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Access to services in low-income city communities

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Volume 1: Main Report

Mapping of Service Provision in low-income areas – Sub-Saharan Africa

Volume 2: Country Reports

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1. Introduction

The availability and provision of services in Sub-Saharan Africa are highly variable, by location (e.g. urban/rural), by socio-economic factors (e.g. household income and tenure status) and in the quality of services available. This report presents an overview of selected public services in Sub-Saharan Africa, as part of the RurbanAfrica research project Work Package 4 - Access to services in low-income city communities. The report considers patterns of service access, barriers and innovative or successful approaches in a variety of sectors including sanitation, water, electricity, education, health, mobile phones, urban transport and street lighting. For each service we present an overview of provision in Sub-Saharan Africa followed by more detail on the service in the four case study countries: Cameroon, Ghana, Rwanda and Tanzania. Key data are presented on access to services in both urban and rural areas but the discussion focuses more on the constraints and opportunities to improve services in urban areas. A final conclusions section discusses the way forward.

This overview report is accompanied by country reports for the four case study countries.

1.1 Case study countries

Cameroon

Cameroon has experienced rapid urbanisation with over fifty percent of the population living in urban areas. The total population in 2010 was approximately 19.5 million people with the total expected to reach almost 22 million by 2015. Two principal cities, Yaounde and Douala have populations of approximately 2 million each. The other regional capitals are; Bamenda (north-west), Bafoussam (west), Maroua (far-north) and Garoua (north). In 2005, the population density in each region ranges from 7 people/km^2 in the East to 124 people/km^2 in Littoral (National Institute of Statistics, 2011). Keeping pace with service delivery in these urbanised areas is a significant challenge for city planners, especially when the growth is spontaneous and unplanned. City borders have expanded and in Douala, people have moved into mangrove zones, which leaves them prone to flooding on a daily basis.

The financial capacity of urban households is decreasing over time rather than improving which further hampers efforts to access basic services. The 'Cameroon Vision 2035' document sets out targets for increasing access to services through the use of specific strategies to maintain and rehabilitate urban infrastructures, control land use, protect vulnerable groups and reinforce institutional capacity in the urban sector (Ministry of Economy, Planning and Regional Development, 2009).

Ghana

In 2010, Ghana had a population of approximately 24.6 million. The proportion of people living in urban areas is 50.9% with the levels of urbanisation varying between regions. Greater Accra has the highest proportion of urbanisation at 90.5% whilst the Upper West has the lowest at 16.3%. Consequently the population density varies significantly between regions. In Greater Accra the population density is approximately 1,236 people/km^2 compared to 35 people/km^2 in the northern

region (Ghana Statistical Service, 2012). Accra, the capital, has 10% of the total population. Other major cities include: Kumasi, Sekondi-Takoradi, Tema, Tamale, and Cape Coast.

Ghana is in a constant state of transition and faces many challenges in promoting economic growth and combating poverty. Decades of mismanagement of its economy, political instability and unfavourable terms of trade had a negative impact on the economy. As a consequence, investments in infrastructure and services have not kept pace with the growing population. However, for over 25 years Ghana has experienced both political and economic stability.

Investments in infrastructure are governed by the Growth and Poverty Reduction Strategy. It is acknowledged that investing in infrastructure is vital for continuing economic growth. A well-functioning infrastructure network operating within a transparent regulatory environment and a sound governance system help to create an enabling environment for both public and private sector developments.

Rwanda

Rwanda is trying to improve the population's access to a range of services to meet the MDGs and also go beyond them. The genocide in 1994 devastated the country causing both loss of life and significant damage to infrastructure.

In 2011, Rwanda had a total population of approximately 10.7 million. The capital, Kigali City had a total population of approximately 1.1 million, equivalent to approximately 10% of the population. The percentage of urbanized areas has grown from less than 1% in the 1960s to 14.8% in 2011 (National Institute of Statistics, 2012). After the capital, the principal towns are Musanze (north), Muhanga (south), Huye (south), and Rubavu (west). The population density was estimated at 408 people/km^2 in 2011 (National Institute of Statistics, 2012).

Rwanda does not have high levels of natural resources to exploit and as such has committed to transforming its agrarian economy into a knowledge based economy in which people are the greatest natural resources. To that end, the Government of Rwanda has committed to improving access to a range of services including health, education, transport and use of ICTs. Vision 2020 is the guiding document for achieving this growth, complimented by 5 year Economic Development and Poverty Reduction Strategies (EDPRS).

Tanzania

The population of Tanzania is almost 45 million. In 2002, Tanzania had the highest levels of population growth in the whole of SSA. Urban areas have expanded over time and more than 70% of the population in urban settlements lives in low income areas characterized by high population density, low access to services and poor living conditions. In 2012, Dar es Salaam had a population of 4.36 million, accounting for 10% of the total Tanzania Mainland population. Most of the Tanzania mainland is sparsely populated with a population density of 51 people/km^2. However, in Dar es Salaam and the Mjini Magharibi region the population densities are 3,133 and 2,581 people/km^2 respectively (National Bureau of Statistics, 2013). After Dar es Salaam the next largest cities are Mwanza, Arusha, Dodoma, Mbeya and Morogoro.

The Poverty Reduction Strategy Paper (PRSP) and National Strategy for Growth and Reduction of Poverty (NSGRP I and II) are committed to achieving the MDGs by supporting economic growth, reducing poverty and improving the quality of life for everyone. Unfortunately, economic growth has not yet translated into large scale poverty reduction. One of the major challenges is population growth which lessens the impact of economic growth on levels of poverty and improvements in livelihoods. Population growth and urban expansion have outstripped the abilities of government authorities to provide basic services like transport, water and sanitation, and adequate housing.

1.2 Data analysis method

This report includes extensive analysis of Demographic and Health Surveys (DHS) data. The DHS program was established by USAID in 1984. The aim of the DHS is to collect a large amount of comparable data across countries and regions. In order to support this process, countries that participate in the DHS program are encouraged to use the standard model questionnaires which are modified and reviewed between each five year phase of the DHS programme. Questions can be added to or removed from the questionnaire to suit the needs of the country carrying out the study. DHS surveys are completed nationally with support from USAID and the DHS program. The data collected is made available to researchers after the main survey report has been published which is generally within 12 months after the end of the data collection phase (Rutstein and Rojas, 2006). This provides researchers with up to date information for use. In order to access the information, researchers must register their intention and details of the data sets they wish to access through the DHS program portal (available at www.dhsprogram.com).

For the purposes of this study, permission was sought and granted to access the data pertaining to the four case study countries, Cameroon, Ghana, Rwanda and Tanzania. The data can be downloaded in a number of formats. For this study, the SPSS file format was downloaded and SPSS was used to generate the required tables for the key services in each of the case study countries. The result tables were then exported to Microsoft Excel for further organisation and graphic representation. The data presented within the section 'access data' for each service have all been obtained from DHS Standard surveys. In the cases of Ghana, Rwanda and Tanzania, the data sets with an interval of, or close to 10 years were selected in order to show how access to services has changed over time. There are additional data sets available in between those selected for this study, details of which can be found through the DHS portal. In the case of Cameroon, the two most recent data sets were selected which represent 2004 and 2011, with an interval of 7 years.

Every attempt has been made to double-check the data presented in this report as part of the analysis process. However, there are some instances where the data available do not seem to be consistent with each other. This is particularly noticeable when disaggregating the data into the wealth quintiles and comparing it to the national data presented by place of residence (urban/rural). Unfortunately it is not always possible to determine the reasons for these anomalous data but these cases have been highlighted in the report where necessary.

Definition of key terms

***Wealth Index (Quintiles)*:** An indicator for the income/wealth status of a household. The five ranks; poorest; poorer, middle, richer and richest are calculated using data about a household's ownership

of selected assets (e.g. televisions and bicycles) the types of materials used for housing construction; and the types of water and sanitation facilities available (MEASURE DHS/ICF, 2013).

Access/coverage (for the water and sanitation data as used by the Joint Monitoring Program, JMP) refers to the availability of a drinking water source or sanitation facility 'within reach' of the household/user. For the purposes of this study, water and sanitation facilities are categorised as shown in Table 1.1.

Water	Sanitation
• ***Piped water:*** all piped water • ***Ground water:*** protected/unprotected dug well, springs, boreholes, tube wells • ***Surface water:*** river, dam, lake, pond, stream • ***Rainwater*** • ***Other:*** *t*anker, cart with small drum etc.	• ***Flush toilet***: of all types • ***VIP*** • ***Pit latrines***: with or without slabs • ***No facilities/bush/open defecation*** • ***Other:*** composting toilets etc

Table 1.1 Categorisation of water and sanitation for data analysis

Points to note

- The totals for household coverage figures for the water source and access to sanitation facilities may be +/- 1 (i.e. 101%/99%) in some cases due to the rounding-up of figures to whole numbers. This applies to only the regional and wealth quintile disaggregation.

- Totals for the data on the *time taken to get water* may not always add up to 100% because responses such as '*Don't Know*' were not included in this analysis. This was done because the '*Don't know*' category was not considered in all surveys and was therefore not comparable. For example, in Cameroon, the 2011 data set had a '*don't know*' *response* but the 2004 data set did not.

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2. State of the Art Overview of Sanitation in Sub-Saharan Africa

Overall, Sub-Saharan Africa is not on track to meet the MDG sanitation target by 2015 (AMCOW, 2012). This is part due to broader difficulties of population growth and poverty. We explore the varying reasons and challenges for inadequate sanitation services in both rural and urban sanitation, which is done in the following sections, after examining patterns in the access data for each of the study countries.

2.1 Patterns of access to sanitation

Rural sanitation

A comparison of levels of rural sanitation services for the four countries is presented in Table 2.1, including access to 'improved' services and the percentage of people using open defecation. 'Improved sanitation' is defined as facilities that enable hygienic separation of human excreta from human contact (UNICEF, 2011).

Table 2.1 Trends in percentage of rural population using improved sanitation

Country	Use of improved sanitation	1990	2000	2010
Ghana	**% using 'improved' sanitation**	**4%**	**6%**	**8%**
	% using open defecation	29%	31%	33%
Cameroon	**% using 'improved' sanitation**	**37%**	**37%**	**36%**
	% using open defecation	17%	15%	12%
Rwanda	**% using 'improved' sanitation**	**34%**	**45%**	**56%**
	% using open defecation	7%	5%	3%
Tanzania	**% using 'improved' sanitation**	**6%**	**16%**	**7%**
	% using open defecation	10%	13%	16%
Sub-Saharan Africa (SSA)	**% using 'improved' sanitation**	**19%**	**21%**	**23%**
	% using open defecation	46%	42%	35%

UNICEF, JMP 2012

In Ghana, use of improved sanitation is very low, the majority of rural people use shared sanitation or other unimproved sanitation, but the level of open defecation is high in this country. The same applies to Tanzania to some extent. Rwanda has made significant steps in improving access to rural sanitation, and is expected to meet its MDG sanitation target. Since 1990, the population without an improved sanitation facility in all of SSA increased by 98 million in rural areas (AMCOW, 2012).

The relatively high levels of open defecation and low levels of access to 'improved sanitation' in rural Sub-Saharan Africa are in part due to a combination of limited funds and institutional constraints in rural areas, as well as a lack of demand for 'improved sanitation' in rural communities. These issues are being addressed in most SSA countries. In East Africa for example, partners are making efforts to scale up sanitation either through an adaptation of Community-Led Total Sanitation (CLTS) and/or through Sanitation Marketing. CLTS is a community participatory approach first used in South Asia, where a change of behaviour is 'triggered 'amongst a village community. Key commonalities of

approaches include a focus on learning; strategies to create demand; improving supply chains for sanitary components, a prioritization of capacity building; and the need to move to a scale sufficient to make significant progress towards the MDG for sanitation (WSP, 2011; Cardosi et al, 2010). Whilst some successes have been achieved in using these approaches in certain areas, it has not yet translated into improved rural sanitation services at scale.

Urban sanitation

There is considerably less open defecation in urban areas than in rural areas, as can be seen by comparing the data in Tables 2.1 and 2.2. This is in part due to their being less space in urban areas and therefore greater incentives to improve sanitation. Is this an example of where some people migrate to urban areas to access better basic services, amongst other reasons?

Table 2.2 Percentage of urban population using improved sanitation

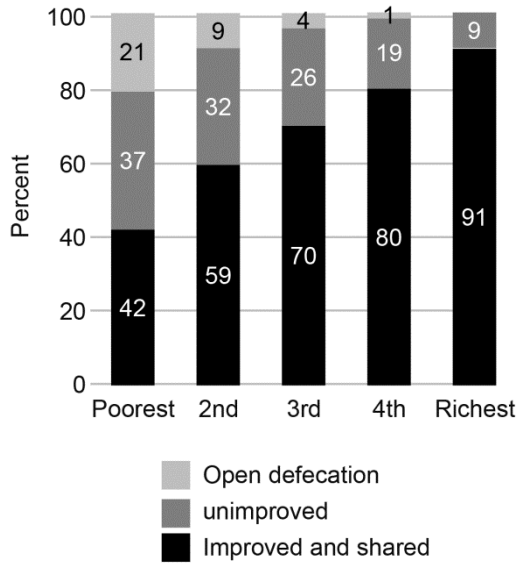
Country	Use of improved sanitation	1990	2000	2010
Ghana	**% using 'improved' sanitation**	**12%**	**16%**	**19%**
	% using open defecation	11%	9%	6%
Cameroon	**% using 'improved' sanitation**	**63%**	**61%**	**58%**
	% using open defecation	2%	1%	1%
Rwanda	**% using 'improved' sanitation**	**69%**	**60%**	**52%**
	% using open defecation	3%	2%	1%
Tanzania	**% using 'improved' sanitation**	**9%**	**16%**	**23%**
	% using open defecation	2%	2%	2%
Sub-Saharan Africa	**% using 'improved' sanitation**	**43%**	**43%**	**43%**
	% using open defecation	**10%**	**9%**	8%

UNICEF, JMP 2012

Table 2.2 shows the percentage of people using 'improved' or hygienic sanitation is low in the case of Ghana and Tanzania. In Cameroon and Rwanda service levels are better but access to improved sanitation is still declining as a percentage of the urban population in those countries. Since 1990, the urban population in SSA without an improved sanitation facility increased by 100 million (AMCOW, 2012).

There is increasing use of shared sanitation or 'other unimproved' forms of sanitation in many African countries. These results show that the overall figures for open defecation in urban areas is encouragingly low. However, we need to consider the experiences of poorer sections of the community.

Figure 2.1 Urban sanitation services by income quintile in Sub-Saharan Africa



Source: JMP, 2012

Figure 2.1 reveals the urban sanitation levels by income quintile in Sub-Saharan Africa, with 37% of the poorest 20% of people, who often live in informal settlements, using unimproved sanitation and 21% practising open defecation. The poorest people in sub-Saharan Africa are five times less likely to use an improved sanitation facility compared to the richest quintile (AMCOW, 2012).

Overall, average figures may show relatively high urban sanitation access rates such as 53% coverage for Sub-Saharan Africa (Toubkiss, 2010). However, the overcrowded conditions, poverty, lack of government activity and fragile environments; increasingly prone to flooding and pollution, experienced by poor households living in informal settlements, result in much lower access to sanitation in those areas.

Shared sanitation

A significant percentage of households (31% in Africa) currently rely on shared facilities (UNICEF, 2012). The quality of those shared facilities is inadequate in many cases. Shared sanitation facilities, such as community toilet blocks or sharing toilets with neighbours, is one of the most ubiquitous sanitation solutions in urban areas in Africa. Currently, the Joint Monitoring Programme (JMP), part of the Million Development Goal (MDG) monitoring process does not include shared facilities in the 'improved' facilities category (UNICEF, 2012). Whilst the JMP does acknowledge the importance of shared toilets compared to no facilities at all, it considers the lack of cleanliness and the lack of accessibility of shared facilities to be unacceptable (ibid). Many shared facilities are however, clean and well managed (Mazeau et al, 2013). Several sector experts have argued that in more densely populated urban areas, shared sanitation is the most technically and financially viable solution that exists (Schaub-Jones et al., 2006; Mara & Alabaster, 2008). The fraction of the population using shared sanitation has significantly increased during recent years amongst the Sub-Saharan urban population, see Table 2.3.

Table 2.3 Percentage of urban population sharing toilet facilities

Area	1990	2000	2010
Urban Ghana	44%	59%	73%
Urban Cameroon	20%	19%	18%
Urban Rwanda	24%	21%	18%
Urban Tanzania	8%	15%	23%
Urban Sub-Saharan Africa (SSA)	28%	29%	31%

(UNICEF 2012)

Such high levels for the use of shared sanitation suggests that careful consideration needs to be given to how shared facilities can be incorporated more effectively into wider urban and infrastructure planning. This is particularly important in countries such as Ghana (Mazeau et al, 2012 and 2013).

2.2 Barriers to improved urban sanitation services

A principal concern is the safe disposal of human faeces and the most suitable form of sanitation to achieve this aim. Flush toilets with sewer systems or septic and effective wastewater treatment are common in high income countries, however, coverage of sewers is low in many developing countries and where they do exist, treatment facilities may not exist or be working correctly, leading to pollution downstream. Household based sewerage systems are expensive and are not currently affordable in many high density low income areas. Therefore, solutions such as pit latrines and community toilet blocks are often used. A key challenge is the safe disposal of the effluent from such facilities, which is discussed in the next section on innovative approaches.

Urban sanitation challenges faced by households in lower income areas are exacerbated by on-going change including demolitions, slum upgrading, redevelopment, over-crowding and lack of services such as piped water supplies that can enable better sanitation. This applies to both shared sanitation and individual household sanitation. A key concern is lack of security of tenure for residents in low-income urban areas. Scott et al (2013) found in Dakar, Senegal that tenants with low tenure security do not invest in capital infrastructure costs, but they are willing to pay for operational costs, such as emptying latrines. The rapid demographic growth and urbanization of Sub-Saharan Africa is predicted to result in a slum population of 313 million by 2015 (Oosterveer and Spaargaren, 2010). There is a pressing need for future sanitation interventions to respond effectively to the changing urban environments.

Municipal governments generally have very limited capacity and resources to deal with on-plot or non-sewered sanitation. In this power vacuum, a complex range of stakeholders have emerged for urban sanitation to provide individual or shared sanitation services in urban areas including: municipal/central government, private developers, informal private sector, water utilities, civil society (NGOs and CBOs) and individual households (Sansom, Scott and Cotton, 2012) .

Both market-driven and state-led efforts to improve sanitation in deprived communities tend to be severely compromised, as there is a lack of effective market demand (due to collective action problems) and severe barriers to the centralized provision of low-cost sanitation facilities. In principle, community-driven initiatives have a number of advantages (McGranahan, 2013).

However, community-driven sanitary improvements face serious challenges, including: 1) The collective action challenge of getting local residents to coordinate and combine their demands for sanitary improvement; 2) The co-production challenge of getting the state to accept community-driven approaches to sanitary improvement, and where necessary to co-invest and take responsibility for the final waste disposal; 3) The affordability challenge of finding improvements that are affordable and acceptable to both the state and the community and to other funders if relevant; 4) The trans-sectoral challenge of ensuring that other poverty-related problems, such as insecure tenure, do not undermine efforts to improve sanitation. But if community-driven efforts to improve sanitation in informal settlements explicitly tackle and surmount these challenges they are far more likely to succeed, and to be able to demonstrate the advantages of putting local residents and their organizations at the centre of sanitary improvement (McGranahan, 2013).

In Ashaiman, a low income urban area in Ghana, private providers are the main developers and managers of community toilet blocks, but these private providers have limited incentives to provide toilet blocks in poorer areas, where people's ability to pay is less; or to provide new toilet blocks which could take away customers from their existing toilet blocks (Mazeau, 2013). This suggests that there should be a greater role for Local Government and community groups, if services are to be improved for the poor.

2.3 Innovative approaches in urban sanitation

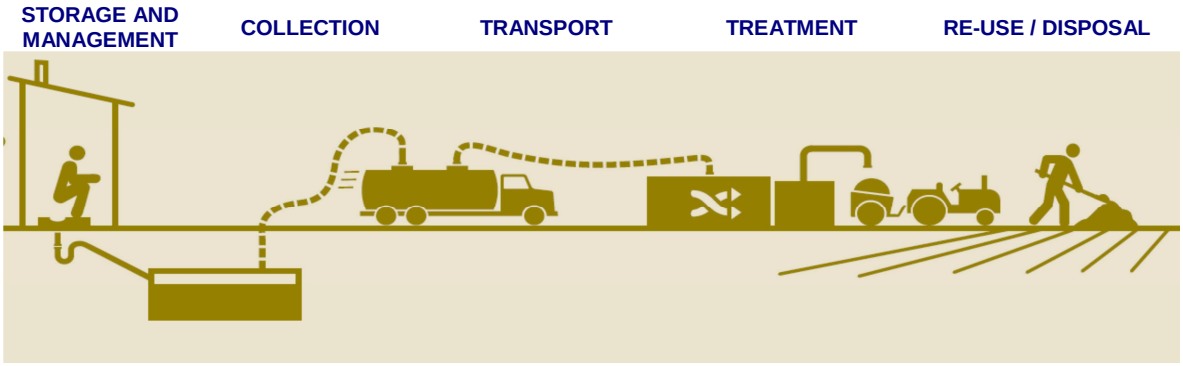
Supporting small scale sanitation providers in the sanitation service chain

To minimise pollution the arrangement of non-sewered sanitation services is often considered to be a series of services – termed the "*sanitation service chain*". Where there are no sewers transporting sewage from a household to a treatment facility in a continuous system, the *chain* consists of a series of separate activities – or services – that rely on the next step to "transport" sewage away from the latrine or septic tank. The chain of services starts with the service needs of a household latrine or public sanitation facility where excreta and wastewater are generated. The chain then supports the services needed in the environment around the latrine facility, then in the local neighbourhood and out to the wider urban area (such as a locality or ward, the whole town or city). It continues until the service chain ideally reaches a point where the waste can be safely treated, reused, or disposed of (Sansom, Scott and Cotton, 2012).

An effective system of sanitation provision relies on all the required stages of the chain working correctly. Where there is a break in the service chain, this risks human excreta getting out into the environment – with resulting risks to health and possible contamination of water supplies. At each stage of the sanitation service chain, a number of technical, management, operation and maintenance services will be necessary – from the household out to wider domains of the urban area. Where the municipality is not providing these services, non-state providers of sanitation services often fill the service gap. In a growing number of situations, municipalities work together with non-state actors (NGOs, the private sector, etc.) to provide the full chain of services.

Figure 2.2 The Sanitation Service Chain

The figure below (courtesy of The Bill and Melinda Gates Foundation) represents one example of how the sanitation service chain provides a connected system for managing human waste. There are many different ways in which the stages of the chain occur in reality. Examples are outlined for each stage.



STORAGE AND MANAGEMENT	COLLECTION	TRANSPORT	TREATMENT	RE-USE / DISPOSAL
Human excreta and anal cleansing materials are captured and stored in a latrine pit, vault, chamber, bucket, etc. In some cases the latrine is closed-off when it gets full and excreta are not removed.	The waste from a full latrine needs to be removed from storage. This may be done manually, or using automated equipment such as a vacuum tanker. Waste that is manually removed may be "managed" on site (e.g. re-buried or burned) or drained into a drain or watercourse – at which point the service chain stops. Ideally the waste is removed from site and transported away for safe disposal.	A form of transport (e.g. barrel, truck, vacuum tanker) removes the waste from site. In some cases the waste will be taken to a treatment plant. In other cases, the waste will be taken for disposal (e.g. to landfill), or for re-use (e.g. applied to land), without a treatment stage.	Waste may be treated at a formal wastewater treatment facility, if the private sanitation providers have been given permission to dispose of faecal sludge there. Alternatively, the waste may be taken to a privately owned treatment facility.	Treated waste may be sold to farmers, for applying to land as a fertilizer or soil conditioner. Untreated waste may be directly disposed of at landfill sites or at sea.

Image of the Sanitation Service Chain courtesy of the Bill and Melinda Gates Foundation – used with permission.

(Sansom, Scott and Cotton, 2012)

A common 'weak link' in the Service Chain is where owners or operators of individual or shared latrines or septic tanks face problems in arranging or paying for emptying, transport and safe disposal of the effluent. This is often due to access issues, or the affordability of the cost of emptying and transportation. It is evident in many urban areas that in such cases, people resort to draining effluent from latrines and tanks to nearby drains, holes or watercourses; thus causing pollution and environmental health problems. This problem is exacerbated where solid waste is dumped in such drains and watercourses, leading to blockages and sewage overflowing, particularly when it rains.

Non-state sanitation providers (NSSPs) are often the primary group ensuring that some level of sanitation service, however limited, is offered to the vast majority of poor households. Public agencies in developing countries usually have a small share of the sanitation market in terms of providing facilities for excreta disposal to the poor. There are many cases where the local municipality supports NSSPs at key stages of the sanitation service chain – such as by constructing

public latrine blocks that are leased-out to private operators (e.g. Kumasi in Ghana), or by allowing private tanker operators to discharge sewage sludge into the sewer network (e.g. Dakar in Senegal) (Sansom, Scott and Cotton, 2012).

Sanitation marketing

The two components of sanitation marketing that need to be balanced are generating demand for sanitation and increasing the supply of sanitation goods and services to meet that demand (Devine and Kullmann, 2011). Carrying out a detailed initial study of the potential market (user groups) and possible suppliers is essential to develop an appropriate marketing strategy. If sanitation marketing can be carried out successfully, there are many benefits to be gained:

- By addressing both the demand and supply sides of sanitation, households are helped to make decisions around latrine choices. The approach bases choice on identifying users motivations for sanitation, rather than only on health or commercial grounds;
- Involving the private and informal sector helps to establish or develop a stronger supply of sanitation services, such as latrine building, emptying septic tanks, or disposing of faecal sludge.

There have been some large successes attributed to sanitation marketing initiatives, but McGranahan (2013) found that what characterized the approach was not an emphasis on applying commercial marketing, but on upgrading the supply side by working with the private producers of sanitary services, and upgrading the demand side by working with various people active at the community level.

2.4 Case study countries

2.4.1 Cameroon

Access data

Figure 2.3 shows national data on the types of toilet facility used in Cameroon in 2004 and 2011. In 2004 approximately 26% of households had access to an improved latrine with 7% of households practicing open defecation. In 2011, the levels of access to improved latrines dropped significantly to 13% with a large rise in the proportion of households using an unimproved pit latrine. Levels of open defecation were the same in both 2004 and 2011.

Figure 2.4 shows the type of latrine available by place of residence. In 2004, 53% of households in urban areas had access to an improved latrine, but by 2011 the percentage had dropped to less than half the 2004 levels. In rural areas, the percentage of households with access to an improved latrine decreased to just 1.4% from a 2004 level of 13.5%. The levels of open defecation have remained similar in both urban and rural areas.

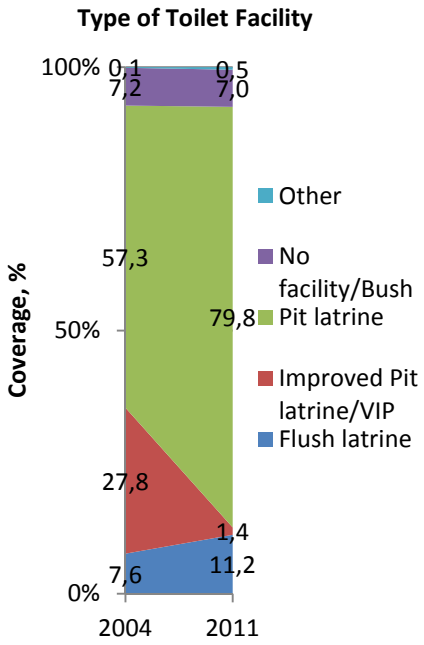


Figure 2.3 Type of toilet facility used in Cameroon in 2004 and 2011 (Source: DHS data)

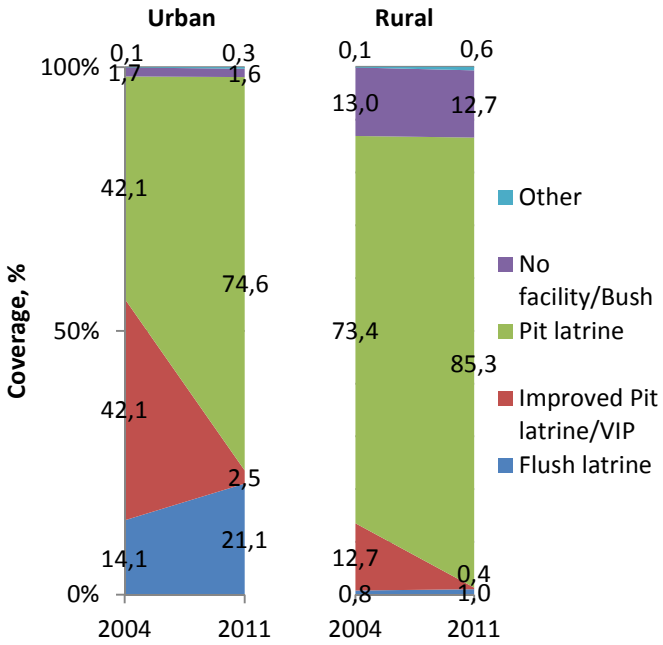


Figure 2.4 Type of toilet facility used by place of residence in Cameroon in 2004 and 2011 (Source: DHS data)

Figures 2.5 and 2.6 show the type of latrine facility in use by wealth quintile for urban (Figure 2.5) and rural (Figure 2.6) areas. In figure 2.5 the data for the poorest quintile in 2011 is not available and is therefore not presented.

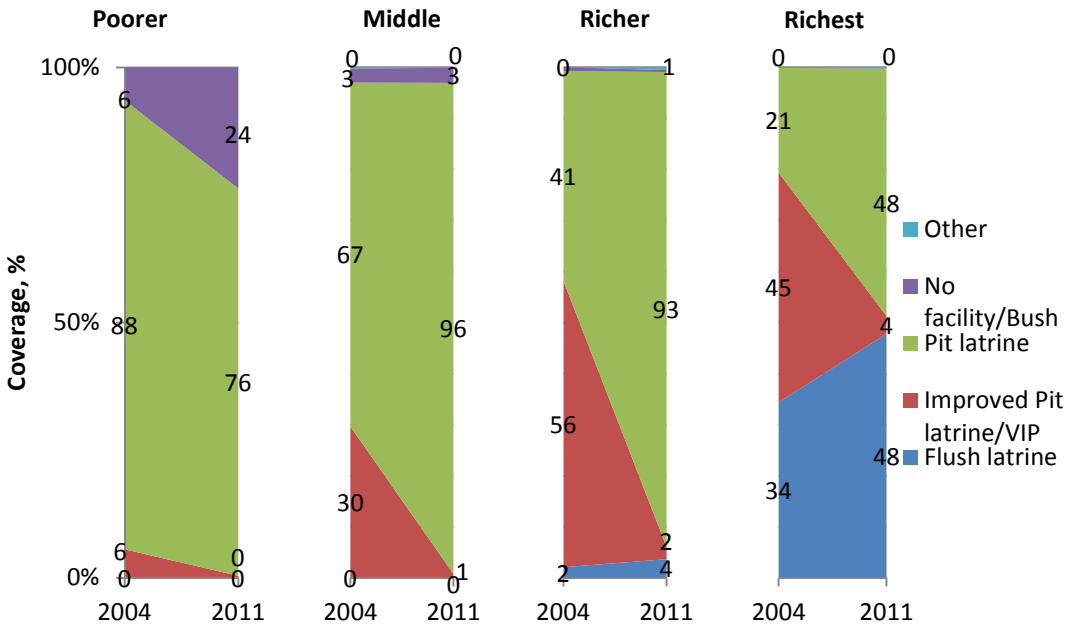


Figure 2.5 Access to type of latrine by wealth quintile from 2004 to 2011 in urban areas of Cameroon (Source: DHS data)

Figure 2.5 shows that access to improved pit latrines has decreased across all wealth quintiles in urban areas with the largest decreases occurring in the richer and richest quintiles. Access to improved latrines in the poorer quintile was much lower to begin with but over the 7 years the coverage of improved latrines has dropped to zero. The use of flush toilets is limited to the richer and richest quintiles. Levels of open defecation have increased significantly for households in the poorer quintile, rising by 18% over the 7 years between surveys.

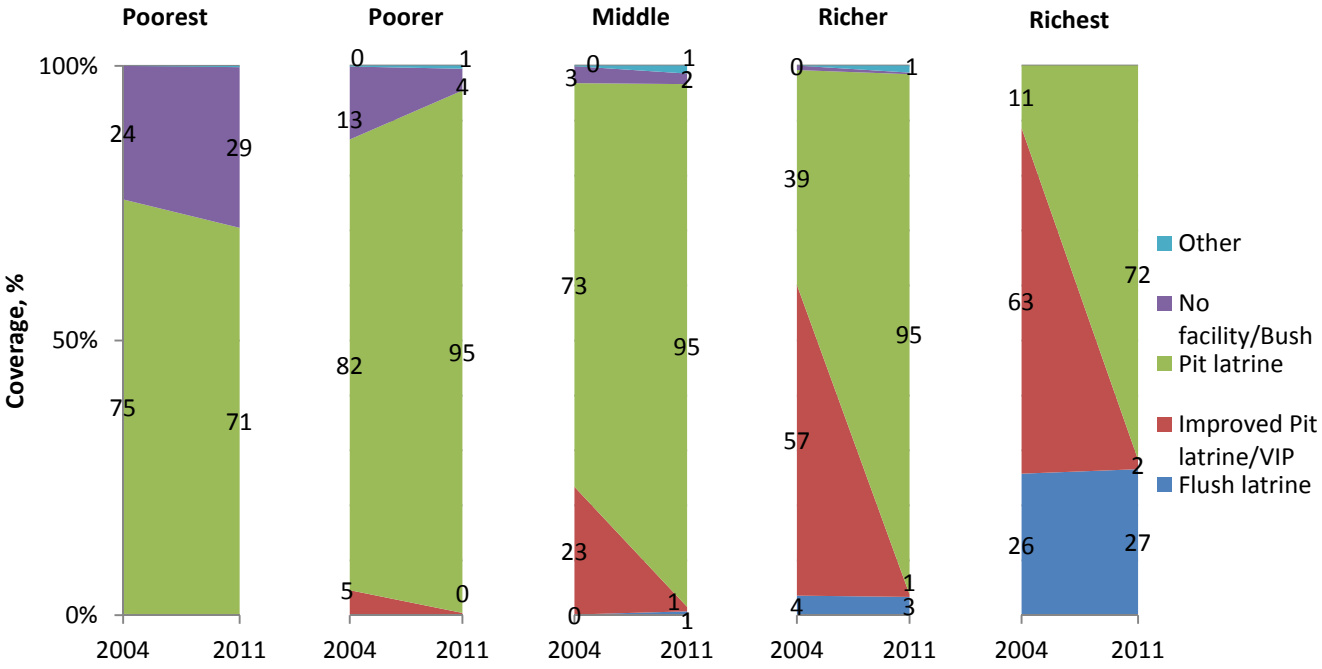


Figure 2.6 Access to type of latrine by wealth quintile from 2004 to 2011 in rural areas of Cameroon (Source: DHS data)

Figure 2.6 shows that for households in the poorest quintile in rural areas, open defecation increased and there is no access to any type of improved latrine. The most dramatic decrease in the use of improved latrines can be seen in the richest and richer quintiles where access to an improved latrine dropped from 89% to 29% and from 61% to just 4% respectively. From the poorer quintile through to the richest, the coverage of improved latrines has dropped dramatically with a majority of the rural population across all quintiles relying on unimproved latrines by 2011.

Figures 2.7 and 2.8 show the national, urban and rural statistics for sharing toilet facilities in Cameroon. The use of shared facilities has decreased in both urban and rural areas between 2004 and 2011 but the use of shared facilities is higher in urban areas than it is in rural areas. Almost half of the households in urban areas rely on shard latrines compared to around one third of households in rural areas.

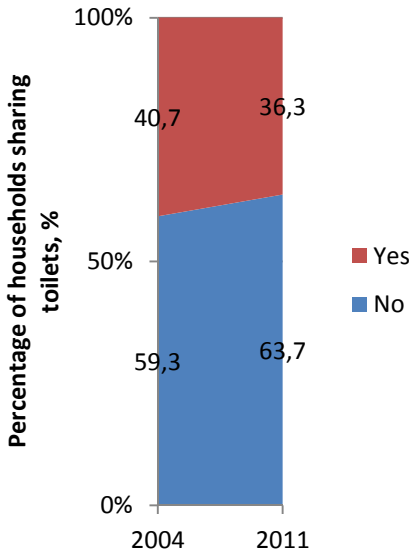


Figure 2.7 national data on sharing toilet facilities in Cameroon (Source: DHS data)

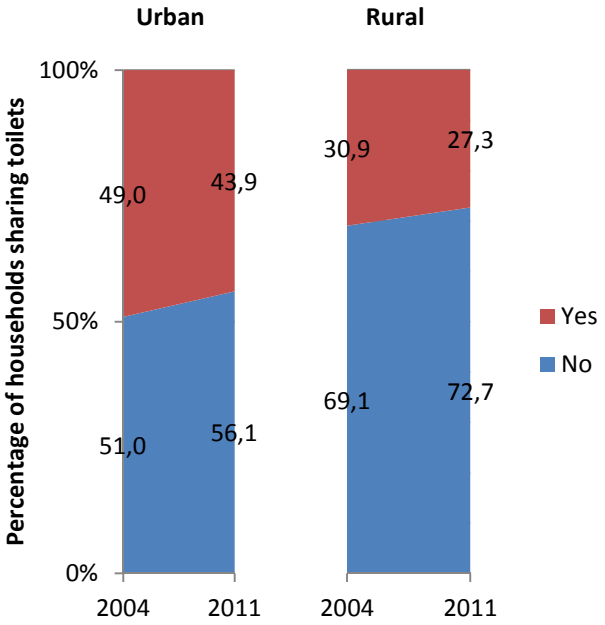


Figure 2.8 Sharing of toilet facilites according to place of residence in Cameroon (Source: DHS data)

Figure 2.9 shows the use of shared facilities according to wealth quintile in urban areas. The data for the poorest quintile in 2011 is not available, however, in 2004 80% of households in the poorest quintile did not share a latrine and only 20% did which is much lower than the figures for all the other quintiles, even the richest, where sharing was at 54% in 2004. The most significant increase in the levels of sharing is in the richer quintile where sharing has increased by 35% over the 7 years.

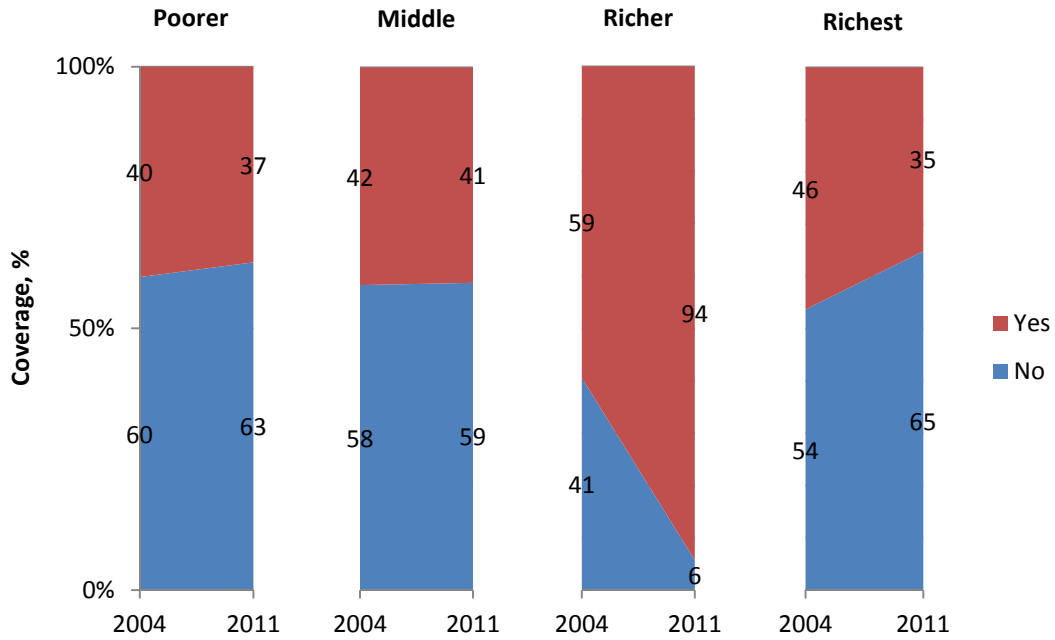


Figure 2.9 Sharing of toilet facilites by wealth quintile in urban areas in Cameroon 2004 and 2011 (Source: DHS data)

Figure 2.10 shows the sharing of facilities by wealth quintile for rural areas. Levels of sharing in rural areas have stayed relatively stable over the 7 years with the largest decrease occuring in the poorer quintile. The lowest level of sharing in any area and any quintile is the poorest quintile in rural areas which has a significanlty lower percentage of sharing than any of the other quintiles.

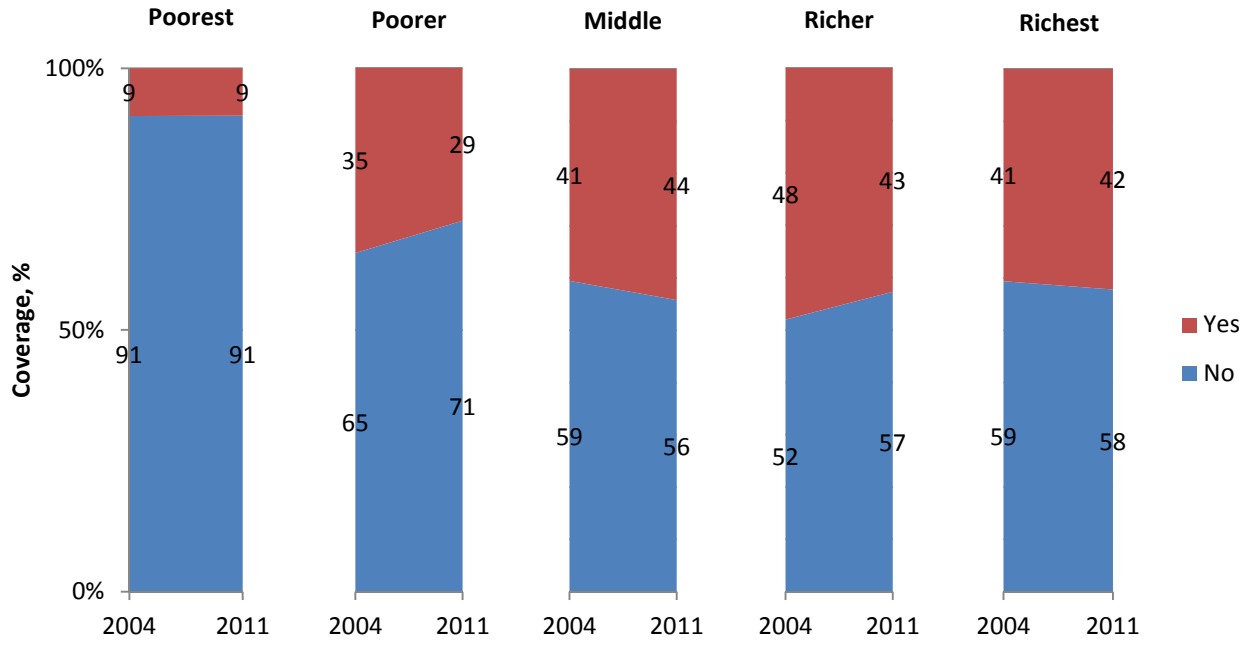


Figure 2.10 Sharing of toilet facilites by wealth quintile in rural areas in Cameroon 2004 and 2011 (Source: DHS data)

2.4.2 Ghana

Sector overview

Many residents in low income areas rely on the use of public latrines, however, the JMP does not consider a public latrine to be 'improved' and as such access to improved latrines is estimated to be just 18% (WHO/UNICEF, 2012). In Accra, most per-urban communities are described as having slum-like characteristics in the centre with better planned infrastructure at the periphery. The sewerage system does not extend to any peri urban areas and as such liquid waste management is left to the communities themselves. It is estimated that 50% of newly built houses have flush toilets connected to septic tanks but the rest still depend on pit and pan latrines (Norstrom *et al*, 2009). There are 3 septic treatment plants which should accept waste collected by service providers, however, none of the 3 are in operation and consequently, untreated liquid waste is discharged directly into the sea.

In Kumasi, the Strategic Sanitation Plan for Kumasi makes the following recommendations for sanitation systems; simplified sewerage for densely populated areas, VIPs for moderately populated areas and septic tanks in low density areas. In areas where septic tanks are used they rarely function properly and tend to overflow which results in surface water pollution (Owusu-Addo, 2006).

Where public toilets are used, the maintenance and management of these facilities is supposed to be coordinated by the local Unit Committees which act as intermediaries between the city council and local communities. However, there are several challenges faced by the Unit Committees

including the inability to raise sufficient funds and the dumping of solid waste by resident. Public toilets have to be de-sludged every six weeks at a cost of 34 USD each time. Not all Unit Committees are able to pay this rate in addition to covering the other operation and maintenance costs which can result in low levels of maintenance and frequent breakdowns. The aim is to reduce the dependence on public latrines by improving access to household latrines in the long term but the MDG target will definitely not be met.

Access data

Figure 2.11 shows the types of toilet facility used in Ghana in 1998 and 2008. In 1998 approximately 33% of households had access to an improved latrine with 20% of households practicing open defecation. In 2008, the levels of open defecation were similar to those in 1998 but the number of households with access to an improved latrine increased to 56%.

Figure 2.12 shows the type of latrine used by place of residence. In 1998, 55% of households already had access to an improved latrine. By 2008, access had increased to over 80%. However, in rural areas, only 20% of households had access to an improved latrine in 1998 rising to 33% in 2008. Between 1998 and 2008, open defecation decreased in urban areas but increased in rural areas.

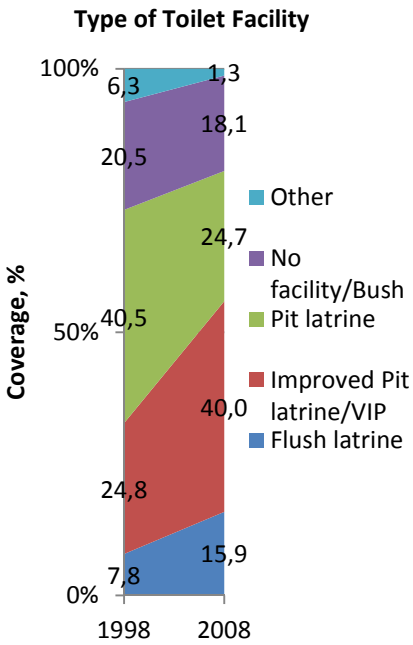


Figure 2.11 Type of toilet facility used in Ghana in 1998 and 2008 (Source: DHS data)

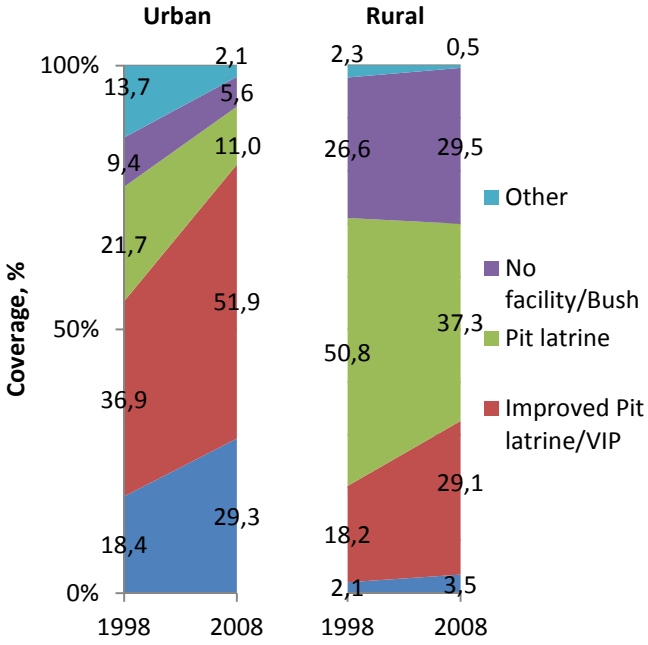


Figure 2.12 Type of toilet facility used by place of residence in Ghana in 1998 and 2008 (Source: DHS data)

Figures 2.13 and 2.14 show the levels of access to improved sanitation services by wealth quintile from 1998 to 2008 in both urban and rural areas of Ghana. In urban areas, the use of improved latrines has increased across all wealth quintiles but the greatest increase occurred in the poorer quintile which rose from 7% in 1998 to 51% in 2008. Rates of open defecation have only increased in the poorest quintile, in all others they have decreased, reaching zero in the richest quintile.

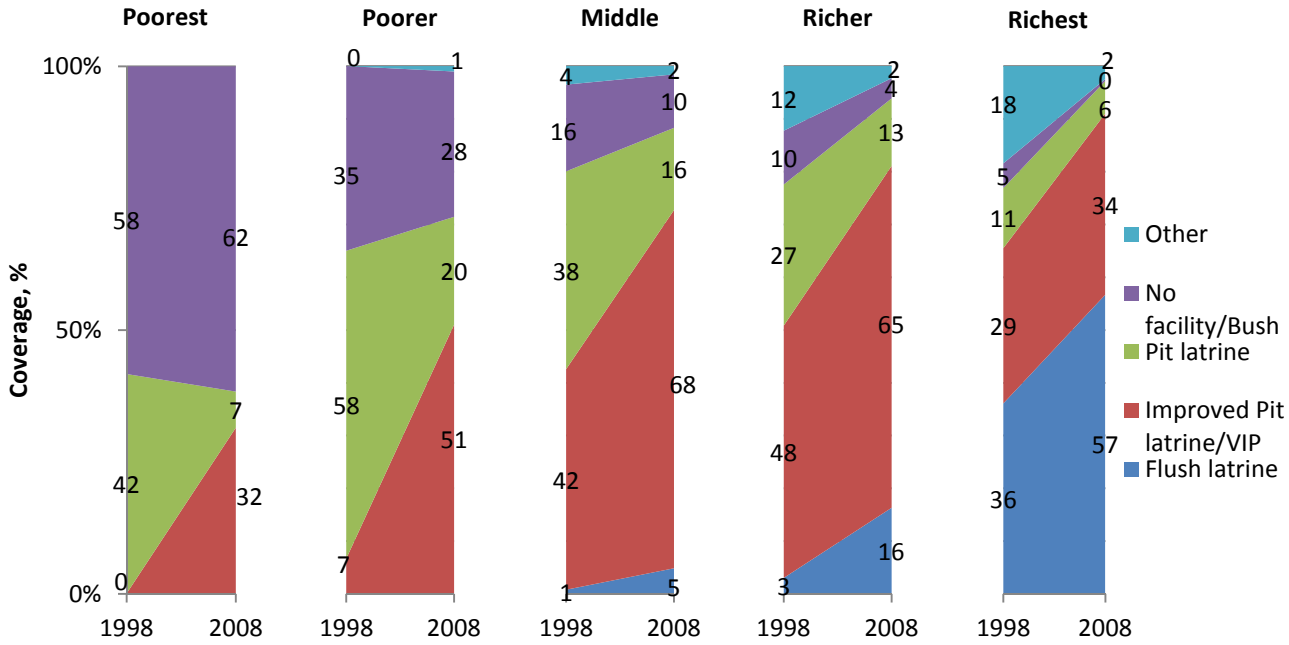


Figure 2.13 Access to type of latrine by wealth quintile from 1998 to 2008 in urban areas of Ghana
(Source: DHS data)

In rural areas open defecation also increased in the poorest quintile but decreased across the others. Once again, rates of access to improved latrines increased the most in the poorer quintile, growing by 23% over the 10 years.

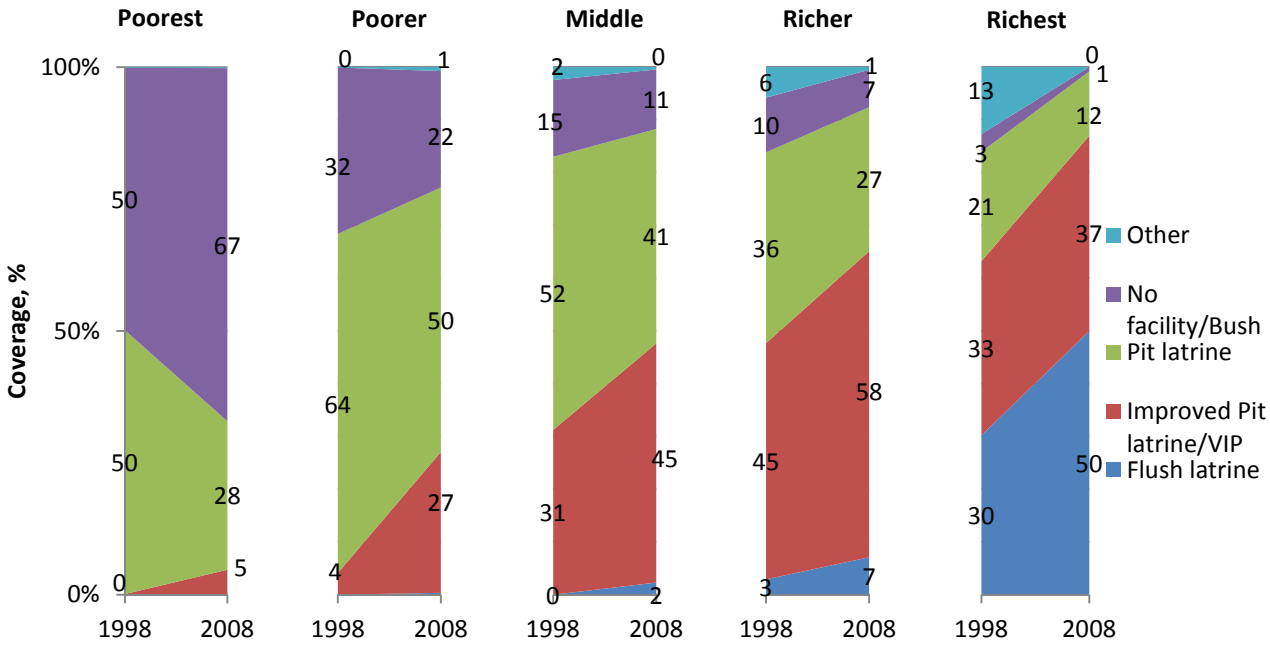


Figure 2.14 Access to type of latrine by wealth quintile from 1998 to 2008 in rural areas of Ghana
(Source: DHS data)

In terms of sharing facilities, a majority of the households in both urban and rural areas rely on shared sanitation facilities as shown in figure 2.15.

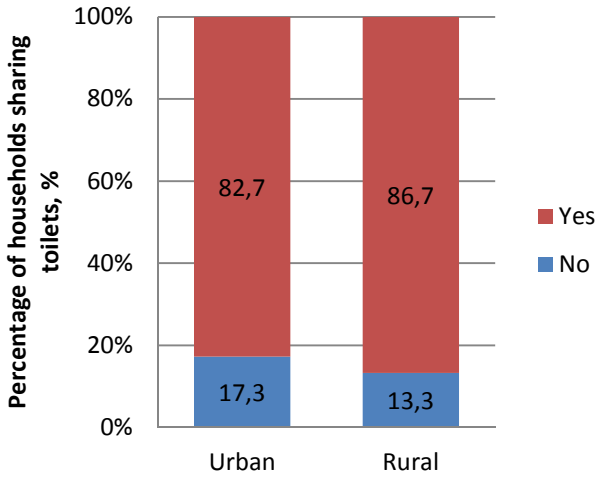


Figure 2.15 National data on sharing toilet facilities in Ghana in 2008 (Source: DHS data)

Figures 2.16 and 2.17 show the percentage of households using shared toilet facilities in both urban and rural communities by wealth quintile in 2008. Those in the poorest quintile rely exclusively on shared toilets but even in the richest quintile, 66% of households rely on shared toilets.

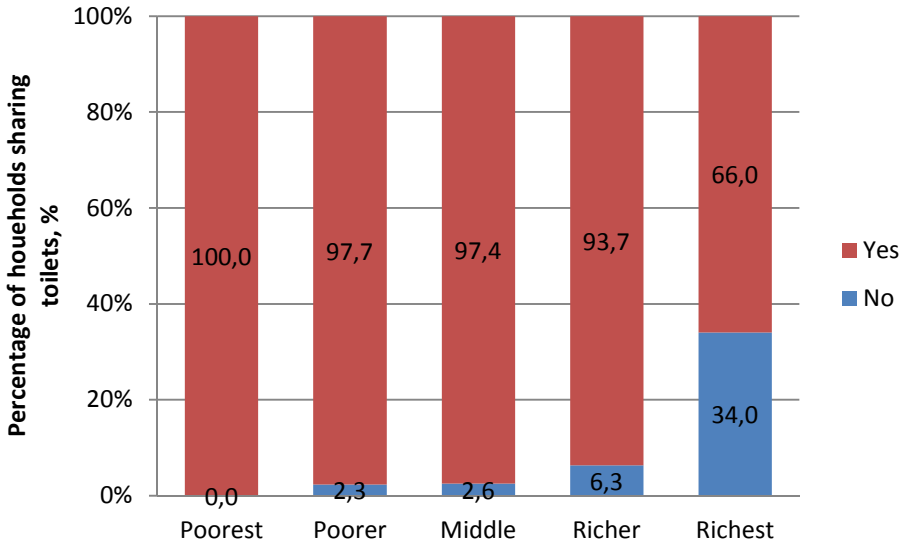


Figure 2.16 Sharing of toilet facilites by wealth quintile in urban areas in Ghana 2008 (Source: DHS data)

Figure 2.17 shows that the poorest quintile in rural areas appears to have one of the lowest levels of sharing, beaten only by the richest quintile in urban areas. However, the percentages presented represent only shared 'improved' facilities whereas the urban/rural data includes sharing of any facility and includes the households which have no facility and practice open defecation. Therefore, lower levels of sharing are in this case indicative of higher levels of open defecation as shown in figure 2.13. Overall, the very high levels of sharing across the wealth quintiles in both urban and rural areas demonstrate the important role that shared facilities have in providing people with access to some type of facility in Ghana.

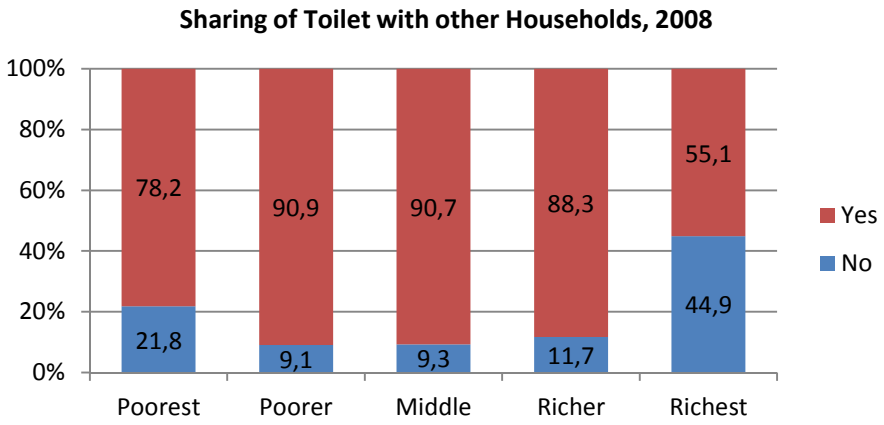


Figure 2.17 Sharing of toilet facilites by wealth quintile in rural areas in Ghana 2008 (Source: DHS data)

2.4.3 Rwanda

Sector overview

In 2002, the administrative structure of Rwanda was changed in line with the decentralization policy. Districts were created, originally 106 there are now 30, and urban towns were incorporated into urban municipalities. In many cases, large rural areas were included in the new urban municipalities. As the urban areas expanded into the formerly rural areas they were separated into smaller sectors. Kigali grew from 3 sectors to 8. In 2006, urban municipalities were abolished and replaced with an urban centre for each district.

The most common type of latrine used in Rwanda is a pit latrine without a slab. The percentage of households with improved latrines is higher in urban areas than it is in rural areas but the use of a flush toilet is still relatively uncommon even in urban areas. The levels of open defecation are very low at around 2%. The low use of flush latrines is attributed to the availability of piped water into houses.

Access data

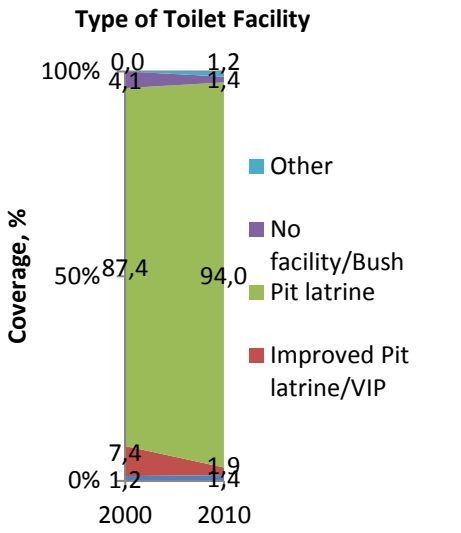


Figure 2.18 Type of toilet facility used in Rwanda in 2000 and 2010 (Source: DHS data)

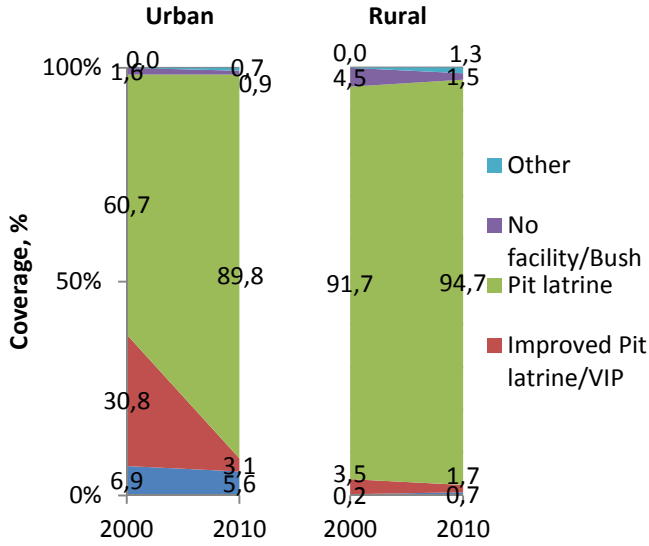


Figure 2.19 Type of toilet facility by place of residence in Rwanda in 2000 and 2010 (Source: DHS data)

Figures 2.18 and 2.19 show the type of toilet facility used nationally in Rwanda and by place of residence. Levels of open defecation are incredibly low in both urban and rural areas at just 0.9 and 1.5% respectively. Coverage of latrines in high but the majority of those latrines are unimproved. In urban areas just 8.7% of households had an improved latrine in 2010 and just 2.4% of rural households. Flush toilets are almost exclusively found in urban areas.

Figures 2.20 and 2.21 show the type of facility used according to wealth quintile and place of residence. In both urban and rural areas, the richest quintile has seen the largest drop in access to improved services between 2000 and 2010. This is most likely attributable to a lack of maintenance of the latrines or to a re-classification of what constitutes an improved latrine between 2000 and 2010. In both urban and rural areas the poorest and poorer quintiles have slightly increased levels of open defecation.

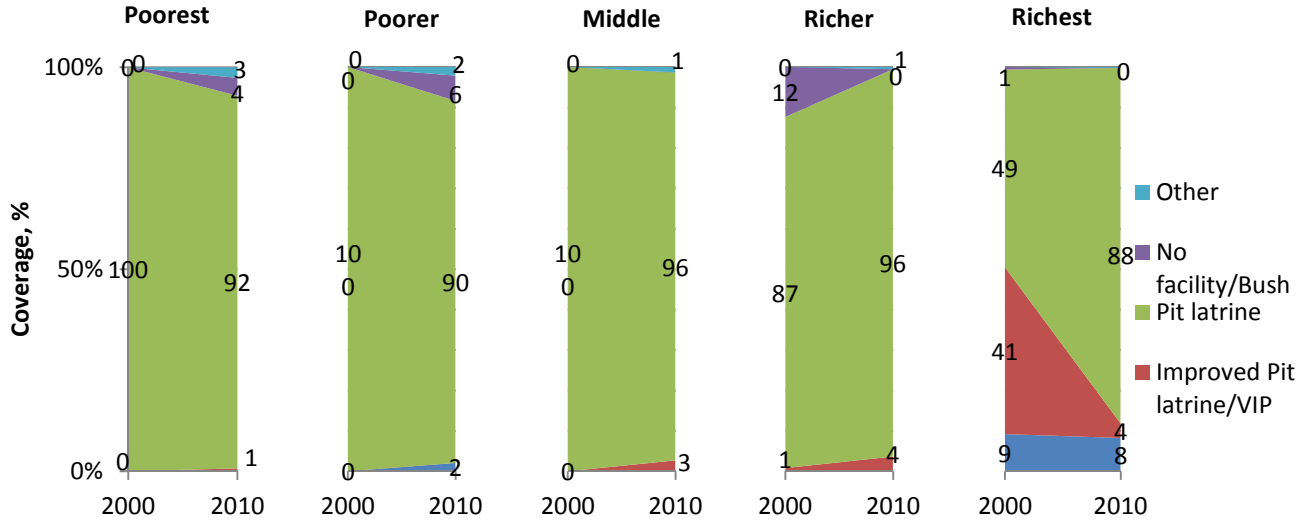


Figure 2.20 Access to type of latrine by wealth quintile from 2000 to 2010 in urban areas of Rwanda (Source: DHS data)

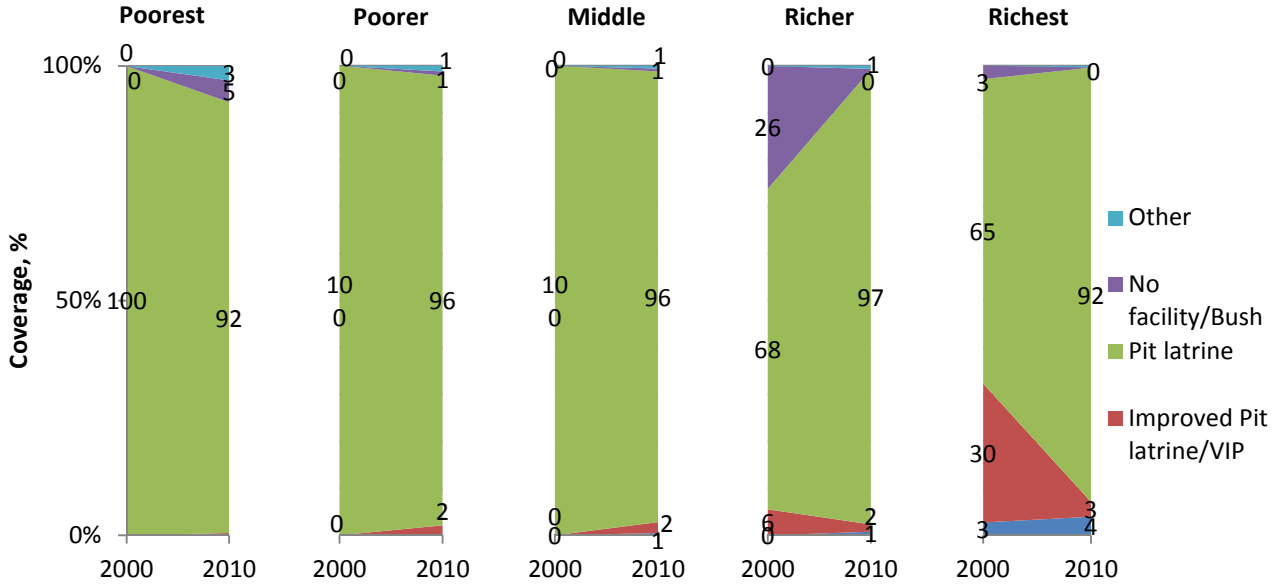


Figure 2.21 Access to type of latrine by wealth quintile from 2000 to 2010 in rural areas of Rwanda (Source: DHS data)

In terms of sharing access to latrines, figures 2.22 and 2.23 present the situation nationally and by place of residence. In both urban and rural areas, the number of households sharing latrines has increased but a larger proportion of urban residents have shared access compared to rural residents.

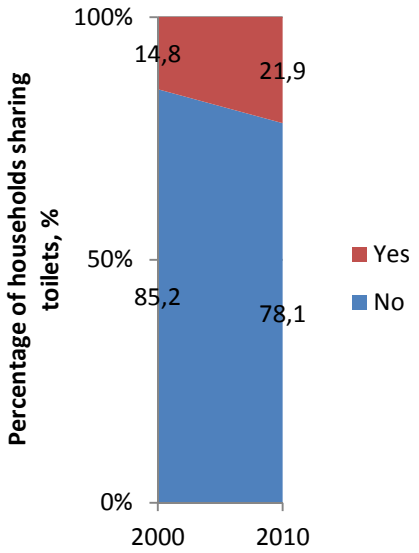


Figure 2.22 National data on sharing toilet facilities in Rwanda (Source: DHS data)

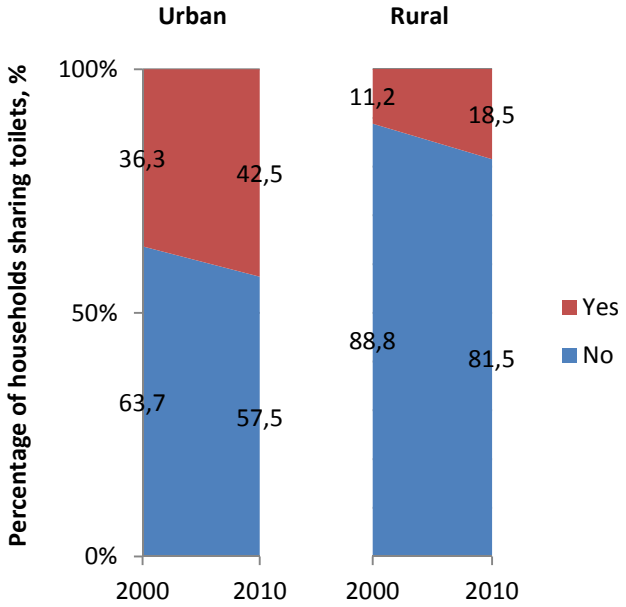


Figure 2.23 Sharing of toilet facilities by place of residence in Rwanda 2000 and 2010 (Source: DHS data)

Figure 2.24 shows that for shared facilities, households in the richer and richest quintiles in urban areas are more likely to have shared access than those in the poorer and poorest quintiles. Households in the middle quintile have the lowest levels of sharing, however, the percentage of households in the middle quintile sharing access rose by the largest amount across the decade. This may therefore be indicative of an increasing trend towards sharing for the middle quintile.

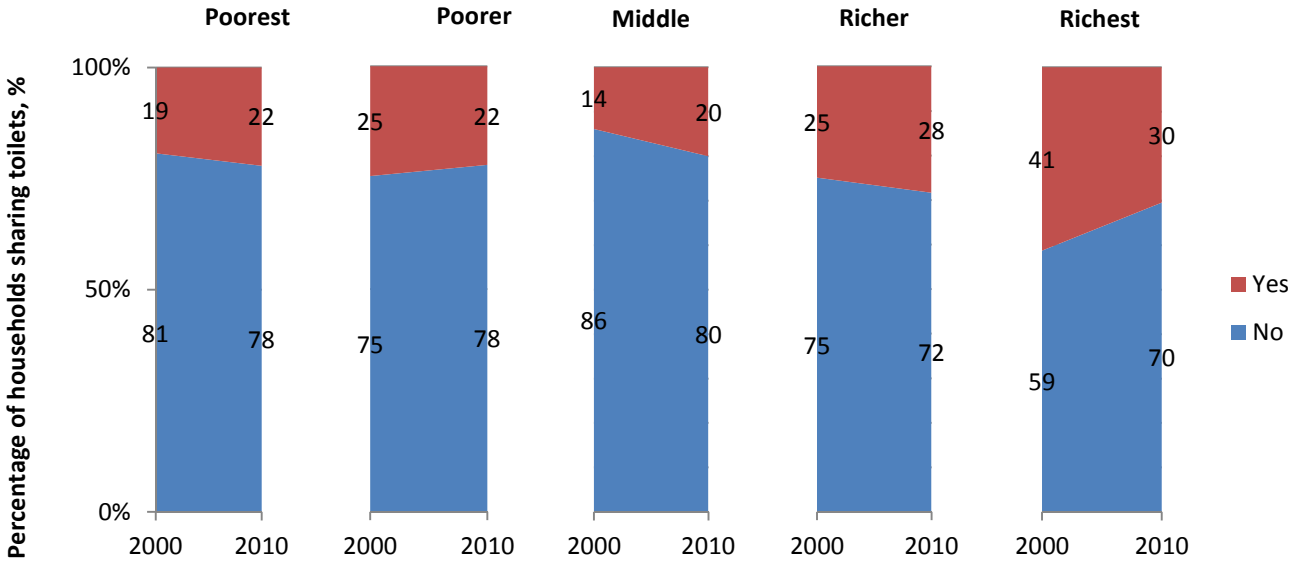


Figure 2.24 Sharing of toilet facilities by wealth quintile in urban areas of Rwanda 2000 and 2010 (Source: DHS data)

Figure 2.25 shows that levels of sharing in rural areas are lower than those in urban areas across all wealth quintiles. Levels of sharing have increased across all wealth quintiles with those in the poorest having the highest levels of shared access and the largest increase in levels of shared access over the decade.

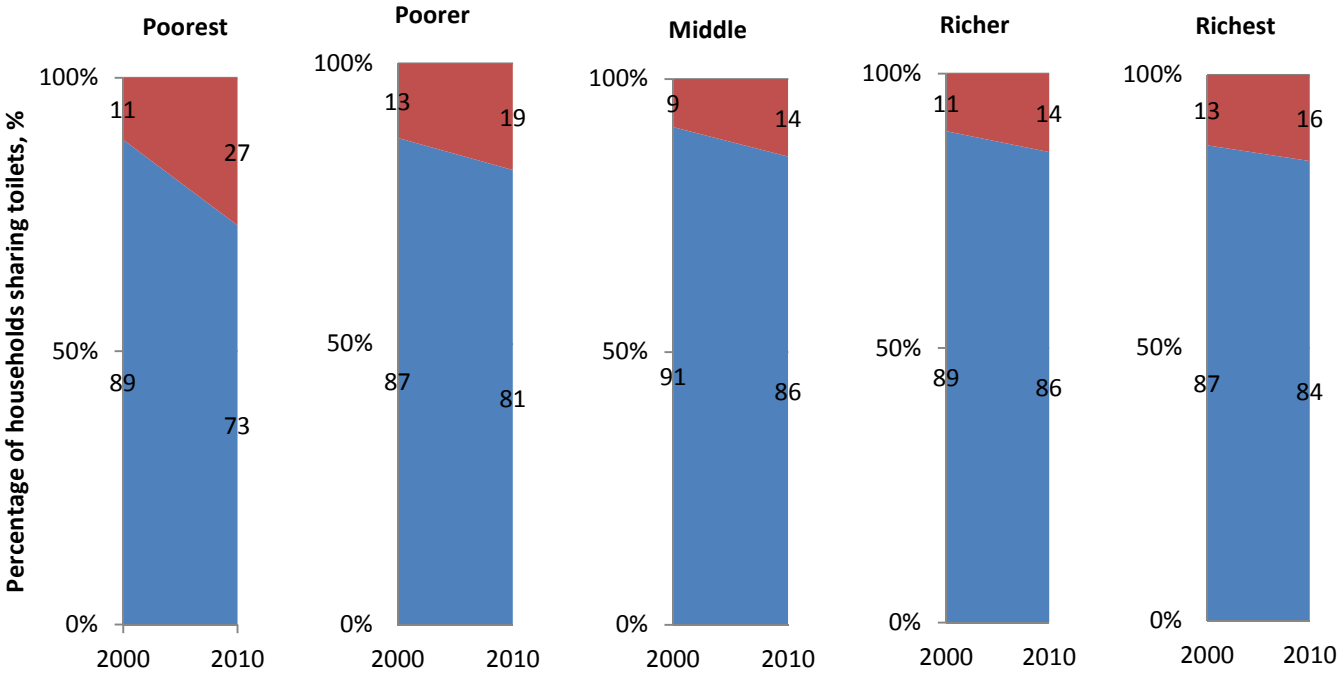


Figure 2.25 Sharing of toilet facilities by wealth quintile in rural areas of Rwanda 2000 and 2010 (Source: DHS data)

2.4.4 Tanzania

Sector overview

Traditional pit latrines are the most common type of latrine facility used in mainland Tanzania. VIPs are used by some households but open defecation remains a challenge as well. VIP and flush toilets are more commonly found in urban areas rather than rural ones. Those in the poorest wealth bracket are the most likely to have no latrine. The government has made efforts to increase levels of access to both water and sanitation in low income and peri –urban areas but one of the biggest challenges is how to deal with waste water hygienically.

Access data

Figures 2.25 and 2.26 show the type of toilet facility used nationally and by place of residence. The use of unimproved pit latrines is still high in both urban and rural areas but the use of improved facilities has increased more in urban areas than in rural areas over the 11 years. Open defecation has increased in both urban and rural areas.

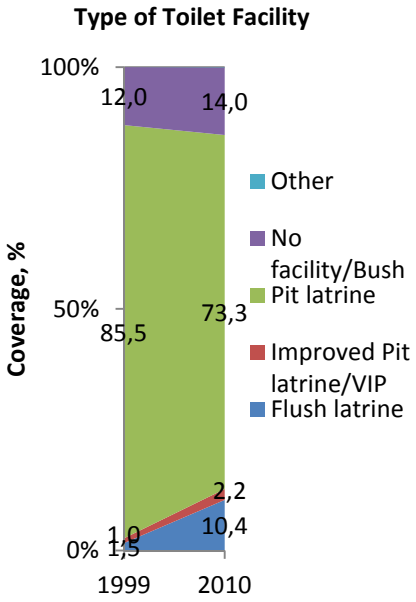


Figure 2.25 Type of toilet facility in Tanzania 1999 and 2010 (Source: DHS data)

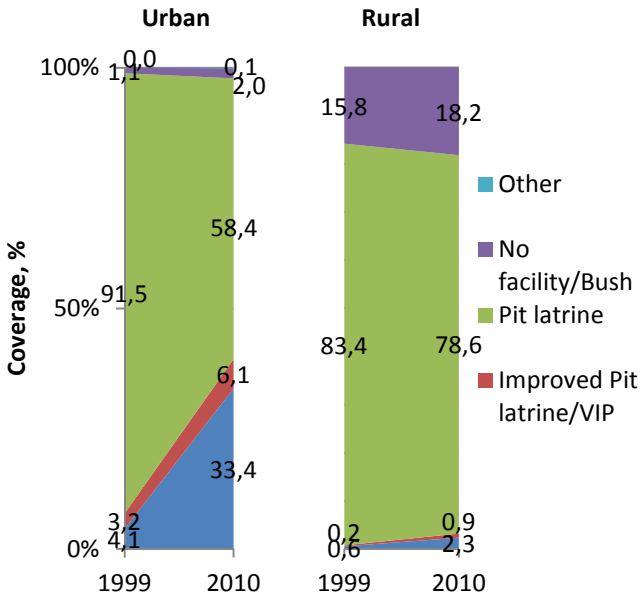


Figure 2.26 Type of toilet facility by place of residence in Tanzania 1999 and 2010 (Source: DHS data)

In figure 2.26 it appears that access to flush toilets is relatively high in urban areas but figure 2.27 shows that access to flush toilets is limited to the richer and richest wealth quintiles. The same is true in rural areas with just 1% of the middle quintile having access to flush toilets.

Figures 2.27 and 2.28 show that in both urban and rural areas, open defecation in the poorest quintile has decreased. In urban areas the percentage of improved latrines in the poorest quintile has increased but in rural areas the poorest and poorer quintiles rely exclusively on unimproved facilities. In the poorer and middle quintiles, in both urban and rural areas open defecation has worsened and apart from 1% access to flush toilets in the middle quintile in rural areas there is no access to any other type of improved facility.

Figure 2.27 Access to type of latrine by wealth quintile from 1999 to 2010 in urban areas of Tanzania (Source: DHS data)

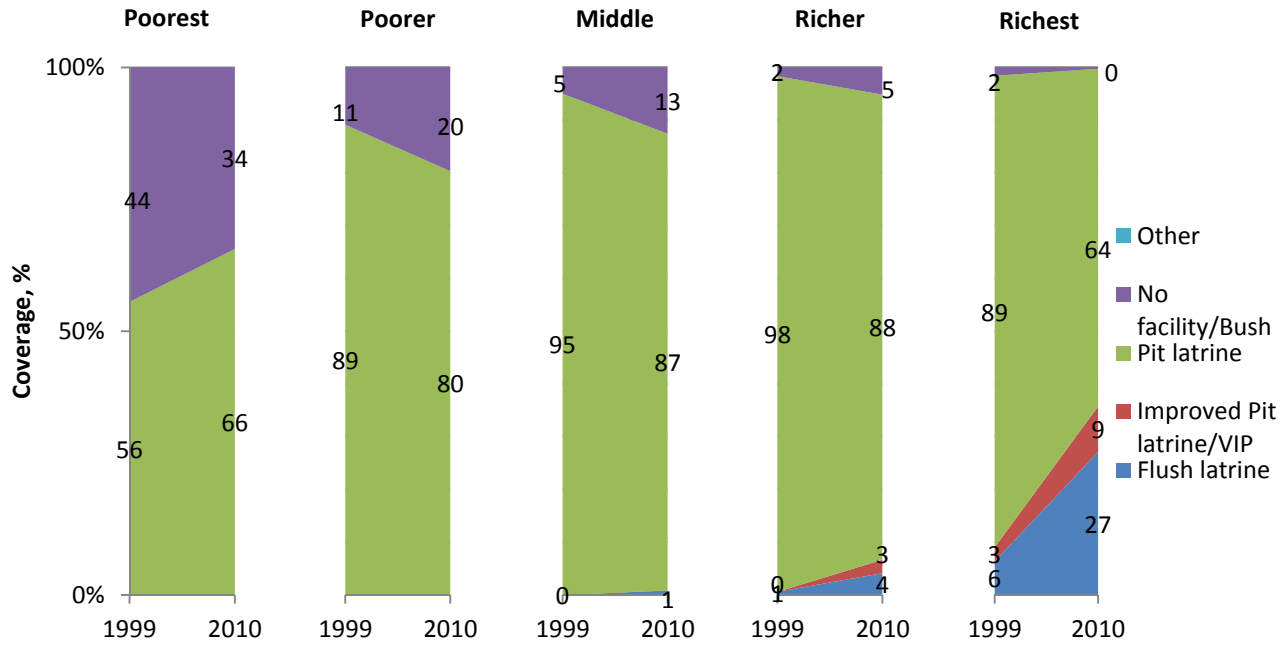


Figure 2.28 Access to type of latrine by wealth quintile from 1999 to 2010 in rural areas of Tanzania (Source: DHS data)

Figure 2.29 shows that sharing toilet facilities is much more common in urban areas than it is in rural ones with twice as many households sharing.

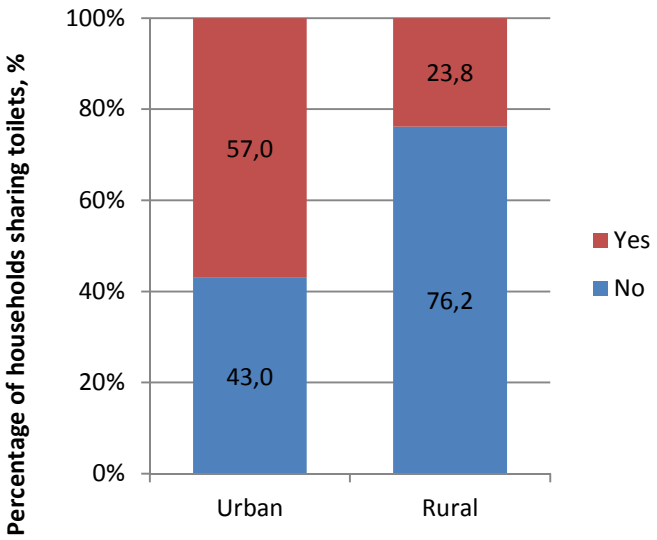


Figure 2.29 National data on sharing toilet facilities in Tanzania 2010 (Source: DHS data)

In urban areas, those in the richer and richest quintiles have higher levels of sharing than the poorest, as shown in figure 2.30. The levels of sharing in the poorest quintile are almost one third of the levels found in the richer quintile which has the highest levels of sharing. Figure 2.31 shows that in rural areas, the percentage of households sharing facilities is relatively similar across the wealth quintiles with those in the richer quintile having the highest levels of sharing.

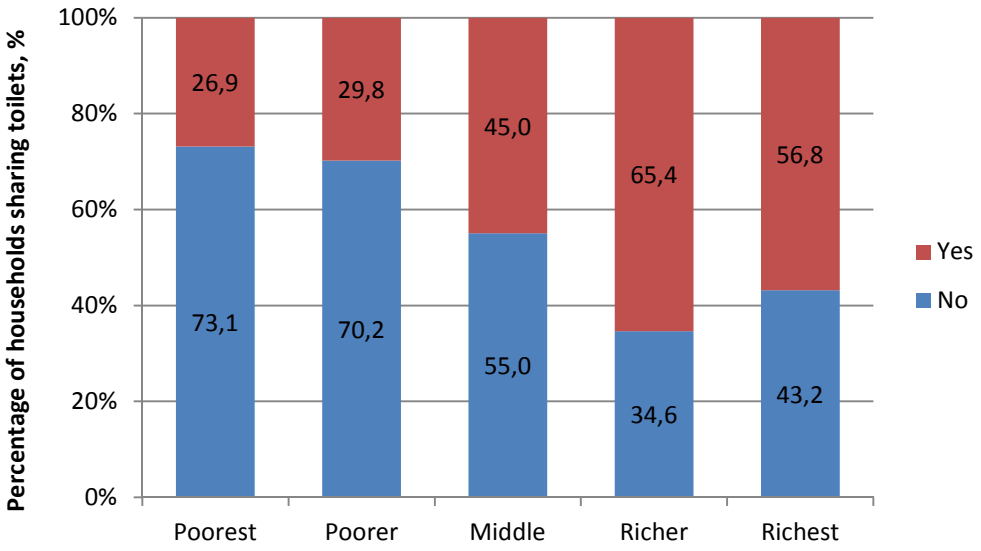


Figure 2.30 Sharing of toilet facilites by wealth quintile in urban areas of Tanzania 2010 (Source: DHS data)

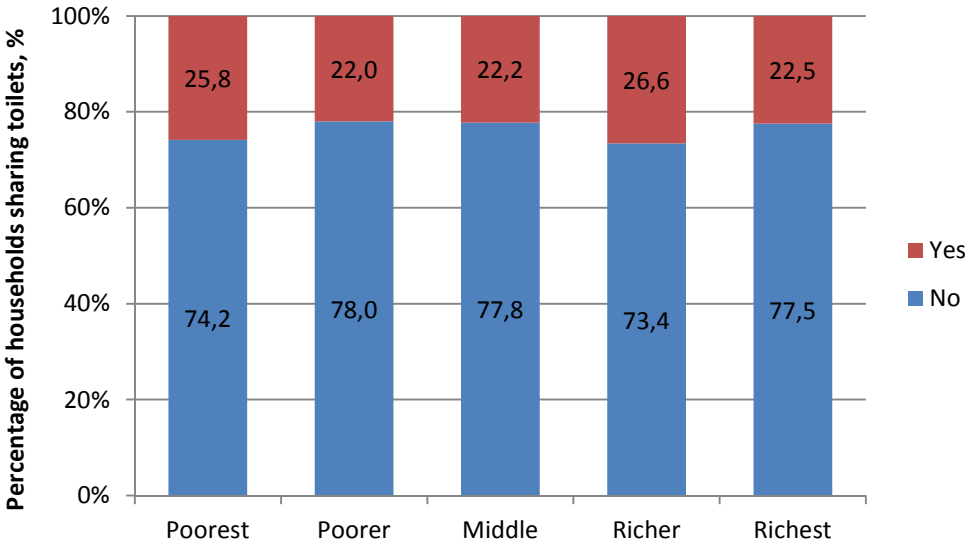


Figure 2.31 Sharing of toilet facilities by wealth quintile in rural areas of Tanzania 2010 (Source: DHS data)

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3. State of the Art Overview for Water Supply in Sub-Saharan Africa

Overall, Sub-Saharan Africa is not on track to meet the MDG drinking water target by 2015, although individual countries are expected to achieve the target (AMCOW, 2012). This is in part due to broader difficulties of population growth and poverty. We explore the varying reasons and challenges for inadequate services in both rural and urban water services in the following sections, after examining patterns of access data for each of the study countries.

3.1 Patterns of access to rural water

A comparison of levels of rural water services for the four countries is presented in Table 3.1. There have been encouraging improvements in access to improved rural water sources in Ghana, whilst access rates have remained approximately the same in the other three study countries.

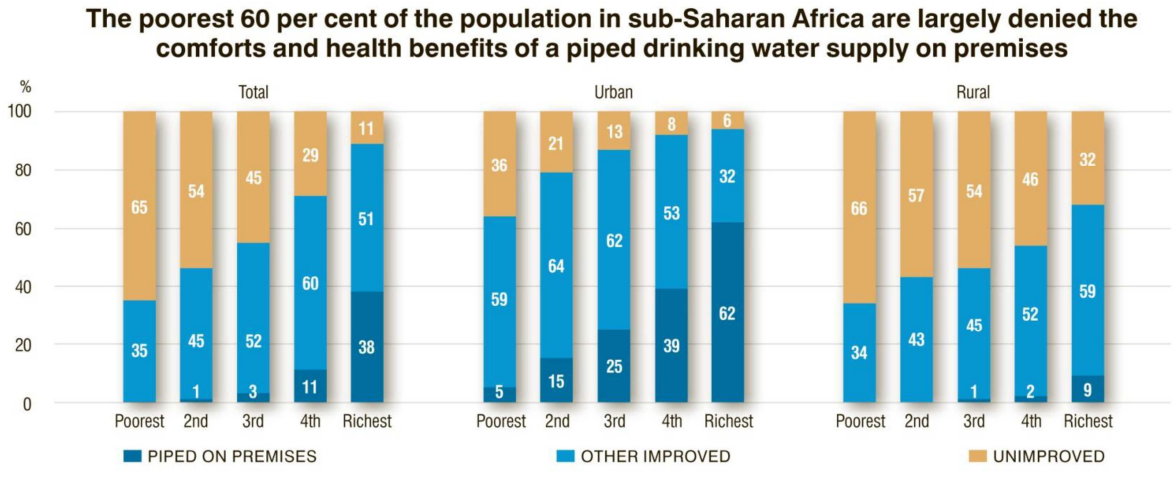
Table 3.1 Percentage of rural population using improved water sources

Country	1990	2000	2010
Ghana	36%	58%	80%
Cameroon	37%	37%	36%
Rwanda	64%	63%	63%
Tanzania	46%	45%	44%
Sub-Saharan Africa	36%	42%	49%

UNICEF,JMP, 2012

Almost five times as many people in rural areas are without an improved drinking water source than in urban areas. Also since 1990, the rural population in Africa without an improved drinking water source increased by 35 million (AMCOW, 2012), which shows that despite considerable investments, difficulties have been experienced in keeping pace with population growth. A comparison of the level of water services for both rural and urban areas is provided in the following extract from the UNICEF JMP document, based on income quintiles (Figure 3.1).

Figure 3.1 A comparison of the level of water services in rural and urban areas by income quintile



Sub-Saharan Africa: Drinking water coverage by wealth quintiles and urban or rural areas, based on population-weighted averages from 35 countries

Source: MICS and DHS surveys from 35 countries in sub-Saharan Africa, 2004-2009

WHO/UNICEF JMP, 2012

Note that for the poorest two quintiles, the level of service for both rural and urban dwellers is similarly low, with only 34 to 45% having access to improved water supplies and little or no access to piped water supplies. While the proportion of people in the richer urban income quintiles have better services such as piped water in their premises, compared with rural dwellers. This would suggest that improvements in water services, is not necessarily a driver for poorer families to migrate from rural to urban areas. But it would be interesting to test this as part of field research on this project.

3.2 Rural water challenges and barriers

The management of rural water supplies in Sub-Saharan Africa generally follows the 'community management model', where village water and sanitation committees are held responsible for the management of their water systems, including operation and maintenance and cost recovery. Varied levels of support are provided by Local Government and NGOs to assist these village committees in their management tasks. However, **'**despite the blanket application of community management of rural water supplies in Sub-Saharan Africa, the sustainability of such interventions remains woefully inadequate. It is currently estimated that 35% of all rural systems in Sub-Saharan Africa are not functioning' (Harvey and Reed, 2007).

'Given the limitations of community management, successful approaches to support community management should be extended and alternatives sought' (UNICEF and WHO, 2011). Whilst Local Government struggles to provide adequate support to village water sanitation committees who manage their water services, more focus is now given to supporting the local private sector to play a more active role in the supply of hand pump spares and undertaking repairs. Whilst there has been some success in encouraging the private sector, a key issue is the lack of economies of scale to achieve viable business opportunities for local private providers in many areas (Harvey and Reed, 2007; Sansom and Koestler, 2009). Research has been commissioned by a number of key sector stakeholders to review the sustainability of approaches to rural water services and consider the way forward.

3.3 Patterns of access urban water

The provision of adequate urban water services is key to effective urban development. Trends in overall urban water service provision for SSA can be demonstrated by comparison with other regions. Table 3.2 shows trends in urban water service levels in three regions. It is evident that although some improvements have been achieved in the use of improved water sources, this has only been by 1 or 2% in all regions over a period of 10 years. Despite the national investments to achieve MDG targets, use of improved urban water sources has only really kept pace with population growth.

Table 3.2 Urban water service level trends by region

	South Asia		South East Asia		Sub-Saharan Africa	
Year	**2000**	**2010**	**2000**	**2010**	**2000**	**2010**
Percentage of households with piped water into dwelling or yard	52%	51%	46%	53%	43%	34%
Total percentage who use improved water sources	92%	94%	92%	94%	82%	83%

(UNICEF, JMP, 2012)

In terms of the percentage of households with piped water into dwelling or yard, there is much scope for improvement. In SSA the average percentage of households with piped water has reduced by 9% to 34% over 10 years. This would suggest that there is a lack of investment in water supply infrastructure, and there is room for improvement in utility performance. There are, however, utilities that have performed well in Africa and is important to learn lessons from those organizations.

Inequality is evident in urban water services, with only 5% of the poorest income quintile of the urban population having piped water in Sub-Saharan Africa (UNICEF JMP, 2012). Hence 95% of the poorest 20%, who usually live in informal settlements, are not direct customers of the local water utility. Water utilities in Africa therefore face a huge challenge in serving these communities with piped water. Table 3.3 shows trends in urban water service levels in the four study countries in Africa.

Table 3.3 Percentage of urban population using improved water sources and piped water

Country	Percentage of households using an improved source	1990	2000	2010
Ghana	**Improved water source**	**84%**	**87%**	**91%**
	Piped water in premises	41%	37%	33%
Cameroon	**Improved water source**	**76%**	**86%**	**95%**
	Piped water in premises	23%	25%	26%
Rwanda	**Improved water source**	**95%**	**86%**	**76%**
	Piped water in premises	33%	23%	13%
Tanzania	**Improved water source**	**94%**	**87%**	**79%**
	Piped water in premises	33%	29%	24%
Sub-Saharan Africa	**Improved water source**	**83%**	**82%**	**83%**
	Piped water in premises	43%	39%	34%

(UNICEF, JMP 2012)

Both Cameroon and Ghana have shown clear improvements in the percentage of urban people who use 'improved' or potentially hygienic water sources. Apart from Cameroon, the other three countries have declining proportions of households with piped water in their premises. Despite an increase in drinking water coverage from 56 per cent in 1990, to 66 per cent in 2010, the population in Sub-Saharan Africa relying on unimproved drinking water source increased from 279 million in 1990, to 344 million in 2010 (AMCOW, 2012).

Increasing access to piped water supply and sewage connections on plot is the intervention that has the largest health impact of all water and sanitation interventions, although they are the most expensive service options (Haller et al, 2007). The lack of piped water on the premises also means increased time spent on collecting water from alternative sources and less opportunity for business requiring water inputs (Bosch et al, 2001). So lack of piped water in or near a house or premises hampers economic growth in urban areas.

3.4 Barriers to improved water services

Water kiosks are widely used in areas where utilities have limited water resources or insufficient piped water distribution capacity. But, in general terms, water kiosks are a very basic form of water service, which can be time-consuming and inconvenient for users, due to queuing and having to carry water considerable distances. Other typical coping strategies of the poor in urban areas include obtaining water from wells, boreholes or small scale water providers(water vendors), all of which either take considerable time to collect the limited water, or they have to pay high prices to water vendors.

Illegal connections are a significant problem both for the utilities and customers with legal connections. The rate at which utility piped water connections are extended to low income groups remains slow – and in many countries, connection charges are a major obstacle (GWI, 2011). Kayaga and Franceys (2007) found a mean cost of new water connection of US$500 (median of $197) in Uganda. This is unaffordable for $2 per-day-households, which are therefore unable to access the benefits from piped water services. Since the publication of the research, the utility in Uganda (NWSC) have reduced their connection charges significantly, resulting in substantial increased customer numbers and revenues. Many utilities in Africa, however still have high connection costs.

Inadequate governance and regulation of the urban water sector has hindered progress in service improvements. As the provision of water is an essential service for all urban consumers, utility regulation is justified because of the monopolistic nature of the management of piped network water services. The distribution of water services are natural monopolies (Groom, Halpern and Ehrhardt, 2006). Credible and stable regulatory frameworks are also critical to attract operators and mobilize finance for sector investment.

Groom et al (2006) define economic regulation as 'The rules and institutions that set, control and modify the maximum authorised tariffs and ensure they are applied and the minimum agreed service standards for water service operators'. While Franceys and Gerlach (2010) view the regulator as 'a separate (not autonomous, rarely independent) "referee," balancing the decisions to be made within the particular socio-political context'.

Multi-sector regulators for water and electricity have been established in Ghana, Rwanda and Tanzania amongst other countries in Africa, as part of initiatives to improve sector governance (Mwanza, 2010). Yet the utility in Uganda (NWSC) does not have a regulator agency and has made more significant improvements in recent years than the countries with regulators (Van den berg and Danilenko, 2011). NWSC is performing better in terms of cost recovery, water supply hours and rate of increase in new connections and is supervised by the Ministries of Finance and Water. This would suggest that there is still much to be done in terms of regulation and sector management, even in

countries with regulatory agencies. Reforms to public services can prove futile in the absence of upfront resources for investment in the restoration and extension of the existing infrastructure (Dagdeviren, 2008). The decline in the percentage of households with piped water on their premises in the four study countries (UNICEF JMP, 2012) suggests that sector regulation and recent policies have had little impact on ensuring investments in urban water keep pace with population growth.

3.5 Successful and innovative urban water approaches

Collaboration with alternative water providers

These alternative providers have market shares ranging between 30% and 80% in many African cities (Franceys and Gerlach, 2008). The important role of non-state or alternative providers is now widely acknowledged by many stakeholders in the water sector. These providers include the local private sector (formal and informal) or Community Based Organisations (CBOs) who provide effective services in low income areas, in many situations. Government engagement with water and sanitation NSPs can be split into five main types: recognition, dialogue, facilitation/collaboration, contracting and regulation. In many situations, a lack of formal recognition of non-state water providers is an impediment to more productive forms of engagement (Sansom, 2006).

In several cases, the local private sector or Community Based Organisations (CBOs have been formally handed over responsibility for service provision. Such "delegated management models" are a new approach to improve service provision in unserved areas. More progressive Governments and utilities are supporting such initiatives as a means of providing better water services to areas where utilities cannot provide adequate water services. Many innovative examples of working with smaller scale alternative water providers in urban poor areas are outlined in the Water Utility Partnership publication entitled 'Better Water and Sanitation for the Urban Poor: Good practice from Sub-Saharan Africa'. Utilities in many African countries such as Uganda and South Africa have also been innovative in terms of offering and supporting different water service options in poor areas such as water kiosks with storage tanks, shared yard connections and pre-payment meters (Berg and Muguisha, 2010).

In 2011, Messas et al describe an approach used in Ouagadougou Mali to supply water to informal neighbourhoods through formal delegated management contracts with small local private operators. Some capital funding has been provided using output based aid (OBA). This arrangement has advantages over working with informal providers, because there was well structured capacity development and there is better accountability and transparency through a formal contract. Such innovative arrangements can be replicated in other urban informal settlements in Africa.

Successful water utility change programmes

A study was conducted of successful public water utilities - NWSC in Uganda, the Water utility in Phnom Penh, and the eThekwini Water Department (EWSD) in Durban, South Africa, (Sansom and Coates, 2011). All three utilities have achieved: big increases in the number of active pipe connections including poor communities and much improved cost recovery. All three utilities implemented New Public Management approaches such as better autonomy, transparency and

accountability. Other key interventions in these three utilities that contributed to substantial performance improvements were:

1. A collaborative leadership style with managing directors who assemble effective management teams who then carefully delegate duties to staff throughout the organization.
2. A customer services focus, satisfying customers and seeking new customers were primary utility objectives.
3. Moving towards cost reflective tariffs, with increasing revenues while managing costs, in order to generate more funds to be invested in services and staff.
4. The use of effective and user friendly computer systems for financial management, billing, customer services, O&M etc. The use of GIS to enable better asset management and linking with other computer systems.
5. A focus on human resource and management development, recruiting staff with good qualifications, or encouraging capable staff to seek continuing professional development.
6. Flexibility and innovations in serving the poor including using marketing approaches and providing different service options to suite the local conditions in lower income areas.
7. Well managed organizational change programmes that start with an open and honest analysis of 'where are they now'.

The overall utility performance improvements have enabled these three utilities to provide considerably better services to their low income urban areas (ibid).

Mobile water payments

A study by Hope et al (2012) examined the impacts and implications of mobile water payments from Kenya, Uganda, Tanzania and Zambia. Their findings reveal low mobile water payments adoption rates at present, with only one water service provider achieving over 10 per cent uptake from its consumer base. Key barriers to adoption include delayed reconciliation of billing systems, limited customer awareness, lack of physical proof of payment, high transaction tariffs, and convenience of alternative pay points. All these barriers can be overcome as exemplified by one small and privately-run scheme in Kenya where 76 per cent of customers have adopted the mobile bill payment option. In this case, high time and cost savings were revealed as principal motivations for mobile water payment adoption, with women benefiting most from time savings. There was no evidence that levels of wealth, education or water service satisfaction are significant predictors of choosing to pay by mobile transaction (Hope et al, 2012).

3.6 Case study countries

3.6.1 Cameroon

Sector overview

Water sector management

The water supply sector was originally controlled by the government through the Société Nationale des Eaux du Cameroun (SNEC). SNEC faced significant managerial and technical challenges which had a negative impact of the provision of services, these included; the inability to process connection requests within a reasonable time frame, a lack of transparency, a lack of monitoring and loses caused by illegal connections and damaged infrastructure. In 2005 the sector was privatised and SNEC was split into the Cameroon Water Utilities Corporation (CAMWATER) and Cameroon Water (CDE). CAMWATER manages the public property and rights associated with drinking water in urban and peri-urban areas. CDE is the service provider for urban and peri-urban areas. CDE is a public-private partnership operating on a 10 years lease.

Access to water nationally

In Cameroon, a large proportion of households still drink untreated water (approximately nine out of ten households). In 46% of households, women over the age of 15 bear the primary responsibility for collecting water and in 20% of households the task is completed be men over the age of 15. Access levels depend on the region with those in the north having the lowest levels of access compared to those in Littoral with the highest. Non-poor households in urban areas are the most likely to have access compared to the poor in rural areas who are least likely.

In 2010 CDE supplied water to just over 300,000 households nationally. Unfortunately there are loses in the system caused by damaged infrastructure so supply cannot always meet demand. Having a household connection does not necessarily mean that water will be available.

Drinking water in Bafoussam

The water in Bafoussam comes from three sources; the Mifi river plant at Bameke, the Metchie river plant at Métchie and the Nlem river plant at Bamougoum although this is currently out of service. The brewery company in Bafoussam absorbs approximatley 50% of water produced daily leaving only 50% for the connected residents. Production capacity should be 25,920m^3/day, but current production is approximately 16,144 m^3/day. The distribution network is limited to the central areas and those immediately surrounding the centre which means that many households remain unconnected to the CDE system. Unconnected households rely on alternative sources such as wells, rivers, springs and water vendors. Water from vendors costs (Central African Franc - CFA) 2500/m^3 compared to CFA 350/m^3 from CDE. Access in Bafoussam is higher than the national average for other urban areas for both poor and non-poor households (National Institute of Statistics, 2007).

Drinking water in Douala

Water is Douala is currently provided by five deep wells (250m deep) and a water treatment facility on the Dibamba river. An additional treatment facility is being built in the west of Douala on the

Mungo river with financing from the Government of China. This plant will provide an additional 50,000m^3/day and will add to the distribution network serving the Bonabéri area. The same company is also undertaking a rehabilitation of the Japoma Station to restore a daily production capacity of 70,000m^3/day. Drilling wells in the area of Massoumbou and in several quarters of Douala are also expected also to increase daily production levels with the aim of achieving 60% coverage of safe drinking water by 2018.

Access in Douala is higher than the national average for other urban areas for both poor and non-poor households (National Institute of Statistics, 2007) however, Douala suffers from water shortages, with demand far out-stripping supply, especially during peak times. Households with piped connections rely on stored water during these times. Alternative sources of water from wells and surface drilling can be used for activities like bathing and laundry but surface water can be easily contaminated. In poor areas households rely heavily on private water vendors. Public fountains are prone to malfunction and they are managed on a lease basis for which there are no public calls for tenders. This calls the transparency of their allocation into question. Drilling activities under the FOURMIS programme for action on water and sanitation have provided water in some areas, which does help to reduce the deficiency of piped services, however, the difficulty of managing and controlling these points makes them unsuitable as a long term, sustainable solution.

Access data

Figures 3.2 and 3.3 show that whilst access to piped and ground water appears to be high nationally, households in urban areas have far higher levels of access to those services than households in rural areas. However, access to ground water in rural areas has increased significantly over the 7 years.

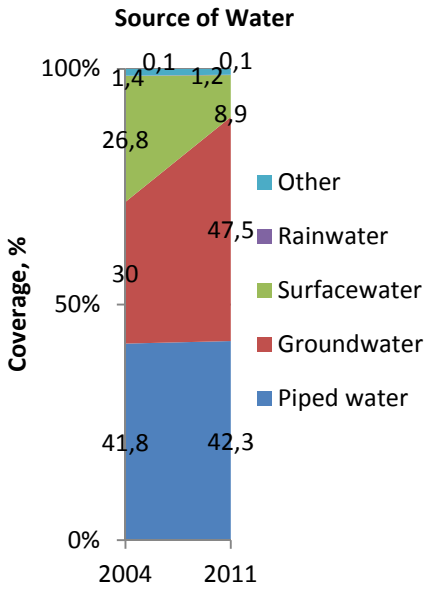


Figure 3.2 Source of water nationally in Cameroon 2004 and 2011 (Source: DHS data)

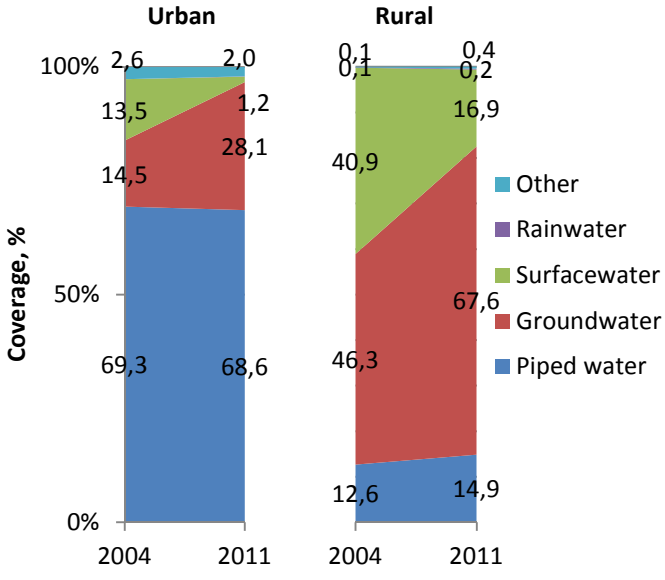


Figure 3.3 Source of water by place of residence in Cameroon 2004 and 2011 (Source: DHS data)

Figure 3.4 shows the source of water used by wealth quintile in urban areas. Data for the poorest quintile in 2011 is not available, therefore, that category is missing from figure 3.4. In 2004, there was 2% coverage of piped water, 49% coverage of groundwater and 49% coverage of surface water

for the poorest quintile. The poorest quintile therefore had the lowest levels of access to piped water in 2004 by a significant margin. Even in the poorer quintile coverage was 28% in 2004. In the middle quintile access to piped water has increased slightly but in all other quintiles, including the richest, coverage has dropped over the 7 years. Access to groundwater has increased with the largest increase in coverage occurring in the poorer quintile. In the richer and richest quintiles reliance on surface water as decreased to zero whilst in the poorer and middle quintiles the use of surface water has dropped dramatically over the 7 years.

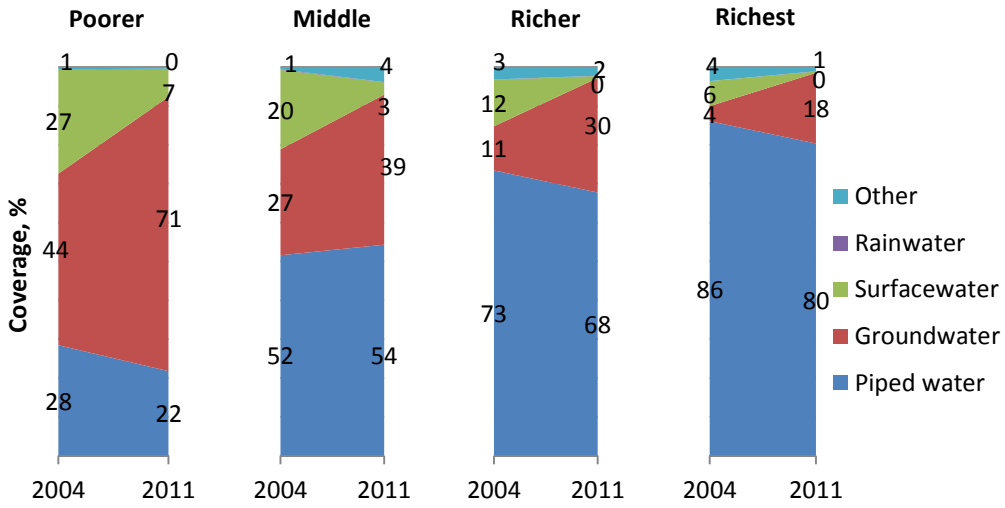


Figure 3.4 Source of water by wealth quintile in urban areas of Cameroon 2004 and 2011 (Source: DHS data)

Figure 3.5 shows that coverage of piped water in the richest quintile in rural areas is similar to the levels of coverage of the middle quintile in urban areas. The availability of piped water services is biased towards urban areas and in the rural areas far fewer households in the poorer and middle quintiles have access to piped water. Groundwater accounts for a much larger proportion of supply in rural areas across all quintiles with those in the poorest and poorer quintiles relying most heavily on groundwater. The use of rainwater is very limited in both urban and rural areas throughout all quintiles.

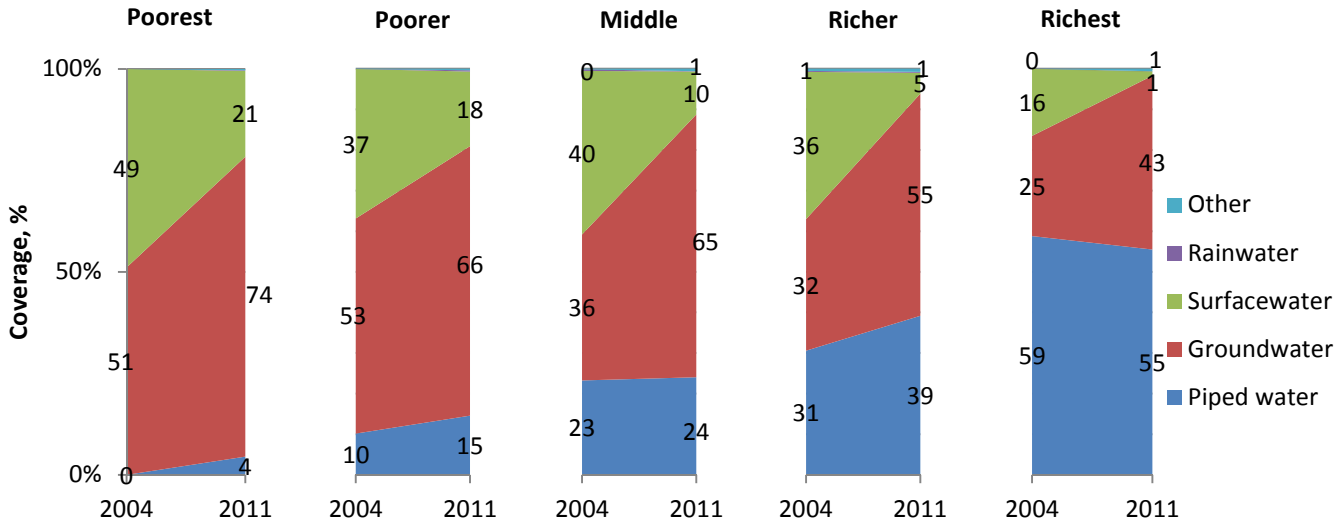


Figure 3.5 Source of water by wealth quintile in rural areas of Cameroon 2004 and 2011 (Source: DHS data)

Figure 3.6 shows that in urban areas, between 2004 and 2011 there has been an increase in the percentage of households with water piped onto their premises. The time taken to fetch water has decreased to under 30 minutes for over 80% of households.

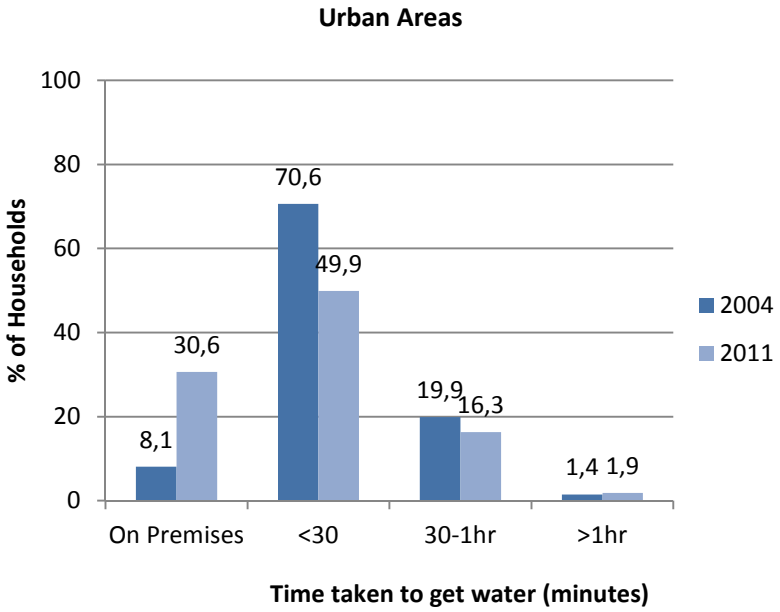


Figure 3.6 Time taken to fetch water in urban areas of Cameroon 2004 and 2011 (Source: DHS data)

In rural areas, shown in figure 3.7, the increase in access to piped water has not been so significant, but the percentage of households which spend less than 30 minutes collecting water is still at 64.3% which is relatively high. The proportion of households spending more than 30 minutes fetching water has increased slightly over the 7 years in rural areas.

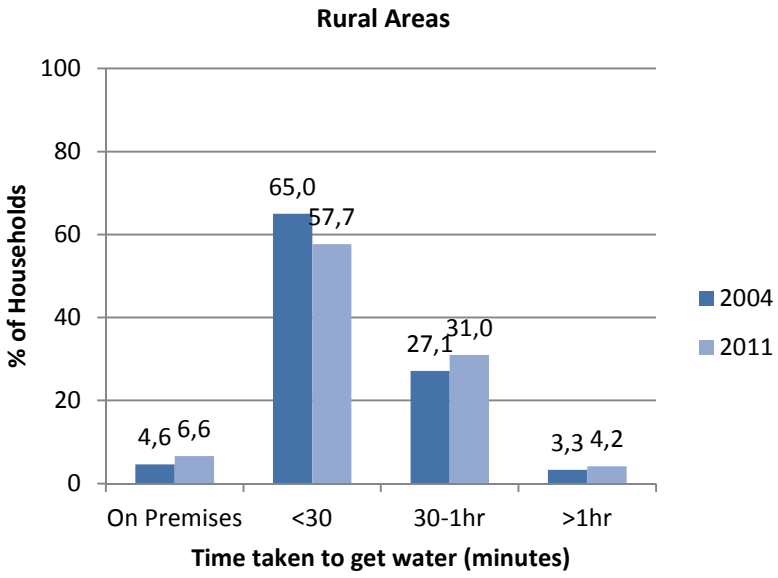


Figure 3.7 Time taken to fetch water in rural areas of Cameroon 2004 and 2011 (Source: DHS data)

3.6.2 Ghana

Sector overview

The Ghana Water Company Limited (GWCL), along with its public operating entity Ghana Urban Water Limited (GUWL), has the mandate to supply water to all urban areas. Over the years, the company has experimented with different service models in an attempt to address the challenges confronting the sector. These include developing alternative approaches to service delivery, incorporating innovative institutional and contractual arrangements and establishing partnerships between communities, utilities, the private sector and regulators.

Ghana has already achieved the MDG for water supply by increasing access to 86% nationally in 2012 (UNICEF and WHO, 2012). In rural areas access is 80% whilst in urban areas access is 92%. Unfortunately service provision is not yet universal and those living in low-income settlements and peri-urban areas are in most cases, the worst served. Consequently the people in these areas are dependent on unsafe water or have to pay higher costs to access water from private sources. The rate of increase in the availability of piped water into households has stagnated over the last two decades with population growth and rapid urbanization negating the gains made in real terms. Demand for water outstrips both the installed capacity and the actual operating capacity of the current water systems.

In Accra, it is estimated that only 25% of residents enjoy a 24 hour water supply, about 30% have an average of 12 hours service per day for five days a week, 35% have service for two days a week and the remaining residents on the outskirts of Accra are completely without access to piped water supplies which leaves them dependent on secondary suppliers such as vendors or tanker services (WSRP, 2010; Wateraid, 2008). Despite the erratic supply and frequent disruption to services, users are still billed monthly and if bills are not paid on time, supply can be cut off and users are then required to pay an expensive re-connection charge.

Ghana is relatively advanced in the adoption of rural water reforms, including a rural water policy, dedicated agency and funding source, and a move toward cost recovery for rural water services (World Bank, 2010).

Attempts to improve access

Over the past decade, attempts have been made to address the constraints on the sustainable development and management of urban water supply and sanitation services. These interventions have primarily focused on streamlining the roles, functions, and decision-making processes within the water and sanitation sector. The first of these initiatives was the Urban Water Reform, which transformed the Ghana Water and Sewerage Corporation in 1999 into a limited liability company, the GWCL, as an initial step towards the introduction of private sector operation and management of urban water supply systems.

As part of the reform, the regulation of urban water was shifted away from government to an independent body, the Public Utilities Regulatory Commission (PURC). The Commission is responsible for the protection of consumer interests, while at the same time maintaining the

balance between tariff levels and investment, operation and maintenance costs of the water supply system to encourage private sector involvement.

According to the GWCL and PURC, the concerns of low-income residents are partially addressed through a special tariff structure and the provision of public standpipes for informal areas and poor urban neighbourhoods where piped household connections are not feasible. GWCL uses one, national uniform tariff structure for domestic customers irrespective of income levels or the type of neighbourhood. It is an increasing block tariff with a lifeline for the first block of $20m^3$ (formerly $10m^3$). However, this tariff structure does not work for multiple occupancy households with a single meter, which is a common arrangement amongst the urban poor. Due to the higher number of occupants, the overall water consumption is higher than a household with a single family, but the consumption per capita can be significantly lower than a single family household. As a result, multiple occupancy households pay a higher price per unit volume.

It is recognised that secondary suppliers play an important part in the delivery of water services to those not connected to the public network, therefore, PURC is attempting to strengthen the capacity of secondary suppliers in collaboration with GWCL, who are required to allocate a percentage of their production to secondary suppliers. The overall aim is to reduce the cost of providing secondary sources and to safeguard the quality of service for consumers.

Access data

Figures 3.8 and 3.9 show that access to either piped or ground water is relatively high in Ghana but that urban areas are much better served with piped water than rural areas. The reliance on surface water has decreased in both urban and rural areas. Coverage of rainwater is higher in rural areas than in urban areas but at just 1% it still accounts for a very small percentage of the water used nationally.

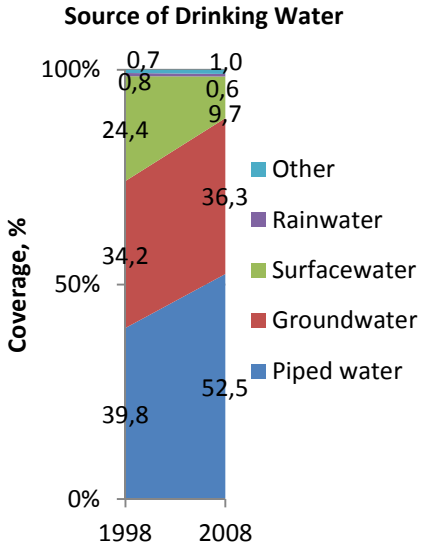


Figure 3.8 Source of water nationally in Ghana 1998 and 2008 (Source: DHS data)

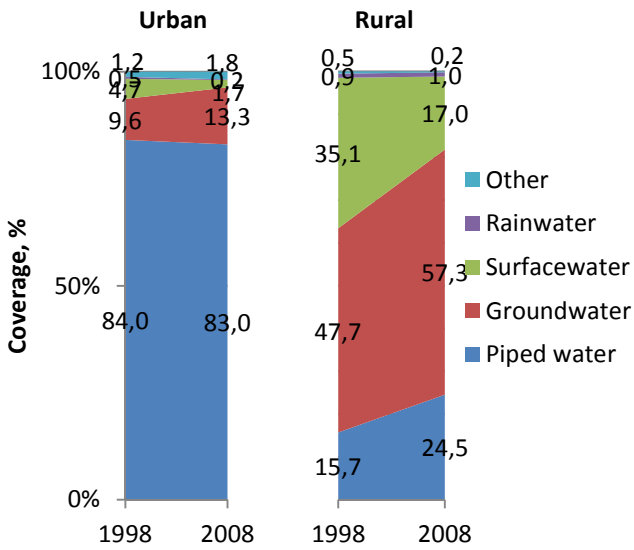


Figure 3.9 Source of water by place of residence in Ghana 1998 and 2008 (Source: DHS data)

Figure 3.10 shows that between 1998 and 2008, access to piped water increased for the poorest and poorer quintiles in urban areas but in the middle, richer and richest quintiles coverage of piped water decreased over the decade. The drop was most dramatic in the richest quintile where coverage dropped by 11% leading to an increased reliance on groundwater.

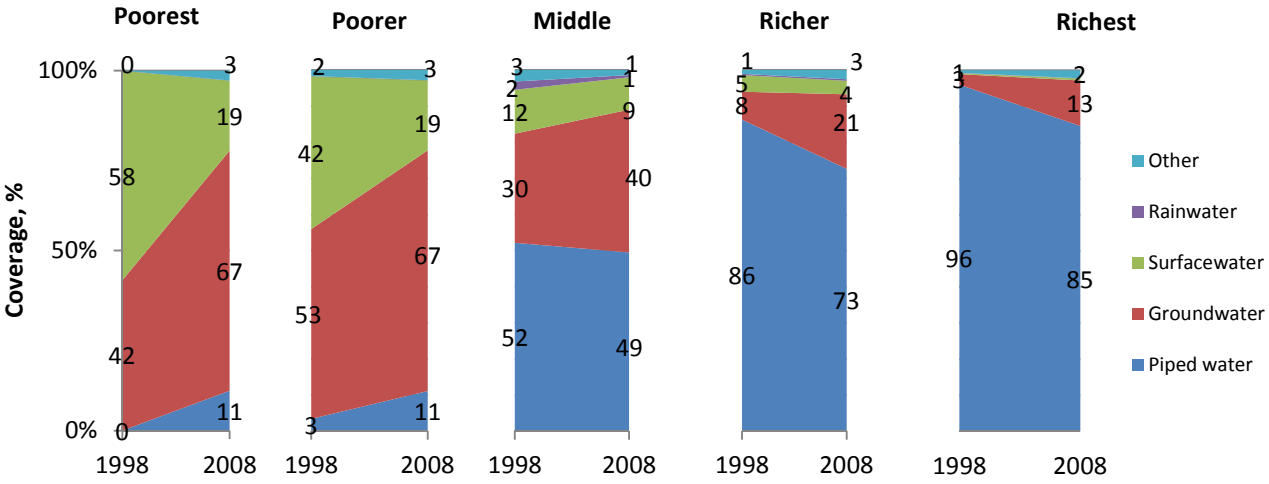


Figure 3.10 Source of water by wealth quintile in urban areas in Ghana 1998 and 2008 (Source: DHS data)

Figure 3.11 shows that access to piped water in rural areas has increased across all wealth quintiles, however , the largest increase has been in the middle quintile which rose 18% over the decade. Coverage in the poorer quintile increased by 15% over the same period of time which means that 79% of households in the poorer quintile in rural areas have access to either piped or ground water. Reliance on surface water decreased significantly across the quintiles, but the largest decrease was in the poorest quintile which dropped from 55% to 30% over the decade. Despite this, reliance on unimproved surface water still remains high in both the poorest and poorer quintiles.

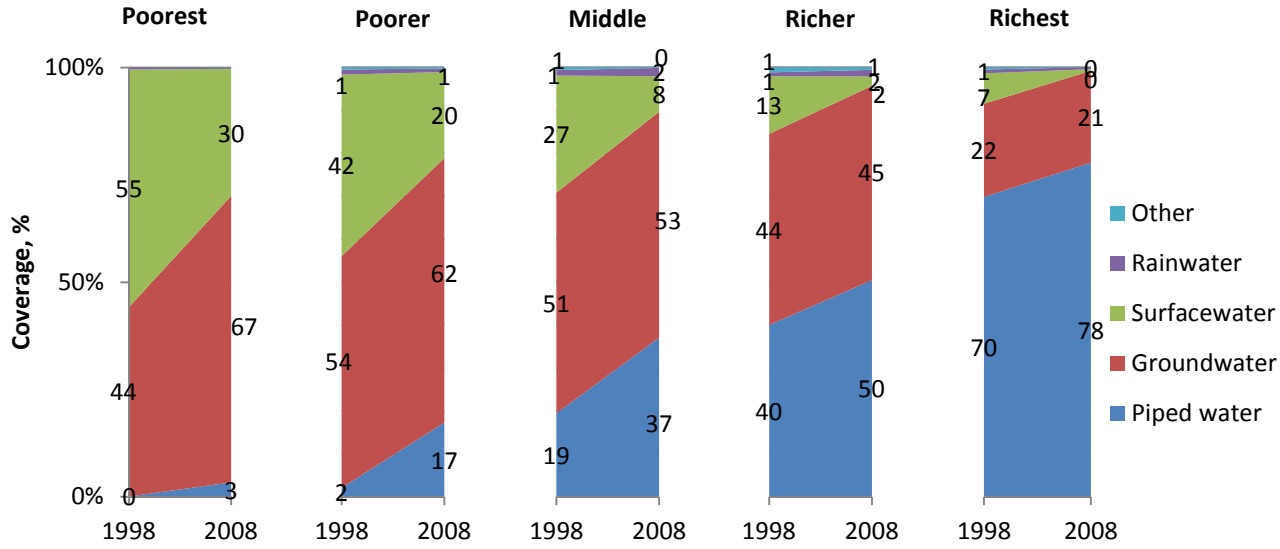


Figure 3.11 Source of water by wealth quintile in rural areas in Ghana 1998 and 2008 (Source: DHS data)

The percentage of households with piped water on the premises in urban has increased dramatically over the decade, as shown in figure 3.12. For over 91% of households it took less than 30 minutes to

collect water in 2008. The percentage of households able to collect water in less than 30 minutes in rural areas is also high, at 78.5% as shown in figure 3.13, but the proportion of households with piped water on the premises is much lower at just 6.1% against the urban figure of 41.6%. Although the time taken to access water has decreased for a majority of households in rural areas, there are still 20% of households who take longer than 30 minutes to collect water against an urban figure of just 7.2%.

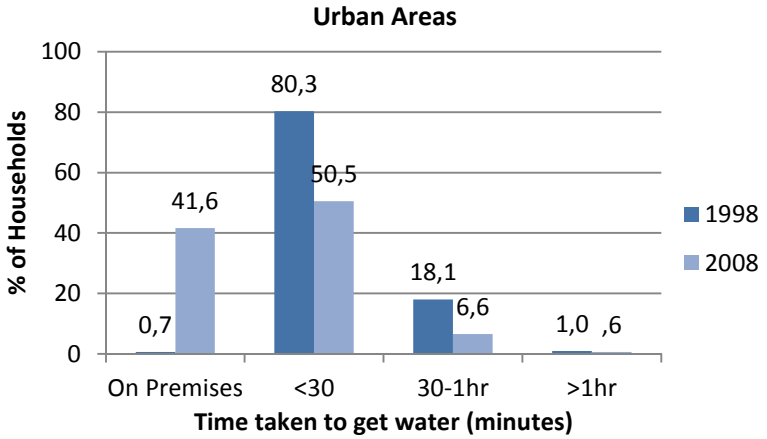


Figure 3.12 Time taken to access water in urban areas of Ghana 1998 and 2008 (Source: DHS data)

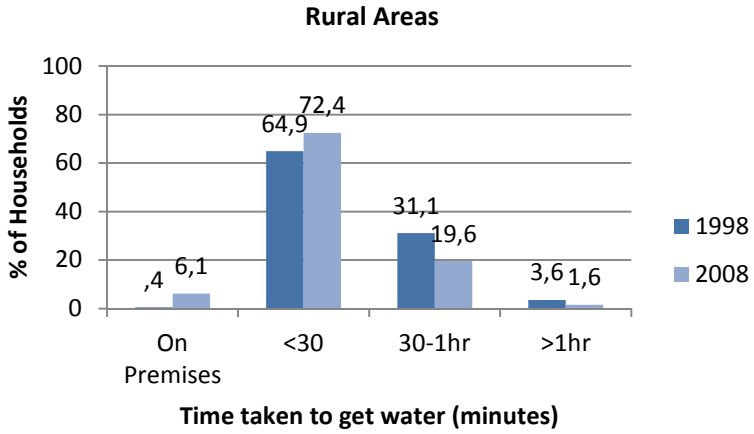


Figure 3.13 Time taken to access water in rural areas of Ghana 1998 and 2008 (Source: DHS data)

3.6.3 Rwanda

Sector overview

Rwanda uses the JMP definition for an improved source of potable water and also takes into consideration the distance to a source and an acceptable walking time. One hundred percent coverage is defined in terms of distance, walking time and per capita water consumption. In rural areas the maximum distance any user should travel is 500m or 15 minutes. In urban areas the distance is 200m or 5 minutes. The aim is for everyone to be able to access a minimum of 20 litres per person per day.

The most recent Integrated National Living Conditions Survey 2010/2011(EICV3) states that urban households are more likely to use an improved water source than rural ones (85% and 72% respectively). Poorer households rely more on protected springs while wealthier households are more likely to have water piped into their dwelling or yard and have greater access to public standpipes. Rural households also have to travel further with 20% of households within 200m and 41% within 500m. In urban areas 53% are within 2900m and 68% within 500m. The average for Kigali City is slightly higher with 54% of households within 200m. People living in isolated rural communities have the lowest levels of access to improved water (NISR, 2012).

The Energy, Water and Sanitation Authority is the national utility and as such manages 15 public water treatments plants and a majority of the supply network which serves urban areas. User satisfaction of services varies with location. In Kigali City user satisfaction with the service was 64% whereas in the Eastern province which is predominately rural, user satisfaction was 51%. For households with piped water supply, levels of satisfaction raise to 80% (NISR, 2012). More households are now paying for water and the mean expenditure on water has increased in urban areas. Despite progress being made, demand for water is outstripping capacity and EWSA is not yet finically stable.

Access data

Figures 3.14 and 3.15 show that coverage of piped water has decreased in Rwanda between 2000 and 2010 leading to an increase in the use of groundwater in both urban and rural areas. However, the coverage of piped water is still higher in urban areas than it is in rural areas. The use of surface water has decreased in both urban and rural areas. Rainwater accounts for only 0.4% of coverage nationally.

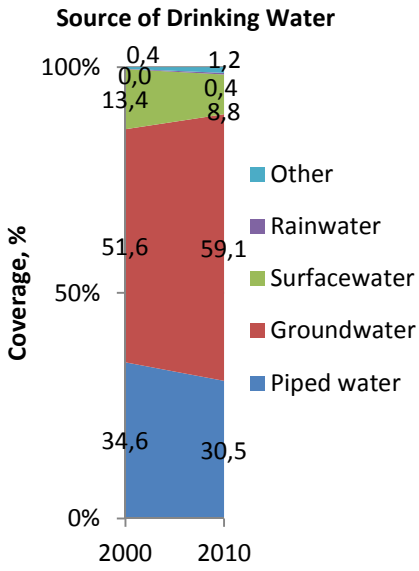


Figure 3.14 Source of water nationally Rwanda 2000 and 2010 (Source: DHS data)

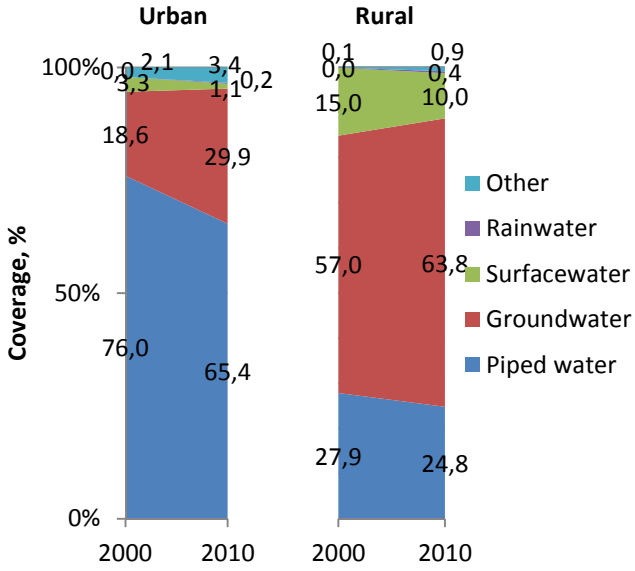


Figure 3.15 Source of water by place of residence in in Rwanda 2000 and 2010 (Source: DHS data)

Figures 3.16 and 3.17 show that piped water is available across all wealth quintiles in both urban and rural areas, although levels of coverage are higher in urban areas. The data for the poorer quintile in 2000 for both the urban and rural figures, indicating that coverage of piped water was 100% is an error in the data sets available. Coverage of piped water increased in the poorest and middle quintiles in both urban and rural areas over the decade but for the richer and richest quintiles coverage in piped water decreased. The largest drop in coverage, down 22%, was for households in urban areas in the richer quintile. The same quintile suffered a 15% drop in coverage for households in rural areas. The use of surface water has decreased in both urban and rural areas but the use of 'other' sources has increased across all quintiles (except urban poorer). Rainwater is predominately used by the middle and richer quintiles.

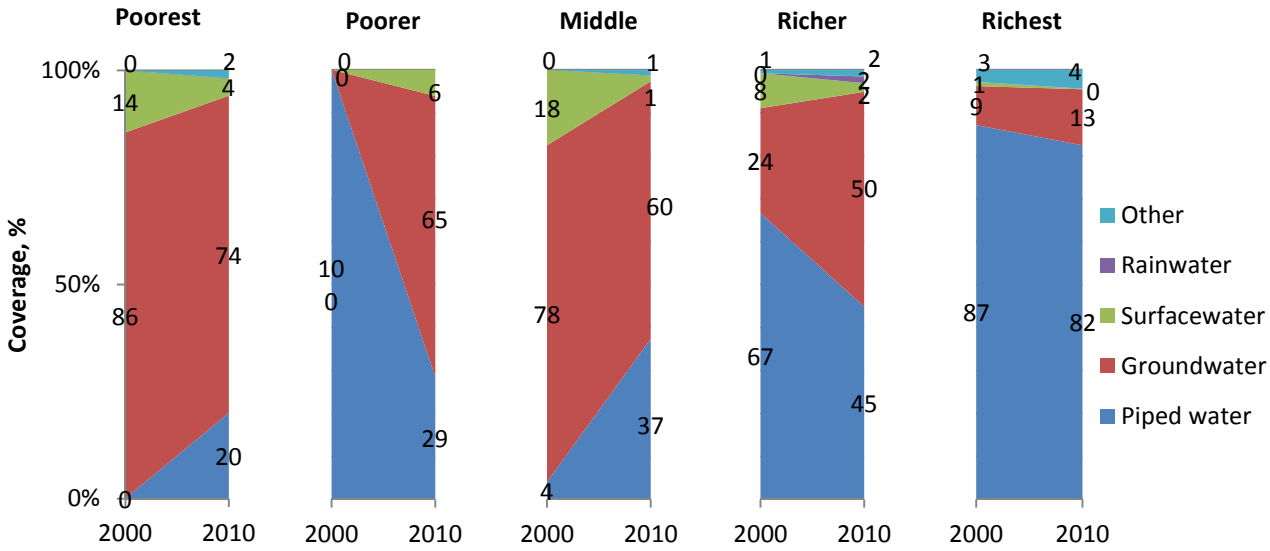


Figure 3.16 Source of water by wealth quintile in urban areas in Rwanda 2000 and 2010 (Source: DHS data)

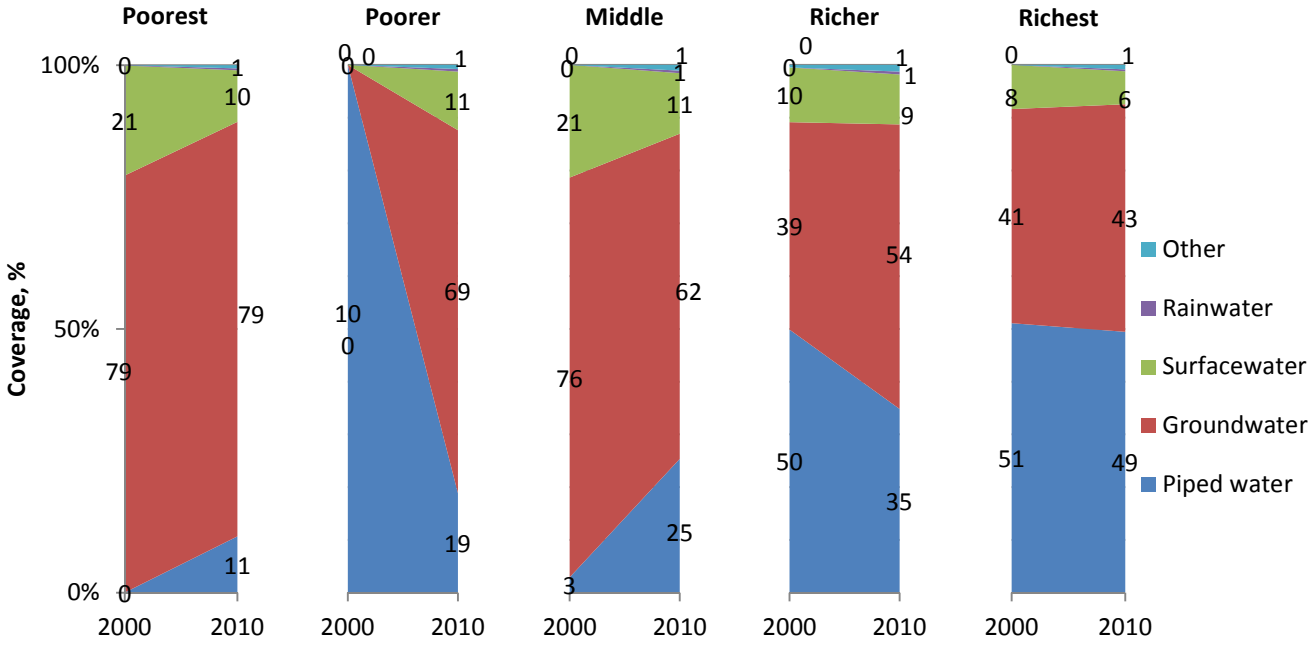


Figure 3.17 Source of drinking water by wealth quintile in rural areas in Rwanda 2000 and 2010 (Source: DHS data)

The time taken to collect water in urban areas was reduced to less than 30 minutes for 71.1% of households in 2008 as shown in figure 3.18. In rural areas, 43.1% of households could collect water in less than 30 minutes as shown in figure 3.19. Although the time taken to collect water has been reduced in both urban and rural areas almost half the households in rural areas take 30 minutes to 1 hour to collect water and a further 8.6% take more than 1 hour. This is high compared to urban areas where a total of 28.7% of households take from 30 minutes upwards.

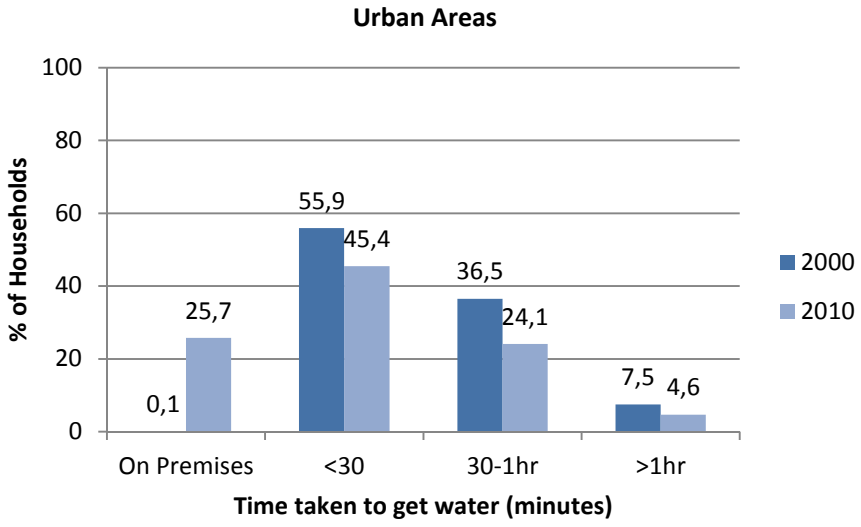


Figure 3.18 Time taken to access water in urban areas in Rwanda 2000 and 2010 (Source: DHS data)

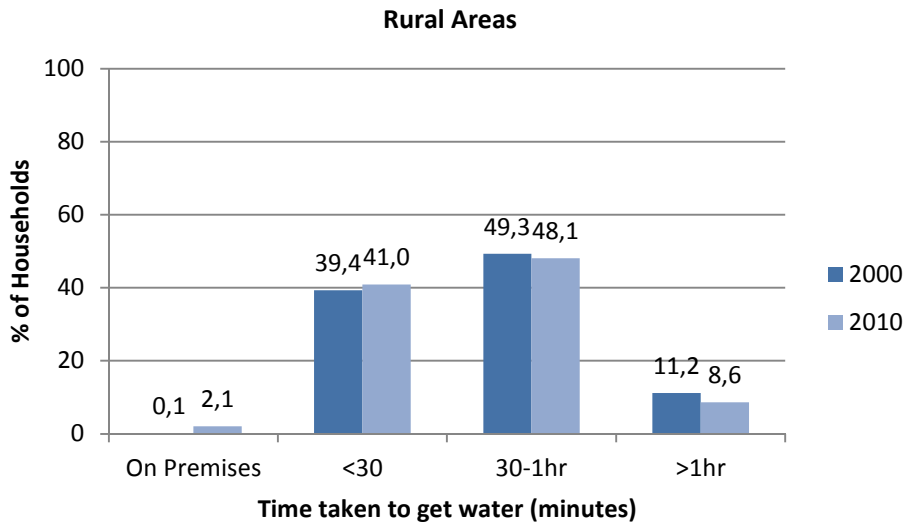


Figure 3.19 Time taken to access water in rural areas in Rwanda 2000 and 2010 (Source: DHS data)

3.6.4 Tanzania

Sector overview

In 2007, about 52 percent of mainland Tanzanian households had access to safe water. In Dar es Salaam access was 94% but in other urban and rural areas access was 77% and 40% respectively. Households in the lowest wealth quintiles had the lowest levels of access with only 44% of very poor and 47% of poor households having access. The proportion of very poor households with access to safe water has decreased since 1991/92, dropping down from 50.8%. For poor and non-poor households levels of access have increased in the same period (NBS, 2009).

During the dry season 71% of urban households (excluding Dar es Salaam) and 50% of rural households have to walk less than 1km to an improved water source. In 1991/92 the figures were 44% and 67% respectively so there has been an improvement in both areas (NBS, 2009). The government aims to have a water source within 400m of each household. In Dar es Salaam 87% of households can access water within 30 minutes but only 81% can access an improved source within 30 minutes. Since 1991/92 access rates in real terms have dropped because of rapid urbanisaiton and population growth which outstrips available water supply infrastructure. Between 2005 and 2007 the government drilled 1,273 boreholes as part of the programme to increase access to improved water sources nationally. Water quality tests are also carried out on water from both improved and unimproved water sources. In 2007, 2,914 samples were taken of which 92% were found to be of good quality (NBS, 2011).

Access data

Figures 3.20 and 3.21 show that access to piped water has decreased in Tanzania between 1999 and 2010 but the decrease is larger in urban areas where coverage of piped water dropped by almost 20% over the 11 years in comparison to a 5% drop in rural areas. The use of surface water has increased in both urban and rural areas but the use of surface water is still higher in rural areas than in urban ones.

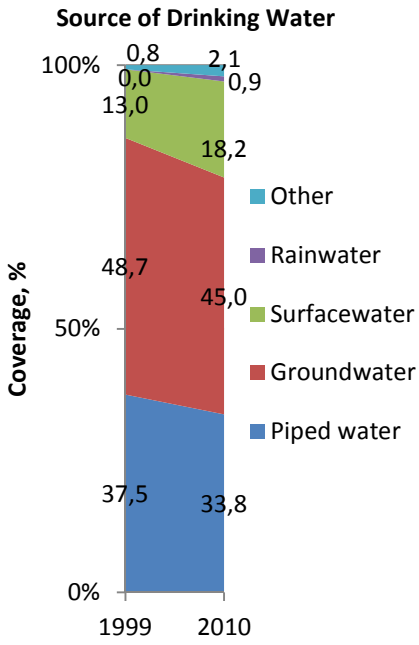


Figure 3.20 Source of water nationally in Tanzania 1999 and 2010 (Source: DHS data)

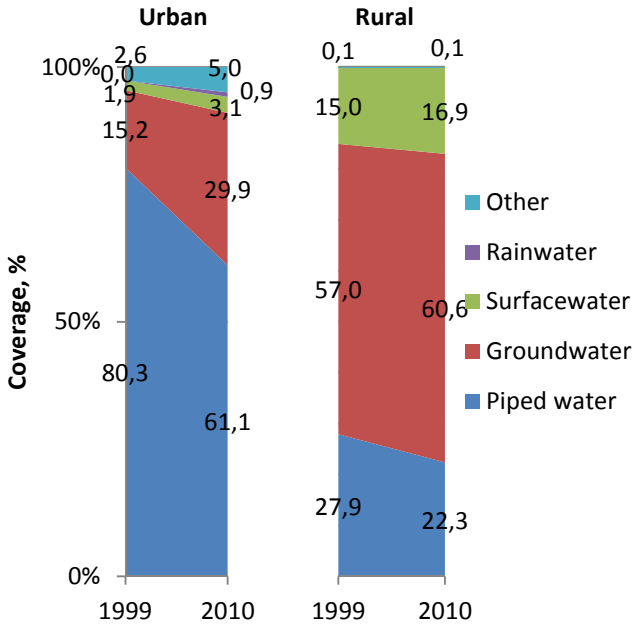


Figure 3.21 source of water by place of residence in in Tanzania 1999 and 2010 (Source: DHS data)

Figure 3.22 shows that in urban areas, access to piped water has decreased in the poorest, richer and richest quintiles, however, for the poorer and middle quintiles, access has improved but it is still significantly lower than the levels in the richer and richest quintiles. Reliance on surface water has decreased for the poorest and middle quintiles but has increased in the poorer and richer quintile. The use of sources classed as 'other' have increased in the middle, richer and richest quintiles over the 11 years.

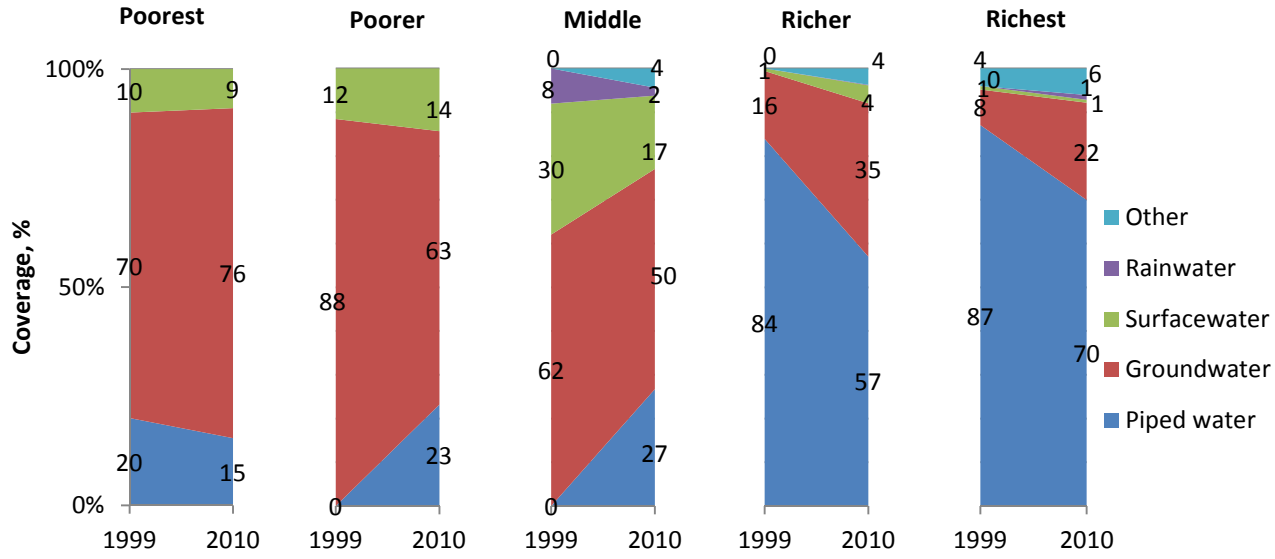


Figure 3.22 Source of water by wealth quintile in urban areas of Tanzania 1999 and 2010 (Source: DHS data)

In rural areas, coverage of piped water has increased in the poorest, poorer and middle wealth quintiles but has decreased in the middle and richer quintiles as shown in figure 3.23. The largest increase is in the poorer quintile which rose 16% over the 11 years. Despite an increase in the coverage of piped water, reliance on surface water increased significantly for the poorest quintile. Rainwater was used by 8% of the middle urban quintile in 1999 but in 2010 it dropped to 2% with similar low levels of coverage in rural areas. The use of 'other' sources increased in the middle, richer and richest quintiles with the greatest increase occurring in the richest quintile.

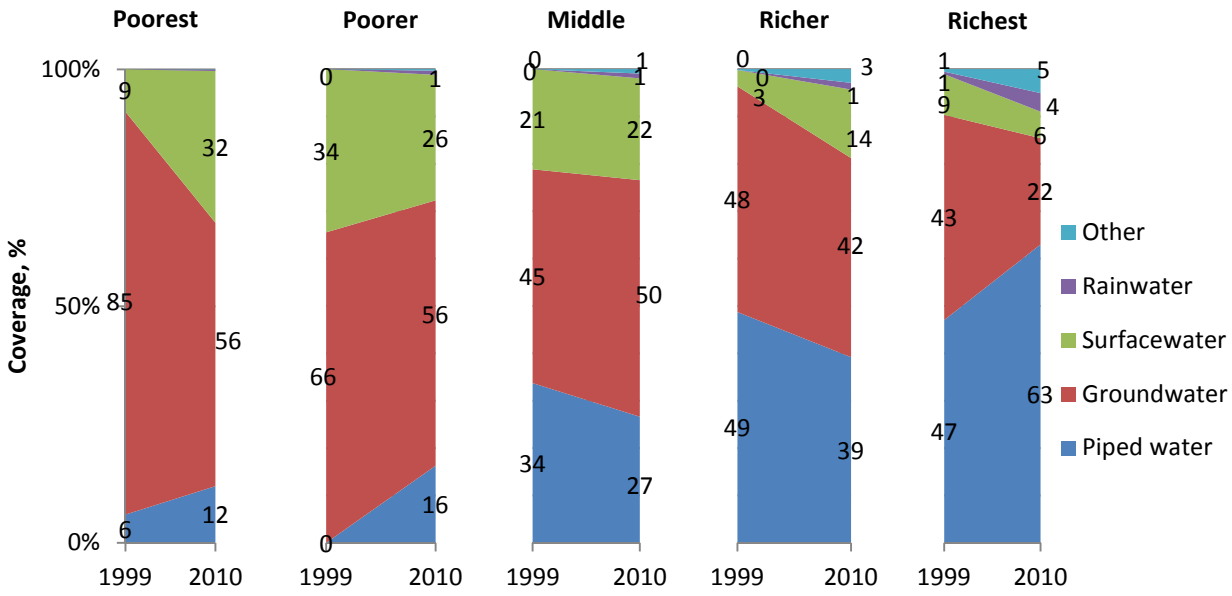


Figure 3.23 Source of water by wealth quintile in rural areas of Tanzania 1999 and 2010 (Source: DHS data)

The percentage of households which take less than 30 minutes to collect water increased between 1999 and 2010 to reach 74.4% as shown in figure 3.24. The percentage of households spending upwards of 1 hour has decreased significantly from 20% in 1999 to 3.2% in 2010. In comparison, only 48.7% of households in rural areas take less than 30 minutes to collect water, as shown in figure 3.25, and the percentage of households taking upwards of 1 hour has only dropped by 3.4% in the 11 years.

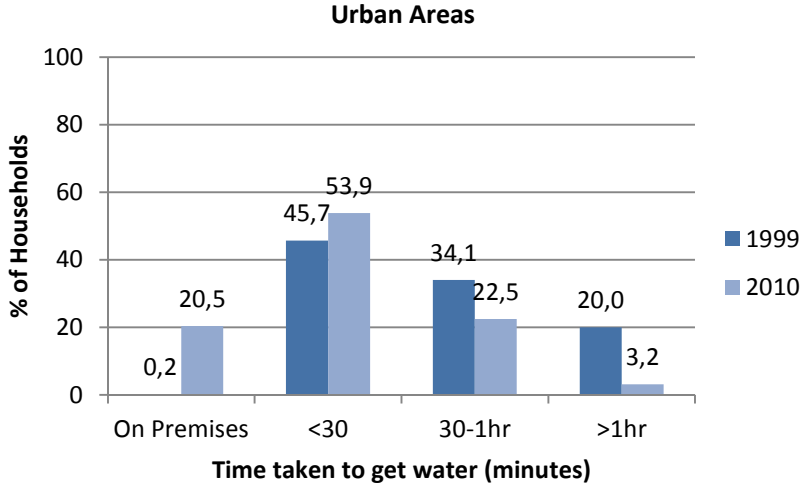


Figure 3.24 Time taken to collect water in urban areas of Tanzania 1999 and 2000 (Source: DHS data)

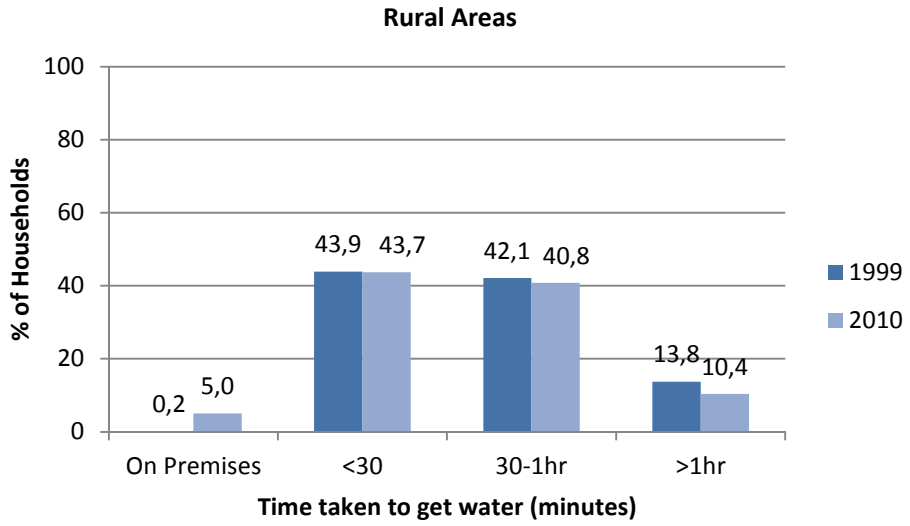


Figure 3.25 Time taken to collect water in rural areas of Tanzania 1999 and 2000 (Source: DHS data)

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4. State of the Art Overview for Electricity in Sub-Saharan Africa

4.1 Patterns of access

It is widely recognised that there is a power crisis in Sub-Saharan Africa with less than a quarter of the population having access to electricity. It is predicted that by 2050 less than 40% of African's will gain universal access to electricity (Eberhard et al, 2008). If South Africa is excluded from the statistics, Sub-Saharan Africa is the only region where per capita electricity consumption is declining (Eberhard, 2011). At the same time, Africa has a rapidly urbanising population, with urban populations set to exceed rural populations by 2030.

According to Garmendia, Smits and Foster (2009) most governments in Sub-Saharan Africa spend between 6 and 12 per cent of their GDP per year on infrastructure, with approximately 80% allocated to power and roads. However, unlike the road sector which receives substantial investments from donors, the energy sector is primarily financed by national governments. Access to electricity is considered part of the energy poverty debate which has 2 indicators measured at the international level. These are access to electricity and access to 'modern fuels' for cooking (liquid or gas). Access to electricity is defined as 'the number of effective connections'.

The International Energy Agency (IEA) has further expanded their definition of energy poverty to include 4 indicators which each capture a specific aspect of energy poverty. The Energy Development Index (OECD and IEA, 2010).

- Per capita energy consumption: overall indicator of the economic development of a country
- Per capita electricity consumption in the residential sector: indicator of reliability of service and the customer's ability to pay
- Share of modern fuels in total residential sector energy use: indicator of levels of access to clean cooking fuels
- Share of population with access to electricity.

Each value is calculated to give a figure between 0 and 1, therefore, whilst it shows how a country is performing in relation to the rest of the world there is limited disaggregation of the data based on urban or rural parameters.

Practical Action (2012) expand the parameters even further to create the concept of 'Total Energy Access' (TEA) which sets out minimum standards that should be achieved before a household is judged to have 'total energy access'. Where households meet some but not all of the requirements for TEA, specific interventions can be designed to address the needs of households. These services and standards are outlined in Table 4.1.

Table 4.1: Requirements for Total Energy Access

Energy Service	Minimum Standard
Lighting	300 lumens for a minimum of 4 hours per night
Cooking and water heating	1kg wood fuel or 0/3kg charcoal or 0.04 kg LPG or 0.2 litres of kerosene or biofuel per person per day, taking less than 30 minutes per day to obtain Minimum efficiency of improved solid fuel stoves to be 40% greater than a 3-stone fire in terms of fuel use Annual mean concentration of particulate matter (PM2.5) < 10µg/m3 in households with interim goals of 15µg/m3, 25µg/m3 and 35µg/m3
Space heating	Minimum daytime temperature of 18 degrees Celsius
Cooling	Households can extend life of perishable products by a minimum of 50% over that allowed by ambient storage Maximum apparent indoor air temperature of 30 degrees Celsius
Information communication technologies	People can communicate electronic information from their household People can access electronic media relevant to their lives and livelihoods from their household.

(Adapted from Practical Action, 2012)

In terms of measuring access, not all countries have energy access targets. In sub-Saharan Africa, only 35 countries have targets for electricity access. For modern fuels, improved cook stoves and mechanical power the figures are 13, 7 and 5 respectively (OECD and IEA, 2010).

According to DHS statistics, levels of urban access are always higher than those in rural areas. For countries where data from multiple years is available the number of households with access is increasing. However, the data does not show per capita consumption which in most countries has decreased, primarily due to population growth in urban areas outstripping the growth in electricity generation. Access is also heavily skewed in favour of higher income, urban households (Eberherd et al, 2005). This data can be found on a country by country basis using the AICD, 'quick data' reports.

4.2 Financing access to electricity

National utilities, many of whom are government owned are generally responsible for urban electrification programmes. There is generally little competition and little innovation. Electricity prices vary widely between countries and it is a highly subsidised sector where 'cross-subsidising' between urban and rural customers is common. In many cases countries with higher urban populations tend to have higher levels of rural electrification due to the practice of cross subsidising. The affordability threshold of electricity services is considered to be 5% of monthly income (Eberhard et al, 2008).

Under-pricing in the power sector is widespread in Africa. Foster and Garmendia (2010) estimate that the power sector loses $2.2 billion per year in forgone revenues. In some cases the utilities receive less than half of the revenues they need. However, charging cost-recovery tariffs for electricity would make access all but impossible for a majority of people in Sub-Saharan Africa. In countries where electricity production costs are high, a full cost tariff can cost $0.25/kWh. For a

family of five people, with a modest electricity consumption of 50kWh per month, that would equate to $12 per month. Even if the family are in the highest income quintile their monthly budget can be $260, therefore $12 would represent close to 5% of their monthly income (Eberhard et al, 2008). In addition to the tariff, some utilities charge a fixed monthly sum which can substantially increase the cost of power, especially for those in low-income households who consume relatively small amounts of electricity.

Subsidised tariffs are one option for making access more affordable but they are difficult to manage and are not very successful at increasing levels of access because poor households are less likely to be connected to the power grid and therefore cannot take advantage of the subsidies. Instead, wealthier customers with higher levels of consumption benefit from the lower priced electricity (Eberhard et al, 2011, Eberhard et al, 2008).

4.3 Barriers to improved electricity access

According to Eberhard et al (2011) most African households spend more than 50% of their budgets on food and up to 25% on infrastructure services (including utilities, energy and transport). One of the most significant barriers to access is the up-front connection fee required by many utilities

Access to electricity is not enough in itself. 'Effective access' is influenced by a number of factors including the quality and reliability of supply, price (affordability) and patterns of usage (Practical Action, 2012; IBRD, 2005). The power grids in Sub-Saharan Africa are notoriously unreliable. This can be due to ageing infrastructure, poor maintenance, insufficient generation capacity and other technical issues like losses due to the size of the networks.

Similar to urban water supply, illegal connections are a significant problem for the utilities, customers with legal connections and those with the illegal connection as they are inherently unsafe. The number of Illegal connections is not currently reported, therefore, there could be many more households with access to electricity than is officially reported. Illegal connections cause the generated capacity to be stretched further than it should be, reducing services to paying customers. There are no costs recovered for the utility from illegal connections so their potential to re-invest in repairs, maintenance and new capacity is reduced. It is estimated that 40% of people connected to infrastructure services (there is no separate figure for electricity services alone) do not pay for them, with rates for non-payment at 20% for the richest quintile and 60% for the poorest quintile (Eberhard et al, 2005). For the people using illegal connections there are significant concerns about safety from fires, sub-standard wiring and falling wires (Practical Action, 2012).

In addition to illegal connections, some people will use an intermediary person with a private connection to supply their electricity on an 'as needed' basis. This allows people to pay for their electricity in much smaller values but they are more likely to be paying above market value for the connection (Modi, 2006). People in peri-urban areas face particular challenges gaining access to services because they occupy the middle ground between urban and rural communities, often on the fringes of a city. Urban areas are often well provided for by utilities and there are many initiatives for increasing rural access through electrification agencies. Peri-urban areas fall between the two and often remain un-served (Putti, 2011).

At the heart of the access problem is consumer demand. The customer base for electricity is small because the prices are high, even though the utilities do not operate cost-recovery tariffs and there is heavy subsidising. In theory, connecting urban households to electricity supplies should be easier than for those in rural areas due to the high density of households in a given location. However, lack of capacity on the supply side is also a significant factor with many utilities unable to connect new users who are willing to pay. In cases where tenure is not secure both government and utilities can be unwilling to connect services to illegal dwellings or those without formal titles (Eberhard et al, 2011; DfID, 2005).

4.4 Use of electricity in urban low income communities

Cooking is the single biggest use of energy in most households, with the majority using biomass or charcoal (practical action, 2012). In urban areas where biomass cannot be collected people can spend up to 15% of their budget on fuel for cooking (practical action, 2010). When households get electricity, it is widely known that they tend to use it for lighting. However, there is a significant knowledge gap regarding how households use or wish to use electricity for purposes other than lighting.

There is a great deal of literature describing the potential benefits that having access to electricity can afford and an unspoken assumption that people want electricity in order to improve their lifestyles. However, understanding what people actually want to use their electricity connection for is much harder to identify. For example, do they have electrical appliances which they wish to run from it, or are they part of the next level of aspiration, do they want to run a business from home and therefore require a connection or is it about social status within the community? These questions are currently unanswered by the literature. If lighting remains the primary use for the electricity then the other fuel requirements, such as clean energy for cooking, need to be addressed separately. DfID (2005) argue that as access to electricity remains expensive, securing well priced and reliable sources of other fuels like charcoal and fire wood may be a higher priority for poor communities. However, the problems associated with poor health and breathing problems linked to the continued use of biomass as a fuel may well render this argument less persuasive.

Modi (2006) argues that in many cases, city-ward migrants are pushed towards cities because of their greater opportunities and therefore, will be more willing to take advantage of opportunities like access to electricity because of the potential advantages which can arise from it.

In the Poor People's Energy Outlook 2012 (practical action), three basic connections between energy access and earning a living are stated.

- creating new earning opportunities not possible without energy access;
- improving existing earning activities in terms of returns by increasing productivity, lowering costs, and improving the quality of goods and services;
- reducing opportunity costs, reducing drudgery, and releasing time to enable new earning activities.

However, as stated earlier, having access to electricity in itself is not enough. In order for people to fully realise the potential benefits that access to electricity can offer there needs to be a reliable, affordable supply, access to markets, social networks and a successful business idea which can

harness the productive use of electricity. The location of the business may also be significant, if the business is located in an illegal settlement area it is likely that they will find it more difficult to get a legal connection and will have to rely on an illegal connection or one from an intermediary. Consequently, this makes their business more risky and more prone to external shocks and may prevent it from growing and becoming more formalised in the future.

4.5 Effects of intermittent or no electricity

Due to the unreliable nature of the electricity supply in SSA many businesses, schools, medical facilities and households keep at least one alternative source of energy available. In the case of a business this may be a diesel powered generator. For a household it could be a kerosene lamp or candles to provide light. In this scenario, people have to pay twice for access to energy, once for the electricity and again for the reserve energy source. In countries which charge a fixed monthly rate on top of the tariff people can end up paying for access to a service which they cannot use.

It is estimated that in countries with 'underperforming' energy systems the loss to economic growth from power outages can be between 1 and 2% per year (OECD and IEA, 2010). Own generation is primarily achieved through diesel generators, at a cost of US$0.30 – 0.70 per kWh (Foster and Steinbuks, 2008). Considering that a full cost recovery tariff can be in the region of $0.25/kWh the cost of own generation is significantly higher than purchasing power from a utility. Foster and Steinbuks (2008) also found that businesses which experience power outages fewer than 30 days per year did not consider electricity supply as an obstacle to doing business. However, for those who experienced power outages more than 60 days per year electricity was cited as a major obstacle to operation and growth. Own generation is more prevalent in low-income countries where supply is less reliable but not surprisingly; own generation capacity is related to the size of the business. According to Putti (2011) 90% of jobs in urban areas are based on small and micro enterprises in the informal sector. These small and micro enterprises are far less likely to have a secondary source of power generation due to their high cost and are therefore more vulnerable to power outages and less able to keep a business operating during a power outage.

4.6 Increasing electricity access

There are many suggestions of approaches which can be taken to increase levels of access. These include, developing specific policies to target the urban poor including the promotion of LPG and the better use of cross-subsidy tariffs (Forum for Energy Ministers in Africa, FEMA, 2006).

Eberhard et al (2005) argue for bringing an end to power subsidies for higher-income households in order to focus more resources on expanding the national grids to peri-urban and rural areas. In a later paper, Eberhard et al (2011) suggest the introduction of capital subsidies or repayment options to help with the initial cost of connecting to the network.

Practical Action (2012) suggests the introduction of stepped tariffs which charge according to consumption so that those who consume least are given the lowest price tariff. DfID (2005), advocate for the adoption of new and renewable energy technologies, many of which have already been tested in rural areas, specifically biogas and solar power.

4.7 Case Study Countries

4.7.1 Cameroon

Sector overview

Cameroon has considerable natural resources for energy including oil and natural gas. Hydroelectricity plays a significant role with Cameroon having the second largest potential in SSA after the Democratic Republic of Congo. Solar energy could be exploited further, especially in the northern region. The total capacity of installed systems is 1033MW, of which 736MW is produced by 3 hydropower plants and 297 is produced by 39 thermal power plants. The electricity transport network consists of high, medium and low voltage lines. AES-SONEL, the electricity provider has more than 780,000 customers with 55,000 new connections every year. Approximately 45% of the customers live in Douala and Yaoundé. ALUCAM (an aluminum producer) uses a massive 41% of the total electricity produced.

AES-SONEL is working to achieve the following:

- Increase production capacity to restore the balance between supply and demand.
- Improve the reliability of the network and strengthen the capacity of the transformers in order to provide the optimum level of service.
- Continue to facilitate access to electricity to larger numbers of customers by offering attractive connection and subscription charges.

Sector organization

In 1998 the energy sector was restructured in order to reduce the public expenditure on electricity production. The aim was to produce a competitive market with the national electricity company (SONEL) being privatized in 2001 to become AES-SONEL. The State still holds a 44% share of the capital. During the restructuring process, the Agency for Regulation of the Electricity Sector (ARSEL) was created to regulate, control and monitor the activities of the operators. The Electricity Development Corporation (EDC) was created to manage the public heritage of the electricity sector, study, prepare or implement any public energy infrastructure project and to promote public private partnerships in the sector.

Access to electricity

ECAMIII estimated that 48% of households use electricity for lighting but access to electricity varies with household income and areas of residence. In 2007, 12.1% of poor residents in rural areas had access to electricity compared to 30.9% of non-poor households. In urban areas, 64.8% of poor households had access compared to 92.5% of non-poor households. Access by region ranges from the lowest levels in the Far-North at 3.2% for poor and 23.6% for non- poor households, up to the highest levels in the South with 61.9% for poor and 74.3% for non-poor. The Agency for Rural Electrification (AER) is responsible for the promotion of rural electrification nationally and provides both technical and financial assistance to operators and communities.

Customers have faced problems related to cuts in service and rising electricity tariffs. Tariffs are organized according to usage into 3 categories; domestic, professional and public lighting. In 2003, a

seasonal tariff was introduced with the price per Kwh dependent on the season. January 1st to June 30th is the dry season whilst July 1st to December 31st is the wet season. Low water levels in the hydroelectric plants during the dry season create supply problems as production capacity drops.

Bafoussam

Electricity for Bafoussam is supplied by the south network through a 90kV power line which is reduced to 15kV and then to 220/380V for distribution. There is an emergency generator in the Bamenzi quarter. In 2007 33% of poor households and 8% on non-poor households did not have access to electricity in Bafoussam. The network is limited and does not supply all areas of the city, it is also in need of maintenance and repair. AES-SONEL suffers from the non-payment of invoices and in some cases people make illegal, direct connections to the supply cables.

Douala

Douala's subscribers represent about 24% of the total clientele of AES- SONEL and use around 44% of the energy produced nationally. There are many industrial consumers in the area, which reflects the cities importance as the economic hub of Cameroon. Industrial consumers use 44% of the total electricity used in Douala with 56% used by domestic customers. Access to electricity in Douala is the highest in the country with only 14% on poor and 2.5% of non-poor without access. However, the use of one meter for multiple households is common amongst poor households. Illegal connections and fraud are common, especially from corporate clients. Vandalism is also a challenge and infrastructure needs to be better protected. The cost of preventing vandalism and tracking down and cutting off illegal connections takes away resources that could be used in the extension and maintenance of the system.

Although access to electricity remains low nationally, in urban areas residents have got used to a certain standard of living and enjoy the comforts of lighting and television. It is relatively easy to connect to the network and tariffs are affordable. Efforts are being made to increase production to reduce the frequency of power cuts with a new dam under construction at Lom Pangar. This should ease the problem in the short to medium term.

Access data

Figures 4.1 and 4.2 show how access to electricity has increased between 2004 and 2011. The largest increase occurred in urban areas with an additional 10% of households gaining access. The number of rural households with access remains relatively low at just 18.5%.

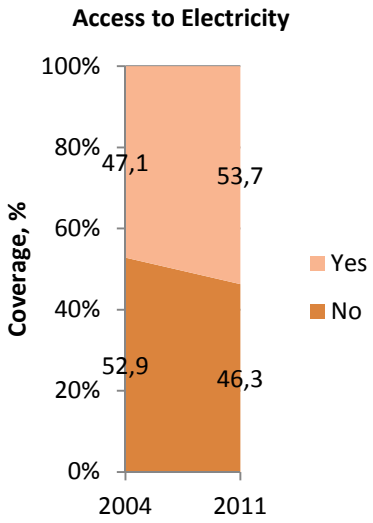

Figure 4.1 National access to electricity in Cameroon 2004 and 2011 (Source: DHS data)

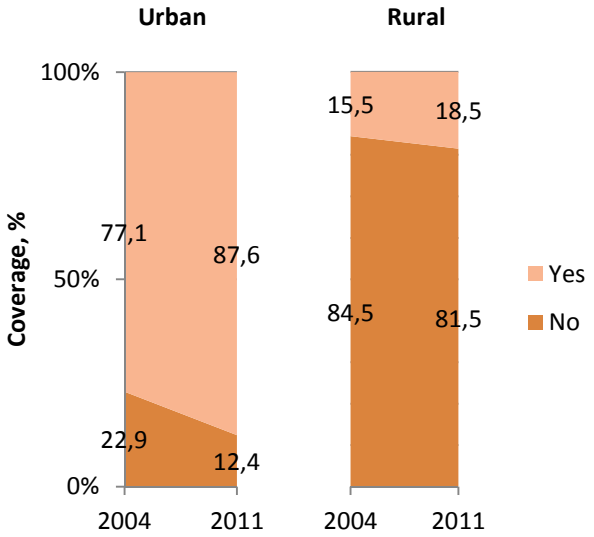

Figure 4.2 Access to electricity by place of residence in Cameroon 2004 and 2011 (Source: DHS data)

Figure 4.3 shows access to electricity by wealth quintile for urban areas in 2004 and 2011, however, data about access for the poorest quintile in 2011 is unavailable and is therefore not presented. In 2004, 99% of households in the poorest quintile were without access to electricity. Access rates have increased across the poorer, middle and richer quintiles with the middle quintile seeing the largest increase over the 7 years. Access in the richest quintile has remained at 100%.

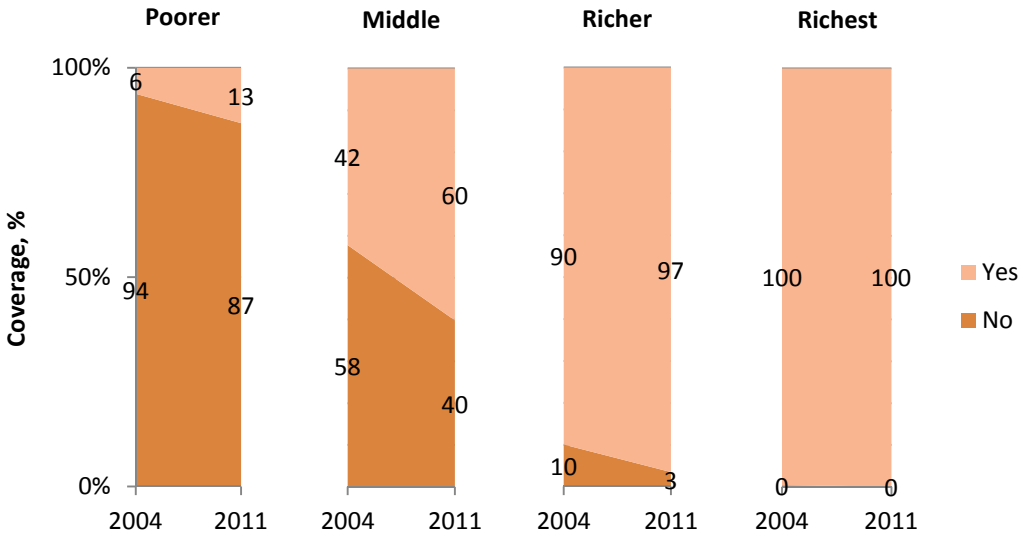

Figure 4.3 Access to electricity by wealth quintile in urban areas of Cameroon 2004 and 2011 (Source: DHS data)

Figure 4.4 shows access to electricity by wealth quintile for rural areas. Once again, the middle quintile has the largest increase in access but the percentage of households with access remains lower than urban levels. The richest quintile is the only set to have decreased levels of access, down 6% over the 7 years. Rates of access for the poorer quintile are similar in both urban and rural areas but for those in the poorest quintile, access to electricity remains at zero.

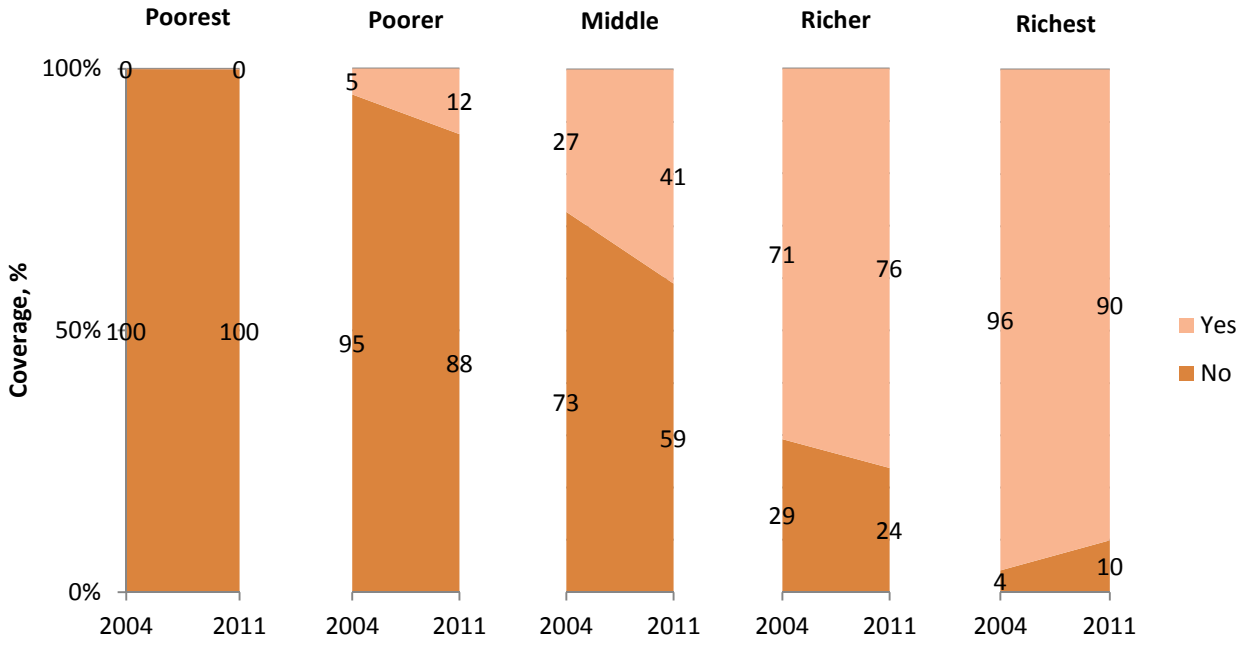

Figure 4.4 Access to electricity by wealth quintile in rural areas of Cameroon 2004 and 2011 (Source: DHS data)

4.7.2 Ghana

Sector overview

Ghana has higher levels of electricity coverage than other Sub-Saharan African countries. In 1990 the National Electrification Scheme was launched with the aim of providing universal access to electricity by 2020. Access levels in 1990 were less than 15%. In 2012 it was estimated that 72% of the population live in communities with access to the electricity grid (Oteng-Adjei, 2012) but access is biased in favour of urban households which have 74% access compared to 25% in rural areas (GLSS, 2008).

Over 80% of domestic energy supplies are consumed in cities and towns. Access within urban areas is again biased in favour of wealthier households with those in low-income or slum areas suffering from an unreliable supply. The Accra Metropolitan Assembly estimates that almost all slum and squatter communities have access to electricity through illegal connections (AMA, 2011). In order to establish a formal connection, residents must provide building permits and land titles. After this measure was introduced the number of illegal connections rose at an unprecedented rate. The tariff design also favours low usage households, therefore, in the cases where there are several households connected to the single meter the unit cost of electricity is higher than it would be for a single household (AMA, 2011). The situation is similar in Kumasi (Asamoah, 2010).

Ghana has two main methods of electricity production, hydro and thermal. Two hydro power plants at Akosombo and Kpong have a total installed capacity of 1,180 MW. Thermal power contributes a further 550MW from two plants but they rely on imported fuels for operation. The transmission network is more than 4000km long and covers large sections of the country. Two companies, the Electricity Company of Ghana (ECG) and the Northern Electricity Department (NED) are responsible for the supply and transmission of electricity nationally.

The biggest challenge posed by relying on hydro power generation is that of varying climatic conditions. In 2006 and 2007 Ghana had a severe power crisis when low rainfall affected the Akosombo Reservoir and caused significant disruption to generation and supply. The estimated economic loss for the period was 1.9% of GDP. When hydro power fails there is an increased reliance on more expensive oil-based generation which is subject to global market fluctuations. Electricity generated using hydropower costs in the region of 0.05 USD/kWhr but thermal generation can cost in excess of 0.20 USD/kWhr, a 400% increase.

One of the ways to reduce the dependency on oil based generation is to diversify they energy portfolio to include alternatives such as gas. Ghana can access gas supplies from Nigeria via the Weat African Gas Pipeline and is also exploring national hydrocarbon potential. Gas based generation is expected to be in the region of 0.06 -0.08 USD/kWhr.

Renewable energy sources

Renewable energy sources are also being considered, especially for communities which are not likely to receive grid electricity for many years. In 2006 there were already over 4000 off-grid photovoltaic systems installed with a combined capacity of 1MW. The other options are wind, biomass and small hydro. The primary challenge in terms of increasing access to renewable energies is the high investment costs needed and the ongoing operation and maintenance costs, especially for people in off-grid communities.

Access data

Figures 4.5 and 4.6 show that access to electricity has increased in Ghana between 1998 and 2008 but that access in rural areas is still well below the levels of access in urban areas. Rates of access have increased more significantly in rural areas than in urban areas increasing by 18% over the decade.

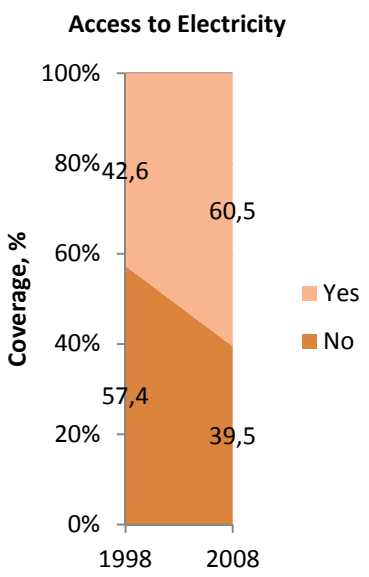

Figure 4.5 National access to electricity in Ghana 1998 and 2008 (Source: DHS data)

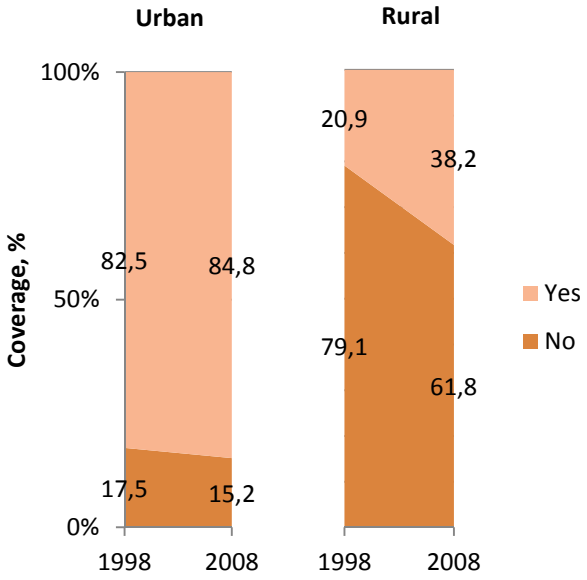

Figure 4.6 Access to electricity by place of residence in Ghana 1998 and 2008 (Source: DHS data)

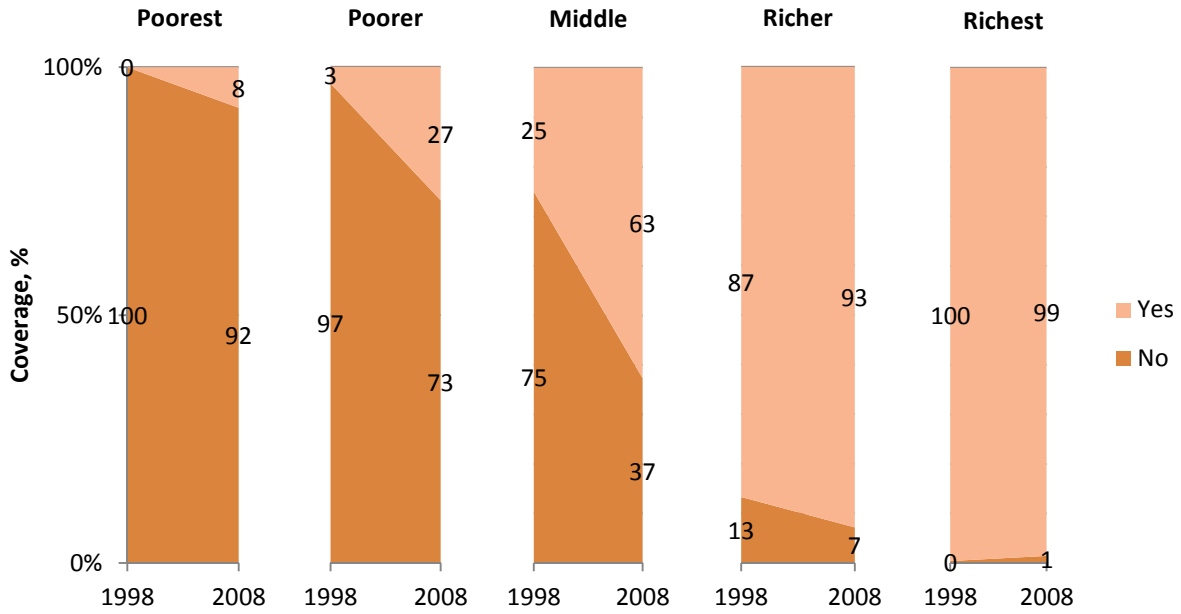

Figure 4.7 Access to household electricity by wealth quintile in urban areas of Ghana 1998 and 2008 (Source: DHS data)

Figure4.7 shows access to electricity by wealth quintile in urban areas. Access has increased in all but the richest quintile where access has decreased to 99%. The poorer and middle income quintiles had the largest increase in access rising by 24% and 37% respectively over the decade. The same is true for the poorer and middle wealth quintiles in rural areas, shown in figure 4.8 where access to electricity increased by 23% and 46% respectively. Even in the poorest quintile access increased in both urban and rural areas although the level of increase was smaller in rural areas.

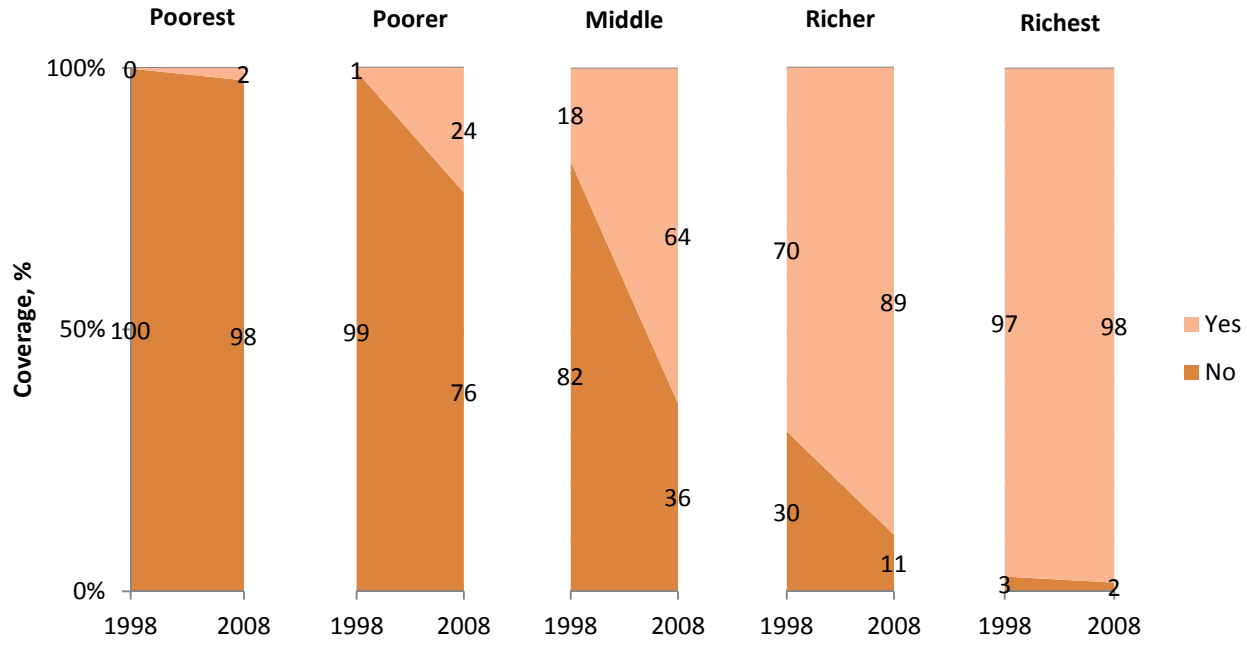

Figure 4.8 Access to electricity by wealth quintile in rural areas of Ghana 1998 and 2008 (Source: DHS data)

4.7.3 Rwanda

Sector overview

Lighting

Nationally, only around 11% of households have electricity and access is concentrated in urban areas with close to 50% of urban households having access against 5% in rural areas. Additional sources of lighting include batteries, oil lamps, candles and firewood. Rwanda uses both renewable and non-renewable sources of energy and is trying to increase the diversity of the sources used. Recent developments include a micro-hydro power programme, extensive work in Lake Kivu to extract methane gas, the exploration of geothermal potential and the use of peat. The Electricity Access Scale-up Roll-out Program (EARP) began in 2009 and focuses on connecting rural agglomerations and villages to the national grid.

Cooking

The use of modern fuels for cooking is very low, even in urban areas. Almost all households still rely on the use of biomass (firewood, charcoal and straw) for cooking purposes. Firewood is the most common material followed by charcoal. In urban households nationally firewood and charcoal are used in almost equal proportions but in Kigali City charcoal is more commonly used than firewood.

Access data

Figures 4.9 and 4.10 show that between 2000 and 2010 access to electricity increased in Rwanda although overall levels of access remain low nationally. Levels of access are still biased in favour of urban areas with a much higher percentage of households having access than those in rural areas.

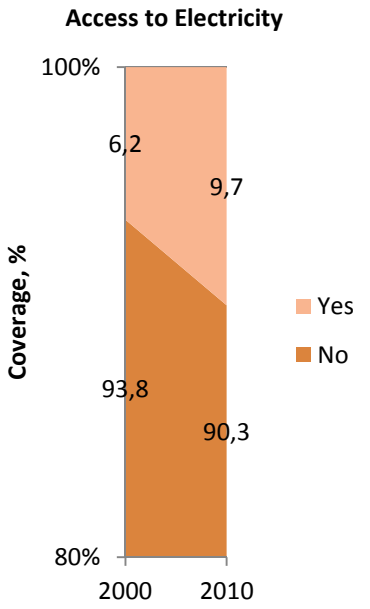

Figure 4.9 National access to electricity in Rwanda 2000 and 2010 (Source: DHS data)

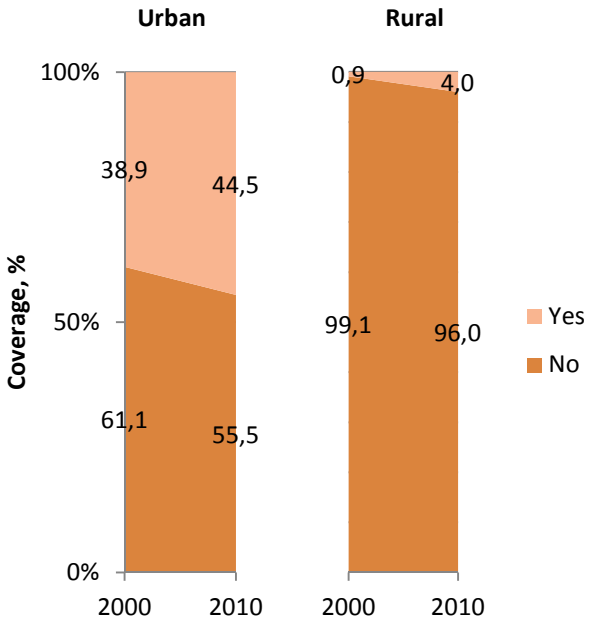

Figure 4.10 Access to electricity by place of residence in Rwanda 2000 and 2010 (Source: DHS data)

Figures 4.11 and 4.12 show that in both urban and rural areas, access to electricity is limited to the richer and richest wealth quintiles. However, even in urban areas, only 2% of households in the richer quintile have access to electricity. The largest rise in access was for households in rural areas in the richest quintile with access rising 15% over the decade. Those from the richer quintile in rural areas also have a slightly better level of access than those from urban areas, at 3% and 2% respectively.

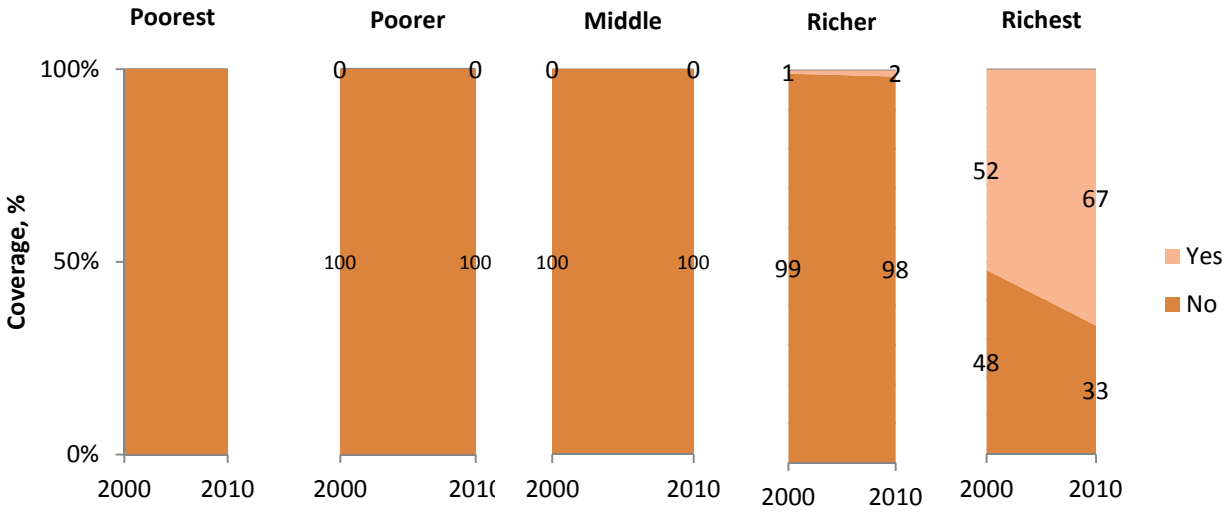

Figure 4.11 Access to electricity by wealth quintile in urban areas of Rwanda 2000 and 2010 (Source: DHS data)

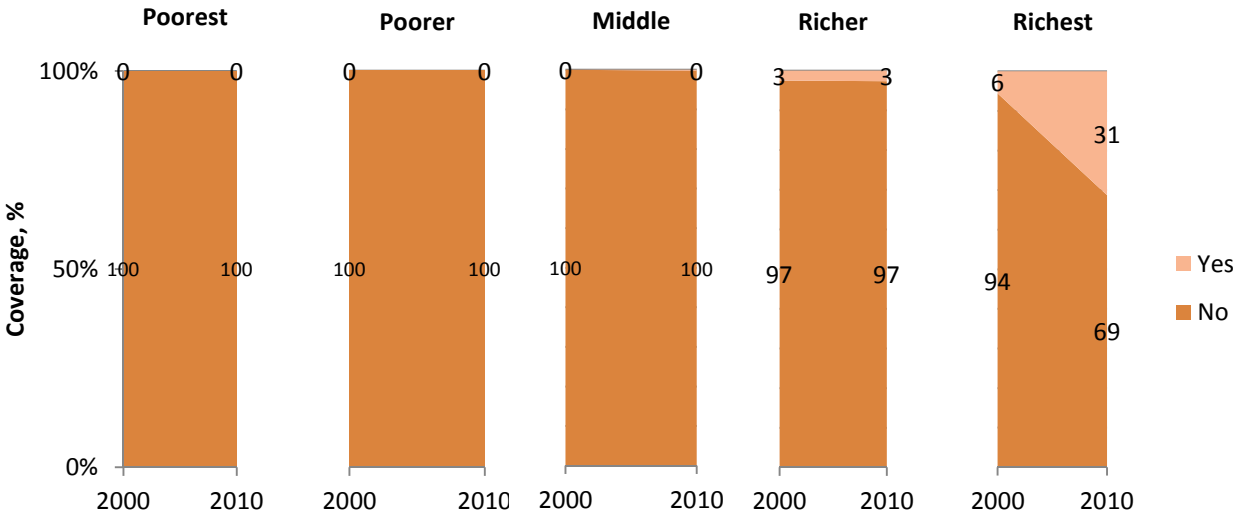

Figure 4.12 Access to electricity by wealth quintile in rural areas of Rwanda 2000 and 2010 (Source: DHS data)

4.7.4 Tanzania

Sector overview

National electricity grid infrastructure has not been able to keep pace with increasing urbanisation resulting in large numbers of unserved households in urban areas. Dar es Salaam has the highest rates of access nationally but the high cost of connecting to the grid and the payment of monthly bills prices out households from lower income brackets. Kerosene is widely used as an alternative for lighting and is much more affordable than electricity although there are regional variations in price. Kerosene is cheaper in Dar es Salaam than it is in other urban areas but the cost of electricity is lower than it is in Dar es Salaam. Cooking is done using firewood and charcoal in both urban and rural areas.

Access data

Figures 4.13 and 4.14 show that access to electricity has increased in Tanzania between 1999 and 2010 but that access in urban areas is higher than rural areas.

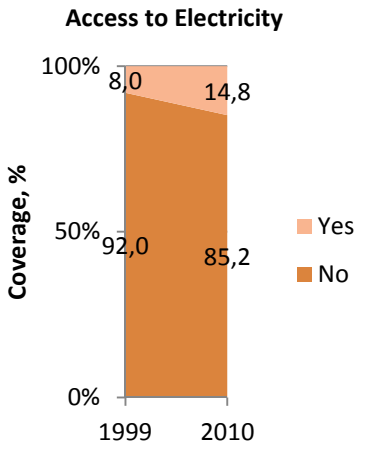

Figure 4.13 National access to electriricy in Tanzania 1999 and 2010 (Source: DHS data)

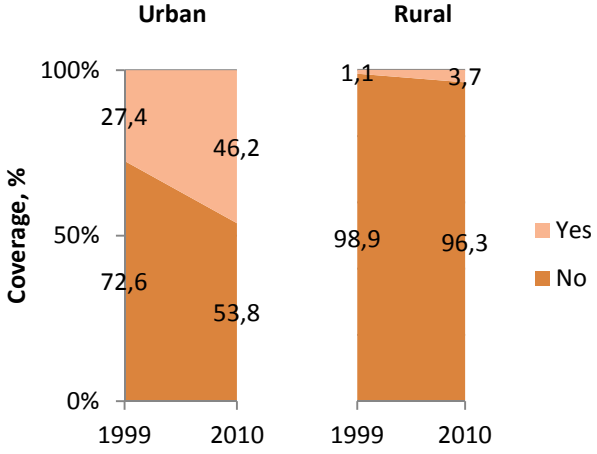

Figure 4.14 Access to electricity by place of residence in Tanzania 1999 and 2010 (Source: DHS data)

In Tanzania, access to electricity in both urban and rural areas is limited almost exclusively to those in the richest quintile as shown in figures 4.15 and 4.16 . Just 1% of urban and 2% of rural households in the richer quintile have access with those in the poorest, poorer and middle quintiles having no access at all. Households in rural areas have experienced the largest level of increase in access rising by 50% in 11 years.

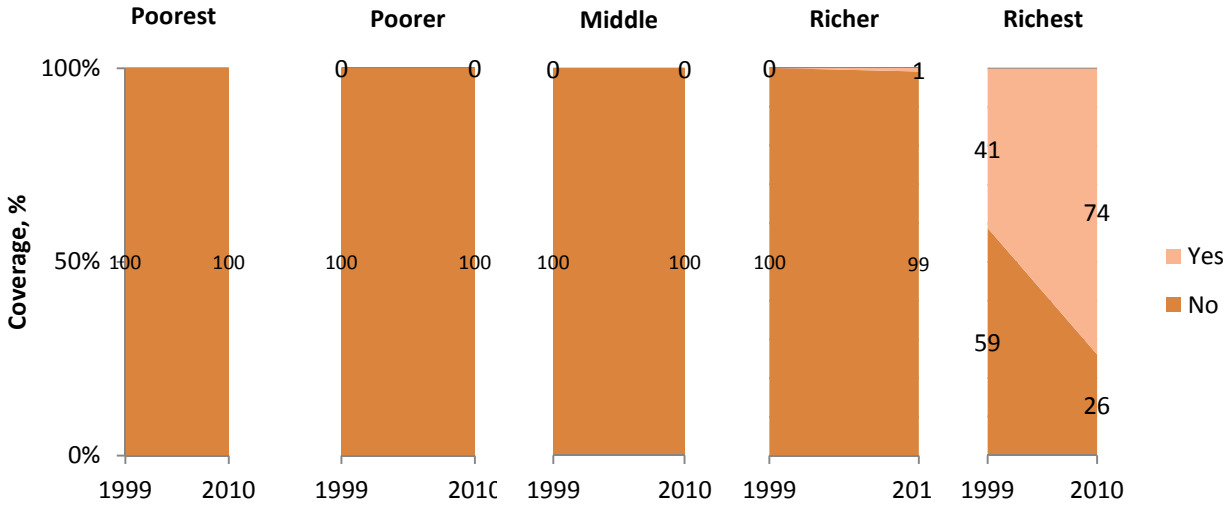

Figure 4.15 Access to electricity by wealth quintile in urban areas of Tanzania 1999 and 2010 (Source: DHS data)

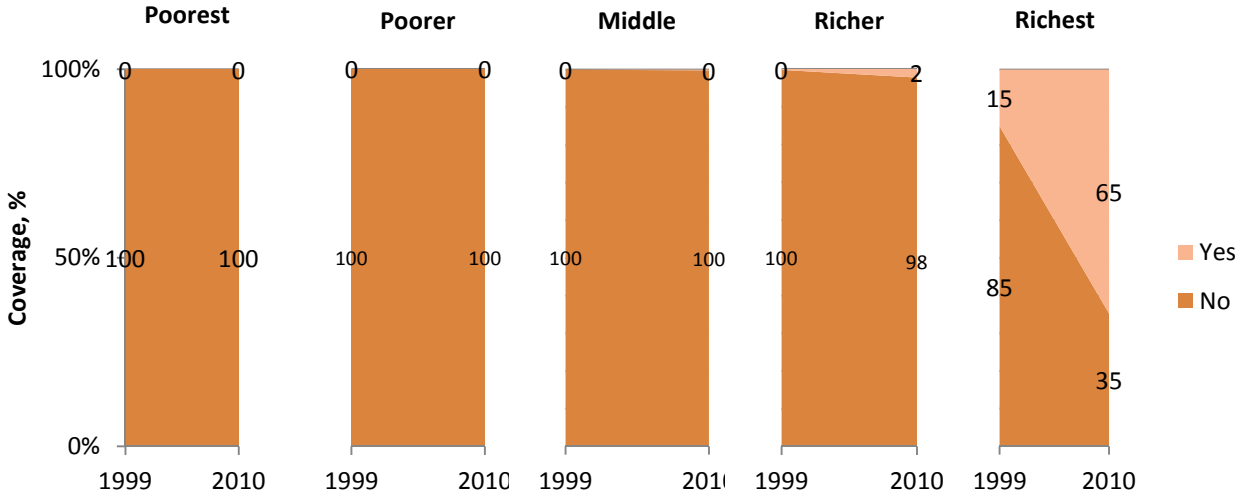

Figure 4.16 Access to electricity by wealth quintile in rural areas of Tanzania 1999 and 2010 (Source: DHS data)

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Additional electricity literature sources

World Energy Outlook

The World Energy Outlook is a comprehensive review of global energy trends. However, there is limited disaggregation of data by country or region. List of publications available at: http://www.worldenergyoutlook.org/publications/

Energy Development Index, OECD/IEA

The Energy Development Index is an indicator that tracks progress towards the use of modern fuels on a national or regional level. The most recent statistics can be accessed through this link where they can be exported to Microsoft excel format.

http://www.iea.org/publications/worldenergyoutlook/resources/energydevelopment/theenergydevelopmentindex/

Key World Energy Statistics, IEA

Global data on supply, transformation and consumption of all major energy sources. http://www.iea.org/publications/freepublications/publication/kwes.pdf

The Urban Household Energy Transition Energy, Poverty, and the Environment in the Developing World

A book detailing research into household fuel choices in urban areas in the developing world. It does not include any of the case study countries specifically but it is well researched and gives good overall insights into urban energy dynamics and their wider impact on the environment.

Barnes, D, Krutilla K, Hyde W, 2004. '*The Urban Household Energy Transition Energy, Poverty, and the Environment in the Developing World*'. World Bank

Available at: http://siteresources.worldbank.org/INTGENENERGY/Resources/UrbanEnergyTransitionV51.pdf

Power Outages and the Costs of Unsupplied Electricity: Evidence from Backup Generation among Firms in Africa

Research looking specifically at the cost of intermittent electricity supplies on business activities in Africa and the factors affecting the adoption of alternative energy generation methods.

Oseni M, 2012. 'Power Outages and the Costs of Unsupplied Electricity: Evidence from Backup Generation among Firms in Africa'. Available at: http://www.usaee.org/usaee2012/submissions/OnlineProceedings/IEE%20PAPER%20FRST%20YEAR%20EDITED%20LAST%201%20LATEST.pd

5. State of the Art Overview for Primary and Secondary Education in Sub-Saharan Africa

5.1 Patterns of access

Primary education

The second Millennium Development Goal (MDG) target 2a is to "ensure that, by 2015, children everywhere, boys and girls alike, will be able to complete a full course of primary schooling". Progress towards universal primary education (UPE) has been achieved globally, with rates of primary school attendance in developing regions rising from 82% in 1999 to 90% in 2010 (UNESCO, 2008). The progress that has been made has been uneven across the region . However, the average primary school net enrolment rate (NER) has risen from 57% to 70% between 1999 and 2005 (UNESCO, 2008).

Most recent estimates from the UNESCO Institute for Statistics (2013) estimated that 59 million children of primary school age were out of school in 2010. The number of children not in school in sub-Saharan Africa has risen from 29 million in 2008 to 31 million in 2010 (UNESCO,2012). This is a half of all out-of-school children worldwide and is the highest out-of-school rate of all the regions. Almost one in four primary school-age children have either never attended school or left school without completing primary education (UNESCO Institute for Statistics, 2012b). Sixty per cent of sub-Saharan countries have NERs below 80% and one third is below 70% (UNESCO, 2008).

Repetition rates and school retention remain problematic in sub-Saharan Africa, for those who do attend primary school. Only 63% of pupils stayed until the last stage of primary education, (and this does not necessarily mean they complete their primary education) although these 'survival rates' have improved in some countries (UNESCO, 2008).

Secondary education

The increase that has occurred in primary school education has resulted in an associated increased demand for secondary school education by the 74 million young people aged between 12 and 15 years who do not currently attend school[1]. Most sub-Saharan countries now see post-primary or lower secondary education as an important policy objective. This has resulted in an increased participation of 55% to 33 million children from 1999 to 2005. Lower secondary education participation rates are much higher (38%) than upper secondary rates (24%).

5.2 Barriers to improved education access

There are a range of factors that inhibit educational access and performance.

- ***Financing education***

Household poverty is seen to directly reduce the likelihood of school attendance (UNESCO, 2008). UNESCO Institute for Statistics (2012b) confirms this clear link between household wealth and the non-attendance. Children from the poorest quintile (20%) of households are four times more likely

[1] http://www.un.org/millenniumgoals/education.shtml

to be out of school than those from the richest quintile. The probability of being out of school decreases steadily with increasing household wealth. It is also known that poor children are more likely to enter education late, to repeat grades and to leave without the expected level of skills (UNESCO, 2012).

Poverty is also linked to school dropout rates, with sub-Saharan Africa having the highest (42% in 2010) which means one in six children leave school before grade 2 (UNESCO,2012). In Adama, Ethiopia, dropping out of school is common for the children of poor families. The reasons for this are given as insufficient funds to buy teaching materials required, lack of interest in schooling, lack of food and health issues, and the need to contribute to household incomes (Stotler, 2012).

- ***Disability***

The likelihood that a non-disabled child will attend school is two to three times higher than that of a disabled child in countries such as Malawi, Zambia and Zimbabwe (UNESCO, 2008).

- ***Urban and rural locations***

Children in both urban and rural settings can be disadvantaged with regards to access to education. Living in informal urban settlements that are not recognised can work against a child's chances of going to school; in rural areas, remoteness is an issue affecting access to schooling, as is the need to help with household or farming tasks (UNESCO, 2008). However, children in rural communities are still twice as likely to be out of school than urban children (UNESCO Institute for Statistics, 2012b). For example, in Ethiopia, for every 100 urban dwelling children, only 43 rural dwellers attend school. Urban slums however are the exception where HERs have decreased compared to the increase in rural areas in countries such as Zimbabwe, Tanzania and Zimbabwe (UNESCO, 2008).

- ***Gender***

Globally girls are more likely to be out of school (28%) than boys (25%) (UNESCO Institute for Statistics, 2012b). Gender disparities in access to education and educational achievement are still the highest globally in sub-Saharan Africa. 35% of countries in 2005 had achieved parity of primary education; rates for secondary and tertiary were 8% and 3% respectively. These inequalities are greater in rural than in urban settings, and in slum areas than in non-slum areas.

- ***Lack of teachers***

Primary pupil/teacher ratios (PTRs) have increased by 8.2% between 1999 and 2005 but this rise does not keep pace with enrolment figures (UNESCO, 2008). Recent projections show that sub-Saharan Africa will need to recruit more than 1.1 million additional primary school teachers between 2009 and 2015 to ensure that every child can complete their primary education (UIS, 2011a).
PTRs are much greater in public than in private schools, with teacher shortages more likely in public schools. Less than 80% of primary teachers were trained in 2005 in the region (UNESCO, 2008). Female teachers are predominantly found in pre-primary education (77%). 45% of primary school

and 29% of secondary school teachers are women. Where there are women teachers, this does not guarantee that girls will participate equally in school, as found in Ghana (UNESCO, 2008).

- ***The learning environment***

The level and quality of basic services in a school have a significant impact on education outcomes UNESCO Institute for Statistics, 2012a). A SACMEQ survey found that only 13% of school buildings were in good repair; others needed significant repairs or re-building (UNESCO, 2008). Studies also show that safe, adequate water and sanitation facilities in schools and hygiene education encourage school attendance, and also reduce the incidence of diarrhoea and other diseases which may result in a child not attending school (UNESCO Institute for Statistics, 2012a).

Although governments have taken action to improve physical infrastructure in recent years, particularly in rural and other disadvantaged areas, it has not kept pace with enrolment. In Ethiopia, classrooms increased by 55% between 1999 and 2005 but enrolments doubled (UNESCO, 2008).

UNESCO (2008b) estimates that countries in sub-Saharan Africa currently need to double the number of classrooms by 2015 (EPDC and UNESCO, 2009) in order to meet a deficit of approximately 1.7 million classrooms. The ten sub-Saharan African countries that furthest away from reaching the MDG goals are only increasing this number at half the required rate (Theunynck, 2009). In sub-Saharan Africa, the average class size in public primary schools is from 26 pupils in Cape Verde to 67 in Chad (UNESCO Institute for Statistics, 2012a). Four out of ten countries report an average of 50 or more children in a class. Ten per cent of pupils are taught in multi-grade classes (two or more grades in the same class) taught by the same teacher. In Chad, this figure is nearly 50%.There is often also a lack of teaching materials, books, chalk and boards. Conflict-affected countries such as Liberia, Burundi and Mozambique were seen to be worst affected by these shortages (UNESCO, 2008).

5.3 Increasing access: innovative approaches

The Dakar Framework calls on governments to ensure that education systems explicitly identify, target and respond to the needs of poor and marginalized populations (UNESCO, 2008). If it can be demonstrated that the 'Education For All' goals are being prioritised in relation to increased expenditure and planning, donors will then provide additional resources to help implement these plans (UNESCO, 2008).

- ***Reducing costs***

The enrolment gaps seen in poor children, girls, rural children, those with special needs and orphans have been reduced following the abolition of school fees in Kenya, Malawi, and Zambia. This financial short fall has been funded at least in part by donors. Other countries adopted a phased-in approach to reducing fees, as in Lesotho and Mozambique. This allowed additional teaching posts to be created and the provision of additional classrooms and learning materials.

- ***Alternative forms of education***

A variety of non-formal education takes place outside of the formal system, but the actual level of this is unknown and is diverse in terms of target groups and content. Large scale literacy programmes which include skills for life and livelihood are common in Ethiopia and Senegal. Rural development programmes are evident in Burkina Faso and Ethiopia. These receive government support (UNESCO, 2008a). Household survey results reveal that up to 31% of qualifications achieved by young adults are from non-standard curriculum (UNESCO, 2008).

Zimbabwe's satellite schools were established as a state initiative to make the goal of universal primary education fee for all. A study by Takesure and Tsikira (2012) found significant disparities in performance between the satellite schools compared to their mother schools. This was dependent on factors such as the school location, teachers' morale, poor infrastructure and resources, and the parents' attitudes.

- ***Addressing teaching quality***

Namibia is an example of where the number of trained teachers has increased from 29% to 90% between 1999 to 2005 (UNESCO, 2008a), resulting in a PPR of 33:1. This was the result of a deliberate policy to put trained teachers in place and to upgrade teacher qualifications. In Ethiopia, the government raised the number of female teachers through admissions quotas at teacher training colleges.

The District Development Support Programme (1989–2003) in four provinces in South Africa aimed to improve the quality of poor education in grades one to nine. It included provision of learning resources and teacher training. The educational impact was gains in grade 3 literacy and numeracy (UNESCO, 2008).

- ***Addressing increased vulnerability***

Ethiopia's special education needs strategy, introduced in 2006, is designed to encourage inclusive schooling by training teachers to identify learning difficulties and to establish support systems. Social protection programmes aimed at children affected by HIV and AIDS also exist in several countries, including Botswana (covering 95% of households with such children), Namibia (33%), Lesotho (25%), Uganda (23%), Zambia (13%), and Kenya and Togo (10% each). In Zambia, a social cash transfer programme provides cash to very poor households affected by HIV and AIDS. This resulted in an increase of 3% in enrolment among beneficiary children in Kalomo district.

- ***Promoting gender equality***

In Burkina Faso, girls' participation in school has been encouraged by establishing groups for mothers of schoolchildren. In addition, contributions to parent- teacher associations charged to parents of girls entering primary school have ended. Ethiopia's Education Sector Development Programmes have focused on increasing equality for girls, pastoral groups and those with special needs. This includes community sensitization campaigns, accompanying girls to school and the installation of school toilets and water supply.

- ***Social protection programmes***

Scaling up social protection measures has been found to mitigate some of the effects of poverty on education and to point to positive effects on enrolment and attendance (UNESCO, 2010). Two examples of this are:

  - The World Food Programme in Burkina Faso provided school lunches for all children in targeted rural primary schools and take-home food rations for girls in the last two grades resulted in increased enrolment for girls and decreased absenteeism.

  - In Kenya the cash Transfers for Orphans and Vulnerable Children initiative gave $20 a month to ultra-poor households fostering orphan or vulnerable children or where a child is cared for by chronically ill adult. Initial findings on educational impact suggest improvements in attendance and retention. The four-year pilot is now being scaled up as a regular programme.

5.4 Case Study Countries

5.4.1 Cameroon

Sector overview

Education in Cameroon is managed by three different departments: the Ministry of Basic Education (MINEDUB), the Ministry of Secondary Education (MINESEC) which also supports technical education, and the Ministry of Higher Education (MINESUP). The schooling system is organised as follows; nursery education from birth to 5 years, primary school from 6 years old for 6 years and secondary school for 7 years. Secondary schooling is sub-divided into 2 cycles and is different under the francophone and Anglophone system. In the francophone system the first cycle is 4 years and the second is 3 years. In the Anglophone system the first cycle is 5 years and the second is 2 years. Post primary education is also available as an alternative to enrolling in secondary school. For post primary education, students can enroll in a technical secondary school or enter the job market.

There are a mixture of public and private schools with different laws governing each category. Within the private category, schools are supposed to be organised into are sub-categories but this system is not yet in effect. Approximately 70% of pupils are in a public school with 30% in private schools. The number of private schools has been increasing across all regions but the most significant rise is in the 2 major cities of Douala and Yaounde.

Primary schools

In terms of accessibility, the distances to public primary schools vary throughout the different regions and by place of residence. In urban areas the distance to a public primary school is less than 1km in almost all regions except the far north and the south west where distances are almost 2km in the north and just over 1km in the south. There is very little difference in the distance travelled by those from poor and non-poor households. In rural areas, the distance to a public primary school is between 1km and 3km for both poor and non-poor households in all regions except littoral where the distance is less than 1km. Children in rural areas therefore have to travel further than their urban counterparts but the level of household income does not greatly affect the distance travelled.

The demand for school places outstrips the availability in most regions. In northern Cameroon there are 3 children for every 2 places. However, in Douala, Littoral and the south west the number of places available is higher than the demand. In peri-urban areas access to public schools is becoming more difficult as the cities continue to expand. Urban sprawl outstrips the construction of public schools and the void is instead filled by private schools which are more expensive to attend.

In some areas, primary schools are built by communities who then employ 'parent teachers' at their own expense. These schools and the teaching staff do not necessarily meet the appropriate standards expected in primary schools. There can also be problems in assimilating trained teachers into public sector schools which leaves many in unstable, part-time posts.

Secondary schools

Data relating to the proximity of secondary schools to pupils seems to indicate that pupils are closer to secondary schools than they are to primary schools. However, in reality, secondary school pupils have to travel further to reach school but they tend to use motorised transport such as a taxi or moto-taxi which is obviously quicker than walking. Other pupils board at the school or live with relatives who are much closer to the school than the family household would be and therefore the distance to be travelled is reduced.

Demand for places in secondary schools outstrips supply in the east, the centre, Douala and Yaounde. Yaounde has the highest levels of demand per space available. Secondary schools struggle to provide equipment and facilities for their students. Some schools are built with temporary materials and access to ICT equipment, particularly computers is a significant challenge, especially in rural areas.

Levels of satisfaction with education services

Overall, levels of satisfaction with education services are higher for non-poor urban service users. Poor service users in rural areas express the lowest levels of satisfaction. When disaggregated by region, service users in the east express the lowest levels of satisfaction and users in the south west express the highest. In terms of the levels of satisfaction regarding the number of qualified teachers available in schools, service users do not consider there to be enough teachers with 51% of users in urban areas and 84% in rural areas expressing dissatisfaction with the levels of teaching staff. The levels are slightly better in private schools than in public ones but in private schools, 46% of users still expressed dissatisfaction with the levels of teaching staff available.

In 2009, the cost of attending all school levels (nursery, primary, secondary 1 and secondary 2) in public schools was almost 50% more in urban areas than it was in rural areas. Given that a majority of the population of Cameroon lives in urban areas, the cost of education is a significant financial burden on families. Inability to pay the school fees results in many children being removed from schooling after primary school. Girls from poor families are especially likely to be removed from school at either the primary or first secondary level. Attendance rates for children from the higher wealth quintiles are higher in all levels of schooling than children from poorer and poor families.

Key challenges for the education sector

- Lack of financial resources for school construction
- Lack of qualified teachers

- Inefficient recruitment, evaluation and orientation system for teacher s
- Inefficient internal processes, structure and regulations affecting the whole educational system
- Lack of school places and infrastructure (e.g. not enough desks in classrooms, no equipment)
- Corruption and embezzlement within schools (e.g. charging additional fees)
- Ensuring universal access to education/apprenticeship or vocational training to ensure that future generations are well educated and able to find a place in the workforce.

5.4.2 Ghana

Sector overview

The Ministry of Education and the District assemblies are responsible for the provision of primary and secondary education. Tertiary education is the responsibility of the MoE. In addition to public schools there are also schools operated by private organisations, faith-based organisations and other non-governmental agencies. Over 85% of primary school children have a school within 30 minutes of their home but there is a disparity in access between urban and rural areas. For those in the lowest income groups, the urban poor have a better rate of access than the rural poor with rates of over 90% and over 70% respectively.

Access to local secondary schools is much lower. Less than 50% of children have a secondary school with 30 minutes of their home but access is better in urban areas, even for those in low income groups because there is a higher concentration of schools in urban areas. However, the standard of education varies significantly between different schools and travelling to another area to attend school is common, especially for senior high schools, of which there are fewer available.

5.4.3 Rwanda

Sector overview

The Rwandan education system is currently structured as follows; 3 years of pre-primary education, 6 years of primary education, 6 years of secondary education, and 3 to 5 years of higher education. Pre-primary education is provided entirely by private organisations and as such parents have to bear the full cost of tuition. The number of pre-primary schools is still relatively low nationally but there are more available in Kigali for those in higher income brackets who can afford the fees.

Schools for children with physical or learning difficulties are also rare but efforts are being made to make sure that children with special needs are integrated into the education system. There is also a strong emphasis on educating girls to make sure that there are no gender imbalances in access to education.

In addition to the public schools there are now many private primary and secondary schools. Kigali has the highest concentration of both primary and secondary schools with a mixture of public and private facilities. Kigali is also able to attract better qualified staff with higher wages being paid in private schools and in urban areas. The pupil to teacher ratio in Kigali is lower than the national average and the literacy rate of people aged 15 and above is higher than the national average.

Primary education

Universal primary education was introduced in 2003. The aim was to increase access and enrollment rates for all Rwandans but especially those from low income households and girls. In 2009 Nine Year Basic Education (9BYE) was introduced which guarantees 6 years of primary school and 3 years of secondary school without fees, this was increased to 12 years basic education in 2012. Primary school enrolment is almost 100% for both boys and girls and is amongst the highest enrolment rates in East Africa (IPAR, 2012).

In all districts, the concentration of schools is always higher around urban areas. In the Northern and Eastern province children are more likely to have to walk for more than one hour to reach a school whereas in Kigali the time is much less. The number of new classrooms and qualified teachers is rising constantly but teacher to pupil ratios can still be high in some schools which effects the quality of education received.

Secondary education

The introduction of 9 and then 12 year basic education required the building of additional classrooms. In many cases these classrooms were added to existing primary schools in order access to a secondary school possible in the local area. The Eastern province has fewer schools than other provinces and pupil to teacher ratios in secondary schools are increasing due a shortage of trained teachers.

5.4.4 Tanzania

Sector overview

Primary school

The government introduced the Primary Education Development Plan (PEDP) in 2001 with the aim of achieving universal access to primary education by introducing free schooling. Poorer households have benefitted from the plan, especially those in Dar es Salaam. The biggest challenge for schools is a lack of infrastructure and a lack of teachers which results in overcrowding, especially in low income urban areas where classes can be in excess of 100 pupils instead of the recommended 45. Although schooling is free there are associated costs including uniforms, writing materials and transport which need to be paid for by the family. Drop-out rates amongst low income families are higher than those from wealthier households because the additional costs of attending school cannot be met.

Secondary school

Enrolment in secondary school is affected by a lack of secondary classrooms and primary completion rates. Students attending secondary school tend to be from urban areas and from higher income households. In order to increase levels of access to secondary school the Secondary School Development Plan (2004 – 2009) was developed. The number of secondary schools available was increased which provided more places and supported growth in enrollment rates.

The income gap between those who are uneducated and those who have completed tertiary education is much higher in Dar es Salaam and other urban areas than it is in rural areas. Increasing

levels of literacy and expanding higher, technical and vocational education have been identified as key drivers in poverty reduction.

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6. State of the Art Overview for Health in Sub-Saharan Africa

6.1 Patterns of access

Unless current trends are drastically changed, most countries in Sub-Saharan Africa will miss the MDG health related targets. The issue of universal health coverage and health inequalities is gaining increased attention throughout the world. Not only are there inequalities between countries and regions but there are also inequalities within countries, where those in lower wealth quintiles are more at risk from higher rates of illness and higher mortality. In 2005 all WHO Member States committed to achieving universal health coverage which would allow everyone to access the health services they need without the risk of financial ruin or impoverishment (WHO, 2013a).

Low income populations suffer from 'traditional risks' including under-nutrition, unsafe sex, poor access to clean water, sanitation and hygiene or breathing related illnesses caused by smoke inhalation from poor quality solid fuels. Wealthier populations are more at risk from chronic 'modern' health problems including obesity, smoking and alcohol related illnesses. In low and middle income countries, governments are having to deal with both traditional and modern risks at the same time (WHO, 2009). This section considers access to health services in urban settings.

6.2 Challenges and barriers to access

One of the biggest barriers to improving health in Sub-Saharan Africa is the prevalence of weak health systems which are unable to provide the necessary health services due to insufficient infrastructure, and a lack of financial and human capacity. WHO (2007) have identified six key elements which contribute to an effective health system;

- ***Service delivery***: the ability to deliver effective, safe and good quality services to those that need them in a resource efficient manner.
- ***Health workforce:*** a strong workforce which is able to work responsively, fairly and efficiently with the resources available in any given circumstances.
- ***Medical products, vaccines and technologies:*** equitable access to essential medical products which are of an assured quality, safe and cost effective.
- ***Information:*** the availability and dissemination of up to date information and analysis of health determinants, system performance and health status.
- ***Financing:*** the adequate availability of funds to ensues that everyone can access the services they need without financial hardship or impoverishment.
- ***Leadership and governance:*** effective strategic policies and frameworks in place to ensure effective oversight, regulation, system design and accountability.

Service delivery

The Ouagadougou Declaration on Primary Health Care and Health Systems in Africa: Achieving Better Health for Africa in the New Millennium was adopted during the International Conference on Primary Health Care and Health Systems in Africa, 2008. Member States are encouraged to update their national health policies in line with the Primary Health Care approach with the specific goal of

strengthening health systems and tackling the key health issues in the MDGs (Lusamba-Dikassa *et al*, 2010). However, achieving good service delivery is a multi-faceted, highly complex challenge as it involves co-ordinating all the different aspects of a health care system in an efficient and equitable way. When resources are limited, improving one area of service delivery such as infrastructure can reduce the resources available for other areas such as reducing financial barriers to services.

In a multi country study by WHO (2012b) which considered health systems from the perspective of communities, the acceptability of public services, particularly for women and marginalised groups is of particular importance in providing health care which meets the needs of users. The main reason given for not accessing health care was the cost of it, however, transport problems, a lack of medications and the perception that the case was not serious enough for health care were also given.

Health workforce

The numbers of health professionals available in the Africa region remains well below the levels needed to provide national health care services. Table 6.1 shows the ratio of health professionals per 10,000 population in the 4 case study countries.

Table 6.1 Health professionals per 10,000 population in the case study countries.

Health workforce per 10,000 population 2005 - 2012	Ghana	Cameroon	Rwanda	Tanzania
Physicians	0.9	0.8	0.6	0.1
Nurses and midwives	10.5	4.4	6.9	2.4
Dentists	<0.05	<0.05	0.1	<0.05
Pharmacists	0.2	<0.05	<0.05	<0.05
Environment and public health professionals	<0.05	___	0.1	___
Community health workers	1.9	___	___	___
Psychiatrists	<0.05	<0.05	<0.05	<0.05

(WHO, 2013d)

People living in urban areas generally have access to better health infrastructure if they can afford to use it. There can be a mixture of public, private, religious and not for profit facilities available. Urban areas also attract more of the skilled health workforce (WHO, 2012).

Medical products, vaccines, technologies

Like the availability of trained health personnel, the availability of medical products, vaccines and technologies is dependent on country and location. Ensuring access to and enforced regulation of good quality products, especially medications is a top priority, especially in urban areas where many people seek help from unregulated, commercial providers or street vendors instead of using more

formal services. In many cases, equipment and machines are un-used because they are broken and unable to be repaired or the staff do not know how to use them.

Information

The generation, availability and use of information and data is critically important in a health system. In terms of equality of access to services, global data has found that socially constructed gradients exist across all levels of society in every country. Historically, health inequalities related to economic status have received the most attention. However, there is a growing recognition that there are many more socially constructed factors which can influence levels of access to services. These include; education, social class, ethnicity or race, sex, province or district, place of residence (urban or rural), language or immigrant status. (WHO, 2013b; WHO 2013c). There is also limited information available about the differences which exist within a city.

Financing

The Abuja Declaration (2001) sets the target for countries to allocate at least 15% of public expenditure to the health sector (WHO, 2010). Only Togo (15.4%), Botswana (15.6%), Zambia (17%) and Rwanda (20.1%) have reached this target (WHO, 2012a). In 12 of the countries, including Cameroun the life expectancy at birth has decreased since 1990. Infection and parasitic diseases account for 42.5% of the overall burden of disease in the Africa region (WHO, 2012a). Table 6.2 highlights some of the key indicators used to assess access to health services.

Table 6.2 Key indicators for assessing access to health services

Indicator	Lowest	Ghana	Cameroun	Rwanda	Tanzania	Highest
Life expectancy at birth (2009) (yrs)	Malawi 47	60	51	59	55	Mauritius 73
Total expenditure on health as a % of GDP (2010) (%)	Congo 2.5	5.2	5.1	10.5	6	Sierra Leone 13.1
Per capita total expenditure on health (2010) (includes public, private and external funding) (PPP int. $)	Eritrea 16	85	122	121	83	Equatorial Guinea 1,545
General govt. spending on health as % of total govt expenditure (2010) (%)	Guinea 1.8	12.1	8.5	20.1	13.8	Rwanda (20.1)

(WHO, 2012a).

Leadership and governance

A well-functioning health system involves the inputs from a wide range of stakeholders because there are so many inter-dependencies within the system, no single body can have responsibility for all aspects and this can lead to confusion over roles and responsibilities, duplication of activities, neglect and serious inefficiencies which effect the overall functioning of the health system. Although central government should have responsibility for policy and strategy formulation, all the different stakeholders should be involved in the process of development and for implementation, decentralised approaches using a combination of actors including local government, NGOs,

communities and the private sector is encouraged. Ensuring that the sector is properly regulated is also an important aspect to protect users from unregulated, substandard and potentially dangerous services. Again this can be achieved by combining the efforts of multiple actors.

6.3 Increasing access

There are many different initiatives to try and tackle the challenge of developing and sustaining an effective and equitable health system. Every country suffers from health inequalities and there is no single approach that can be adopted.

One of the most recent developments in monitoring health systems is Urban HEART. Urban HEART has been developed for use by national and local officials in order to identify health inequities and plan actions to reduce them (WHO, 2014).By collecting monitoring data across more categories, with greater disaggregation, it is hoped that countries will have a stronger foundation for evidence based health planning and the ability to assess if current health initiatives are promoting equity. Poor city dwellers, those living in slums or the homeless are often neglected because authorities do not collect information from them regarding access to services, including health. UrbanInfo from UN-HABITAT is another tool for measuring and recording data on urban indicators.

There are 3 main approaches to reducing urban health inequalities (WHO and UN-HABITAT, 2010). Disadvantaged groups can be targeted, with the aim of improving the health of that specific group. Attempts can be made to narrow the health gap between the best and worst off sections of the population. Initiatives are targeted towards a group or groups of the population who are disadvantaged relative to the majority of population. The third option is to consider the urban population as a whole and to try and reduce the inequalities across the entire population. This is achieved through broad interventions which tackle problems related to improving the urban environment such as improving access to clean water and good sanitation facilities, improving housing, controlling air pollution, making roads safer to reduce traffic accidents and creating opportunities for physical exercise in safe environments.

6.4 Case Study Countries

6.4.1 Cameroon

Sector overview

Activities within the health sector are directed by the Health Sector Strategy, which has 4 key components focusing on maternal health, child and adolescent health, disease prevention and the development of healthy districts. Malaria is the first cause of mortality in Cameroon and as such represents the most frequently reported complaint from patients. Malaria related deaths account for between 35-40% of all deaths in medical facilities and children are particularly susceptible.

In terms of public infrastructure, there are 4 general hospitals, 4 central hospitals, 11 regional hospitals, 164 district hospitals, 155 sub-division medical centres and 1,888 integrated health centres (with approximately 1,600 functional). In addition to the public facilities there are 93 private hospitals, 192 non-profit private health centres, 289 clinics/polyclinics and 384 consulting rooms. Due to the administrative complexities of establishing a private facility there are a growing number

of illegal health facilities which operate 'officially'. Urban residents generally have to travel a shorter distance, around 2km, to reach a medical facility whereas rural residents have to travel around 5km.

There is also a substantial laboratory and medical supply supply sector with 12 accredited medical laboratories, 5 drug manufacturers, 14 wholesalers, 331 pharmacies (although a significant proportion of these are in the 2 major cities), a National Centre for Essential Drug Procurement and Medical Disposables and 10 regional pharmaceutical supply centres. For training there are 3 public faculties of medicine (in Yaounde, Douala and Buea), 1 private faculty and 39 training centres.

The number of medical staff available has decreased in real terms due to several factors including; brain drain, failing to replace staff who retire, insufficient supply of trained staff from training facilities and population growth. The distribution of trained staff is uneven with higher concentrations found in urban areas than in rural ones. It is common for patients to not see a medical doctor during a consultation; instead, a chief nurse takes on the consultation role, especially in rural areas. In private facilities there are better ratios of doctors to patients and therefore, more likelihood of seeing a doctor for a consultation, but private facilities are limited to urban areas. In some cities like Douala the use of private facilities has outstripped the use of public ones. In rural areas there is a greater reliance on consultations with nurses and auxiliary nurses and in both areas, patients consult informal drug salesmen or visit the homes of traditional healers for advice and treatment. The use of traditional healers is marginally higher in rural areas than it is in urban areas and is more common amongst those on lower incomes. However, as the cities continue to grow, new facilities will need to be established and it is important that these are considered in now so that they can be planned for in the coming years.

Key challenges for the health system

- Lack of medical equipment in facilities and low supplies of essential drugs in health units
- Poor sanitation in health units
- Inadequate and unreliable supply of electricity in rural areas
- Lack of qualified and trained staff
- Continuation of preventable diseases e.g. malaria and influenza
- Poor service in public health facilities.

6.4.2 Ghana

Sector overview

Decentralisation is an important aspect of promoting more equitable access to health services and as such Ghana has established Budget Management Centres to promote financial decentralisation which in turn influences access to health services in districts. Community Management Committees have also been established to ensure that community views are taken into consideration during the planning and implementation of services. The Ministry of Health uses an agency the Ghana Health Service (GHS) to provide health based services using a Community Based Health and Planning Service model the CHPS. CHPS centres and health centres are the first point of contact for patients. From here, more complex cases can be referred to district, regional, teaching or speciliased hospitals as needed.

The MoH employs a majority of the national health workforce with others employed in private, mission, quasi-government or other health services. It is also estimated that there are over 21,000

traditional medical practitioners and over 350 traditional birth attendants. A majority of the highly skilled professionals are concentrated in the Greater Accra region with the two teaching hospitals employing more than 45% of the country's doctors. In comparison less than 15% work in district hospitals. The more affluent southern regions attract a greater proportion of staff but over 65% of the population live in rural areas where access to services is more difficult. Private facilities are concentrated in urban areas.

The three major causes of morbidity and mortality are malaria, acute respiratory tract infections and diarrheal diseases which are closely linked to poor sanitary conditions and a lack of access to safe water. For pregnant women, mortality levels are highest in the northern belt and amongst those with lower levels of education. Social factors including poverty, high fertility rates, early childbearing and teenage pregnancy are all contributors to maternal mortality rates in addition to health related complications.

The MoH has identified significant inequalities between different geographical regions. Health indicators in the northern and central regions are the worst. These areas are also the most rural and have the highest incidents of poverty. Health services in rural areas can sometimes be provided by semi-skilled or even un-skilled workers. Table 6.3 shows the proportion of health professionals working in urban and rural areas in 2009.

Table 6.3 Proportion of health professionals working in urban and rural areas in 2009

Occupational Category/Cadre	Total	Urban %	HW/1000 Pop. in Urban	Rural %	HW/1000 Pop. in Rural
Generalist Medical Practitioners	1,945	70	0.13	30	0.04
Specialist Medical Practitioners	695	100	0.07	-	-
Medical Assistant(*)	712	30	0.02	70	0.04
Nursing Professionals	8,938	70	0.60	30	0.20
Nursing Associate Professionals	8,197	30	0.23	70	0.43
Midwifery Professionals	4,929	40	0.19	60	0.22
Dentist	55	95	0.00	5	0.00
Dental Assistance and Therapists	102	95	0.01	5	0.00
Pharmacists	532	70	0.04	30	0.01
Pharmaceutical Technician & Assistants	1,253	60	0.07	40	0.04
Environmental and Occupational Health & Hygiene Workers	600	20	0.01	80	0.04
Physiotherapist and physiotherapy assistant	100	100	0.01	-	-
Optometrists and Opticians	41	80	0.00	20	0.00
Medical Imaging and therapeutic equipment operators	256	60	0.01	40	0.01
Medical and Pathology Laboratory Technicians	923	70	0.06	30	0.02
Medical and dental prosthetic technicians	13	85	0.00	15	0.00
Health Management Workers/Skilled Administrative Staff	467	95	0.04	5	0.00
Other Health Support Staff	24,26	40	0.93	60	1.08
Trainees	25,279	80	1.93	20	0.38
TOTAL	**78,757**	**67.89**	**4.34**	**32.11**	**2.47**

6.4.3 Rwanda

Sector overview

The Ministry of Health has overall responsibility for the health sector but as with other services, decentralisation is prioritised. At the national level the MoH is responsible for developing and implementing health policies and strategies, monitoring and evaluating operational programs and managing the national referral facilities. At the level of provinces (of which there are 4 plus Kigali City) there are provincial health offices which ensure the planning, management and coordination of activities in the provinces. Below the provincial offices are district health offices which manage and co-ordinate activities at the district level.

Health services are provided by a mixture of public, private and government assisted health facilities which include those run by religious groups or non-profit organisations. The private providers tend to offer more specialised services such as maternity care or ophthalmology. Traditional healers also play a role and the use of their services is still widespread in Rwanda. For direct treatment services there are 5 categories of facility; referral hospitals, district hospitals, health centres, dispensaries and health posts. The initial point of entry for most people will be a local health post with cases transferred up through the different levels as necessary.

Membership of a health insurance scheme is mandatory for everyone. There are a number of health insurance schemes, some of which are attached to a place of work; for example universities, the civil service or the military. At the community level there is a community based health insurance called Mutuelle de Santé (MUSA). The aim of MUSA is to reduce the risk of exclusion from health care and to provide some level of universal access to health services. The scheme was initially designed to charge a flat fee for everyone of 1,000 Rwandan Francs (RwF) (approx. 2 USD) per year with a family considered as one person. In 2012, for the purposes of making access more equitable, people were classified into different wealth categories, poorest, poor and wealthy. Those in the wealthy category pay 7,000 RwF pp/per year. The poor pay 3,000 RWF pppy and the Government covers the cost for those identified as poorest by their communities. MUSA covers up to 85% of the medical bill for all levels of health care.

For large families or those that struggle to pay, which includes causal labourers living in urban areas, the MoH encourages them to pay in two instalments which can be more easily budgeted for in the household expenditures. The main challenge with MUSA for patients is access to medicine at health centres. Only medicines bought through the health centre are eligible, consequently if there are no supplies, medicines must be purchased at full cost from a private pharmacy. At the national level, the biggest challenge is a lack of funds to support all those in the poorest category. A lack of understanding at the community level on how the system works can also impede uptake, despite the fact that it has been made a mandatory requirement.
Old health facilities have been rehabilitated and new facilities are being built in the more underserved areas like the eastern province which currently has the lowest number of facilities. All health facilities are equipped with at least the basic equipment needed for treatment and laboratory analysis. District hospitals have at least 2 ambulances to assist in patient transport and each district has cars available to help in monitoring district activities and health levels. In terms of distribution,

the 4 referral hospitals are all in Kigali or Huye, another large urban area. Kigali also has a high number of private facilities but these are concentrated in the centre with limited access for those living in peri-urban areas. The national average for time taken to walk to a health facility is 1 hour. In Kigali the time is closer to 30 minutes and in some districts the walk can be longer than 2 hours. For those in low income households in Kigali, although there is more choice available, the cost of services is higher than in rural areas which reduces the possibility of using services.

Rwanda lost a large number of health sector personnel during the 1994 Genocide and it has taken many years to recover. Health sector staff including; doctors, nurses, midwives, paramedics and laboratory technicians are trained at the National University of Rwanda, the Kigali Health Institute and specialist high schools. However, the number of health personnel per population is still well below those recommended by WHO.

6.4.4 Tanzania

Sector overview

Recent government initiatives have focused on improving physical access to health facilities and a special emphasis has been placed on the importance of maternal and child health. The aim is for everyone to be able to travel less than 5km in order to reach a health facility. Residents in urban areas have better levels of access with average travel distances of 6km but in rural areas the distances can be in excess of 40km. Regional, referral and specialised hospitals are all located in urban areas. Dispensaries are the most widely available form of health service and travel distances in both urban and rural areas are less than 6km.

The use of public health facilities has increased, especially in rural areas, but in Dar es Salaam, private health services are more commonly used than public ones. People from low income households are more likely to use a public facility or consult a traditional healer. The ratios of medical personnel to population are better in urban areas than in rural areas but are still much higher than recommended levels. Long wait times, a lack of medical supplies and a lack of staff are significant challenges for the public health facilities. Health insurance schemes are available to help ease the burden of medical costs incurred by patients but access to the schemes is limited to those in employment who can afford the fees. Consequently, people with higher incomes living in urban areas tend to benefit from membership to a scheme and those who are unemployed or cannot afford insurance have to pay the full cost of using any health services.

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7. State of the Art Overview for Mobile Phones in Sub-Saharan Africa

7.1 Patterns of access

The adoption of and growth in mobile phone communications has been a remarkable achievement in Sub-Saharan Africa. Initially, the high cost of handsets and services meant that mobile users were primarily wealthy, educated, urban men (Aker and Mbiti, 2010). However, coverage of mobile networks in urban areas is now over 91% (Foster and Garmendia, 2010) and handsets are becoming more affordable. Although the initial cost of handsets can be high, the cost of using a mobile phone is relatively low, especially since the introduction of pre-paid services. It is estimated that 97% of consumers in Sub-Saharan Africa use the pre-pay service which allows them to buy credit (airtime) in small denominations, according to their budget (Foster and Garmendia, 2010).

According to World Bank data on cellular phone subscriptions in Sub-Saharan Africa (excluding South Africa) in 1989 there were 3,980. In 2011 (most recent data available) there were 462,576,525. Globally in 2011 there were 5,959,909,665 subscriptions (a subscription is defined as a subscription to a public mobile telephone service using cellular technology, which provides access to the public switched telephone network. Post-paid and prepaid subscriptions are included, World Bank, 2012). Some people have multiple subscriptions to different networks, therefore, the real figure of mobile ownership is likely to be lower than the figure reported.

In the Total Energy Access (TEA) framework designed by Practical Action (2012) there are two minimum standards relating to information communication technologies (ICTs), these are for people to be able to send and receive electronic information from within their home. Owning a mobile phone allows households to meet both of these standards. During their research (presented in poor people's energy outlook 2012 report) it was found that more households met the two standards for ICTs than for any other energy service standard (outlined in the energy chapter). Expanding and strengthening social networks is considered to be the most important benefit of having access to mobile phone services (Duncombe, 2012; Sife et al, 2010).

7.2 Barriers to mobile phone access

The main barriers to access are cost of the handset and lack of network coverage. In terms of handset affordability, households who cannot afford to own their own mobile most often use a public phone (usually in a shop or with an agent) or use those of family and friends.

There can also be a barrier to access in terms of credit availability. Duncombe (2012) highlights that users who are able to purchase credit (airtime) are more likely to be part of active contact networks who can choose when to communicate and with whom. Users with less ability to purchase credit may only be included at the discretion of those who have credit and have less choice over when and how to communicate with the group. The extent to which this impacts on social networks and people's ability to improve their livelihoods is not known. The data presented in the access section is limited to a yes/no response regarding ownership of a mobile phone, it is not possible to determine from the data currently collected the types of services available for use, e.g. the ability to access internet services through a mobile phone.

7.3 Innovative uses to enhance livelihoods

There is a great deal of literature available which discusses the role of mobile phones in sustainable livelihoods, however, a good deal of it deals with hypothetical situations and small-scale innovations driven by local organisations. The extent to which mobile telephony services are contributing to sustainable livelihoods is under debate (Aker and Mbiti, 2010; Sife at al, 2010).

Despite this, it is relatively easy to find examples of projects where the use of mobile communications has been successful, especially in the agricultural sector. For example, the project, 'Collecting and Exchange of Local Agricultural Content' (CELAC), Uganda uses text messages to facilitate access to markets and to share good farming practice (Duncombe, 2012).

In his research into the impact of mobile phones on livelihoods Duncome (2012) outlines 4 ways in which the relationship between mobile phones and assets can be conceptualised:

1. Direct substitution: e.g. between mobile phone airtime and transportation costs. People can call instead of meeting in person, saving time as well. People may also forgo other items in order to purchase a mobile phone.
2. Asset enhancement: through improving the efficient use of resources e.g. time. Mobile phones provide the ability to communicate over large differences and co-ordinate complex activities, especially in the agricultural sector.
3. Asset disembodiment: information that was previously committed to memory can be stored and potentially shared, helping to build personal and professional networks.
4. Asset exchange and combination: mobile airtime can be used as a cash substitute to pay for services.

The responsive nature of mobile services allows small scale initiatives to harness the availability of two-way mass communication and expanding communication channels. Radios and newspapers are useful for communicating information but they are a unidirectional service.

One of the most significant ways that mobile phones are promoting enterprise is through the formalisation of previously informal communication networks. Information can now be transferred via the phone which would previously have to be given through word of mouth. This allows enterprises to have larger networks, which can encompass a whole supply chain.

There has also been job creation linked directly to mobile phones. This includes the large network of airtime sellers and businesses which provide services such as phone repairs or battery charging. However, Sife *et al* (2010) found that relatively few households were earning money from phone related goods and services but that in rural areas, the reduction of transport bills contributed to an improved household income. Aker and Mbiti (2010) propose that mobile phones should reduce labour market search costs which would in turn increase wages, increase job arrival rates and reduce unemployment.

As discussed earlier, there are many examples of the use of mobile phones in the agricultural sector. However, these may be more relevant to rural populations than those living in urban areas. In peri-urban areas people may be involved in both agricultural and non-agricultural activities where land is available for such activities.

One of the most successful advances has been the introduction of 'mobile money' or money transfer services. In their research with households in the Morogoro region of Tanzania, Sife et al (2010) found that 50% of respondents reported that having a mobile phone improved or greatly improved their abilities to send and receive money.

Financial applications for mobile phones have the ability to 'bank the unbanked'. However, Aker and Mbiti (2010) found that M-Pesa users in Kenya tended to be wealthier, educated and 'already banked'. Mobile money transfers are more common in urban areas, therefore, this is a potential area for growth within the urban economy, which may support the growth of small and micro enterprises.

7.4 Case Study Countries

7.4.1 Cameroon

Sector overview

The first mobile phone telephone company in Cameroon was CAMEROON CELLNET which was initiated in 1994. Fixed phones had been available for some time but use was limited to wealthy customers in urban areas due to the high cost of installing a fixed line. In 1998 the telecom sector was restructured to separate the telecoms and postal services, liberalise the sector and separate regulation from the provision of telecom services. This ended the public monopoly and allowed new companies to enter the mobile communications sector. CAMTEL a national company, Mobilis which became Orange and MTN –Cameroon joined the sector and remain the 3 major operators with MTN having the largest market share, followed by Orange and CAMTEL. Telecommunications is one of the fastest growing service sectors in Cameroon.

In 2007 45% of households were subscribed to a mobile phone provider but access rates varied between 57% in urban areas and 15% in rural areas. Non-poor households in urban areas had the highest rates of subscription at 84% with 31.8% in rural areas. For poor households access rates were significantly lower at 32% in urban areas and 12% in rural areas. Cell phones are becoming cheaper all the time so the levels of access are increasing nationally. Littoral and the western region have particularly high rates of subscription but the topography of these areas lends itself to the installation of antennas, allowing for good coverage of services. Douala, as a coastal city has the added advantage of being the entry point of the fibre optical cable used for internet based services, including access to mobile internet.

The ability to use mobile phone services is very important for maintaining links between families and social or business networks spread throughout different urban and rural areas. The use of 'call boxes' has grown, especially in densely populated neighbourhoods and business centres. Call boxes provide additional access to mobile communication services on an 'as needed' basis. The use of SMS as a form of communication is increasing, as is the average monthly use per subscriber. However, the costs of services in Cameroon as one of the highest in the region, with costs twice as high as those in Ghana, Senegal and the Ivory Coast.

Access Data

Figure 7.1 shows that in 2011, access to mobile phones in urban areas was almost twice as high as it was in rural areas.

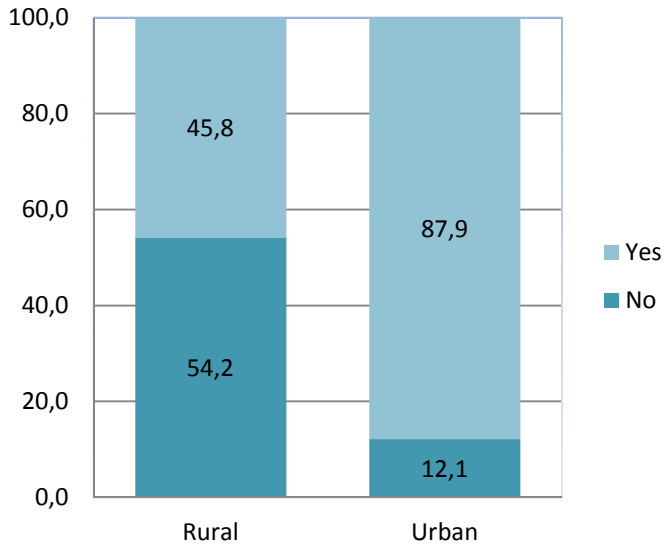

Figure 7.1 Access to mobile phone by place of residence Cameroon 2011 (Source: DHS data)

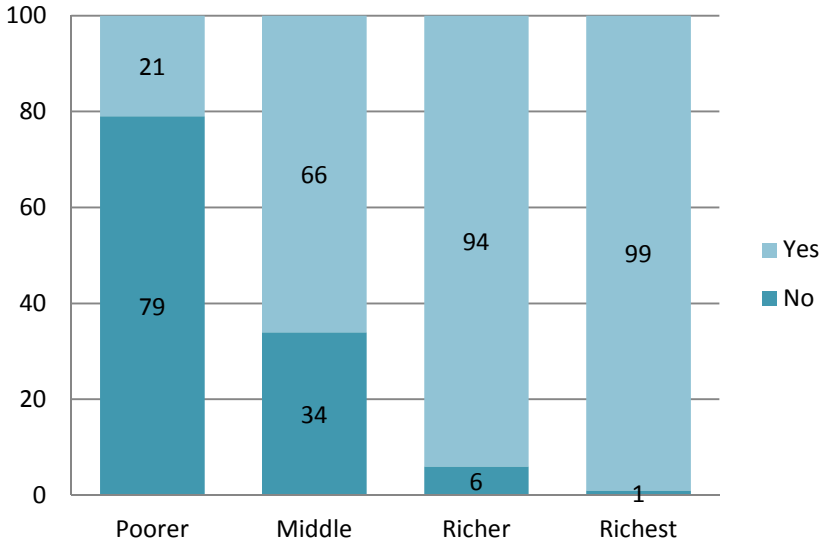

Figure 7.2 Access to mobile phones by wealth quintile in urban areas of Cameroon 2011 (Source: DHS data)

Figure 7.2 shows access to mobile phones by wealth quintile in urban areas, however, the data for the poorest quintile in 2011 is not available. In 2004, no households in the poorest quintile had access to mobile phones. However, given the overall trend in increased access across the wealth quintiles for both urban and rural areas it can be assumed that there has been some growth in access for the poorest quintile since 2004. Figure 7.3 shows access to mobile phones by wealth quintile in rural areas. The poorer quintile from rural areas has over twice the level of access to mobiles than the same quintile in urban areas. Households in the richer and richest wealth quintiles are the most likely to have access to mobile phone services.

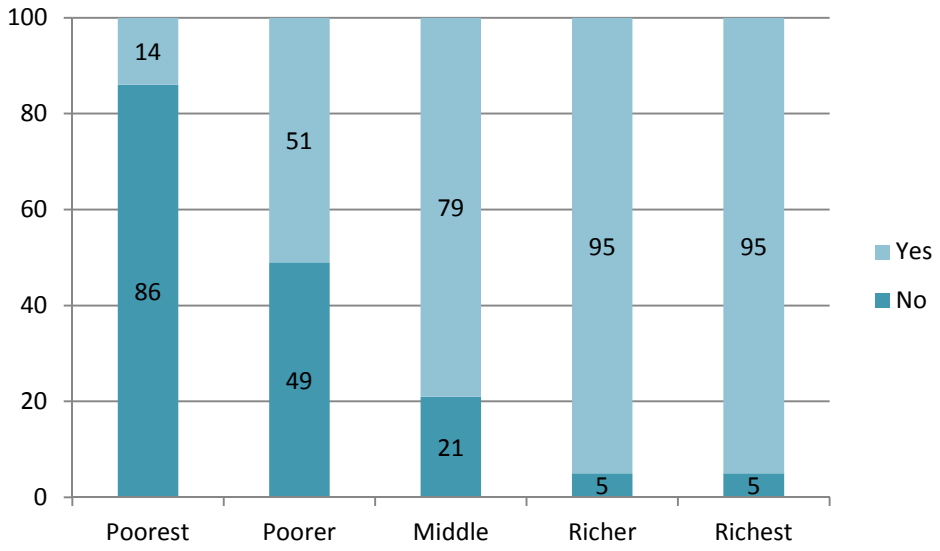

Figure 7.3 Access to mobile phones by wealth quintile in rural areas of Cameroon 2011 (Source: DHS data)

7.4.2 Ghana

Sector overview

Ghana deregulated its telecommunication industry in 1994 and since then a number of fixed and mobile service providers have entered the market. The National Communication Authority (NCA) is the regulating body for the sector. Fixed line services are limited to urban centres with no access for most peri-urban and rural areas. In order to try and expand access to fixed line services Ghana Telecom uses a Fixed Cellular Terminal which can be installed in areas or communities where Ghana Telecom has GSM coverage.

Despite Ghana Telecom having a significant amount of infrastructure throughout the regions of Ghana, this infrastructure is still limited to regional capitals and a few towns. In order to increase access in rural areas the government raises a 1% levy on the revenues of all telecoms operators, which is used to support the Ghana Investment Fund for Telecommunication (GIFTEL). The provision of universal access has been acknowledged as an important factor in future economic and social development nationally. Providing access to marginalised groups and communities is supported by affirmative policies and initiatives. The aim is to be able to provide high quality community based broadband information and communication services that include voice, data services, access to the internet, local relevant content, community radio and access to government services at an affordable price.

There are six mobile phone operators in Ghana, both African and International. The companies are MTN, Tigo, Vodafone, Airtel, Glo and Expresso. MTN is the market leader in Ghana whilst Airtel, was the first to introduce the 3.5G network enabling high-speed internet connectivity and video calling (Oluniyi, 2009). Mobile networks cover a much larger area than fixed networks which improves access to these services. The biggest challenge for phone owners is the lack of electricity to charge the handsets.

Access data

Figure 7.4 shows that access to mobile phones is more than twice as high in urban areas as it is in rural areas.

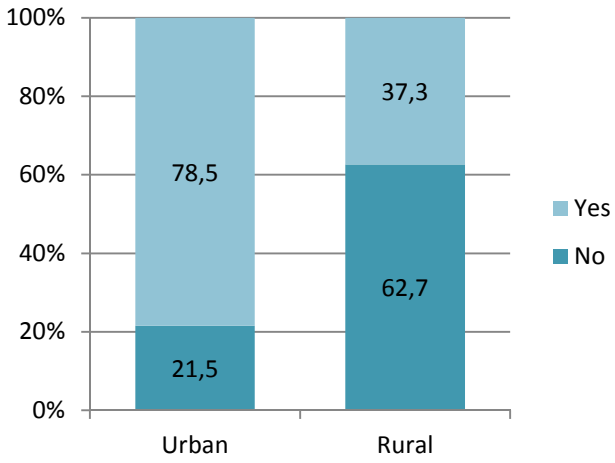

Figure7.4 Access to mobile phones by place of residence in Ghana 2008 (Source: DHS data)

Figures 7.5 and 7.6 show access to mobile communications by wealth quintile in both urban and rural areas. Levels of access are similar between comparative wealth quintiles in urban and rural areas, except for those in the poorest quintile in rural areas, which have much lower levels of access than the poorest quintile in urban areas. Those in the richest quintile are the most likely to have access with almost 100% access in both urban and rural areas.

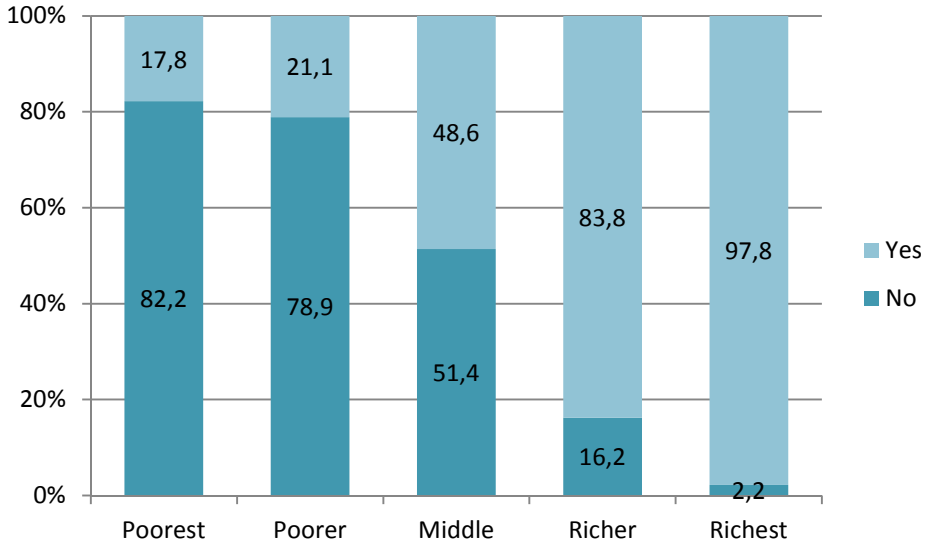

Figure 7.5 Access to mobile communication by wealth quintile in urban areas of Ghana 2008 (Source: DHS data)

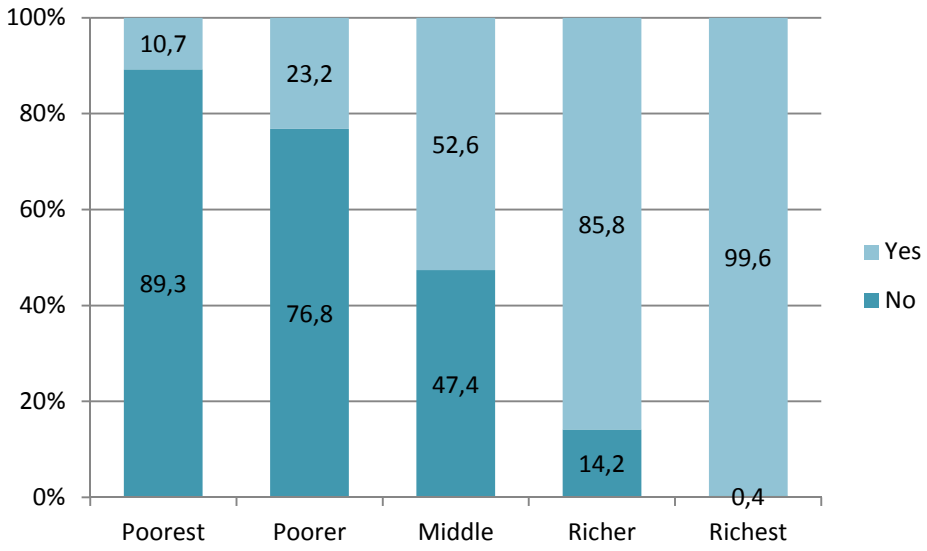

Figure 7.6 Access to mobile communication by wealth quintile in rural areas of Ghana 2008 (Source: DHS data)

7.4.3 Rwanda

Sector overview

Rwanda aims to become a knowledge- based, information rich country by 2020 and as such large resources have been invested in ICT infrastructure and services. From the initial introduction of GSM technology, the sector has developed to include 3G services. MTN held a monopoly for around 10 years but now there are more providers the cost of services has decreased dramatically. By January 2013, 55 percent of the population had access to a mobile phone (RURA, 2013b). There is greater ownership of mobile phones in urban areas than in rural areas but demand in rural areas is growing. The cost of handsets has reduced dramatically through the removal of sales tax on mobile phones by the government and the importation of cheap handsets from China capable of operating multiple sim cards from multiple networks. MTN is still the market leader but other operators are Tigo, Airtel and new operator Bharti Airtel.

Innovations

Mobile banking is becoming increasing popular as it allows money to be transferred by anyone with a mobile phone no matter what their location. In rural areas it allows people to transfer money without the need for a bank account. Many of the national banks have become partners with network operators to provide additional services via the mobile money network. Linked with mobile banking is the e-payment system which allows users to pay for goods and services using credit from their mobile phone.

There are a number of advances in the mobile phone sector which are having a positive impact on people's lives;

- Students are able to receive exam results through their mobiles.
- It is possible to register for a driving test through SMS.

- Mobile phones allow community health workers and disaster management committees to respond to situations much more effectively than they could do in the past, which saves lives.
- Through the mobile e-health system it is possible to record clinical data into the medical records system and to gather data on infectious diseases.
- Farmers and other businesses can be linked through the exchange of mobile based market information on commodities.
- Community security officers are able to report security threats more quickly than before.
- Governance can be improved through the faster more effective sharing of information. Toll-free numbers are now available to report offences like gender based violence and corruption.
- Mobile phones allow people to participate in national cultural events such as voting for a Miss Rwanda candidate or entering competitions hosted by network providers or other organisations.

The main challenges in increasing access are the cost of services for those with very low incomes, the inability to charge a phone due to limited access to electricity and limited network coverage in some areas. The other challenge is language, phones are not programmed with Kinyarwanda, consequently, users have to select another operating language.

Access data

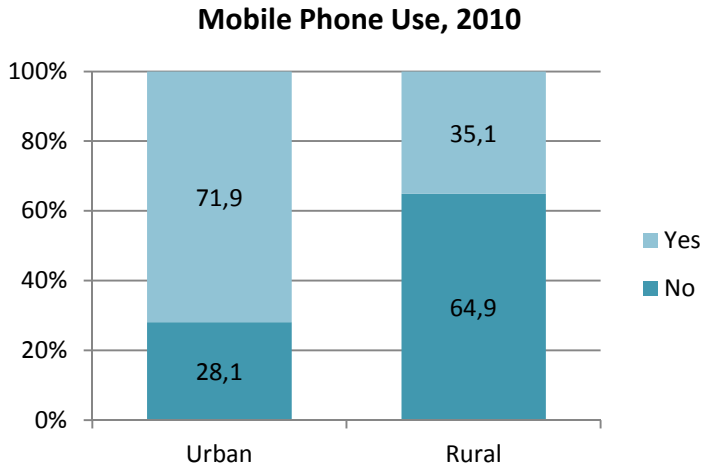

Figure 7.7 Access to mobile phones by place of residence in Rwanda 2010 (Source: DHS data)

Figure 7.7 shows that access to mobile phones is twice as high in urban areas as it is in rural areas. Figures 7.8 and 7.9 show that for households in the poorest and poorer wealth quintiles levels of access to mobile phones are significantly better in rural areas than they are in urban areas. For the middle quintile, access is almost the same between urban and rural areas and in the richest quintile access is marginally higher in rural areas than it is in urban areas.

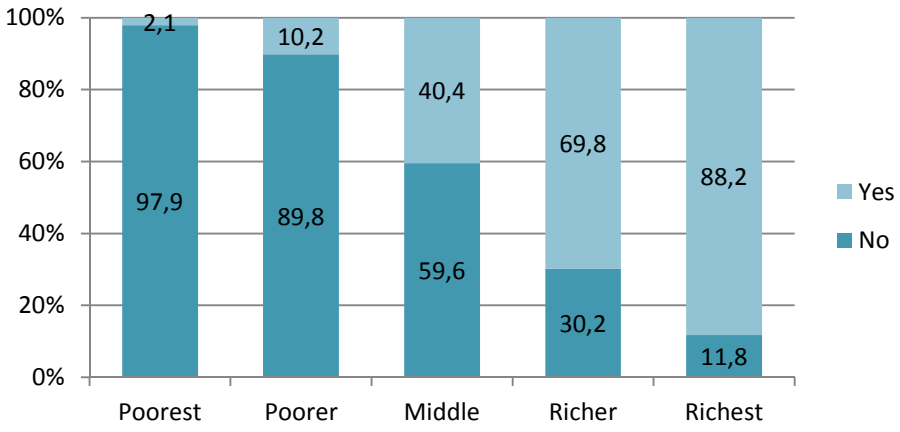

Figure 7.8 Access to mobile communication by wealth quintile in urban areas of Rwanda 2010 (Source: DHS data)

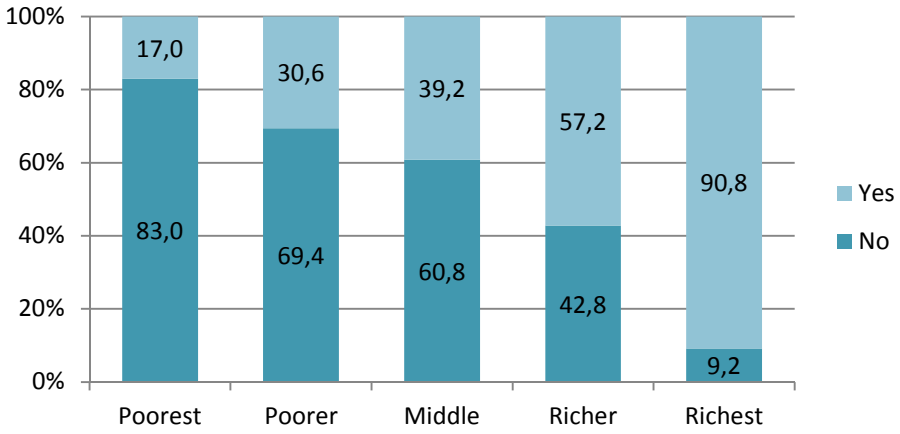

Figure 7.9 Access to mobile communication by wealth quintile in rural areas of Rwanda 2010 (Source: DHS data)

7.4.4 Tanzania

Access data

Figure 7.10 shows that access to mobile phones in urban areas is more than twice as high as levels of access in rural areas.

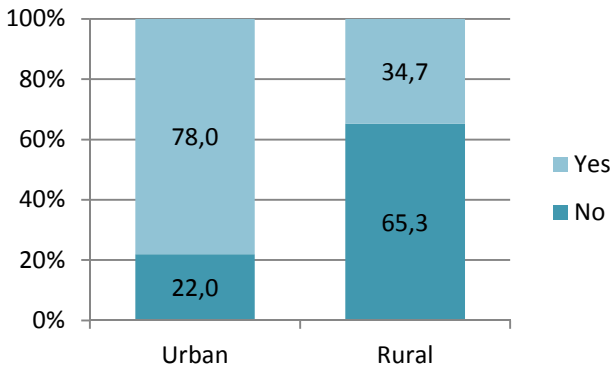

Figure 7.10 Access to mobile phones by place of residence in Tanzania 2010 (Source: DHS data)

When disaggregated by wealth quintile, figures 7.11 and 7.12 show that households in the poorest and poorer quintiles in both urban and rural areas have much lower levels of access to mobile phones than those in the richer and richest quintiles.

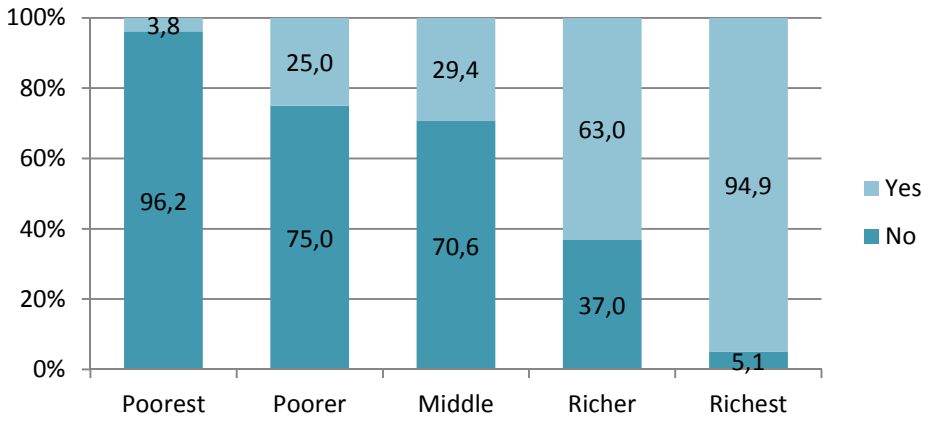

Figure 7.11 Access to mobile phones by wealth quintile in urban areas of Tanzania 2010 (Source: DHS data)

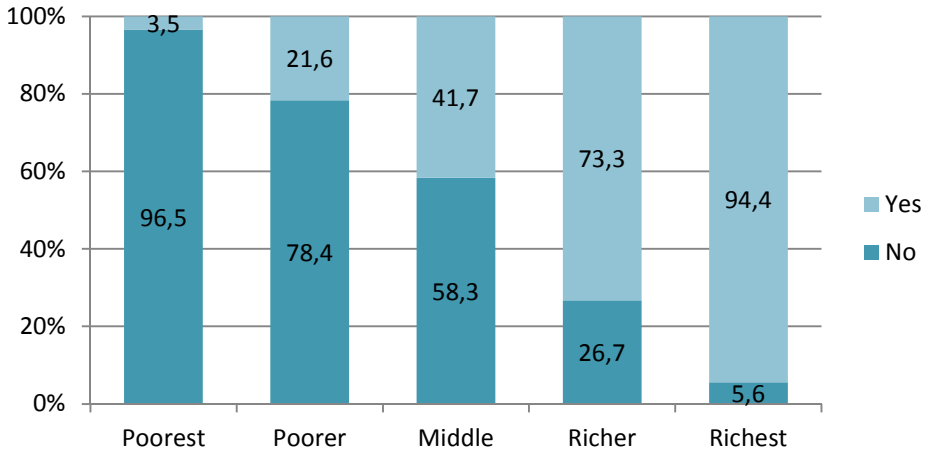

Figure 7.12 Access to mobile phones by wealth quintile in rural areas of Tanzania 2010 (Source: DHS data)

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Available at: http://www.ejisdc.org/ojs2/index.php/ejisdc/article/viewFile/660/323

Additional literature sources

Online Blog: Mobile livelihoods
Researching mobile phones in the global south http://mobilelivelihoods.wordpress.com/

Online blog: mmd4d (Mobile market designs for development)
A noble use for mobile phones (posted July 2012)
States how one organisation has developed an app for people to check if malaria drugs are counterfeit or originals. http://mmd4d.org/2012/07/25/a-noble-use-for-mobile-phones/

World Bank Mobile cellular access statistics are available by country at:
http://data.worldbank.org/indicator/IT.CEL.SETS/countries/1W?display=graph

8. State of the Art Overview for Urban Transport in Sub-Saharan Africa

8.1 Key problems

Increases in world population have meant a huge rise in the proportion of people living in urban areas. It is estimated that by 2025 two thirds of the world will be living in cities (World Bank, 2000). As cities grow, so do the size of their peripheral areas (Cox, 2012), sprawling away from the central business districts. This creates an increased demand for transport by urban dwellers who live beyond walking distance to the more central areas for employment and other services (Cox, 2012).

It follows therefore that efficient urban mobility facilities are vital for both economic and social development, as they allow access to employment, education, goods, services and markets (Williams, no date). The impact on education opportunities in both rural and urban areas is outlined in UNESCO (2010); additional impacts on access to health and social services are also well documented (World Bank, 2008).

It is known that improving urban transport increases incomes (Cox, 2012) and that even small improvements in transport services contribute to economic growth in Africa (Thompson, 2011) and social progress and environmental protection (van der Griend, R.A. and Siemonsma, W.J.A., 2011). However growing urban populations, increasing motorization, and poorly designed and maintained urban transport infrastructure together cause major problems for the citizens who live in these cities (United Nations Department of Economic and Social Affairs, 2008).

8.2 Patterns of access

Non-motorized transport makes up the majority of trips for the urban poor, for example, it is estimated that 71% of all trips in Dakar are made on foot (UN-HABITAT/UITP, 2010). Salon and Gulyani (2008) suggest that 65% of slum-dwellers in Nairobi walk to work because they cannot afford the bus fares. However, walking and cycling is not always safe if roads and pavements are unsuitable. Ownership of bicycles by urban dwellers varies considerably, at 73% in Burkina Faso in 2010, and 3.5% in Ethiopia in 2000 (Macro International Inc., 2013).

Motorized transport ownership is low amongst the urban poor in Africa. Less than a fifth of residents in urban areas own a car (Trans African Consortium, 2010a). It is suggested that this figure is quite conservative and that it is likely to be nearer 10 – 12 per cent in many sub-Saharan African cities. This is supported by disaggregated figures for car ownership: for Nigeria this is 14.9% (2008) but most countries show that less than 10% of the population owns a car (Macro International Inc., 2013). Figures for motorcycle ownership also vary at 0.2% in Ethiopia (2005) and 57% in Burkina Faso (2010).

The main motorized transport options for urban dwellers are some form of urban mass transit public transport (buses and minibuses) and taxis (Trans-African Consortium, 2010a*).* The use of motorcycle taxis is increasing but poor or lack of training is resulting in a high level of accidents (Trans-African Consortium, 2010b). In general, these trips are difficult to quantify as they may not be measured in census data. Public transport is likely to be inefficient, slow and unsafe. Travelling to work in this

way for low-income residents living in the outskirts of large cities, such as Nairobi, can take up to four hours a day (Cox, 2012).

8.3 Barriers to access to urban transport

There are several known barriers to accessing effective and efficient transport:

- ***Management processes and political will***

Urban planning and infrastructure development is constrained by several factors such as over regulation, lack of human resources, and lack of political will (HABITAT/UITP, 2010). For transport, this has led to poor regulatory and institutional frameworks, resulting in most public transport being under the auspices of the ministries in charge of transport. Institutional reform and structured transport growth is required to ensure that unfair competition is not gained by informal providers which do not comply with regulations (Trans-African Consortium (2010b).

- ***Finance***

Current investment in transport infrastructure focusses mostly on the needs of the minority of private car owners with public transport getting very little funding (Trans-African Consortium, 2010b). Public transport is dominated by the privately operated informal sector which takes a 90% share of this (UN-HABITAT/UITP, 2010). These services are mainly concerned with maximizing profits rather than improving service provision for users; services and fares are often unregulated and security is poor. As a result, the urban poor can spend 30% of their household income on travelling to and from work (UN-HABITAT/UITP, 2010; Hook, 2006). In addition, formal public transport and transport infrastructure remain poor as sufficient revenue is not generated for this purpose. Road maintenance is still a huge challenge, with fuel levies in most countries being inadequate to meet routine maintenance. Hook (2006) recommends that domestic spending on roads should be covered by fuel taxes or other road user charges. However, this situation has improved over the last ten years, with the Sub-Saharan African Transport Policy (SSATP) Program reporting that a third of African countries are now able to carry out routine maintenance (Thompson, 2011).

Institutional reform is taking place however, as in Dakar, Senegal and Douala, Cameroon. This has resulted in better public transport and has brought significant benefits to the community, including the poor (Trans-African Consortium, 2010a). Hook provides evidence in support of urban mass transit where “public investment in the transit sector in developing countries should be focused on infrastructure that allows for the profitable private operation of bus-based mass transit systems, rather than on bus procurement by public agencies” (p.5) known as Bus Rapid Transit. This involves measures such as separation from congestion, faster fare collection and boarding times, priority at intersections, and express bus services (Hook, 2006).

- ***Lack of transport infrastructure***

It is estimated that in Africa, only one quarter of the main road network is in good condition and about one quarter is fair. In comparison, only a quarter of rural roads are good or fair (Thompson, 2011). Seven of every 100km of roads are paved and 40% of these are in poor condition (United Nations Department of Economic and Social Affairs, 2008). This includes bike lanes and footpaths which are likely to be non-existent. Road capacity, age and incompatibility with higher speeds of traffic add to these problems (Trans-African Consortium (2010b). As a consequence traffic-related deaths in sub-Saharan Africa are the highest in the world and rising (Williams, no date). The state of the roads in sub-Saharan Africa accounts for more than 43% of public transport vehicle breakdowns (Trans-African Consortium (2010b).

- ***Traffic congestion and high levels of pollution***

HABITAT/UITP (2010) reports that the World Energy Outlook of the IEA found 23% of global greenhouse gas emissions are attributable to transport-related energy use. Rapid motorization of cites which is partially met by the influx of imported second hand vehicles is one cause of congestion and pollution. 70% of public transport vehicles used in Africa are between five and 15 years old (Trans-African Consortium (2010b).

- ***Housing and poverty***

Lack of access to transport for the poor due to the high demand for it is demonstrated by commuters in Zimbabwe where it is a serious problem, especially in peak periods. People in Harare are forced to walk long distances and use unsuitable transport such as trucks (Mbara, 2006). Hook (2006) states that the poor do not have the necessary capital to live close to their employment so they tend to live in distant peripheral areas. If they do not own a motorcycle and the roads are too poor to walk or cycle, they spend a high proportion of household income on public transport services.

A result of this is that the low-paid are moving to residential areas close to their work, staying with relatives or building temporary and illegal accommodation on municipal land. There are also reports of those who have left their employment due to transport difficulties, joining the informal sector selling in their own communities. Unaffordable transport costs have also led others to return to the rural areas (Mbara, 2006).

8.4 Increasing access to urban transport: innovative approaches

There are some key principles put forward that are seen to lead to efficient urban mobility systems. It is suggested that transport demand management can be achieved by planning more compact cities so that journey times are shorter. This combined with effective public and non-motorized transport options (UN-HABITAT/UITP, 2010) would reduce sole reliance on the motorized vehicle, decreasing fuel usage, congestion and pollution levels.

The domination of private, unregulated transport operators also needs to be addressed, to increase incomes and working conditions of drivers, and to provide a more efficient, safer service for users.

One way of achieving this is through formalization of the sector (by consolidating several providers). A growing body of evidence indicates that public investment in the transit sector in low-income countries should be focused on infrastructure that allows for the profitable private operation of bus-based mass transit systems, rather than on bus procurement by public agencies, such as "Bus Rapid Transit" or BRT (Hook, 2006).

There are examples of where access to efficient transport services has been successfully achieved:

- In South Africa a scheme has been set up to encourage 'Human settlement planning and design' which includes pedestrian access and 'walkable neighbourhoods' (CSIR, 2000:7) and safe and direct public transport options as part of an Integrated Transport Plan.
- UN-HABITAT has been working in three informal settlements (Kibera, Mirera-Karagita and Kamere) to promote bicycle modes of transport and load carrying vehicles for water, sanitation and income generation opportunities (UN-HABITAT/UITP, 2010).
- A comprehensive road programme in Douala has resulted in road rehabilitation and maintenance, with 520 new buses and 1500 jobs created (UN-HABITAT/UITP, 2010).
- A transport service franchise scheme in Dakar, Senegal, provided financial incentives with loans to private operators and a scrapping scheme for old vehicles which has resulted in 550 new minibuses and 400 city buses. As a result, informal transport operators have fallen from 95.4% to 66% and there is now greater integration between different service operators (UN-HABITAT/UITP, 2010).
- The Bus Rapid Transport (BRT) system "Rea Vaya" has been adopted in Johannesburg is a further example of how sustainable transport options have been provided. This included construction of bus infrastructure and stations, and an IT system to provide passenger information and to collect fares, all paid for centrally. Private operators are contracted to run the bus services, collect the fares and maintain the stations. This has reduced pollution and congestion, and has also resulted in greater professionalism by the drivers (UN-HABITAT/UITP, 2010).
- An important legislative driver for change has been the SSATP programme which aims to ensure that the transport sector promotes poverty reduction, pro-poor growth, and regional integration in Africa. This has contributed to better government-led coordination and donor funding. SSATP initiated the Poverty Reduction Transport Sector Review (PRTSR) process, launched in 2003, leading to greater political commitment and increases in transport budgets (Thompson, J.B., 2011).

8.5 Case Study Countries

8.5.1 Cameroon

Sector overview

Roads

The road network in Cameroon is classified into 3 different types, tarred roads, untarred priority roads and untarred non-priority roads. Tarred roads account for 10% of the road network with un-tarred priority and untarred non-priority accounting for 47% and 43% respectively. Maintaining and

upgrading the network is a constant challenge with many roads becoming impassable for extended periods of time throughout the year. In the Strategic Framework for Growth and Employment (DSCE) the primary challenge for the road sector is to increase the levels of access to a good quality road network for rural sector markets which will promote development in industry growth. The number of vehicles on the roads, used for both private and commercial purposes, is growing each year.

Bafoussam

Bafoussam is at a cross roads in the tarred network and as such suffers from heavy traffic volumes with heavy vehicles accounting for at least 9% of all traffic. Parking for the loading an un-loading of lorries is non-existent and therefore adds to problems of congestion. This has knock-on consequences for traffic in the city centre. There are also high levels of mini-buses and buses which constitute the largest providers of shared transport services in the city with many privately owned operators.

The ownership and use of private cars in Bafoussam is limited to the wealthier residents and bicycles are not a popular form of transport. Taxis only operate on paved roads which leaves residents in many neighbourhoods unable to use them. Motorbikes and moto-taxis are therefore the most popular form of transport because they are relatively cheap and serve all areas 24 hours a day picking up and dropping off passengers at any chosen point. The problem with moto-taxi drivers is that many are operating illegally without a licence or legal papers for the bike. Transport operators require a licence from the Division Officer in each territorial jurisdiction. The licences are assigned to a specific person and are not supposed to be transferred or rented out.

The condition of roads in Bafoussam is very poor due to the high levels of traffic and there are many bridges in use which are not designed to sufficiently drain rain water away from their surfaces, which leaves them prone to flooding during the rainy season. The number of traffic lights at key junctions in the city is insufficient which leads to traffic jams and accidents. There are no designated facilities for parking which leads people to park at the side of a road and reduces the flow of traffic. Pedestrian pavements are almost non-existent. Street lighting is also non-existent which makes night time travel particularly dangerous.

Douala

Heavy volumes of traffic in the port city of Douala make city travel very challenging. Douala is Cameroons main port, through which 85% of all foreign trade passes. Close to 5.5 million tons of cargo is transported by road each year. The railway transports a further 2.5 million tons annually.

The roads are in poor condition and the gap between supply and demand for transport is increasing as the city expands. There are insufficient secondary and tertiary roads linking the different areas of the city which causes a majority of the traffic to pass through the city centre, which puts extreme pressure on the road network in and around the centre.

Buses were originally supported by the state with operators receiving subsidies to keep them operational. However, in 1987, significant cuts were made to public expenditure and the subsidies for buses were stopped. In 2001 Société Camerounaise de Transport Urbain (SOCATUR) was created to reinstate public buses on 8 routes. Although the cost of fares is affordable, heavy traffic and the limited number of routes means the use of buses is not practical for many residents.

Moto-taxis are the most popular form of transport as they are in Bafoussam. In Douala, motor bikes represent between 35% and 60% of the traffic on incoming roads (East and West) and up to 75% of the traffic on city centre roads (Urplan, 2008). Fares are negotiated with the driver according to the distance travelled. The number of accidents involving moto-drivers is not recorded but their reputation for being involved in accidents is well known. The Hospital Laquintinie has a dedicated building for victims of moto related accidents which demonstrates the severity of the problem. Moto drivers have been banned from certain areas of the town including the administrative zones and some residential areas.

Rail

The railway is at least 50 years old in Cameroon. In 2009 the overall length was 1,245km with a mainline of 1016km. There are two principal lines; the western line which travels from Douala to Kumba via Mbanga and the Transcamerounais which links the region of Littoral to the centre, the East and Adamaoua (Douala-Yaounde-Belabo-Ngaoundéré).

The railway was managed by the State through REGIFERCAM until 1996, after which it was privatised and transferred to the CAMRAIL Company. Through a process of restructuring and modernizing, CAMRAIL created a reliable and safe service for both goods and passengers which has attrached growing numbers of users. The transportation of goods fluctuated between 2006 and 2010 but started to rise in 2009/2010 due to increases in the production of key materials such as wood, building materials, flour and cereals which required transportation. Since 2006, passenger numbers have grown steadily from 1.1 million in 2006 to 1.4 million in 2010.

Air and Sea

Cameroon has ten modern airports which meet the standards designated by the International Civil Aviation Organization. Three are international airports at Douala, Yaounde and Garoua. There are also three ports at Douala, Limbe, Kribi with a further river port at Garoua under development. Douala is the largest with a storage capacity of 11 million tons. Primary imported goods are fuels, clinker and hardware. Primary exports are agricultural products including wood, bananas and cocoa.

8.5.2 Ghana

Sector overview

The regions and districts of Ghana are well connected by the national road network but the condition of the roads ranges from good to poor. ‘Tro-tros’ or ‘Urvans’ are common methods of public transport in urban areas. These small buses have specific routes but no schedule and only leave a terminal when full which can result in long delays and uncertain travel times for users. Tro-tros are a vital form of transport for people travelling to and from low-income communities, especially those who travel into city centre work or market places.

Larger buses are generally only used for longer journeys or for the transport of company personnel. Taxis can be used individually or as a shared form of transport with passengers being picked up and dropped off throughout the journey. In taxis the fare is set by the driver.

The use of motorcycles (Okada) is becoming more common, especially for those who wish to avoid problems associated with traffic congestion and the unpredictable service of tro-tros. Motorcycles fill a void between the cheaper tro-tro and the more expensive taxi.

In Accra, traders and commuters continue to use hand pulled or pushed cards to move goods around the city due to the relatively low cost of labour compared to the high cost of motorised transport. For pedestrians and cyclists there are very limited numbers of walk ways and cycle lanes but there is an intention to develop non-motorised transport infrastructure, especially the used of bicycles to ease heavy congestion on some routes.

8.5.3 Rwanda

Sector overview

Developments in the transport sector are based on a series of transport policies. The most important are the Public Transport Policy and Strategy and the Strategic Transport Master Plan. The focus of these policies and strategies is to;

- ensure universal access to public transport services in rural and urban areas
- ensure a balance between transport services offered by the public and private sectors, especially in under-served areas
- develop regional integration models aimed at diversifying the modes of transport for both goods and passengers and the conveyance of supplies out of the country.

Private operators dominate the transport sector for both goods and people. The types of transport commonly used are private cars, public and private buses (mini-buses and larger coaches), taxis, private motorcycles, motorcycle taxis and bicycles. Access to transport is easier in urban areas due to the higher number of cars, motorbikes and buses available. Privately operated buses account for 84% of all journeys made, taxis and moto taxis account for 3% and 13% respectively (MININFRA, 2012). Whilst the use of large buses is common in urban areas, small 17 seater minibuses still dominate transport in rural areas. The Rwanda Utilities Regulatory Authority (RURA) sets fares for public transport nationally.

The transport system and road network in Kigali has suffered from a rapid increase in population and car ownership which results in higher traffic volumes and frequent traffic jams. Lorries and buses have been banned from some parts of town because the roads are too narrow which adds to congestion. There is also a lack of parking in the city centre and many roads do not have pedestrian sidewalks. Cycling is banned on the major roads in Kigali but the use of bike taxis in other areas is common.

Whilst city centre connections are good, outlying areas and those which are newly developed due to the cities expansion are not well served. In these areas, moto taxis provide an alternative to the private buses because they serve a wider area than the buses and are available after 9pm when bus services stop but they are also more prone to road accidents and are more expensive as the fare needs to be negotiated with each driver.

Kigali City is investing heavily in the transport sector through the extension and improvement of city roads. The road network is in a constant state of development and attempts are being made to organise service provision more effectively. Taxi parks have been constructed in 4 key locations and bus operators are encouraged to operate larger, standardised buses based on specific routes which will operate between 4am and 11pm.

All of the major towns and cities are connected by good roads and private companies offer frequent services between these major towns and also regionally into neighboring countries. There is a federation for each type of operator including the taxi and moto drivers. Moto taxis are especially useful for gaining relatively quick access to areas not served by public transport because of their ability to use roads in poor condition.

Moto taxis, taxicab, minibus and bus drivers are all male. One of the biggest challenges in increasing access to transport in rural areas is the poor condition of roads ,which are usually unpaved and therefore prone to frequent damage, especially in the rainy seasons. Poor roads take a toll on cars and buses and increase the costs of maintenance for any operators with services along unpaved routes.

Although Rwanda has more than 30 lakes, water transport is limited to Lake Kivu which has 3 small ports in the towns at the edge of the lake. BRALIRWA, a brewery based at the north of the lake is the primary user of water based transport. There is a ferry connecting Idjwi Island (in DRC) with Rwanda for the transport of goods but people wishing to travel to other areas of the lake must use rowing boats.

8.5.4 Tanzania

Sector overview

The road network is a key component in the Tanzanian transport sector. Large sections of Tanzania are sparsely populated and as a result, people are drawn to live near major roads. This creates pockets of high population density throughout the country and provides people with an easier route for accessing services and engaging in economic activities such as trade. However, the road network cannot cope with rapid growth in the cities, especially in unplanned areas and constructing a road after an areas has already become populated is particularly challenging.

Transport services in Dar es Salaam are dominated by private operators running small buses (Daladala) but there are not enough services to meet the increasing demand for transport, especially during rush hour. School children are routinely denied access to the buses in favour of more profitable adult passengers. There is no regulatory or supervisory authority in charge of the daladalas, consequently they tend to focus on the most profitable routes which include the central business district, the commercial district, the largest market, the main hospital and other industrial zones. This leaves large sections of the city underserved and for those wishing to travel to the outskirts it is necessary to make at least one change of daladala which increases the cost of travelling. Traffic congestion, especially during peak travel hours is severe and can lead to long travel times, making travel to work increasingly complicated.

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Case Study Countries

Cameroon

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9. State of the Art Overview for Street Lighting in Sub-Saharan Africa

9.1 Patterns of access

Reliable and comprehensive statistics for the provision of street lighting in rural and urban areas in Africa do not exist. It is estimated that 60% of the population of Africa (600 million people) have no access to electricity. The en.lighten forum produces a global policy map[2] which shows that estimated efficient lighting policy status is limited in sub-Saharan Africa.

However, more is known about the effects of dark roads. Although accident reporting and recording systems are also unreliable, it is known that the greatest impact of unlit roads is the level of road traffic accidents. Jacobs et al. (2000) attribute 1.2 million deaths per year to road traffic accidents, 85% of these occur in developing countries. Night-time accidents on unlit roads are generally more serious and result in more fatalities (CIE, 2007; Downing, 1992). It is also estimated that at the global level this typically transfers into a loss of between 1% and 2% of gross national product (CIE, 2007).

Perel at al (2004) highlight the need for more research on preventing road accidents in developing countries. There is only $0.4 of global research and development funding per disability adjusted life year for road traffic accidents compared to $26.2 for HIV (WHO, 1996). Perez et al. cite Renton and Pond's (2004) analysis of street lighting intervention data from developed countries. This showed a decrease in pedestrian injuries, which are the most common accident type in developing countries. ILE (1990) supports this, attributing a 30% decrease in night-time accidents to a modest level of street lighting, and a maximum level of luminance accounting for the halving of the rate of accidents.

Other impacts of street lighting in addition to better driving conditions are reduced fear of and actual robbery and assault, more night time trading, a better quality of life, more attractive inner city areas, more use of the road network thereby reducing daytime congestion, and a boost to tourism (ILE, 1990; The Climate Group, n.d). Yach et al (1990) document a decrease in peri-urban violence as a result. The United Nations Foundation lists the further benefits: "keep women and children safe from violence at night and also positively impact education, economic productivity and the environment"[3].

9.2 Barriers to access

The major barrier to installation of street lighting is the means of funding it. CIE (2007) suggests that fixed roadway lighting is most effective in improving night-time visibility, although installation and running costs are the most expensive. They argue that it is only justified therefore where there are particularly high volumes of traffic or accident rates.

The need for inspection, cleaning and maintenance is also highlighted as being essential for effective operation. CIE (2007) suggest that if any of these are neglected, public dissatisfaction will be the result as well as increased accident rates.

[2] http://www.enlighten-initiative.org/portal/CountrySupport/GlobalPolicyMap/tabid/104292/Default.aspx
[3] http://www.unfoundation.org/who-we-are/impact/our-impact/health-data-disaster-relief/solar-lights-bring-hope.html

9.3 Increasing access to street lighting : innovative approaches

For several years now, the idea of using alternative, off-grid, energy sources for lighting to conventional electricity networks have been discussed (Bhatia, 1988; Barnes and Floor, 1996). However , Freling and Ramsour (2010) note that renewable energy (such as solar, wind, micro-hydro and geothermal power) have not yet been used to their full potential in regions where there is sunshine, wind, water and underground thermal heat.

However, there are examples of innovative approaches to providing lighting solutions currently underway, although very few in sub-Saharan Africa. And many relate to household level lighting only:

- The UNEP Enlighten Project[4] is the largest initiative of its kind as a pilot project by the Kenyan Urban Roads Authority and Philips for solar-powered LED street lighting in Nairobi. If scaled up across the country, this is said to have the potential for 100 per cent energy savings compared to conventional systems. LED lighting was found to need minimal repairs with a failure rate of 1% over 6,000 hours, compared to 10% for conventional lighting.

- The Lighting Africa program is working "to catalyze and accelerate the development of sustainable markets for affordable, modern off-grid lighting solutions for low-income households and small enterprises"[5] . This approach has been applied in Ethiopia, Ghana, Kenya, Nigeria, Senegal and Tanzania using technologies such as light-emitting diodes (LEDs) for households and small businesses.

- The Solar Electric Light Fund (SELF) (Freling and Ramsour, 2010) has various solar energy programmes in Africa. One of them is Phase II of a project to improve rural agriculture in Benin (from 2011) involving the complete electrification of the pilot villages of Dunkassa and Bessassi, using solar power generation for street lighting, and also for the school, health clinic, houses, community center, and a WiFi network.

- Although these are at household level only, Solar Aid works in Kenya, Malawi, Tanzania and Zambia towards the aim to eradicate the kerosene lamp from Africa by 2020[6] through not-for-profit sales of their S2 d.light. This means that households no longer have to spend up to 13% of their income on kerosene and thereby avoiding the dangerous carbon emissions given off by this.

[4] http://www.unep.org/Documents.Multilingual/Default.asp?DocumentID=2691&ArticleID=9210

[5] http://www.lightingafrica.org/about-us/program-overview.html
[6] http://www.solar-aid.org/about/

9.4 Case Study Countries

9.4.1 Cameroon

Sector overview

The city of Douala has almost 1,400 streetlights but they are in varying states of repair and operation. Public lighting is limited to the major axes of the town centre which leaves many neighbourhoods and sections of the city unserved. The Urban Community of Douala (CUD) is the owner of the public lighting network and is responsible for its maintenance. AES-SONEL supplies the electricity and bills CUD with an annual lump sum, however, the bill is rarely settled in full. Authorities and the CUD are looking into alternatives including the use of solar energy.

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10. Conclusions and the way forward

The urbanization of Africa promises great economic benefits and the data in this report show that public services are generally better in urban areas than in rural areas, although not necessarily for poorer households. But so far the pace of urbanization has outstripped the delivery of infrastructure services. Roads are choked, power is unreliable, and sanitation is poor. Significant investments are needed to make cities more productive and to ensure decent living conditions for growing urban populations. Poorly functioning land markets, inadequate land-use planning, and the weak financial base of most African cities are big parts of the problem (African Development Bank, 2013). Inadequate water supply, education and health services have also constrained effective urban development.

In this paper we have broadly examined patterns of service access, barriers and innovative or successful approaches in a variety of sectors including sanitation, water, electricity, education, health, mobile phones, urban transport and street lighting in Sub-Saharan Africa and the four study countries. These issues will be explored in more detail in the selected urban low income areas of the four case study countries, as part of the field research for the RurbanAfrica project.

The conclusions for each service are presented in 3 sections which provide an overview of the availability of each service, an overview of constraints and potential areas for consideration by urban planners and policy makers.

10.1 Sanitation

Availability of services

Since 1990, the urban population in SSA without an improved sanitation facility has increased by 100 million (AMCOW, 2012) as access to improved sanitation has increased more slowly than population growth. The poorest people in sub-Saharan Africa are five times less likely to use an improved sanitation facility compared to the richest quintile (AMCOW, 2012). There is increasing use of shared sanitation or 'other unimproved' forms of sanitation in many African countries but shared facilities are not currently recognised as being 'improved' under the JMP. Whilst the JMP does acknowledge the importance of shared toilets compared to no facilities at all, it considers the lack of cleanliness and the lack of accessibility of shared facilities to be unacceptable. This has given shared sanitation a bad reputation but in many cases facilities are clean and well managed with several experts arguing that shared sanitation is the only viable option in densely populated urban areas.

In Cameroon, the use of improved facilities has decreased in the poorest and poorer wealth quintiles in urban areas and is almost non-existent in the same rural quintiles. Sharing is more common in urban areas. In Ghana the use of improved facilities has increased in both the poorest and poorer wealth quintiles in both urban and rural areas but open defecation has also increased in the poorest quintile. Ghana has the highest levels for sharing facilities of the four case study countries. In Rwanda the use of improved facilities is almost non-existent with most households relying on non-improved latrines. Sharing is not as common as it is in Ghana but the levels are growing. In Tanzania the use of improved latrines has increased in the poorest quintile in urban areas but overall remains

very low at just 3%. Access to improved latrines in rural areas is non-existent. Sharing in the poorest and poorer quintiles is lower than the levels in the richer and richest quintiles.

Constraints

Urban sanitation challenges faced by households in lower income areas are exacerbated by on-going change including demolitions, slum upgrading, redevelopment, over-crowding and lack of services such as piped water supplies that can enable better sanitation. This applies to both shared sanitation and individual household sanitation. A key concern is lack of security of tenure for residents in low-income urban areas.

Municipal governments generally have very limited capacity and resources to deal with on-plot or non-sewered sanitation. In this power vacuum, a complex range of stakeholders have emerged for urban sanitation to provide individual or shared sanitation services in urban areas including: municipal/central government, private developers, informal private sector, water utilities, civil society (NGOs and CBOs) and individual households (Sansom, Scott and Cotton, 2012).Community driven initiatives are a popular alternative to public provision but they face significant challenges related to organisation, affordability and acceptance by authorities.

There are many cases where the local municipality supports Non-State Sanitation Service Providers (NSSPs) at key stages of the sanitation service chain – such as by constructing public latrine blocks that are leased-out to private operators (e.g. Kumasi in Ghana), or by allowing private tanker operators to discharge sewage sludge into the sewer network (e.g. Dakar in Senegal) (Sansom, Scott and Cotton, 2012).

Potential areas for future planning/policy areas for authorities to use

The growing need for improved sanitation services in urban areas for an ever increasing population requires decision makers to carefully consider the implications of shared sanitation and its place in the sanitation service chain, in the wider urban infrastructure planning sector. The relationship between the NSSP and the State needs to be carefully established and understood by all parties concerned. There also needs to be trust and a dialogue should be established, especially between the private sector operators and the government, either locally or nationally. The example of private tankers in Dakar being allowed to discharge into the sewer network is a good example of this practice. The alternative would be to dump the waste illegally or leave latrines and septic tanks to overflow. It is important for all parties concerned to identify all the levels in the service chain, identify the specific role they play according to the resources available (not the role they want or think they should play) and identify any weaknesses.

10.2 Water supply

Availability of services

Increasing access to piped water supply and sewage connections on plot is the intervention that has the largest health impact of all water and sanitation interventions, although they are the most expensive service options (Haller et al, 2007). Almost five times as many people in rural areas are without an improved drinking water source than in urban areas. Since 1990, the rural population in

SSA without an improved drinking water source increased by 35 million (AMCOW, 2012), which shows that despite considerable investments, difficulties have been experienced in keeping pace with population growth. Across SSA, for the poorest two quintiles, the level of service for both rural and urban dwellers is similarly low, with only 34 to 45% having access to improved water supplies and little or no access to piped water supplies. This would suggest that improvements in water services, is not necessarily a driver for poorer families to migrate from rural to urban areas.

In many cases, despite national investments to achieve MDG targets, the use of improved urban water sources has only really kept pace with population growth. Across SSA the percentage of households with piped water access has decreased over time and in most cases, access to piped water is limited to those in higher wealth quintiles.

In Cameroon, the percentage of households in the poorer wealth quintile with piped water has decreased in urban areas but increased in rural areas. However, the coverage in urban areas is still higher than it is in rural areas. In Ghana, the access rates for the poorest quintiles are higher in both urban and rural areas but the levels of access are still much lower than for those in the middle and higher wealth quintiles. In Rwanda, access to piped water has increased slightly for the poorer quintile in both urban and rural areas but is still higher in urban areas. In Tanzania, access to piped water has increased for the poorer quintile in both urban and rural areas but for the poorest quintile in urban areas levels of access have decreased.

Constraints

Communities living in informal settlements are very unlikely to have a legal connection to a water utility due to the difficulty of providing services to these areas and the high costs of connection. Water kiosks are common but are not always able to provide the desired level of service due to inconvenient locations, or poor flow causing long queues and extended collection times. Water vendors provide a more immediate source of water but their prices tend to be much higher than those at public taps or kiosks. Illegal connections are a significant problem both for the utilities and customers with legal connections.

Potential areas for future planning and policy making

Credible and stable regulatory frameworks are critical to attract operators and mobilize finance for sector investment. The important role of non-state or alternative providers is now widely acknowledged by many stakeholders in the water sector. These providers include the local private sector (formal and informal) or Community Based Organisations (CBOs) who provide effective services in low income areas, in many situations. Government engagement with water and sanitation NSPs can be split into five main types: recognition, dialogue, facilitation/collaboration, contracting and regulation. In many situations, a lack of formal recognition of non-state water providers is an impediment to more productive forms of engagement (Sansom, 2006).

In several cases, the local private sector or Community Based Organisations (CBOs) have been formally handed over responsibility for service provision. Such ‘delegated management models’ are a new approach to improve service provision in unserved areas. More progressive Governments and utilities are supporting such initiatives as a means of providing better water services to areas where utilities cannot provide adequate water services. Strengthening the capacity of utilities to enable

them to provide higher levels of service to increasing numbers of customers will be a key driver in improving access to water in urban areas.

10.3 Electricity

Availability of services

It is widely recognised that there is a power crisis in Sub-Saharan Africa with less than a quarter of the population having access to electricity. It is predicted that by 2050 less than 40% of African's will gain universal access to electricity (Eberhard et al, 2008). If South Africa is excluded from the statistics, Sub-Saharan Africa is the only region where per capita electricity consumption is declining (Eberhard, 2011). In SSA, only 35 countries have targets for electricity access. National utilities, many of whom are government owned are generally responsible for urban electrification programmes. There is generally little competition and little innovation. Electricity prices vary widely between countries and it is a highly subsidised sector where 'cross-subsidising' between urban and rural customers is common. In many cases countries with higher urban populations tend to have higher levels of rural electrification due to the practice of cross subsidising. People in peri-urban areas often on the periphery of a city face particular challenges gaining access to electricity because they occupy the middle ground between urban and rural communities. The urban residents are served by the utility and the rural residents benefit from targeted rural electrification programmes but there are no similar programmes for peri-urban areas.

In theory, connecting urban households to electricity supplies should be easier than for those in rural areas due to the high density of households in a given location. However, lack of capacity on the supply side is also a significant factor with many utilities unable to connect new users who are willing to pay. In cases where tenure is not secure both government and utilities can be unwilling to connect services to illegal dwellings or those without formal titles (Eberhard et al, 2011; DfID, 2005).

In Cameroon, a small percentage of households in the poorer quintile have gained access to electricity in both urban and rural areas but the levels are still much lower than those for the higher wealth quintiles. In Ghana both the poorest and poorer in urban and rural areas have gained increased access but again levels are lower than in the higher wealth quintiles. In Rwanda and Tanzania access is limited almost exclusively to the richest wealth quintile in both urban and rural areas with a very small percentage for the richer quintile.

Constraints

One of the biggest challenges facing electricity providers is cost recovery. Under-pricing is common because charging a cost-recovery tariff would make electricity unaffordable to all but the richest households. Fixed monthly connection charges can increase the cost of electricity even further, especially for households with relatively low levels of use.

Another serious challenge is the power infrastructure in place. The power grids in Sub-Saharan Africa are notoriously unreliable. This can be due to ageing infrastructure, poor maintenance, insufficient generation capacity and other technical issues like losses due to the size of the networks. Illegal connections are also a significant problem for the utilities, for customers with legal connections and for those with the illegal connection as they are inherently unsafe.

Potential areas for future planning and policy making

When households get electricity, it is widely known that they tend to use it for lighting. However, there is a significant knowledge gap regarding how households use or wish to use electricity for purposes other than lighting. There is a great deal of literature describing the potential benefits that having access to electricity can afford and an unspoken assumption that people want electricity in order to improve their lifestyles. However, understanding what people actually want to use their electricity connection for is much harder to identify. For example, do they have electrical appliances which they wish to run from it, or are they part of the next level of aspiration, do they want to run a business from home and therefore require a connection or is it about social status within the community? These questions are currently unanswered by the literature and are worth exploring further in the future. Understanding why people want access could help in establishing a system that provides more equitable access.

10.4 Education

Availability of services

The number of children not in school in sub-Saharan Africa has risen from 29 million in 2008 to 31 million in 2010 (UNESCO,2012). This is a half of all out-of-school children worldwide and is the highest out-of-school rate of all the regions. Almost one in four primary school-age children have either never attended school or left school without completing primary education (UNESCO Institute for Statistics, 2012b). Most sub-Saharan countries now see post-primary or lower secondary education as an important policy objective. This has resulted in an increased participation of 55% to 33 million children from 1999 to 2005. Lower secondary education participation rates are much higher (38%) than upper secondary rates (24%).

Household poverty is seen to directly reduce the likelihood of school attendance (UNESCO, 2008). Children from the poorest quintile (20%) of households are four times more likely to be out of school than those from the richest quintile. The probability of being out of school decreases steadily with increasing household wealth.

Private schools are helping to address the lack of places available in public schools but their higher fees make them unaffordable for all but the wealthier quintiles. Public schools in all 4 case study countries are struggling to provide the necessary infrastructure, materials and teaching staff. Whilst huge efforts have been made to improve access to primary education, secondary education has fallen behind with demand for places outstripping supply in many areas. There is usually a higher concentration of schools in urban areas which shortens the distance between a child and a school and it can be easier for schools in urban areas to attract better qualified staff. Children in rural areas generally have to travel further to get to school and their choice of schools is more limited.

Constraints

In addition to financial constraints, there are several other constraints on completing a full course of both primary and secondary education. These include disability, gender, place of residence, a lack of infrastructure, materials and teaching staff.

Potential areas for future planning and policy making

Reducing the cost of attending school and providing alternative forms of education are key areas where improvements can be made. In the case study countries, a lack of space in schools and a lack of qualified teaching staff were highlighted as being particular constraints on improving access. By focusing on improving the quality of teaching staff, countries such as Ethiopia and Namibia have made significant gains in the number of qualified staff available which improves the quality of education provided. By improving the quality of education for all teachers, teachers in rural schools can benefit from the same level of training as those in urban schools and provide a similar level of service.

10.5 Health

Availability of services

Unless current trends are drastically changed, most countries in Sub-Saharan Africa will miss the MDG health related targets. The issue of universal health coverage and health inequalities is gaining increased attention throughout the world. Not only are there inequalities between countries and regions but there are also inequalities within countries, where those in lower wealth quintiles are more at risk from higher rates of illness and higher mortality. People living in urban areas generally have access to better health infrastructure if they can afford to use it. There can be a mixture of public, private, religious and not for profit facilities available. Urban areas also attract more of the skilled health workforce (WHO, 2012). Health services in rural areas can sometimes be provided by semi-skilled or even un-skilled workers. In the 4 case study countries the use of traditional healers and informal vendors is still widespread across the wealth quintiles.

Constraints

WHO (2007) have identified six key elements which contribute to an effective health system; service delivery, a strong health workforce, the availability of medical products, vaccines and technologies, information systems, financing and good leadership and governance. In most cases, these elements are weak or non-existent which makes the provision of good quality health services to all very challenging. In many cases, the number of medical staff available has decreased in real terms due to several factors including; brain drain, failing to replace staff who retire, insufficient supply of trained staff from training facilities and population growth.

Potential areas for future planning and policy making

Countries around the world are struggling with the problem of providing equitable access for all. The introduction of medical insurance is helping to increase access to health facilities in countries such as Rwanda but the lack of infrastructure and availability of qualified staff and the lack of equipment is still a significant challenge throughout SSA.

10.6 Mobile telephones

Availability of services

The adoption of and growth in mobile phone communications has been a remarkable achievement in Sub-Saharan Africa. Initially, the high cost of handsets and services meant that mobile users were primarily wealthy, educated, urban men (Aker and Mbiti, 2010). However, coverage of mobile networks in urban areas is now over 91% (Foster and Garmendia, 2010) and handsets are becoming more affordable. Although the initial cost of handsets can be high, the cost of using a mobile phone is relatively low, especially since the introduction of pre-paid services. It is estimated that 97% of consumers in Sub-Saharan Africa use the pre-pay service which allows them to buy credit (airtime) in small denominations, according to their budget (Foster and Garmendia, 2010). Expanding and strengthening social networks is considered to be the most important benefit of having access to mobile phone services (Duncombe, 2012; Sife et al, 2010).

In all 4 case study countries, access to mobile phones is higher for urban households in the poorest and poorer quintiles than those in rural areas. However, the levels of access in those wealth quintiles are significantly lower than those in the higher wealth quintiles for the same area of residence.

Constraints

The main barriers to access are cost of the handset and lack of network coverage. In terms of handset affordability, households who cannot afford to own their own mobile most often use a public phone (usually in a shop or with an agent) or use those of family and friends.

Potential areas for future planning and policy making

There is a great deal of literature available which discusses the role of mobile phones in sustainable livelihoods, however, much of this deals with hypothetical situations and small-scale innovations driven by local organisations. The extent to which mobile telephony services are contributing to sustainable livelihoods is under debate (Aker and Mbiti, 2010; Sife at al, 2010).

One of the most significant ways that mobile phones are promoting enterprise is through the formalisation of previously informal communication networks. Information can now be transferred via the phone which would previously have to be given through word of mouth. This allows enterprises to have larger networks, which can encompass a whole supply chain. Mobile money transfers are more common in urban areas, therefore, this is a potential area for growth within the urban economy, which may support the growth of small and micro enterprises.

10.7 Urban transport

Availability of services

It is known that improving urban transport increases incomes (Cox, 2012) and that even small improvements in transport services contribute to economic growth in Africa (Thompson, 2011) and social progress and environmental protection (van der Griend, R.A. and Siemonsma, W.J.A., 2011). However growing urban populations, increasing motorization, and poorly designed and maintained

urban transport infrastructure together cause major problems for the citizens who live in these cities (United Nations Department of Economic and Social Affairs, 2008).

The urban poor use a mixture of non-motorised and motorised transport. The use of bicycles depends on national preference but the use of public buses and motorbike taxis is common in the 4 case study countries. Motorized transport ownership is low amongst the urban poor in Africa. Less than a fifth of residents in urban areas own a car (Trans African Consortium, 2010a).

Constraints

There are several known barriers to accessing effective and efficient transport, these include; poor management of the existing infrastructure and the planning framework, the availability of finance for expensive road building projects, limited availability of and financing for public transport, traffic congestion and urban sprawl.

Public transport is dominated by the privately operated informal sector which takes a 90% share of this (UN-HABITAT/UITP, 2010). These services are mainly concerned with maximizing profits rather than improving service provision for users; services and fares are often unregulated and security is poor. As a result, the urban poor can spend a significant proportion of their time and income travelling to work, especially those that live in unserved areas. Residents on the peripheries of cities can have to walk substantial distances before they are able to reach public transport.

It is estimated that in Africa, only one quarter of the main road network is in good condition and about one quarter is fair. In comparison, only a quarter of rural roads are good or fair (Thompson, 2011).The state of the roads in SSA accounts for more than 43% of public transport vehicle breakdowns (Trans-African Consortium, 2010b) which makes the challenge of improving public transport even more difficult.

Potential areas for future planning and policy making

Alternative options for financing the transport sector need to be considered to allow activities like routine maintenance to take place. Giving priority to bus services can also be considered but the main challenge is the lack of roads, especially secondary and tertiary roads which link different areas of cities and allow for the traffic to be more evenly spread out rather than concentrated in the centre. Poor city design means that in many cities, large lorries and trucks still pass through the city centre to industrial areas which causes damage to the roads and adds significantly to congestion. Regulating fares charged by private sector operators may go some way to reducing costs but for residents travelling long distances the gains could be minimal.

10.8 Street lighting

Availability of services

Reliable and comprehensive statistics for the provision of street lighting in rural and urban areas in Africa do not exist. In addition to better driving conditions, the benefits of street lighting include; reduced fear of and actual robbery and assault, more night time trading, a better quality of life,

more attractive inner city areas, more use of the road network thereby reducing daytime congestion and a boost to tourism.

Constraints

The major barrier to installation of street lighting is the means of funding it. CIE (2007) suggests that fixed roadway lighting is most effective in improving night-time visibility, although installation and running costs are the most expensive. They argue that it is only justified therefore where there are particularly high volumes of traffic or accident rates. The need for inspection, cleaning and maintenance is also highlighted as being essential for effective operation.

Potential areas for future planning and policy making

There are some examples of street lighting initiatives that have been successful in SSA and these have the potential to be replicated in other areas. The largest project is the UNEP Enlighten Project working to light up urban roads in Kenya. There may also be potential to scale up some of the household centred projects for use at the city scale.