1	
Mauritania	2000	11	5	14	1	5	11	10	14	5	3	5	2	4	6	4	
Morocco	2003	9	4	10	5	6	8	9	14	2	1	2	3	2	2	1	
Mozambique	2003	3	2	3	1	1	1	2	5	4	4	3	4	3	3	3	
Niger	2005	5	4	7	2	3	4	5	7	4	4	3	5	4	4	5	
Nigeria	2003	1	1	1	1	1	1	1	2	2	2	1	4	2	2	1	
Rwanda	1998	8	4	8	1	1	1	1	9	8	6	3	3	2	2	4	
Sao Tome & Principe	2000	5	0	10	0	0	1	1	18	3	0	4	0	0	1	4	
Senegal	2001	4	2	5	2	2	3	4	6	2	1	2	2	2	2	2	
Sierra Leone	2003	2	1	2	0	0	2	2	2	1	1	1	0	0	3	2	
South Africa	2000	6	1	8	1	1	2	4	13	1	0	1	1	1	1	1	
Tanzania	2000	2	2	1	1	2	2	2	2	3	5	1	3	5	4	3	
Uganda	2002	3	2	3	1	1	2	2	5	3	3	2	4	3	3	2	
Zambia	2002	2	0	3	1	1	1	1	4	2	1	2	2	1	1	2	
Overall		4	2	5	1	2	3	3	6	2	2	2	2	2	2	2	
Income																	
LIC		3	2	4	1	2	2	3	5	2	2	2	2	2	2	2	
MIC		5	3	6	1	3	4	5	8	2	2	2	1	2	2	2	
Urbanization																	
Low		3	2	4	2	2	2	2	4	3	2	2	3	2	2	2	
Medium		2	1	3	1	1	1	2	3	3	2	2	2	2	2	2	
High		5	3	6	1	3	3	4	8	2	2	2	2	2	2	2	
Region																	
East		3	2	3	1	1	1	2	4	3	3	2	3	3	2	2	
West		4	2	5	2	2	4	4	6	2	2	2	2	2	2	2	
South		2	1	3	1	1	1	1	4	2	1	1	2	1	1	1	
Central		6	4	7	1	3	4	6	9	3	3	2	2	2	2	2	

* Sample average

Source: AICD Expenditure Survey Database, 2007

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Table A1.3.4 Electricity expenditure budget and share in household budget

By 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	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Benin	2002	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Burkina Faso	2003	4	11	1	12	10	8	6	2	3	10	1	25	15	9	5	1
Burundi	1998	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Cameroon	2004	1	1	1	1	0	0	1	2	1	1	1	3	0	0	1	1
Cape Verde	2001	2	2	3	2	2	2	2	3	2	2	1	3	2	2	2	1
Chad	2001	13	5	15	3	5	8	12	18	4	3	3	3	4	4	4	3
Congo	2002	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Cote d'Ivoire	2005	7	5	7	3	5	7	7	9	3	3	3	3	3	4	3	2
DRC	2005	2	1	2	1	1	1	2	3	2	1	2	2	2	2	2	2
Ethiopia	2000	2	0	2	1	1	1	1	3	3	1	2	2	2	2	2	3
Gabon	2005	20	9	21	2	13	17	21	27	4	4	4	2	4	4	4	4
Ghana	1999	5	4	6	1	4	3	5	6	3	3	3	2	4	2	3	2
Guinea-Bissau	2005	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Kenya	1997	8	6	8	0	1	1	2	9	5	6	3	1	2	1	1	4
Madagascar	2001	2	2	2	0	0	1	2	2	1	1	0	0	0	1	1	0
Malawi	2003	10	7	11	1	1	3	4	12	14	12	9	3	1	6	6	10
Mauritania	2000	15	4	16	3	20	10	12	18	7	2	5	4	15	6	5	5
Morocco	2003	14	8	15	6	9	12	15	23	3	2	3	4	3	3	3	2
Mozambique	2003	13	6	14	3	6	6	9	15	20	12	12	15	17	13	16	10
Niger	2005	12	9	12	4	5	7	6	14	10	8	6	7	7	8	5	6
Nigeria	2003	5	4	5	5	4	4	5	5	6	5	5	15	9	6	5	4
Rwanda	1998	10	5	11	—	—	1	4	11	10	7	3	—	—	1	4	4
Sao Tome & Principe	2000	26	8	40	1	2	4	7	82	12	5	16	1	2	3	4	19
Senegal	2001	9	6	10	4	5	6	8	11	4	4	3	4	4	4	3	3
Sierra Leone	2003	9	6	9	0	1	2	5	12	8	7	6	0	2	3	4	5
South Africa	2000	12	5	16	2	4	6	9	26	2	2	2	2	3	3	3	2
Tanzania	2000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Uganda	2002	6	5	6	1	2	2	4	9	7	7	5	5	4	4	4	4
Zambia	2002	5	4	5	1	1	2	4	7	5	5	4	3	2	3	4	4
Overall		9	5	10	3	4	5	6	14	6	5	4	5	5	4	4	4
Income																	
LIC		9	5	10	2	4	4	5	13	7	5	5	5	5	4	4	5
MIC		10	5	11	3	6	7	10	16	3	2	2	3	3	3	3	2
Urbanization																	
Low		7	6	8	3	3	4	5	9	6	6	4	6	4	4	4	4
Medium		7	4	8	1	2	3	5	9	9	6	6	5	6	5	7	5
High		11	5	13	3	6	7	8	19	4	3	4	4	4	3	3	4
Region																	
East		6	4	7	1	1	1	3	8	6	5	3	3	2	2	3	4
West		10	6	11	4	6	6	7	17	6	5	5	6	6	5	4	5
South		8	5	10	1	2	4	6	12	9	6	5	5	5	5	6	5
Central		9	4	10	2	5	7	9	12	3	2	3	3	2	2	3	2

* Sample average

Source: AICD Expenditure Survey Database, 2007

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Table A1.3.5 Kerosene expenditure budget and share in household budget

By 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																
Benin	2002	2	2	2	2	2	2	2	2	2	3	2	5	4	3	2	2
Burkina Faso	2003	1	1	1	1	1	1	1	1	1	1	1	2	2	1	1	1
Burundi	1998	1	1	4	1	1	1	2	2	2	2	2	4	3	2	2	2
Cameroon	2004	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Cape Verde	2001	2	1	2	1	1	1	2	2	1	2	1	2	2	1	1	1
Chad	2001	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Congo	2002	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Cote d'Ivoire	2005	3	3	4	2	3	3	3	4	1	2	1	3	2	2	1	1
DRC	2005	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Ethiopia	2000	1	0	1	0	0	0	1	1	1	1	1	1	1	1	1	1
Gabon	2005	4	6	3	5	5	4	4	4	1	2	1	5	1	1	1	1
Ghana	1999	4	3	5	2	3	2	7	3	2	2	2	3	3	2	4	1
Guinea-Bissau	2005	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Kenya	1997	2	1	4	1	1	2	2	3	1	1	2	2	2	2	2	1
Madagascar	2001	3	2	4	0	0	0	11	3	1	1	1	0	0	0	4	1
Malawi	2003	2	1	13	1	1	1	1	6	3	2	10	2	2	2	2	5
Mauritania	2000	1	2	1	0	1	2	2	1	1	1	0	0	1	1	1	0
Morocco	2003	3	3	2	3	3	4	4	5	1	1	0	2	1	1	1	0
Mozambique	2003	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Niger	2005	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Nigeria	2003	3	3	4	2	2	3	3	4	4	3	4	6	4	4	4	3
Rwanda	1998	1	1	2	1	1	1	1	2	1	2	1	2	2	2	1	1
Sao Tome & Principe	2000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Senegal	2001	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	0
Sierra Leone	2003	3	2	3	2	2	2	3	4	2	3	2	4	3	3	3	1
South Africa	2000	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Tanzania	2000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Uganda	2002	1	1	1	1	1	1	1	2	1	2	1	2	2	2	1	1
Zambia	2002	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Overall		2	2	3	1	2	2	3	3	1	2	2	2	2	2	2	1
Income																	
LIC		2	2	3	1	1	2	3	0	2	2	2	3	2	2	2	0
MIC		2	3	2	2	2	2	2	3	1	1	1	2	1	1	1	1
Urbanization																	
Low		2	1	4	1	1	1	3	3	2	2	2	2	2	1	2	1
Medium		2	2	2	1	2	2	2	0	2	2	2	3	3	2	2	0
High		2	3	2	2	2	2	3	3	1	2	1	2	2	1	2	1
Region																	
East		1	1	2	1	1	1	1	2	1	2	1	2	2	2	2	1
West		2	2	3	2	2	2	3	3	2	2	1	3	2	2	2	1
South		2	1	6	0	0	0	4	4	2	1	4	1	1	1	2	2
Central		3	4	2	3	3	2	2	3	1	2	1	3	1	1	1	1

* Sample average

Source: AICD Expenditure Survey Database, 2007

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Table A1.3.6 LPG expenditure budget and share in household budget

By 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	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Benin	2002	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
Burkina Faso	2003	5	5	5	5	5	5	5	5	4	5	2	10	7	5	4	2
Burundi	1998	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Cameroon	2004	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Cape Verde	2001	3	2	3	1	2	3	3	3	2	3	2	2	3	3	3	2
Chad	2001	13	12	13	7	9	11	13	15	4	6	3	7	6	5	4	2
Congo	2002	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Cote d'Ivoire	2005	5	4	5	2	3	4	5	5	2	3	2	2	2	2	2	1
DRC	2005	1	0	2	1	0	0	0	1	1	0	1	2	0	0	0	1
Ethiopia	2000	1	0	1	1	0	0	0	2	1	0	2	3	1	0	0	2
Gabon	2005	11	11	11	9	11	11	11	10	2	4	2	10	3	3	2	2
Ghana	1999	6	5	6	—	—	3	6	6	4	4	3	—	—	2	3	2
Guinea-Bissau	2005	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Kenya	1997	14	11	14	—	—	2	9	14	10	10	6	—	—	2	7	6
Madagascar	2001	6	6	6	—	8	—	14	5	2	3	1	—	6	—	5	1
Malawi	2003	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mauritania	2000	2	1	4	0	1	2	3	4	1	1	1	0	1	1	1	1
Morocco	2003	10	9	11	6	8	10	13	16	2	3	2	4	3	3	2	2
Mozambique	2003	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Niger	2005	8	2	10	1	1	1	2	10	6	2	5	2	1	1	2	4
Nigeria	2003	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rwanda	1998	3	1	20	0	1	1	1	7	3	1	6	1	1	1	1	3
Sao Tome & Principe	2000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Senegal	2001	6	3	7	2	3	4	6	8	3	2	2	2	2	2	3	2
Sierra Leone	2003	5	1	6	0	—	3	2	7	5	1	4	1	—	4	2	3
South Africa	2000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tanzania	2000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Uganda	2002	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Zambia	2002	6	3	10	1	1	1	5	12	6	3	8	2	2	2	5	7
Overall		5	4	7	2	3	3	5	7	3	2	3	3	2	2	2	2
Income																	
LIC		5	3	7	2	3	3	4	6	3	3	3	3	2	2	3	2
MIC		6	6	6	4	5	6	7	7	2	2	1	4	2	2	2	1
Urbanization																	
Low		7	5	10	3	4	3	6	8	4	4	4	5	4	3	3	3
Medium		3	1	5	1	1	1	2	5	3	1	3	2	1	2	2	3
High		5	4	5	3	4	4	5	6	2	2	2	2	2	2	2	1
Region																	
East		6	4	12	1	0	1	3	7	5	4	5	2	1	1	3	3
West		5	3	5	2	3	3	4	6	3	2	2	2	2	2	2	2
South		4	3	5	0	3	1	6	6	3	2	3	1	3	1	3	3
Central		8	8	8	6	7	7	8	9	2	3	2	6	3	3	2	2

* Sample average

Source: AICD Expenditure Survey Database, 2007

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Table A1.3.7 Wood/charcoal expenditure budget and share in household budget

By 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	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Benin	2002	4	4	4	4	4	3	4	4	4	5	3	9	6	5	4	3
Burkina Faso	2003	4	4	4	4	4	4	4	4	3	4	2	8	5	4	3	2
Burundi	1998	8	4	11	2	3	3	4	9	12	6	5	9	8	6	7	8
Cameroon	2004	3	3	3	0	1	1	2	5	3	3	2	1	1	2	2	3
Cape Verde	2001	3	3	3	3	3	3	3	3	3	4	2	5	4	3	3	2
Chad	2001	6	8	5	4	4	5	9	9	2	4	1	4	2	2	3	1
Congo	2002	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Cote d'Ivoire	2005	5	6	5	4	5	6	5	5	2	3	2	5	4	3	2	1
DRC	2005	1	1	2	1	1	1	1	2	1	1	1	1	1	1	1	1
Ethiopia	2000	4	4	2	3	4	4	4	5	7	8	3	9	8	8	7	6
Gabon	2005	5	6	5	4	5	4	5	6	1	2	1	4	2	1	1	1
Ghana	1999	6	4	6	2	4	4	8	6	3	3	3	3	3	3	4	2
Guinea-Bissau	2005	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Kenya	1997	4	4	4	2	3	3	4	4	3	3	2	4	4	3	3	2
Madagascar	2001	2	2	2	3	1	1	2	2	1	1	0	3	1	1	1	0
Malawi	2003	6	6	8	5	6	6	7	8	9	10	6	14	13	12	10	7
Mauritania	2000	3	2	4	1	2	3	4	3	1	1	1	1	1	2	2	1
Morocco	2003	2	3	2	2	2	2	3	3	1	1	0	1	1	1	1	0
Mozambique	2003	0	0	0	0	0	0	0	1	1	1	0	1	1	1	1	0
Niger	2005	6	5	7	4	4	5	6	7	5	5	4	8	5	5	5	3
Nigeria	2003	1	1	2	1	2	2	1	1	2	2	2	5	3	2	2	1
Rwanda	1998	8	5	10	1	1	3	4	11	8	7	3	3	3	4	4	4
Sao Tome & Principe	2000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Senegal	2001	1	1	1	0	1	0	1	1	0	0	0	0	1	0	0	0
Sierra Leone	2003	3	2	4	1	2	2	3	4	3	3	2	3	3	3	3	2
South Africa	2000	3	4	3	3	4	5	3	2	1	2	0	3	3	2	1	0
Tanzania	2000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Uganda	2002	4	3	4	2	2	3	4	6	5	5	3	7	5	5	4	3
Zambia	2002	4	2	7	1	1	1	2	9	4	2	5	3	3	2	2	5
Overall		4	3	4	2	3	3	4	5	3	3	2	5	4	3	3	2
Income																	
LIC		4	3	5	2	3	3	4	5	4	4	2	5	4	4	3	3
MIC		3	4	3	2	3	3	3	4	2	2	1	3	2	2	1	1
Urbanization																	
Low		5	5	6	3	3	4	5	6	5	5	3	7	5	5	5	4
Medium		3	2	3	1	2	2	2	4	3	2	2	3	3	2	2	2
High		3	3	3	2	3	3	3	4	2	2	1	3	2	2	2	1
Region																	
East		5	4	6	2	3	3	4	7	7	6	3	7	6	5	5	4
West		3	3	4	2	3	3	4	4	2	3	2	4	3	3	3	2
South		3	3	4	2	3	3	3	4	3	3	2	5	4	3	3	2
Central		4	5	4	2	3	3	4	6	2	3	1	3	2	2	2	2

* Sample average

Source: AICD Expenditure Survey Database, 2007

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Table A1.3.8 Transport expenditure budget and share in household budget

By 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	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Benin	2002	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Burkina Faso	2003	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Burundi	1998	1	0	16	0	0	0	0	3	2	1	7	0	0	0	1	3
Cameroon	2004	3	2	7	1	1	2	2	7	3	2	4	1	1	2	2	4
Cape Verde	2001	8	4	12	2	3	4	4	14	6	4	7	4	4	4	4	8
Chad	2001	3	2	3	1	1	1	2	4	1	1	1	1	0	1	1	1
Congo	2002	19	5	36	2	4	7	13	46	9	4	11	3	3	5	7	12
Cote d'Ivoire	2005	13	11	14	7	9	11	12	20	6	7	5	8	6	6	5	5
DRC	2005	5	3	6	2	2	3	3	8	5	4	4	4	3	4	3	4
Ethiopia	2000	2	1	5	1	1	1	2	4	4	3	6	3	2	3	3	5
Gabon	2005	56	31	59	17	28	37	53	77	12	12	12	18	9	9	11	12
Ghana	1999	10	7	13	3	5	7	8	16	6	5	6	5	4	5	4	6
Guinea-Bissau	2005	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	1
Kenya	1997	12	8	23	3	4	6	8	20	9	7	10	5	5	5	6	9
Madagascar	2001	6	4	14	1	2	4	5	17	2	2	3	2	1	2	2	3
Malawi	2003	11	11	13	6	9	7	9	14	16	17	10	17	20	13	13	12
Mauritania	2000	3	1	6	0	1	2	3	7	1	1	2	0	1	1	1	2
Morocco	2003	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mozambique	2003	1	0	1	0	0	0	0	1	1	1	0	1	1	1	1	0
Niger	2005	2	1	3	1	1	1	1	3	1	1	1	2	2	1	1	1
Nigeria	2003	8	5	10	3	3	4	6	11	9	7	10	9	6	6	7	8
Rwanda	1998	14	7	21	2	3	4	5	19	14	9	6	8	5	6	5	8
Sao Tome & Principe	2000	12	8	15	2	3	6	7	29	6	5	6	2	3	4	4	7
Senegal	2001	8	5	13	3	3	5	8	17	4	3	4	2	3	3	3	4
Sierra Leone	2003	6	3	10	1	2	2	4	16	5	3	6	2	2	3	4	6
South Africa	2000	24	10	31	2	5	9	18	54	4	4	4	3	3	5	6	4
Tanzania	2000	5	3	9	1	2	2	3	9	8	5	11	5	4	4	5	9
Uganda	2002	10	8	15	2	3	4	7	24	12	11	11	9	7	6	7	10
Zambia	2002	12	10	13	3	4	4	6	20	12	13	10	8	6	6	6	11
Overall		9	6	14	2	4	5	7	17	6	5	6	4	4	4	4	6
Income																	
LIC		7	4	10	2	3	3	5	12	6	5	5	4	4	4	4	5
MIC		22	10	29	5	8	12	18	40	7	5	8	0	4	5	6	8
Urbanization																	
Low		6	4	10	2	2	3	4	10	6	5	6	4	4	4	4	5
Medium		6	4	8	1	2	3	3	11	6	5	5	4	3	3	3	5
High		15	8	20	4	6	8	12	27	6	5	7	5	4	4	5	6
Region																	
East		7	5	15	2	2	3	4	13	8	6	8	5	4	4	4	7
West		6	4	9	2	3	4	5	12	4	3	4	3	3	3	3	4
South		11	7	14	2	4	5	8	21	7	7	6	6	6	5	6	6
Central		17	9	22	4	7	10	14	28	6	4	7	5	3	4	4	6

* Sample average

Source: AICD Expenditure Survey Database, 2007

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Table A1.3.9 Refuse disposal expenditure budget and share in household budget

By 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	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Benin	2002	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Burkina Faso	2003	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Burundi	1998	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Cameroon	2004	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Cape Verde	2001	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Chad	2001	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Congo	2002	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Cote d'Ivoire	2005	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
DRC	2005	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Ethiopia	2000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Gabon	2005	10	12	10		19		15	8	2	5	2		6		3	1
Ghana	1999	2	1	2	0	0	1	1	3	1	1	1	1	0	1	1	1
Guinea-Bissau	2005	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Kenya	1997	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Madagascar	2001	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Malawi	2003	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mauritania	2000	2	2	2	1	1	1	1	2	1	1	1	1	1	1	1	1
Morocco	2003	1	0	1	1	1	1	1	2	0	0	0	1	0	0	0	0
Mozambique	2003	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Niger	2005	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Nigeria	2003	0	0	1	0	0	0	0	0	0	0	1	1	0	0	0	0
Rwanda	1998	5	16	2	39	7	13	12	4	5	21	1	128	14	20	13	2
Sao Tome & Principe	2000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Senegal	2001	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sierra Leone	2003	21	4	22	0	1	1	10	29	19	5	14	1	1	1	9	12
South Africa	2000	1	0	1	0	0	0	1	2	0	0	0	0	0	0	0	0
Tanzania	2000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Uganda	2002	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Zambia	2002	1	1	2	0	0	1	1	2	1	1	1	1	1	1	1	1
Overall		5	4	5	5	3	2	5	6	3	4	2	17	3	3	3	2
Income																	
LIC		5	4	5	7	2	3	4	7	5	5	3	22	3	4	4	3
MIC		4	4	4	0	7	1	6	4	1	2	1	0	2	0	1	1
Urbanization																	
Low		5	16	2	39	7	13	12	4	5	21	1	128	14	20	13	2
Medium		11	2	12	0	1	1	5	15	10	3	8	1	1	1	5	6
High		3	2	3	1	4	1	3	3	1	1	1	1	1	0	1	1
Region																	
East		5	16	2	39	7	13	12	4	5	21	1	128	14	20	13	2
West		5	1	6	1	1	1	3	7	4	1	3	1	1	1	2	3
South		1	0	2	0	0	1	1	2	1	0	1	1	0	1	1	1
Central		10	12	10	—	19	—	15	8	2	5	2	—	6	—	3	1

* Sample average

Source: AICD Expenditure Survey Database, 2007

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Table A1.3.10 Landline expenditure budget and share in household budget

By 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	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Benin	2002	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Burkina Faso	2003	1	5	0	10	10	1	4	0	1	5	0	20	15	1	4	0
Burundi	1998	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Cameroon	2004	3	0	5	—	0	1	1	5	3	0	3	—	0	1	1	3
Cape Verde	2001	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Chad	2001	8	3	12	1	2	5	8	18	2	2	3	1	2	2	3	3
Congo	2002	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Cote d'Ivoire	2005	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0
DRC	2005	1	0	2	0	0	1	1	2	1	0	1	1	1	1	1	1
Ethiopia	2000	4	0	4	0	1	1	2	4	7	1	5	1	2	3	3	5
Gabon	2005	10	18	10	5	5	7	7	15	2	7	2	6	2	2	1	2
Ghana	1999	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Guinea-Bissau	2005	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Kenya	1997	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Madagascar	2001	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Malawi	2003	22	8	26	—	—	3	7	23	32	13	20	—	—	5	11	19
Mauritania	2000	59	45	60	—	56	41	15	68	26	26	20	—	42	22	6	18
Morocco	2003	18	12	18	10	11	13	15	22	4	4	3	6	4	4	3	2
Mozambique	2003	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Niger	2005	18	10	21	—	5	6	10	20	15	10	10	—	7	7	9	9
Nigeria	2003	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Rwanda	1998	3	3	3	—	1	0	1	3	3	3	1	—	2	1	2	1
Sao Tome & Principe	2000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Senegal	2001	6	2	8	1	2	2	4	10	3	1	3	1	1	1	2	3
Sierra Leone	2003	8	6	9	0	0	2	4	10	8	7	5	1	0	3	3	4
South Africa	2000	64	19	90	4	11	19	38	161	12	7	13	5	8	10	13	12
Tanzania	2000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Uganda	2002	5	2	8	1	2	2	2	10	7	3	6	3	4	3	2	4
Zambia	2002	2	2	3	0	0	0	1	3	2	2	2	1	1	1	1	2
Overall		14	8	16	3	0	0	7	22	8	5	6	4	6	4	4	5
Income																	
LIC		11	7	12	2	7	5	5	13	8	6	6	3	6	4	4	5
MIC		24	12	31	7	7	10	15	51	5	5	5	6	3	4	4	5
Urbanization																	
Low		9	5	11	3	3	2	5	11	9	5	6	6	5	3	5	6
Medium		4	3	4	0	0	1	2	5	4	3	3	1	1	1	2	2
High		23	14	27	4	12	12	11	40	7	7	6	4	8	6	4	6
Region																	
East		4	2	5	1	1	1	2	6	6	2	4	2	3	2	2	4
West		16	12	17	4	12	9	7	19	8	8	6	6	10	5	4	5
South		30	9	39	2	5	7	15	62	15	7	12	3	4	5	8	11
Central		6	6	7	2	2	3	4	10	2	2	2	2	1	1	2	2

* Sample average

Source: AICD Expenditure Survey Database, 2007

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Table A1.3.11 Cellphone expenditure budget and share in household budget

By country		Expenditure Budget (2002 US\$)								Share in Household Budget (%)							
		Year	National*	Rural	Urban	Q1	Q2	Q3	Q4	Q5	National	Rural	Urban	Q1	Q2	Q3	Q4
Angola	2000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Benin	2002	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Burkina Faso	2003	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Burundi	1998	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Cameroon	2004	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Cape Verde	2001	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Chad	2001	2	1	3	0	0	0	1	7	1	0	1	0	0	0	0	1
Congo	2002	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Cote d'Ivoire	2005	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
DRC	2005	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Ethiopia	2000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Gabon	2005	32	28	33	8	11	18	27	45	7	11	7	8	4	4	5	7
Ghana	1999	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Guinea-Bissau	2005	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Kenya	1997	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Madagascar	2001	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Malawi	2003	31	30	32	—	1	3	7	33	45	48	24	—	2	6	10	28
Mauritania	2000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Morocco	2003	11	30	9	—	—	—	6	13	2	10	2	—	—	—	1	1
Mozambique	2003	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Niger	2005	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Nigeria	2003	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Rwanda	1998	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sao Tome & Principe	2000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Senegal	2001	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sierra Leone	2003	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
South Africa	2000	42	10	59	0	1	3	12	123	8	4	8	1	1	2	4	9
Tanzania	2000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Uganda	2002	18	13	22	3	7	7	10	24	23	19	16	12	14	11	10	10
Zambia	2002	10	5	10	3	1	1	2	12	10	6	7	9	1	1	2	6
Overall		21	17	24	3	0	0	9	37	14	14	9	6	4	4	5	9
Income																	
LIC		15	12	17	2	2	3	5	19	20	19	12	7	5	4	6	11
MIC		28	23	34	4	6	11	15	60	6	8	6	4	2	3	3	6
Urbanization																	
Low		17	15	19	2	3	4	6	21	23	23	14	6	6	6	7	13
Medium		10	5	10	3	1	1	2	12	10	6	7	9	1	1	2	6
High		28	23	34	4	6	11	15	60	6	8	6	4	2	3	3	6
Region																	
East		18	13	22	3	7	7	10	24	23	19	16	12	14	11	10	10
West		11	30	9	—	—	—	6	13	2	10	2	—	—	—	1	1
South		27	15	34	2	1	2	7	56	21	19	13	5	1	3	5	15
Central		17	14	18	4	6	9	14	26	4	6	4	4	2	2	3	4

* Sample average

Source: AICD Expenditure Survey Database, 2007

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Table A1.3.12 All infrastructure expenditure share

By 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	0	0	0	0	0	0	0
Benin	2002	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Burkina Faso	2003	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
Burundi	1998	1	0	16	0	0	0	0	3	2	1	7	0	0	0	1	3
Cameroon	2004	4	2	10	1	1	2	3	9	3	2	6	1	1	2	2	5
Cape Verde	2001	7	3	13	2	3	3	4	14	6	3	7	2	3	4	4	8
Chad	2001	26	8	39	4	8	14	24	55	8	4	9	4	5	6	8	8
Congo	2002	21	6	40	2	5	9	15	50	10	4	13	3	4	6	8	12
Cote d'Ivoire	2005	13	6	18	4	7	10	13	23	6	4	6	5	5	6	5	6
DRC	2005	2	1	6	0	1	1	2	5	2	1	4	1	1	1	2	3
Ethiopia	2000	2	2	7	1	2	2	2	4	4	3	8	4	4	3	3	5
Gabon	2005	103	48	111	25	47	68	99	146	23	18	23	26	15	16	20	23
Ghana	1999	10	6	17	1	4	6	9	20	6	4	8	2	4	4	5	8
Guinea-Bissau	2005	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	1
Kenya	1997	13	8	24	3	4	6	8	23	9	7	10	5	5	5	6	10
Madagascar	2001	5	4	10	1	2	3	5	12	2	2	2	1	1	2	2	2
Malawi	2003	4	2	19	0	1	1	2	12	6	3	15	1	1	2	3	10
Mauritania	2000	9	2	19	0	2	5	7	21	4	1	6	0	2	3	3	6
Morocco	2003	16	2	27	3	6	13	22	43	4	1	5	2	2	3	4	4
Mozambique	2003	6	1	8	1	1	1	3	11	10	3	7	4	4	3	6	8
Niger	2005	9	4	17	2	3	4	6	16	7	4	8	5	4	4	5	7
Nigeria	2003	6	3	10	2	3	4	5	11	7	4	9	7	5	5	6	8
Rwanda	1998	3	1	22	0	0	0	1	11	3	1	7	0	0	0	1	5
Sao Tome & Principe	2000	43	17	65	3	6	11	16	128	20	11	25	3	5	8	9	31
Senegal	2001	17	7	30	4	6	8	16	38	8	4	10	4	4	5	7	10
Sierra Leone	2003	5	2	12	0	1	2	3	21	5	2	8	1	2	2	3	8
South Africa	2000	147	46	204	9	21	40	80	377	27	18	29	11	15	21	27	29
Tanzania	2000	3	2	8	1	1	2	3	7	6	4	9	2	3	3	5	8
Uganda	2002	7	4	22	1	2	3	7	33	9	6	16	2	3	4	7	14
Zambia	2002	4	1	10	0	1	1	2	12	4	1	7	1	1	1	2	7
Overall		16	6	26	2	5	7	12	37	7	4	9	3	3	4	5	8
Income																	
LIC		8	3	16	1	2	4	6	20	5	3	8	2	3	3	4	7
MIC		43	15	58	6	12	19	32	92	10	7	12	7	6	7	9	12
Urbanization																	
Low		6	3	15	1	2	3	5	15	5	3	8	2	2	3	3	6
Medium		4	1	7	0	1	1	2	10	4	1	5	1	1	2	2	5
High		30	11	43	4	9	14	22	68	9	6	11	5	5	6	8	11
Region																	
East		5	3	16	1	1	2	3	14	5	4	10	2	3	3	4	7
West		10	4	18	2	3	5	8	26	6	3	7	3	3	3	4	7
South		28	9	42	2	4	8	15	71	8	4	10	3	4	5	7	9
Central		31	13	41	6	12	19	28	53	9	6	11	7	5	6	8	10

* Sample average

Source: AICD Expenditure Survey Database, 2007

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Table A1.3.13 Affordability analysis at the continental level

At 3% of household budget threshold for % of urban households																
Cost of Minimum Consumption (US\$)																
Quintile	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	1	3	4	6	7	8	10	11	13	14	15	17	18	20	21	23
2	1	2	3	3	4	5	6	7	8	9	9	10	11	12	13	14
3	1	1	2	2	3	4	4	5	6	6	7	7	8	9	9	10
4	0	1	1	2	2	3	3	4	4	4	5	5	6	6	7	7
5	0	1	1	1	1	2	2	2	2	3	3	3	3	4	4	4
At 5% of household budget threshold for % of urban households																
Quintile	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	1	3	4	5	7	8	9	11	12	13	15	16	17	19	20	21
2	1	1	2	3	3	4	5	5	6	7	7	8	9	9	10	11
3	0	1	1	2	2	3	3	3	4	4	5	5	6	6	6	7
4	0	0	1	1	1	1	2	2	2	2	2	3	3	3	3	4
5	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1

Source: AICD Expenditure Survey Database, 2007

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Table A1.3.14 Affordability analysis at the country level

At 3% of household budget threshold for % of urban households																
Cost of Minimum Consumption (US\$)																
Country	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Burundi	4.0	20.0	45.0	62.0	72.0	82.0	86.0	95.0	99.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Benin	0.0	0.0	3.0	6.0	15.0	33.0	42.0	55.0	65.0	75.0	84.0	88.0	91.0	95.0	97.0	97.0
Burkina Faso	0.0	2.0	8.0	21.0	35.0	47.0	60.0	71.0	75.0	80.0	87.0	88.0	90.0	91.0	93.0	93.0
Cote d'Ivoire	0.0	0.0	0.0	1.0	2.0	3.0	5.0	7.0	8.0	14.0	21.0	27.0	34.0	41.0	47.0	53.0
Cameroon	0.0	0.0	0.0	0.0	0.0	1.0	2.0	6.0	11.0	18.0	30.0	45.0	60.0	73.0	82.0	88.0
Congo, Rep.	0.0	0.0	1.0	3.0	6.0	12.0	21.0	25.0	33.0	35.0	46.0	50.0	56.0	60.0	67.0	72.0
Cape Verde	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	2.0	3.0
Ethiopia	23.0	77.0	93.0	97.0	99.0	99.0	99.0	99.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Ghana	0.0	1.0	3.0	9.0	14.0	30.0	41.0	52.0	61.0	72.0	82.0	90.0	95.0	98.0	98.0	100.0
Guinea Bissau	0.0	4.0	22.0	52.0	68.0	81.0	88.0	89.0	92.0	93.0	96.0	98.0	98.0	98.0	98.0	99.0
Kenya	0.0	0.0	4.0	9.0	23.0	36.0	59.0	69.0	77.0	80.0	83.0	87.0	88.0	90.0	91.0	93.0
Morocco	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	0.0	1.0	1.0
Madagascar	0.0	7.0	23.0	34.0	49.0	61.0	66.0	76.0	82.0	85.0	89.0	92.0	94.0	94.0	95.0	95.0
Mozambique	0.0	8.0	20.0	39.0	48.0	59.0	65.0	73.0	76.0	80.0	85.0	87.0	88.0	89.0	90.0	90.0
Malawi	1.0	18.0	49.0	70.0	79.0	87.0	92.0	93.0	94.0	95.0	95.0	95.0	95.0	95.0	95.0	95.0
Niger	1.0	7.0	20.0	39.0	57.0	70.0	78.0	87.0	92.0	93.0	95.0	97.0	97.0	98.0	98.0	98.0
Nigeria	2.0	8.0	18.0	25.0	37.0	57.0	75.0	88.0	93.0	95.0	97.0	98.0	98.0	98.0	99.0	99.0
Senegal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	1.0	1.0	2.0	4.0	5.0	6.0	8.0	9.0
Sierra Leone	0.0	3.0	7.0	22.0	35.0	44.0	53.0	60.0	65.0	68.0	72.0	74.0	79.0	81.0	84.0	87.0
Sao Tome & Principe	0.0	1.0	5.0	18.0	32.0	46.0	59.0	74.0	78.0	83.0	87.0	90.0	93.0	95.0	96.0	97.0
Tanzania	0.0	4.0	15.0	34.0	62.0	75.0	88.0	94.0	97.0	98.0	99.0	99.0	99.0	99.0	99.0	99.0
Uganda	0.0	5.0	32.0	53.0	68.0	82.0	90.0	94.0	96.0	98.0	98.0	98.0	98.0	99.0	99.0	99.0
South Africa	0.0	0.0	0.0	0.0	0.0	1.0	1.0	1.0	1.0	1.0	1.0	2.0	2.0	2.0	3.0	4.0
DRC	5.0	36.0	67.0	84.0	93.0	98.0	99.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Zambia	0.0	2.0	11.0	26.0	37.0	50.0	56.0	64.0	72.0	78.0	82.0	87.0	90.0	91.0	91.0	93.0
LIC	2.9	13.9	26.2	35.9	46.5	59.5	70.3	78.5	82.5	85.2	87.9	89.7	90.7	91.5	92.5	93.1
MIC	0.0	0.0	0.0	0.1	0.3	1.2	1.8	2.6	3.7	4.8	7.2	10.1	12.6	14.8	17.2	18.9
Overall	2.2	10.4	19.5	26.8	34.8	44.7	52.9	59.2	62.5	64.7	67.3	69.4	70.8	72.0	73.4	74.2
At 5% of household budget threshold for % of urban households																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
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
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
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
Cote 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
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
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
Cape Verde	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	0.0	0.0	0.0
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
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
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

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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
Morocco	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	0.0	0.0	0.0
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
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
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
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
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
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
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
Sao Tome & Principe	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
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
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
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
DRC	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
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
LIC	0.1	5.0	12.1	18.4	26.2	32.4	38.0	44.5	52.7	59.5	66.7	72.3	76.7	79.7	82.5	84.3
MIC	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.9	1.2	1.4	1.8	2.2	2.9	3.7	4.7
Overall	0.1	3.7	9.0	13.7	19.5	24.2	28.3	33.2	39.5	44.7	50.1	54.3	57.7	60.2	62.5	64.1

Source: AICD Expenditure Survey Database, 2007

Part 4 Access to infrastructure alternatives

- Table A1.4.1 Standpost**
- Table A1.4.2 Borehole**
- Table A1.4.3 Surface water**
- Table A1.4.4 Vendor**
- Table A1.4.5 VIP/ventilated/improved latrine**
- Table A1.4.6 Traditional pit latrine**
- Table A1.4.7 No sanitation**
- Table A1.4.8 LPG for cooking**
- Table A1.4.9 Kerosene for cooking**
- Table A1.4.10 Wood/charcoal for cooking**
- Table A1.4.11 Refuse disposal on pit or heap**
- Table A1.4.12 Refuse disposal by burning or burial**
- Table A1.4.13 Average annual growth rate in water services**
- Table A1.4.14 Average annual growth rate in sanitation services**
- Table A1.4.15 Average annual growth rate in energy and ICT services**

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Table A1.4.1 Standpost

Percentage population	By time period (national)			By location		By expenditure quintile				
	Early 1990s	Late 1990s	Early 2000s	Rural	Urban	1st	2nd	3rd	4th	5th
By country										
Benin	—	5	14	19	6	13	18	20	16	3
Burkina Faso	10	8	13	4	53	0	0	5	17	47
C. African Rep	19	—	—	2	43	0	2	10	36	47
Cameroon	22	23	26	10	43	0	17	28	49	35
Chad	—	6	7	2	23	0	1	7	7	18
Comoros	—	27	—	25	30	69	8	26	15	7
Congo, Rep.	—	—	23	5	40	4	11	46	50	6
Cote d'Ivoire	21	23	—	28	15	24	33	29	29	1
Ethiopia	—	12	16	12	41	0	4	18	20	37
Gabon	—	30	—	11	37	13	55	63	20	0
Ghana	19	21	20	8	38	2	22	17	35	27
Guinea	—	11	13	2	38	0	0	5	17	43
Kenya	11	9	9	7	20	3	5	10	15	14
Lesotho	—	52	48	50	38	55	43	56	55	31
Madagascar	12	11	18	10	47	0	0	6	34	50
Malawi	20	16	13	7	43	0	0	6	23	34
Mali	—	11	20	16	32	1	11	27	28	34
Mauritania	—	—	15	8	24	0	24	19	21	12
Mozambique	—	18	18	5	43	0	3	6	29	51
Namibia	19	21	—	22	19	13	30	38	23	0
Niger	11	13	—	7	37	0	0	0	32	31
Nigeria	13	14	9	6	17	4	7	9	13	15
Rwanda	21	29	25	22	41	0	3	51	23	48
Senegal	18	17	18	23	12	19	33	23	14	2
South Africa	—	19	—	30	10	31	48	17	0	0
Tanzania	20	20	25	19	45	12	15	20	37	42
Togo	—	18	—	15	23	8	11	20	28	21
Uganda	4	—	7	1	47	0	0	1	3	32
Zambia	18	16	16	4	36	0	3	13	45	17
Zimbabwe	8	7	—	8	6	1	9	10	16	1
Congo, Dem. Rep.	7	—	12	0	40	0	0	0	7	59
Sudan	—	8	—	10	37	0	0	5	45	77
By income group										
Low income	14	14	15	9	29	3	7	11	21	32
Middle income	24	22	21	24	21	22	38	24	18	10
By urbanization										
Low	12	13	16	11	39	3	5	14	22	35
Medium	15	16	15	5	34	1	3	6	24	48
High	17	17	16	12	20	10	19	15	17	13
By subregion										
East	16	16	17	11	38	3	5	14	24	41
West	17	17	17	9	21	5	11	13	19	19
South	19	19	16	14	22	12	20	12	19	22
Central	12	12	15	2	40	0	5	10	18	46
Overall	15	15	16	10	27	5	10	13	21	30

Note: Location and Expenditure Quintile Data is for the Latest Available Year

Source: AICD DHS/MICS Database, 2007

ACCESS, AFFORDABILITY, AND ALTERNATIVES:
MODERN INFRASTRUCTURE SERVICES IN AFRICA

Note: The shaded 'Trends in Access' figures are based on Method 3 (Refer to Annex A1.1.5)

Table A1.4.2 Well/borehole

Percentage population	By time period (national)			By location		By expenditure quintile				
	Early 1990s	Late 1990s	Early 2000s	Rural	Urban	1st	2nd	3rd	4th	5th
By country										
Benin	—	55	45	54	28	50	60	62	44	8
Burkina Faso	79	82	68	79	13	65	83	84	77	19
C. African Rep	38	—	—	41	35	31	35	53	43	30
Cameroon	28	27	32	48	15	47	56	34	20	5
Chad	—	72	66	74	34	52	76	77	85	40
Comoros	—	46	—	54	24	19	50	57	62	46
Congo, Rep.	—	—	15	25	6	18	27	21	8	2
Cote d'Ivoire	41	41	—	54	20	56	55	64	30	2
Ethiopia	—	6	10	11	2	5	14	12	11	8
Gabon	—	8	—	24	3	22	15	3	1	0
Ghana	33	35	42	57	21	51	56	49	46	8
Guinea	—	47	50	59	30	30	71	67	72	13
Kenya	25	22	22	24	14	12	25	30	26	16
Lesotho	—	15	33	38	10	44	43	32	33	15
Madagascar	16	23	22	22	19	19	18	19	28	25
Malawi	59	66	69	78	24	84	83	77	69	33
Mali	—	79	65	75	37	95	80	62	62	27
Mauritania	—	—	45	68	15	96	45	53	24	6
Mozambique	—	46	59	73	33	68	78	77	60	13
Namibia	27	32	—	47	0	67	52	35	4	0
Niger	75	72	—	87	8	99	95	92	52	20
Nigeria	32	44	54	57	48	59	58	52	48	51
Rwanda	2	10	20	21	18	6	37	18	25	15
Senegal	51	49	36	56	10	77	56	36	8	0
South Africa	—	4	—	9	0	9	7	3	1	0
Tanzania	31	41	41	48	19	57	54	45	34	15
Togo	—	38	—	45	23	40	51	49	38	15
Uganda	40	—	68	73	35	66	69	72	82	52
Zambia	24	45	47	64	16	69	63	60	36	6
Zimbabwe	54	52	—	76	1	80	68	76	34	1
Congo, Dem. Rep.	49	—	9	8	11	4	13	15	11	4
Sudan	—	45	—	51	36	74	58	41	27	12
By income group										
Low income	40	41	45	45	29	46	49	45	38	22
Middle income	11	11	12	22	4	21	22	13	7	2
By urbanization										
Low	33	34	37	41	17	38	44	41	38	20
Medium	57	49	52	42	22	44	47	44	31	8
High	28	34	39	49	29	49	48	41	34	28
By subregion										
East	40	41	45	33	20	34	37	33	29	17
West	51	54	56	61	37	62	62	57	48	33
South	25	36	31	47	9	42	41	39	29	10
Central	47	26	41	24	14	19	29	27	22	9
Overall	37	38	41	43	24	44	46	42	35	20

Note: Location and Expenditure Quintile Data is for the Latest Available Year

ACCESS, AFFORDABILITY, AND ALTERNATIVES:
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Source: AICD DHS/MICS Database, 2007

Note: The shaded 'Trends in Access' figures are based on Method 3 (Refer to Annex A1.1.5)

Table A1.4.3 Surface water

Percentage population	By time period (national)			By location		By expenditure quintile				
	Early 1990s	Late 1990s	Early 2000s	Rural	Urban	1st	2nd	3rd	4th	5th
By country										
Benin	—	17	12	16	5	37	14	7	3	0
Burkina Faso	4	5	13	16	1	35	17	11	5	0
C. African Rep	39	—	—	57	14	69	63	36	20	8
Cameroon	35	37	28	40	15	53	27	33	19	7
Chad	—	12	18	22	4	48	22	13	7	2
Comoros	—	3	—	3	1	10	1	1	0	0
Congo, Rep.	—	—	30	59	5	76	55	17	4	0
Cote d'Ivoire	13	7	—	12	0	20	10	4	3	0
Ethiopia	—	78	68	76	8	94	82	70	69	25
Gabon	—	18	—	56	5	64	23	3	0	0
Ghana	34	27	20	32	3	45	20	30	4	1
Guinea	—	32	27	37	4	69	29	28	10	0
Kenya	45	47	46	56	6	84	65	52	29	2
Lesotho	—	20	8	9	1	1	14	11	8	3
Madagascar	65	59	55	65	17	81	82	76	36	1
Malawi	15	10	12	14	1	16	16	16	7	2
Mali	—	4	5	6	2	4	8	8	5	1
Mauritania	—	—	5	8	1	4	13	4	2	1
Mozambique	—	29	15	21	3	32	18	15	9	1
Namibia	21	8	—	12	0	17	14	7	3	0
Niger	3	3	—	3	0	1	3	5	3	2
Nigeria	42	28	23	31	8	33	30	28	16	8
Rwanda	75	54	51	56	25	94	59	30	50	23
Senegal	3	2	1	2	0	2	1	1	0	0
South Africa	—	14	—	31	0	53	14	4	0	0
Tanzania	34	24	24	30	7	31	31	35	21	5
Togo	—	26	—	36	2	51	35	25	16	0
Uganda	53	—	22	24	2	34	30	25	14	4
Zambia	26	17	19	29	1	31	34	26	4	0
Zimbabwe	11	8	—	11	0	19	11	6	1	0
Congo, Dem. Rep.	22	—	62	86	22	96	85	73	55	12
Sudan	—	20	—	28	7	15	27	35	13	3
By income group										
Low income	43	32	34	41	8	49	41	37	25	7
Middle income	23	21	19	33	4	52	20	12	5	2
By urbanization										
Low	54	38	41	45	7	59	50	43	33	10
Medium	34	31	38	47	10	52	45	40	24	5
High	32	23	20	29	6	37	24	21	10	5
By subregion										
East	43	41	45	51	8	62	54	48	38	11
West	34	24	22	23	6	31	23	21	11	5
South	31	24	21	30	3	43	27	20	8	1
Central	25	31	49	69	16	80	64	54	38	9
Overall	41	31	33	41	7	49	39	34	23	7

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Note: Location and Expenditure Quintile Data is for the Latest Available Year

Source: AICD DHS/MICS Database, 2007

Note: The shaded 'Trends in Access' figures are based on Method 3 (Refer to Annex A1.1.5)

Table A1.4.4 Vendor

Percentage population	By time period (national)			By location		By expenditure quintile				
	Early 1990s	Late 1990s	Early 2000s	Rural	Urban	1st	2nd	3rd	4th	5th
By country										
Benin	—	0	0	0	0	0	0	0	0	0
Burkina Faso	1	1	0	0	0	0	0	0	0	0
C. African Rep	0	—	—	0	0	0	0	0	0	0
Cameroon	0	1	0	0	0	0	0	0	0	0
Chad	—	7	4	0	16	0	0	1	1	16
Comoros	—	0	—	0	0	0	0	0	0	0
Congo, Rep.	—	—	1	1	0	1	1	1	0	0
Cote d'Ivoire	0	0	—	0	0	0	0	0	0	0
Ethiopia	—	0	0	0	1	0	0	0	0	0
Gabon	—	0	—	0	0	0	0	0	0	0
Ghana	1	1	1	0	2	0	0	1	3	2
Guinea	—	0	0	0	0	0	0	0	0	0
Kenya	0	0	0	0	0	0	0	0	0	0
Lesotho	—	0	0	0	0	0	0	0	0	0
Madagascar	0	1	0	0	0	0	0	0	0	0
Malawi	0	0	0	0	0	0	0	0	0	0
Mali	—	0	0	0	0	0	0	0	0	0
Mauritania	—	—	16	3	32	0	14	15	26	25
Mozambique	—	0	0	0	0	0	0	0	0	0
Namibia	1	0	—	0	0	1	0	0	0	0
Niger	4	5	—	2	21	0	1	3	4	19
Nigeria	3	3	6	4	10	4	4	7	10	6
Rwanda	0	0	0	0	0	0	0	0	0	0
Senegal	0	0	0	0	0	0	0	0	0	0
South Africa	—	1	—	2	0	2	2	1	0	0
Tanzania	0	1	2	1	6	0	0	0	1	7
Togo	—	0	—	0	0	0	0	0	0	0
Uganda	0	—	0	0	0	0	0	0	0	0
Zambia	0	0	0	0	0	0	0	0	0	0
Zimbabwe	0	0	—	0	0	0	0	0	0	0
Congo, Dem. Rep.	0	—	0	0	0	0	0	0	0	0
Sudan	—	0	—	0	0	0	0	0	0	0
By income group										
Low income	1	1	2	1	4	1	1	2	3	3
Middle income	1	1	1	1	0	1	1	1	0	0
By urbanization										
Low	1	1	1	0	3	0	0	0	0	3
Medium	0	0	0	0	0	0	0	0	0	0
High	2	2	4	3	6	2	3	4	6	3
By subregion										
East	1	1	2	0	1	0	0	0	0	1
West	2	2	4	2	7	2	2	4	6	4
South	0	0	0	0	0	1	1	0	0	0
Central	2	1	1	0	1	0	0	0	0	2

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Overall	1	1	2	1	4	1	1	2	2	2
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Note: Location and Expenditure Quintile Data is for the Latest Available Year

Source: AICD DHS/MICS Database, 2007

Note: The shaded 'Trends in Access' figures are based on Method 3 (Refer to Annex A1.1.5)

Table A1.4.5 VIP/ventilated/chemical toilet

Percentage population	By time period (national)			By location		By expenditure quintile				
	Early 1990s	Late 1990s	Early 2000s	Rural	Urban	1st	2nd	3rd	4th	5 th
By country										
Benin	—	1	14	5	29	0	1	4	13	52
Burkina Faso	1	0	18	7	70	0	1	3	20	74
C. African Rep	13	—	—	18	6	16	28	13	7	3
Cameroon	0	24	27	13	41	0	1	25	64	46
Chad	—	8	3	0	12	0	0	0	0	13
Comoros	—	21	—	15	35	0	0	18	24	62
Congo, Rep.	—	—	15	4	25	0	1	8	19	48
Cote d'Ivoire	22	13	—	8	23	0	1	11	28	27
Ethiopia	—	0	1	0	4	0	0	0	1	4
Gabon	—	22	—	8	27	2	13	38	53	4
Ghana	13	22	23	11	39	1	22	17	39	35
Guinea	—	0	2	2	3	0	1	4	2	4
Kenya	6	6	8	7	11	0	0	6	12	22
Lesotho	—	18	21	17	38	0	1	25	34	44
Madagascar	31	4	49	44	67	0	20	66	77	82
Malawi	1	1	1	1	2	0	0	0	0	6
Mali	—	8	11	7	21	0	1	8	17	28
Mauritania	—	—	4	0	9	0	0	0	3	16
Mozambique	—	1	2	0	5	0	0	0	0	9
Namibia	0	3	—	3	2	0	0	7	7	0
Niger	12	12	—	2	55	0	0	0	2	58
Nigeria	0	6	3	2	5	0	0	2	5	7
Rwanda	0	8	29	26	48	0	0	4	75	67
Senegal	22	23	10	11	9	6	16	10	10	7
South Africa	—	0	—	0	0	0	0	0	0	0
Tanzania	1	1	4	1	12	0	0	0	1	17
Togo	—	18	—	12	33	0	4	7	32	48
Uganda	2	—	2	1	9	0	0	0	2	9
Zambia	1	0	2	1	2	0	0	1	4	2
Zimbabwe	21	25	—	36	2	7	23	58	36	0
Congo, Dem. Rep.	11	—	10	0	26	0	0	0	2	40
Sudan	—	0	—	0	0	0	0	0	0	0
By income group										
Low income	7	7	9	5	14	0	3	6	10	19
Middle income	2	7	8	4	13	0	1	8	19	15
By urbanization										
Low	5	3	9	6	21	0	2	6	12	24
Medium	11	10	11	4	12	1	3	6	6	19
High	4	9	8	4	12	0	3	6	13	13
By subregion										
East	6	7	10	3	8	0	0	1	6	12
West	8	11	12	4	14	0	3	5	12	20
South	7	4	11	13	9	1	6	17	17	16

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	Central	11	12	13	3	28	1	2	6	15	37
Overall		6	7	9	5	14	0	2	6	11	19

Note: Location and Expenditure Quintile Data is for the Latest Available Year

Source: AICD DHS/MICS Database, 2007

Note: The shaded 'Trends in Access' figures are based on Method 3 (Refer to Annex A1.1.5)

Table A1.4.6 Traditional pit latrine

Percentage population	By time period (national)			By location		By expenditure quintile					
	Early 1990s	Late 1990s	Early 2000s	Rural	Urban	1st	2nd	3rd	4th	5th	
By country											
Benin	—	24	15	9	26	0	2	9	37	27	
Burkina Faso	26	22	10	9	14	0	0	12	25	10	
C. African Rep	59	—	—	40	86	0	41	76	89	91	
Cameroon	45	60	58	73	41	84	84	71	34	15	
Chad	—	21	24	13	64	0	0	2	47	70	
Comoros	—	75	—	82	56	100	97	81	73	24	
Congo, Rep.	—	—	70	78	62	80	80	87	74	27	
Cote d'Ivoire	21	39	—	36	44	3	30	85	65	13	
Ethiopia	—	17	35	29	77	0	12	56	33	73	
Gabon	—	51	—	83	40	93	83	55	24	0	
Ghana	47	41	41	50	27	88	52	26	25	11	
Guinea	—	61	67	59	87	4	88	69	93	84	
Kenya	68	68	64	69	44	87	81	60	61	32	
Lesotho	—	36	33	30	45	0	13	49	56	47	
Madagascar	6	33	3	2	6	0	0	0	4	8	
Malawi	72	79	81	82	74	99	88	67	74	76	
Mali	—	64	62	62	62	77	72	47	61	53	
Mauritania	—	—	44	28	66	0	13	58	77	75	
Mozambique	—	35	48	38	68	0	10	77	84	73	
Namibia	7	8	—	9	5	0	0	22	15	0	
Niger	4	7	—	4	21	0	0	1	10	24	
Nigeria	62	54	59	60	58	75	75	62	61	24	
Rwanda	93	87	66	70	43	100	97	88	20	25	
Senegal	29	35	31	38	22	56	39	24	24	13	
South Africa	—	34	—	64	9	48	72	47	4	0	
Tanzania	82	85	79	80	75	87	74	80	85	68	
Togo	—	15	—	6	35	2	5	6	13	49	
Uganda	79	—	80	81	78	86	83	68	83	81	
Zambia	42	51	53	57	47	14	71	80	79	21	
Zimbabwe	13	15	—	21	2	12	21	25	16	0	
Congo, Dem. Rep.	71	—	76	82	66	82	77	86	90	51	
Sudan	—	49	—	41	60	19	37	57	77	66	
By income group											
Low income	51	49	54	51	54	49	52	57	58	44	
Middle income	42	42	39	63	21	57	72	55	17	7	
By urbanization											
Low	45	45	52	48	57	45	45	52	49	55	
Medium	55	56	55	53	56	34	48	65	74	52	
High	51	48	51	57	42	66	68	57	45	17	
By subregion											
East	49	46	52	55	65	47	50	64	59	64	
West	53	48	52	46	50	55	56	50	52	26	

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South	33	45	39	44	23	30	46	48	33	24
Central	62	59	65	70	59	70	69	73	73	46
Overall	50	49	52	52	49	50	54	57	54	40

Source: AICD DHS/MICS Database, 2007.

Note: Location and expenditure quintile data are for the latest available year. Shaded 'Trends in Access' figures are based on Method 3 (Annex A1.1.5).

Table A1.4.7 No sanitation/Open defecation

Percentage population	By time period (national)			By location		By expenditure quintile				
	Early 1990s	Late 1990s	Early 2000s	Rural	Urban	1st	2nd	3rd	4th	5th
By country										
Benin	—	74	68	85	37	99	95	87	48	9
Burkina Faso	72	77	70	83	8	100	99	84	53	6
C. African Rep	26	—	—	41	5	84	31	11	3	0
Cameroon	13	10	7	13	1	15	15	4	1	1
Chad	—	71	72	86	16	100	100	98	51	8
Comoros	—	0	—	0	0	0	1	0	0	0
Congo, Rep.	—	—	10	17	3	19	19	5	4	1
Cote d'Ivoire	42	35	—	54	3	97	69	5	4	0
Ethiopia	—	82	62	69	11	100	88	43	63	17
Gabon	—	2	—	4	2	5	3	2	1	0
Ghana	27	24	25	37	7	11	23	55	29	4
Guinea	—	34	28	38	2	96	11	27	4	1
Kenya	18	16	18	22	4	13	18	34	24	2
Lesotho	—	40	45	53	8	100	86	26	10	1
Madagascar	61	61	47	54	20	100	80	33	18	1
Malawi	25	17	14	16	5	1	11	33	25	2
Mali	—	27	21	28	2	23	27	37	16	1
Mauritania	—	—	49	70	21	100	87	41	18	0
Mozambique	—	60	47	61	18	100	89	22	16	3
Namibia	64	57	—	79	11	99	99	65	19	0
Niger	82	79	—	94	18	100	100	99	85	13
Nigeria	29	26	25	33	9	25	24	34	24	15
Rwanda	6	3	3	3	3	0	2	8	4	3
Senegal	38	32	22	36	4	35	37	28	7	1
South Africa	—	13	—	26	2	50	11	2	0	0
Tanzania	14	12	14	18	2	13	26	20	12	2
Togo	—	64	—	79	30	95	86	85	52	3
Uganda	17	—	15	17	2	13	16	30	12	2
Zambia	29	27	27	40	4	86	29	18	3	0
Zimbabwe	39	28	—	42	0	81	44	11	5	0
Congo, Dem. Rep.	16	—	12	17	3	18	22	14	8	2
Sudan	—	43	—	56	24	78	61	39	14	2
By income group										
Low income	50	40	37	42	9	50	44	35	25	7
Middle income	16	14	13	26	2	42	17	5	1	0
By urbanization										
Low	59	44	41	45	8	55	54	41	36	7
Medium	57	49	42	42	12	64	47	27	13	2
High	26	23	21	33	6	33	25	26	16	9
By subregion										
East	50	39	36	41	11	52	49	34	31	7
West	50	44	40	46	9	44	39	42	27	10
South	38	35	28	40	6	68	42	17	9	1

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	Central	22	18	19	27	4	29	29	20	11	2
Overall		46	37	34	41	8	49	41	32	23	6

Source: AICD DHS/MICS Database, 2007.

Note: Location and expenditure quintile data are for the latest available year. Shaded 'Trends in Access' figures are based on Method 3 (Annex A1.1.5).

Table A1.4.8 LPG for cooking

Percentage population	By time period (national)			By location		By expenditure quintile					
	Early 1990s	Late 1990s	Early 2000s	Rural	Urban	1st	2nd	3rd	4th	5 th	
By country											
Benin	—	0	1	0	2	0	0	0	0	0	3
Burkina Faso	—		2	0	10	0	0	0	0	0	11
C. African Rep	—	—	—	—	—	—	—	—	—	—	—
Cameroon	—		11	1	22	0	0	0	4	4	52
Chad	—	—	—	—	—	—	—	—	—	—	—
Comoros	—	—	—	—	—	—	—	—	—	—	—
Congo, Rep.	—		8	1	15	0	0	2	9	9	31
Cote d'Ivoire	—	—	—	—	—	—	—	—	—	—	—
Ethiopia	—	0	0	0	1	0	0	0	0	0	1
Gabon	—	62	—	15	79	0	40	81	93	93	98
Ghana	—	—	7	1	15	0	2	1	4	4	26
Guinea	—	—	0	0	0	0	0	0	0	0	0
Kenya	—	—	3	1	12	0	0	0	1	1	15
Lesotho	—	14	19	10	57	0	0	1	16	16	77
Madagascar	—	—	1	0	2	0	0	0	0	0	4
Malawi	—	0	0	0	0	0	0	0	0	0	0
Mali	—	—	0	0	1	0	0	0	0	0	1
Mauritania	—	—	28	14	46	0	0	12	47	47	81
Mozambique	—	—	2	0	5	0	0	0	0	0	8
Namibia	—	7	—	3	16	0	0	1	23	23	12
Niger	—	—	—	—	—	—	—	—	—	—	—
Nigeria	—	—	1	1	2	0	0	0	0	0	5
Rwanda	—	0	0	0	0	0	0	0	0	0	0
Senegal	—	—	38	11	75	0	3	35	65	65	90
South Africa	—	5	—	3	7	0	2	6	9	9	7
Tanzania	—	—	0	0	0	0	0	0	0	0	0
Togo	—	—	—	—	—	—	—	—	—	—	—
Uganda	—	—	0	0	1	0	0	0	0	0	1
Zambia	—	—	0	0	0	0	0	0	0	0	0
Zimbabwe	—	0	—	0	0	0	0	0	0	0	1
Congo, Dem. Rep.	—	—	—	—	—	—	—	—	—	—	—
Sudan	—	11	—	6	18	0	0	0	9	9	60
By income group											
Low income	—	2	2	1	7	0	0	1	3	3	11
Middle income	—	8	8	3	14	0	2	6	10	10	23
By urbanization											
Low	—	1	1	0	3	0	0	0	0	0	4
Medium	—	1	1	2	8	0	0	0	4	4	23
High	—	6	5	2	10	0	1	4	7	7	17
By subregion											
East	—	2	2	1	7	0	0	0	2	2	12
West	—	4	3	1	8	0	0	2	5	5	13
South	—	3	2	1	5	0	1	2	4	4	6

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Central	—	9	8	1	26	0	2	5	10	51
Overall		3	3	1	8	0	0	2	4	13

Source: AICD DHS/MICS Database, 2007.

Note: Location and expenditure quintile data are for the latest available year. Shaded 'Trends in Access' figures are based on Method 3 (Annex A1.1.5).

Table A1.4.9 Kerosene for cooking

Percentage population	By time period (national)			By location		By expenditure quintile				
	Early 1990s	Late 1990s	Early 2000s	Rural	Urban	1st	2nd	3rd	4th	5 th
By country										
Benin	—	5	3	1	7	0	0	0	1	13
Burkina Faso	—	—	0	0	0	0	0	0	0	0
C. African Rep	—	—	—	—	—	—	—	—	—	—
Cameroon	—	—	5	1	9	0	0	2	9	12
Chad	—	—	—	—	—	—	—	—	—	—
Comoros	—	—	—	—	—	—	—	—	—	—
Congo, Rep.	—	—	4	1	7	0	1	4	9	7
Cote d'Ivoire	—	—	—	—	—	—	—	—	—	—
Ethiopia	—	4	3	0	25	0	0	0	0	15
Gabon	—	2	—	0	3	0	3	4	3	1
Ghana	—	—	0	0	1	0	0	0	0	1
Guinea	—	—	0	0	0	0	0	0	0	0
Kenya	—	—	9	1	40	0	0	1	6	38
Lesotho	—	23	10	7	25	0	3	11	27	10
Madagascar	—	—	0	0	0	0	0	0	0	0
Malawi	—	0	0	0	0	0	0	0	0	0
Mali	—	—	0	0	0	0	0	0	0	0
Mauritania	—	—	0	0	0	0	0	0	0	0
Mozambique	—	—	0	0	1	0	0	0	0	2
Namibia	—	3	—	1	7	0	0	7	7	0
Niger	—	—	—	—	—	—	—	—	—	—
Nigeria	—	—	21	9	45	0	1	2	26	77
Rwanda	—	0	0	0	0	0	0	0	0	0
Senegal	—	—	0	0	0	0	0	0	0	0
South Africa	—	21	—	17	24	10	36	41	17	0
Tanzania	—	—	1	0	5	0	0	0	1	6
Togo	—	—	—	—	—	—	—	—	—	—
Uganda	—	—	1	1	5	0	0	1	2	4
Zambia	—	—	0	0	0	0	0	0	0	0
Zimbabwe	—	8	—	2	20	0	1	1	30	7
Congo, Dem. Rep.	—	—	—	—	—	—	—	—	—	—
Sudan	—	0	—	0	0	0	0	0	0	0
By income group										
Low income	—	8	7	2	22	0	0	1	8	26
Middle income	—	16	14	11	18	6	23	27	14	4
By urbanization										
Low	—	3	3	0	14	0	0	0	1	11
Medium	—	2	2	0	3	0	0	0	4	2
High	—	17	15	8	30	2	8	9	19	44
By subregion										
East	—	8	7	0	14	0	0	0	1	13
West	—	13	11	5	31	0	1	2	16	48
South	—	9	8	5	15	4	13	15	10	1

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Central	—	3	3	0	14	0	0	0	1	13
Overall		9	8	3	21	1	3	4	9	23

Source: AICD DHS/MICS Database, 2007.

Note: Location and expenditure quintile data are for the latest available year. Shaded 'Trends in Access' figures are based on Method 3 (Annex A1.1.5).

Table A1.4.10 Wood/charcoal for cooking

Percentage population	By time period (national)			By location		By expenditure quintile				
	Early 1990s	Late 1990s	Early 2000s	Rural	Urban	1st	2nd	3rd	4th	5 th
By country										
Benin	—	94	96	99	89	100	100	99	98	81
Burkina Faso	—	—	97	99	89	100	100	99	99	88
C. African Rep	—	—	—	—	—	—	—	—	—	—
Cameroon	—	—	83	97	67	99	98	96	84	34
Chad	—	—	—	—	—	—	—	—	—	—
Comoros	—	—	—	—	—	—	—	—	—	—
Congo, Rep.	—	—	83	96	71	99	98	92	76	51
Cote d'Ivoire	—	—	—	—	—	—	—	—	—	—
Ethiopia	—	80	89	92	70	100	100	85	87	73
Gabon	—	34	—	84	16	99	55	13	3	0
Ghana	—	—	92	98	83	100	97	98	95	69
Guinea	—	—	80	97	39	100	100	99	86	14
Kenya	—	—	87	97	46	100	100	99	92	44
Lesotho	—	56	62	74	9	100	83	78	44	5
Madagascar	—	—	98	99	96	99	100	100	99	94
Malawi	—	97	98	100	89	100	100	100	99	90
Mali	—	—	96	95	98	96	93	95	98	97
Mauritania	—	—	70	84	52	100	99	86	50	17
Mozambique	—	—	97	99	92	100	100	99	99	86
Namibia	—	66	—	89	19	100	96	82	50	0
Niger	—	—	—	—	—	—	—	—	—	—
Nigeria	—	—	77	89	52	99	98	96	73	17
Rwanda	—	99	99	100	98	100	100	100	100	97
Senegal	—	—	59	85	24	95	93	63	33	9
South Africa	—	37	—	66	14	86	57	30	14	0
Tanzania	—	—	98	100	93	100	99	100	99	92
Togo	—	—	—	—	—	—	—	—	—	—
Uganda	—	—	97	99	88	100	100	99	98	91
Zambia	—	—	84	98	58	100	100	99	92	28
Zimbabwe	—	67	—	96	5	100	89	94	49	1
Congo, Dem. Rep.	—	—	—	—	—	—	—	—	—	—
Sudan	—	88	—	93	81	100	100	99	89	39
By income group										
Low income	—	84	78	95	65	99	98	95	85	54
Middle income	—	54	49	77	30	91	71	52	36	11
By urbanization										
Low	—	90	85	96	80	100	99	95	94	79
Medium	—	78	72	96	66	100	98	98	86	42
High	—	71	64	87	47	97	90	82	62	20
By subregion										
East	—	84	78	95	76	100	100	94	92	70
West	—	77	68	92	58	99	98	95	77	33
South	—	73	68	90	40	95	83	74	61	40
Central	—	55	49	97	64	99	96	91	78	36

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Overall	—	80	74	93	58	98	95	90	79	49
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Source: AICD DHS/MICS Database, 2007.

Note: Location and expenditure quintile data are for the latest available year. Shaded 'Trends in Access' figures are based on Method 3 (Annex A1.1.5).

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Table A1.4.11 Refuse disposal on pit or heap (%)

By country	National	Rural	Urban	Q1	Q2	Q3	Q4	Q5
Benin	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Burkina Faso	65.0	71.2	41.7	77.7	73.3	70.1	64.5	50.9
Cote d'Ivoire	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cameroon	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Congo, Rep.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ethiopia	3.1	1.6	12.2	1.4	1.8	3.1	3.0	5.3
Ghana	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Morocco	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Madagascar	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mauritania	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Malawi	68.8	68.7	69.4	63.0	69.0	68.9	70.3	70.4
Nigeria	41.4	41.3	41.5	38.3	43.6	43.2	42.0	40.1
Rwanda	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sierra Leone	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Chad	5.5	3.7	12.5	6.0	3.9	4.8	6.0	6.3
Tanzania	53.6	50.6	64.5	44.0	51.0	50.6	58.4	58.4
Uganda	36.8	33.8	51.4	30.6	35.9	39.9	42.2	39.8
DRC	52.8	62.2	28.6	58.2	54.9	55.4	50.9	48.4
Zambia	52.1	47.3	61.6	51.0	50.5	50.4	51.5	55.5
Overall	28.4	29.3	26.3	27.2	29.0	29.3	29.0	28.1
By income group								
LIC	31.6	31.4	31.3	30.2	32.2	32.5	32.2	31.2
MIC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
By urbanization								
Low	25.9	24.5	32.3	23.0	25.3	26.1	27.6	27.1
Medium	44.4	51.2	28.0	48.1	45.7	46.0	43.0	41.8
High	26.7	27.6	25.8	24.8	28.2	27.9	27.1	25.9
By subregion								
East	22.9	20.1	36.6	18.3	21.4	22.7	25.2	25.8
West	12.2	10.6	15.3	11.7	13.0	12.8	12.3	11.5
South	35.6	35.2	36.9	33.5	35.2	35.1	35.9	37.0
Central	35.9	44.5	18.0	39.5	37.1	37.5	34.6	33.0

Source: AICD Expenditure Survey Database.

Note: Data are from the most recent IES/LSMS.

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Table A1.4.12 Refuse disposal by burning or burial (%)

By country	National	Rural	Urban	Q1	Q2	Q3	Q4	Q5
Benin	86.8	89.9	82.1	93.3	93.3	91.1	87.0	77.5
Burkina Faso	28.7	28.6	28.9	21.8	26.0	28.5	31.4	31.8
Cote d'Ivoire	77.6	99.2	50.7	96.0	90.3	86.1	76.3	57.6
Cameroon	74.2	88.1	54.9	84.7	83.8	78.7	76.5	62.7
Congo, Rep.	80.4	99.1	66.2	92.0	86.5	84.7	80.9	66.5
Ethiopia	51.7	50.6	58.7	53.0	51.0	51.2	50.5	52.9
Ghana	95.9	99.6	89.3	99.7	99.5	97.6	96.5	90.7
Morocco	47.8	96.9	11.0	71.6	59.7	43.5	32.8	18.9
Madagascar	90.2	92.3	83.5	97.7	95.5	92.9	92.8	77.9
Mauritania	88.0	98.9	72.8	97.9	97.5	92.9	86.2	74.4
Malawi	7.0	6.9	7.1	8.8	7.3	7.0	6.8	5.9
Nigeria	40.2	52.9	24.8	39.5	40.9	42.6	40.6	38.4
Rwanda	96.8	99.7	70.8	99.8	99.6	99.1	98.8	88.1
Sierra Leone	93.3	96.2	87.5	96.2	95.4	95.7	91.4	87.4
Chad	82.1	87.2	62.3	84.0	86.4	88.0	81.4	74.9
Tanzania	41.4	47.3	19.7	53.0	44.5	47.2	38.1	32.3
Uganda	56.1	61.8	28.5	62.9	58.8	52.8	51.1	49.1
DRC	32.0	24.1	52.1	27.1	31.5	30.1	33.3	35.0
Zambia	44.2	51.9	29.2	48.0	47.5	46.9	45.0	37.3
Overall	51.1	57.0	39.5	54.9	53.7	52.4	50.0	45.9
By income group								
LIC	50.2	54.4	41.5	52.4	51.9	51.8	49.9	46.9
MIC	59.1	94.0	29.1	77.6	69.7	58.4	51.0	37.1
By urbanization								
Low	52.6	54.3	45.0	56.7	53.9	53.6	51.2	48.6
Medium	42.7	37.7	54.7	40.5	43.5	42.2	43.6	42.6
High	50.9	67.2	32.3	55.5	54.4	52.5	49.3	43.8
By subregion								
East	52.2	54.8	40.4	57.4	53.4	52.9	49.9	48.5
West	22.9	24.1	20.3	24.9	24.5	23.8	22.2	19.7
South	51.8	53.0	47.9	56.6	55.1	53.7	53.1	44.5
Central	47.1	43.0	54.7	46.5	49.3	47.5	48.4	45.7

Source: AICD Expenditure Survey Database.

Note: Data are from the most recent IES/LSMS.

ACCESS, AFFORDABILITY, AND ALTERNATIVES:
MODERN INFRASTRUCTURE SERVICES IN AFRICA

Table A1.4.13 Annual average growth rate of water services (1996-2005)

By country	Piped Water			Standposts			Wells/Boreholes			Surface Water			Vendors		
	National	Rural	Urban	National	Rural	Urban	National	Rural	Urban	National	Rural	Urban	National	Rural	Urban
Benin	4	7	4	13	13	13	0	0	-2	-2	-3	4	—	—	—
Burkina Faso	7	-4	6	7	11	4	0	0	-3	14	14		—	—	—
C. African Rep	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Cameroon	3	-3	0	2	-4	2	3	4	5	-2	-2	4	—	—	—
Chad	5		8	4	-4	12	1	1	-1	7	6	9	-5	2	-3
Comoros	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Congo, Rep.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Cote d'Ivoire	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Ethiopia	5	47	8	5	12	0	7	7	-5	0	-1	-6	—	—	—
Gabon	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Ghana	1	-5	0	1	-3	1	3	3	12	-2	-1	-3	7	-2	11
Guinea	1	1	1	3	-3	5	2	2	0	0	-1	4	—	—	—
Kenya	0	0	0	1	2	0	1	0	9	1	1	4	—	—	—
Lesotho	0	1	4	-1	-1	-1	10	9	4	-10	-11	-16	-9	-12	0
Madagascar	0	0	2	7	19	4	1	1	1	1	1	-2	-39		-32
Malawi	-1	1	-1	-1	-5	4	2	2	9	3	3	4	15	15	
Mali	7	13	8	9	24	2	0	-1	-1	4	2	20	—	—	—
Mauritania	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mozambique	2	-9	0	1	-6	1	4	4	6	-6	-6	15	—	—	—
Namibia	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Niger	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Nigeria	-3	-4	-3	-3	-5	-2	4	3	5	-1	-2	8	11	8	15
Rwanda	-6	-3	-2	1	0	7	11	10	24	2	1	12	-27	—	-20
Senegal	5	10	3	2	5	-3	-2	-2	-2	-5	-4	-24	-22	-21	—
South Africa	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Tanzania	-6	-3	-6	4	2	7	1	1	6	1	1	9	15	31	14
Togo	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Uganda	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Zambia	0	6	0	1	-2	2	1	1	2	3	2	0	—	—	—
Zimbabwe	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Congo, Dem. Rep.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sudan	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Overall	1	3	2	3	3	3	3	3	4	0.4	0	2	-6	3	-2

Source: AICD DHS/MICS Database, 2007.

ACCESS, AFFORDABILITY, AND ALTERNATIVES:
MODERN INFRASTRUCTURE SERVICES IN AFRICA

Table A1.4.14 Annual average growth rate of sanitation services (1996-2005)

	Flush Toilet			VIP/Chemical/SAN PLAT			Traditional Pit Latrine			No Sanitation		
	National	Rural	Urban	National	Rural	Urban	National	Rural	Urban	National	Rural	Urban
Benin	—	—	—	31	40	30	-3	3	-5	1	1	-7
Burkina Faso	16	30	12	63	60	63	-7	-1	-16	1	1	-21
C. African Rep	—	—	—	—	—	—	—	—	—	—	—	—
Cameroon	4	-6	1	3	-1	2	1	1	3	-2	-1	-21
Chad	28	—	28	-9	-11	-7	3	3	6	2	1	-15
Comoros	—	—	—	—	—	—	—	—	—	—	—	—
Congo, Rep.	—	—	—	—	—	—	—	—	—	—	—	—
Cote d'Ivoire	—	—	—	—	—	—	—	—	—	—	—	—
Ethiopia	24	—	17	14	38	10	10	16	3	-2	-2	-19
Gabon	—	—	—	—	—	—	—	—	—	—	—	—
Ghana	5	-1	4	2	-3	3	1	1	4	1	2	-13
Guinea	1	16	0	—	—	—	2	3	2	-1	-2	-27
Kenya	0	1	0	4	4	3	1	0	3	3	3	-14
Lesotho	-3	-11	2	2	5	1	-1	-1	1	1	1	-1
Madagascar	0	-3	2	33	36	28	-24	-26	-19	-1	-1	-11
Malawi	2	2	2	9	7	13	2	1	2	0	-1	-11
Mali	23	53	19	5	7	6	1	2	1	-1	-2	-26
Mauritania	—	—	—	—	—	—	—	—	—	—	—	—
Mozambique	0	5	-3	10	-21	14	5	4	5	-2	-1	-12
Namibia	—	—	—	—	—	—	—	—	—	—	—	—
Niger	—	—	—	—	—	—	—	—	—	—	—	—
Nigeria	2	5	1	-7	-12	-2	2	1	5	1	1	-11
Rwanda	0	0	4	18	27	12	0	-1	3	4	3	4
Senegal	18	37	14	-8	-10	-1	0	9	-9	-3	-2	-24
South Africa	—	—	—	—	—	—	—	—	—	—	—	—
Tanzania	7	-1	10	18	27	17	0	1	1	3	3	-16
Togo	—	—	—	—	—	—	—	—	—	—	—	—
Uganda	—	—	—	—	—	—	—	—	—	—	—	—
Zambia	0	7	0	18	15	22	1	1	1	1	1	-23
Zimbabwe	—	—	—	—	—	—	—	—	—	—	—	—
Congo, Dem. Rep.	—	—	—	—	—	—	—	—	—	—	—	—
Sudan	—	—	—	—	—	—	—	—	—	—	—	—
Overall	7	9	7	12	12	13	0	1	-1	0	0	-15

Source: AICD DHS/MICS Database, 2007.

ACCESS, AFFORDABILITY, AND ALTERNATIVES:
MODERN INFRASTRUCTURE SERVICES IN AFRICA

Table A1.4.15 Annual average growth rate of electricity and landline telephones (1996-2005)

By country	Electricity			Landline Telephone		
	National	Rural	Urban	National	Rural	Urban
Benin	7	11	7	—	—	—
Burkina Faso	8	17	6	10	14	9
C. African Rep	—	—	—	—	—	—
Cameroon	2	-4	2	0	-12	-3
Chad	7	8	9	10		12
Comoros	—	—	—	—	—	—
Congo, Rep.	—	—	—	—	—	—
Cote d'Ivoire	—	—	—	—	—	—
Ethiopia	2	24	3	14	51	16
Gabon	—	—	—	—	—	—
Ghana	3	2	1	15	15	13
Guinea	3	8	4	14	8	15
Kenya	2	2	2	20	31	16
Lesotho	18	13	-12	—	—	—
Madagascar	8	20	5	29	44	25
Malawi	5	9	3	—	—	—
Mali	8	25	8	16	13	18
Mauritania	—	—	—	—	—	—
Mozambique	2	-10	2	6	15	3
Namibia	—	—	—	—	—	—
Niger	—	—	—	—	—	—
Nigeria	3	3	2	11	23	8
Rwanda	-1	6	2	-1	13	1
Senegal	6	13	3	—	—	—
South Africa				—	—	—
Tanzania	5	9	6	—	—	—
Togo	—	—	—	—	—	—
Uganda	—	—	—	—	—	—
Zambia	1	9	1	—	—	—
Zimbabwe	—	—	—	—	—	—
Congo, Dem. Rep.	—	—	—	—	—	—
Sudan	—	—	—	—	—	—
Overall	5	9	3	12	19	11

Source: AICD DHS/MICS Database, 2007.