AICD
AFRICA INFRASTRUCTURE COUNTRY DIAGNOSTIC

BACKGROUND PAPER 13 (PHASE I)

Climbing the Ladder: The State of Sanitation in Sub-Saharan Africa

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About AICD

This study is a product of the Africa Infrastructure Country Diagnostic (AICD), a project designed to expand the world's knowledge of physical infrastructure in Africa. 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 better empirical foundation for prioritizing investments and designing policy reforms in Africa's infrastructure sectors.

AICD is based on an unprecedented effort to collect detailed economic and technical data on African infrastructure. The project has produced a series of reports (such as this one) on public expenditure, spending needs, and sector performance in each of the main infrastructure sectors—energy, information and communication technologies, irrigation, transport, and water and sanitation. *Africa's Infrastructure—A Time for Transformation*, published by the World Bank in November 2009, synthesizes the most significant findings of those reports.

AICD was commissioned by the Infrastructure Consortium for Africa after the 2005 G-8 summit at Gleneagles, which recognized the importance of scaling up donor finance for infrastructure in support of Africa's development.

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

Consistent with the genesis of the project, the main focus is on the 48 countries south of the Sahara that face the most severe infrastructure challenges. Some components of the study also cover North African countries so as to provide a broader point of reference. Unless otherwise stated,

therefore, the term “Africa” will be used throughout this report as a shorthand for “Sub-Saharan Africa.”

The World Bank is implementing AICD with the guidance 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, the Development Bank of Southern Africa, and major infrastructure donors.

Financing for AICD is provided by a multidonor trust fund to which the main contributors are the U.K.’s Department for International Development, the Public Private Infrastructure Advisory Facility, Agence Française de Développement, the European Commission, and Germany’s KfW Entwicklungsbank. The Sub-Saharan Africa Transport Policy Program and the Water and Sanitation Program provided technical support on data collection and analysis pertaining to their respective sectors. A group of distinguished peer reviewers from policy-making and academic circles in Africa and beyond reviewed all of the major outputs of the study to ensure the technical quality of the work.

The data underlying AICD’s reports, as well as the reports themselves, are available to the public through an interactive Web site, www.infrastructureafrica.org, that allows users to download customized data reports and perform various simulations. Inquiries concerning the availability of data sets should be directed to the editors at the World Bank in Washington, DC.

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Summary

Nearly all countries in Sub-Saharan Africa are likely to miss the Millennium Development Goal for access to improved sanitation. As of 2006, coverage of improved sanitation as defined by the Joint Monitoring Program managed by the United Nations Children's Fund (UNICEF) and World Health Organization (WHO) and responsible for tracking progress toward the goals stood at 31 percent. The target for 2015 is 63 percent.

A sanitation ladder

Sanitation can be provided at several levels that may be represented as rungs on a ladder. At the bottom of the ladder are those who lack any kind of sanitation facility and must still resort to open defecation. The first rung of the ladder is provided by the traditional latrines, which refers to various kinds of pits for disposal of excreta. Thereafter, improved latrines come —comprising SanPlat, VIP latrines and basic pits with slabs—all of which ensure more hygienic separation of excreta from the immediate living environment. The final rung of the ladder is the flush toilet, which may be connected either to a septic tank or to a water-borne sewer network. Each successive rung of the ladder represents a higher unit cost but a correspondingly lower level of health risk.

The Joint Monitoring Program counts the top two rungs of the ladder as improved sanitation for purposes of measuring progress toward the MDG target. But, in practice, drawing a line between improved and unimproved forms of sanitation is not easy, owing to the wide variety of installations bundled together under these basic labels. Classification of traditional latrines is particularly difficult. A key issue is the extent to which a traditional latrine can or, with some modification, could provide improved sanitary protection. In addition, the boundary between traditional and improved latrines is somewhat porous, because the extent to which latrines deliver the intended health benefits depends on the way they are used. Even very basic latrines can provide protection if measures are taken to cover them, empty or replace them in a timely fashion, and ensure that, once removed, sludge is properly treated and disposed of. Users must also wash their hands after using the latrine. Conversely, even improved latrines can sometimes fail to provide sanitary protection if they are not properly used.

Throughout the world, the development of water-borne sewage networks generally lags substantially behind the evolution of the piped-water networks on which they depend. In Africa, only 40 percent of the urban population enjoys private connections to piped water networks, and this already places a very low ceiling on the potential for water-borne sewerage.

Indeed, the prevalence of water-borne sewage systems is extremely low in Sub-Saharan Africa. Among utilities serving the largest cities, only half report operating a sewage network at all. In middle-income countries such as Namibia and South Africa, and in the exceptional case of Senegal, these utilities provide a high level of sewerage coverage. However, the more typical situation—in countries such as Côte d'Ivoire, Kenya, Madagascar, Malawi, Lesotho, and Uganda—is that even where sewer networks exist they reach barely 10 percent of the population in the service area. Little more than half of those with piped water also have flush toilets, in most cases connected to septic tanks rather than sewers.

Onto the bottom rung

Sanitation in Sub-Saharan Africa essentially consists of on-site sanitation of the types just described (table A). About half of the population—urban and rural alike—rely on traditional latrines. About 30 percent of the population continues to practice open defecation, this share being even higher in some countries. Improved modalities reach no more than 20 percent of the overall population. Curiously, the prevalence of improved latrines is no greater than that of septic tanks, even though there is a significant cost differential between the two.

Table A Patterns of access to sanitation

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

Source: AICD DH/MICS Survey Database, 2007.

A clear urban-rural divide emerges. In rural areas the bulk of the population still practices open defecation, and improved sanitation remains negligible. In urban areas, about 40 percent the population has access to improved modalities, with septic tanks much more common than improved latrines; fewer than 10 percent of urban dwellers practice open defecation. A typical pattern of urban sanitation is the practice of sharing sanitation facilities among multiple families—more than 40 percent of households report sharing their toilet facilities with other households.

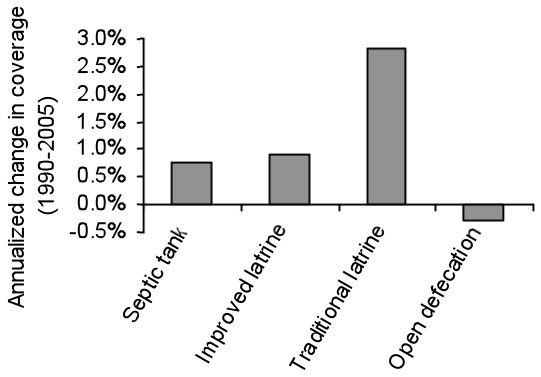
Patterns of sanitation access vary dramatically across the socioeconomic spectrum. Traditional latrines are by far the most egalitarian form of sanitation, accounting for about 50 percent of households across the income range. Conversely, the pattern of access for improved latrines tracks that for septic tanks very closely, suggesting that (despite their lower cost) improved latrines remain something of a luxury, having not penetrated the middle of the income distribution. In particular, improved latrines are virtually nonexistent in the poorest half of the population; even in the richest strata, they account for 20–30 percent of households.

Not only are traditional latrines the most common sanitation modality in Sub-Saharan Africa, they are also by far the fastest growing. In recent years, they have been reaching an additional 2.8 percent of the population each year in urban areas and an additional 1.8 percent in rural areas, more than twice the rate of expansion of flush toilets and improved latrines put together (figure A). As might be expected, the expansion in traditional latrines is concentrated in the poorer half of the population, that in improved latrines and flush toilets in the richer half.

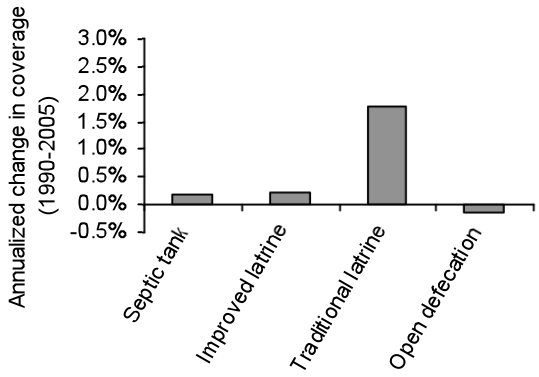
While the overall picture is bleak, there have been some important success stories in recent years. Because the target articulated in the Millennium Development Goal for sanitation focuses on the top improved options, the rapid expansion of traditional latrines does not always appear clearly in the policy discussion. Another piece of good news is that open defecation has finally begun to decline in Sub-Saharan Africa, however modestly.

Figure A Rate of expansion of different sanitation modalities

1. Urban areas



2. Rural areas



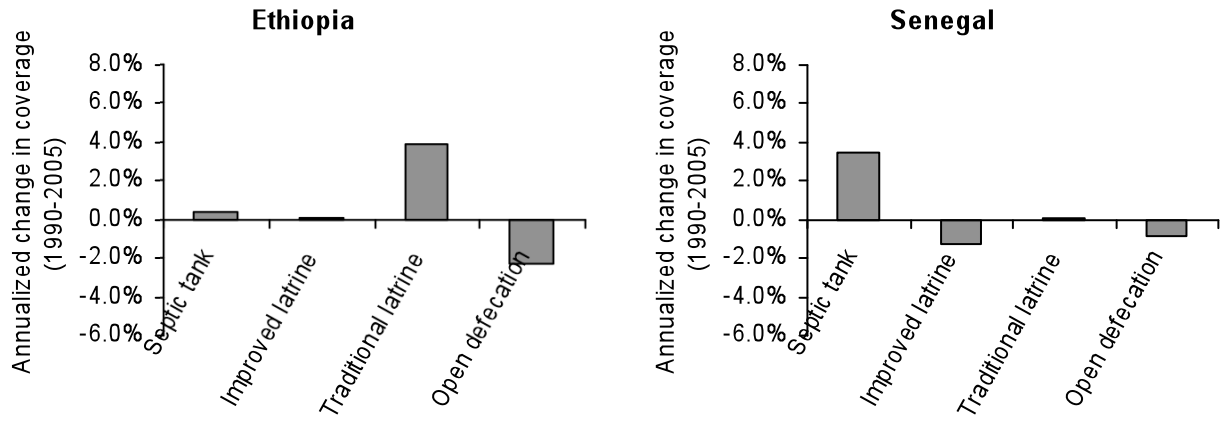
Source: AICD DH/MICS Survey Database, 2007.

Several countries have succeeded in moving at least 3 percent of their populations across any particular rung of the sanitation ladder each year (figure B). At the bottom end of the ladder, countries such as Côte d'Ivoire, Ethiopia, Uganda and the Democratic Republic of Congo are switching more than 3 percent of their population each year into the use of traditional latrines. Ethiopia is making the most rapid progress in reducing open defecation, moving more than 2 percent of its population away from this practice each year. A second group of countries—comprising Burkina Faso, Madagascar and Rwanda—is succeeding in upgrading more than 3 percent of the population each year into some type of improved latrine. Finally, at the top end of the ladder, Senegal (and only Senegal) has achieved a comparable pace of expansion for septic tanks.

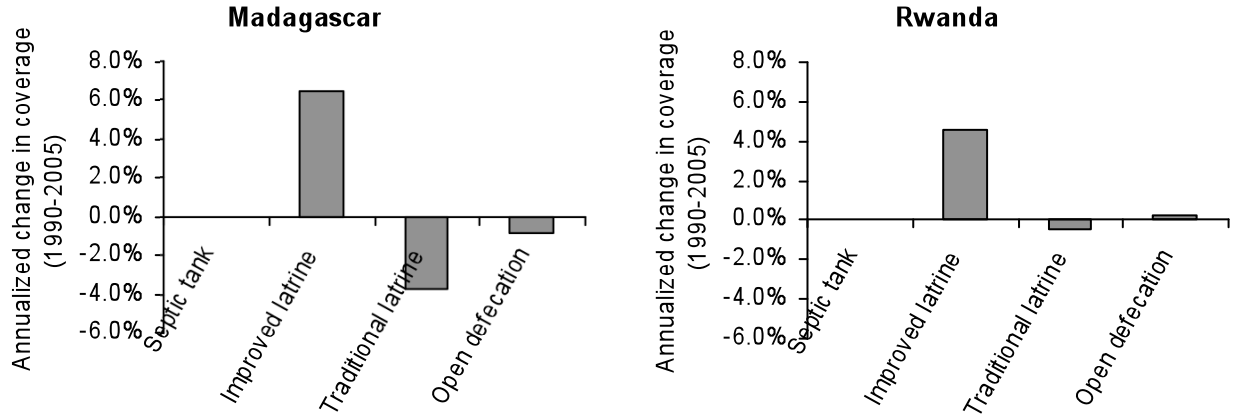
Figure B Successful examples from up and down the sanitation ladder

1. Ethiopia: Getting on to the bottom rung (below)

2. Senegal: Mainstreaming septic tanks



3. Madagascar and Rwanda: Upgrading latrines



Source: AICD DH/MICS Survey Database, 2007

Patterns of practice across country groups ... and appropriate policy responses

Beyond this picture, the anatomy of the sanitation challenge differs markedly across different groups of Sub-Saharan countries, and also across urban and rural settings within individual countries (figure C).

In urban areas, one discerns three distinct types of country. The largest group relies primarily on traditional latrines for urban sanitation. In the second group, improved latrines prevail, but traditional latrines still constitute a large share of sanitation. The third, small group of countries exhibits a bimodal pattern of access: close to half of the population have septic tanks, while the other half continue to rely on traditional latrines, and there is virtually no middle ground in the form of improved latrines.

In rural areas, the three typologies are somewhat different. First, there is a group of countries in which open defecation is still practiced by the vast majority of the rural population. In the second and largest group of countries traditional latrines are the dominant sanitation mode in rural areas. A third group of countries has achieved significant coverage of improved latrines in rural areas, even though the majority still relies on traditional latrines or practice open defecation.

The implications of these major differences in the pattern of access to sanitation are that policies must be tailored to each setting. Policymakers should avoid concentrating efforts on rungs of the sanitation ladder above the realities of their societies. If the ultimate objective is to provide universal access, investments should target people who can move to the next rung of the ladder and in particular those at the bottom, leaving more expensive options to households with the resources to take them up.

Where open defecation remains prevalent, promoting appropriate sanitary behavior is critical for two reasons. The first is to ensure that latrines are actually used when available, since there is widespread international evidence that such facilities may be altogether ignored by beneficiary households if there is no effort to engender behavioral change. The second is to ensure that latrines deliver the corresponding health benefits—less a matter of technology and material used and more a matter of good practices and behaviors.

Figure C Patterns of access to sanitation across countries

Urban areas

Prevalence of traditional latrine: Central African Republic, Chad, Comoros, Republic of Congo, Ethiopia, Guinea, Lesotho, Malawi, Mali, Mauritania, Mozambique, Nigeria, Tanzania, Uganda, Sudan and Democratic Republic of Congo.

Prevalence of improved latrine: Benin, Burkina Faso, Cameroon, Ghana, Madagascar, Niger, Rwanda

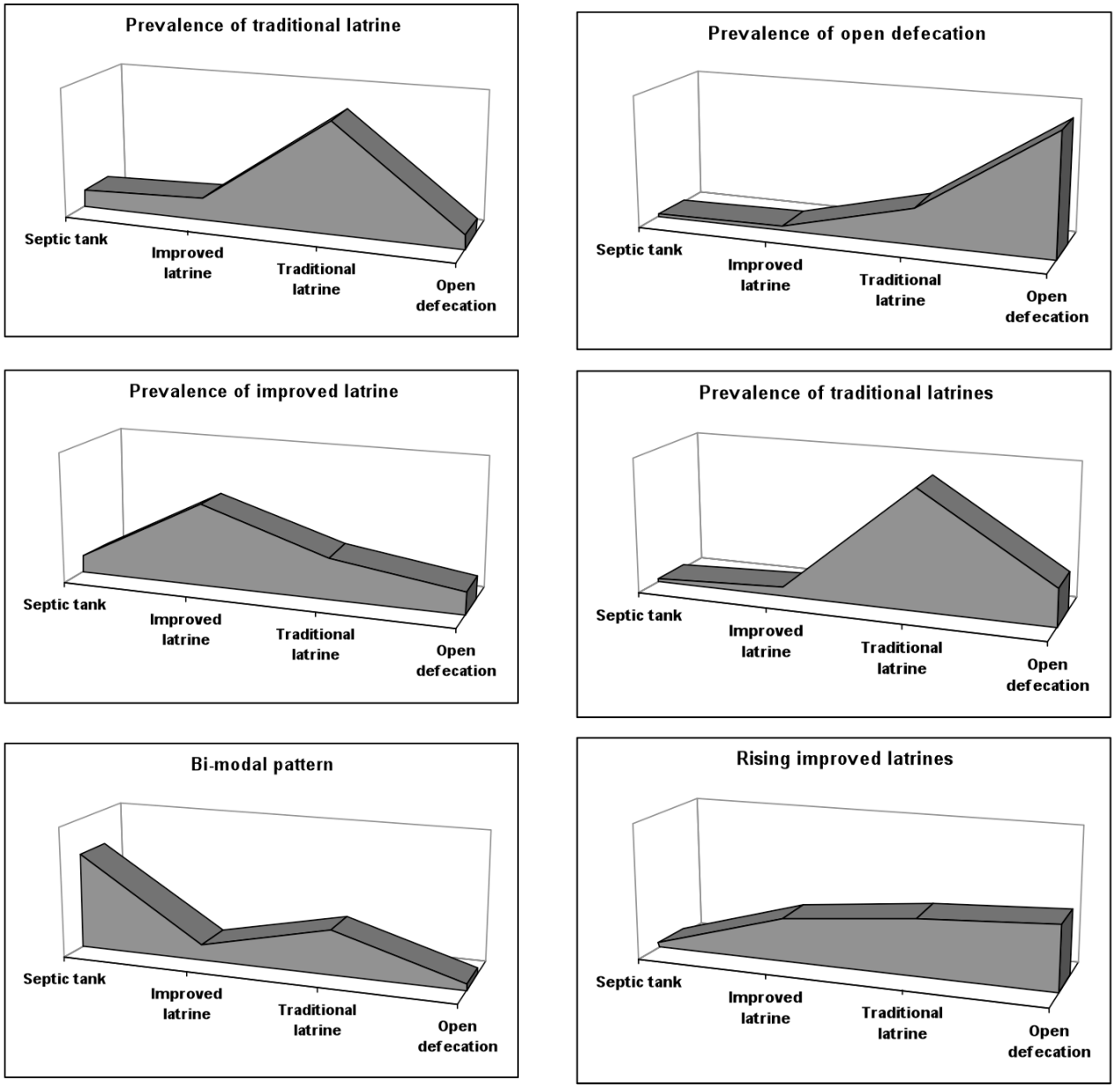
Bi-modal pattern: Côte d'Ivoire, Gabon, Kenya, Namibia, Senegal, South Africa, Zambia, Zimbabwe

Rural areas

Prevalence of open defecation: Benin, Burkina Faso, Chad, Côte d'Ivoire, Ethiopia, Mauritania, Mozambique, Namibia, Niger and Sudan

Prevalence of traditional latrines: Cameroon, Comoros, the Republic of Congo, Gabon, Ghana, Guinea, Kenya, Malawi, Mali, Nigeria, South Africa, Tanzania, Uganda, Zambia and Democratic Republic of Congo

Rising use of improved latrines: Central African Republic, Lesotho, Madagascar, Rwanda, Senegal, Zimbabwe



Source: AICD DH/MICS Survey Database, 2007.

In settings where traditional latrines are already common, attention needs to focus on upgrading latrines to improved models. Here, the debate centers on whether the main bottleneck lies on the demand side of the market or on the supply side.

From the supply side, the lack of improved latrines can be explained by limited knowledge in construction sectors of required designs, as well as the possible lack of key building materials in local markets. This hypothesis corresponds with the observed low prevalence of improved latrines across Africa (even in middle-income countries); traditional latrines serve a steady 40 to 50 percent of the population, even among the highest income groups, where the resources for more advanced facilities would appear to be available.

From the demand side, the low use of improved latrines may be a matter of affordability. Household incomes are low, and the higher capital costs of such facilities are relatively high. Analyses of sanitation investment costs in Senegal in relation to very limited household budgets show that whereas traditional latrines appear quite affordable across the income spectrum, improved latrines represent more than a month of the household budget, even for households in the highest income group. This is consistent with the much-skewed distribution of improved latrines across the income spectrum.

It is likely that the low numbers of improved latrines can be traced to a combination of demand- and supply-side factors. Nevertheless, it is critical to tackle supply bottlenecks first. Otherwise, subsidy resources may be wasted on households that might have financed the facilities on their own had they been available. Moreover, allowing the local market to develop also provides space for innovation that may ultimately lower the cost of improved latrines and thereby at least partially address the affordability problem.

In cases where septic tanks have reached significant levels of penetration, the key issue becomes how to provide access to improved sanitation to lower-income segments of the population, which in high density settings may require finding solutions to expand sewer networks. While on-site sanitation is likely to remain predominant in Sub-Saharan Africa for some time to come, the method does have its limits. As a result of urban growth, per capita water consumption will increase significantly, creating the challenge of safely returning large volumes of grey water. Also, with growing urban population densities, the limited availability of land will eventually become a binding constraint on the use of latrines. Sooner or later, Africa's burgeoning cities will be faced with the need to develop more extensive sewer networks. But given the acute affordability problems outlined above, it is critical to find ways to reduce their cost via technological innovation.

Greater visibility for an essential service

Across the region, the institutional framework for sanitation is fragmented. In contrast to the water-supply situation, the different elements of the supply chain—from hygiene promotion, to latrine construction, to latrine emptying—are in the hands of different public and private players, with multiple actors often present at each stage. This fragmentation prevents a single, powerful agency from emerging as champion of the sector and rescuing it from its neglected status. The recent trend toward decentralization of the sector has also made it more difficult to capture adequate public resources for

sanitation, while allocating responsibilities to entities that may lack the requisite technical capacity to discharge them.

Some progress has been made in the region toward the adoption of national sanitation policies. The majority of countries have embraced a definition of sanitation and hygiene promotion relevant to establishment of a sanitation framework. Fifteen countries have also established national sanitation policies. That is progress. But key practical components of an effective sanitation regime—such as recovering operating costs, which is known to pay significant dividends—exist in only seven countries. And only eight countries have set up a sanitation fund or a dedicated budget line. In some cases, that fund or line is supplied exclusively by donors (as in Chad and Ethiopia). In others, funds come from a combination of government, sector levies, and donors.

Many ways to better sanitation

To meet the Millennium Development Goal for sanitation, Sub-Saharan Africa needs to spend an estimated 0.9 percent of its gross domestic product (GDP) annually in the sector, of which 0.5 percent should be allocated to new infrastructure, 0.2 percent to the rehabilitation of existing assets and 0.2 percent to operation and maintenance. Meeting the target would bring substantial benefits in the form of reduced incidence of diarrhea, intestinal worms and trachoma—provided, of course, that the new sanitary facilities are accompanied by more hygienic behavior.

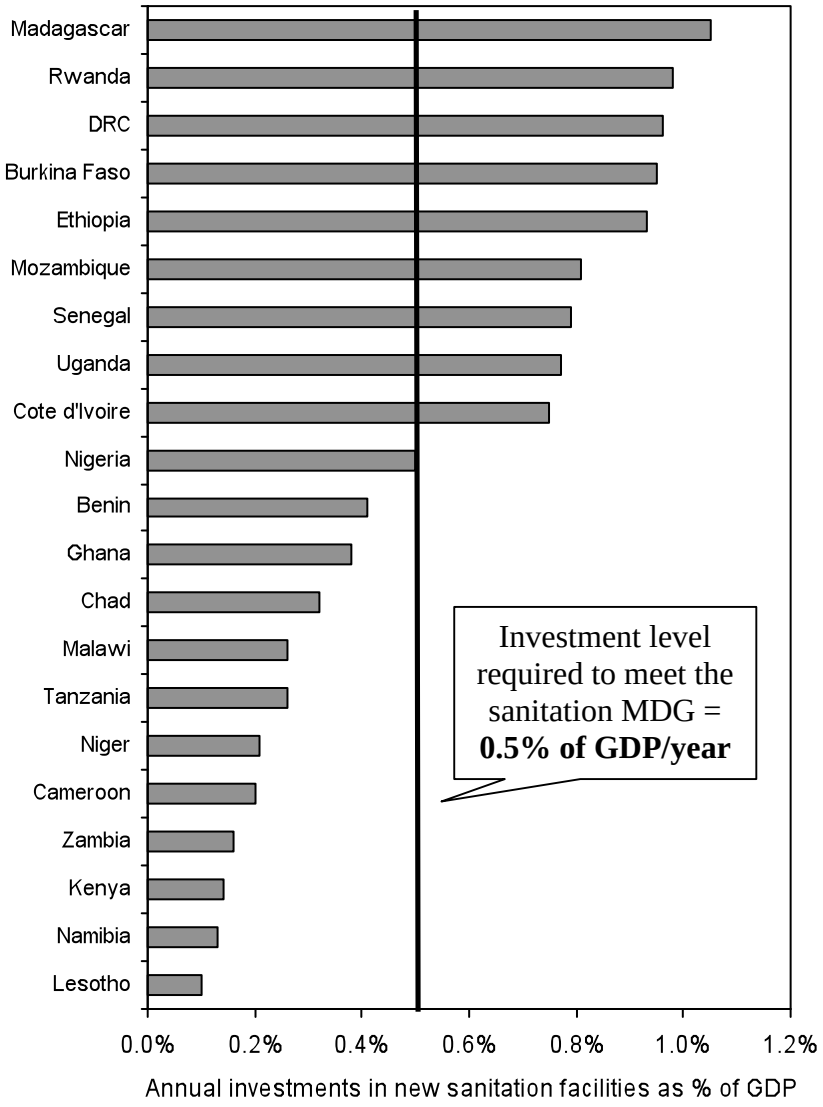
Using access trends, it is possible to estimate how much has been invested by all parties in new sanitation facilities. The answer is 0.5 percent of GDP, exactly the investment level required to reach the sanitation MDG. Although this may look encouraging, the MDG challenge is everything but solved.

First, this overall average masks some differences across countries (figure D). Half of countries for which data are available, show annual investment spending below 0.5 percent of GDP; in a number of cases investments have been below 0.1 percent.

Second, with this approach nothing can be said about rehabilitation and operation and maintenance spending patterns, to which an almost equal amount (0.4 percent of GDP) should be allocated every year in order to meet the sanitation MDG.

Third, owing to decentralization and lack of clear accounting for sector expenditure, it is hard to pin down how much of the estimated total spending on sanitation comes from the public purse as opposed to household budgets and therefore understand to what extent government will contribute to pay for sanitation. The few countries with available evidence report average annual public spending on sanitation to be no more than 0.22 percent of GDP, of which 0.2 percent recurrent and only 0.02 investment. Recurrent spending stands at the level needed to reach the sanitation MDG; however data are too incomplete and this regional average is totally driven by South Africa, which reports operation and maintenance spending on sanitation equal to 0.4 percent of GDP. The rest of the countries reports spending either below 0.05 percent or null. More important, spending refer to sewer systems. Operation and maintenance of on-site sanitation remains a household responsibility and facilities are notoriously poorly maintained. Households also appear to be footing most of the investment bill, of which governments cover a negligible fraction according to the available information.

Figure D Spending on new sanitation infrastructure as percentage of GDP



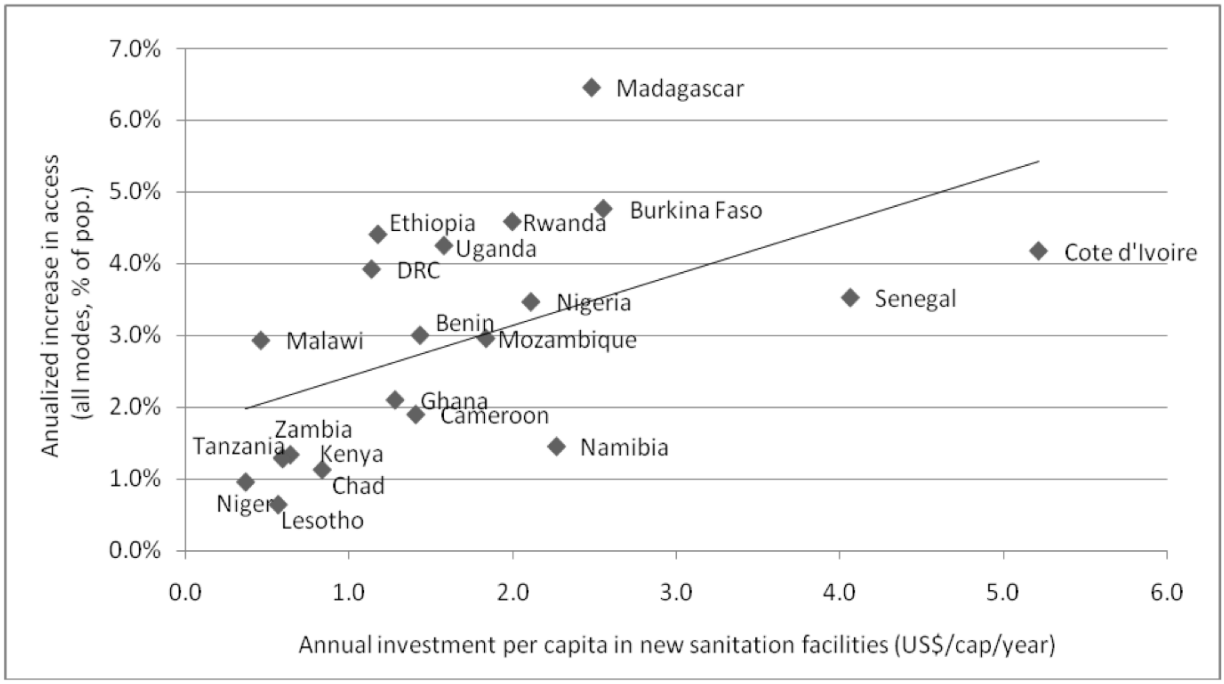
Source: AICD DH/MICS Survey Database, 2007.

Therefore, countries that are not on track with spending may fall short in meeting their needs if governments do not commit to raise public investment and households do not adequately engage in operation and maintenance of on-site sanitation facilities. Similarly, countries that are already on track with expanding infrastructure, with households paying for most of the bill, may still fall short in meeting their rehabilitation and operation and maintenance needs.

By comparing the annualized percentage increase in access to sanitation in all forms with per capita spending (both public and private) on sanitation, it is possible to summarize the relationship between spending and outcomes (figure E). Countries above the line are getting relatively rapid progress out of their estimated spending; countries below the line are not.

Factors that contribute to putting countries above the line are effective sanitation policies and emphasis on relatively low cost sanitation modes, which make it cheaper to expand access. Countries making progress on the higher rungs of the ladder—such as Lesotho and Senegal—tend to report larger spending than countries focusing on the lower rungs—such as Ethiopia, Uganda, Malawi and the Democratic Republic of Congo. However, exceptions to this general rule do apply. Côte d'Ivoire reports high spending despite its efforts are concentrated at the bottom of the ladder. Conversely, with much less spending, Madagascar, Rwanda and Burkina Faso have achieved fast progress on improved sanitation.

Figure E Investment in sanitation and increases in access to sanitation



Source: AICD DH/MICS Survey Database, 2007.

1 The challenge of reaching the Millennium Development Goal for sanitation

The United Nation's Millennium Development Goal No. 7 calls for, by 2015, halving the 1990 percentage of the population lacking access to improved sanitation. According to the latest figures released by the Joint Monitoring Program (JMP), a project of the World Health Organization (WHO) and UNICEF monitoring progress toward water and sanitation targets, as of 2006, over 2.5 billion of people remain without improved sanitation worldwide, of which 22 percent, or more than half billion people, live in Africa. Also, Africa reports 221 million people still defecating in the open, the second largest total for any region after Southern Asia. Access to improved sanitation has increased only modestly in Sub-Saharan Africa, rising from 26 percent of total population in 1990 to 31 percent in 2006. To be on track with the sanitation MDG, improved sanitation coverage should have been at 50 percent of population in 2006. Compared to other regions, Sub-Saharan Africa scores mostly poorly, both in terms of current coverage and trends (table 1.1).

Table 1.1 Regional Progress towards the MDG sanitation target

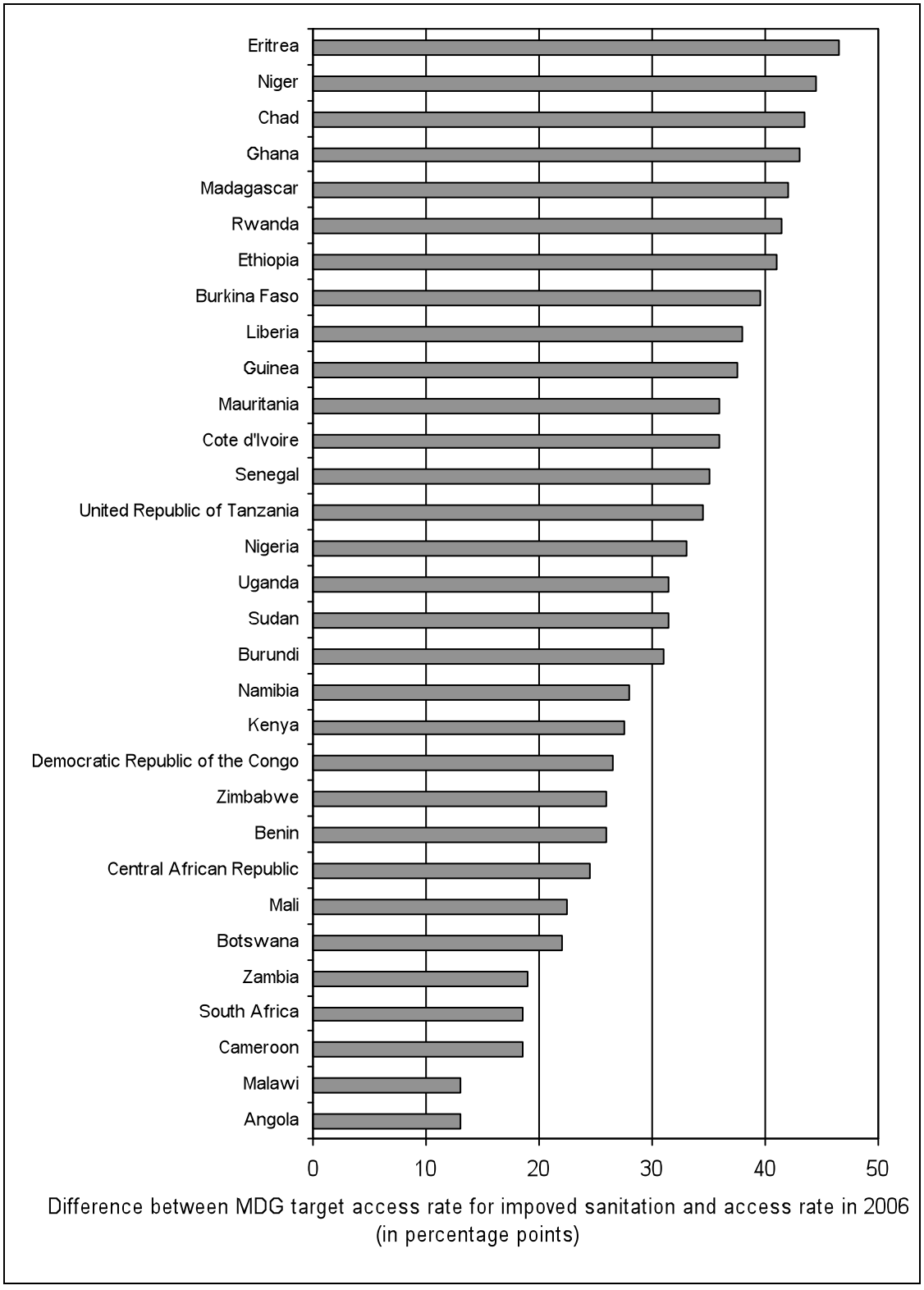
	Sanitation coverage (%)		Coverage needed to be on track in 2006 (%)	MDG target	Progress
	1990	2006			
Western Asia	79	84	86	90	On track
Latin America and Caribbean	68	79	78	84	On track
Northern Africa	62	76	74	81	On track
South-eastern Asia	50	67	64	75	On track
Eastern Asia	48	65	65	74	On track
Southern Asia	21	33	46	61	Not on track
Sub-Saharan Africa	26	31	50	63	Not on track
World	54	62	69	77	Not on track

UNICEF and World Health Organization (2008)

To meet the MDG sanitation target, the current number of people with improved sanitation in Africa needs to more than double—from 242 million in 2006 to 615 million in 2015. If the present trend continues, Sub-Saharan Africa is very unlikely to meet the sanitation MDG, as are all of its constituent countries.

Overall, the poor account for most of the deficit in access to improved sanitation. The Human Development Report estimates that as of 2002 of the 2.6 billion people with no access to improved sanitation, 1.4 billion live on less than 2 dollars a day.

Figure 1.2 The MDG gap



Sources: JMP (2004) and author.

The nature of the MDG challenge differs across African countries, with some being farther than others from meeting the goal for sanitation (figure 1.2). At one end there are countries more than 40 percentage points away from the MDG targeted access rate such as Eritrea, Togo, Niger, Chad, Ghana, Madagascar, Rwanda, Ethiopia and Burkina Faso. A second group—including Liberia, Guinea, Mauritania, Cote d'Ivoire, Senegal, Tanzania, Nigeria, Uganda, Sudan, Burundi, Namibia, Kenya, DRC, Zimbabwe, Benin, CAR, Mali and Botswana —are between 20 and 40 percentage points away from the target. Only Zambia, South Africa, Cameroon, Malawi and Angola are less than 20 percentage points away.

An important explanation for this gap is the very rapid demographic growth and urbanization experienced across Sub-Saharan Africa. Total population growth stands at an annual average of 2.5 percent, while urban population is growing much faster than this, at 3.9 percent per year. In urban areas, the sanitation problem is exacerbated by the rapid spread of slum settlements. There, the high-density does not leave enough space to build on-site sanitation facilities while the low incomes make it difficult to contemplate network-based solutions. At the same time, lack of ownership discourages slum dwellers from making investments to improve their living conditions. In rural areas, environmental conditions are more favorable to on-site sanitation, but very low incomes and established behavioral patterns often represent a formidable barrier.

The AICD analysis of the sanitation sector

Establishment of the Joint Monitoring Program (JMP) has been an important by-product of the Millennium Development Goals. In tracking progress, the JMP draws primarily on assessment questionnaires sent to UNICEF field representatives and household survey data. The analysis presented here complements the work of the JMP by taking a more in-depth analysis of sanitation trends at the household and country levels.

The household analysis is based on the AICD Demographic and Health Surveys (DHS) and Multiple Indicator Cluster Surveys (MICS) database developed by Banerjee et al. (2007). This composite database is referred to as AICD DHS/MICS database and comprises 63 Demographic and Health Surveys conducted by the Measure DHS Program of Macro International in the least developed countries, as well as related surveys. Thirty countries in Africa have had at least one DHS conducted since 1990; while twenty-four of these are covered by at least two DHS data points between 1990 and 2005 permitting the analysis of trends. Population weighted averages for this group of countries are used to estimate trends across Sub-Saharan Africa.

Two main limitations posed by the demographic and health survey data require caution in interpreting findings for policy purposes.

First, this study uses a large corpus of surveys covering a 15-year period done at different times in each country. As a result, the cross-country analysis cannot count on a perfectly homogenous data set; country data may refer to any period between 1990 and 2005, some more recent, others less. Appendix table A1 provides further methodological details underpinning the household survey analysis, including the exact year in which the surveys used were taken in each country.

Second, an important limitation of DHS surveys arises in the classification of traditional latrines. One of the main findings of this report that can already be anticipated is the extent to which traditional latrines dominate and will continue to dominate the African sanitation scene for some time to come.

Traditional latrines comprise a very heterogeneous collection of installations. Some of which can by no means be regarded as improved sanitation. Unfortunately, the household survey instruments do not allow discriminating between the different qualities of installations within this category. As a result, the analysis of sanitation in Africa is blurred precisely in the area where the largest progress is taking place.

The country-level analysis is based on an institutional survey conducted in twenty-four of the countries covered by the AICD DHS/MICS database. The AICD Water Safety and Sanitation Survey (AICD WSS Survey) was administered to line ministries, sector institutions, and water utilities with a view to capturing institutional and performance variables associated with sector organization. See appendix table A2 for a full list of the utilities covered by the survey. Finally, the country level analysis also draws on the AICD Fiscal Database (Briceno-Garmendia and Smits, 2008), which captures information on public expenditure in the infrastructure sectors in the same 24 countries.

The findings of this report are broadly consistent with those of the Joint Monitoring Program (JMP). However, the methodology used differs significantly from that of the JMP in a number of ways. First, the JMP statistics include all African countries, whereas only a subset is covered here. Second, the JMP statistics are based on a survey of surveys, whereas the results reported here are based solely on DHS data. Third, JMP often adopts special rules when the exact disaggregation across modalities is not available in the surveys. In particular, the JMP statistics apportion 50 percent of traditional latrines to the improved category and the remainder to the unimproved category. Conversely, in the AICD analysis the information available in the survey has been taken at face value without any adjustment. Owing to these methodological differences, there is no reason for JMP and AICD figures to be exactly the same. For instance, the urban and rural access to improved sanitation is reported to be 53 percent and 28 percent respectively in JMP; the corresponding numbers in this study are 40 percent and 8 percent (table 1.2).

Table 1.2 Definition of access to or coverage of improved water

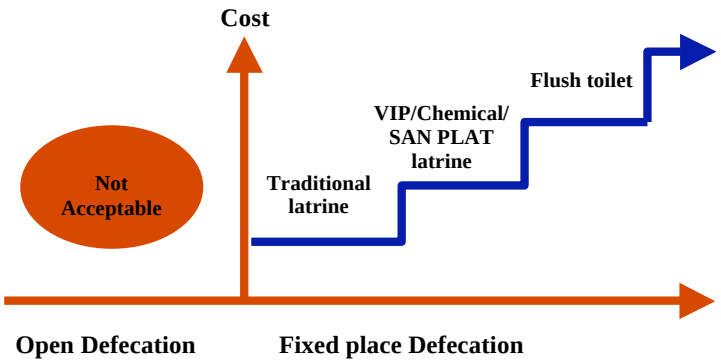
Primary source of water supply	JMP category	AICD category
Flush toilet to network or septic tank	Improved	Improved
VIP latrine, San Plat, or basic pits with slab	Improved	Improved
Traditional pit latrine	Improved/Unimproved	Unimproved
Bucket or other container	Unimproved	Unimproved
Other	Unimproved	Unimproved
No facility (nature, or bush)	Unimproved	Unimproved
Access to Improved Sanitation (%)		
Total	37	18
Rural	28	8
Urban	53	40

Source: JMP 2006 and authors.

Typologies and levels of sanitation services

Sanitation can be provided at a number of distinct levels that may be graphically represented as rungs on a ladder (figure 1.2). Starting from open defecation, the successive increments are traditional latrines (various kinds of pits), moving on to improved latrines (comprising of San Plat, VIP latrines and basic pit with slab), and culminating with flush toilets (connected either to a septic tank or a water-born sewage network).

Figure 1.2 The sanitation ladder



Source: Water and Sanitation Program (WSP), 2007

Each successive rung of the ladder implies a higher unit cost and a correspondingly lower level of health risk. The first two rungs of the ladder are typically regarded as improved sanitation and count toward the MDG target.

Commonly used investment cost estimates applied by the JMP suggest that the differentials between the different rungs of the sanitation ladder are large on the upper end of the ladder, with septic tanks costing almost twice as much as improved latrines, and less relevant on the lower end, with improved latrines costing as much as 1.5 times more than traditional latrines (table 1.3). While these set-up costs tend to be the over-riding factor in household investment decisions, difference in life cycle costs should also be taken into account. Hutton (2004) sets the lifecycle cost of both simple and VIP latrines and of septic tanks at respectively 5 and 10 percent of their annualized investment cost. Using Hutton's suggested length of asset life of 30 years for septic tanks and 20 years for VIP, the annualized lifecycle cost of an improved latrine is larger than that of a traditional latrine, implying an additional 4 cents per capita per year of expenditure (table 1.3). In addition to which, Hutton also suggests the cost of sewage disposal to be US$2 per person per year for VIP and traditional latrine and US$3 per person per year for septic thanks.

Finally, the annual expenditure needed to move a person up the sanitation ladder varies depending on where a person stands on the ladder. The cost difference between septic tank and traditional pit latrine is almost US$5 dollars. A similar amount would be needed to move a person from open defecation toward first time use of a traditional latrine. In both cases, the cost is not so great, but still important. Conversely, the difference between traditional and improved latrines is very small, suggesting that as little as US$1.5 per person could improve service from one modality to another.

Table 1.3 Annual cost for improvement on a per-person-reached basis in Africa

Modality	Simple pit latrine	VIP latrine	Septic tank
Investment cost US$ per capita	39	57	115
Lifecycle cost US$ per capita per year	0.10	0.14	0.38
Improvement cost US$ per capita	4.88	6.21	9.75

Source: JMP and Hutton (2004)

A key issue is the extent to which traditional latrines, which are the least costly and most prevalent sanitation option in Sub-Saharan Africa can—or with some modification could—provide adequate sanitary protection to be considered improved. A key hygiene requirement to convert a traditional latrine into an improved sanitation modality is a stable and cleanable slab; additional advantages would be fly control and reduction of odor (for instance, through a vented pipe with a fly screen). Therefore, a key structural improvement is to make the slab stable and cleanable; also lining and better excavating the pit or arranging compost may be needed.

Unfortunately, as already emphasized, household surveys do not typically provide enough information to distinguish between safe and unsafe traditional latrines. Moreover, whether or not a traditional pit latrine constitutes improved sanitation depends not only on the design of the latrine, but on the way it is used. Even very basic latrines can provide protection if measures are taken to cover them, empty or replace them in a timely fashion, and systematically wash hands after use, as well as making sure that any sludge removed is properly treated and/or disposed. Conversely, even improved latrines can sometimes fail to provide sanitary protection if not used correctly. Evidence from East Asia (Water and Sanitation Program (WSP), 2001) indicates that when facilities are not kept covered or regularly emptied, the useful life of both traditional and improved latrines can be curtailed to as little as three years.

Therefore, an important starting point is to develop a more nuanced understanding of the wide range of installations covered by the very generic label of traditional latrine and the practices that go with them. In particular, more needs to be learned about the different health gains associated with the various versions of traditional latrines and about how to generalize the better versions.

The most critical movement from a health perspective is one from no service or un-improved service to an improved or sanitary service, which may or may not be a traditional pit latrine. Once the basic level of sanitary protection is reached, there are diminishing returns in terms of health benefits with each successive increment of the sanitation ladder.

On-site sanitation is the main form of excreta disposal in most sub-Saharan African cities. Despite public investment in sewer systems in most primary and some secondary cities, only 10-15 percent of the urban population typically benefit from access to the sewer network while about 80 percent depend on on-site facilities such as septic tanks and pit latrines (Water Utility Partnership, 2003). Unlike sewers, on-site sanitation facilities are usually the responsibility of the household. The majority of poor households use communal or shared pit latrines, although a few urban centers still have bucket latrines.

Just as the in-home connection is viewed as the ultimate goal for water supply planners, utilities, and households, the private sewer connection represents the highest level of service for household sanitation. However private conventional household sewer connections are also costly and require substantial

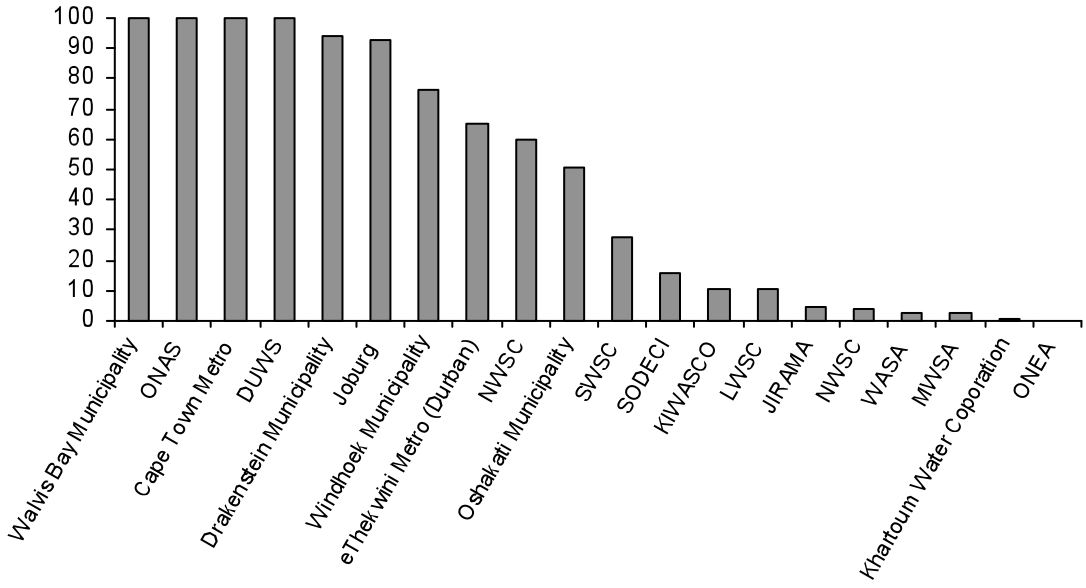
volumes of water for proper use (approximately 615 liters per flush). For these reasons, conventional sewerage is often beyond the reach of low-income urban neighborhoods in developing countries.

The DHS describe access to sanitation without discriminating between on-site sanitation and use of sewerage facilities so that the flush toilets category groups both of them. However, placing the DHS evidence alongside that gleaned from the AICD WSS Survey suggests that the bulk of these flush toilets are in fact septic tanks rather than sewer connections. For this reason, this study assumes that the DHS information relating to flush toilets indeed refers to septic tanks.

According to the survey, even among water utilities serving Sub-Saharan Africa's largest cities, only around half appear to offer sanitation services. Of those that have sewer networks, only about half show rates of sewer coverage above 50 percent (figure 1.3). These refer to utilities serving large cities in middle income countries such as South Africa and Namibia, although there are some exceptions made by urban utilities in Senegal, Tanzania and Zambia. In particular, ONAS in Senegal stands out as having almost the entire population in the utility service area connected to the network. However, the more typical situation—in countries such as Cote d'Ivoire, Kenya, Madagascar, Malawi, Lesotho, and Uganda—is that even where sewer networks exist, they barely reach 10 percent of the population in the service area.

This is no real surprise. Throughout the world, development of water-born sewage networks generally lags substantially behind the evolution of the piped water networks on which they depend. In the low-income countries of Africa, only 15 percent of the population enjoys private connections to piped water networks, and this already places a low ceiling on the potential for water-born sewerage.

Figure 1.3 Share of population that has wastewater connection in the utility service area (%)



Source: AICD WSS Survey Database, 2007

2 Access to sanitation services

Current patterns of sanitation access

Information for latest available year for 32 countries in the AICD DHS/MICS database shows that traditional pit latrines are by far the most common form of sanitation in Sub-Saharan Africa (table 2.1). Open defecation is still practiced by one third of the population. Curiously, prevalence of improved latrines is no greater than that of septic tanks, despite a significant cost difference between the two.

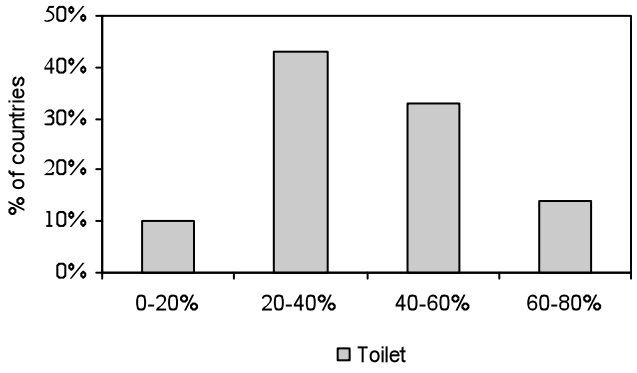
Prevalence of traditional latrines is about the same in both urban and rural areas, extending to half of the population. However; an urban-rural divide emerges when access to improved sanitation is considered. In rural areas, the bulk of the remaining population (41 percent) continues to practice open defecation, with improved sanitation modalities reaching less than 10 percent. In urban areas on the other hand, the bulk of the remaining population (39 percent) have access to improved modalities with septic tanks much more common than improved latrines, and less than 10 percent practicing open defecation. Indeed, Africa's low overall access rates to improved sanitation are partly explained by negligible service coverage in rural areas, where the bulk of the population still resides.

Table 2.1 Patterns of access to sanitation

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

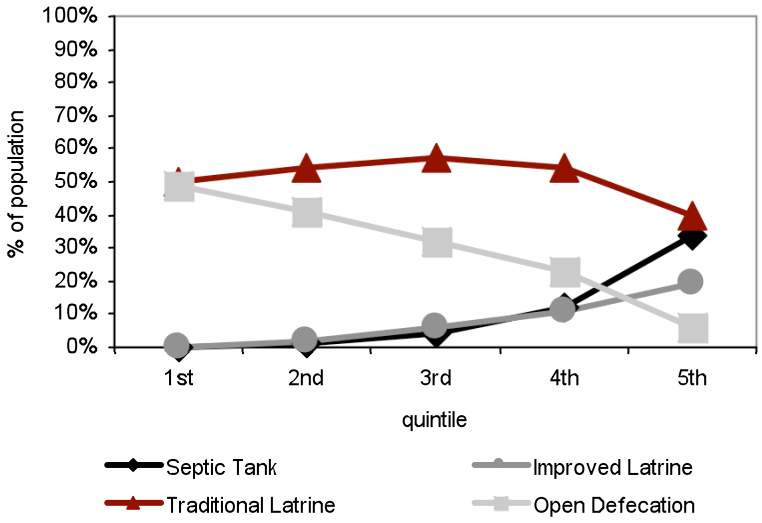
A typical pattern of urban sanitation is the practice of sharing sanitation facilities among multiple families (figure 2.1). The household surveys focus only on formal service provision so that they tend to underestimate the informal sharing of installations between households. In urban areas, more than 40 percent of households report sharing toilet facilities with other households. In particular, in Benin, Burkina Faso, Republic of Congo, Ghana, Guinea, and Madagascar, more than half of households share toilet facilities. In Ghana—where compound housing is commonplace—as many as 80 percent of urban dwellers share water and sanitation facilities with other households. This practice not only implies that people loose time in accessing facilities but may also entail paying significant surcharges to the owners. More important, shared maintenance is often poor, which poses health risks and may discourage use.

Figure 2.1 Current country frequency distribution for percentage of population sharing water and toilet facilities



Source: AICD DHS/MICS Survey Database, 2007.

Figure 2.2 Current access patterns across income quintiles



Source: AICD DH/MICS Survey Database, 2007.

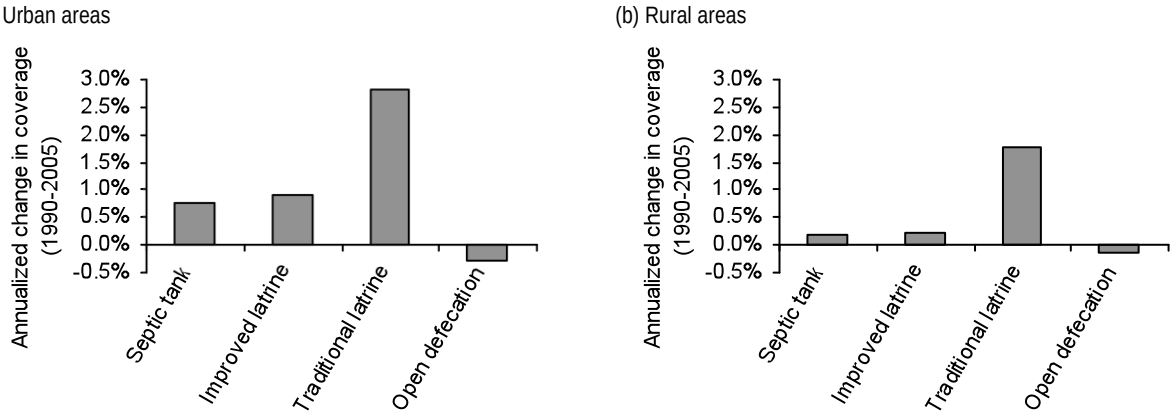
Patterns of sanitation access vary dramatically across the socio-economic spectrum (figure 2.2). As might be expected, open defecation is more widely practiced in the lowest income groups where it accounts for half of the population and declines steadily toward zero prevalence in the highest income groups. Conversely, improved latrines and septic tanks are virtually non-existent in the poorest half of the population, and even among the richest strata account for barely 20-30 percent of households. Access to improved latrines compares to that of septic tanks very closely, suggesting that despite their lower cost, the former remain something of a luxury with little success in penetrating the middle of the income distribution. More important, the overall stumpy prevalence of improved sanitation across poorer groups highlights a crucial issue and namely that high "average" rates of coverage may not help the most vulnerable populations to a significant degree. Finally, traditional latrines are by far the most egalitarian form of sanitation, accounting across income ranges for about 50 percent of households.

Understanding recent trends in sanitation access

Not only are traditional latrines the most common form of sanitation in Sub-Saharan Africa, they are also by far the fastest growing one.

Trends observed by DHS across twenty-four countries report some improvements in access rates for all sanitation alternatives between the early 1990s and the early 2000s. By annualizing these improvements, it has been estimated that traditional latrines have been reaching an additional 2.8 percent of the urban population, and an additional 1.8 percent of the rural population each year (figure 2.3), much faster growth than expansion of septic tanks and improved latrines together. Given that the MDG target focuses on the two higher-end improved sanitation options, this rapid expansion of traditional latrines is not always fully registered in the policy discussion. Expansion rates of improved latrines and septic tanks are four times faster in urban than rural areas. Another piece of good news is that frequency of open defecation in Sub-Saharan Africa has finally begun to decline, albeit at a very modest pace. Some 0.3 percent of the urban population has been moving away from open defecation each year into some form of sanitation service, and the corresponding figure for the rural population is 0.1 percent.

Figure 2.3 Annualized growth in coverage (1990-2005) in urban and rural areas as percentage of the population in the sample of 24 countries

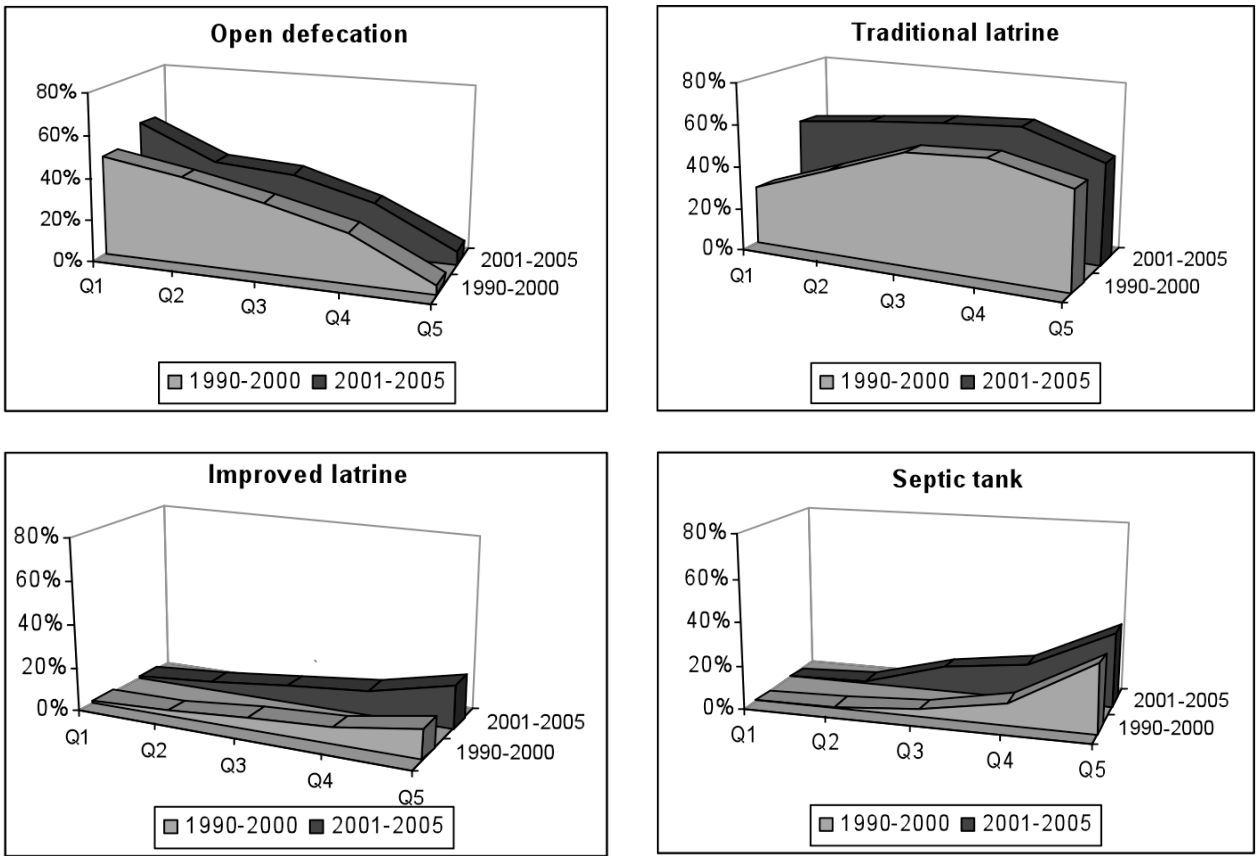


Source: AICD DH/MICS Survey Database, 2007.

Distribution of growth in coverage across income groups shows that the poorest groups are completely left out of growth at the upper rungs of the sanitation ladder (figure 2.4). Among improved alternatives, the expansion of septic tanks is concentrated in the middle and upper-income quintiles reaching a peak in the third quintile, well beyond the growth in the fifth quintile. Improved latrines show expansion across all income groups but substantially skewed towards the top of the distribution. Increased access to traditional latrines appears across all income groups but prevails at the bottom of the distribution. The share of the population practicing open defecation decreases only in the second quintile of the distribution.

By looking at the geographical distribution of those households newly incorporated into each of the sanitation modes each year, it is possible to obtain an understanding of where the gains emerge. As a result of their scale, Nigeria and Senegal account for much of the increased septic tank coverage, 35 and 17 percent respectively. Madagascar, Burkina Faso, and Rwanda account for much of the improved latrine growth. For traditional latrines, Nigeria and Ethiopia account for 51 percent of new users. Ethiopia also completely drives the climb in the population practicing open defecation. Notwithstanding these improvements, the largest populations (70 million people) still practicing open defecation are found in Ethiopia and Nigeria.

Figure 2.4 Growth in access by mode and quintile



Source: AICD DH/MICS Survey Database, 2007.

How does the sanitation challenge differ across countries?

In most countries, the share of the population served by septic tanks is well below 10 percent of the total, while that served by improved latrines is below 20 percent. The difference is made up, in varying degrees, by traditional pit latrines and/or no sanitation. Nevertheless, this general pattern masks huge differences in access to different modalities of sanitation throughout African countries (table 2.2).

All countries share large differences in patterns of access between urban and rural areas. The overall urban-rural divide is marked across all countries and stark for many. In Zimbabwe, 95 percent of urban residents use septic tanks, but rural coverage is less than 2 percent. In South Africa, Namibia and Senegal more than 50 percent of the urban population has access to septic tanks; the numbers in rural areas range from 14 percent (Senegal) to 6 percent (South Africa). Burkina Faso is at the top of the spectrum for improved latrine coverage in urban areas, with 70 percent of the population using this type of facility. Yet in rural areas, coverage is ten times smaller, down to 7 percent. Zimbabwe also shows a minimum level of unserved population in urban areas (close to zero) as opposed to more than 40 percent in rural areas. Across all countries, urban sanitation coverage generally exceeds national averages. Cities experience a larger penetration of improved modalities; in many countries most of the urban population enjoys septic

tanks and improved latrines while those relying on open defecation account for less than 20 percent. Conversely, for most of the countries, traditional latrines remain the most important modality for sanitation in rural areas while septic tanks never extend to more than 15 percent of population. Moreover, open defecation remains common in rural areas, extending to more than 50 percent of the population in half of the countries. In a few countries, and notably Niger, Chad, Benin, Burkina Faso, and Namibia, nearly all the rural populations still practice open defecation.

Table 2.2 Dispersion of coverage across countries in percentage of total population

Septic tank		Improved latrine		Traditional latrine		Open defecation	
South Africa	46.4%	Madagascar	49.0%	Malawi	80.7%	Niger	79.5%
Senegal	36.0%	Rwanda	29.3%	Uganda	80.2%	Chad	71.6%
Zimbabwe	31.5%	Cameroon	27.0%	Tanzania	79.2%	Burkina Faso	70.0%
Namibia	30.6%	Zimbabwe	25.0%	DRC	76.1%	Benin	67.7%
Gabon	24.5%	Ghana	22.6%	Comoros	75.1%	Ethiopia	62.2%
Zambia	18.1%	Gabon	22.1%	Congo (Brazza)	69.8%	Namibia	56.6%
Nigeria	13.1%	Lesotho	20.8%	Guinea	67.4%	Mauritania	49.3%
Cote d'Ivoire	12.5%	Comoros	20.7%	Rwanda	66.1%	Mozambique	46.7%
Ghana	10.3%	Burkina Faso	17.9%	Kenya	64.3%	Madagascar	46.6%
Kenya	9.0%	Congo (Brazza)	15.1%	Mali	62.1%	Lesotho	44.6%
Cameroon	8.1%	Benin	13.9%	CAR	59.5%	Sudan	42.7%
Sudan	6.4%	Cote d'Ivoire	13.3%	Nigeria	59.4%	Cote d'Ivoire	35.4%
Mali	6.0%	CAR	13.3%	Cameroon	57.6%	Zimbabwe	28.4%
Congo (Brazza)	5.3%	Niger	12.1%	Zambia	53.1%	Guinea	27.6%
Malawi	3.6%	Mali	10.8%	Gabon	50.9%	Zambia	27.0%
Comoros	2.9%	Senegal	10.1%	Sudan	48.9%	CAR	25.9%
Mozambique	2.9%	DRC	9.8%	Mozambique	48.0%	Ghana	24.6%
Tanzania	2.8%	Kenya	8.0%	Mauritania	44.3%	Nigeria	24.5%
Guinea	2.6%	Mauritania	3.8%	Ghana	40.5%	Senegal	22.0%
Benin	2.4%	Tanzania	3.7%	Cote d'Ivoire	38.6%	Mali	20.9%
Ethiopia	2.1%	Nigeria	2.9%	Ethiopia	34.7%	Kenya	18.3%
Madagascar	1.9%	Namibia	2.7%	South Africa	34.1%	Uganda	14.8%
Burkina Faso	1.9%	Chad	2.7%	Lesotho	32.9%	Malawi	14.5%
Chad	1.8%	Uganda	2.4%	Senegal	31.3%	Tanzania	14.3%
Mauritania	1.8%	Guinea	2.1%	Chad	23.6%	South Africa	12.8%
Uganda	1.7%	Mozambique	1.8%	Benin	15.2%	DRC	12.2%
Lesotho	1.6%	Zambia	1.6%	Zimbabwe	14.9%	Congo (Brazza)	9.5%
DRC	1.4%	Malawi	1.2%	Burkina Faso	10.0%	Cameroon	7.2%
Rwanda	1.2%	Ethiopia	0.9%	Namibia	7.5%	Rwanda	3.3%
CAR	1.1%	South Africa	0.0%	Niger	6.9%	Gabon	2.1%
Niger	1.1%	Sudan	0.0%	Madagascar	2.5%	Comoros	0.3%
South Africa	46.4%	Madagascar	49.0%	Malawi	80.7%	Niger	79.5%

Source: AICD DH/MICS Survey Database, 2007

Distinct typologies of countries can be identified based on access patterns in urban and rural areas.

In urban areas, three categories of countries emerge (figure 2.5). The first group includes countries with a prevalent part of their urban population—between 50 and 90 percent—relying on traditional latrines. This is the case of the Central African Republic, Chad, Comoros, the Republic of Congo, Ethiopia, Guinea, Lesotho, Malawi, Mali, Mauritania, Mozambique, Nigeria, Tanzania, Uganda, Sudan, and the Democratic Republic of Congo.

The second part comprises countries with a prevalent part of their urban population—from a third to half—using improved latrines along with a significant percentage—20 to 40 percent—using traditional latrines. This is the case of Benin, Burkina Faso, Cameroon, Ghana, Madagascar, Niger, and Rwanda.

The third group features countries with much of their urban populations provided with septic tanks—at least a third and up to 95 percent—although in some countries, up to 45 percent still use traditional latrines. This is the case of Cote d'Ivoire, Kenya, Namibia, Gabon, Senegal, South Africa, Zambia, and Zimbabwe.

In rural areas, three somewhat different categories of countries emerge. The first includes countries with the majority of the rural population—more than 50 percent—still practicing open defecation, the case of Benin, Burkina Faso, Chad, Cote d'Ivoire, Ethiopia, Mauritania, Mozambique, Namibia, Niger, and Sudan.

The second includes countries with a prevalent part of their rural population using traditional latrines. This is the largest group, including Cameroon, Comoros, the Republic of Congo, Gabon, Ghana, Guinea, Kenya, Malawi, Mali, Nigeria, South Africa, Tanzania, Uganda, Zambia, and the Democratic Republic of Congo.

In the third group of countries an increasing share of population uses improved latrines, although both traditional latrine coverage and open defecation practices are large categories. This is the case of the Central Africa Republic, Lesotho, Madagascar, Rwanda, Senegal, and Zimbabwe.

Figure 2.5 Patterns of access to sanitation across countries

Urban areas

Prevalence of traditional latrine: Central African Republic, Chad, Comoros, Republic of Congo, Ethiopia, Guinea, Lesotho, Malawi, Mali, Mauritania, Mozambique, Nigeria, Tanzania, Uganda, Sudan and Democratic Republic of Congo.

Prevalence of improved latrine: Benin, Burkina Faso, Cameroon, Ghana, Madagascar, Niger, Rwanda

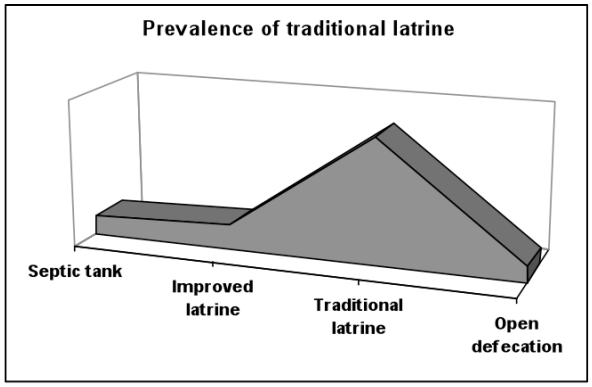
Bi-modal pattern: Côte d'Ivoire, Gabon, Kenya, Namibia, Senegal, South Africa, Zambia, Zimbabwe

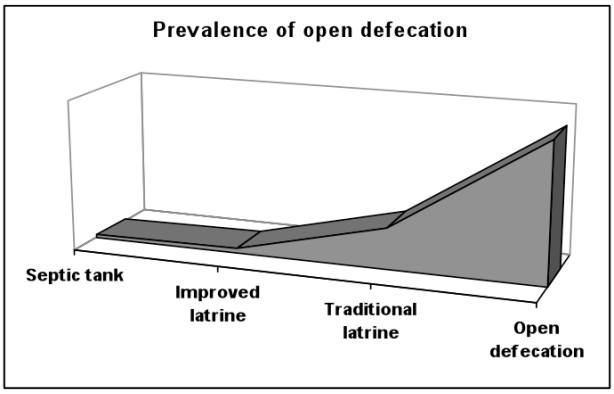
Rural areas

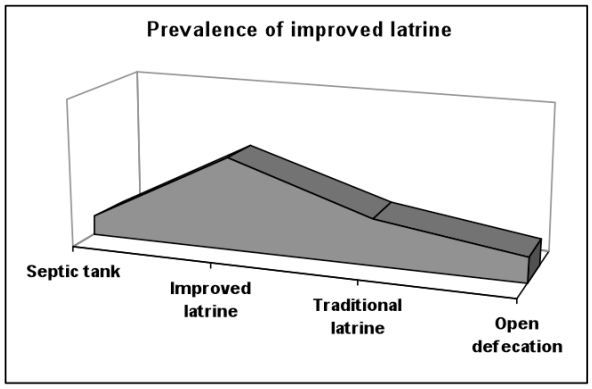
Prevalence of open defecation: Benin, Burkina Faso, Chad, Côte d'Ivoire, Ethiopia, Mauritania, Mozambique, Namibia, Niger and Sudan

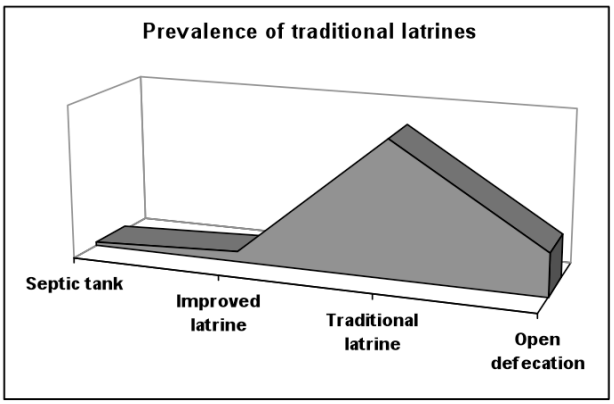
Prevalence of traditional latrines: Cameroon, Comoros, the Republic of Congo, Gabon, Ghana, Guinea, Kenya, Malawi, Mali, Nigeria, South Africa, Tanzania, Uganda, Zambia and Democratic Republic of Congo

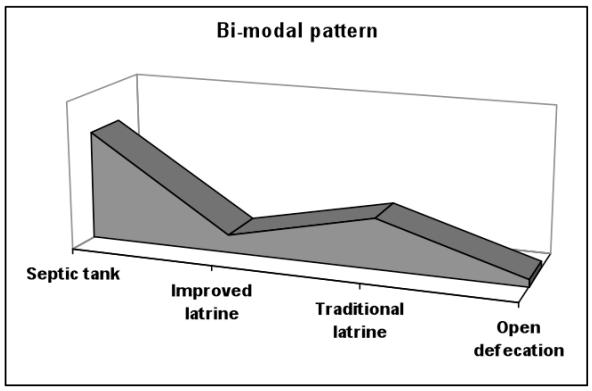
Rising use of improved latrines: Central African Republic, Lesotho, Madagascar, Rwanda, Senegal, Zimbabwe

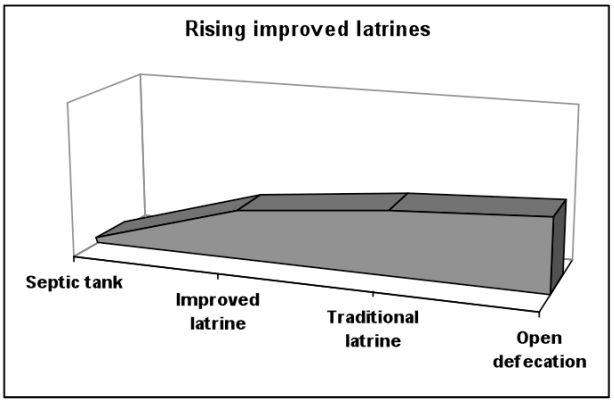












Source: AICD DH/MICS Survey Database, 2007.

Which countries are moving faster, and where are they going?

A handful of African countries have been making impressive gains in sanitation since the 1990s, measured as percentages of population moving up the sanitation ladder every year. While the improvements in these countries may still be too small and too late to meet the sanitation MDG, identifying the successful cases could promote a deeper analysis of their experiences and distill lessons for other countries in the region.

The analysis of access presented above highlighted countries that have made the largest contribution to the regional trend. This list was dominated by some of the larger countries such as Nigeria and Ethiopia, where, as a result of their scale, even relatively modest percentage changes can have major implications in absolute terms. In this section, attention switches to identifying countries that have achieved large percentage gains relative to the size of their own populations. This signals successful experience, although in the case of the smaller countries this does not prove to be material at the regional level.

Table 2.3 presents the average annualized percentage of population gaining access to different modalities of sanitation by country. Any country moving more than two percent of its population up any of the rungs of the sanitation ladder each year can be considered to be making noteworthy progress. A number of clear leaders emerge.

Table 2.3 Annualized change in coverage from 1990 to 2005

Percent population/year

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

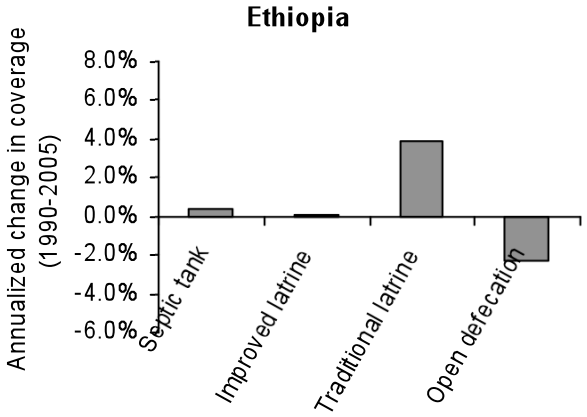
Mozambique	0.00	Chad	–0.52	Lesotho	–0.48	Burkina Faso	1.04
Madagascar	–0.01	Nigeria	–0.68	Benin	–1.08	Lesotho	1.05
Lesotho	–0.09	Cote d'Ivoire	–1.20	Burkina Faso	–2.25	Chad	1.60
Zambia	–0.12	Senegal	–1.29	Madagascar	–3.69	Niger	1.81

Source: AICD DH/MICS Survey Database, 2007.

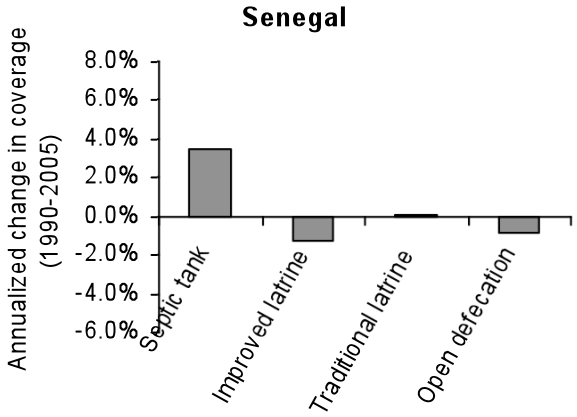
In the cases of septic tanks, Senegal stands out as having by far the largest average annual gain, adding more than 3 percent of its population into the septic tank category each year. As a result, the share of population accessing a septic tank in Senegal has increased from 9 to 36 percent from 1997 to 2005 (figure 2.6). By contrast, Madagascar, Lesotho and Zambia show declining septic tank coverage from the late 1990s and the early 2000s.

Figure 2.6 Successful examples from up and down the sanitation ladder

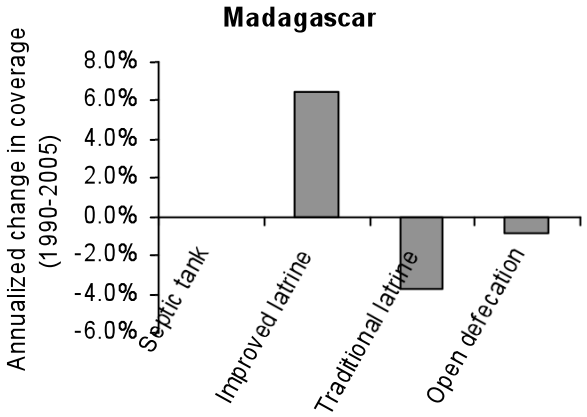
1. Ethiopia: Getting on to the bottom rung (below)

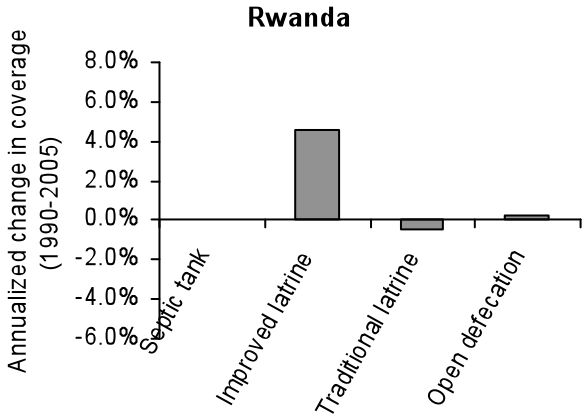


2. Senegal: Mainstreaming septic tanks



3. Madagascar and Rwanda: Upgrading latrines





Source: AICD DH/MICS Survey Database, 2007

In the case of improved latrines, three countries stand out as achieving accelerated expansion, namely Madagascar, Rwanda and Burkina Faso. In Madagascar, about 7 percent of the population has been moved under improved latrine coverage every year; in Rwanda and Burkina Faso the corresponding figure exceeds 4 percent.

In Cote d'Ivoire, Uganda, Ethiopia and the Democratic Republic of Congo more than 3 percent of population has gained access to traditional latrines every year.

Another way to look at performance is to say which countries have made the most rapid reductions in the share of the population practicing open defecation. Ethiopia is again the leading country, decreasing the share of the population without access to any form of sanitation from 82 to 62 percent between 2000 ad 2005. Zimbabwe and Mozambique immediately follow; both have moved slightly more than 1 percent of their population out of open defecation every year.

Nigeria, which stood out earlier for contributing the largest amount of people moving up the sanitation ladder, does not appear to have made such impressive progress when gains are normalized by its population. Conversely, Senegal continues showing a salient performance on septic tank coverage.

Analyzing the experiences of individual countries, many of them are focusing their efforts on moving people along different rungs of the sanitation ladder. In Ethiopia, for example, the main focus is reducing the practice of open defecation by getting people onto the bottom rung of the sanitation ladder. In countries such as Madagascar and Burkina Faso, the action is mainly concentrated on upgrading services among the population already engaged in some kind of basic sanitation practice. In Senegal, the focus has been on getting people from the middle to the top of the ladder by increasing the prevalence of septic tanks. The financial and health implications of these strategies are very distinct.

A similar analysis of country's performance can be conducted at the urban and rural levels. Table 2.4a presents the annualized increase in the sample urban population covered by the different sanitation modalities in each country between the early 1990s and the early 2000s. Table 2.4b presents the corresponding figures in rural areas. The two tables allow breaking down the various countries' performances and understanding where gains and losses emerge.

Looking at the outliers discussed above, Senegal's performance on septic tank coverage originates mainly from accelerated expansion in urban areas, while the increase in rural areas is much less remarkable. The same applies to Zimbabwe, which realizes a noteworthy expansion in urban areas while septic tank coverage declines in rural areas. Also, Burkina Faso's performance on improved latrines is stark in large cities, while results in rural areas are ten times smaller. Conversely, Cote d'Ivoire and Uganda show similar progress in traditional latrine coverage across urban and rural areas, and so does Ethiopia in reducing the practice of open defecation.

Table 2.4 Annualized change in coverage by modality and by country, 1990–2005

Percent

Septic tank		Improved latrine		Traditional latrine		Open defecation	
a. Urban							
Senegal	5.7	Burkina Faso	17.2	Nigeria	5.1	Malawi	1.0
Zimbabwe	3.0	Madagascar	8.5	DRC	4.7	Rwanda	0.4
Mali	2.3	Rwanda	6.1	Cote d'Ivoire	4.5	Namibia	0.4

Namibia	1.8	Benin	5.3	Uganda	4.4	Tanzania	0.3
Burkina Faso	1.3	Ghana	2.0	Mozambique	4.2	Kenya	0.3
Ghana	1.2	Tanzania	1.8	Ethiopia	3.9	Benin	0.2
Benin	1.2	Mali	1.7	Chad	3.6	Chad	0.1
Ethiopia	1.2	Niger	1.4	Malawi	3.3	Cameroon	0.1
Tanzania	1.1	Cameroon	0.9	Guinea	2.3	Burkina Faso	0.1
Chad	0.9	DRC	0.8	Rwanda	2.2	Uganda	0.1
Malawi	0.9	Uganda	0.7	Niger	2.0	Zambia	0.1
Uganda	0.5	Mozambique	0.6	Kenya	2.0	Zimbabwe	0.0
Nigeria	0.5	Kenya	0.6	Ghana	1.7	Guinea	0.0
Cote d'Ivoire	0.5	Lesotho	0.5	Cameroon	1.6	Ghana	–0.1
Rwanda	0.4	Guinea	0.5	Zambia	0.8	Lesotho	–0.1
Lesotho	0.3	Ethiopia	0.5	Mali	0.7	Senegal	–0.1
Cameroon	0.2	Malawi	0.4	Lesotho	0.6	Niger	–0.2
Madagascar	0.2	Zambia	0.3	Namibia	0.4	Nigeria	–0.2
DRC	0.2	Zimbabwe	0.2	Tanzania	0.2	Mali	–0.4
Zambia	0.0	Namibia	0.2	Zimbabwe	0.0	Cote d'Ivoire	–0.5
Guinea	0.0	Senegal	–0.1	Benin	–3.2	DRC	–0.5
Kenya	–0.1	Nigeria	–0.3	Senegal	–3.8	Mozambique	–0.9
Niger	–0.2	Cote d'Ivoire	–0.9	Madagascar	–5.3	Madagascar	–1.1
Mozambique	–0.4	Chad	–1.6	Burkina Faso	–13.1	Ethiopia	–2.2
b. Rural							
Senegal	1.7	Madagascar	5.9	Ethiopia	4.3	Niger	2.5
Mali	0.6	Rwanda	4.6	Cote d'Ivoire	3.9	Burkina Faso	1.6
Namibia	0.5	Zimbabwe	1.8	Uganda	3.9	Chad	1.5
Nigeria	0.5	Burkina Faso	1.7	DRC	3.1	Ghana	1.5
Ethiopia	0.3	Lesotho	1.1	Senegal	2.6	Kenya	1.0
Zambia	0.2	Benin	1.0	Malawi	2.5	Benin	0.9
Burkina Faso	0.1	Mali	0.6	Guinea	2.1	Tanzania	0.7
Guinea	0.1	Kenya	0.4	Mali	1.7	Lesotho	0.6
Benin	0.1	Namibia	0.4	Mozambique	1.7	Nigeria	0.5
Chad	0.1	Guinea	0.3	Nigeria	1.3	Namibia	0.5
Cote d'Ivoire	0.1	Tanzania	0.2	Zambia	1.1	Uganda	0.4
Malawi	0.0	Zambia	0.2	Zimbabwe	0.9	Zambia	0.3
Uganda	0.0	Uganda	0.1	Tanzania	0.6	DRC	0.2
Niger	0.0	Malawi	0.1	Cameroon	0.6	Rwanda	0.1
Kenya	0.0	Ethiopia	0.1	Ghana	0.5	Malawi	–0.2
Mozambique	0.0	DRC	0.0	Kenya	0.5	Cameroon	–0.2
Rwanda	0.0	Niger	–0.1	Chad	0.4	Cote d'Ivoire	–0.4
Tanzania	0.0	Chad	–0.1	Benin	0.4	Mozambique	–0.8
DRC	0.0	Mozambique	–0.1	Niger	0.3	Mali	–0.8
Madagascar	0.0	Cameroon	–0.1	Namibia	0.1	Guinea	–0.9
Ghana	0.0	Ghana	–0.8	Burkina Faso	–0.3	Madagascar	–1.0
Zimbabwe	–0.1	Nigeria	–0.9	Lesotho	–0.5	Senegal	–1.0
Lesotho	–0.1	Cote d'Ivoire	–1.3	Rwanda	–1.3	Zimbabwe	–1.5
Cameroon	–0.1	Senegal	–2.1	Madagascar	–3.1	Ethiopia	–2.8

Source: AICD DHS/MICS Survey Database, 2007

Policy implications of different country typologies

On the strongest findings emerging from the earlier review is how much the sanitation challenge differs across African countries and between urban and rural space thereof. The implication of these major differences is that policies must be tailored to each setting. If the ultimate objective is to provide universal access, policymakers should focus on expanding service and reducing open defecation as much as possible. Therefore, they should avoid concentrating efforts on rungs of the sanitation ladder above the realities of their societies – for example, channeling limited public resources into sewer networks that serve only a few people while overlooking the urgent need to lift many more people away from open defecation. Investments should target people who can move to the next rung of the ladder and in particular those at the bottom, leaving more expensive options to households with the resources to take them up.

Individual countries or urban and rural regions thereof may face one of the following distinct situations. A substantial number of countries still face high prevalence of open defecation especially in rural areas, and their central challenge is necessarily one of creating demand for sanitation through interventions targeted at behavioral change. The largest group of countries is that in which traditional latrines are either dominant or still significant in both urban and rural areas, and their central challenge is to move people up the ladder toward more hygienic forms of sanitation. A small group of countries shows significant coverage of septic tanks, including incipient sewer networks, which reach a small share of population, mainly wealthier urban residents. The challenge there: how to spread these services toward the middle of the socio-economic spectrum.

Different policy options apply to each of these different settings. Although addressed as separate cases, it is likely that any given country may need to use combinations of these approaches for different segments of the population.

Among populations accustomed to open defecation, the transition to using a fixed-point facility involves a substantial and sometimes culturally challenging change of behavior. In the absence of such change, latrines may not be used at all, or may be used in such a way as to undermine the potential health benefits.

To this extent, hygiene education is a priority in any sanitation setting. Safe disposal of feces or hand washing with soap protect health regardless the type and quality of sanitation services people use. In addition, where demand for sanitation services needs to be built, promoting hygiene can start a virtuous cycle resulting in positive externalities in the life of communities. On one hand, new behaviors and practices establish awareness of the benefits of sanitation; on the other, they establish codes of conduct and new life standards that will ultimately result in a larger demand for better sanitation. A study in South India showed that despite 100 percent coverage of latrines, without any accompanying hygiene education only 37 percent of men used these facilities (WSP-SA 2002).

Also, where people do make use of latrines, incorrect usage can dramatically reduce or even reverse the health benefits associated with these facilities. A fully sanitary and safe facility is less a matter of technology and material used and more a matter of good practices and behaviors, such as keeping the facility closed and clean. An “improved” latrine that is not correctly used and emptied still poses high risks of environmental contamination and disease spread.

Bringing about behavioral change involves a sustained communication and public education effort best targeted at the community level. For this effort to succeed, motivations that interest people in hygiene and sanitation should be well understood. Health is one motivation, but not necessarily the top priority. Convenience, dignity, and social status may be the real drivers. Adapting hygiene and sanitation promotion programs to cultural and institutional norms and intensely marketing to stimulate community-wide involvement is critical. Peer pressure—to improve one's status—can also help. Once behaviors are recognized by a community, there is a pressure to conform, and social structures and leaders begin to contribute

It thus makes little sense to roll out a physical investment program without accompanying promotion of hygiene. And effective hygiene promotion alone may stimulate self-financed household investment in better facilities. Too often these "soft" aspects of sanitation are overlooked and priority given to the "hard" aspects, such as installing and upgrading infrastructure. A successful example is the Regional Health Bureau Program Sanitation Advocacy Campaign launched in 2003 in the Southern Regions of Ethiopia (Box 2.1). The campaign achieved an increase in latrine coverage from 13 to 78 percent in just two years.

Box 2.1 Ethiopia's experience with community-led programs

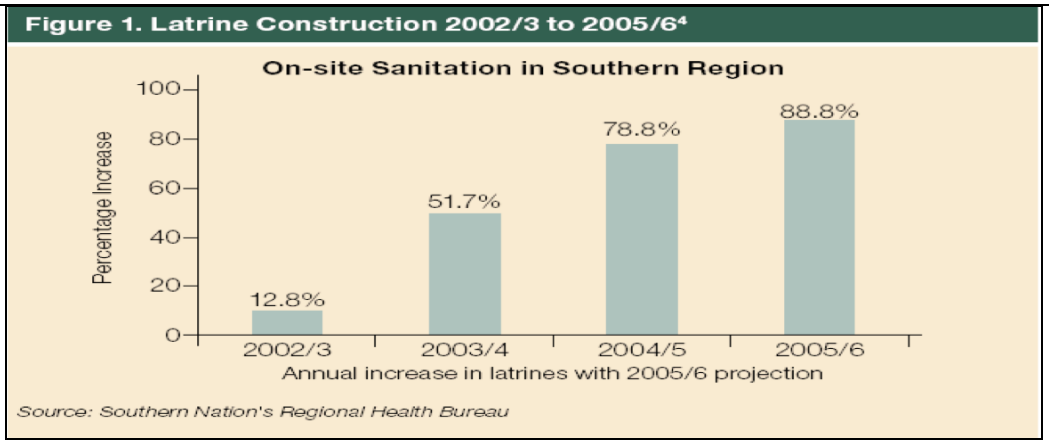
Ethiopia's Southern Region is home to diverse cultures and scores of ethnic groups, with a population of 15 million—much bigger than many African countries. There are 13 zones divided in 133 districts. Population density varies to a great deal, reaching a peak of 1,100 people per square kilometer (Wanago district).

In early 2003, access to on-site sanitation was lower that 13 percent—even below the national average estimated at 15 percent. Low-quality traditional latrines were the most prevalent sanitation modality and yet scarcely used, poorly maintained, smelly and dangerous for children and animals. Meanwhile, population expansion with resulting growing household densities, and deforestation were combining to reduce private open defecation options.

The Southern Regional Health Bureau—entrusted by the central Ministry of Health with sanitation and hygiene promotion—decided to apply some of the key features of the Community-Led Total Sanitation (CLTS) approach, based on "zero subsidy" but allowing the community to come up with its own innovative and affordable models.

With just a modest but dedicated sum of money, a mass communication campaign inspired by the slogan "Sanitation is Everyone's Problem and Everyone's Responsibility" was launched. The objective of the campaign was to promote sustainable and affordable sanitation by creating awareness and push self-financing across households. A close collaboration with all key stakeholders helped to create a cascading process of advocacy consensus and capacity building, promotion (via community volunteers) and supportive supervision. At the household level, women were identified as the main drivers of latrine construction. At public consensus-building meetings, they complained about how open defecation directly affected their lives. They highlighted the health risks of contact with feces in the banana plantations and in the fields where they collected fodder for cattle. They also complained of the bad smell and embarrassment of seeing people defecate in open spaces. Featured stories cite shame as an important factor in consensus building and a strong motivator for latrine construction. At the village level, volunteer community health promoters have led by example by going house-to-house with health workers and members of the sub-district health committee to persuade householders to build latrines and by supervising construction works.

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



Source: Reproduced from WSP (2007), "From Burden to Communal Responsibility. A Sanitation Success Story from Southern Region in Ethiopia."

In countries where use of traditional latrines remains widespread, the key problem becomes how to upgrade them to more hygienic improved facilities so that the full health benefits of fixed-point defecation can be realized.

The policy options for this category of countries are more complex and some debate remains about whether the main impediment to upgrading latrines stems primarily from the supply-side or the demand-side.

From the demand-side, low prevalence of improved latrines can be explained by affordability constraints associated with low household incomes and by the higher capital costs associated with constructing such facilities. The option of improving latrines from traditional materials can be costly, given that in most instances it effectively implies constructing a new latrine from purchased components. In urban areas the problem of improving latrines is exacerbated because impoverished residents in slums do not own the land or houses and so have fewer incentives to invest in improving their living conditions.

Table 2.5 uses standardized unit costs drawn from the Senegal sanitation sector to estimate the percentage of households' monthly budget that would be absorbed by the upfront investment cost associated with different types of sanitation facilities. The results indicate that while traditional latrines look quite affordable across the income spectrum in Senegal, improved latrines represent more than a month of the household budget even for households in the highest income group. These findings are born out by the patterns of access to sanitation already observed across the socio-economic spectrum. That half of Sub-Saharan African households have invested in traditional latrines in the absence of any far-reaching subsidization policy corroborates that investments of this size are affordable across the income spectrum. At the same time, the fact that improved latrines are confined to upper income groups bears out in the high budget shares families would need to finance an improved latrine.

Table 2.5 Cost of facility as % of monthly household budget in Senegal

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

Source: AICD DH/MICS Survey Database, 2007

The appropriate policy response to this problem would likely entail some degree of public subsidy for incremental capital costs associated with improved facilities.

Nevertheless, it is important to be aware of the drawbacks that subsidizing improved facilities may imply, especially the potential distortions on demand and markets. Subsidization can suppress demand in households with the ability to pay. Moreover, by setting a "standard" facility, it may create a sense of entitlement among poor income groups regardless the appropriateness of this standard with respect to the particular circumstances and geographic locations. The widespread adoption of a standard could also discourage innovations that might lower costs.

From the supply-side, low numbers of improved latrines can be explained by lack of knowledge within countries' construction sectors of required designs as well as potential non-availability of key input materials in the local market. The analysis of access patterns presented above already provides some clues that supply-side issues may be a real constraint in Africa. First, there is the low prevalence of improved latrines across Africa, even in middle-income countries, except in a handful of cases where special efforts seem to have been made. Second, traditional latrines account for a steady 40 to 50 percent of the population, even among the highest income group where the resources for more advanced facilities would be available.

While both demand- and supply-side factors are likely responsible for low prevalence of improved latrines, it is critical to tackle supply bottlenecks first. Otherwise subsidy resources may be wasted on households that could have financed the facilities on their own had they only been available. Moreover, allowing the local market to develop also provides space for innovation that may ultimately lower the cost of improved latrines and thereby at least partially address the affordability problem.

Therefore, the appropriate policy response to this problem would entail training local builders, product development and research, opening-up markets for missing inputs and provision of access to credit for small-scale businesses. With very limited budgets, government policies focusing on supply-side limitations can yield outstanding results, as shown by the Lesotho experience. The National Sanitation Program in Lesotho, dating back twenty years, was established as a separate item on the government budget and dedicated to sanitation promotion and private sector training. Clear financing rules excluded direct subsidies for building individual household latrines; instead, householders directly employed private-sector latrine builders who were trained under the program. The program resulted in a sanitation coverage increase from 20 to 53 percent of the national population.

Where septic tanks have reached significant levels of penetration, the challenge is to provide access to improved sanitation to lower-income segments of the population, which in high density settings may require finding solutions to expand sewer networks. In many African settings, on-site sanitation is the most cost-effective, and likely only practical approach for securing the health benefits associated with hygienic disposal of excreta. However, the method does have its limits. As urban population increases, water consumption also increases, creating the challenge of safely returning large volumes of grey water. Today about 60 percent of the urban population relies on water sources unlikely to be able to deliver much more than 40 liters per capita per day. Yet, those provided with access to private piped water connections, equal to 40 percent of the urban population, are consuming close to 80 liters per capita per day. Only slightly more than half of these have flush toilets, the majority connected to septic tanks rather than to water-born sewage systems. There is therefore already a significant issue associated with water returns.

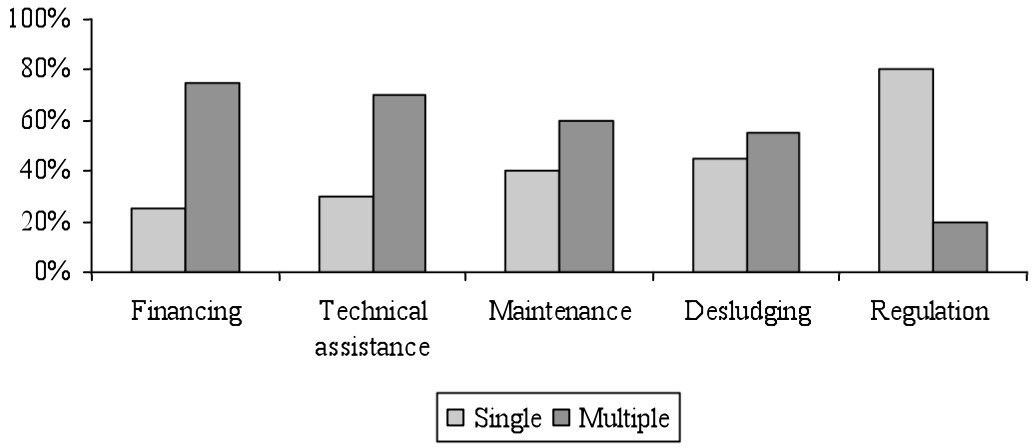
Also, as a result of densification in urban areas, limited availability of land will rapidly become a binding constraint particularly on the simpler types of latrines, which over the medium term require rotation of sites. Moreover, the pollution risk of latrines increases proportionally to population density.

Sooner or later, Africa's burgeoning cities will be faced with the need to develop more extensive sewer networks. In that sense, the evidence on affordability presented in Table 2.5 is particularly worrisome. If improved sanitation facilities result over expensive even across wealthier groups, water-born sewerage is way beyond the reach of all but the most affluent households. At the same time, levels of public subsidy required to support a major rollout of sewerage networks are equally unaffordable for governments. In that sense, it is critical to promote technological innovation to find ways to reduce the cost of sewer networks.

3 Institutional, regulatory and policy framework of sanitation services

The institutional framework governing the sanitation sector is characterized by complexity, a multiplicity of actors, and lack of clear accountability for sector leadership. The main areas of responsibility for on-site sanitation can be identified as financing investment, provision of technical assistance, maintenance, emptying (or desludging) of facilities and regulation. In a majority of countries, responsibility for each of these different activities is spread across a range of institutions including central ministries, national and city-level utilities, municipalities, local government agencies and small rural authorities, households, and non-governmental organizations. Only in the case of regulation there is a clear delineation of responsibility to a single entity in the majority of countries.

Figure 3.1 Responsibilities for on-site sanitation functions

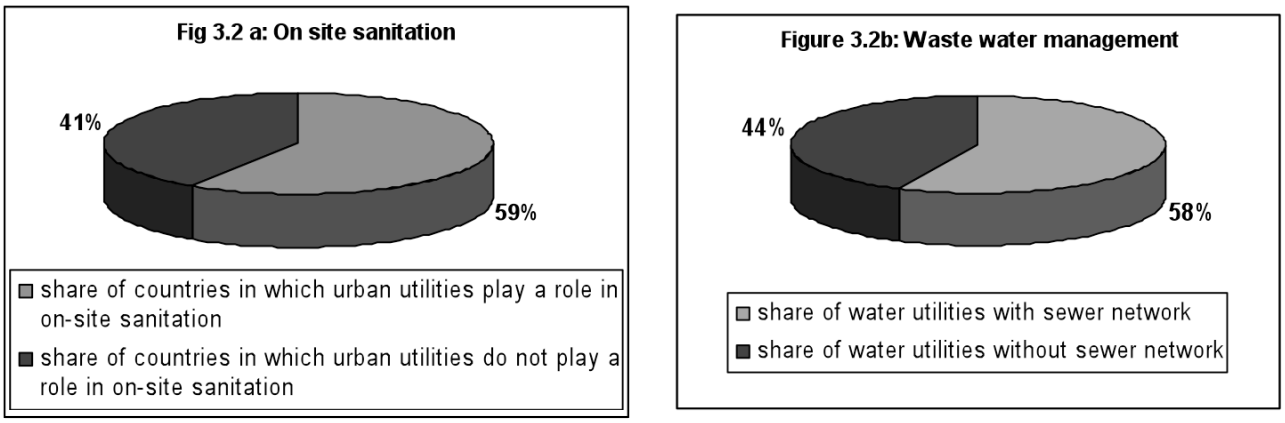


Source: AICD WSS Survey Database, 2007

Institutional arrangements tend to differ sharply across urban and rural environments. In rural areas, sanitation is usually community and household managed, with oversight from ministries of health and education in charge of rural and school sanitation. Urban sanitation is generally a central government responsibility under the oversight of ministries such as infrastructure or water, environment, housing and public health. Operation is entrusted to municipal agencies or utilities, usually water or even energy utilities.

The AICD WSS Survey found that close to 60 percent of water utilities operated a sewer network, and a similar proportion had some responsibility for on-site sanitation also (3.2). In both cases, sanitation can either be treated as a separate business line with dedicated staff, organization, and management or operated jointly with water. Both approaches are equally prevalent. Senegal is the only country where a specialized sanitation utility, ONAS, has been established, which was reporting to a fully fledged Ministry of Sanitation recently reorganized as the Ministry of Urban Affairs, Housing, Urban Water, Public Hygiene and Sanitation. In Burkina Faso, the water utility ONEA has a separate department that is responsible for sanitation.

Figure 3.2 Urban utilities responsibility over on-site sanitation and waste water management



Source: AICD WSS Survey Database, 2007

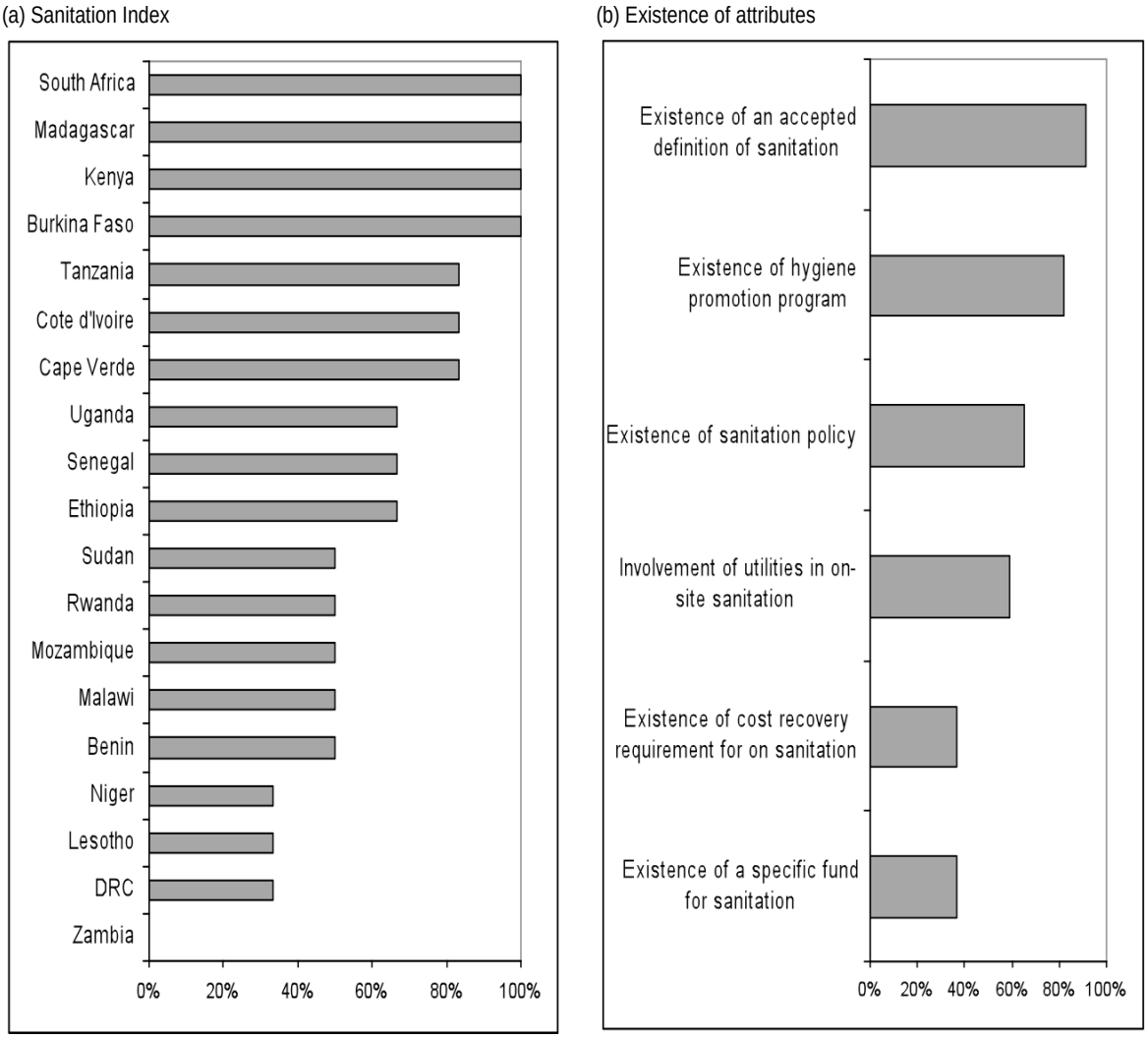
As in the case of water, the devolution of provision of sanitation services to sub-national governments has been the most significant reform of the past decade, affecting 80 percent of countries surveyed. Decentralization was first applied to large cities, where it had effectively been a reality for some time due to the comprehensive role played by many water utilities. However, it is now also being applied to rural areas, with responsibilities transferred to small local authorities, many of which, as in the case of Mali, Benin, and Burkina Faso, have been recently established.

Countries have also taken a number of measures to establish a comprehensive sanitation framework aiming to move more people away from open defecation to use of on-site sanitation. A simple scoring system can be used to evaluate progress toward these reforms. The focus of this reform index is on-site sanitation because a vast majority of Africans depend on this source and prevalence of piped sewerage is miniscule in comparison. The sanitation index includes the following six indicators: (1) existence of a national sanitation policy, (2) existence of a hygiene promotion program, (3) existence of an accepted definition of sanitation, (4) existence of a specific fund for sanitation, (5) involvement of utilities in on-site sanitation, and (6) clear cost recovery policies for on-site sanitation. The index is a simple addition of the six indicators, and the countries with any missing data point for any of the indicators are dropped to ensure consistency. Together, these six indicators provide a glimpse of the progress toward a holistic sanitation agenda.

The majority of countries have adopted measures such as an accepted definition of sanitation and a hygiene promotion program relevant to establishment of a sanitation framework. Fifteen countries have also established a national sanitation policy. Contrary to these widely prevalent policies, a measure such as operating cost recovery policies known to pay significant dividends exists only in seven countries. Only eight countries have set up a sanitation fund or a dedicated budget line, in some cases, funded exclusively by donors such as in Chad and Ethiopia, or a combination of government, sector levies, and donors. Cote d'Ivoire is the only country where the fund is financed entirely by sector levies. South Africa, Madagascar, Kenya, Chad, and Burkina Faso stand out as scoring 100 percent on the sanitation

index. At the other extreme are countries such as the Democratic Republic of Congo, Zambia, Lesotho and Niger that are struggling to establish systems in accordance to the needs of the sanitation sector.

Figure 3.3 Sanitation Index



Source: AICD WSS Survey Database, 2007.

The widespread use of on-site sanitation facilities brings up issues of construction, management and maintenance of latrines. The AICD WSS Survey provides an overview of the practice with respect to latrine construction and operation. The construction of on-site sanitation is in most cases the responsibility of households and/or NGO/CBOs and the private sector. Only in a few cases is government reported to play any kind of role in financing sanitation facilities. Latrine emptying is predominantly a private sector function, although in a substantial number of cases the municipality and/or local utility take primary responsibility. Formal regulatory oversight of latrines is reported only by nine countries in the sample. However, the majority of countries report concerns about proximity of unhygienic latrines to drilled holes with potential for cross-contamination.

Table 3.1 Management of latrines

	Latrine construction	Emptying latrines	Regulation of latrines	Level of latrine regulation	Groundwater contamination is a problem
Benin	Households	Local private	No	not applicable	Yes
Burkina Faso	Government	Combination	No	not applicable	No
Cape Verde	NGO/CBO	Municipality	No	not applicable	
Chad	NGO/CBO				No
Cote d'Ivoire	Government, households	Utility, combination	Yes	Utility	
DRC	Private sector	Local private	No	not applicable	No
Ethiopia	Private sector	Municipality	No	not applicable	Yes
Ghana					Yes
Kenya	NGO/CBO	Combination	Yes	Central Government, Utility	
Lesotho	Households	Utility	Yes	Central Government	No
Madagascar	Households	Local private, combination	Yes	Municipality	No
Malawi	Government/NGO/Household	Municipality, local private, utility	Yes	Central Government , Municipality, Community	Yes
Mozambique	Households/NGO	Other	No	not applicable	Yes
Namibia	Government/Household	Municipality			Yes
Niger	Households	Local private	No	not applicable	Yes
Nigeria		Local private	No	not applicable	Yes
Rwanda	Households	Combination	No	not applicable	No
Senegal	Government/NGO/Household	Local private	Yes	Central Government	Yes
South Africa	Government	Municipality	Yes	Municipality	Yes
Sudan	Households	Local private	Yes	Municipality	No
Tanzania	Households	Local private	No	not applicable	Yes
Uganda	Households	Combination	Yes	Municipality	Yes
Zambia	Households	Local private	No		Yes

Source: AICD WSS Survey Database, 2007

4 Investment needs and funding for the sanitation sector

Benefits of Sanitation

Sanitation makes a key contribution to public health, particularly in densely populated areas. In particular, access to adequate sanitation, understood as access to any private or shared, but not public modality that guarantees that waste is hygienically separated from human contact (JMP 2000), reduces the risk of intestinal worms, diarrhea, and trachoma.

Diarrhea is the most frequent and burdensome disease associated with unsafe water and sanitation. It kills an estimated 1.8 million people each year, accounting for 17 percent of the deaths of children under age five in developing countries. Of this burden, about one-third occurs in Africa. Access to adequate sanitation reduces the incidence of diarrhea by an estimated 36 percent. Adequate sanitation is also very important—even more than access to safe water—in fighting hookworm infection (Esrey et al.1991). Trachoma is also associated with a lack of sanitation, because of the fly breeding that occurs in the absence of safe disposal of excreta. Trachoma incidences were reduced by 75 percent in villages in Gambia solely by controlling flies (Emerson et al. 1999).

The benefits associated with promoting access to sanitation span well beyond the direct health gains of disease prevention—to economic and social benefits. The widespread insurgence of diarrhea results in enormous economic burdens because of the significant treatment costs incurred by the health sector and by patients as well as the economic losses associated to lost time at school, work, and other productive activities (Mulligan 2005).

Hutton estimates[1] that reaching Millennium Development Goal 7 for both water and sanitation (WSS MDG) in Sub-Saharan Africa would avoid 172 million diarrhea cases every year[2] resulting in US$1.8 billion of total treatment costs including additional expenses borne by patients—or US$ 3.70 per capita saved every year. Overall, due to less diarrheal illness, 99 million days of school and 456 million days of work for the total working population aged 15-59 would be gained, the work days resulting in economic benefits for up to US$116 million.

Sanitation is also particularly important for women, especially for school enrolment of girls. If there are no separate latrines for girls, anecdotal evidence suggests that many girls will simply decide not to go

[1] Hutton uses health care unit costs from WHO to estimate the expenditure associated with treating diarrhea, to which other expenses (such as transport) incurred to the patient are added. A number of assumptions are made regarding treatment (such as number of visits or length of hospitalization). As a result, the mean cost per case of diarrhea treated and the additional costs per visit incurred to the patient are estimated to be between US$10 and US$23 and between US$0 to US$0.50 respectively. As far as economic losses associated to lost time at work and school and to death are concerned, Hutton relies on the concept of minimum wage rate for his estimates, adjusted to reflect the varying productivity of the different countries (for each country, the value of the minimum wage rate must be not larger than the local GNP per capita and not smaller than the manufacture added value.

[2] Both health and economic benefits are presented assuming that all interventions are implemented within one-year period (the year 2000). Also, to account for population growth, the projected population figures for 2015 are used.

to school. For example, a United Nations Children's Fund (UNICEF) project in Bangladesh found that construction of school latrines was associated with an 11 percent increase in the enrolment of girls (UNICEF 1999). This is significant because it is well known that women's education is important for child survival and for improving hygiene measures at home.

Finally, people value sanitation not only for health reasons, but for the enhanced social status they gain from living in a cleaner environment and the privacy and convenience they enjoy by being able to use toilets either within or close to their homes.

Cost of sanitation

Notwithstanding the major health benefits, the large investments needed to achieve the sanitation MDG have proved difficult to mobilize. Set against the perceived benefits to the individual and society, sanitation is still thought to provide a low return on investment compared to water projects. As a result, many countries and households and individuals, assign a low priority to sanitation.

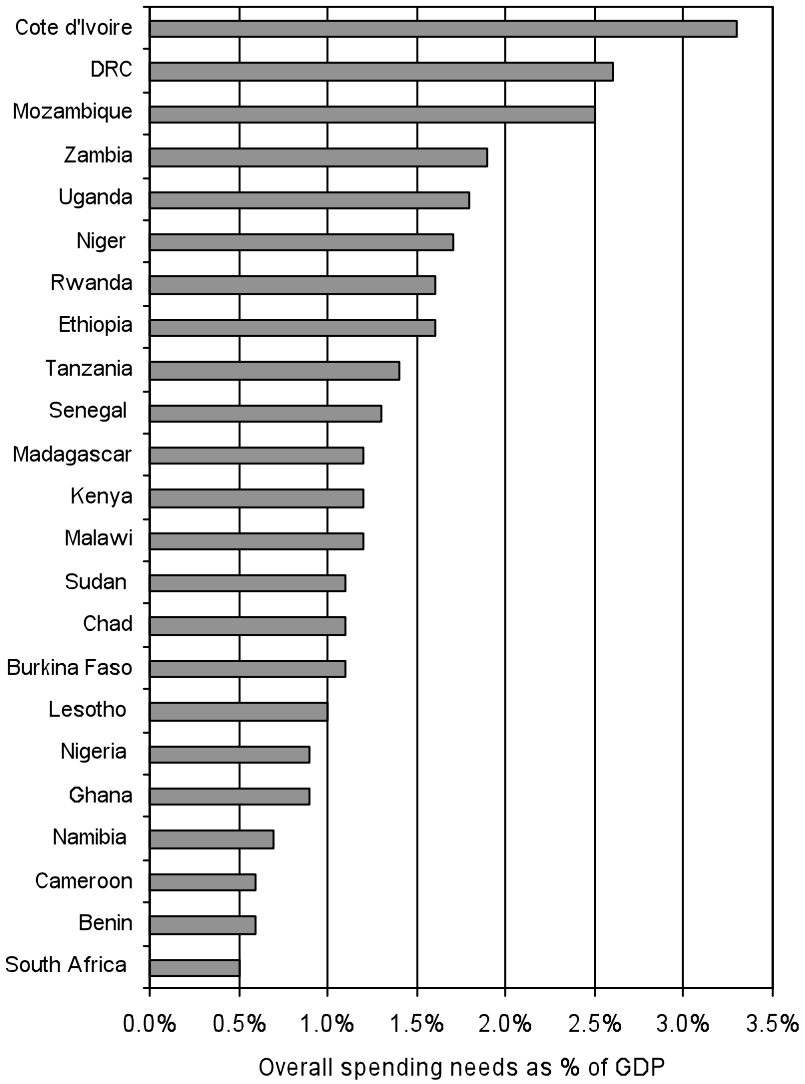
The overall price tag for reaching the sanitation MDG is estimated at US$6 billion or roughly 0.9 percent of Africa's GDP. Capital investment needs can be conservatively estimated at $4.5 billion per annum or 0.7 percent of the region's GDP. This includes both the cost of new infrastructure, which accounts for large part of the overall needs – 0.5 percent of GDP – and rehabilitation of existing assets, accounting for the remaining 0.2 percent. Similarly, maintenance requirements stand at $1.5 billion per annum or 0.2 percent of the region's GDP. These estimates differ from those released elsewhere for two main reasons.

First, investments costs are based on minimum acceptable asset standards; namely, services will be upgraded only for a small part of customers and the relative prevalence of sanitation supply modalities will remain constant between 2006 and 2015. Therefore, as population grows, in 2015 more people will be accessing improved sanitation - this being sewers, septic tanks or improved latrines; however, measured as share of population, access to improved sanitation will be the same as of today.

Second, differently than all precedent studies assessing MDG investment needs, non-standardized unit costs have been used, which reflect country-specific patterns of demography, density as well as different levels of technological innovation and local market development in the sanitation sector. Therefore, unit costs may vary to a large extent across countries. They have been estimated using different methodologies. On-site sanitation asset prices have been drawn from review of World Bank investments on sanitation across all Africa. Conversely, unit costs of sewer connections have been calculated using a model specifically set up to estimate capital costs of infrastructure network expansion based on location and density. Operation and maintenance of sewers and on-site sanitation services have been estimated at respectively 3 and 1.5 percent of the replacement value of installed infrastructure. Rehabilitation costs of sewers have been based on a model that takes into account the maintenance backlog of network infrastructure in each country. In particular, countries have been assigned to two categories ('A', severe; or 'B', moderate) depending on the years of maintenance backlog. Rehabilitation costs have been then calculated

multiplying the years of maintenance backlog applying to the specific country category times the annual depreciation charge of assets. This is equal to one thirtieth of the replacement value of installed infrastructure. Rehabilitations needs of on-site sanitation services have been also calculated as share of the replacement value of installed infrastructure, with shares expressing the ratio between the cost of components to be replaced and the total cost of assets.

Figure 4.1 Overall spending needs by country



Source: Authors

The regional average on overall spending needs masks large differences across countries (figure 4.1). Most of the 23 countries for which data are available report spending need in excess of 1 percent of GDP per year and a few above 2 percent. In particular, Mozambique and Cote d'Ivoire should allocate about 2.5 percent of their GDP every year to sanitation. Overall needs for the Democratic Republic of Congo reach up to 3.3 percent. On the opposite side of the spectrum, South Africa, Benin, Cameroon and Namibia all report needs below regional averages.

The affordability of the sanitation MDG appears to be strongly correlated to countries' income (table 4.1). Middle Income Countries report spending needs slightly above 0.5 percent of GDP per year; Resource-Rich Countries almost as much as twice and Low Income and Aid-Dependant countries as much as three times. The bill becomes much less affordable for fragile states, which should need to allocate over 3 percent of GDP every year to sanitation in order to win the MDG challenge.

Table 4.1 Overall spending needs as percentage of GDP

	by income
MIC	0.52
Resource-Rich	0.97
LIC-No Fragile	1.39
Aid-Dependent	1.61
LIC-Fragile	3.10
	and by location
Southern Africa	0.63
Coastal	0.83
Western Africa	1.19
Central Africa	1.23
Island	1.24
Eastern Africa	1.34
Landlocked	1.50

Source: Authors

What do countries spend on sanitation?

There is no hard evidence available on spending trends for sanitation. Measurement is difficult given that public spending tends to be channeled through decentralized entities and that there is a sizeable amount of private funding invested directly by households.

Nevertheless, it is possible to estimate what countries must have invested in sanitation facilities by considering the number of new households acquiring on-site sanitation facilities over time as it results from household surveys and value the additional facilities provided at the same prices used for spending needs estimates. Regardless of who funded the investment, these resources must have been expended to achieve the observed gain in access.

Obviously, increased access to improved latrines may have been realized either by building new facilities or by upgrading existing ones, which however, cannot be discerned from the household surveys. As a result, this methodology treats all the added facilities as newly built and may overestimate the expenditures incurred by countries that mainly focused on upgrading traditional latrines. Also, this method does not shed any light on the extent of rehabilitation expenditures, which according to the estimates discussed above account for a fair part of overall requirements.

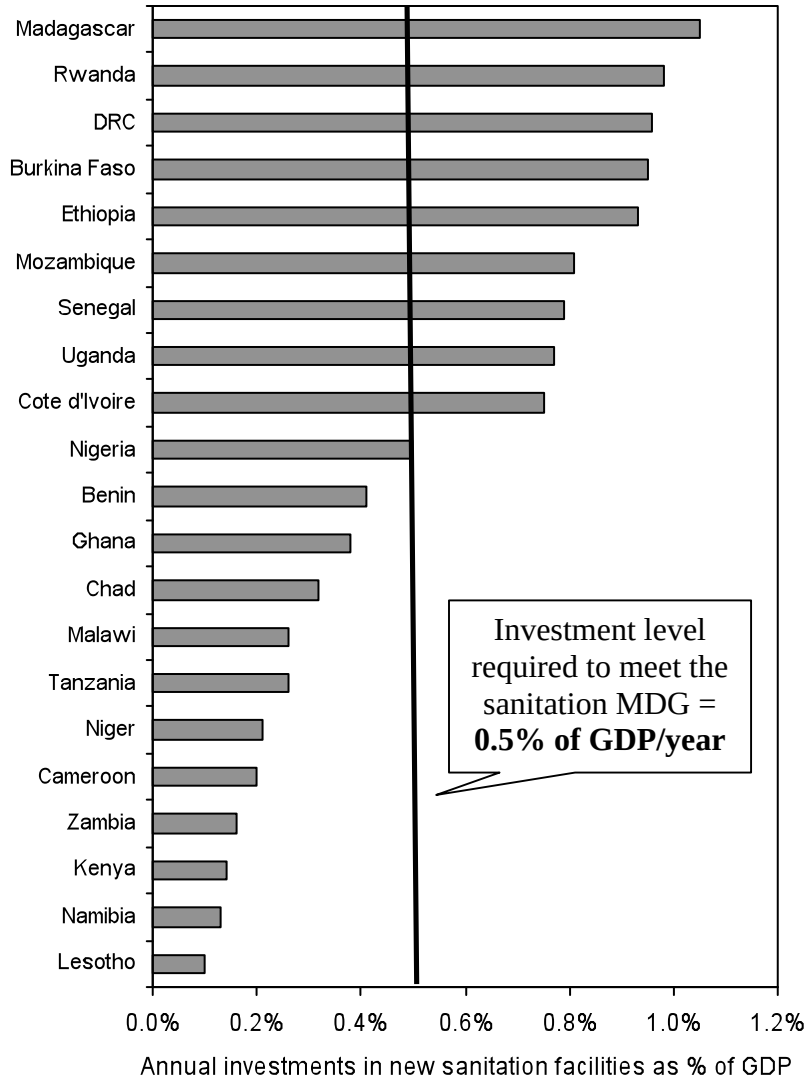
A similar methodology can, in principle, also be applied to estimate operating expenditures. However, unlike investments, there is no way of verifying whether operating expenditures really took place. Given that on-site sanitation facilities are notoriously poorly maintained, this method would likely result in significant overestimation of actual operational expenditures.

Based on this methodology, Nigeria emerges as the country making the largest annual investments in absolute value in new sanitation facilities, in excess of US$260 million per year. It is followed by Cote d'Ivoire, spending some US$83 million per year and Ethiopia with some US$81 million per year. A second group of countries have invested US$10-60 million per year including, in decreasing order of magnitude, the Democratic Republic of Congo, Senegal, Madagascar, Uganda, Mozambique, Burkina Faso, Ghana, Tanzania, Cameroon, Kenya, Rwanda and Benin. Chad, Zambia, Malawi, Namibia, Niger, and Lesotho have invested amounts below US$8 million per year. Investment estimates expressed in absolute value reflect country scale but also technology choices. Senegal reports to have channeled all investment to septic tanks, which is consistent to the fact that it is also the country with the largest annual increase in access to this mode. The same applies to Madagascar with improved latrines and to Cote d'Ivoire with traditional latrines. However, as result of higher unit costs, septic tanks may absorb a larger fraction of overall investments even in countries, markedly Nigeria and Chad, where most of the progress has been lower down the sanitation ladder.

Normalized by GDP, this approach yields an estimated 0.5 percent of GDP being invested in new sanitation facilities in Sub-Saharan Africa every year. Strikingly, this is exactly the investment level required to reach the sanitation MDG. As much as this may look encouraging, again it should be stressed that with this approach nothing can be said about rehabilitation and operation and maintenance spending patterns, to which an almost equal amount (0.4 percent of GDP) should be allocated every year in order to meet the sanitation MDG. Therefore, even countries on track with expanding infrastructure may fall short in meeting their rehabilitation and operation and maintenance needs.

In addition, large differences apply across countries (table 4.2). Half of the countries for which data are available, including Madagascar, Rwanda, the Democratic Republic of Congo, Burkina Faso, Ethiopia, Mozambique, Senegal, Uganda, Cote d'Ivoire and Nigeria, stand above this benchmark. Half stand below; in a number of cases—notably Namibia, Kenya and Zambia, investments have been below 0.1 percent of GDP. Interestingly, among these there are countries that have achieved fast coverage expansion despite low expenditures. This is mostly the case of Cote d'Ivoire, which reports the fastest expansion of traditional latrines moving more than 4 percent of its population into this category every year, and yet standing at the bottom of the spending spectrum with only 0.08 percent of GDP invested in sanitation every year.

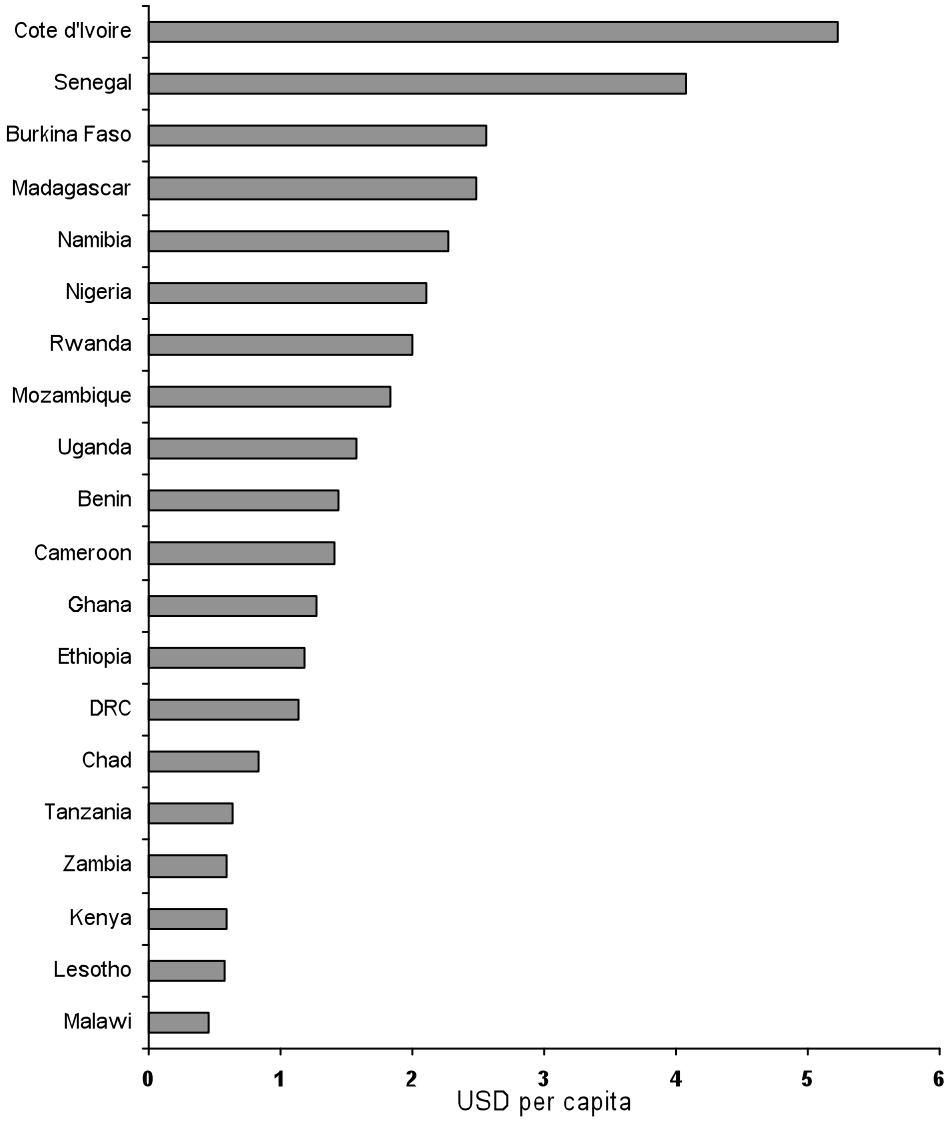
Figure 4.2 Spending on new sanitation infrastructure as percentage of GDP



Source: AICD DH/MICS Survey Database, 2007.

Country spending capacity can also be assessed by considering annual per capita investments, controlling for country size. Figure 4.3 shows that Cote d'Ivoire stands out with the highest spending level of US$5 per capita, which is consistent with its high investment level measured in absolute terms. In addition, Senegal spends some US$4 per capita. Burkina Faso, Madagascar, Namibia, Nigeria and Rwanda and spend more than US$2 per capita every year. A second group of counties including Mozambique, Uganda, Benin, Cameroon, Ghana, Ethiopia and the Democratic Republic of Congo spend US$1-2 per capita. Chad, Tanzania, Zambia, Kenya, Lesotho, and Malawi spend less than US$1 per capita per year.

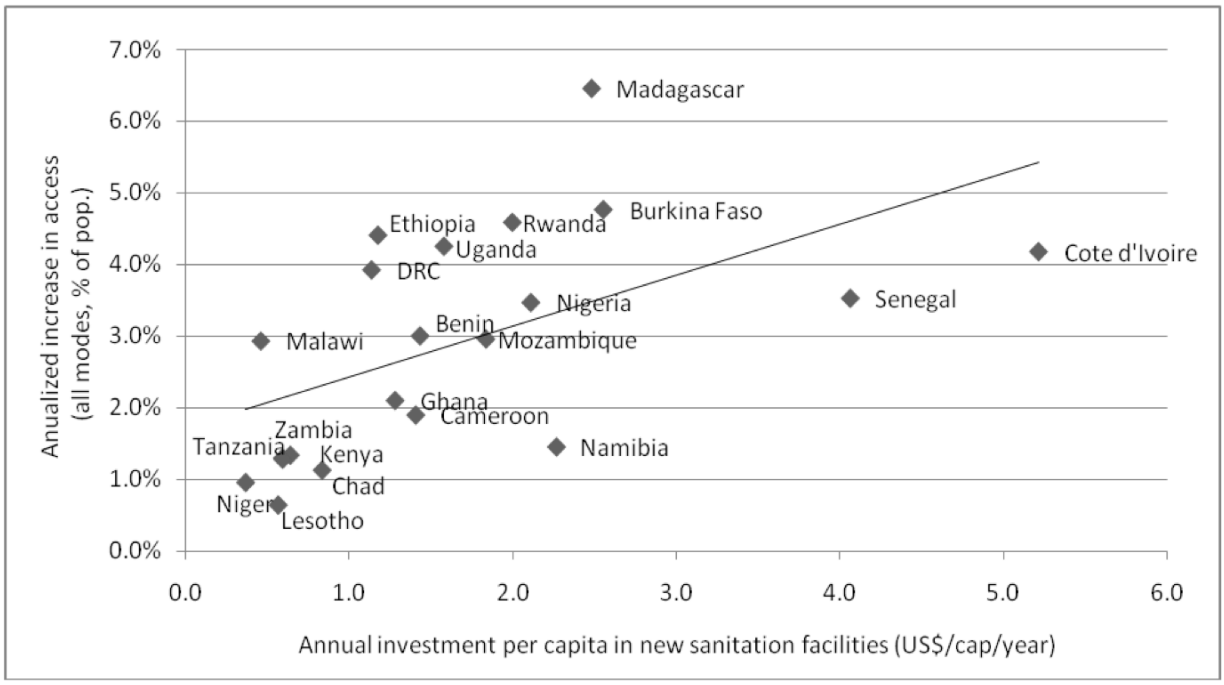
Figure 4.3 Annualized investment per capita across the sample of 24 countries



Source: AICD DH/MICS Survey Database, 2007.

In order to examine to what extent results that countries are obtaining reflect the resources invested, a cross-plot is made between the average annual investment per capita and the annual increase in coverage in percentage terms, all modes compounded, in each country (figure 4.4).

Figure 4.4 Scatterplot of average annual investment per capita and annual increase in access



Source: AICD DH/MICS Survey Database, 2007.

Countries are grouped in three main clusters based on their position relative to the trend line. In the first cluster, which lies below the line, are countries such as Lesotho, Niger, Chad, Kenya, Zambia, Tanzania, Namibia, Cameroon, Ghana, Senegal and Cote d'Ivoire that do not present very cost-effective outcomes relative to their peers. However, this may be primarily because they are concentrating expenditures at the higher end of the sanitation ladder. This is especially the case of Lesotho and Senegal. Cote d'Ivoire makes an exception, spending a lot relatively to its peers despite efforts are made at the bottom of the ladder. The second cluster, which lies above the trend line, finds Madagascar, Ethiopia, Uganda, Rwanda, Burkina Faso, the Democratic Republic of Congo and Malawi. These countries appear to have made progress in a relatively cost-effective manner. Interestingly, Madagascar, Rwanda and Burkina Faso report cost-effective investments even if they concentrate on high-end services such as improved latrines. Conversely, Uganda, Ethiopia, the Democratic Republic of Congo and Malawi have experienced movement mainly on the lower rungs of the sanitation ladder, as it would be expected. Finally, countries such as Mozambique, Nigeria and Benin sit close to the trend line, showing results more or less proportional to the resources being spent.

Government spending

The AICD Fiscal Database provides data on public expenditures from 2001 to 2005 for a subset of ten countries. Data are incomplete. In some case they refer to estimates rather than actual figures; only in a few cases are both central and local government expenditures reported, and it is not clear to what extent they capture investment spending, given the variety of budget classification methods adopted across the different countries.

Subject to all these caveats, recorded total public spending on sanitation, including both capital and recurrent expenditures, appears very low. Cape Verde stands out as having made the largest effort (0.5 percent of GDP), followed by South Africa (0.4 percent of GDP), Mozambique, Senegal and Tanzania (all at about 0.1 percent of GDP), Cote d'Ivoire (0.05 percent of GDP), Nigeria (0.04 percent of GDP), Kenya (0.02 percent of GDP), and Madagascar and Rwanda (both at 0.01 percent of GDP).

Within expenditures made by governments, table 4.3 considers investments only and compares them against the investments in new infrastructure as estimated before for each country that has both this information available.

Table 4.3 Government expenditure and overall investment on sanitation

Million USD	Average Government Expenditure (2001-2005)	Average overall annual investments (1995-2005)	Ratio government investments/total investments
Tanzania	6.31	23.69	27%
Kenya	3.86	19.46	20%
Nigeria	47.70	266.02	18%
Senegal	5.03	45.23	11%
Cote d'Ivoire	7.44	83.34	9%
Mozambique	1.11	35.02	3%
Madagascar	0.68	43.80	2%
Rwanda	0.01	17.46	0%

Source: AICD Fiscal Database, 2007

A main finding emerges, namely that public investment is negligible compared to the total estimated investment. This suggests that either households have self-financed the cost of gaining access to sanitation or that there has been substantial under-recording of public investment.

When these figures are analyzed against the advances in sanitation achieved by each country, it is clear that larger dedication of public resources does not guarantee larger progress. Some countries have managed to make dramatic improvements in moving people up the sanitation ladder with negligible public spending. This is the case of Rwanda and Madagascar, which lie among the top performers in upgrading service from traditional to improve latrines. In addition, Senegal has reached the largest increase in septic tanks coverage with relatively low government subsidy, equal to 11 percent of overall investment. However, it is not clear whether this figure accounts for the transfers to the national sanitation utility ONAS and so could represent an under-estimate. In other countries, such as Cote d'Ivoire and Mozambique, expanded unimproved sanitation coverage has been achieved with little government spending. Finally, Tanzania and Kenya show poor advances in sanitation despite the relatively larger level of government spending.

On average, public spending on operation and maintenance stands at 0.2 percent of GDP a year, the recommended level to meet the sanitation MDG. However, data are incomplete and refer only to a small subset of countries. Also, the regional average is totally driven by South Africa, which reports annual operation and maintenance spending on sanitation equal to 0.4 percent of GDP. The rest of the countries reports spending either below 0.05 percent of GDP or null.

More important, spending is allocated to sewer system, while operation and maintenance of on-site sanitation remains a household responsibility and facilities are notoriously poorly maintained.

Cost recovery

Tariffs are the most common way to recover costs. There is just one type of user charge applying to the sanitation sector -—wastewater tariffs, and these apply only to the tiny minority of the population served by water-born sewer systems. Thus, cost-recovery through wastewater tariffs is very limited.

The structure of payment for sanitation varies. It can either be calculated as a surcharge percentage on the water bill, or it can follow an independent block or fixed tariff structure of its own. In more than half of utilities the sanitation charge is levied as part of the water bill ranging from 30 percent for Zambia to 85 percent in Lesotho with an average of 53 percent. The block tariff structure for sewerage is evident in six utilities in Africa, and the blocks can vary between 1 and 5 (table 4.4). ONEA in Burkina Faso and AWSA in Ethiopia enforce a linear tariff or one block, and households pay the same effective price irrespective of the consumption. At the other extreme is KIWASCO in Kenya that enforces a 5-block tariff structure. Among those adopting the block-tariff, Walvis Bay in Namibia stands out as applying a decreasing block tariff where prices decline with rising consumption. Also, KIWASCO in Kenya is the only utility that reports levying a separate connection fee of US$90 specifically for sewer service. With their dedicated sanitation utilities, Senegal and Burkina Faso stand out for applying strikingly low charges for sewerage, below 0.05 dollar per cubic meter.

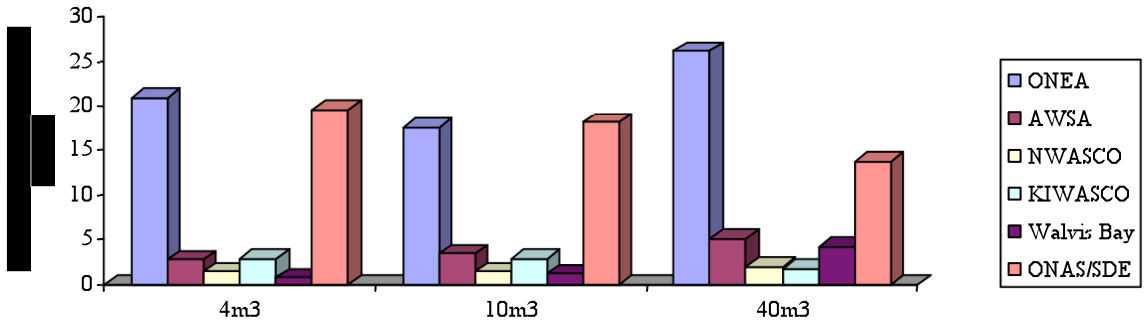
Table 4.4 Structure and level of wastewater tariffs

Utility	Country	Type of tariff	Connection fee	Fixed charge	Number of blocks	Size of 1st block	Size of Nth block	Price of 1st block	Price of Nth block
ONEA	BFA	Flat	NA	0	1	0+		0.04	0.04
AWSA	ETH	Flat	NA	0	1	7.1+		0.07	0.07
NWASCO	KEN	IBT	NA	0	4	0-10	60+	0.13	0.21
KIWASCO	KEN	IBT	$90	0	5	0-10	60+	0.21	0.42
Walvis Bay	NAM	DBT	NA	$2.69	4	0-15	85+	0.34	0.02
ONAS	SEN	IBT	NA	0	3	0-20	40+	0.02	0.13

Source: AICD WSS Survey Database, 2007

The majority of the African utilities are responsible for providing wastewater services in addition to supplying water. This institutional setting makes it more likely that water pays for sanitation, a commonplace in Africa. This evidence is corroborated by the comparison between water and wastewater prices at similar levels of consumption for the utilities that enforce a block tariff structure. Figure 4.4 shows that consumers of wastewater services are subsidized by water users. In ONEA and ONAS particularly, the water charges are several orders of magnitude higher than the wastewater charges

Figure 4.4 Ratio of water and wastewater charges at different levels of consumption



Source: AICD WSS Survey Database, 2007

5 Conclusions

A number of key findings have emerged from this analysis of the sanitation sector in Sub-Saharan Africa.

Traditional latrines are by far the most prevalent form of sanitation, with about half of the population relying on this modality in both urban and rural areas. They comprise a collection of installations so heterogeneous that it is difficult to discern among them, especially as far as health impacts are concerned.

Open defecation is still practiced by one-third of the population, while the prevalence of middle-of-the-range sanitation options—such as VIP latrines and San Plat—is surprisingly low in Sub-Saharan Africa, below 10 percent of the population. This is close to the percentage of the population using septic tanks, despite the fact that improved latrines offer most of the health benefits at a significantly lower cost. Only a handful of countries, including Madagascar, Rwanda, Cameroon, and Zimbabwe, have achieved significant prevalence of this modality. Also, improved latrines remain quite regressive in distribution; they are found primarily among higher income groups.

Sanitation situations differ significantly between urban and rural areas. Rural areas—where most of the population still resides—show negligible levels of service while 40 percent of the urban population has access to improved sanitation, with septic tanks being much more common than improved latrines. The majority of poor households use communal or shared latrines. In rural areas, the bulk of the population still practices open defecation, and less than 10 percent has access to any form of improved sanitation.

Not only are traditional latrines the prevalent form of sanitation today, they are also likely to continue to dominate the Africa sanitation scene for some time to come. They show the fastest growth in access, with more people securing access to this mode each year than to septic tanks and improved latrines combined. The expansion in traditional latrines is concentrated among the lower income groups, while the expansion in improved latrines and septic tanks is concentrated in the middle and upper income groups.

All these general patterns mask huge differences in access to different modalities across African countries and between urban and rural areas. Both in urban and rural areas, three distinct typologies of countries emerge.

In the Central African Republic, Chad, Comoros, the Republic of Congo, Ethiopia, Guinea, Lesotho, Malawi, Mali, Mauritania, Mozambique, Nigeria, Tanzania, Uganda, Sudan, and the Democratic Republic of Congo, a prevalent part of the urban population—between 50 and 90 percent—relies on traditional latrines. In Benin, Burkina Faso, Cameroon, Ghana, Madagascar, Niger, and Rwanda, a prevalent part of the urban population uses improved latrines although the share relying on traditional latrines is still relevant. In Cote d'Ivoire, Kenya, Namibia, Gabon, Senegal, South Africa, Zambia, and Zimbabwe, a prevalent share of the urban population is provided with a septic tank, although in some countries, traditional latrines still accommodate up to 40 percent of the population.

In Benin, Burkina Faso, Chad, Cote d'Ivoire, Ethiopia, Mauritania, Mozambique, Namibia, Niger, and Sudan, the majority of rural population—more than 50 percent—still practices open defecation. In

Cameroon, Comoros, the Republic of Congo, Gabon, Ghana, Guinea, Kenya, Malawi, Mali, Nigeria, South Africa, Tanzania, Uganda, Zambia, and the Democratic Republic of Congo, a significant part of their rural populations uses traditional latrines. In the Central African Republic, Lesotho, Madagascar, Rwanda, Senegal, and Zimbabwe an increasing share of the rural population is using improved latrines, although both traditional latrines coverage and open defecation are common,.

Just about all countries in Sub-Saharan Africa are likely to miss the Millennium Development Goal for access to improved sanitation by wide margins. Despite this, a key finding emerging from this analysis is that Sub-Saharan Africa has been making modest progresses in expanding access to sanitation, and the population practicing open defecation is somewhat declining in absolute terms.

In particular, a significant group of countries, including Ethiopia, Cote d'Ivoire, Uganda, the Democratic Republic of Congo, Madagascar, Rwanda, Burkina Faso, and Senegal, is making good progress at a rate that substantially outstrips peers in the rest of Africa. These countries have each been moving at least three percent of their populations up the sanitation ladder each year and hence provide potentially important lessons to their peers. While all these countries have been moving rapidly, the area of focus has been quite different in each case.

- In Ethiopia, Cote d'Ivoire, the Democratic Republic of Congo, and Uganda, the main achievement has been to move people away from open defecation to the use of traditional latrines.
- Madagascar, Rwanda, and Burkina Faso, have achieved substantial progress in upgrading people from traditional to improved latrines.
- In Senegal, the focus has been to move people over the last rung of the sanitation ladder from latrines to septic tanks.

Nigeria does not stand out as having made particularly rapid progress in expanding sanitation access. Yet because of its size, a large percentage of those gaining access to sanitation in Africa are Nigerians. This underscores the importance of even modest improvements in the performance of large countries. Also, since this analysis is based on 24 countries for which time series data were available, there may be other fast-moving countries not identified here. An important example would be South Africa, which is well-known to have made major strides in sanitation access in recent years.

Given the heterogeneity of situations noted above, the key challenges and policy options therefore differ substantially across different groups of countries and need to be tailored to the local setting.

In settings where open defecation remains the prevalent practice, the key challenge is promoting appropriate sanitary behavior, first to ensure that latrines are actually used when available, and second to ensure that latrines are properly used and maintained in order to deliver the corresponding health benefits.

In settings where traditional latrines are already prevalent, attention should focus on upgrading latrines. Bottlenecks for the expansion of improved latrines may lie both on the demand or supply side of the market and need to be understood. From the demand-side, the problem likely resides in the affordability constraints associated with low household incomes along with the higher capital costs associated with such facilities. Therefore, the policy response may need to entail some degree of public subsidy for incremental capital costs associated with improved facilities. From the supply-side, low

prevalence of improved latrines can be explained by lack of knowledge within the country's construction sector of required designs as well as potential lack of key input materials on the local market. The appropriate policy response would then entail training local builders, product development and research, opening-up markets for missing inputs, and provision of access to credit for small-scale businesses. While demand and supply side factors may apply together, it is critical to tackle supply bottlenecks first. Subsidy resources may be wasted on households that could have financed the facilities on their own had they only been available. Local market development also provides space for innovation that may ultimately lower the cost of improved latrines and thereby at least partially address the affordability problem.

In cases where septic tanks have reached significant levels of penetration, the key issue becomes how to expand improved sanitation into lower income segments of the population. Rampant urbanization will soon pose a barrier to further development of on-site sanitation, and Africa's burgeoning cities will be faced with the need to develop more extensive sewer networks. Therefore, the challenge is to find more affordable ways of expanding sewer networks via technological innovation.

The institutional framework governing the sanitation sector is characterized by a multiplicity of actors, including central ministries, national and city-level utilities, municipalities, local government agencies and small rural authorities, households, and non-governmental organizations. A lack of clear accountability for sector leadership causes sanitation issues to often fall between the cracks.

Institutional arrangements tend to differ sharply across urban and rural environments. In rural areas, sanitation is usually community and household managed, with oversight from ministries of health and education. Urban sanitation is generally a central government responsibility under the oversight of ministries such as infrastructure or water, environment, housing, and public health. Operations are entrusted to municipal agencies or utilities; the latter are usually water or even energy utilities also responsible for sanitation.

Countries have taken a number of measures to establish a comprehensive sanitation framework, including: adopting an accepted definition of sanitation, instituting a national sanitation policy and an hygiene promotion program, establishing a cost recovery policy and setting up a sanitation fund or a dedicated budget line. Considering these groups of measures, countries such as South Africa, Madagascar, Kenya, Chad, and Burkina Faso stand out as having adopted all of them. At the other extreme are countries such as the Democratic Republic of Congo, Zambia, Lesotho and Niger that are struggling to establish a system conducive to the needs of the sanitation sector.

The widespread use of on-site sanitation facilities also brings up the issue of construction, management and maintenance of latrines. The construction of on-site sanitation is in most cases the responsibility of households and/or NGOs and community-based organizations and the private sector. Latrine emptying is also predominantly a private sector function. However, the majority of countries report concerns about proximity of unhygienic latrines to drill holes—with potential for cross-contamination.

The overall price tag for reaching the Millennium Development Goal for sanitation is estimated at 0.9 percent of Africa GDP per year, of which 0.5 percent should be allocated to new infrastructure, 0.2 percent to the rehabilitation of existing assets and 0.2 percent to operation and maintenance.

It has been estimated that 0.5 percent of GDP is currently being invested by all parties in new sanitation facilities every year, exactly the level required to reach the sanitation MDG. Although encouraging, this does not means that overall spending needs will be easily filled. First, half of countries for which data is available show annual investment spending below 0.5 percent of GDP and in a number of cases even below 0.1 percent. Second, investments in new infrastructure appear to be mostly privately financed, with governments providing for only a negligible part of it. Nothing can be said about household spending on rehabilitation and operation and maintenance, to which an almost equal amount (0.4 percent of GDP) should be allocated every year. As far as operation and maintenance is concerned, the little evidence from government accounts shows annual recurrent spending at 0.2 percent of GDP, up to what is recommended to reach the sanitation MDG. However data are too incomplete and this regional average is totally driven by South Africa. More important, spending refer to sewer systems. Operation and maintenance of on-site sanitation remains a household responsibility and facilities are notoriously poorly maintained. Therefore, countries that are not on track with spending may fall short in meeting their needs if governments do not commit to raise public investment and households do not adequately engage in operation and maintenance of on-site sanitation facilities. Similarly, countries that are already on track with expanding infrastructure, with households paying for most of the bill, may fall short in meeting their rehabilitation and operation and maintenance needs.

Cost-recovery is normally pursued through user charges; the only type levied in the sanitation sector is wastewater tariffs. Given the dominance of on-site sanitation, these apply only to the tiny minority of the population served by water-born sewer systems. Thus, cost-recovery through wastewater tariffs is very limited. Also, because most of the African utilities provide wastewater services in addition to water supply, it is commonplace that water pays for sanitation.

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Appendix 1 Study methodology

Table A1 Countries included in the AICD analysis

Country	Available observations			Year of Survey		Included in the trend analysis
	1990-95	1996-00	2001-05	DHS	MICS	
Benin		√	√	1996, 2001		X
Burkina Faso	√	√	√	1993, 1999, 2003		X
Central African Republic	√			1995		
Cameroon	√	√	√	1991, 1998, 2004		X
Chad		√	√	1997, 2004		X
Comoros		√		1996		
Congo, Dem. Rep.	√		√		2000	X
Congo, Republic of			√	2005		
Cote d'Ivoire	√	√		1994, 1999		X
Ethiopia		√	√	2000, 2005		X
Gabon		√		2000		
Ghana	√	√	√	1993, 1998, 2003		X
Guinea			√	1999, 2005		X
Kenya	√	√	√	1993, 1998, 2003		X
Lesotho		√	√	2005	2000	X
Madagascar	√	√	√	1992, 1997, 2004		X
Malawi	√	√	√	1992, 2000, 2004		X
Mali		√	√	1996, 2001		X
Mauritania			√	2001		
Mozambique		√	√	1997, 2003		X
Namibia	√	√		1992, 2000		X
Niger	√	√		1992, 1998		X
Nigeria	√	√	√	1990, 1999, 2003		X
Rwanda	√	√	√	1992, 2000, 2005		X
Senegal	√	√	√	1993, 1997, 2005		X
South Africa		√		1998		
Sudan		√			2000	
Tanzania	√	√	√	1992, 1999, 2004		X
Togo		√		1998		
Uganda	√		√	1995, 2001		X
Zambia	√	√	√	1992, 1996, 2002		X
Zimbabwe	√	√		1994, 1999		X

Source: Authors

Table A2 Utilities included in AICD WSS Survey Database

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

39	South Africa	Ethekwin* (Durban)	3,375,000	Urban	yes
40	South Africa	Joburg*	3,753,900	Urban	yes
41	Sudan	Khartoum Water Corporation	7,602,000	Urban	yes
42	Sudan	South Darfur Corporation	2,051,000	Urban	no
43	Sudan	Upper Nile Water Corporation	250,000	Urban	no
44	Tanzania	DAWASCO	NA	Urban	yes
45	Tanzania	DUWS	279,000	Urban	yes
46	Tanzania	MWSA	458,493	Urban	yes
47	Uganda	NWSC	2,284,000	National	yes
48	Zambia	LWSC	1,564,986	Urban	yes
49	Zambia	NWSC	990,806	Urban	yes
50	Zambia	SWSC	294,000	Urban	Yes