BACKGROUND PAPER

AFRICA INFRASTRUCTURE COUNTRY DIAGNOSTIC

Expanding Access to Sanitation in Sub-Saharan Africa

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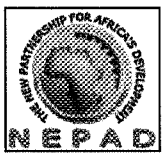


About AICD

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

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

The first phase of AICD focuses on 24 countries that together account for 85 percent of the gross domestic product, population, and infrastructure aid flows of Sub-Saharan Africa. The countries are: Benin, Burkina Faso, Cabo Verde, Cameroon, Chad, Congo (Democratic Republic of Congo), Côte d'Ivoire, Ethiopia, Ghana, Kenya, Madagascar, Malawi, Mali, Mozambique, Namibia, Niger, Nigeria, Rwanda, Senegal, South Africa, Sudan, Tanzania, Uganda, and Zambia. Under a second phase of the project, coverage will be expanded to include additional countries.

AICD is being implemented by the World Bank on behalf of a steering committee that represents the African Union, the New Partnership for Africa's Development (NEPAD), Africa's regional economic communities, the African Development Bank, and major infrastructure donors. Financing for AICD is provided by a multi-donor trust fund to which the main contributors are the Department for International Development (United Kingdom), the Public Private Infrastructure Advisory Facility, Agence Française de Développement, and the European Commission. A group of distinguished peer reviewers from policy making and academic circles in Africa and beyond reviews all of the major outputs of the study, with a view to assuring the technical quality of the work.

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

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

Introduction

Presently, Africa lags behind all other regions in coverage of sanitation services. To meet the MDGs, Africa must achieve 66 percent improved sanitation coverage by 2015. Although coverage has expanded on all sanitation modes in the last decade, the pace at which more people gain access every year remains too low for the continent to be on target. In addition, access to improved sanitation is still strongly dependant on income capacity and is negligible among the bottom 40 percent of Africa's population.

Yet, both current access and trend vary a lot across countries and show that some countries have succeeded in sustaining expansions of sanitation coverage to more than two percent of their population each year. The analysis presented here complements the work of the JMP by offering a more detailed picture of access trends for different modalities of sanitation service at the country level, aiming to identify and characterize countries with particularly strong performance in this area. The results are based on a subset of 18 countries in Sub-Saharan Africa.

This study is part of the Africa Infrastructure Country Diagnostic (AICD), a project designed to expand the world's knowledge of physical infrastructure in Africa. The project entails the collection and analysis of a wide range of data relating to the infrastructure sectors across a broad swathe of countries in Africa. AICD is being implemented by the World Bank on behalf of a steering committee that represents the African Union, the New Partnership for Africa's Development (NEPAD), Africa's Regional Economic Communities, the African Development Bank, and major donor members of the Infrastructure Consortium for Africa. This and other papers analyzing key infrastructure topics, as well as the underlying data sources described above, will be available for download from www.infrastructureafrica.org. Free-standing summaries are available in English and French.

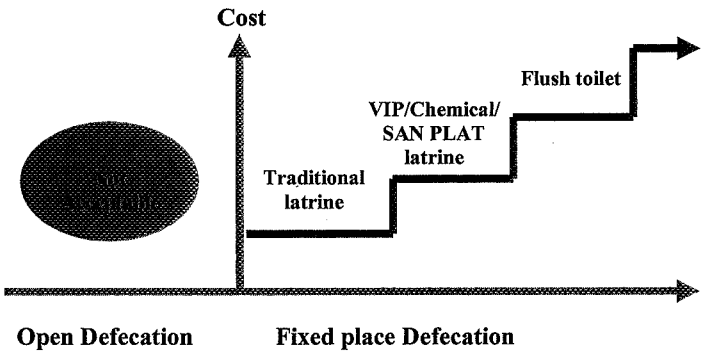
Methodology

This report is based on a pooled database that draws upon a body of publicly available household surveys conducted in Africa in the last 15 years. The database includes 63 Demographic and Health Surveys (DHSs), 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; 18 are covered by at least two DHS data points between 1995 and 2005. This study concentrates on this subset of 18 countries for analyzing historic trends in access to services. In a few countries such as the Democratic Republic of the Congo (DRC), Lesotho, and Sudan where data is not available at all or only for a year, we use Multi-Indicator Cluster Surveys (MICS) as a substitute. Implemented by UNICEF MICS was designed to report on the health of women and children

The report also draws upon on a utility survey conducted across 51 utilities in 24 of the 30 countries covered by DHS, which provides information on the sector institutional and legal framework as well as on utilities' operational and financial performance, and a fiscal database drawing from national budget documents and IMF estimates.

The findings of this report are broadly consistent with those of the Joint Monitoring Program (JMP) sponsored by WHO and UNICEF and entrusted with tracking access to improved Water and Sanitation (WSS) with respect to the target fixed by the Millennium Development Goals. 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 statistics make some adjustments to separate different

types of traditional pit latrines. JMP figures acknowledge that 'open pit latrine' and 'traditional pit latrine' are terms often used interchangeably and cannot be considered as 'improved' forms of sanitation. Therefore, only 50 percent of traditional pit latrine users are considered improved. Conversely, in this study no attempt is made to breakdown the category of traditional pit latrine usage into these two subsets.



Source: Water and Sanitation Program, 2007

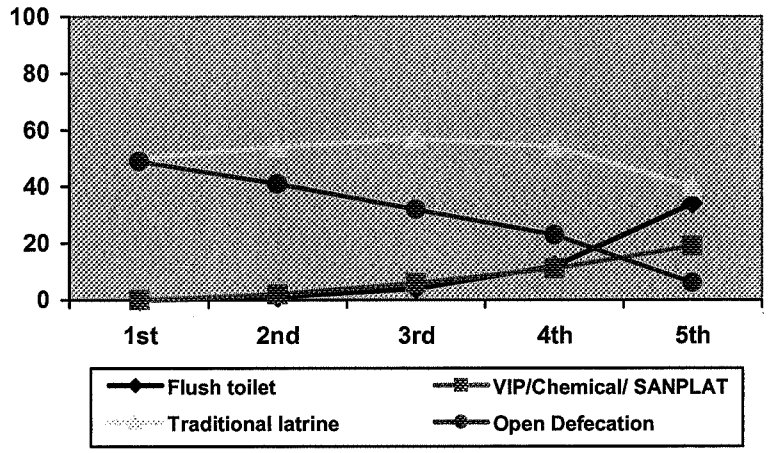
The focus of this work will be on examining each sanitation modality separately. The modalities considered are flush toilets (including both water borne sewerage and septic tanks), improved latrines (including Ventilated Improved Pit latrines, chemical toilets and San Plat latrines) and traditional latrines. The 'improved sanitation' bracket of the JMP refers to the first two modes but also includes part of the traditional latrine grouping; thus it is somewhat wider of what we soul intend as 'improved sanitation'. The term 'open defecation' identifies the population with no facility at all who must resort to nature. As illustrated in the figure, the modes can be represented hierarchically on a sanitation ladder, with each successive rung on the ladder offering a higher level of sanitation at a greater cost. Thus, the cost of a flush toilet is approximately ten times as high as the cost of a traditional latrine.

Current patterns of sanitation access

The latest figures released by the JMP indicate only modest improvement in the percentage of the population in Sub-Saharan Africa with access to improved sanitation, rising from 36 percent in 2000 to 38 percent in 2004. Conversely, the share of the population practicing open defecation has been falling over the same period from 28 percent to 25 percent. According to the DHS data analyzed here, around three quarters of the population with some kind of sanitation coverage are reliant on traditional pit latrines. It is particularly striking that the remaining quarter is almost evenly divided between those using flush toilets and those using improved latrines, notwithstanding the significantly lower cost of the latter.

The modality of sanitation used is strongly related to household income levels (Figure 1). The use of flush toilets and so-called VIP/chemical latrines is negligible among the bottom 40 percent of Africa's population. The number of households with no sanitation facility is quite prevalent across the first fourth quintiles but declines steeply with increasing income, while household dependence on the traditional latrines, prevalent across all groups, increases up to the third quintile before declining. One pattern that stands out from the data is that even "second best" options such as improved latrines are still comparatively skewed toward the upper-income groups.

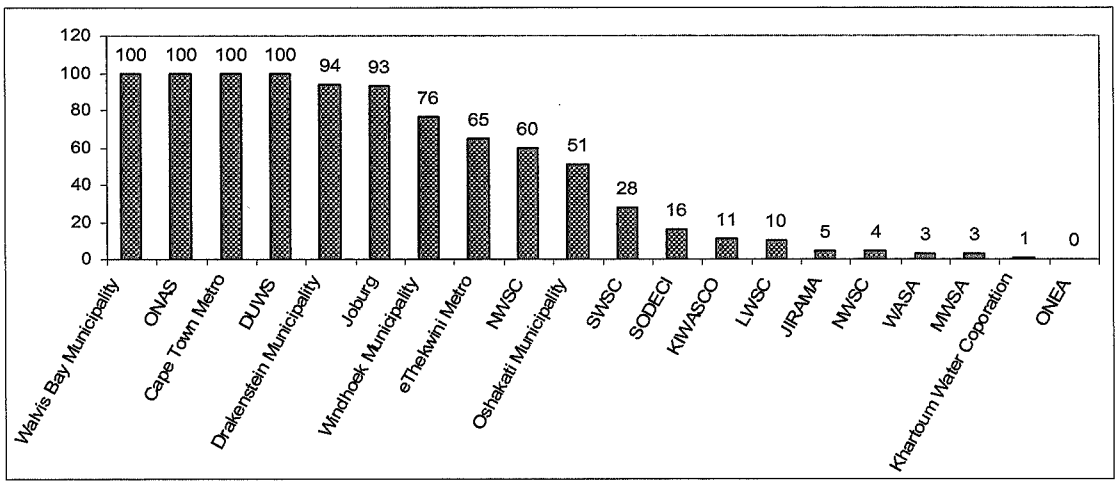
Figure 1: Current access patterns across income quintiles



ource: AICD DH/MICS Survey Database, 2007

The DHS describe access to sanitation without discriminating between on-site sanitation and use of sewerage facilities. Hence the discussion of flush toilets above groups together sewerage systems with on-site septic tanks. The utility survey conducted under the AICD provides some evidence on the prevalence of sewerage networks in Africa, and confirms that sewers remain a small niche. By implication, most of the flush toilets referred to in the discussion above take the form of septic tanks.

Figure 2: Share of population that has wastewater connection in the utility service area (%)



Source: AICD WSS Survey Database, 2007

The AICD survey shows that even among water utilities serving Sub-Saharan Africa's largest cities, only around half appear to offer a sewerage service. Of those that have sewer networks, about half show rates of sewer coverage above 50 percent (Figure 2). This figure mainly relates to

utilities serving large cities in middle income countries such as South Africa and Namibia, although there are also some cases in Senegal, Tanzania and Zambia. In particular, ONAS in Senegal stands out as having almost the entire population resident in the utility service area connected to the network. In the remaining group of utilities coverage drops dramatically, with the majority of them not reaching 10 percent.

The structure of payment for sanitation varies, it can either be part of the water bill calculated as a percentage, or it can be a block or fixed tariff structure. In more than half of utilities the sanitation charge is levied as part of the water bill, entailing a surcharge of 53 percent on average. In most of the other cases a block tariff structure applies. In the few cases where information on sewerage tariff structures is available, tariffs are strikingly low at less than US$0.15 per cubic meter in most cases.

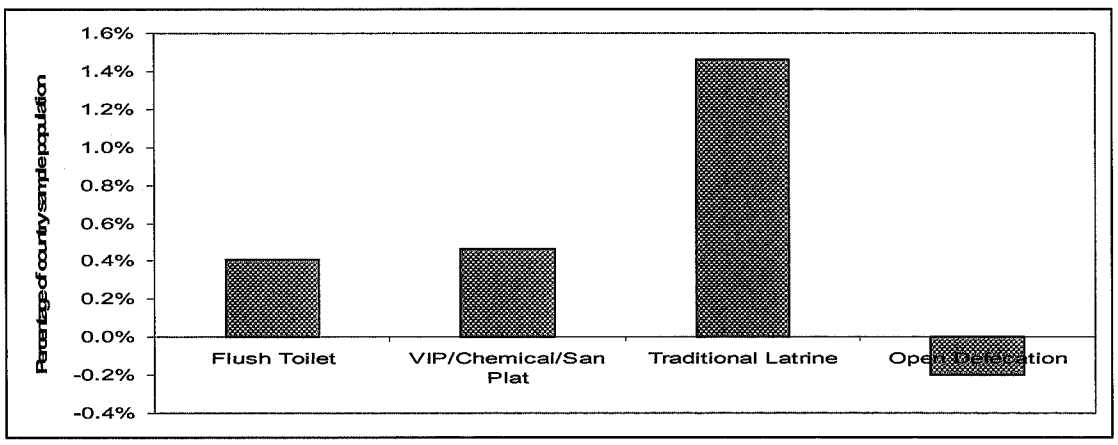
Understanding recent gains in access

While expansion of sanitation access has been much slower than needed to meet the MDGs, there have been significant improvements. This section identifies where the main gains have been made looking across modalities, countries and income groups.

Which modalities of sanitation have been expanding most rapidly?

Trends picked up by DHS across eighteen countries and averaged by population show that all sanitation alternatives register modest improvements in access rates between the early 1990s and the early 2000s. By annualizing these improvements we estimated that on average only 0.2 percent of the total population of the sample of 18 countries we are considering moves away from open defecation each year into some form of sanitation service. About 1 percent of the population gains access to flush toilet and improved latrine each year; and less than 1.5 percent gains access to a traditional latrine each year (Figure 3). It is striking that, VIP/chemicals show an expansion rate hardly greater that flush toilets, notwithstanding the former is a much more affordable option. At this pace the MDG on sanitation coverage appears well beyond reach.

Figure 3: Annualized growth in coverage (1995-2005) as percentage of the population in the sample of 18 countries



ource: AICD DH/MICS Survey Database, 2007

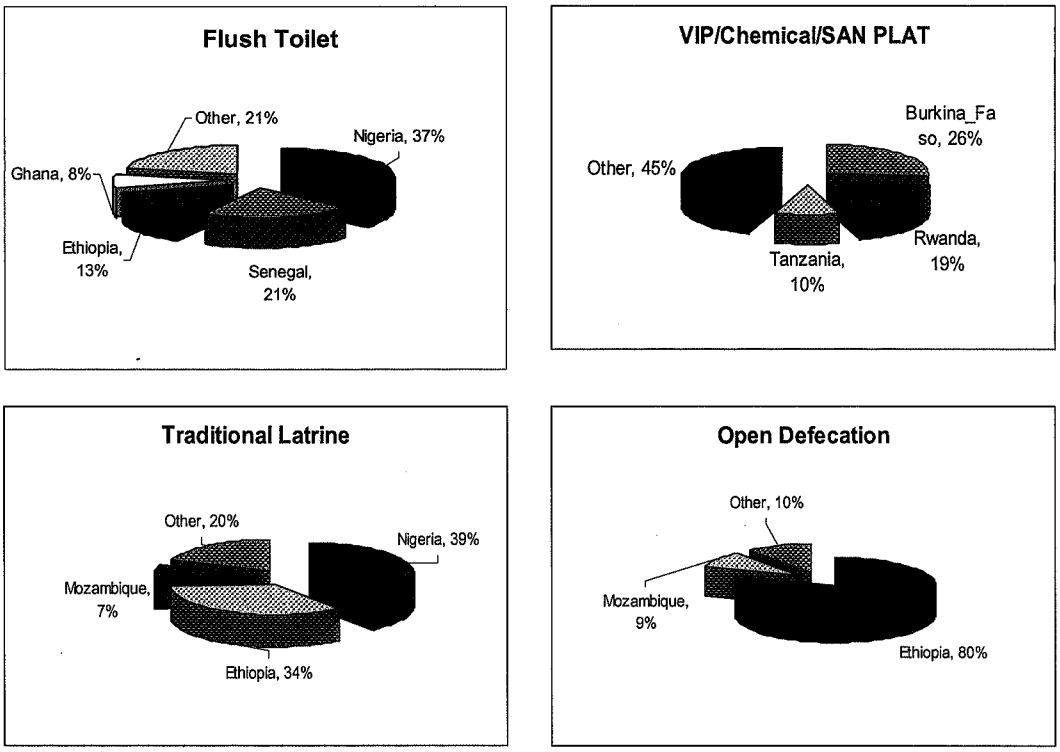
Which countries have made the largest contribution to regional access gains?

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 are coming from (Figure 4).

Nigeria and Senegal account for much of the increased flush toilet coverage, respectively 37 and 21 percent. Burkina Faso and Rwanda together account for much of the improved latrines growth. For traditional latrines, Nigeria and Ethiopia together account for 73 percent of new users. Ethiopia also completely drives the climb in un-served population.

Notwithstanding these improvements, the largest populations still practicing open defecation are to be found in Ethiopia, Nigeria and Sudan, which together account for 90 million people that continue to practice open defecation, reflecting the large size of these countries.

Figure 4: Breakdown of growth by country



Source: AICD DH/MICS Survey Database, 2007

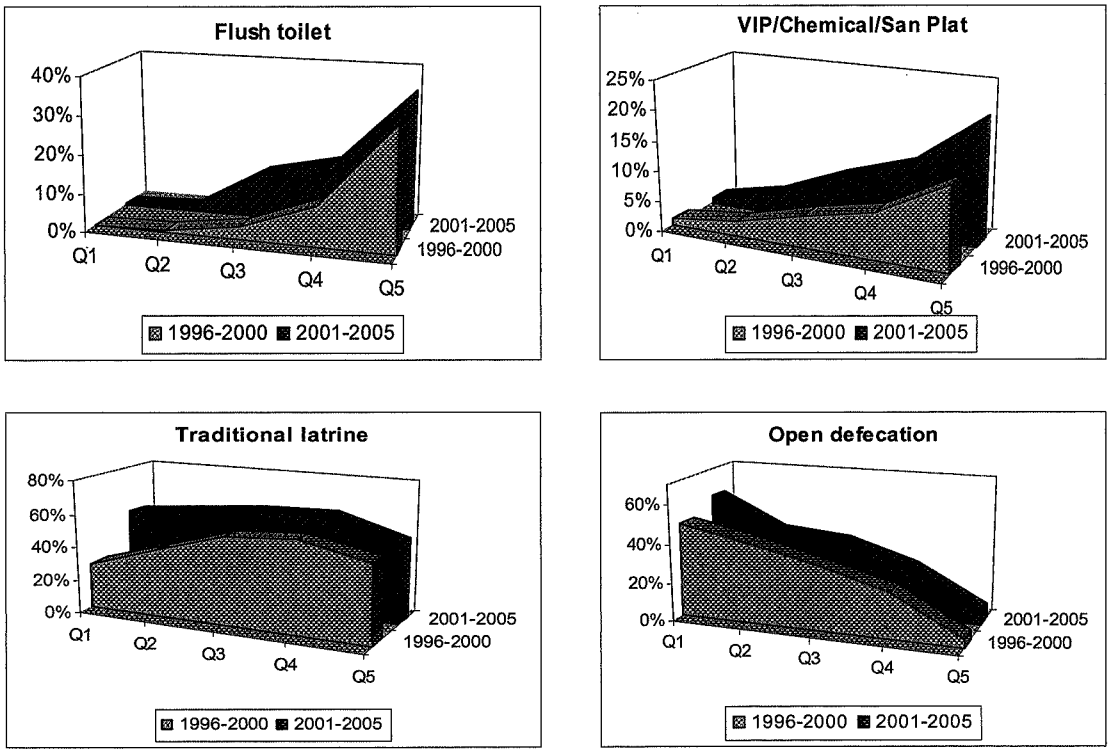
Which income groups have experienced the largest gains?

The distribution of coverage increases across income groups shows that the poorest groups are completely left out from growth at the upper rungs of the sanitation ladder (Figure 5).

Among modern alternatives, the improvements in flush toilets are concentrated in the middle and upper-income quintiles reaching a peak of 8 percent in the third quintile, well beyond the 3 percent of the fifth quintile. VIP/chemical latrines show improvement across income groups but substantially skewed to the top of the distribution. Increased access to traditional latrines is

visible across income groups but prevails at the bottom of the distribution. The share of population practicing open defecation decreases only in the second quintile of the distribution.

Figure 5: Growth in access by mode and quintile



ource: AICD DH/MICS Survey Database, 2007

How does the sanitation challenge differ across countries?

In most countries, the share of the population served by a flush toilet is well below 10 percent of the total, while that served by improved latrine is below 20 percent. The difference is made up to varying degrees by traditional pit latrines and/or no sanitation facilities. Nevertheless, this general pattern masks huge differences in access to different modalities of sanitation across African countries (Table 6). Countries can be classified into four different groupings according to the different patterns that they present.

A first group of countries comprises those where open defecation remains the prevalent situation, and access to any of the higher forms of sanitation is negligible (Figure 6.a). This is the case of Niger, Chad, Burkina, Benin and Ethiopia. In all of these countries, more than 60 percent of the population is still practicing open defecation.

A second group of countries shows strong dominance of traditional latrines, with negligible prevalence of flush toilet or improved latrine (Figure 6.b). This is the case of Malawi, Uganda, Tanzania, Democratic Republic of Congo, Comoros and Republic of Congo.

Table 6: Dispersion of coverage across countries

Flush Toilet		VIP/San Plat/Chemical		Traditional latrine		Open defecation	
South Africa	46%	Rwanda	29%	Malawi	81%	Niger	79%
Senegal	36%	Cameroon	27%	Uganda	80%	Chad	72%
Zimbabwe	31%	Zimbabwe	25%	Tanzania	79%	Burkina Faso	70%
Namibia	31%	Ghana	23%	DRC	76%	Benin	68%
Gabon	25%	Gabon	22%	Comoros	75%	Ethiopia	62%
Zambia	18%	Lesotho	21%	Congo (Brazza)	70%	Namibia	57%
Nigeria	13%	Comoros	21%	Guinea	67%	Mauritania	49%
Cote d'Ivoire	12%	Burkina Faso	18%	Rwanda	66%	Mozambique	47%
Ghana	10%	Congo (Brazza)	15%	Kenya	64%	Lesotho	45%
Kenya	9%	Benin	14%	Mali	62%	Sudan	43%
Cameroon	8%	Cote d'Ivoire	13%	CAR	59%	Cote d'Ivoire	35%
Sudan	6%	CAR	13%	Nigeria	59%	Zimbabwe	28%
Mali	6%	Niger	12%	Cameroon	58%	Guinea	28%
Congo (Brazza)	5%	Mali	11%	Zambia	53%	Zambia	27%
Malawi	4%	DRC	10%	Gabon	51%	Ghana	25%
Mozambique	3%	Kenya	8%	Mozambique	48%	Nigeria	25%
Tanzania	3%	Mauritania	4%	Mauritania	44%	Senegal	22%
Guinea	3%	Tanzania	4%	Ghana	41%	Mali	21%
Benin	2%	Nigeria	3%	Cote d'Ivoire	39%	Kenya	18%
Ethiopia	2%	Namibia	3%	Ethiopia	35%	Uganda	15%
Burkina Faso	2%	Chad	3%	South Africa	34%	Malawi	14%
Chad	2%	Uganda	2%	Lesotho	33%	Tanzania	14%
Mauritania	2%	Guinea	2%	Senegal	31%	South Africa	13%
Uganda	2%	Mozambique	2%	Chad	24%	DRC	12%
Lesotho	2%	Zambia	2%	Benin	15%	Congo (Brazza)	10%
DRC	1%	Malawi	1%	Zimbabwe	15%	Cameroon	7%
Rwanda	1%	Ethiopia	1%	Burkina Faso	10%	Rwanda	3%
CAR	1%	South Africa	0%	Namibia	8%	Gabon	2%
Niger	1%	Sudan	0%	Niger	7%	Comoros	0%

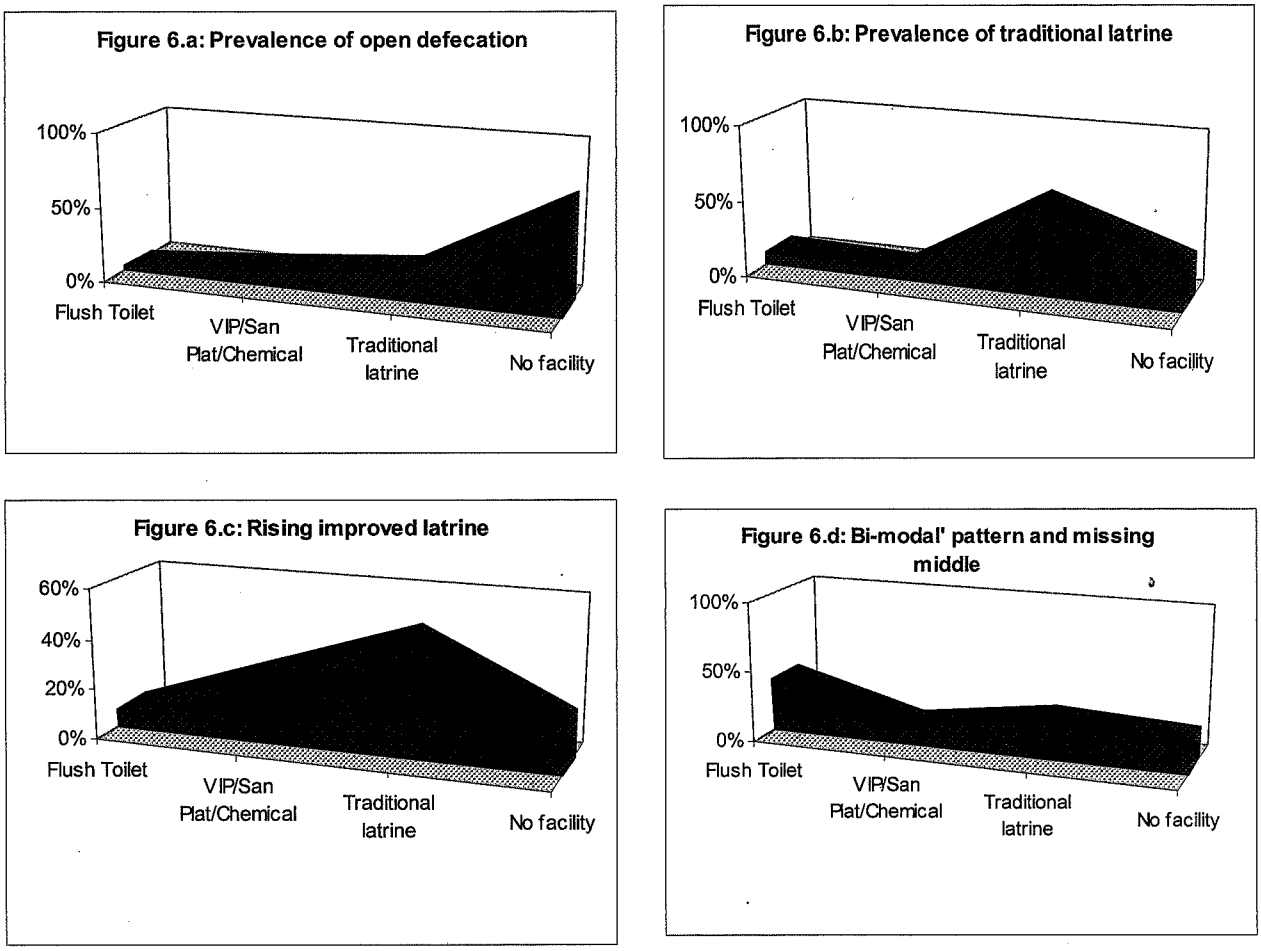
ource: AICD DH/MICS Survey Database, 2007

A third group of countries, although still dominated by traditional latrines, has achieved a significant prevalence of improved latrine technologies covering more than 20 percent of the population (Figure 6.c). This is the case of Rwanda, Cameroon, Zimbabwe, Ghana, Gabon, Lesotho and Comoros. It is interesting to note from that coverage of improved latrines is not necessarily associated with income level; even some of the poorest countries in the list have achieved significant coverage of improved latrines.

A fourth and final group of countries presents a bimodal distribution, with a substantial minority enjoying flush toilets and the remainder excluded from improved latrines (Figure 6.d). What is particularly striking about these countries is the relatively low penetration of improved latrines compared to flush toilets. This is the case of South Africa, Senegal, Zimbabwe and Namibia, all

with at least a 30 percent of population covered by flush toilets. It is also interesting to note that this group includes low income countries, in addition to the middle income ones.

Figure 6: Patterns of access across countries



ource: AICD DH/MICS Survey Database, 2007

The policy implications of each of these different situations are of course quite different. In countries where open defecation remains prevalent, large scale behavior change is the central challenge to try to move a large share of the population on to the sanitation ladder. In countries dominated by traditional latrines, the central challenge is one of finding suitable financing mechanisms for households to upgrade their facilities. In the remaining countries, there seem to be issues of equity across the population, and a key question is how to expand the middle ground so that a higher share benefits from improved latrines.

Which countries are moving faster and where are they going?

In its latest review, the JMP concludes that none of the countries of Sub-Saharan Africa – with the possible exception of Malawi – are likely to meet the sanitation MDG. Notwithstanding this sobering prospect, it is important to acknowledge that a handful of African countries have

been making truly impressive gains in sanitation since 1990s, as measured by the percentage of their populations that are moving up the sanitation ladder each year. While the improvements in these countries may still be too little, too late to meet the MDGs, it is important to identify the successful cases in order to promote a deeper analysis of their experience and distillation of lessons for other countries in the region.

The analysis of access trends above highlighted those countries whose increases in access have made the largest contribution to the regional trend. For obvious reasons, this list was mostly dominated by some of the larger countries – such as Nigeria – 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 is a clear signal of successful experience even if in the case of the smaller countries this does not prove to be material at the regional level.

Table 7 presents the average annualized gain in the percent of the population with 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 7: Annualized change in coverage from 1995 to 2005

Flush Toilet		Vip/San Plat/Chemical		Traditional Pit Latrine		Open Defecation	
Senegal	3.37%	Burkina Faso	4.42%	Ethiopia	3.56%	Ethiopia	-4.05%
Mali	0.98%	Rwanda	4.23%	Mozambique	2.20%	Mozambique	-2.26%
Ghana	0.54%	Benin	2.48%	Nigeria	1.36%	Burkina Faso	-1.65%
Benin	0.48%	Mali	0.60%	Guinea	1.06%	Senegal	-1.30%
Ethiopia	0.36%	Cameroon	0.57%	Chad	0.44%	Benin	-1.22%
Burkina Faso	0.32%	Lesotho	0.55%	Malawi	0.30%	Mali	-1.16%
Nigeria	0.30%	Tanzania	0.55%	Zambia	0.30%	Guinea	-1.13%
Cameroon	0.28%	Kenya	0.35%	Ghana	-0.06%	Malawi	-0.52%
Chad	0.23%	Guinea	0.34%	Mali	-0.37%	Cameroon	-0.44%
Tanzania	0.22%	Zambia	0.20%	Cameroon	-0.38%	Nigeria	-0.37%
Malawi	0.07%	Ghana	0.16%	Senegal	-0.48%	Zambia	0.01%
Guinea	0.00%	Mozambique	0.16%	Kenya	-0.66%	Chad	0.02%
Mozambique	-0.06%	Malawi	0.14%	Lesotho	-0.66%	Rwanda	0.07%
Rwanda	-0.06%	Ethiopia	0.12%	Tanzania	-1.15%	Ghana	0.11%
Lesotho	-0.10%	Chad	-0.68%	Benin	-1.76%	Tanzania	0.38%
Kenya	-0.16%	Nigeria	-0.86%	Burkina Faso	-3.03%	Kenya	0.49%
Zambia	-0.43%	Senegal	-1.62%	Rwanda	-4.22%	Lesotho	0.85%

ource: AICD DH/MICS Survey Database, 2007

In the cases of flush toilets, Senegal stands out as having by far the largest average annual gain, adding more than 3 percent of its population into the flush toilet category each year. As a result, the share of population accessing flush toilet in Senegal has increased by 25 percent from 1997 to 2005, at a pace of more than 3 percent a year (Figure 8). By contrast, Zambia, Kenya, Lesotho, Mozambique, Rwanda and Guinea show declining flush toilets coverage from the late 1990s and the early 2000s.

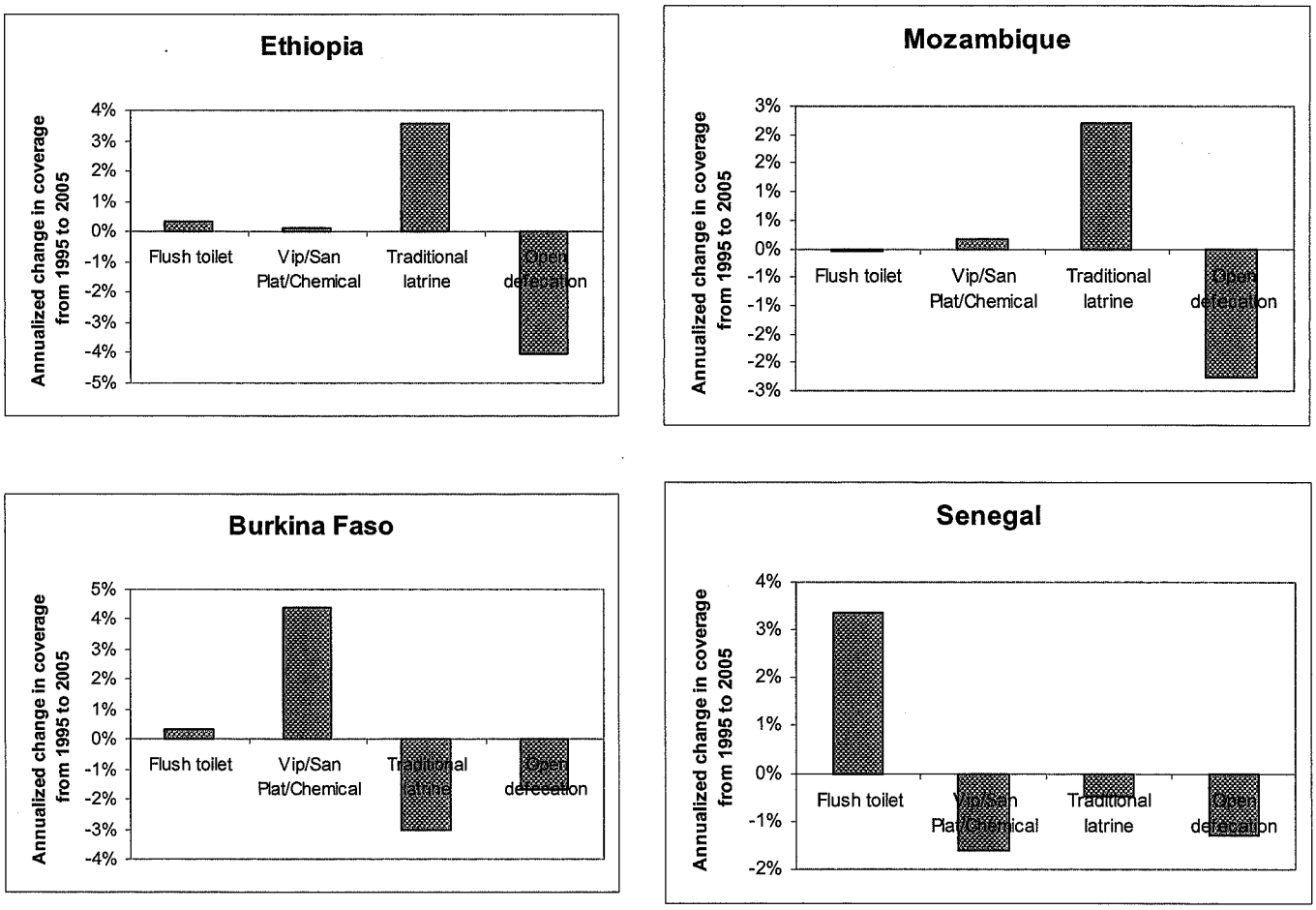
In the case of improved latrines, three countries stand out as achieving accelerated expansion, namely Burkina Faso, Rwanda and Benin. As a result, the share of population using improved

latrines in Rwanda and Burkina Faso has increased over 10 percent over the period from 1997 to 2004.

In the case of traditional latrines, Ethiopia and Mozambique are the two outliers. In Ethiopia, the share of population covered by traditional latrines has grown by 18 percent between 2000 and 2005, immediately followed by Mozambique, where coverage has grown by 13 percent.

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 having moved more than 20 percent of its population out of open defecation. The performance of Mozambique has also been impressive, followed by Burkina Faso, Senegal and Benin.

Figure 8: Annualized growth in coverage, four remarkable country performances



ource: AICD DH/MICS Survey Database, 2007

It is noteworthy that Nigeria, which stood out earlier as contributing the largest absolute population that has moved up the sanitation ladder, does not appear to have made such impressive progress when gains are measured against the size of its population.

Analyzing the experiences of individual countries it becomes evident that many of them are focusing their efforts on moving people along different rungs of the sanitation ladder. In countries

such as Ethiopia and Mozambique, for example, the main focus is reducing the practice of open defecation by getting people on to the bottom rung of the sanitation ladder. In countries such as Burkina Faso and Rwanda, the action is mainly concentrated on upgrading the quality of latrines among the population that is already engaged in some kind of basic sanitation practice. In the case of Senegal, the focus has been on getting people from the middle to the top of the ladder by increasing the prevalence of flush toilets. Clearly the financial and health implications of these strategies are very distinct.

Factors behind more rapid expansion

The existence of a number of countries that show relatively rapid gains in sanitation immediately raises questions as to how this has been achieved and what can be learned by the rest of the region. Two possible explanations for rapid progress are high levels of spending and effective policy reforms. This section examines the limited evidence available on each of these scores.

How much money has been spent on sanitation in recent years and by whom?

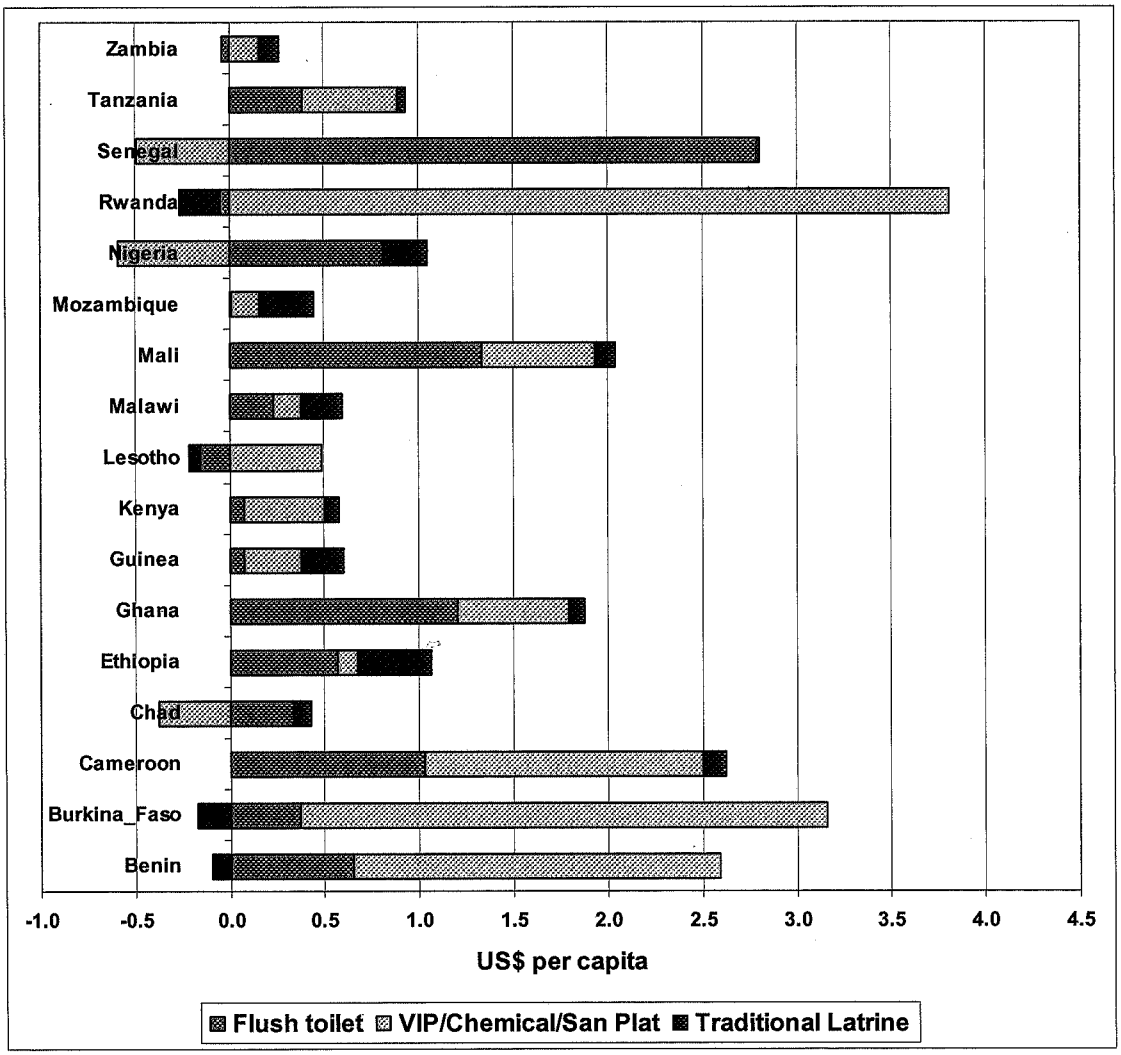
We have observed that coverage of all sanitation modes has grown in the past decade, although modestly. We have also estimated the pace at which service has expanded and identified the countries that have made the major strides in this sense. How much has cost to expand coverage and who has borne most of this cost? To what extent countries' performance is the result of efficient investments?

To estimate the overall investment made in sanitation by all actors, including governments, utilities and households we have used standardized unit costs drawn from the experience of the Senegal sanitation sector and calculated as the average expenditure needed to build a facility that would serve a household with ten members. The expenditure varies as we move up on the sanitation ladder, exponentially as we move from traditional latrines to improved latrines and flush toilets. In particular, the cost of a flush toilet has been estimated at US$784, the cost of a VIP latrine at US$441 and the cost of traditional latrine at US$49. Therefore these figures have been applied to the growth in coverage experienced by each country across the various alternatives. Adjustments to the standardized figures have been made to reflect the average household size typical of each country. Household size indeed varies a lot across our sample, from a minimum of 3 to a maximum of 10 people, which substantially affects the unit cost per capita.

Based on these estimates, Nigeria results to have made by far the largest investments, above US$ 100 million per year, followed by Ethiopia with some US$77 million per year. A second group of countries have invested US$20-50 million per year including, in decreasing order of magnitude, Cameroon, Burkina Faso, Ghana, Tanzania, Rwanda, Senegal, Mali, Benin and Kenya. Mozambique, Malawi, Guinea, Chad, Zambia and Lesotho have invested negligible amounts, below US$10 million per year. As result of low unit costs, investments on traditional latrines are only a tiny fraction of the overall sum invested, and are material to the spending envelope only in the cases of Ethiopia and Mozambique, where particularly rapid expansion of this mode has taken place. Conversely, the expansion of flush toilets has absorbed a large fraction of overall investments and dominates the bill even in countries, markedly Nigeria and Ethiopia, where most of the progress has been lower down the sanitation ladder.

A number of countries report significant 'negative investments' in sanitation, and this merely indicates that a significant segment of the population has been abandoning infrastructure associated with a lower modality of sanitation in order to secure access to a higher modality. This would happen for example when a household with an improved latrine moves up to a flush toilet. This finding highlights the fact that some capital may be written-off in countries where households progress gradually up the sanitation ladder.

Figure 9: Annualized investment per capita by mode across the sample of countries



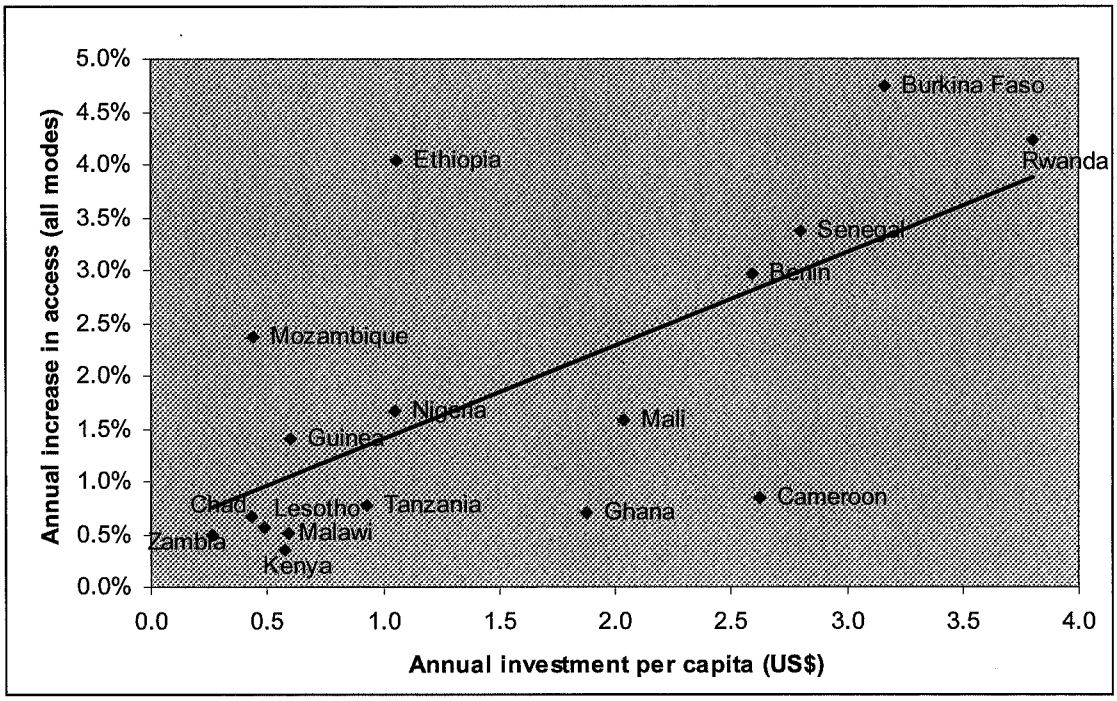
Source: AICD DH/MICS Survey Database, 2007

The figures presented above are substantially influenced by country size; the overall picture changes completely when we consider investments per capita. Figure 9 shows that Rwanda and Burkina Faso are the only countries spending more than US$3 per capita every year. A second group of counties including Senegal, Cameroon, Benin, Mali and Ghana spends US$3-2. Ethiopia

and Nigeria, the two large countries ranked first in absolute terms, spend little more than US$1 per capita per year. Finally, Tanzania, Guinea, Malawi, Kenya, Lesotho, Mozambique, Chad and Zambia spend less than a dollar per year per capita.

In order to examine to what extent the results that countries are obtaining reflect the magnitude of 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 10).

Figure 10: Scatter plot of average annual investment per capita and annual increase in



Source: AICD DH/MICS Survey Database, 2007

Countries are grouped in three main clusters based on their position relatively to the 45 degree line. In the first cluster, which lies below the line, are found countries such as Kenya, Zambia, Lesotho, Malawi, Tanzania, Mali, Ghana, Chad and Cameroon that spend disproportionately given the results they are achieving. In the second cluster, which lies above the 45 degree line, are found Ethiopia, Mozambique, Burkina Faso, whose progresses are more than proportional to the resources being spent and that stand out as making the most efficient investments. This is consistent with the fact that such countries are also among those that have made the largest progress in expanding coverage, Ethiopia and Mozambique down the ladder on traditional latrine, Burkina Faso on improved latrine. Finally, countries such as Guinea, Nigeria, Benin, Senegal and Rwanda sit close to the 45 degree line, indicating results that are more or less proportional to the resources being spent.

Although interesting and generally valid, it should be borne in mind that the results of this analysis may be biased by the great variability of the country household sizes. In fact, the larger the household size the less the investment needed to expand coverage, as more people would benefit from the same facility. Thus, a large size may be a major factor in the better performance

of a country relatively to the others. Senegal, for instance, looks particularly cost-effective in spite of its high reliance on flush toilets, on which the country concentrates most of its efforts, leaving behind both improved and non-improved latrines. This may be a consequence of the relatively large household sizes in this country, which reduce the per capita investment requirements.

A parallel fiscal database completed under the AICD has provided data on public expenditure for a subset of ten countries from 2001 to 2006. Data are incomplete; in some case they refer to estimates rather than actual figures; only in a few cases both central and local government expenditures are 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. Although a substantial under-reporting may have occurred, public expenditure on sanitation appears very low. South Africa stands out as having the made largest effort with a spending reaching 0.17 percent of GDP, followed by Mozambique (0.12 percent of GDP), Senegal (0.07 percent of GDP) and Nigeria (0.06 percent of GDP).

By comparing these figure with the total investment estimated from the household survey two main patterns emerge (Table 11).

Table 11: Government expenditure and overall investment on sanitation

million USD	**Average Government Expenditure (2001-2005)**	**Average annual investments (1995-2005)**	**Ratio Government Expenditure/Investments**
Mozambique	7.28	8.93	81%
Kenya	6.67	20.30	33%
Nigeria	39.75	152.05	26%
Senegal	6.10	33.48	18%
Lesotho	0.06	0.88	7%
Tanzania	0.88	36.83	2%
Madagascar	2.53	110.38	2%
Rwanda	0.30	35.20	1%

Source: AICD Fiscal Database, 2007

In three out of eight countries, public expenditure appears high relative to total estimated investment, suggesting that a significant subsidy policy maybe in place. In Mozambique in particular most of investments on sanitation (81 percent) seem to originate from the public sector. In the remainder of the countries, public expenditure is negligible compared to the total estimated investment, less than 10 percent, suggesting that households have self-financed the cost of gaining access to sanitation.

When these figures are analyzed against the advances in sanitation achieved by each country, we see that a substantial dedication of public resources is not always a prerequisite for significant progress. Some countries have managed to make dramatic improvements moving people up on the sanitation ladder with negligible public spending. This is the case of Rwanda, which lies among the top performers in upgrading service from traditional to improve latrines. In addition, Senegal has reached the largest increase in flush toilet coverage with relatively low government subsidy, equal to 18 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. Comparing these results with the investment analysis conducted above, we can see that

these are also countries lying above, although slightly, the 45 degree line of Figure 10 suggesting that investments were efficient perhaps because mostly privately driven.

In other countries, large government spending has been employed in bringing un-improved sanitation to the people who had no service at all. This is the case of Mozambique and Nigeria, which show high government spending on sanitation and have mainly moved from open defecation to traditional latrines. Yet, Mozambique is also the country with the largest advances on sanitation compared to the employed investment, suggesting that public money was effectively spent on the objective of reducing the un-served population.

Finally, Kenya shows poor advances on sanitation despite the high level of government spending on the sector. The country has been slow in increasing access to all modes and even lost ground on flush toilet coverage; indeed it shows the worst investment performance according to figure 10.

On the whole, this analysis seems to suggest that little public spending and conversely large households financing of investment are associated with better efficiency gains. However, most African households live on no more than $180 per month and spend more than half of their resources on food; it is therefore relevant to examine the issue of affordability.

Table 12 shows the cost of building a facility as percentage of the average monthly household budget in Low Income Countries. We refer to the case of on-site sanitation facilities without including the costs of maintaining or emptying the facility.

Table 12: Cost of facility as % of monthly household budget

	National	Rural	Urban	Q1	Q2	Q3	Q4	Q5
Total monthly household budget (2002 US$)	177	130	241	59	97	128	169	340
Flush toilet	443%	603%	325%	1329%	808%	613%	464%	231%
VIP latrine	249%	339%	183%	747%	455%	345%	261%	130%
Traditional latrine	28%	38%	20%	83%	51%	38%	29%	14%

Source: AICD DH/MICS Survey Database, 2007

Improved sanitation alternatives remain prohibitive across all income groups. On average, building a flush toilet at the standardized price estimated above would cost as much as four times the monthly budget of the average African household, up to thirteen times the monthly budget of a household in the poorest income quintile and at least twice the monthly budget of a household in the highest quintile.

The cost of an improved latrine would absorb twice the monthly budget of the average African household and seven times the monthly budget of a household in the poorest quintile. This is, however, a much more affordable option for the richest groups, which would engage in building the latrine slightly more than the resources they spend in a month.

Conversely, traditional latrines prove to be affordable across the entire income spectrum. Although a poor household would still spend almost the entire budget of a month to build a latrine, this would cost less than a third of the monthly budget to the average African household.

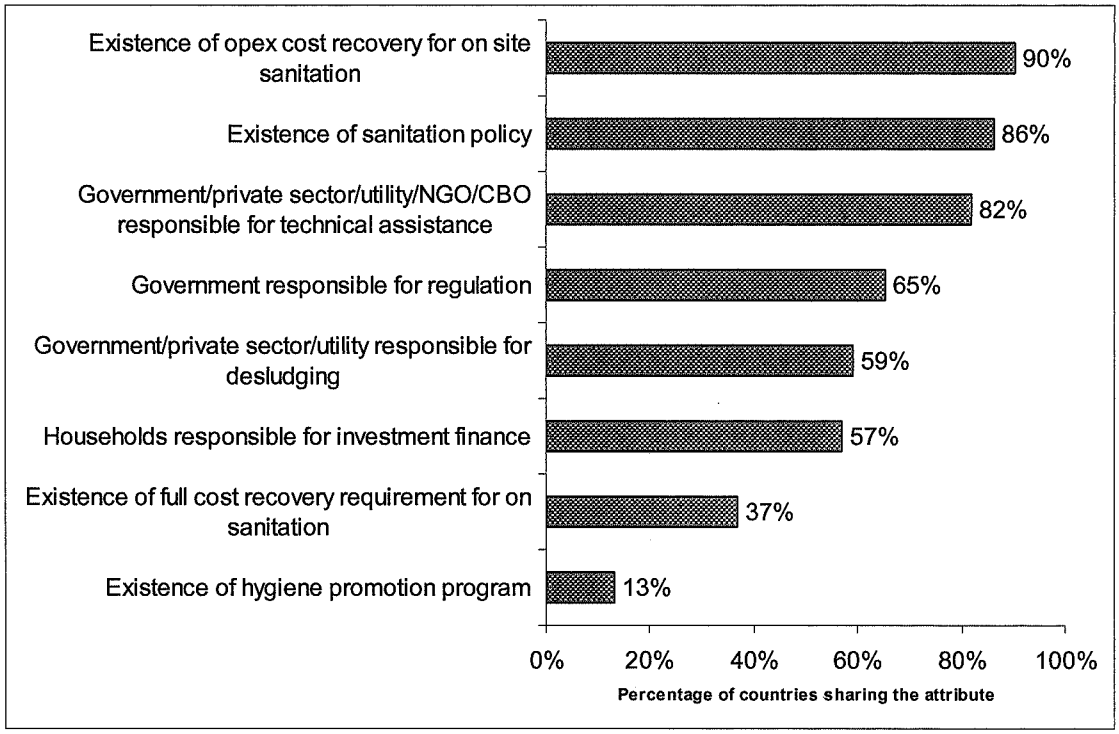
Therefore, flush toilets and to a less extent improved latrines are prerogatives of wealthier groups who can pay to gain access. Bringing service to the poor would require government subsidies, but we have seen that this may be neither a feasible nor an efficient solution. Conversely, traditional latrines remain an affordable alternative to many and the experience of

countries such as Mozambique and Nigeria suggests that public money can be efficiently spent is subsidizing access.

To what extent have sound policies contributed to outcomes?

The AICD utilities has assessed the level of reform, regulation and governance in the sanitation sector in twenty-four countries by testing the existence of good practices such as national sanitation and hygiene promotion programs, independent regulation, cost recovery requirements for on-site sanitation, government responsibility over technical assistance and de-sludging and privately-financed investment on on-site sanitation. Figure 13 shows the prevalence of each of these practices across the 24 countries.

Figure 13: Dispersion of reform and regulation attributes



Source: AICD WSS Survey Database, 2007

90 percent of the surveyed countries require by law operating costs recovery for on-site sanitation. This is the most prevalent practice, immediately followed by national sanitation policy, which is in effect in 86 percent of the surveyed countries. Also, in 82 percent of them there is a specific mandate for technical assistance that is taken up indifferently by the government, the utility, the private sector, NGOs and community-based organizations. The government is also responsible for regulation in 65 percent of the countries and for desluging in the 60 percent. Interestingly, in 57 percent of the countries investment finance mainly falls on households. Also, only in 37 percent of the countries cost recovery of both operating and capital cost for on-site sanitation is required, suggesting that some capital subsidy is in place. Finally, national hygiene promotion is less of a common practice, being adopted in only 13 percent of the surveyed countries.

By analyzing these figures against access rates we have found that countries with a national sanitation policy tend to show larger coverage of flush toilets and improved latrines. However, when we consider the good practices altogether, we found contrasting explanation of their impact on country performance. Burkina Faso and Lesotho share almost all the good practices discussed above. Yet, while Burkina Faso is also one of the countries that are making the major strides on sanitation, especially by moving people from un-improved to improved sanitation, Lesotho shows negative performance all across the sanitation ladder except a modest improvement in improved latrines. Therefore we are not really able to establish whether and to what extent a good policy framework may lead to better country performances.

Conclusions

In conclusion, a number of key trends have emerged from this analysis of the DHS data for the sample of 30 Sub-Saharan African countries.

- First, 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. Progresses are distributed across modes as follows:
  - Traditional latrines show the fastest growth in access, with more people securing access to this mode each year than to flush toilets and improved latrines put together.
  - The majority of people rising up the sanitation ladder each year are to be found in Africa's larger countries (notably Ethiopia and Nigeria).
  - The expansion in traditional latrines is concentrated among the lower income groups, while the expansion in improved latrines and flush toilets is concentrated in the middle and upper income groups.
- Second, the prevalence of middle of the range sanitation options – such as VIP latrines, chemical toilets and San Plat that offer most of the health benefits at a significantly lower cost – is surprisingly low in Sub-Saharan Africa. In particular:
  - The overall percentage of the population with improved latrines is about the same as the percentage with flush toilets.
  - Only a handful of countries, including Rwanda, Cameroon and Zimbabwe, have achieved significant prevalence of this modality.
  - Improved latrines remain quite regressive in distribution being found primarily among the higher income groups.
- Third, there is huge variation across African countries in their current patterns of access to sanitation, and this has important policy implications.
  - In Niger, Chad and Burkina Faso the vast majority of the population continues to practice open defecation and the central challenge is one of behavioral change.
  - In Uganda, Malawi, Tanzania, DRC the bulk of the population is already making use of traditional latrines, and the main concern is how to finance the upgrades needed to move towards more sanitary options.
  - In Namibia, Senegal and South Africa a substantial minority of the population have flush toilets while the reminder has only traditional or no sanitation. The middle ground of improved latrines is conspicuous by its absence in these countries and the central policy challenge is how to achieve a more equitable distribution of sanitation access.

- Fourth, according to the most recent JMP findings none of the countries in Sub-Saharan Africa are likely to meet the sanitation MDG. Nevertheless, there are a significant group of countries that are making good progress in expanding sanitation access and at a rate that substantially outstrips their peers in the rest of Africa. This group of fast moving countries comprises Burkina Faso, Ethiopia, Mozambique, Rwanda and Senegal. These countries have each been moving at least two percent of their population up the sanitation ladder each year; and hence potentially have important lessons to offer to their peers. While all these countries have been moving rapidly, the area of focus has been quite different in each case.
  - In Ethiopia and Mozambique the main achievement has been to move people away from open defecation to the use of traditional latrines.
  - In Burkina Faso and Rwanda there has been 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 flush toilets.
  - Finally, it is noteworthy that Nigeria does not stand out as having made particularly rapid progress in expanding sanitation access, and yet in spite of this – 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. Since this survey is based on 18 countries for which time series data were available, there may be other fast moving countries that are 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.
- Fifth, based on access trends and unit costs it is possible to estimate the resources that must have been invested in order to achieve the recorded improvements in access. The finding is that most countries have invested no more than US$3 per capita per year in sanitation in recent years. However, many of the fast moving countries (including Rwanda, Burkina Faso, and Senegal) have been investing between US$3-4 per capita per year. Comparing expenditure levels with the speed of access expansion shows that:
  - Countries that have focused efforts on lower end sanitation solutions (such as Ethiopia and Mozambique) are getting relatively high value for money.
  - Countries (such as Cameroon and Ghana) where most of the expansion has come from higher end options are getting relatively lower value for money.

  Finally, some limited information is available for public expenditure on sanitation. This shows that:
  - Rwanda has achieved rapid improvements without any significant government spending.
  - In a second group of fast moving countries (including Mozambique and Senegal) government spending has been significant.
  - A third category of countries (including Kenya and Nigeria) are those registering relatively high government spending without particularly fast acceleration in sanitation access.

  These findings suggest that government spending is neither necessary nor sufficient for expanding sanitation access, but can play a valuable role if wisely used.

- Sixth, the affordability analysis shows that improved sanitation alternatives remain prohibitive across all income groups and are prerogatives of wealthier households who can pay to gain access. In particular:
  - Building a flush toilet would cost as much as four times the monthly budget of the average African household, up to thirteen times the monthly budget of a household in the poorest income quintile and at least twice the monthly budget of a household in the highest quintile.
  - Building an improved latrine would cost twice the monthly budget of the average African household, seven times the monthly budget of a household in the poorest quintile and slightly more than the monthly budget of a household in the highest quintile.

  Conversely, traditional latrines prove to be affordable across the entire income spectrum. Although a poor household would still spend almost the entire budget of a month to build a latrine, it would cost less than a third of the monthly budget to the average African household.

- Finally, the analysis of the policy framework has highlighted that good practices such as operating cost recovery, national sanitation policy, or technical assistance on sanitation are increasingly gaining ground in Africa. Also, countries with a national sanitation policy tend to show larger coverage of flush toilets and improved latrines. Yet, information is available only for a few policies and countries; therefore it is not possible to establish to what extent sounds policies may contribute to better country performances on sanitation.