

How does the HIV and AIDS epidemic in South Africa impact on Water, Sanitation and Hygiene Sectors?

Report to the
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EXECUTIVE SUMMARY

Overview

The overall aim of this project was to gain a better understanding of the special needs of people living with HIV and AIDS in respect of water, sanitation and hygiene and the impact these needs have on provision of such services. The impact of HIV and AIDS is, however, not confined to family communities only but is rather spread and felt at every fabric of the society. At workplaces in particular the HIV and AIDS pandemic is imposing huge costs as it kills young adults in their prime ages (18-49 years) including a significant proportion of experienced and often highly skilled workforce. Hence part of the study was to highlight broadly the impact of HIV and AIDS at municipal workplaces and gain insights from the responsible authorities how the disease is constraining service delivery within water, sanitation and hygiene (WSH) sectors. Increasing ill-health and deaths due to HIV and AIDS among the personnel working in WSH-affiliated departments impact on capacity to deliver. HIV and AIDS will not only negatively impact on the quantity but also quality of service delivered by WSH sector. Not only does this result in poor quality services but will decrease staff performance due to diminished productivity and prolonged absenteeism caused by illness and death.

There is sufficient evidence that access to and quality of water, sanitation and hygiene is critical for people living with HIV and AIDS (PLWHA). Access to basic sanitation and effective solid waste management is essential in reducing HIV and AIDS-related morbidity and mortality. Access to clean water is essential in promoting effective health and hygiene practices. All these require an enabling environment that includes not just safe water supply, but effective wastewater disposal and solid waste management. The raising of health and hygiene awareness amongst affected households will be of limited value unless safe water supplies are available to these households so that they can practice good hygiene. Hygienic behaviour reduces opportunistic infections and lengthens the time period between HIV infection and full blown AIDS. This extends the period in which HIV sufferers can be both socially, domestically and economically active.

In sum the specific objectives of this study project were the following: (i) to investigate presently available water, sanitation and hygiene resources available to HIV and AIDS infected individuals in three different communities in South Africa; (ii) to establish a needs assessment in different water, sanitation and hygiene sectors based on various criteria (e.g. personnel needed, availability of skilled and trained people and skills development strategies) in order to provide adequate water, sanitation and hygiene resources and how HIV and AIDS infection would play a role in these criteria in each of these sectors; (iii) to gain insight from people concerned in different water, sanitation and hygiene sectors on the adequacy of water supply and quality, hygiene and sanitation infrastructures/services provided; and (iv) to provide recommendations and guidelines for strategies related to water supply (domestic and productive), sanitation and hygiene at household, community and national levels.

This study was conducted over three identified and selected districts of Ukhahlamba (Eastern Cape Province), Khayelitsha, City of Cape Town Metropolitan Municipality (Western Cape Province) and Groblersdal, Greater Sekhukhune District Municipality (Limpopo Province). To meet the objectives of the study two types of questionnaires were designed: the first type was the community-based questionnaire which focused on two distinct components – health-related and economics-related components; the second type was the water service provider (WSP) questionnaire.

The community-based questionnaire was administered by a team of home-based caregivers, selected from each district, who conducted face-to-face interviews with the head of each sampled household. For the WSP-based questionnaire, copies were distributed to several human resource, water/sanitation and environmental health managers within the selected districts. However with regards to WSP questionnaire we encountered the problem of low response and in this regard our analysis was largely qualitative. Below we provide summary of the main results based on three structures: (a) Community economics-based results, (b) Community health-based results, and (c) WSP-based results. We conclude by highlighting key recommendations and challenges affecting municipalities in their endeavour to supply efficient water, sanitation and hygiene service delivery.

Observed Results

(a) Community economics-based results

In accordance with the first objective, the community-based economics-related survey aimed at understanding in depth the presently available water, sanitation and hygiene resources to HIV and AIDS infected individuals in three different types of communities (rural, peri-urban and informal) in South Africa. Our results show that almost three quarters of the people interviewed were women and more than half were heads of the household. The most common household type in Khayelitsha was urban informal, in Ukhahlamba urban formal, and in Groblersdal rural. The dominant marital status was single. A significant proportion of sampled households lack skills and high levels of unemployment were evident in all three areas. In each area a significant number of interviewees had also never been employed.

The average age of interviewees was 38 years and there was, on average, two children of 10 years of age or younger in each household. Almost two thirds of the interviewees received some form of government grant. Overall, of those with a primary income source ("own effort"), the highest proportion came from a self-income project/business. Of secondary sources ("transfers from other sources"), by far the highest income came from child support grant followed by disability grant. The average income of those few with formal employment only marginally exceeds the national poverty line (NPL) threshold income, while for a majority, average household incomes were all below this threshold.

More than two thirds of interviewees usually walk to the local clinic. About one quarter use public transport. It takes approximately 30 minutes walk to nearest clinic (about 5-7 km). Most households in rural areas are forced to walk to clinic because of non-availability of public transport.

The high level of unemployment in South Africa, coupled with low education and lack of skills, make it worse for people living with HIV and AIDS to secure formal employment. Although the government continually adjusts income grants (child and disability), they tend to fall behind the general rise in food prices. One approach the government could adopt would be to offer inflation-adjusted income grant or consider the food stamps as alternative option targeting the poor people living with HIV and AIDS.

Household water sources differed considerably between the three areas. There is greater access to in-yard water in Groblersdal (about three quarters of households) than in Ukhahlamba (about half) or Khayelitsha (just over one third). About 1 in 13 households use typically unsafe water from rivers or dams. While in-house piped water is the safest and most convenient for people living with HIV and AIDS, only about 1 in 10 households had such water.

Communal water sources are often subject to a range of problems ranging from vandalism to the potential spread of disease due to unhygienic circumstances. About two thirds of households were aware of municipal water policies although less than 10% were aware of the free basic water policy. Significant numbers of interviewees thought the policies were ineffective. Less than 10% of households are paying for municipal water. However, only a little more than half of the interviewees thought they should be paying for such water. Almost one quarter of the total interviewees thought it government's responsibility to provide water and that they should not have to pay. The majority of interviewees nevertheless associated improved water sources with improved health status.

Almost one in five households with people living with HIV and AIDS in the three areas had no sanitation facilities so residents had to use the bush or open spaces. Furthermore, about one in ten of the houses used the bucket system. There are problems associated with using communal sanitation facilities or the bush. These relate to safety, basic human dignity and potential spread of disease. Those that preferred to use a neighbour's facilities sometimes had to pay for this, potentially significantly increasing their monthly financial burden. While only about 1 in 20 households were paying for municipal sanitation services, more than half think they should be paying for such services. Nevertheless, there were significant numbers that did not think they should pay, many stating that they think it is government's responsibility (as for water). Even so, many are aware that improved sanitation facilities will improve their health.

Aspects of the interviewee's understanding of "hygienic living" were of some concern. In particular, only a small percentage of people associated this with 'washing hands after using the toilet'. While local municipalities had held hygiene campaigns in recent years, overall little more than half of the households were aware of them. Khayelitsha had the least awareness (less than one third) and Groblersdal the highest (more than 90%).

There was evidence that households, notwithstanding their poor status, would be willing and able to pay for improved services. Such payments varied from about R68 to R136 per month for water services and from R78 to R138 per month for sanitation services.

Fairly substantial differences exist between the respective sampled provinces generally in respect of effectiveness of basic service provision. Western Cape is typically better than Eastern Cape which in turn is better than Limpopo. However, in 2006 the prevalence of HIV and AIDS was highest in Eastern Cape and lowest in Western Cape. In each district HIV and AIDS is the largest cause of death. The informal nature of the many settlements comprising Khayelitsha poses challenging problems for the City of Cape Town in respect of provision of water and sanitation. Water provision in the Greater Sekhukhune District is challenged by significant pollution of local water. Notwithstanding this, there has been a significant increase in the number of houses with access to clean water. In the Ukhahlamba District, the majority of the population relies on water from natural sources, many of which are not protected from pollution from livestock.

(b) Community health-based results

The community health-based focused on water safety and health-related issues and surveys conducted covered two districts of Khayelitsha (106 households), and Groblersdal (121 households). Key issues questions covered related to availability of safe water, appropriate sanitation, hygiene practices, how general waste was dealt with, and the incidence of tuberculosis, coughing and diarrhoea and below we provide brief summary.

The availability of enough water and water of an acceptable quality and quantity is of great importance in households where HIV and AIDS infected people are present. Home-based care of HIV and AIDS infected persons is wholly dependent on enough water and water of a good quality. Various studies have demonstrated that opportunistic infections accelerate progression of AIDS in presence of poor water quality. The frequency of infections is also linked to poor water service provision and inappropriate hygiene practices of household members that are often as a result of the lack of sufficient quantities of water.

Our results indicate that the surveyed districts of Khayelitsha and Groblersdal are provided with improved water sources according to WHO/UNICEF (2006). In Khayelitsha, a majority of the participating households have access to standpipes. Groblersdal almost all the study participants have access to either taps in their homes or stand pipes. These sources are considered improved water sources (WHO/UNICEF 2006).

Apart from having access to improved water source on a sustainable basis, the distances for collection should be taken into account during development of water provision programmes. The responsibilities associated with water in a household usually lies with the female children or female parent of a household. This seems the case in both Khayelitsha and Groblersdal where most households were female-headed. Women have to fetch enough water, on a daily basis, for all household purposes. When a water source is between 100 and 1000 m away from the dwelling unit, issues of health risk and burden of ferrying water, become issues of concern.

The implication to water service providers is that provision of protected sources might be insufficient in the case of households where HIV and AIDS patients reside. In areas where protected sources are the only option as in Khayelitsha and Groblersdal, promotion of hygiene practices related to water handling and adequate quantities of water, should be seriously considered.

Diarrhoea is a common symptom of HIV and AIDS and it affects 90% of infected people and results in significant morbidity, mortality, limited uptake of medicines and malnutrition. The growing number of immuno-suppressed people in South Africa makes

the provision of water, of a good microbial quality, even more urgent because drinking-water can contain a range of microorganisms which create health risks for HIV and AIDS infected people. The immuno-compromised population is in need of a more stringent microbial water quality than healthy people. The provision of more stringent water quality treatment at the point of use could be highly beneficial.

The drinking water quality measured using *E. coli* as an indicator, in Khayelitsha, seemed to have been of good quality. Households in Groblersdal, where standpipes as well as other types of sources of water used, showed that 66% of the samples did not comply with drinking water quality guidelines. A wider study should be undertaken in Groblersdal and authorities should be informed of the actual water quality and appropriate action to improve the situation should be planned. In the rural areas visited during this study such as in Ukhahlamba, people were wholly dependent on spring water. The springs were not protected in any way and animals had free access to the water. The quality reflected this and all the samples had unacceptable high *E. coli* counts. Rural areas like these are so isolated that costs and the necessary infrastructure to provide piped water seems almost impossible. A possible solution is point-of-use disinfection.

The HIV and AIDS epidemic has highlighted the tremendous importance of proper sanitation facilities and the degree to which proper sanitation can reduce diarrhoea in humans. As many studies have asserted, diarrhoea is a massive killer of children and key to its control is provision of quality water, safe sanitation and proper hygiene. The current survey showed that toilet availability is high in both Khayelitsha and Groblersdal. However, communal toilets and pit toilets are the most common types recorded in the two areas. Anecdotal and observed information obtained from the community in Khayelitsha is that the communal toilets are often vandalised, very dirty and long distances away from the households and that the sick especially females and children have to use their yard or the bush for defecation. Women feel especially vulnerable to use the pit latrines especially at night. About 20% of the respondents indicated that they have to share their toilet with neighbours. This practice is known to increase diarrhoea incidences in communities. This practice also increases the exposure of immune-compromised people to possible infections.

Diarrhoea, tuberculosis and coughing are illnesses that are closely associated with people living with HIV and AIDS. Tuberculosis is well known for its effect on the lungs of patients and coughing and the extent of tuberculosis in the HIV and AIDS population is known to be high. Diarrhoea is a common ailment of HIV and AIDS patients that is associated with parasitic and fungal infections. This survey investigated the prevalence of these diseases to get some understanding of the extent of these illnesses in the communities and whether or not they could be related to the water and sanitation status quo at the time of the survey. Positive associations with sharing the pit toilet was observed in Groblersdal, while in Khayelitsha, where great numbers of people had to share one standpipe, an association with coughing (and therefore indirectly diarrhoea) were observed, for instance. In Khayelitsha, using the bush for toilet functions was associated with increased diarrhoea and coughing, but not associated with either an increase or decrease in tuberculosis. Although the statistical analysis strictly only provides circumstantial evidence for these associations (i.e. not proof of the mechanism, but just what you would expect if that mechanism was operating) some of the associations could seem to have a rational and logic explanation. The analysis, to some extent, related the ailments with the level of water and sanitation and HIV and AIDS in the areas highlighted the need for adequate water and sanitation for those with HIV and AIDS.

(c) WSP-based results

A questionnaire was developed for service providers to better understand the impact of HIV and AIDS on their ability to provide their services. In general, Municipalities have scored commendable progress in terms of raising awareness, offering voluntary counselling and education, providing ART and other numerous forms of support to HIV and AIDS-infected employees at workplaces. In big municipalities like the city of Cape Town, they have created a Wellness Centre so as provide on-job care, counselling and psycho-

social support for HIV and AIDS employees. But despite seemingly wide array of support, persistent fear of discrimination and stigma at workplaces have discourage uptake of HIV and AIDS testing. Currently very low proportion of municipal employees (<1%) participate in these wellness activities and as a result the prevalence rate of HIV and AIDS at workplaces within municipalities remains unknown. This makes it difficult for the government to plan and strategize especially as the HIV and AIDS pandemic intensifies. Rough estimates indicate HIV and AIDS prevalence rates within water and sanitation sectors ranging between 1.5-10% and slightly lower compared to the manufacturing sector. Across all sectors, semi-skilled labour force is the worst affected. Below we make a number of important observations:

First, with respect to large municipalities, the impact of HIV and AIDS within WSH sectors tends to be minimal (at least in the short-run) due to the '**illusion of size**'. In this case, it does not make much difference when one or a few employees are affected by HIV and AIDS as the municipality, due to its size, has the capacity to absorb shocks resulting from losses in skilled labour due to prolonged illness or death. Under such circumstances, the marginal impact on labour productivity due to loss of a single skilled labour force within WSH sectors in large municipalities will be very minimal. But as the situation persists in the long-run, large municipalities will start feel the impact of the loss resulting in higher replacement, recruiting and training costs.

In contrast, for smaller municipalities losses even of one skilled personnel within WSH sectors can severely disrupt the operations of the entire district with immediate effects. For instance, within municipalities of Ukhahlamba and Greater Sekhukhune districts we observed that water and sanitation works are mostly handled by semi-skilled personnel due to critical shortage of skilled staff.

Second, **inability to deliver** on water and sanitation services is severe in smaller municipalities. The ability to deliver efficient WSH services depends directly on pool of skilled labour available within municipalities (engineers, artisans, plumbers, etc.). Most of small municipalities are working with depleted labour force within WSH for a number of reasons: first, many municipalities continue to face critical shortage of skilled manpower; second, most small municipalities have failed to provide attractive incentives to lure skilled manpower work in remote rural areas; third, because of severe budget constraint, many small municipalities cannot afford meet replacement and training costs necessitated by loss of skilled labour force either due to prolonged illness or death; fourth, poor and/or unfavourable working conditions have discouraged skilled labour force to work in rural municipalities. In sum, the workforce available in WSH sectors within smaller municipalities may be so overburdened and overworked to discharge their functions in the most efficient manner.

Third, most human resource managers pointed to sanitation as relatively the **worst affected** sector compared to water. The estimated prevalence rates are higher within sanitation sector for both semi-skilled (9.5%) and skilled (6.5%) workers compared to water. A similar trend is observed within the manufacturing sector where highest prevalence rate of 11.7% was recorded among semi-skilled workers. In some rural municipalities (e.g. Gariep municipality in Eastern Cape) the shortage of skilled labour force is so severe that sanitation works are handled by non-skilled personnel.

Fourth, across many municipalities medical aid is **largely absent**. Most human resource managers interviewed indicated that very few employees can afford it even though it is subsidised. This makes it difficult for the affected employees to seek private medical assistance.

Fifth, we observe **wide differences in counselling services** offered across municipalities. In large municipalities there are well established counselling services that cater for HIV and AIDS employees, offering on-job-care, moral and psycho-social support to the infected employees. But counselling services offered to infected employees tend to differ a lot across municipalities. In the CCT for example a Wellness Centre with a well-defined structure and functions has been established as referral point for counselling of all HIV+ employees. But due to stigma, not many HIV and AIDS employees are making use of the counselling services and benefits. In contrast, there are no such well-established counselling services in smaller municipalities but rather an appointed individual may act as 'support point'. On numerous times the HIV and AIDS sufferers are often referred to private counsellors, often at own cost.

As HIV and AIDS take its toll on skilled labour force, municipalities incur heavy losses in the process. Three types of losses are identified which include; loss of skilled and experienced workforce, production loss and loss due to vandalism. Below we highlight the costs associated with these losses.

Thus, sixth, we estimate the **cost incurred** due to loss of skilled and semi-skilled labour either due to early retirement or death related to HIV and AIDS, using a method suggested by Booyesen and Molelekoa (2001). It is estimated that the average cost per AIDS death for semi-skilled and skilled labourer is R70,500 and R190,900 respectively. Thus for a large municipality like the city of Cape Town, HIV and AIDS can potentially cost between R5 to R15 million losses per year in semi-skilled and skilled labour within WSH sectors respectively due to either death or early retirement.

Seventh, as HIV-positive employee becomes increasingly sick, there is marked **loss in production**, leading to general failure and inefficiency in service delivery. According to human resource managers, each municipal worker is entitled to 30 annual sick leave days. But what has frequently been observed is that, HIV-positive employee need longer sick-leave period beyond 30 days period. In some cases, municipalities provide additional 15 grace sick-leave days to their HIV and AIDS employees in an effort to accommodate the need for extended absence from work. Added together, this prolonged absence from work due to HIV and AIDS translates into huge production losses when aggregated across districts and provinces.

Eighth, **vandalism** is rife in informal settlements and this imposes huge and often unplanned cost on maintenance of water and sanitation infrastructure by municipalities. For example in Khayelitsha, every R1.00 invested in water and sanitation, 10-20% goes to repairs and replacements due to vandalism. For instance, considering the budget planned for water and sanitation expansion during the 2010/2011 financial year of R19.6 billion by the city of Cape Town, it follows (holding other things equal) that approximately R1.8 billion will be expended on repairs and replacements due to vandalism. If aggregated across the entire country, this converts into billions worth of water and sanitation infrastructure lost due to vandalism.

Recommendations

(a) Water provision at community level for PLWHA

People living with advanced HIV and AIDS have a much greater requirement for water than healthy people. This is because they need it for cleaning soiled bed linen, extra bathing and medication. Hence, we recommend that special consideration needs to be given to ways in which **extra free water** can be supplied to meet special needs of PLWHA.

In rural areas, a significant number of people living with HIV and AIDS only have access to unsafe water sources like rivers and dams. Where feasible, increasing the availability of safe (protected) boreholes will address this problem, making safe water available and easing the pressure on other municipal water supply services. Thus we recommend that there is a need to increase the availability of **safe borehole waters** to supplement municipal services.

Paying for water naturally instils a sense of ownership and responsibility. This empowers households to be their own custodians of water sources. People living with HIV and AIDS and local communities have a very important role to play in maintaining water sources. Ideally they should become the primary decision maker, investor, maintainer, organiser and overseer. Such a **bottom-up approach** should complement any top-down approach from government.

Our results show that PLWHA are aware of the need to make payment contributions towards water provision. Thus PLWHA take it as their duty (and not the government) to pay for the provision of water. The results help to dispel the belief that PLWHA cannot pay for provision of basic services, including water and sanitation that are so central to their livelihoods. Thus, we recommend that,

notwithstanding whether the government will subsidize for water provision or not, the ‘**user pays principle**’ must be the overriding principle conveyed to all users.

It was evident during the field study that although people could not qualify for support because their CD4 count was still greater than 200, many were nevertheless still too sick to fend for themselves. Hence, it is important that the use of the CD4 count criterion be **re-examined** to avoid this situation.

(b) Sanitation provision at community level for PLWHA

In rural areas and many of the townships people build their own structures which mostly consist of pit latrines that are often of very low standard. Therefore consideration should be given to developing and communicating **minimum standards** for the construction of pit-latrines. This should alleviate the current situation of sub-standard pit-latrines existing in so many rural areas.

To every pit-latrine must be accompanied by a hand-washing facility nearby so as promote the habit of ‘washing hands after toilet use’, a practice which we find largely missing in many communities of PLWHA. Provision of such hygienic facilities will help eliminate faecal-oral diseases especially diarrhoea, a leading cause of death for infants and PLWHA. Hence recommend that effort should be directed towards providing hand-washing facilities **as close as possible** to pit-latrines.

Currently a significant proportion of households in informal settlements are paying dearly to access clean and safe toilets from neighbours, as they try to avoid use of public toilets which are generally dirty and oftentimes over-flowing with human waste. For PLWHA such toilet facilities become hot-spots for contracting opportunistic infections. To address the serious lack of adequate sanitation facilities within informal settlements, we recommend that the following **toilet models** be investigated:

- a. **First Best Option (FBO):**
Ideally where possible, each household should have its own toilet facility connected to a sewer system or septic tank. This we view it as meeting the basic sanitation service provision comparable with formal households.
- b. **Second Best Option (SBO):**
But we realize FBO model may not work given the haphazard, limiting space and clustered way the shacks are constructed. Hence given the logistical problems associated with the FBO, the next best option is the provision of community-owned, managed and maintained blocks of toilets subject to supervision by municipal authority. We coin this, the second-best option (SBO) model. Under this model emphasis is that ownership and responsibility must be conferred to few households who must be fully in charge and control of toilet facility.
- c. **Pay-as-you-access (PAYA):**
The third model is again a community-based but secured block of toilets with expanded services that include hot water and bath taps in a homely environment to be owned, managed and maintained by the local community subject to authorisation and constant supervision by local council. This should be particularly well-suited to people living with HIV and AIDS and small children.

Much effort by the government has been directed towards improving service delivery, water and sanitation included. But however there has been less emphasis on how to sustain service delivery to the poor especially PLWHA. We therefore recommend that a **special indigent policy** that focuses on poor PLWHA be carefully considered across all municipalities.

(c) Hygiene provision at community level for PLWHA

The results indicated a general lack of understanding of the importance of ‘**hand-washing after toilet use**’. Most of faecal-oral diseases are transmitted via dirty hands including diarrhoeal pathogens, the leading cause of death among PLWHA. Accordingly, it is strongly recommended that District municipalities’ Environmental Health Departments include in their educational hygiene campaigns specific emphasis on this issue. Further, it could prove strategic if district authorities could link hand-washing awareness campaigns with annual events such as World Sanitation or Water Day.

Simple devices like ‘**tippy-taps**’ made from local materials and installed near toilet facilities should go hand-in-hand with ‘hand-washing’ campaigns. These simple devices could be ideal in rural areas. Increasing the number of visual communications would be of great assistance in communicating the message to those with low literacy levels. Any written communication must also be in vernacular language.

Challenges affecting Municipalities in meeting WSH service delivery

Drawing on insights gained from our extensive interaction with water, sanitation and health managers, human resource managers, and other local authorities we observe a number of challenges undermining ability and capacity of municipalities in general to deliver efficient services especially in water and sanitation.

- **Shortage of skilled manpower in water and sanitation sectors**

One of the main constraints affecting the municipal water and sanitation sectors is the critical shortage of skilled manpower. Many municipalities are enduring without technically skilled and experienced staff within water and sanitation sectors. This compromises the quality and efficiency in service delivery especially in water and sanitation sectors. An interplay of factors key amongst them — impact of HIV and AIDS on skilled labour; emigration of skilled labour to developed countries; poor and unattractive working conditions — have all created a huge vacuum of skilled manpower shortage in municipalities. In some cases technical operations and maintenance of complex water services infrastructure are either manned by semi-skilled labour or at worse the capital equipments lie dysfunctional.

- **Influx of migrants to urban areas**

According to UN-Habitat (2008) prediction, by 2020 a majority of people in Africa would be living in and around major cities in search for employment and better living conditions. Most of these ‘new urbanites’ would be poor, jobless with a majority living in slum settlements. This predicted trend is particularly true for South Africa where most of the major cities are characterized by multitude of informal settlements. The situation is worsened by high influx of immigrants from neighbouring countries especially Zimbabwe. This creates headaches for municipal authorities in a number of ways: first, informal settlements grow haphazardly including the invasion of preserved land often not even suitable for human settlement (e.g. flood-prone areas); second, the logistics of providing water and sanitation services under such conditions are difficult to coordinate. Third, with a high influx of migrants moving into cities each year, it is difficult for municipalities to plan, manage and budget for water and sanitation provision in slum settlements. Overly there is a need for national guidelines on the provision of water and sanitation in the informal settlements and backyards.

- **Rapid population and economic growth adds stress to urban water demand**

Many cities in South Africa are not only experiencing explosion in population growth but also undergoing rapid growth in industries, agriculture, manufacturing, mines and, etc. With such a rapid expansion of economy the demand for water will grow. While new infrastructure for water will be necessary, water supply resources are limited and hence key to sustenance of water resources is effective water conservation and water demand management strategies. Failures in water supply and demand management could entail huge costs that can hurt the entire economy. The challenge is therefore to ensure future water supply that can continue to meet the growing demand for water in urban regions.

- **Underinvestment in water and sanitation services infrastructure**

According to water and sanitation managers, the greatest threat facing many municipalities is gross underinvestment in water and sanitation infrastructure. In particular what has been observed is inadequate investment in the rehabilitation, replacement and maintenance of water services infrastructure across water services providers in South Africa. As a result the condition of assets has deteriorated, posing great danger to future sustainability of water and sanitation service infrastructure.

For many municipalities the existing infrastructure, particularly the sewer system, is severely worn out due to several years of under-provision of essential maintenance and replacement of aging infrastructure. But replacement costs can be prohibitively high. For instance, just for the city of Cape Town, replacement costs of water and wastewater system are estimated at R19.5 billion. If these costs are extrapolated to include other municipal districts throughout the country, this translates into huge replacement cost that would be required. This requires huge resource commitment and shrewd planning by the national government.

- **Eradication of backlogs in water and sanitation**

While many districts have scored commendable progress in water and sanitation provision since the end of apartheid, many still face great challenges in eradicating water and sanitation backlogs. In addition, eradicating the bucket system is also another challenge facing municipalities. According to the CCT annual report (2009/10) this problem arises mainly as a result of two factors: inadequate funds to eradicate water and sanitation backlogs, and lack of experienced personnel within water and sanitation sectors.

- **Cost recovery and sustainability of services**

Most municipalities are operating on huge debts primarily due to non-payment and cost recovery problems associated with water and sanitation provision. This makes sustainability of water and sanitation service delivery difficult to attain within both short and long run. Government subsidies only provide a temporal solution. Sustainable cost recovery measures must be premised on 'consumer pays principle'. Hence emphasis must be devoted to consumer education and awareness about the need to pay for water and sanitation services.

- **Government must find appropriate partners.**

Quite simply, government cannot do the job alone and need other partners to work together. In HIV and AIDS declaration by the General Assembly of the United Nations (UN, 2006), national governments commit themselves to programmes "supported by international cooperation and partnership". The above-mentioned types of partners are already used to different extents and degrees of effectiveness. However, it is recommended that the cooperative relationships established with these partners be given higher prominence. This should be done to the extent that cooperation is demonstrably "mainstreamed" into the everyday national, provincial and especially municipal working culture.

Conclusion

The study revealed a wide range of issues in their various dimensions that relate to provision of adequate water, sanitation and hygiene with specific focus on people living with HIV and AIDS. These dimensions include (a) understanding the currently available WSH requirements for people living with HIV and AIDS in rural, peri-urban and/or informal settlements, (b) assessing the impact of HIV and AIDS at municipal workplaces within water and sanitation sectors, and (c) draw insights and recommendations on needs of WSP and challenges undermining the ability and capacity of municipalities as key WSP to deliver efficient services on WSH.

Various insights and recommendations are drawn: **First**, irrespective of specific HIV and AIDS-related requirements, the provision of services that satisfy the basic minimum WSH standards will go a long way towards alleviating problems faced by PLWHA in both rural and informal settlements. Effective knowledge flows “upwards” (from household and municipality to national level) and “downwards” (from national to municipal to household) are critically important for a holistic approach to WSH problems.

Second, whilst at national level South Africa has scored commendable progress in water and sanitation provision since democratic transition (1994), the country still faces daunting challenges in eradicating water and sanitation backlogs especially in rural and informal settlements. Although government’s mandate places the primary responsibility for service provision squarely on its shoulders (national down to municipal), it is prudent to assert that it cannot reasonably be expected to address the backlogs without strategic partnership with other players. The failure to provide adequate WSH needs and improve the livelihoods of people living in slum settlements in general, poses the greatest challenge to the attainment of the MDGs.

Third, the greatest risk threatening the country is the aging water and sanitation infrastructure which has suffered immensely due to inadequate investment in the rehabilitation, replacement and maintenance of infrastructure across water services providers in South Africa. As a result the condition of assets has deteriorated, posing great danger to future sustainability of water and sanitation service infrastructure. For many municipalities in particular, the existing sewer system is severely dilapidated due to several years of under-provision of essential maintenance and replacement of aging infrastructure.

Finally, most municipalities are operating on huge debts primarily due to non-payment and cost recovery problems associated with water and sanitation provision. This makes sustainability of water and sanitation service delivery difficult to attain unless lasting solutions are developed. Cost recovery measures premised on ‘consumer pays principle’ will go a long way towards sustenance of water and sanitation provision. We conclude that to solve these problems requires massive financial and human resource commitment, careful planning at both national and local government level and strategic partnership with other public and private institutions.

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Acronyms

CCT	City of Cape Town
DWA	Department of Water Affairs
GDP	Gross Domestic Product
HSRC	Human Science Research Council
MDGs	Millennium Development Goals
NDoH	National Department of Health
PLWHA	People living with HIV and AIDS
SADC	Southern African Development Community
SSA	Sub-Saharan Africa
UNAIDS	Joint United Nations Program on HIV and AIDS
UNICEF	United Nations International Children's Emergency Fund
UN-HABITAT	United Nations Human Settlements Program
WHO	World Health Organization
WRC	Water Research Commission
WSH	Water Sanitation and Hygiene
WSP	Water Service Provider
WTP	Willingness-to-Pay



A pit latrine in rural Elansddorn municipality, Limpopo

SECTION I: BACKGROUND

1.1 INTRODUCTION

The HIV and AIDS crisis is affecting many developing countries especially Sub-Saharan Africa (SSA) and constitutes the greatest threat to the attainment of UN Millennium Development Goals (MDGs). The AIDS epidemic has affected every social and economic fabric of all sectors — education, industry, agriculture, transport, human resources, etc. — and continues to wreck havoc, rolling back decades of development progress. The HIV and AIDS pandemic is not simply a health problem that calls for commitment from government to provide assistance in the form of anti-retroviral treatment to infected individuals. Instead, it is now widely acknowledged that HIV and AIDS constitutes the most formidable challenge to economic development and social progress for most developing regions especially SSA. To date, about 22.5 million people are infected and 1.7 million have already died in SSA making it one of the worst affected region in the world (UNAIDS 2009). In addition, the grim statistics further show that 14.8 million children have either lost one or both parents in SSA since the epidemic started early 1980s. In sum, SSA faces three challenges (www.avert.org/hiv-aids-africa):

- Providing health care, antiretroviral treatment, and support to an expanding population of people living with HIV and AIDS
- Reducing the annual toll of new HIV infections by enabling individuals to protect themselves and others
- Coping with the impact of millions of HIV and AIDS deaths including increasing orphanage, child-headed households and general rise in poverty and destitution

Although HIV prevalence rates vary greatly, Southern African is the worst affected region in SSA. Some of the highest HIV prevalence rates in the world have been recorded in countries like South Africa (17.8%), Botswana (24.8%), Lesotho (23.6%) and Swaziland (25.9%). For South Africa in particular, many factors have contributed to the spread of HIV and AIDS which include: rampant poverty especially in rural and informal settlements; inequality and social deprivation; high levels of sexually transmitted infections and sexual violence; high mobility (particularly migrant labour); limited and uneven access to quality medical care. Hence although South Africa commands one of the strongest economies in Africa, the HIV and AIDS pandemic is weakening the nation as it inflicts a heavy toll on the most productive labour force within age group of 18-49 years old, marked by high HIV prevalence rate of 16.9% (SA HIV and AIDS Stats, 2009). This means the impact of HIV and AIDS is unique as it kills young adults mostly at the prime time of their lives, robbing families, communities and the nation at large of the most productive generation. As families lose their breadwinners, income is lost, productivity declines, health-care expenditure increases, AIDS-orphans and child-headed households increase, children drop out of school, savings dwindle and overly leading to intensification and proliferation of destitution and chronic poverty. UNDP asserts that the projected socio-economic impact of the epidemic is so devastating to the extent that fighting HIV and AIDS and fighting poverty becomes one and the same battle.

1.2 THE LINK BETWEEN HIV AND AIDS AND WATER, SANITATION AND HYGIENE

HIV and AIDS is not a water-related disease nor is it spread via contaminated water or poor hygiene, such as diseases like diarrhoea, typhoid and cholera (Kgalushi et al., 2004; Kamminga and Wegelin-Schuringa, 2006). Ostensibly, the issues of HIV and AIDS and water would appear to be largely unrelated. On one hand HIV and AIDS is principally transmitted between people primarily through sexual contact. On the other hand, water is a renewable natural resource of which the availability depends on a variety of geographic and climatic factors. However, there are several significant linkages between HIV and AIDS and water with important consequences for water resource management and provision of safe water and sound sanitation services (Ashton and Ramasar, 2002).

First, with the AIDS pandemic affecting mostly young adults, the burden of caring for the sick is increasingly being passed to the old grandparents and small children. This means the physically demanding tasks of caring, water-carrying, laundry and cleaning are handled by grandparents and/or children. These tasks are more demanding in rural settings and informal settlements where there is a general lack of in-house piped water and sanitation facilities. Furthermore, as people living with HIV and AIDS (PLWHA) increasingly become more bed-ridden and incapacitated their demand for water increases as well and ends up putting severe strain old people and/or small children as they often fail to cope with physical tasks such as carrying water buckets or operating hand-driven communal water pumps. This often leads to situations where water of inferior quality may be tolerated for consumption and use by PLWHA, making it a shortcut of sentencing these people to death.

Second, AIDS kills by destroying the immune system of the body and this ends up exposing the body to common diseases. As a result the AIDS sufferer dies after succumbing to one or more of “opportunistic diseases”, in particular diarrhoea and skin diseases (Barnett and Whiteside, 2002). Therefore, safe water, good sanitation and hygiene are central issues to fighting the spread of infections and reducing their vulnerability.

Third, other arguments in support for the provision of the safe water and sanitation services include the need for clean water when taking medication and when using formula feeds as supplements for babies and infants. There is evidence that HIV-positive mothers can pass the virus to her baby via breast-feeding. The recommended baby-feeding practice is therefore to use powdered formula milk rather than breastfeeding and needless is to say access to clean water is vital.

Fourth, there is also the argument that increasing ill-health and deaths due to HIV and AIDS among the personnel working in WSH-affiliated departments (e.g. DWAF, Municipalities or Local councils) resulting in a rise in poor service delivery and general inefficiency. Thus the services by water/sanitation professionals may therefore be severely compromised due to HIV and AIDS-related illness and/or death. In such a case, the coordination and implementation of public/private water projects becomes more difficult to manage and this can affect long-term efforts to improve water supplies (Hammerskjöld, 2003). HIV and AIDS will not only negatively impact on the quantity but also quality of service delivered by WSH sector. Not only does this result in poor quality services but will decrease staff performance due to diminished productivity and capacity caused by staff illness and death, lack of skills and lack of training capacity.

In sum, there is ample evidence that access to and quality of water, sanitation and hygiene is critical for PLWHA. Access to basic sanitation and effective solid waste management is essential in reducing HIV and AIDS-related morbidity and mortality. Access to clean water is essential in promoting effective health and hygiene practices. All this requires an enabling environment that includes not just safe water supply, but effective wastewater disposal and solid waste management. The raising of health and hygiene awareness amongst affected households will be of limited value unless safe water supplies are available to these households so that they can practice good hygiene. Hygienic behaviour reduces opportunistic infections and lengthens the time period between HIV infection and full blown AIDS. This extends the period in which HIV sufferers can be both socially, domestically and economically active.

In South Africa, provision of safe water and appropriate sanitation is a basic human right. It is particularly important for people with compromised immune systems, like HIV and AIDS sufferers, because it promotes effective health and hygiene practices. Therefore, people living with HIV and AIDS not only require better services from water and sanitation provision sectors but the associated morbidity and mortality within those sectors diminishes the capacity for such provision (**Figure 1.1**).

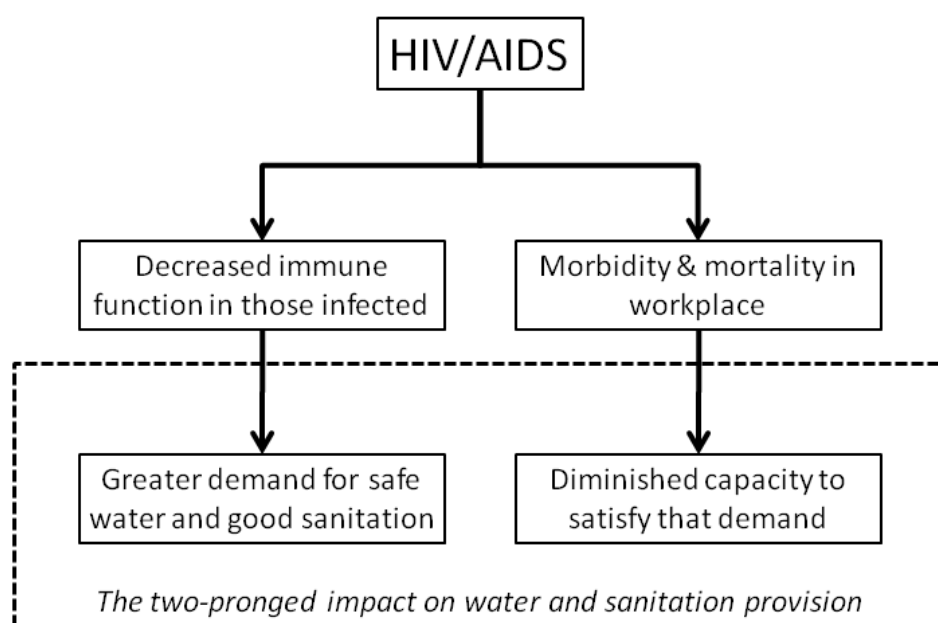


Figure 1.1: The two-pronged impact of HIV and AIDS on the water and sanitation provision.

1.3 OVERVIEW OF WATER, SANITATION AND HYGIENE SECTORS IN SOUTH AFRICA

1.3.1 Access to water

According to a report of the World Commission on Water for the 21st Century, every human being should have access to safe drinking water as this resource is a necessary requirement for meeting basic human needs (Serageldin, 2000). Sustainable access to safe drinking water is one of the three targets set by the UN Millennium Declaration and is also a key component in the UNDP Human Poverty Index for developing countries (UNDP, 1999). This section highlights the association between safe water and the reduction of waterborne diseases and the alleviation of poverty and subsequently a more sustainable environment for development (UNDP, 2005).

Access to water and sanitation services are essential for the reduction of waterborne diarrhoeal diseases that contribute significantly to morbidity and mortality in impoverished populations in Sub-Saharan Africa. Globally diarrhoeal disease is the second highest cause of mortality and morbidity in children under five years of age. Estimates that about 1.6 million deaths per year of children under-five occurring in developing countries can be attributed to diarrhoea (WHO, 2002). This translates to two lives lost every hour (WHO, 2002). In addition, 479,000 Disability Adjusted Life Years are lost annually due to diarrhoea (WHO, 2002). Unsafe water, inadequate sanitation and poor hygiene practices are the causes of 85% to 90% of diarrhoeal cases in developing countries (Prüss-Üstün et al., 2004).

Currently, about 16% of people in South Africa do not have access to a reliable source of safe drinking water (www.allafrica.com/stories) while 21% lack access to adequate sanitation (Muller, 2011). Although not all diarrhoeal illnesses are caused by poor quality drinking water, diarrhoea is among the top ten causes of death in South Africa claiming 13,600 lives annually (or 2% of all deaths). South African municipalities have the responsibility for the provision of a basic water supply which is defined as:

- The infrastructure to supply 25 litres of potable water per person per day supplied within 200 metres of a household and with a minimum flow of 19 litres per minute (in case of communal water points); or
- 6000 litres of potable water supplied per formal connection per month (in the case of yard or house connections).

All piped water supplied to communities should meet relevant drinking water quality standards and should not negatively impact on the community consuming the water. However, with only 71.3% of households receiving piped water in their dwelling or on site (STATS SA, 2007), this means nearly 30% of households do not have this luxury. They have to fetch water and store it in containers. This increases the risk of exposure to contaminants at point of use (Levi et al., 2008; Wright et al., Potgieter et al., 2008).

The presence of the physical infrastructure for water does not automatically mean that water is accessible. Water interruptions are common in many of the smaller municipal areas and in townships (Rietveld et al., 2008). As a result people have to store water or resort to using surface water if available, buy water, get water from sources far away from their home yards. Each of these scenarios poses some potential impact for their health. Storing water leads to in-house contamination and using surface water exposes people to waterborne pathogens (Levi et al., 2004; Gundry et al., 2009). Travelling long distances to collect water is sometimes impossible for sick people and time-consuming for the healthy. Buying water will result in many households ill-affording and many will be forced to go without water.

The same problems are experienced worldwide. In 2000 it was estimated that one-sixth of humanity (1.1 billion people) lacked access to any form of improved water supply within 1 kilometre of their home (WHO and UNICEF, 2000). The basic need for water includes water used for drinking and personal hygiene.

The minimum volume per person per day cannot easily be defined because use depends on accessibility and availability in rural communities. The latter includes the distance to travel and the time it takes to collect water. The reliability of the source and potential costs need to be taken into account as well. Accessibility can be categorised in terms of service level. A summary of the degree to which different levels of service will meet requirements to sustain good health and interventions required to ensure health gains are maximised, is shown in **Table I.1**. The volume collected is dependent on the availability. Interruptions of the water supply will reduce the volume and the risks of drinking contaminated water increases.

Health gains are firstly linked to increased volumes and secondly to having access to safe water at household level. The first relates to overcoming a lack of basic access, where the distances and time involved in water collection result in use of volumes inadequate to support basic personal hygiene and may be marginally adequate for human consumption. The second issue relates to having access to water at household level which increases time for food preparation, child care and free time.

Where the basic access service level has not been achieved, hygiene and health gains cannot be assured. Therefore providing a basic level of access is the highest priority for the water and health sectors. Public health gains are primarily achieved through providing protected water sources, promoting good water handling, hygiene practices and household treatment of water and other essential hygiene behaviours notably hand and face washing (Howard and Bartram, 2003).

Table 1.1: Requirements of water service level to promote health

Service level	Access measure	Needs met	Level of health concern
No access (quantity collected often below 5 l/person/day)	More than 1000 m or 30 minutes total collection time	Consumption — cannot be assured Hygiene — not possible (unless practised at source)	Very High
Basic access (average quantity unlikely to exceed 20 l/person/day)	Between 100 and 1000 m or 5 to 30 minutes total collection time	Consumption — should be assured Hygiene — hand washing and basic food hygiene possible; laundry and bathing difficult to assure unless carried out at source	High
Intermediate access (average quantity about 50 l/person/day)	Water delivered through one tap on plot (or within 100 m or 5 minutes total collection time)	Consumption — assured Hygiene — all basic personal and food hygiene assured; laundry and bathing should also be assured	Low
Optimal access (average quantity 100 l/person/day and above)	Water supplied through multiple taps continuously	Consumption — all needs met Hygiene — all needs should be met	Very Low

Source: Howard and Bartram, 2003

The implication to water service providers is that provision of protected sources might be insufficient in the case of households where HIV and AIDS patients reside. In areas where protected sources are the only option, promotion of hygiene practices related to water handling and adequate quantities of water should be seriously considered.

1.3.2 Water quality and risks of diarrhoea

Diarrhoea is a common symptom of HIV and AIDS (Antony, 1988). Diarrhoea affects 90% of HIV and AIDS infected people and results in significant morbidity, mortality, limited uptake of medicines and malnutrition (Katabira, 1999; Monkemuller and Wilcox, 2000). Morbidity caused by diarrhoea in HIV and AIDS child patients has been shown to be much higher than in adults (Thea et al., 1993). People infected with the disease also have to deal with waterborne pathogens that are known to cause eye and skin infections. Specific risk situations for infections from drinking water are drinking contaminated water, exposure of mucosal lesions during tooth care, aspiration of aerosols during showers and the formation of reservoirs in bathroom utilities (toothbrush, showerheads).

The water supply sector and specifically Water Service Authorities have the responsibility to provide the country with safe drinking water. Notwithstanding widespread, and often successful, efforts in recent years to improve both the supply and quality of water provided by Water Service Authorities (DWA National Drinking Water Quality Framework, 2006), inadequate quality and contamination at the point of use remain significant problems.

The traditional method for determining the drinkability of water involves testing for organisms that are indicators of faecal pollution (SANS, 2006). Faecal coliforms, however, may not be suitable for ensuring safe water for all uses and all people. The growing number of immuno-suppressed people in developing countries (UNAIDS, 2004) makes it necessary to develop new concepts to protect these patients from infectious agents in drinking water other than those indicated by traditional indicator methods (Glasmaier et al., 2003). With HIV and AIDS, this becomes even more urgent because drinking-water can contain a range of microorganisms,

(*Pseudomonas aeruginosa*, non-tuberculous *Mycobacterium* spp., *Acinetobacter* spp., *Aeromonas* spp. and *Aspergillus*) all of which create health risks for HIV and AIDS infected people. Immuno-compromised individuals also have a greater risk of mortality from these normally benign organisms (WHO, 2003).

Rosenbaum (2008) recently pointed out the irony in providing people living with HIV and AIDS with advanced antiretroviral agents while they are forced to wash them down with water that may contain life-threatening pathogens. Care givers should be provided with access to a safe water supply to maximise the effectiveness of antiretroviral treatment. Not only is diarrhoea one of the many side effects of these drugs, but people on antiretroviral drugs require greater amounts of water for drinking (Murphy et al., 2000). Diarrhoeal disease in these patients will compromise the absorption of the drugs and can even contribute to antiretroviral resistant strains of the HIV virus (Bushen, 2004). From the above it is clear that safe water and sanitation play a pivotal role in mitigating the impacts of HIV infections.

1.3.3 Safe treatment and storage of water in the household

Safe treatment of storage water at the point of use has been shown to reduce the risk of diarrhoeal disease by 30 to 40%. A wide range of interventions including hygiene, sanitation, water supply, water quality (which included point-of-use interventions) and combinations of interventions (water, sanitation and hygiene) from 38 studies were analysed for their relative impact on risk of diarrhoea (Fewtrell et al., 2005). Hand washing was found to reduce the risk by 44% while hygiene education reduced the risk by 28%. Improving the microbial safety of water at the point-of-use seemed to be very effective in reducing diarrhoeal disease (relative risk 0.61, 95% CI, 0.46 to 0.81; Fewtrell et al., 2005). Using chlorine and a narrow-mouthed container with a lid and tap reduced the frequency of diarrhoea by 30% and in addition reduced the severity of diarrhoea cases in HIV and AIDS infected people (Lule et al., 2005). Integrating safe storage and home treatment could make a substantial contribution to the health gains in people living with HIV and AIDS.

1.3.4 Sanitation in relation to HIV and AIDS

Water, sanitation and hygiene (WASH) is intimately linked to the human health and the socio-economic status of communities in Sub-Saharan Africa. These linkages have been elaborated on by several authors (Kaminga and Wegelin-Schuringa, 2005; Ngwenya and Kgathi, 2006; Obi 2006, Bery and Rosenbaum, 2007; Potter and Clacherty, 2007; Manase, 2008). It has also been shown that diarrhoea can be reduced by adequate sanitation, hygiene and safe water interventions. Lule (2005) has shown that the presence of a latrine in the yard of a household reduces diarrhoea episodes and days with diarrhoea and reduces days off work. Hand washing with soap has also been shown to reduce diarrhoea rates in people with HIV and AIDS in the United States by 58% (Bery and Rosenbaum, 2007). Safe disposal of faeces can reduce the risk of diarrhoea by 30% (Fewtrell et al., 2004).

The definition of a sanitation facility is infrastructure which is safe, reliable, private, protected from the weather and ventilated, keeps smells to the minimum, is easy to keep clean, minimises the risk of the spread of sanitation related diseases by facilitating the appropriate control of disease carrying flies and pests, and enables safe and appropriate treatment and/or removal of human waste and waste water in an environmental sound way. The HIV and AIDS epidemic has highlighted the tremendous importance of proper sanitation facilities and the degree to which proper sanitation can reduce diarrhoea in humans.

The responsibility for provision of sanitation lies with households themselves in South Africa while local government's role is to assist in the process. They have the responsibility to provide a basic sanitation facility which is easily accessible to a household, the sustainable operation of the facility, including the safe removal of human waste and wastewater from the premises where this is

appropriate and necessary, and the communication of good sanitation, hygiene and related practices. In rural areas and many of the townships people build their own structures which mostly consist of pit latrines.

1.3.5 Hygiene in relation to HIV and AIDS

Hygiene awareness and improvement of hygiene is a commendable approach to reducing diarrhoeal disease. The evidence base to document the relationship between hygiene improvement and reduction in diarrheal disease morbidity in people living with HIV and AIDS is just emerging. However, the evidence base regarding the impact of hygiene in reducing diarrheal disease overall is indisputable and impressive. Indeed, hand washing, sanitation, and water disinfection and safe storage have each been proven to reduce diarrhoea rates significantly. Promoting hand washing at critical times can reduce diarrhoea in the general population by 42-44% (Cairncross et al., 2010; Curtis and Cairncross, 2003). The presence of soap in the house was associated with fewer days with diarrhoea inferring that washing hands reduces diarrhoea (Lule et al., 2005). CARE/Bangladesh's SAFE program demonstrated a 65 percent decrease in diarrhoea rates when all three components of hygiene improvement were present in a program (Bateman et al., 2002; UNAIDS, 2004).

Promoting these practices can prolong life and improve the quality of life of infected people. Family members and caregivers are also protected from contracting diarrhoea. Although becoming infected with HIV by touching an infected person's faeces or by faecal-oral transmission is not possible, there can be an increased presence of diarrhoea-causing pathogens in faeces. Caregivers are therefore more exposed in the late stages of AIDS when diarrhoea is severe and persistent, placing them and family members at greater risk of contracting diarrheal disease if improved hygiene practices are not followed (USAID, 2008).

1.4 PROJECT AIM AND OBJECTIVES

The overall aim was to provide insight into the extent to which the water, sanitation and hygiene sectors have to make provision and adapt management practices to overcome the onslaught of the HIV and AIDS epidemic in the work place, while simultaneously taking account of the needs of the users of water and sanitation services.

The project objectives were:

1. To investigate presently available water, sanitation and hygiene resources available to HIV and AIDS infected individuals in three different communities in South Africa;
2. To establish a needs assessment in different water, sanitation and hygiene sectors based on various criteria (e.g. personnel needed, availability of skilled and trained people and skills development strategies) in order to provide adequate water, sanitation and hygiene resources and how HIV and AIDS infection would play a role in these criteria in each of these sectors;
3. To gain insight from people concerned in different water, sanitation and hygiene sectors on the adequacy of water supply and quality, hygiene and sanitation infrastructures/services provided; and
4. To provide recommendations and guidelines for strategies related to water supply (domestic and productive), sanitation and hygiene at household, community and national levels.

1.5 STRUCTURE OF THE REPORT

The remainder of the study is structured as follows: Section 2 provides a general overview of HIV and AIDS in South Africa; Section 3 gives a description of study sites in terms of the prevalence rates of HIV and AIDS and general provision of water, sanitation and hygiene services at district and provincial level; in Section 4 we discuss in detail results of the study based on three types surveys conducted (WSP, Community-health and Community-economics surveys); Section 5 summarizes the main results and Section 6 provides the recommendations and conclusion.



Inside the pit latrine in Elaansdorn, Limpopo

SECTION 2: OVERVIEW OF HIV AND AIDS IN SOUTH AFRICA

2.1 Overview of HIV and AIDS in Southern Africa

Southern Africa continues to be the worst region in SSA to be affected by HIV and AIDS (WHO World Health Statistics, 2008). In this region, national adult HIV prevalence rates exceeding 15% have been reported in countries like Botswana, Lesotho, Namibia, South Africa, Swaziland and Zimbabwe (WHO World Health Statistics, 2008). Nowhere else has national adult HIV prevalence rates reach such high levels. It is also important to emphasize that the reported cases represent only the visible part of the epidemic. The cumulative number of AIDS cases is not known because many more are infected but have not developed AIDS. Some people never seek hospital care, some cases are not reported as AIDS by medical personnel (Groenvelde et al., 2006), and some hospitals may not have the capability to test for HIV infection. Moreover, statistical records are based on women that attend antenatal clinics and do not take into account of the male population that may be infected.

2.2 Overview of HIV and AIDS in South Africa

The estimated overall HIV-prevalence rate for South Africa is approximately 17.8%, which amounts to approximately 5.35 million people living with HIV and AIDS (StatsSA, 2008). The percentage prevalence in antenatal attendees was 15.9% in 2005, decreased to 13.7% in 2006 and decreased further to 12% in 2007 (NDoH, 2008). HIV prevalence rate within age group of 20-24 year group declined over the same period from 30.9 % in 2005 to 28.1 % in 2007. However this was not the case with the age group of 30-34 years showing a rise in the prevalence rate from 37% in 2006 to 40% in 2007. A similar trend was observed for the 35-39 year age group with prevalence rising from 29.3% in 2006 to 33.2% in 2007 (NDoH, 2008).

Table 2.1 shows the prevalence rates of HIV and AIDS among the young and most productive age group (15-49 years) in South Africa and how the disease is distributed by type of settlement. As observed the highest HIV+ prevalence rate occurs in urban informal settlements, followed by rural informal settlements. This result would be expected given a majority of people who live in informal settlements are largely unemployed and hence illicit activities like prostitution, drug abuse, transmission of sexual diseases and sexual violence are rampant.

Table 2.1: Type of Settlements and HIV and AIDS Prevalence rate within most productive age group (15-49 years)

Type of settlement	HIV+ (whole sample)	HIV+ (15-49)
Urban formal	9.1%	13.9%
Urban informal	17.6%	25.8%
Rural informal (former homelands)	11.6%	17.3%
Rural formal	9.9%	13.9%

Source: Tomlinson, 2006

Today about 5.3 million people in South Africa are living with HIV and AIDS for which a majority are women (2.8 million) and this also includes 220,000 children under the age of 15 (UNAIDS 2009). During the year of 2008 about 300,000 people died of HIV and AIDS, while accumulatively for the period of 1990-2010 about 3.4 million people have died of disease in South Africa (**Table 2.2**). It is projected that by 2015, the number of people living with HIV and AIDS would have risen to 5.4 million and while 5.3 million people would have died by that time (SA-HIV and AIDS Stats, 2009).

Table 2.2. Projected population, number of HIV+, AIDS sick and cumulative AIDS death, 1990-2015

Year	Total population (mil)	Annual growth rate	Total HIV+ (mil)	% HIV+	Cumulative AIDS deaths	Total AIDS sick
1990	35,538,787	1.8%	38,597	0.1%	326	293
1995	40,153,091	2.7%	943,590	2.3%	20,662	16,135
2000	43,966,756	1.4%	3,731,645	8.5%	318,697	194,424
2005	46,156,343	0.7%	5,165,797	11.1%	1,542,169	589,454
2010	47,380,126	0.5%	5,408,621	11.4%	3,404,415	692,511
2015	48,294,565	0.3%	5,407,945	11.2%	5,358,501	742,261

Source: Tomlinson, 2006

2.3 HIV and AIDS Orphans in South Africa

There are a large number laws and charters in South Africa that oblige the State to take measures to reduce “infant and child mortality” and prevent “disease and malnutrition”. The South African Constitution (Section 27) states that everyone has the right to access health-care services. In addition, section 28(1)(c) gives children “the right to basic nutrition, basic health care services, and social services”. Article 14(1) of the African Charter on the Rights and Welfare of the Child, states that every child shall have the right to enjoy the best possible state of physical, mental and spiritual health”. Article 24 of the UN Convention on the Rights of the Child says that State Parties should recognise “the right of the child to the enjoyment of the highest attainable standard of health and to facilities for the treatment of illness and rehabilitation of health.”(Johnston 2008). Although nations and organisations endeavour to provide the best possible care in terms of health and nutrition and to reduce child mortality, the reality of the lives of millions of children affected directly and indirectly by the HIV and AIDS epidemic is far from idyllic. The growing number of orphans and the expected long term adverse effects of HIV and AIDS still to be manifested through new infections is a serious matter of concern (UNAIDS/UNICEF/WHO, 2007). Projections show that by 2010, 16 percent of all children in South Africa will be orphans and more than 70 % of them will be AIDS orphans (Dennis et al., 2002). Long term plans are needed to deal with children long after the epidemic has waned. Currently there is very little evidence of such plans. Differences in opinions about what constitutes an orphan is also adding to the complexity of the problem. **Table 2.3** shows that by 2020 the number of orphans in South Africa would have risen to 2.1 million. These trends have far-reaching intergenerational poverty implications arising largely from unprecedented increases in orphanage and child-headed households.

Children affected by AIDS generally refer to children under 18 years who: (a) are living with AIDS, (b) have lost one or both parents due to AIDS, (c) are vulnerable, i.e. their survival, well-being or development is threatened or altered by HIV and AIDS (UNAIDS, 2006). Vulnerable children in South Africa are defined as those who are orphaned, neglected or abandoned, have a terminally-ill parent, are born of a teenage girl, live with a parent with no income and, is abused or disabled. Varying definitions for “orphan” makes it difficult to determine whether they were orphaned because of HIV and AIDS (Foster and Williamson, 2000) but it is generally accepted that the increase is related to HIV and AIDS. Since 2005, 1.2 million children under 18 had lost one or both parents to AIDS in South Africa. After the death of their parents children often lose their right to family land. Family members take possession of their home and provide them no support. Children orphaned or made vulnerable by AIDS often struggle with food insecurity and malnutrition and they are often excluded from society (HSRC, 2008). It has been found that orphaned girls engage in sex much earlier than girls growing up with their own families. In some cases the presence of care-givers raises the possibility of sexual abuse (Tsheko et al., 2007). This behaviour creates many more opportunities for them to experience violence and become infected (Birdthistle et al., 2008). The situation for these children is worsened by the fact that the traditional style of extended

family and culture of caring is slowly disintegrating in South Africa and other areas of Sub-Saharan Africa. South Africa is under great pressure from socio-economic changes that directly impact on families' ability to care for orphans. This results in orphans being exposed to poverty from an early stage of their life. They are often left in the care of the elderly whose main source of income is the old age pension scheme. Some orphans are abused by their caregivers.

Table 2.3. Projected number of maternal orphans, 2000-2020

		2000	2005	2010	2015	2020
South Africa	Total	714 059	1,351,768	2,076,375	2,407,709	2,415,270
	AIDS	157,752	829,402	1,637,096	2,053,332	2,118,895
	% AIDS Orphans	22	61	79	85	88

Source: Tomlinson, 2006

A report (2009) by the 'Joint Learning Initiative on Children and HIV and AIDS' highlighted a number of fundamental issues pertaining to children that have not been addressed in full, even though the HIV and AIDS pandemic is in its 25th year:

- Treatment to prevent infection before birth is provided to only one in three pregnant women with HIV and AIDS in low- and middle-income countries. It is estimated that more than 90% of 2 million children living with HIV are infected before or during birth.
- The proportion of children with HIV and AIDS that receive antiretroviral treatment is small. In Sub-Saharan Africa, children are less likely to receive treatment than adults.
- Only 8% of children born to HIV-positive women are tested for HIV before they are two months old in spite of the adverse prognosis in delays with treatment. Delays beyond the two month period decrease the benefit from treatment. Treatment for the first 12 weeks of the life of a baby that may be infected is necessary to slow any effect (UNICEF-Children and HIV and AIDS, 2009).
- In Southern Africa, adolescent girls are 2 to 4.5 times more likely to be infected than boys of the same age.

2.4 Mortality

The impact of the epidemic on society is illustrated by a decrease in life expectancy and an increase in orphans and child- and female-headed households. Life expectancy in South Africa is now set at 48 years (NDoH, 2008). In Botswana it is 44 years and a third of the work force is living with HIV and AIDS (Reynolds, 2008). **Table 2.4** provides a summary of life expectancy, maternal and under-five mortality for South Africa (World Health Statistics 2006).

Table 2.4. Summary mortality statistics for South Africa for 2004

	Statistic	Males	Females	Both sexes
Life expectancy (years)		47	49	48
Under-five mortality (per 1000)		72	62	67
Maternal mortality (per 100 000 live births)		667	598	-

Source: World Health Statistics, 2006

Child survival rates are being reversed. In South Africa life expectancy has declined to 48 years (NDoH, 2008). Effects of the epidemic are felt in health care systems that struggle to cope and businesses that experience significant losses in skilled and semi-

skilled personnel and managers. The effects are evident in the continual replacement of workers and overall decline in productivity (Dixon et al., 2002).



A common water tap next to a block of toilets in Khayelitsha

SECTION 3: DESCRIPTION OF STUDY AREAS: PROVINCES AND DISTRICTS

In view of our discussion above, the fight against HIV and AIDS cannot be won without careful involvement, planning and management of water, sanitation and hygiene (WSH) sectors. A few studies have looked at this crucial linkage between PLWHA and WSH (IRC 2004; UNDP 2006) and more so segmented by the urban, peri-urban/informal and rural sectors. The study is conducted within identified sites in selected districts drawn from the three provinces of Western Cape, Eastern Cape and Limpopo. A general description of the provinces and selected districts sites in terms of provision of and accessibility to basic services mainly water, sanitation and hygiene sectors are discussed below:

3.1 OVERVIEW OF PROVINCES

Some socio-economic indicators are shown in **Table 3.1** and **Appendix A**. In general, national averages for indicators of some socio-economic determinants of health in South Africa are slowly improving. However, at municipal (sub-district) level there are still huge disparities between areas (Day and Gray, 2008). In summary, in respect of the selected indicators, Eastern Cape and Limpopo have a significantly lower education level than Western Cape. Western Cape and Limpopo have much higher levels of informal housing than Eastern Cape. Access to piped water is best in Western Cape and worst in Eastern Cape. Access to toilet facilities is by far the worst in Eastern Cape. Eastern Cape is also generally much poorer while Western Cape has the least poverty prevalence. The unemployment rate is worst in Eastern Cape and best in Western Cape.

Table 3.1. Provincial socio-economic indicators (*italics* = lowest; **bold** = highest)

	Indicator	W. Cape	E. Cape	Limpopo
Education level (% population 20 years and older with no schooling)				
	2001	5.7	22.8	27.5
	2005	3.4	13.2	17.7
	2006	3.2	12.4	17.9
% households by type of housing				
	2002 informal	15.1	9.4	13.8
	2005 informal	17.3	8.9	14.6
	2006 informal	19.1	7.4	11.4
	2007 informal	14.2	8.0	11.7
% households with access to piped water				
	2001	98.3	62.4	86.7
	2006	98.9	76.4	84.3
	2007	98.9	70.8	91.1
% of households with no toilet				
	2001	7.7	30.8	10.3
	2006	4.8	24.3	8.0
	2007	3.8	23.5	8.0
Poverty prevalence				
	2001 census index	16.7	47.6	37.2
Unemployment rate				
	2002	18.6	28.1	29.8
	2003	20.6	31.8	25.0
	2004	16.9	32.5	25.7
	2005	18.9	29.9	26.9
	2006	15.0	32.0	28.0
	2007	15.7	26.1	22.0

Source: Day and Gray (2008)

3.2 PROVINCIAL WASTE WATER TREATMENT INDICATORS

According to Green Drop report (DWA, 2009) “*Waste water is the first barrier in a multi-barrier system of ensuring safe drinking water quality*”. The Green Drop certification process examined the country’s waste water treatment works on a risk basis. **Table 3.2** compares various indicators for the three provinces.

Table 3.2: Provincial Green Drop indicators

	Indicator	W. Cape	E. Cape	Limpopo
	% Water Services Authorities assessed	69	<i>26</i>	31
	Average Green Drop score (%)	47	29	<i>18</i>
	% of assessed waste water systems with ≥50% score	56	69	<i>0</i>

Source: DWA, 2009

While Western Cape had the highest Green Drop score, there still remains considerable scope for improvement. Eastern Cape and Limpopo averages were very low, with Limpopo the worst. The conclusion must follow that this “first barrier” to ensuring safe water

is a significant challenge and undoubtedly impacts negatively not only the general population but particularly those made more vulnerable by HIV and AIDS.

3.3 PROVINCIAL DRINKING WATER QUALITY INDICATORS

The Blue Drop certification process examined the country's drinking water quality. **Table 3.3** shows the outcomes for the three provinces. Western Cape showed good management performance while Limpopo showed the lowest performance comparatively.

Table 3.3: Provincial Blue Drop indicators

Indicator	W. Cape	E. Cape	Limpopo
% Water Services Authorities assessed	97	100	100
Blue Drop score (%)	92	79	55

Source: DWA, 2010

3.4 DISTRICT COMPARISONS

The focal study area in the Western Cape was Khayelitsha which falls within the City of Cape Town Metropolitan Municipality. The focal area in Limpopo Province was Groblersdal which falls with the Greater Sekhukhune District Municipality. The third study area occurred in the Ukhahlamba District Municipality in Eastern Cape. Some comparative statistics are shown in **Table 3.4** (StatsSA, 2007; Day and Gray, 2008, DWA, 2009; DWA, 2010).

Table 3.4. Selected comparative statistics at district level (*italics* = lowest; bold = highest)

	City of Cape Town Metropolitan Municipality (Western Cape)	Ukhahlamba District Municipality (Eastern Cape)	Greater Sekhukhune District Municipality (Limpopo)
Area (km ²)	<i>2 488</i>	25 402	13 353
Population (2007)	3 497 097	<i>308 365</i>	1 090 424
Average household size (2007)	<i>3.7</i>	4.0	5.0
% houses with more 5+ members (2007)	<i>28.7</i>	36.2	50.2
% living in informal dwellings (2007)	15.6	<i>5.3</i>	6.6
% households with piped water with access point outside yard (2007)	<i>8.4</i>	33.2	42.0
% households with no toilet (2007)	<i>3.5</i>	24.4	6.8
Average Green Drop score (%) (2009)	82	<i>3</i>	No data*
Municipal Blue Drop score (%) 2010	98	55.0	<i>49.5</i>

* The Greater Sekhukhune District Municipality failed, or was unable to provide the Department with the required information.

In summary, the Greater Sekhukhune District has the highest average household size and the highest percentage of households with access to piped water outside the yard. The City of Cape Town has the lowest (best) values. However, it has the highest percentage

of people living in informal dwellings. The Ukhahlamba District has the highest percentage of households with no toilet. In respect of waste water treatment works, overall management performance in that District it is also very poor. In Cape Town it is very good. Cape Town also showed excellent management performance in respect of drinking water quality (and was awarded Blue Drop status) while the Ukhahlamba District and Greater Sekhukhune District showed considerably poorer performance.

3.5 District Health Provision Comparison

Khayelitsha has the second highest prevalence of HIV and AIDS of any Cape Town health district (City of Cape Town, 2006a). Khayelitsha also has the highest HIV and AIDS-related age-standardised mortality rate of all the Cape Town sub-districts (City of Cape Town, 2006b). HIV and AIDS is also accompanied by very high tuberculosis mortality. On the other hand, a marked decrease was observed in infant mortality rates (all causes) in Khayelitsha where it declined from 4.2% in 2003 to 3.2% in 2006 (City of Cape Town, 2006b). Nevertheless, generally Khayelitsha stands out as having the highest rates of premature mortality.

Provision of primary health care is available at three clinics in Khayelitsha and ten more in the City of Cape Town. There are no hospitals in Khayelitsha. There are ten locations where people can be tested for tuberculosis. This is also a number of antiretroviral and condom distribution points. Free testing for HIV infection is available.

The Ukhahlamba District Municipality noted a continuous decrease in population growth rate from 1996 to 2007 (Ukhahlamba District Municipality, 2009). Two possible reasons were given for this: First, individuals may have moved out of the area in search of work or educational opportunities. Secondly, they also acknowledged that there may have been increased deaths due to HIV and AIDS.

Estimates of the population infected with HIV and AIDS vary from 9.6% to 29.9%. The low estimates are thought not to be a true reflection of the actual infection rate given the tendency of individuals not to disclose their HIV status. Furthermore many people, particularly those in rural areas, may not be aware of their status (Ukhahlamba District Municipality, 2009).

In 2007, AIDS accounted for 38.9% of total deaths. High mortality rates in the Ukhahlamba District Municipality result largely from poverty particularly in terms of the inability of poor people to access life-saving drugs, the prevalence communicable diseases such as TB amongst the poor and the unsuitable environment that poor people are forced to live (Ukhahlamba District Municipality, 2009).

Access to health facilities within the Greater Sekhukhune district municipality is fairly poor. On average, there is one clinic for every 17 000 people within the district and approximately 97 500 people per hospital. There are eight hospitals, 43 clinics and eight mobile clinic stops. HIV and AIDS is the largest single cause of death in the node, accounting for 24% of all deaths in 2000 (GSDM, 2008). Clinics and hospital are evenly distributed throughout the District, but the accessibility of these to the residents remains a challenge. Rural areas remain the most disadvantaged in terms of access to hospitals.

In 2000 HIV prevalence in the 15-19 year age group was 7.7% and in the 20- 24 age group 17.6% and in the 25-29 age group 18.4%. There has been an increase in the prevalence of HIV and AIDS between 1999 and 2000. This is particularly true for the potentially economically active age groups under the age of 40. The situation was better for those above the age of 40. However, with the HIV and AIDS Awareness and Prevention campaigns that have gained ground in the last few years, the scenario could have changed since that study was conducted.

3.6 District Water and Sanitation Provision Comparison

The 2001 census provided the following statistics for Khayelitsha (City of Cape Town, 2001): About 62% dwellings had access to piped water either inside the dwelling or yard. About 21% had access to piped water on a community stand within 200 m of the dwelling and about 16% further than 200 m. About 1% used other sources.

63% of dwellings had a flush toilet connected to a sewage system and about 2% a flush toilet with a septic tank. About 9% had other sanitation facilities and some 26% had no sanitation.

The district covers a huge mountainous area making it almost impossible to provide treated water to communities in remote areas. Education, employment and access to basic services are further undermined by the vast distances people have to travel. A large number of households rely entirely on government grants and pensions.

Although water and sanitation services have been extended to a significant number of households in the district, the more populous eastern section of the district (Elundini) still struggles with significant backlogs. The main source of water for the majority of the population is raw water from natural sources such as rivers, springs, streams and dams. The extraction points for this water in most cases are not properly protected and as a result are shared with livestock. Currently the district has 148 274 people without water supply (36 309 households) with no access to potable clean water (Ukhahlamba District Municipality, 2009).

Other than Maletswai, all local municipalities in Ukhahlamba fall below the provincial average of households not having access to any formal sanitation facilities. The infrastructure distinction between rural and urban areas is marked. This is particularly true with regard to sanitation, where the bucket system has been eliminated in urban areas but still prevails in rural parts of Ukhahlamba. Over 40% of households have no form of sanitation and only 11.8% of households have access to waterborne sewerage (Ukhahlamba District Municipality, 2009).

The greatest challenge to the District is its water and electricity infrastructure. The electricity and water infrastructure in the district is in need of upgrading and extension to provide not only for residents in the area, but also for future development (Ukhahlamba District Municipality, 2009).

In Groblersdal, the apparently dire situation in respect of waste water treatment works is evident in **Table 3.2**. A study currently being undertaken by the CSIR to determine the quality of the upper Olifants River, the Loskop dam and tributaries entering the Olifants River, has shown gross microbial contamination, most likely due to untreated, or poorly treated, sewage, (Oberholster, PJ et al., 2010). The organisms have also developed a very high level of resistance to a wide range of antibiotics. Therefore, the water treatment works have to deal with intake water of very poor quality. People using water directly from these water resources face significant health risks.

The district municipality has a total number of 217,171 households. 51% of the households have water supplied to Reconstruction and Development Programme (RDP) standard and 2% of Sekhukhune households are receiving above RDP standard sanitation services (GSDM, 2008). Two thirds of the schools do not have RDP standard access to water, and only 47% of the schools have access to sanitation above RDP levels. The Municipality has noted high backlogs in water and sanitation provision and inadequate financial resources to address them (GSDM, 2008). However, the District municipality has developed a comprehensive water quality monitoring system to continuously assess the quality of water.

In sum, the fact that HIV and AIDS is the largest cause of death in each district is the single most powerful reminder of the degree of seriousness of the situation. The informal nature of the many settlements comprising Khayelitsha poses challenging problems for the City of Cape Town in respect of provision of water and sanitation. Water provision in the Greater Sekhukhune District is challenged by significant pollution of local water. Notwithstanding this, there has been a significant increase in the number of houses with access to clean water. In the Ukhahlamba District, the majority of the population relies on water from natural sources, many of which are not protected from pollution from livestock.

Provision of sanitation is complicated by the informal nature of Khayelitsha. Significant sanitation backlogs exist in the Greater Sekhukhune District. Over 40% of households in the Ukhahlamba District have no form of sanitation.



A common water tap in Khayelitsha, Cape Town

SECTION 4: MUNICIPAL AND HOUSEHOLD SURVEYS

The impact of HIV and AIDS is felt at every level of society — in families, communities and workplaces — and is imposing huge costs on all sectors of the economy. In this section we present the results as follows: **first** we present our results based on water service provider (WSP) survey with central aim being to highlight broadly the impact of HIV and AIDS at municipal workplaces with specific focus on water and sanitation sectors. Our overall objective is to assess the extent to which HIV and AIDS is constraining service delivery within municipalities. Our discussion is based in part on a questionnaire distributed to municipal water and sanitation managers, human resource and environmental health managers within surveyed districts of Groblersdal, Khayelitsha and Ukhahlamba. However because of low response to our questionnaire, we also dwell on literature to highlight some of the perceived impact of HIV and AIDS at municipal workplaces. We conclude by highlighting key challenges affecting municipalities in their bid and quest to supply efficient water and sanitation service delivery.

The **second** part presents the results based on health-related surveys administered over 200 HIV and AIDS households drawn from Khayelitsha and Groblersdal districts. It must be noted that the information collected during the household health-related survey was obtained independently from the household economics-related survey and that some overlap in the questionnaires is evident. Neither the selected population nor the time it was collected was the same as the household economic-related survey and naturally some differences in data of similar kind have occurred.

The **third** part presents results based on economics-related surveys administered over 485 HIV and AIDS households sampled from three selected districts of Khayelitsha, Ukhahlamba and Groblersdal. The questionnaire was administered by a team of trained home-based caregiver drawn from each study site. Sample of the questionnaire is attached in Appendix C.

4.1. Water Service Provider Results

4.1.1 National Legislation of HIV and AIDS at Municipal Workplaces

Four major pieces of legislations relating to HIV and AIDS and workplaces in general across South Africa have been promulgated since 1995. As shown in **Table 4.1**, the first was the Labour Relations Act of 1995 which prohibited the dismissal of any employee on basis of his/her HIV and AIDS status. The second piece of legislation was Employment Equity Act of 1998 which prohibited mandatory HIV and AIDS testing and/or denial of promotion because employee's HIV status. The third legislation is the Medical Schemes Act of 1998 which prevents medical schemes from offering differential benefits based on employee's HIV status. The fourth legislation is the Prescribed Minimum Benefit Amendment Act of 2005 which requires all medical aids benefits be made available to HIV employee.

Table 4.1: National Legislation relating to HIV and AIDS at Workplace in South Africa

Legislation	Protection or rights related to HIV and AIDS
Labour Relations Act 1995	Prohibits automatic dismissal as a result of HIV status. Requires reasonable accommodation for disability caused by HIV and AIDS-associated illness
Employment Equity Act 1998	Prohibits mandatory HIV testing, refusal to promote as a result of HIV status, and the limitation of benefits for HIV-positive employees
Medical Schemes Act 1998	Prohibits medical schemes from offering differential benefits based on HIV status
Prescribed Minimum Benefit Amendment 2005	All medical aid scheme benefits must include HIV testing, care and treatment including antiretroviral therapy

Source: Mohajan et al. (2007)

Across the surveyed district municipalities, all sampled human resource managers indicated high level of awareness of these pieces of legislations and implications. In addition all the surveyed human resource managers were able to show us their own ‘home-grown’ HIV and AIDS policy documents pertaining to respective municipalities. In **Table 4.2** we illustrate, using Mahajan et al. (2007) study, common achievements and challenges to the implementation of HIV and AIDS policies at municipal workplaces in South Africa. Most of government statutory policies that relate to HIV and AIDS at workplaces are well reflected in municipal-specific HIV and AIDS policy documents. However we note a number of challenges across the sampled municipalities: first, there seems to be poor monitoring of legal violations at municipal workplace; second, there seems to be persistent fear of discrimination and stigma at workplaces resulting in poor uptake of HIV testing; third, concern about confidentiality is another issue contributing to low uptake of ART at workplaces ; fourth, high insurance premiums have discouraged many HIV-positive workers (especially low skilled) from accessing medical-aid schemes.

Table 4.2: Common achievements and Challenges to implementation of HIV and AIDS at Municipal Workplaces

Government policy statutory	Achievement	Challenges
a) National legislation and labour policy	-Legal measures have been put in place to guarantee basic rights at municipal workplaces and safeguard against discrimination based on HIV status	-Poor recognition and monitoring of legal violations at municipal workplace -Inadequate access to legal service for aggrieved workers
b) Workplace HIV and AIDS Policy summary	-increasing prevalence of HIV and AIDS policies among many municipalities -widespread management awareness of legally binding provisions at workplaces	-non-uniform HIV and AIDS policy programs across municipal districts -This means wide varying provisions, benefits and interpretation
c) Workplace HIV and AIDS prevention programs	-high prevalence of HIV awareness and education programs and growing provision of VCT -widespread peer education at workplaces, e.g. creation of Wellness Centres	-lack of monitoring and evaluation of HIV prevention programs at workplace -persistent fear of discrimination and stigma in workplace resulting in poor uptake of HIV testing
d) Workplace HIV and AIDS treatment programs	-promoting provision of ART at workplaces	-low uptake of ART at workplaces because of low VCT -Concern about confidentiality -low access to medical-aid schemes for most low-skilled workers because of high costs premiums

Source: adapted from Mahajan et al. (2007)

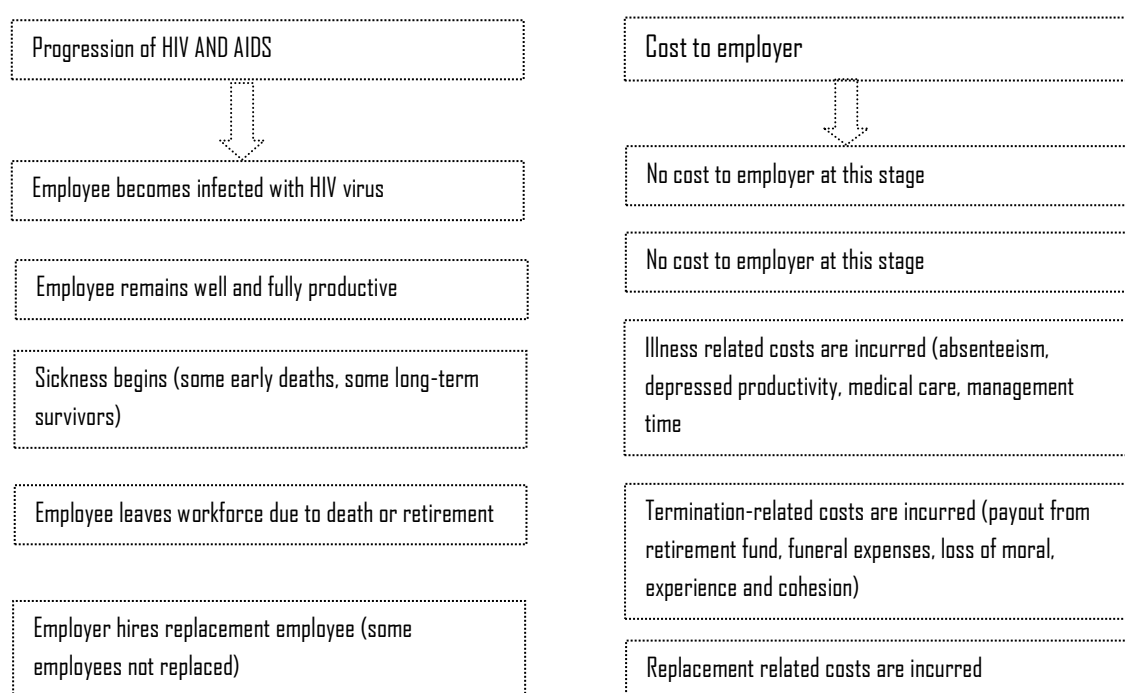
4.1.2 Assessing costs of HIV and AIDS at Municipal Workplaces

As discussed earlier, HIV and AIDS is such a unique disease killing mostly the young and middle-aged adults (18-49 years old) who constitute the bulk of the most productive workforce in South Africa. Hence, HIV and AIDS is robbing the nation of its most productive workforce especially the scarce skilled labour force. Further, because of its negative impact on labour supply and disposable incomes, HIV and AIDS reduces aggregate savings, investment and consumer spending. Some studies predict that HIV and AIDS can decrease GDP by 2.5-5% per year as a result of the epidemic (IFC, 2002).

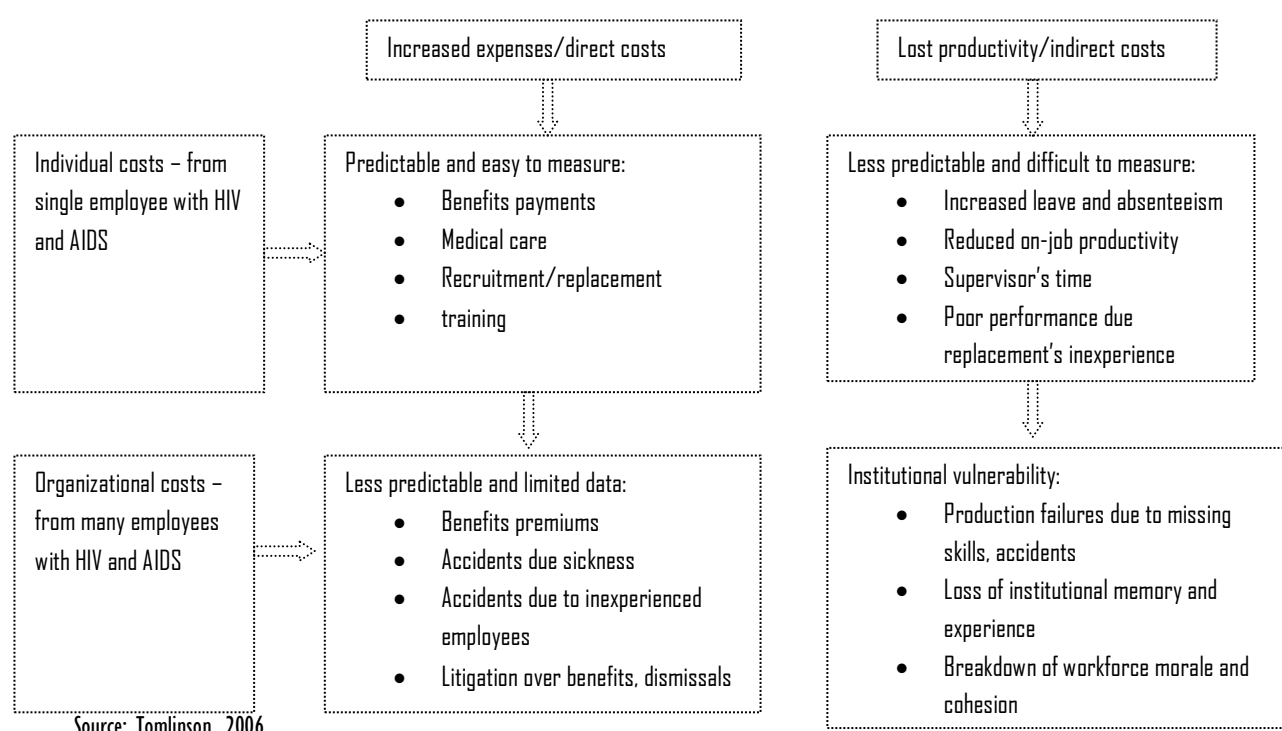
The impact of HIV and AIDS is more pronounced at sectoral level, as one sector may be more disproportionately affected than other sectors comparatively (e.g. farm workers and agricultural sector). Direct consequences of HIV and AIDS include increased expenditures on medical and health insurance costs, funeral costs and death benefits, as well as recruitment and training needs due to lost personnel.

In **Table 4.3** we demonstrate rather qualitatively the progression of HIV and AIDS and associated costs say within a typical firm or municipal department. At the initial stage when an employee becomes infected with HIV virus, he/she remains physically well and fully productive and no costs incurred by the employer. But as the disease progresses, the employee becomes increasingly bed-ridden, sick and debilitated. In turn, costs to the employee increase due to higher absenteeism, depressed productivity, medical care, etc. Eventually the employee leaves workforce due to either death or early retirement (on medical grounds) and the firm has to incur termination-related costs which include retirement or pension funds, funeral, replacement and training expenses. In **Table 4.4** we further illustrate the costs by distinguishing between direct versus indirect, predictable versus less predictable, costs. But what is important to emphasize is the issue of institutional vulnerability which arises as the firm experiences production failures due to missing skills, accidents, loss of institutional memory and breakdown of workforce morale and cohesion.

Table 4.3 Progression of HIV and AIDS and Costs



Source: Tomlinson, 2006

Table 4.4: Direct and Indirect costs arising from HIV and AIDS

4.1.3 HIV and AIDS prevalence within Water and Sanitation Sectors

In general, Municipalities have scored commendable progress in terms of raising awareness, offering voluntary counselling and education, providing ART and other numerous forms of support to HIV and AIDS-infected employees at workplaces. In big municipalities like the city of Cape Town, they have created Wellness Centres so as provide on-job care, counselling and psycho-social support for HIV and AIDS employees. But despite seemingly wide array of support, persistent fear of discrimination and stigma at workplaces have discourage uptake of HIV and AIDS testing. Currently very low proportion of municipal employees (<1%) participate in these wellness activities and as a result the prevalence rate of HIV and AIDS at workplaces within municipalities remains unknown. This makes it difficult for the government to plan and strategize especially as the HIV and AIDS pandemic intensifies. In this section, we use insights drawn from questionnaire and discussion with human resource managers to provide a 'rough assessment' of HIV and AIDS prevalence at municipal workplaces specifically targeting water and sanitation sectors as shown in **Table 4.4**. Estimates indicate HIV and AIDS prevalence rates within water and sanitation sectors ranging between 1.5-10% and slightly lower compared to the manufacturing sector. Across all sectors, semi-skilled labour force is the worst affected. Below we make a number of important observations:

○ Illusion of size:

With respect to large municipalities, the impact of HIV and AIDS within WSH sectors tends to be minimal (at least in the short-run) due to the 'illusion of size'. In this case, it does not make much of difference if a few employees are affected by HIV and AIDS pandemic as the municipality has the capacity to absorb shocks resulting from losses in skilled labour due to HIV and AIDS-related illness or death. Under such circumstances, the marginal impact on labour productivity due to loss of skilled labour force within WSH sectors in large municipalities will be very minimal. But as the situation persists in the long-run, large municipalities will gradually feel the impact of the loss resulting in higher replacement, recruiting and training costs.

In contrast, for smaller municipalities loss even of single skilled personnel within WSH sectors can severely disrupt the operations of the entire district. For instance, within municipalities of Ukhahlamba and Greater Sekhukhune districts we observed that water and sanitation works are mostly handled by semi-skilled personnel due to critical shortage of skilled staff,

- **Inability to deliver is severe in small municipalities**

The ability or inability to deliver efficient WSH services depends directly on pool of skilled labour available within municipalities (engineers, artisans, plumbers, etc.). Most of small municipalities are working with depleted labour force within WSH for a number of reasons: first, many municipalities continue to face critical shortage of skilled manpower; second, most small municipalities have failed to provide attractive incentives to lure skilled manpower work in remote rural areas; third, because of severe budget constraint, many small municipalities cannot afford meet replacement and training costs necessitated by loss of skilled labour force either due to prolonged illness or death; fourth, poor and/or unfavourable working conditions have discouraged skilled labour force to work in rural municipalities. In sum, workforce available in WSH sectors within smaller municipalities may be so overburdened and/or overworked to discharge their functions in the most efficient manner. These sentiments were also expressed by human resource managers we interviewed who stressed that HIV and AIDS is a 'silent catastrophe' wrecking havoc particularly in small rural municipalities hampering efforts to deliver on water and sanitation services.

- **Sanitation sector worst affected**

Most human resource managers pointed to sanitation as relatively the worst affected sector. In Table 4.5 estimated prevalence rates are higher within sanitation sector for both semi-skilled (9.5%) and skilled (6.5%) workers compared to water. A similar trend is observed within the manufacturing sector where highest prevalence rate of 11.7% is recorded among semi-skilled workers. In some rural municipalities (e.g. Gariiep municipality in Eastern Cape) the shortage of skilled labour force is so severe that sanitation works are handled non-skilled personnel.

- **Absence of medical aid**

Across many municipalities medical aid is voluntary. Most human resource managers interviewed indicated that very few employees can afford it even though it is subsidised. This makes it difficult for the affected employees to seek private medical assistance.

- **Wide difference in counselling services**

In large municipalities there are well established counselling services that cater for HIV and AIDS employees. Counselling services aims to promote on-job-care, moral and psycho-social support to the infected employees. But counselling services offered to infected employees tend differ a lot across municipalities. In the CCT for example a Wellness Centre with a well defined structure and functions has been established as referral point for counselling of HIV and AIDS employees. But due to stigma, not many HIV and AIDS employees are making use of the counselling services and benefits. In contrast, there are no well established counselling services in smaller municipalities but rather an appointed individual may act as 'support point'. Often times HIV and AIDS sufferers are often referred to private counsellors.

Table 4.5: HIV and AIDS prevalence and replacement cost within WSH sectors

	HIV and AIDS Prevalence			Cost of replacement (per unit)
	Manufacturing firms*	Water sector	Sanitation sector	
Semi-skilled	11.7%	7.5%	9.5%	R70,400
Skilled	7.4%	5.5%	6.5%	R190,900
Supervisors	--	-	-	-
Managers	3.7%	1.5%	1.5%	-

Source: Tomlinson and Authors' calculation

4.1.4 Estimated losses within Municipal Workplaces

As HIV and AIDS takes its toll on skilled, semi-skilled and unskilled labour force, municipalities incur heavy losses in the process. Three types of losses are identified which include skilled/semi-skilled workforce loss, production loss and loss due to vandalism. Below we highlight the costs associated with these losses.

○ Cost of skilled/semi-skilled labour losses

In order to estimate the replacement cost for skilled and semi-skilled labour following either early retirement or death due to HIV and AIDS, we use estimates provided by Booysen and Molelekoa (2001). Booysen and Molelekoa (2001) estimated that the average cost per AIDS death for semi-skilled and skilled labourer is R70,400 and R190,900 respectively (Table 4.5). Using a total labour force of 4,500 employed in large municipality like city of Cape Town, it can be roughly estimated that HIV and AIDS is costing WSH sectors between on average R4.8 million and R14.9 million losses in semi-skilled and skilled labour force respectively per year due to either death or early retirement. Though difficult to determine, most municipalities reported that they experience high costs for replacing skilled and highly skilled labour.

○ Cost of production loss

As HIV positive employee becomes increasingly sick and less economically active, absenteeism and productivity loss increase. In turn this leads to the general failure and inefficiency in service delivery especially water and sanitation services. According to human resource managers, each HIV and AIDS municipal worker (as well as any other employee) is entitled to 30 annual sick leave days. But as reported by some municipal human resource managers, 30 days sick leave period is often not enough for the HIV and AIDS employee as he/she may need more time seeking medical treatment and recuperation. In some cases municipalities (e.g. Maletswai, Ukhahlamba) provide additional 15 grace sick leave days to their HIV and AIDS employees so as accommodate their need for prolonged absence from work. Added together each HIV and AIDS employee may require on average 45 sick leave days per annum. Within a typical municipality, this means it takes only 8 HIV and AIDS workers to exhaust 360 working days ($\approx$ year) as sick leave days. Overly this translates into huge production losses when aggregated across districts and provinces.

○ Cost of Vandalism

Vandalism is typically rife in informal settlements and imposes huge and often unplanned cost on maintenance of water and sanitation infrastructure by municipalities. For example in Khayelitsha, every R1.00 invested in water and sanitation, 10-20% goes to repairs and replacements due to vandalism. For instance, considering the budget planned for water and sanitation expansion during the 2010/2011 financial year of R19.6 billion by the city of Cape Town, it follows (holding other things equal) that approximately

R1.8 billion will be expended on repairs and replacements due to vandalism. If aggregated across the entire country, this will convert into billions worth of infrastructure lost due to vandalism.

4.1.5 Challenges facing Municipal Water and Sanitation Sectors

From our surveys results coupled with series of discussion and interaction with water and sanitation managers, human resource managers, environmental health experts and other local authority, we identify six major impediments undermining service delivery of many municipalities.

- **Lack of capacity in water and sanitation sectors**

One of the major factors affecting WSH sectors within municipalities is the lack of capacity. As discussed earlier, many municipalities indicate the general lack of technically skilled and experienced staff within water and sanitation sectors as the main factor hampering service delivery. A number of reasons are noted and key amongst them include; the scourge of HIV and AIDS, emigration of skilled labour to developed countries, general shortage of skilled labour force in the country, poor and unattractive working conditions within municipalities. This perhaps is contributing to widespread poor performance in service delivery across many municipalities. In some cases due to serious lack of operation and maintenance of water services infrastructure, this has contributed to the contamination of potable water supplies resulting in adverse effect on public health. The death of 200 babies experienced in Ukhahlamba (2006/07) is a case in point.

- **Influx of migrants into urban areas**

The UN-Habitat (2008) predicted that by 2015, a majority of population in developing countries particularly Africa would be living in and around major cities in search for employment and better livelihoods. Most of these 'new urbanites' would be poor, jobless with a majority living in slum/informal settlements. This predicted trend is particularly true for South Africa where most of the major cities are characterized by multitude of informal settlements. The situation is worsened by high influx of illegal immigrants from neighbouring countries especially Zimbabwe. This is creating headaches especially for city authorities: first, informal settlements grow haphazardly including the invasion of preserved land often not even suitable for human settlement, e.g. flood-prone areas. Provision of water and sanitation in such areas becomes a difficult task. At present, a significant proportion of households in slum settlements have no toilets and resort to using bushes or open spaces; second, often toilets are placed some distance from household dwelling unit and this creates safety problems at night, especially for women; third, with a high influx of migrants moving into cities each year, it becomes very difficult for municipalities as WSP to plan, manage and budget for water and sanitation provision in slum settlements. Overly there is a need for national guidelines on the provision of water and sanitation in the informal settlements and backyards.

- **Rapid economic and population growth add stress to water demand**

With a rapid expansion of economy the demand for water will grow. In addition, the future demand for water will be further stretched due to population growth in cities. While new infrastructure for water will be necessary, water resources are limited and hence key to sustenance of water resources is effective water conservation and water demand management strategies. In our discussion with water managers, many expressed concern with unacceptable high levels of water losses, wastages and inefficient use. Water wastages in particular are high in informal settlements where there tend to be less monitoring and enforcement of council by-laws. Effective institutional and community-based management arrangements are necessary to ensure reliability and continuity of supply. Failures in the water sector could have costly consequences for the economy and on efforts to eradicate poverty. The

challenge to the water sector is therefore to ensure that future supply can continue to meet the growing demand for water in urban regions.

- **Underinvestment in water and sanitation services infrastructure**

Most water and sanitation managers interviewed indicated gross underinvestment in water and sanitation infrastructure. In general there is inadequate investment in the rehabilitation, replacement and maintenance of water services infrastructure across water services providers in South Africa (CCT report, 2009/10). As a result the condition of assets has deteriorated and unless remedial measures are put place, this poses great danger to the future sustainability of water services infrastructure.

For instance, CCT and Ukhahlamba district, each sets the target level for investment in water and sanitation infrastructure to an average 0.75% of respective GDP per annum. Unfortunately what has been observed is that capital expenditure in water and sanitation has fallen far below set target. For CCT for example, in 2006/07, water and sanitation capital expenditure amounted to R326.5 million — which converts to 0.16% of GDP — and significantly below target. Funds from the national government — e.g. Municipal Infrastructure and Equitable Share Grant — have fallen far short.

Across many municipalities the existing infrastructure, particularly the sewer system, is severely worn out due to several years of under-provision of essential maintenance and replacement of aging infrastructure. But replacement cost can be prohibitively high. The CCT report (2009/10) predicts that, within the city metropole, the replacement cost of water and wastewater pipe network to be about R19.5 billion. If these costs are extrapolated to other major cities and districts throughout the country, this translates into huge replacement cost requirements.

- **Eradication of backlogs in water and sanitation**

While many districts have scored commendable progress in water and sanitation provision since the end of apartheid, many still face great challenges in eradicating water and sanitation backlogs. In addition, eradicating the bucket system is also another challenge facing municipalities. In Ukhahlamba for example, about 9.5% and 47.5% of households are without water and sanitation (UkDM report, 2008/09). According to the CCT (2008/09) this problem arises primarily from two factors: the inadequacy of the funds made available to water services authorities to eradicate the backlog, and constraints experienced by water services authorities and providers (such as capacity constraints) which result in the available funds not being fully or effectively spent.

- **Cost recovery and sustainability of services**

All municipalities are operating on huge debts primarily due to non-payment and cost recovery problems associated with water and sanitation provision. This makes sustainability of water and sanitation service delivery difficult within both short and long run. Government subsidies only provide a temporal solution. Cost recovery measures must be centred on the 'consumer pays principle'. Thus emphasis must be to educate consumers and raise awareness about the need to pay for water and sanitation services especially in urban areas as this will provide a solution to high financial requirements and debt recovery. In actual fact a majority of households expressed willingness to pay for water and sanitation

4.2 Household Health-related Results

The health survey was aimed at gaining information on general demographics of the households to get an indication of the split of responsibilities between genders in respect of water related tasks, for example fetching water and payment for water. The availability

and volume of water provided to households where people with HIV and AIDS resided was also investigated. Furthermore, information on their source of drinking water was collected to determine the source type and the amount of effort of residents to collect water for use in their homes. The available volumes for drinking and cleaning and the microbial quality were also investigated. Because the focus of this part of the project was the HIV and AIDS infected persons and how water and sanitation effects their lives, illnesses associated with poor water quality and subsequently unwanted infections were determined. One example is coughing which is associated with tuberculosis but is also closely associated with diarrhoea and pneumonia in malnourished children in particular in cases where a zinc deficiency is apparent (WHO/UNICEF, 2004, Bhandari et al., 2008). Zinc supplementation can prevent diarrhoea and pneumonia through several mechanisms, notably through its ability to restore immunity in children who have zinc deficiency (Penne and Lanata 1995; Roy et al., 1997). Some cost issues pertaining to treatment were also addressed. Waste handling and removal were also investigated because it gives some indication of disease causing exposures and in addition it was an indication of the level of services related to water and sanitation provision. Waste removal is of particularly importance in respect of medical waste generated by households treating HIV and AIDS patients.

The results obtained for the two areas were statistically compared to determine if any significant difference between the two areas existed.

4.2.1 Household demographics

The data are summarised in Table 4.6 to Table 4.9. Rows in bold indicate a significant difference between the two areas at the 95% confidence level ($P < 0.05$).

Table 4.6: Summary demographic data for Khayelitsha and Groblersdal

	Khayelitsha	Groblersdal	P
No. of households interviewed	106	121	
Household head female	79.4%	55.1%	<0/001
Household head male	20.6%	43.6%	<0/001
No. of females in household	2.5	2.8	0.13
No. of males in household	2.2	2.6	0.11
Average age in household	27.9	28.1	0.84
Married	20.0%	47.5%	<0/001
Living with partner	7.0%	4.2%	0.53

In both Khayelitsha and Groblersdal the majority of households were female headed. The number of households that were female headed in Khayelitsha was higher than in Groblersdal. The indication is that females were mostly responsible water related chores such as collecting water, cleaning, bathing patients and babies and females had to deal with water interruptions and treatment of the water when the microbial quality was suspect. The average age of household residents were 27.9 and 28.1 for Khayelitsha and Groblersdal, respectively confirming that the residents fell within the economically active group. Only 20.0% married couples were recorded in Khayelitsha and 47.5% in Groblersdal. These numbers confirmed the fact that there are many female headed households who had no support from a spouse with regard to household tasks or income (Table 4.6).

4.2.2 Water, Sanitation and Hygiene comparison

Table 4.7 shows that residents in Khayelitsha had a greater need of water provision with respect to taps in-house. They were dependent on stand pipes that were shared with many other residents. In Groblersdal many more people had access to water in their homes and subsequently the number of people sharing a standpipe was much lower. Sanitation measured by toilet availability in both areas seemed acceptable however communal toilets in Khayelitsha, which consisted of flush toilets that were operated by filling the cistern with a bucket of water from a nearby standpipe, were inadequate in terms of hygiene, sustained use because of vandalism and general neglect. Toilets in yards were mostly pit toilets which were shared with neighbours in some cases. In general, hygiene awareness measured by asking about hand washing seemed to be of a reasonable level (Table 4.7). Waste collection was reported by 33% of the households in Khayelitsha and 4.1% in Groblersdal. The inadequate provision of this service leads to burying of wastes and burning of wastes and just throwing wastes outside one's yard (Table 4.7). This is particularly worrying in light of medical wastes, although not in huge amounts, that were generated by the households (Table 4.8). The costs for medicines and visits to the clinic were minimal in Khayelitsha but quite substantial in Groblersdal (Table 4.8).

Table 4.7: Summary of water, sanitation and hygiene data for Khayelitsha and Groblersdal

	Khayelitsha	Groblersdal	P
Tap in house	42.5%	80.1%	<0/001
Communal tap	56.6%	23.1%	<0/001
Average no. of days/month interrupted	<7	<6	
Share tap with how many people?	216.4	22.2	0.011
Percentage of households sharing toilet	19.8%	17.4%	0.77
Toilet available	90.6%	99.2%	0.007
Pit toilet	0.0%	92.6%	<0/001
Flush toilet	48.1%	3.3%	<0/001
Communal toilet	34.9%	0.0%	<0/001
Toilet in own yard?	48.1%	91.7%	<0/001
Hand washing before preparing meal	87.9%	84.0%	0.52
Hand washing before eating	95.7%	84.7%	0.012
Hand washing after changing nappies	72.4%	48.1%	<0/001
Bury waste	26.4%	8.3%	<0/001
Burn	5.7%	60.3%	<0/001
Collected	33.0%	4.1%	<0/001

Table 4.8: Summary of cost and general waste data for Khayelitsha and Groblersdal

	Khayelitsha	Groblersdal	P
Percentage of households that pay for water	11.3%	16.5%	0.35
Monthly costs for medicine	R 0.00	R 172.24	0.002
Monthly costs for clinic visit	R 1.37	R 54.13	0.004
General waste (no. of black bags/week)	<1	1	
Medical waste (no. of black bags/week)	<1	<1	

The general health of residents of the two areas was determined in terms of ailments that are closely related to opportunistic infections in HIV and AIDS infected people. These ailments are also related to malnutrition and inadequate water and sanitation

provision. Coughing and diarrhoea recorded in Khayelitsha were more prevalent in the households than in Groblersdal, $P=0.016$ and $P<0.001$, respectively (Table 5.4).

Table 4.9: Summary of ailment data for Khayelitsha and Groblersdal

	Khayelitsha	Groblersdal	P
Tuberculosis	30.1%	21.5%	0.18
Coughing	63.2%	46.3%	0.016
Diarrhoea	40.1%	18.2%	<0.001

4.2.3 Water quality assessment

Table 4.10 shows the water quality measured using the indicator *E. coli*. A total of 91, and 117 water samples were collected from storage containers in the households in Khayelitsha and Groblersdal, respectively. Only 13 of the 91 samples from Khayelitsha did not comply with the WHO guidelines. More than half of the water samples analysed from Groblersdal did not comply with the WHO guidelines. Very few samples could be collected from Ukhahlamba. These samples consisted of spring water of which not any of the samples analysed complied with the WHO guidelines for drinking water.

Table 4.10 *E. coli* counts/100 ml of water used in the households

	Khayelitsha	Ukhahlamba	Groblersdal
	Stored in house	Stored in house	Spring
No. of samples	91	13	2
No. exceeding WHO guideline ¹	13	1	2
% exceeding WHO guideline	14%	8%	100%
Minimum counts/100 ml	0	0	>200.5 ²
Maximum counts/100 ml	51	>200.5	>200.5

¹ World Health Organization, 2004. *E. coli* guideline for drinking water = 0 counts/100 ml

² 200.5 is the highest concentration that can be measured in an undiluted sample with the chosen method (Colilert)

Table 4.7 above suggests that in Groblersdal, compared with Khayelitsha, safe water is more readily available (“in yard”), taps are shared with far fewer people, and there are more toilets in yards. There is also significantly less coughing and diarrhoea in Groblersdal (Table 4.9). There is also less tuberculosis (but this is not significant at the 95% level). The better access to safe water and sanitation in Groblersdal is likely to be playing an important part in this. In respect of water quality (Table 4.10), the percentage of samples from water stored in the households that were unsafe to drink varied from 14% in Khayelitsha to 56% in Groblersdal.

4.2.4 Statistical correlation analysis

Statistical analyses were performed on some of the above results to establish whether or not certain factors were correlated or associated with changes in disease prevalence. Table 4.11 gives a narrative description of the individual results. More results are shown in Appendices D and E.

It should be pointed out that, strictly, statistical analyses such as those presented here simply indicate when the changes in one variable are correlated with, or are associated with, changes in another. The analyses do not confirm there is an actual cause-and-effect relationship between the two variables or that the factor is somehow involved in the actual mechanism causing the change in

the second variable. In other words, if a statistically significant correlation exists between factor A and an increase in people with ailment B, this does not mean that factor A is definitely involved in any real mechanism relating to ailment B.

Another way of looking at this, if factor A is actually involved in the mechanism causing ailment B, then the current statistical analysis strictly only provides circumstantial evidence for this (i.e. not proof of the mechanism, but just what you would expect if that mechanism was operating).

The analysis presented in **Table 4.11** suggests a complex situation relating to sanitation and hygiene practices in each area and that the situations are different in the two areas. No particularly dominant factors are evident in both areas. Nevertheless, the presence of some significant correlations and associations does suggest the sanitation and hygiene situation is less than ideal and may well be associated with increased levels of the three ailments. This highlights the need for improved levels of water and sanitation services to these two areas (see Appendix D and E).

Table 4.11: Narrative expression and rationalisation of correlation and association results

Narrative expression of results	Possible rationale
In Khayelitsha , increasing the number of people per tap is correlated with increased coughing (99% confidence), but not diarrhoea or tuberculosis. In Groblersdal , there are no such correlations.	The lack of correlations (except with coughing in Khayelitsha) may be because fairly good hygiene is practised when using taps.
In Groblersdal , sharing a toilet is associated with increased diarrhoea and tuberculosis , but not associated with either an increase or decrease in coughing. In Khayelitsha , sharing a toilet is associated with decreased coughing , but not associated with either an increase or decrease in diarrhoea or tuberculosis.	The greater numbers of people requiring access to toilets in Groblersdal compared to Khayelitsha, possibly related to the greater influx of people, may be responsible for this result.
In both Groblersdal and Khayelitsha , having a flush toilet is not associated with either an increase or decrease in any of the three ailments.	This suggests that the prevalence of the three ailments is caused by factors other than access to flush toilets.
In Khayelitsha , using the bush for toilet functions is associated with increased diarrhoea and coughing , but not associated with either an increase or decrease in tuberculosis. In Groblersdal , using the bush for toilet functions is not associated with either an increase or decrease in any of the three ailments.	Using the bush is typically a less hygienic practice which creates potential for infection, particularly causing diarrhoea. Tuberculosis is typically transferred through the air.
In Groblersdal , not burning waste is associated with decreased diarrhoea and tuberculosis , but not associated with either an increase or decrease in coughing. In Khayelitsha , not burning waste is not associated with either an increase or decrease in any of the three ailments.	Not burning waste might be expected to increase exposure to infectious waste and hence increase the prevalence of various ailments. There is therefore no obvious rationalisation of these results.
In both Groblersdal and Khayelitsha , burying waste is not associated with either an increase or decrease in any of the three ailments.	This result suggests that the prevalence of the three ailments is a result of causes other than burying waste.
In Groblersdal , treating the water is associated with increases in all three diseases . In Khayelitsha , treating the water is not associated with either an increase or decrease in any of the three ailments.	In Groblersdal this may be because the source water quality is not generally good or that households are looking after ill people. It is the custom to treat water when there are ill people or babies in a household.
In Groblersdal , the main water source is associated with diarrhoea but not tuberculosis or coughing. In Khayelitsha , the main water source is not associated with either an increase or decrease in any of the three ailments.	Diarrhoea can be caused by water-borne microorganism whereas tuberculosis and coughing usually not. There is use of water sources in Groblersdal typically associated with inadequate quality).

Table 4.12 shows that Groblersdal residents using either the canal, rainwater tank or the spring/fountain were more likely to have diarrhoea than those using a communal tap or a tap in their yards. This was not evident in Khayelitsha.

Table 4.12: Contingency table for diarrhoea in Groblersdal and their types of water source

	Canal	Communal tap	Rainwater tank	Spring/Fountain	Tap in yard
False 3	1	24	0	0	71
True 4	5	4	1	1	7

Table 4.13 shows the statistically significant associations between the three ailments in the two study areas. No association is evident between diarrhoea and tuberculosis in Khayelitsha (see Appendix D and E). However, strong associations are evident between:

- Each pair of diseases in Groblersdal; and
- Diarrhoea & coughing and tuberculosis & coughing in Khayelitsha.

This is generally suggesting that a prevalence of one disease is strongly associated with the prevalence of the other diseases (except in the case of diarrhoea and tuberculosis in Khayelitsha).

Table 4.13: Associations between diarrhoea, tuberculosis and coughing

	Khayelitsha	Groblersdal
Diarrhoea & tuberculosis	5.23	Associated
Diarrhoea & coughing	Associated	Associated
Tuberculosis & coughing	Associated	Associated

4.3 Household Economics-related Results

4.3.1 Household background

A total of 485 people living with HIV and AIDS are sampled from three districts of Khayelitsha (198), Ukhahlamba (175) and Groblersdal (112) which are located in Western Cape, Eastern Cape and Limpopo provinces, respectively. **Table 4.14** shows that a majority of people (about 73%) interviewed are women and that in about 56% of the households women are the household head. In Khayelitsha, most of the households (76%) are urban informal while in Groblersdal the vast majority (96%) were rural. Overall we observe that most of sampled households (37.1%) are drawn from informal settlements, while 33.1% are from rural and 29.1% formal urban areas.

Table 4.14: Household demographic profiles

Study area	Sample size (N)	Gender (%)		Household head (%)		Household type (%)		
		F	M	F	M	Urban formal	Urban informal	Rural
Khayelitsha	198	79.3	20.7	59.6	39.9	23.7	76.3	0.0
Ukhahlamba	175	67.6	32.4	52.6	47.4	54.9	17.1	28.0
Groblersdal	112	69.6	30.4	53.6	45.5	0.0	4.5	95.5
TOTAL	485	72.6	27.0	55.5	43.7	29.5	37.3	33.1

F = female; M = male

The marital status, education level and employment status of the sampled households are shown in **Table 4.15**. With respect to marital status most of the people are living as 'singles'. Only 20% are living as married couples. A small proportion (8%) is widowed while less than 5% are divorcees or life partners. Regarding level of education attained only 23% have attained 12th grade, the highest proportion being in Khayelitsha and the lowest in Ukhahlamba, and 21% had only attained 7th grade. Overall 8% had never attended school, the highest proportion being in Groblersdal. Only 3.7% attained a college degree, the highest proportion again being in Groblersdal.

Overall, a remarkable 59% of interviewees have never been employed, the levels being very similar in each of the three areas. Khayelitsha has the highest levels of employment (about 28%, much of this being casual employment) while in Ukhahlamba and Groblersdal about 20% of interviewees in each area were unemployed, indeed have lost their jobs, due to HIV and AIDS-related illness. It is evident that in the three study areas there is a significant lack of skills and high levels of unemployment, both of which contribute to acute poverty for people living with HIV and AIDS.

Table 4.15: Interviewee marital status, education level and employment status

	All areas N = 485	Khayelitsha N = 198	Ukhahlamba N = 175	Groblersdal N = 112
Marital status				
	N	%	%	%
Single	N = 307	63.3%	66.7%	68.0%
Married	90	18.6	22.2	16.0
Divorced	20	4.1	3.0	0.6
Widowed	37	7.6	5.6	6.9
Living with life partner	23	4.7	2.5	4.0
Other	8	1.6	0.0	4.6
Education attained				
Primary: < 4 th grade	49	10.1	8.6	15.4
Primary: 5 th -7 th grade	103	21.2	16.7	28.6
Secondary: 8 th -10 th grade	164	33.8	46.5	26.3
High school: 11 th -12 th grade	112	23.1	26.8	18.3
College	18	3.7	0.5	1.1
Never attended	39	8.0	0.5	6.9
Employment status				
Formally employed	18	3.7	3.6	6.5
Informally employed	12	2.5	1.5	0.6
Casually employed	68	14.0	22.7	8.9
Unemployed (due to illness)	101	20.8	14.6	24.9
Never been employed	286	58.9	57.1	57.4

Table 4.16 shows the average interviewee age and the age distribution of people within the households. Overall the average age was 38 years. Each household has on average two children of age 10 years or younger. The average number of people per household is similar in Ukhahlamba and Groblersdal (about 7) and higher than in Khayelitsha where it is about 5.

Table 4.16: Average age and average household age distribution

Study area	Interviewee average age (years)	Average number of people per household in given age range					Total
		≤ 10	11-17	18-29	30-50	>50	
Khayelitsha	38	2	1	1	1	0	5
Ukhahlamba	38	2	2	1	1	1	7
Groblersdal	38	2	1	2	1	1	7
All areas	38	2	1	1	1	1	6

Table 4.17 shows the number and types of government grants received by the interviewees. It also shows some of the reasons why grants are not being received. Almost two thirds of all the total 485 sampled households receive some form of government grant. More than a quarter received a child support grant (with the fraction being more than one third in both Ukhahlamba and Groblersdal).

Of some concern is the use of the CD4 count by government as a criterion for approving grants. Individuals with a count less than 200 are considered to have an over-compromised immune system and hence too weak and frail to fend for themselves. However, during the course of the study it was evident on many occasions that people were too sick to fend for themselves yet their CD4 count was still too high to qualify for support.

Table 4.17: Numbers and types of government grants received and reasons for not receiving grants

	All areas N = 485		Khayelitsha N = 198	Ukhahlamba N = 175	Groblersdal N = 112
Totals:	485		198	175	112
	N	%	%	%	%
Receiving government grant:	N = 314	63.7%	66.2%	51.4%	78.6%
Type of grant received					
Pension	N = 7	1.4%	1.0%	2.3%	0.9%
Disability	91	18.8	25.3	12	17.9
Child support	136	28.0	17.7	34.9	35.7
Disability and Child support	71	14.6	21.7	3.4	19.6
Other	9	1.9	1.5	1.1	3.6
Reasons for not receiving grant					
CD4 count too high*	51	10.5	5.1	17.1	9.8
Filed application	24	4.9	7.1	3.4	3.6
Grant discontinued	15	3.1	3.5	3.4	1.8
No valid ID	10	2.1	1.0	4.0	0.9

*CD4 = Cluster of Differentiation 4 — used to test the immune system of patients.

In an effort to understand household income for PLWHA, income sources are classified into two categories, primary versus secondary income sources. Under primary sources, the aim is to assess “own-efforts” by an individual household to raise income for livelihood sustenance. Under secondary sources on the other hand, the aim is to assess all “income transfers” from many possible sources, e.g. remittances from non-resident family members and/or relatives, philanthropic organizations, government social grants, etc. **Table 4.18** shows the primary and secondary sources of income for the households. Overall, of those with a primary income source, the highest proportion come from a self-income project/business (17.5%) and the next highest from casual employment (11.5%). Groblersdal had the highest proportion of households with a primary income from a self-income project/business (32.2%), double that in Khayelitsha and three times higher than in Ukhahlamba.

Overall, in respect of secondary income sources, by far the highest income came from child support grants (52.6%) followed by disability grants (37.3%). In respect of child support grants, the proportion was somewhat similar for the three areas (47-57%) although disability grants varied more widely (18% in Ukhahlamba to 53% in Khayelitsha).

Table 4.18: Number of households with primary and secondary sources of income

		All areas N = 485	Khayelitsha N = 198	Ukhahlamba N = 175	Groblersdal N = 112
Primary sources					
Formally employed	N = 27	5.6%	7.6%	6.9%	0%
Informally employed	10	2.1%	2.5%	1.1%	2.7%
Casually employed	56	11.5	17.2	8.6	6.3
Self-income project/business	85	17.5	15.6	10.3	32.2
Other	18	3.7	0.0	4.6	8.0
Secondary sources					
Spouse/partner	63	13.0	17.7	9.1	10.7
In-house family member	42	8.7	10.1	6.9	8.9
Government pension grant	5	1.0	0.0	2.9	0.0
Disability grant	181	37.3	53.0	18.3	39.3
Child support grant	255	52.6	56.6	46.9	54.5
Remittances	42	8.7	6.1	13.7	5.4
Other	26	5.4	2.5	1.7	6.3

In **Table 4.19** we show the average monthly income per household from primary and secondary sources. It is of interest to compare these amounts with the national poverty line (NPL) threshold income. This provides an estimate of the minimum basket of goods that would satisfy the necessary daily energy requirement per person over period of a month. According to South African Medical Research Council, 2,261 kilocalories per person is the recommended daily energy requirement. Based on expenditure survey data for food items only it would cost R211/month for low-income households to meet this daily energy requirement. This is therefore the per capita national poverty line (based on 2006 prices). Assuming an average household size of 6 family members (**Table 4.16**) the NPL per household would be R1,266/month. It is evident from **Table 4.19** that overall, only those few households with formal employment are above this value. Equivalently, the majority cannot afford the necessary food to satisfy the above basic energy requirements per day.

Table 4.19: Average monthly incomes (R) from primary and secondary sources

		All areas N = 485	Khayelitsha N = 198	Ukhahlamba N = 175	Groblersdal N = 112
	N	ZAR	ZAR	ZAR	ZAR
Primary sources (ZAR)					
Formally employed	N = 27	1 627	1 368	1 950	0
Informally employed	10	967	734	550	1 633
Casually employed	56	1 142	1 211	828	1 475
Self-income project/business	85	797	646	542	882
Other	18	700	500	436	909
Secondary sources (ZAR)					
Spouse/partner	63	640	749	300	775
In-house family member	42	676	683	655	688
Government pension grant	5	1 080	973	1 010	1080
Disability grant	181	425	376	480	480
Child support grant	255	570	300	775	284
Remittances	42	720	412	483	455
Other	26	640	749	300	775

From the sampled households, a person with HIV and AIDS on average visits nearest medical centre or clinic once or twice a month. The visiting frequency may increase to three times or more per month depending on the health condition of the individual concerned. If the health condition has severely deteriorated, his/her visiting frequency to clinic increases as well. In this regard transport cost to nearby clinic or hospital becomes such an important expenditure item from household's budget perspective. **Table 4.20** shows the modes of transport used to get to clinics and the associated public transport costs for a round trip. From this Table, we observe that 69.5% of sampled PLWHA households walk to nearby clinics to seek medication, while 26.2% use public transport. On average it takes 26 minutes walk to nearest clinic, which approximately translates to 5-7 km. Most households in rural settings indicate that walking to clinic is not out of choice but rather are being forced by circumstances they face such as non-availability of public transport and/or transport cost being too expensive for a majority to afford. This is particularly the case with rural households who are paying more than twice for commuting to and fro clinic (R25.00 per round trip) compared to counterparts in urban areas (Khayelitsha). The situation becomes increasingly burdensome when the sick individual is too frail to walk but rather relies on goodwill of care-givers who resort to using either a wheel-burrow or animal-pulled cart to take him/her to clinic.

Table 4.20: Numbers using different modes of transport to clinics and associated round trip fares

		All areas N = 485	Khayelitsha N = 198	Ukhahlamba N = 175	Groblersdal N = 112
	N	%	ZAR	ZAR	ZAR
Walk	N = 337	69.5%	-	-	-
Own/hired transport	17	3.5%	-	-	-
Public transport	127	26.2%	R10.70	R25.00	R26.30

A nutritionally adequate diet is a key recommendation for a person living with HIV and AIDS. **Table 4.21** shows the food security status of the sampled households. Overall only 16.5% indicated that they were food secure. However, in Khayelitsha it was nearly 31% while in Groblersdal and Ukhahlamba it was only about 11% and 9% respectively. Many factors contribute to this. Many are dependent on government grants (**Table 4.18**) which are generally too low to sustain the typically large families living in rural and informal settlements. Although the government continually adjusts grant incomes, these tend to lag behind the general rise in food prices which has been rising by 15-20% for the past few years. The rise in food prices diminishes the purchasing power of many households but mostly hurting the poor. One approach by the government could be to offer inflation-adjusted grant incomes (child and disability) or seriously consider the introduction of food stamps specifically for PLWHA as an alternative.

Table 4.21: Household food security status

		All areas N = 485	Khayelitsha N = 198	Ukhahlamba N = 175	Groblersdal N = 112
Always food insecure	N = 21	4.3%	0%	10.4%	3.0%
Food insecure	87	17.9	8.6	11.0	53.5
Somewhat food insecure	256	52.8	60.6	69.9	29.3
Food secure	80	16.5	30.9	8.7	11.1

4.3.2 Water services

Household water sources differ considerably among the three areas (**Table 4.22**). For example, there is much greater access to in-yard water in Groblersdal (about three quarters of households) than in Ukhahlamba (about half) or Khayelitsha (just over one third). About 18% of households in Ukhahlamba use typically unsafe water from rivers, streams or dams while this is only about 4% in Groblersdal and 0% in Khayelitsha. Of the outside-yard water sources, the most common is the communal tap.

In-house piped water is the safest and most convenient for people living with HIV and AIDS. However, the percentage of households with such access is relatively low (overall about 11%), varying from about 8% in Ukhahlamba to about 15% in Khayelitsha.

Table 4.22: Household water sources

		All areas N = 485	Khayelitsha N = 198	Ukhahlamba N = 175	Groblersdal N = 112
	N	%	%	%	%
In-house piped	N = 55	11.3%	14.6%	8.0%	10.7%
In-yard piped	172	35.5%	21.2%	41.1%	51.8%
In-yard borehole	20	4.1	1.0	1.7	13.5
Outside-yard communal tap	182	37.5	62.1	27.4	9.8
Outside-yard communal borehole	13	2.7	0.5	2.3	7.1
River/stream/dam	39	7.6	0.0	17.9	3.6

The households are asked about their understanding of water policies that are mandates of municipalities. **Table 4.23** shows the level of awareness of these policies, their perceived effectiveness and suggestions for improvement. Overall, almost two thirds of interviewees indicate awareness of one or more such policies. There is greater awareness in Groblersdal than in the other two areas. Importantly, less than 10% of interviewees overall are aware of the free basic water policy. (It was also evident during interviews that many did not know the difference between a policy and a hygiene campaign.)

Significant numbers of interviewees thought the policies are ineffective. One example that exemplifies this is the water wastage associated with washing of taxis and other vehicles. Some households specifically suggested the need to educate residents on water use.

Table 4.23: Water policy awareness, perceived effectiveness and suggestions for improvement

		All areas N = 485	Khayelitsha N = 198	Ukhahlamba N = 175	Groblersdal N = 112
	N	%	%	%	%
Aware of a water policy	N = 305	63.3%	66.2%	51.4%	80.4%
Nature of policy					
Free basic water	N = 47	9.7%	0.5%	13.1%	20.5%
Save water	180	37.1	39.4	43.4	23.2
Pay for water	42	8.7	16.7	2.2	30.4
Save and pay for water	35	7.2	0.0	0.0	5.4
Perceived effectiveness of policy					
Very effective	50	10.3	1.0	10.3	26.8
Effective	148	30.5	26.8	28.0	41.1
Not effective	85	17.4	27.8	9.1	11.7
Suggested improvements					
Residents need education	13	2.6	5.0	1.1	0.0
Serious water wastage	12	2.5	6.1	0.0	0.0

Pertinent questions addressed in this section are the following: do PLWHA have access to water safe enough for drinking including infants and young children, both who are particularly at risk from diarrhoeal diseases? Do PLWHA have enough water for food preparation, washing, laundry, personal hygiene, etc? We cast these types of questions to respondents and as shown in **Table 4.24**, most HIV and AIDS households seem to be water secure. The results (**Table 4.24**) show that water is generally available for a variety of household activities. On the whole, the results suggest a reasonable level of water security with it being better in Khayelitsha and Ukhahlamba than in Groblersdal. A notable exception in Ukhahlamba is that some noted that water for baby feeding is not available. This suggests an acknowledgement of the fact that babies require better quality water. In Groblersdal a lack of water is noted by some interviewees for all the activities.

Table 4.24: Water availability for household activities

		Khayelitsha N = 198	Ukhahlamba N = 175	Groblersdal N = 112
	N 485	%	%	%
Cooking				
Always available	54%	62.1%	70.2%	17%
Available	41.4%	35.3%	28%	72.3%
Not available	3.9	-	1.2	9.8
Drinking				
Always available	54.8	64.6	68	13.4
Available	40.4	33.3	28.3	74.1
Not available	4.3	-	-	11.6
Baby-feeding				
Always available	36.7	50.1	40.6	7.1
Available	32.1	39.2	21.2	34.8
Not available	18.2	-	20.1	4.5

Dishwashing				
Always available	51.8	57.6	69.7	13.4
Available	41.2	37.3	25.7	73.2
Not available	-	-	-	13.4
Body-washing				
Always available	53.8	62.5	70.3	12.5
Available	39.0	34.1	24.5	70.5
Not available	5.2	5.3	5.3	17.0
Laundry				
Always available	52.8	61.6	72.7	8
Available	27.8	32.8	22.9	27.7
Not available	13.8			62.5
House-keeping				
Always available	47.2	47.2	71.1	9.8
Available	25.4	18.4	21.3	45.5
Not available	11.3	-	-	42.9

4.3.3 Water payments

Less than 10% of households are paying for water (Table 4.25). The highest percentage (about 17%) occurs in Khayelitsha, where they are paying on average R62.50/month, and the lowest occur in Ukhahlamba.

Overall, only a little more than half of the interviewees thought they should be paying for water provided by the municipality. Almost three quarters of people in Khayelitsha thought they should be paying but only a third of people in Ukhahlamba. Some 16% thought they should pay for water but on condition that they had a proper house or the tap was in their own yard. Almost one quarter of the total sampled households thought it is government's responsibility to provide water and that they should not have to pay. The proportion was highest in Ukhahlamba (more than one third) and lowest in Khayelitsha (about 16%). Overall, about 10% considered themselves too poor or too sick to have to pay for water.

Table 4.25: Number of people paying for water and reasons for payment and non-payment

		All areas N = 485	Khayelitsha N = 198	Ukhahlamba N = 175	Groblersdal N = 112
	N	%	%	%	%
Paying for municipal water	N = 44	9.7%	17.2%	1.4%	7.1%
R/month	R 58.90	-	R 62.50	Very low	R 43.60
Should pay for water? (Yes)	N=267	55.1%	73.2%	33.7%	56.3%
If Yes, why?					
It's a service	N=149	30.7	39.4	26.3	22.3
Only with proper house	20	4.1	4.5	1.7	7.1
Only with tap in my yard	58	12	19.2	1.7	15.2
Water is scarce	20	4.1	7.1	0.6	4.5
Other	17	3.5	3.5	2.3	5.4
If No, why not?					
Government's responsibility	N=119	24.5	15.7	35.4	23.2
Too poor or too sick	46	9.6	4	18.3	5.4
Staying in shack	18	3.7	3	5.7	1.8
Not receiving bill/never asked	20	4.1	0	6.9	6.3

One key task is to assess rather qualitatively how improvements in water could impact livelihoods of PLWHA. Improvements in water provision can yield great health benefits to PLWHA. This can virtually eliminates many water-borne diseases especially diarrhoeal diseases which are leading causes of death for most PLWHA. Esrey et al. (1985) estimates that improvements in water quality and availability are likely to reduce diarrhoeal morbidity by 37%. **Table 4.26** shows how respondents perceived the likely effects of improved water sources. Of the identified effects, “improved health status” is identified by the majority of respondents. The next highest category was “likely to live longer”.

Table 4.26: Perceptions of the likely effects of improved water services

		All areas N = 485	Khayelitsha N = 198	Ukhahlamba N = 175	Groblersdal N = 112
	N	%	%	%	%
Will improve health status	N = 178	36.7%	40.4%	26.1%	46.7%
Will reduce opportunistic infection	35	7.2	6.1	6.9	9.8
Will reduce vulnerability to water-borne diseases*	65	13.5	7.0	18.3	17.0
Likely to live longer	92	19.0	13.6	34.9	3.6
Enhances my dignity	58	12.0	15.7	5.7	15.2
Other	17	3.5	4.0	1.7	5.4

* Like diarrhoea or cholera.

4.3.4 Sanitation services

We begin this section by asking each respondent the type of toilet that he/she accesses on a regular basis. **Table 4.27** shows different toilet systems used by the sampled PLWHA households across the three provinces. Overall, 42.3% of the sampled households across the three provinces indicate that they have access to some form of flush toilets. In fact more than half of households in Khayelitsha and Ukhahlamba districts use the flush-type of toilets and this is in sharp contrast with Groblersdal where a mere 2.3% have access to flush toilets. Instead more than 80% of sampled households in Groblersdal use pit latrines.

We also observe that a significant percentage (20%) of sampled households have no access to any form of toilet and rather resort to using ‘bush’ or open spaces. This practice is most rife in Khayelitsha, followed by Ukhahlamba where 25.8% and 17.1% of households respectively indicate they do not have toilets. We observe as well that the largely abominable *bucket system* is still practised in Khayelitsha (14%) and Ukhahlamba (10%) but rarely used in Groblersdal (2.7%).

We probe further by asking each respondent a follow-up question that seeks to assess the ‘level of satisfaction’ with toilet system each household is using. Not surprisingly, two-thirds of total respondents express outright dissatisfaction with toilet system the households are currently using and accessing. This is particularly the case in Groblersdal and Khayelitsha districts where approximately more than half of households are *not satisfied* with the current toilet system he/she is using.

In sum, we draw important observations to the effect that although the government has scored remarkable progress in sanitation provision since post-apartheid, it still faces great challenges especially in fast-growing and densely-populated informal settlements. As our results indicated, a quarter of households in informal settlements do not have access to any form of toilet but resort to using bush or open spaces as loos. For PLWHA walking to and fro the bush cannot only be strenuous but unsafe especially for women and children as they risk being mugged, raped or even killed. Because the practise of using bush toilet is ‘more convenient’ at night, one risks stumbling over other people’s faeces and for PLWHA this health hazard increases vulnerability to opportunistic infections. The ‘alternative’ of using the bush toilet during day time is ‘not an easier’ option either as ‘users’ have to endure the ignominy of naked

indignity. With poor sanitation conditions rife in informal settlements, the country faces real danger and/or risk of cholera and diarrhoea outbreaks and will mostly affect those with compromised immune system, the PLWHA. The bottom-line is, with a significant proportion (>25%) of households practising bucket and bush toilet, this does not augur well for a country posed to meet most MDGs but bound to fail in meeting the MDG 10 target 11.

Table 4.27: Sanitation facilities and satisfaction level

		All areas	Khayelitsha N = 198	Ukhahlamba N = 175	Groblersdal N = 112
Toilet system					
	N	%	%	%	%
Flush system	205	42.3	55.1	53.1	2.7
Pit latrine	135	27.8	1.5	18.9	88.4
Bucket system	46	9.5	13.6	9.7	1.8
Chemical system	9	1.9	3.5	0.6	1
No toilet/Bush	88	18.1	25.8	17.1	6.3
Satisfaction level					
	N	%	%	%	%
Very satisfied	33	8.8	5.1	13.1	0
Satisfied	105	28.2	20.2	37.1	8
Somewhat unsatisfied	55	14.7	23.2	5.1	25.9
Not satisfied	177	45.8	49	42.3	65.2

As is the case with water, the majority of households are not paying for sanitation (about 95%) (Table 4.27). However, more than half believe they should be paying with the main reason being that it is a service. However, some say they should be paying only if it is their own toilet, and the latter is the dominant view in Khayelitsha but hardly an issue in Ukhahlamba.

In respect of reasons for not paying, the dominant reason is that they perceive sanitation provision, like water provision, as government's responsibility. Furthermore, a significant proportion thought they are too poor or too sick to pay.

Although the results suggest that most people are not paying for sanitation, some are indeed paying dearly, particularly in informal settlements. Taking some clues from the *Cape Argus* (July 2010), some residents in Khayelitsha are paying between R0.50 and R10 each time they use the neighbour's formal toilet. Assuming a toilet is used once a day, this means a person may be paying anything from about R15 to R300/month for toilet access only. If we assume five members per household, this can amount from R75 to R1,500 in toilet access charges per month.

Table 4.28: Number of people paying for sanitation and reasons for payment and non-payment

		All areas N = 485	Khayelitsha N = 198	Ukhahlamba N = 175	Groblersdal N = 112
	N	%	%	%	%
Paying for municipal sanitation	26	5.4%	17.2%	1.4%	4.5%
Should pay for sanitation? (Yes)	271	55.9%	73.2%	33.7%	88.3%
	If Yes, why?				
It's a service	113	23.3	22.2	25.1	23.3
Only if own toilet	71	14.6	25.3	1.7	16.1
It's the law	9	1.9	4.0	0.6	0.0
Other	66	13.6	5.1	3.4	44.6
	If No, why not?				
Government's responsibility	88	18.1	15.2	28.6	7.1
Too poor or too sick	57	11.8	6.1	24.6	1.8
Dirty and smelly	27	5.6	6.1	8.6	0
Other	28	5.8	8.1	8.6	7.3

Inadequate provision of sanitation is principal cause of diseases that arise from faecal contaminated food, water and hands and such diseases are among the world's leading causes of serious diarrhoeal illness. Improvements in sanitation provision can reduce diarrhoeal morbidity by 22% (Esrey et al., 1985). In this section we ask interviewees how from own viewpoint improvements in sanitation are likely to impact them as PLWHA. As with water, most interviewees suggest that improvements in sanitation are likely to '*improve health*' status of PLWHA and enable them '*live longer*' (Table 4.29). A sizeable proportion (16.3%) view improvements in sanitation as leading to a significant '*reduction in opportunistic infection*', as well as '*enhance dignity*' (15%) of PLWHA.

Table 4.29: Perceptions of the likely effects of improved sanitation services

		All areas N = 485	Khayelitsha N = 198	Ukhahlamba N = 175	Groblersdal N = 112
	N	%	%	%	%
Will improve health status	173	29.5	35.9	17.1	37.5
Will reduce opportunistic infection	73	16.3	9.1	22.3	19.6
Will reduce vulnerability to water-borne diseases*	58	12.0	11.6	10.3	15.3
Likely to live longer	90	18.6	14.1	30.3	8.0
Enhances my dignity	72	14.8	18.6	13.7	17.9
Other	18	3.8	2.0	1.7	0.0

* like diarrhoea or cholera.

4.3.5 Hygiene services

In this section we start by understanding how PLWHA interpret "hygienic living". We then ask specific follow up questions on hygienic campaigns mounted by municipal districts/councils, NGOs, and private organizations. Of interest as well, is to assess the effectiveness of the various hygiene oriented campaigns and plausibly how improvements in hygiene conditions could impact PLWHA. As shown in Table 4.30 most interviewees (34%) interpret "hygienic living" to predominantly mean '*wash your body regularly*'. Another dominant hygiene practice is '*wash hands before eating*' as indicated by a third of sampled respondents. A rather shocking result is with respect to the practice of '*wash hands after toilet use*', where less than 10% are aware of significance of this hygiene

practice. This result helps to raise the general lack of awareness by PLWHA regarding this practice and yet ironically most of faecal-oral diseases are transmitted via dirty hands and are dominant killer for PLWHA.

Table 4.30: Understanding of hygienic living

		All areas N = 485	Khayelitsha N = 198	Ukhahlamba N = 175	Groblersdal N = 112
		%	%	%	%
Wash hands before eating	N = 156	32.2%	42.9%	38.9%	2.7%
Wash hands after toilet use	34	7.0	12.8	4.6	1.0
Wash cooking utensils with soap	18	3.7	8.1	1.1	0.0
Wash your body regularly	165	34.0	29.3	24.0	58.1
Clean toilet with detergents	7	1.4	2.5	1.1	0.0
Other	47	9.7	2.5	0.6	36.6

It was learned from local municipal authorities that several environmental health and hygiene campaigns had been promoted in recent years. **Table 4.31** shows that overall little more than half of the households were aware of any such campaigns. Khayelitsha had the least awareness (less than one third) and Groblersdal the highest (more than 90%). Overall, of those who were aware of such campaigns, there was the general perception that they were effective.

Overall, about 88% of interviewees thought that the campaigns should target people living with HIV and AIDS. Of these, the overwhelming feeling was that such campaigns should educate people on water and sanitation.

Table 4.31: Awareness of hygiene campaigns and perceptions of effectiveness

		All areas N = 485	Khayelitsha N = 198	Ukhahlamba N = 175	Groblersdal N = 112
	N	%	%	%	%
Aware of campaigns? (Yes)	264	54.4%	31.3%	57.1%	91.1%
Very effective	93	19.2	3.5	22.3	42.0
Effective	123	25.4	12.6	27.4	44.6
Not effective	25	5.1	7.1	0.6	3.6
Should they target people living with HIV and AIDS? (Yes)	424	87.4	88.4	81.1	95.5
	If Yes, what should they target?				
How to keep body clean	9	1.9	1.5	3.4	0.0
Education on water & sanitation	232	47.8	46.4	56.0	37.5
How to avoid opportunistic infection	5	1.0	1.5	1.1	0.0
Other	91	18.8	3.0	11.4	58.0

In respect of perceived effects of improved hygiene (**Table 4.32**), the dominant effect was an improved health status, as is the case for water and sanitation.

Table 4.32: Perceptions of the likely effects of improved hygiene services

		All areas N = 485	Khayelitsha N = 198	Ukhahlamba N = 175	Groblersdal N = 112
	N	%	%	%	%
Will improve health status	116	31.1%	38.4%	22.9%	42.0%
Will reduce opportunistic infection	35	9.4	9.6	9.1	18.8
Will reduce vulnerability to water-borne diseases*	47	12.5	9.5	16.0	17.9
Likely to live longer	91	24.4	15.2	34.9	8.9
Enhances my dignity	62	16.1	17.7	15.4	10.7
Other	9	2.4	3.0	1.7	0.0

* like diarrhoea or cholera.

4.3.6 Willingness-to-Pay for Water and Sanitation

4.3.6.1 Improved water and sanitation provision

Every individual has access to water in some form or another since no one can live without water. As UN-HABITAT (2008) stresses, the issue is not about whether households have access to water but whether the water supplies are “safe, sufficient, regular, convenient (for instance piped to their homes or close by) and available at an affordable price”. Likewise for sanitation, everyone needs some provision for defecation be it an open space, drains or open toilets (like in Khayelitsha). The issue is not simply the mere provision of a toilet facility but the quality and convenience of the facility matters most especially for women and small children.

Equally the convenience of an on-yard or in-house water tap be it in rural or informal setting cannot be over-emphasized. In rural areas for instance, the burden of fetching water is mostly the responsibility of women and young children, who often walk long distances, three or more times per day carrying heavy loads of 20-25 litre containers. For people living with HIV and AIDS this could be physically demanding and too strenuous a task. Within informal areas, households often endure unsafe and inconvenient water sources where they often compete with hundreds of other people for water from distant communal standpipes. With many people relying on the same water source, collecting water for drinking, cooking, dish-washing, laundry, and even providing for livestock, it is difficult to keep these sources clean. Should there be contamination at this common water point, the whole community is at risk. In addition, households also endure the hazards of sharing oftentimes dirty and poorly maintained toilets with dozens of other households. Of the many diseases associated with inadequate water and sanitation, the diseases spread via the faecal-oral route are among the leading causes of death especially for PLWHA and small children.

Informal settlements are not only concentrations of people but also concentrations of human excreta which are particularly dangerous where toilet infrastructure and services are general lacking. In Khayelitsha for example, up to 105 people may share one toilet which is equivalent to seven households accessing one toilet (Sanders 2008). With such a high proportion of people living with HIV and AIDS in such a potentially unhygienic environment there is considerable vulnerability to opportunistic infections. Providing improved clean safe sanitation to hundreds of households in informal settlements remains a big challenge for the South African government. The escalation of so-called ‘toilet wars’ recently witnessed in Khayelitsha (Makhaza) is a case in point.

4.3.6.2 Definitions

But what exactly do we mean by ‘improved provision of water and sanitation? Using the definition adopted by UN-HABITAT (2008), improved water provision means “*reasonable access to a water supply from a household connection, a public standpipe, a borehole, a protected well, or protected spring or rain water connection. At least 20 litres per person per day must be available from a source within 1 kilometre of the user’s dwelling.*” For sanitation on the other hand, improved provision means “*access to a private or shared toilet connected to a public sewer or septic tank, or access to a private or shared pour-flush latrine, simple pit latrine or ventilated improved pit latrine.*”

Table 4.33 shows examples of improved and unimproved drinking water sources and sanitation facilities (WHO and UNICEF, 2006). Bottled and tanker water are regarded as unimproved water sources because they are usually a consequence of severe bottlenecks in water supply systems. They are usually considered emergency water supply channels under catastrophic conditions.

Table 4.33: Examples of ‘improved’ and ‘unimproved’ drinking water sources and sanitation facilities

Drinking water sources	Sanitation facilities
Improved	
Piped water into dwelling unit, plot or yard	Flush or pour-flush to piped sewer or septic tank
Public tap/standpipe	Pit latrine
Tubewell/borehole	Ventilated improved pit-latrine
Protected dug well	Pit latrine with slab
Protected spring	Compositing toilet
Rainwater collection	
Unimproved	
Unprotected dug well	Flush or pour-flush to elsewhere
Unprotected spring	Pit latrine without slab or open pit
Cart with small tank/drum	Bucket system
Bottled water	Hanging toilet or hanging latrine
Tanker truck	No facilities or bush or field
Surface water (river, canals)	

Source: WHO/UNICEF 2006 (cited in Fewtrell et al., 2007)

For PLWHA, significant improvement in water and sanitation provision can entail profound health gains. Table 4.26, Table 4.29 and Table 4.32 above indicate that people living with HIV and AIDS perceive improved water, sanitation and hygiene as having many advantages. Health gains due to such improvements have been quantified (Caincross and Valdmanis, 2006; Hutton and Haller, 2004). Table 4.3 shows the significant effects that have been found (Esrey et al., 1991).

Table 4.34: Effects of improved water and sanitation conditions and hygiene promotion on diarrhoeal morbidity

Improved conditions	Median reduction in diarrhoea morbidity (%)
Water quality only	15
Water quantity only	20
Water quality and quantity	17
Sanitation only	36
Water and sanitation	30
Hygiene promotion only	33

Source: Esrey et al., 1991

4.3.6.3 Contingent valuation method

In this section we start by briefly discussing the ‘payment vehicle’ that we use to elicit willingness-to-pay (WTP) for ‘improvements’ in water and sanitation. Why WTP? Using contingent valuation method, based on WTP approach have become such a vital tool in water supply and sanitation studies that help estimating household demand for water and sanitation, designing tariffs and subsidies and improving performance of municipalities. Because we have defined and discussed with respondents what improvement in water and sanitation means and entails, we now proceed to elicit the WTP starting by describing hypothetical scenario portrayed in form of a vote referendum. In order to elicit a WTP price bid, a hypothetical scenario is portrayed in the form of a vote referendum. This is briefly described below:

“For a long time residents in this community (including people living with HIV and AIDS) have raised serious concerns, and at times demonstrated against the local municipality, regarding poor service delivery, general lack of water provision, deteriorating water quality and pollution. Finally the municipality heeds the call and plans to introduce a series of measures to improve the situation. One of the measures the local authority is considering is the introduction of a mandatory water levy to be charged to ALL local residents (employed or not, sick or not). The collected revenue from the water levy will form part of monies needed to fund all local water improvement projects in this district. But before passing the proposed policy/legislation/rule/bill into law the local municipality is to hold a referendum where you are required to vote freely either for or against the bill. Voting for the new bill will result in significant improvement in water service delivery and provision but at a cost which you are expected to pay directly and regularly. Voting against the bill will see you not making any payment but there will be no improvement in the water situation and the status quo will remain the order of the day. Do you understand the scenario so far?”

You may vote as follows:

- *Vote Yes (in favour of the proposed bill), or*
- *Vote No (against the proposed bill).”*

The scenario is repeated with slight adjustments for sanitation. For both ‘commodities’, i.e. water and sanitation, the voting results are shown in **Table 4.35**. The results show that, overall, 75% of ‘voters’ are in favour of the water bill and even more (80%) for the sanitation bill. In Groblersdal the votes for the sanitation bill significantly exceeded their votes for the water bill (80% and 60% respectively) while they were similar in the other two areas.

Table 4.35: Results of water and sanitation ‘referendum bill’ votes

	Vote for Water bill		Vote for sanitation bill	
	Yes		Yes	
	N	%	N	%
All areas	362	74.5	385	79.4
Western Cape	159	80.3	161	81.3
Eastern Cape	136	77.7	134	76.6
Limpopo	112	59.8	90	80.4

Table 4.36 and **Table 4.37** show that, for both water and sanitation, the most common reason for voting against the bill is “too poor or too sick”. However, there were also those that thought it is “government’s responsibility”. These can be regarded as ‘protest responses’ and since the numbers are not very high, the problem of ‘protest bias’ is probably minimal.

Table 4.36: Reasons for ‘No’ vote for water ‘referendum bill’

			Khayelitsha	Ukhahlamba	Groblersdal
	N	%	%	%	%
Government's responsibility	58	12.0	2.0	9.1	33.9
Too poor or too sick	68	14.0	11.6	24.2	2.7
Other	12	2.5	3.0	2.3	3.6

Table 4.37: Reasons for ‘No’ vote for sanitation ‘referendum bill’

	All N=485		Khayelitsha N=198	Ukhahlamba N=175	Groblersdal N=112
	N	%	%	%	%
Government's responsibility	24	2.9	0.5	5.7	11.6
Too poor or too sick	76	17.2	9.1	29.8	5.4
Other	8	1.8	1.5	2.3	0.0

In order to quantify what people are actually willing to pay, it is necessary to formulate a starting price bid that is sufficiently realistic for all respondents and enough to ‘push-start’ thinking about willingness to pay for water and sanitation services. In meetings with municipalities (revenue and tariff department) and local authorities we are able to determine that counterparts living in similar but formal high density suburbs pay on average R116.22/month for water, sanitation and refuse collection). In addition we are able to verify with willing residents the actual monthly water bills that households pay to the local council. To accommodate rural households we adjust the value for the water or sanitation bill slightly downward to R100/month. The contingent valuation question was then framed as follows:

“If you vote Yes (in favour of the water bill), and the local council/authority charges you a flat water bill of R100 per month, would you be willing and able to pay this amount?”

The resulting elicited price bids for perceived improvements in water and sanitation provision are shown in **Table 4.38**. It is evident that respondents in Khayelitsha, where the majority live in informal housing, were generally prepared to pay more than those in Ukhahlamba or Groblersdal. It is also evident that respondents were prepared to pay R3-5 more for sanitation improvements than for water improvements. These results underscore important implications: first, because PLWHA are willing to pay more for sanitation than water, this result implies that the marginal benefit derived from each additional unit of sanitation is higher than additional unit of water. Stated in other words, improvement in sanitation provision will result in higher welfare gains to society than that each additional unit of water. Second, it follows that PLWHA are relatively more sanitation insecure compared to water and hence

explaining their preparedness to pay higher premiums for toilets improvement. Third, while there has been much debate on 'poor service delivery', it is also important to give attention to sustaining such delivery and the associated cost recovery. Knowledge of the degree to which people living with HIV and AIDS are willing to pay for services can contribute to greater financial sustainability. It is known that 'demand-driven' approaches generally produce better outcomes in terms of access and effective use of services and are considered more sustainable than supply-driven approaches.

Table 4.38: Willingness-to-pay price bids (/month) for water and sanitation

	Water				Sanitation			
	Initial Yes		Initial No		Initial Yes		Initial No	
	N	Upper price bid	N	Lower price bid	N	Upper price bid	N	Lower price bid
	253	R 136	206	R 68	290	R 138	218	R 78
Khayelitsha	94	R 160	59	R 81	104	R 165	55	R 81
Ukhahlamba	92	R 126	80	R 66	96	R 129	73	R 70
Groblersdal	67	R 114	67	R 60	90	R 117	90	R 83

The case is made above that there is a need for beneficiaries to pay for water and sanitation services whether living in rural, urban or informal settlements. Given that we are dealing with the generally poor and people with HIV and AIDS, the question might be asked whether or not such households should pay for water and sanitation provision. However, promises of free services for all too often result in 'some services for a few and too little or none for most' (Francey, 2008). The worst possible approach is to see poor people as having no resources and being entirely incapable of making contributions towards meeting their own costs for water and sanitation services that are so central to their livelihood and survival.

Franceys (2008) five sub-classes of poverty have been adapted to current circumstances and are given in **Table 4.39**. Sub-classes (d) and (e), namely the 'very poor' and 'destitute' respectively, are probably categories that deserve greater subsidy for water and sanitation provision.

Table 4.39: Classes of poverty in peri-urban areas

Classes of poverty	Characteristics
(a) Lower middle income 'vulnerable non- poor' household	Often employed at low wage levels by government or formal private sector and living in conventional housing. HIV-headed households susceptible to unexpected financial shocks particularly ill-health. Conventional water and sanitation tariffs are normally affordable but may need restructuring in ways that allow delays in payments in exceptional circumstances so as not to disrupt a household's finances and sink it into poverty. It can also be a household not dependent on government support.
(b) 'Developing poor'	Can be characterised as a household in a slum or an informal house that has sufficient income to invest in permanent (or semi-permanent) materials for their own housing with fairly regular income from at least one semi-skilled member of family; could be HIV+ but not dependent on government grant.
(c) 'Coping poor'	Describes a household with a single daily employed unskilled earner living in a temporary shelter and perhaps rented from a slum landlord; could be HIV+ but not dependent on government support.
(d) 'Very poor'	Might be characterised as a single parent family, very possibly female-headed, sharing a one- or two-room temporary shelter with other families with very irregular or seasonal employment. Could be HIV+ and beneficiary of government grant either for child or disability support (or both).
(e) 'Destitute'	Might be a household in a slum or a street vendor surviving on selling tomatoes, candies, cigarettes, etc.; could be HIV+ either with or without government support.

* Source: adapted from Franceys (2008).



In most rural areas collecting water is primarily the duty of women and young girls

SECTION 5: SUMMARY OF RESULTS

This study was conducted over three selected districts of Khayelitsha in Western Cape, Ukhahlamba in Eastern Cape and Groblersdal in Limpopo, covering a total sample size of 485 people living with HIV and AIDS. To meet the objectives of the study two questionnaires were designed: first type is the community-based questionnaire which consisted of two distinct components — health-related and economics-related components; the second type is the WSP questionnaire which consists of three distinct parts: human resource component; water/sanitation and environmental health component. Within each selected district, a team of field enumerators is identified who had to undergo two-day intensive training on how to conduct face-to-face interviews. All the field enumerators who administered the community questionnaire were drawn from the local home-based care givers.

For the WSP-questionnaire on the other hand, copies were distributed to several human resource, water/sanitation and environmental health managers within selected districts. However encountered the problem of low response and hence our analysis of the WSP questionnaire was very limited. In the sections below we provide a summary of main results and observations based on three components: (a) Community economics-based results, (b) Community health-based results and (c) WSP-based results

5.1 Household Economics-based Results

5.1.1 General demographic information

Almost three quarters of the people interviewed were women and more than half were heads of the household. The most common household type in Khayelitsha was urban informal, in Ukhahlamba urban formal, and in Groblersdal rural. The dominant marital status was single. A significant proportion lack of skills and high levels of unemployment were evident in all three areas. In each area a significant number of interviewees had also never been employed.

The average age of interviewees was 38 years and there was, on average, two children of 10 years of age or younger in each household. Almost two thirds of the interviewees received some form of government grant. Overall, of those with a primary income source (“own effort”), the highest proportion came from a self-income project/business. Of secondary sources (“transfers from other sources”), by far the highest income came from child support grants followed by disability grants. The average income of those few with formal employment only marginally exceeds the national poverty line threshold income (that required for food to satisfy minimal daily energy requirements). For a majority, average household incomes were all below this threshold.

More than two thirds of interviewees usually walk to the local clinic. About one quarter use public transport. It takes approximately 30 minutes walk to nearest clinic (about 5-7 km). Most households in rural areas are forced to walk to clinic because of non-availability of public transport or transport cost is too expensive for many to afford. The situation becomes unbearable when the sick individual is too frail to walk to clinic but rather relies on the assisting hand of relatives or care-givers, mostly small children or elderly parents.

The high level of unemployment in South Africa, coupled with low education and lack of skills, make it worse for people living with HIV and AIDS to secure formal employment. Although the government continually adjusts grant incomes, they tend to lag behind the general rise in food prices due to inflation. The inflation rate ranges between 6.5-8.5% per annum in South Africa and its general rise diminishes the purchasing power of many households, mostly hurting the poor. One approach by the government could be to offer inflation-adjusted grant incomes (child and disability) or seriously consider the introduction of food stamps specifically targeting

poor people living with HIV and AIDS. The general lack of viable livelihood options in rural and informal settlements also makes it very difficult for people living with HIV and AIDS.

5.1.2 Water provision at household level

Household water sources differed considerably between the three areas. There is much greater access to in-yard water in Groblersdal (about three quarters of households) than in Ukhahlamba (about half) or Khayelitsha (just over one third). About 1 in 13 households use typically unsafe water from rivers or dams. While in-house piped water is the safest and most convenient for people living with HIV and AIDS, only about 1 in 10 households had such water.

Communal water sources are often subject to a range of problems. Taps are often vandalised and not cared for, especially in informal settlements. Refuse (disused and abandoned broken containers, plastic, empty cans, bottle-tops, rotting fruit peels, etc.) is a common sight around the taps with no one taking responsibility for its removal. Because these sites are also used for laundry and are often not well drained, pools of grey water can accumulate which are unhygienic. They can contribute to the spread of disease, especially to children.

About two thirds of households were aware of municipal water policies although less than 10% were aware of the free basic water policy. Significant numbers of interviewees thought the policies were ineffective. Some households specifically suggested the need to educate residents on water use. Overall, a reasonable level of water security was evident with it being better in Khayelitsha and Ukhahlamba than in Groblersdal.

Less than 10% of households are paying for municipal water. However, only a little more than half of the interviewees thought they should be paying for such water. Almost one quarter of the total interviewees thought it government's responsibility to provide water and that they should not have to pay. The majority of interviewees nevertheless associated improved water sources with improved health status. As a cost recovery measure by local municipalities, and to ensure financial sustainability, a culture of payment by residents for water services provision should be created and nurtured.

5.1.3 Sanitation provision at household level

Although the South African government has made remarkable progress in improving sanitation provision since apartheid, it still faces great challenges especially in fast-growing and densely-populated informal settlements. For example, almost one in five households with people living with HIV and AIDS in the three areas has no sanitation facilities so residents have to use the bush or open spaces. Furthermore, about one in ten of the houses use the bucket system.

There are various problems created by the lack of sanitation facilities. Walking to and from the location can be strenuous for a person with HIV and AIDS. It can also be unsafe, especially for women and children. Understandably, the bush or open spaces tend to be used at night, emphasising the point made at the recent Sanitation and Hygiene week in Cape Town (May, 2008) that sanitation is not only about health and hygiene but more importantly about human dignity. Use of such spaces is obviously unhygienic, potentially contributing to the spread of disease.

Those that prefer to use a neighbour's facilities sometimes have to pay for this, potentially significantly increasing their monthly financial burden. While only about 1 in 20 households are paying for municipal sanitation services, more than half think they should be paying for such services. Nevertheless, there are significant numbers that do not think they should pay, many stating that they think it is government's responsibility (as for water). Even so, many are aware that improved sanitation facilities will improve their health.

5.1.4 Hygiene provision at household level:

Aspects of the interviewee's understanding of "hygienic living" were of some concern. In particular, only a small percentage of people associated this with 'washing hands after using the toilet'. The most common associations with "hygienic living" overall were 'washing hands before eating' and 'washing one's body regularly'.

While local municipalities have intensified hygiene campaigns in recent years, overall little more than half of the households were aware of them. Khayelitsha had the least awareness (less than one third) and Groblersdal the highest (more than 90%). Of those who were aware of such campaigns, there was a general perception that they were effective. There was also a general feeling that hygiene campaigns should educate PLWHA on water and sanitation.

5.1.5 WTP for water and sanitation

The 'contingent valuation method', based on willingness to pay (WTP), is a powerful tool in water supply and sanitation studies that helps to estimate household demand for water and sanitation. A hypothetical scenario is put to respondents that the local authority will introduce improved water/sanitation services but everyone is required to contribute financially. However, before doing so, they hold a referendum to obtain votes in favour or against this suggestion. Voting against the idea will mean the respondent receives no improved services.

About three quarters of respondents voted in favour. Of those that voted against, the two main reasons were that they considered it government's responsibility to pay or they were too poor or too sick to pay.

The actual amount that they were willing to pay was then established. Amounts varied, on average, from R68 to R136 per month for water services and from R78 to R138 per month for sanitation services.

The results generally indicate that there is a significant willingness to pay for such services, even though the respondents were generally poor.

5.2. Household Health-based results

The availability of enough water and water of an acceptable quality and quantity is of great importance in households where HIV and AIDS infected people are present. Home-based care of HIV and AIDS infected persons is wholly dependent on enough water and water of a good quality. Various studies have demonstrated that opportunistic infections accelerate progression of AIDS in presence of poor water quality. The frequency of infections is also linked to poor water service provision and inappropriate hygiene practices of household members that are often as a result of the lack of sufficient quantities of water.

The two areas included in the survey, Khayelitsha and Groblersdal, were provided with water sources that are considered as improved water sources by the WHO (WHO/UNICEF, 2006). In Khayelitsha about one half of the participating households have access to standpipes and the other half have taps in their homes. In Groblersdal almost all the study participants have access to either taps in their homes or stand pipes. These sources are considered improved water sources (WHO/UNICEF 2006).

Although the sources available in the two areas seem adequate in respect of access, several aspects need to be highlighted to understand the situation in context of the HIV and AIDS epidemic. Health gains are firstly linked to increased volumes and secondly having access to safe water at household level. A lack of basic access affects the volumes of water that are available for use. When

the distances and time involved in water collection result in use of inadequate volumes to support basic personal hygiene and leads to reduced consumption, health gains are compromised. A lack of basic access can be profound for persons who are too weak to fetch water regularly and who need lots of water to clean themselves, bedding and clothes during bouts of diarrhoea. Care givers also have to spend time fetching water that could instead be spent for food preparation, child care and free time.

Water interruptions have become a significant problem in many parts of South Africa with smaller towns and rural areas worst affected. In Khayelitsha and Groblersdal for instance, the number of days these districts endure without water averaged 7 and 6 days respectively. Hunter et al. (2009) constructed models on three waterborne pathogens common in Africa: Rotavirus, Cryptosporidium and Enterotoxigenic *E. coli* and found that potential risk of infection by the target pathogens is substantially greater on days that people have to revert to raw water consumption as a result of water interruptions. Raw water consumption reduces all annual health benefits attributed to consumption of water from an improved supply.

The Constitution of South Africa, through the Municipal Structures Act and Water Services Act of 1997, assigns the responsibility for the provision of water and sanitation services to the country's 52 district municipalities. The national government also assigns responsibility for service provision to local municipalities, of which there are 231. Municipalities have the responsibility to supply a basic water service which is defined as: *The provision of a basic water supply facility, the sustainable operation of the facility (available at least 350 days per year and not interrupted for more than 48 consecutive hours per incident) and the communication of good water use, hygiene and related practices.* Very few municipalities have the capacity to comply with this level of sustained operation. In general this has created a lot of concern, country wide and the effects on HIV and AIDS people are poorly understood or unknown.

Apart from having access to improved water source on a sustainable basis, the distances for collection should be taken into account during development of water provision programmes. The responsibilities associated with water in a household usually lies with the female children or female parent of a household. This seems the case in both Khayelitsha and Groblersdal where households were headed by females in 79.4 and 55.1% of all households interviewed. Women have to fetch enough water, on a daily basis, for all household purposes. When a water source is between 100 and 1000 m away from the dwelling unit, issues of health risk and burden of ferrying water, become issues of concern.

Where the basic access service level has not been achieved sustainably, hygiene and health gains cannot be assured. Therefore providing a basic level of access that can be sustained for 365 days of the year should be the highest priority for the water and health sectors. Public health gains are primarily achieved through providing protected water sources, promoting good water handling hygiene practices and household treatment of water and in other key hygiene behaviours (notably hand and face washing) at critical times within the population served by basic levels of service (Howard and Bartram, 2003).

The implication to water service providers is that provision of protected sources might be insufficient in the case of households where HIV and AIDS patients reside. In areas where protected sources are the only option as in Khayelitsha and Groblersdal, promotion of hygiene practices related to water handling and adequate quantities of water, should be seriously considered.

Diarrhoea is a common symptom of HIV and AIDS and it affects 90% of infected people and results in significant morbidity, mortality, limited uptake of medicines and malnutrition. Specific risk situations for infections from drinking water are drinking contaminated water, exposure of mucosal lesions during tooth care, aspiration of aerosols during showers and the formation of reservoirs in bathroom utilities (toothbrush, showerheads). The growing number of immuno-suppressed people in South Africa makes the provision of water, of a good microbial quality, even more urgent because drinking-water can contain a range of microorganisms

(*Pseudomonas aeruginosa*, non-tuberculous *Mycobacterium* spp., *Acinetobacter* spp., *Aeromonas* spp. and *Aspergillus*) which create health risks for HIV and AIDS infected people. Immuno-compromised individuals also have a greater risk of mortality from these normally benign organisms (WHO, 2003). The infectious dose of an opportunistic pathogen is lower for them, especially if they are receiving antibiotic medication, which is the case in many immuno-compromised patients (Glasmacher et al., 2003). Health care associated infections prolong time spent in hospital and cause significant morbidity and mortality and financial burden (Exner et al., 2005). Importantly these infections are in many cases preventable. The immuno-compromised population is in need of a more stringent microbial water quality than healthy people. The provision of more stringent water quality treatment at the point of use, could be highly beneficial. A recent publication showed a reduction of diarrhoea rates of 49% of women in Lagos, Nigeria who drank water that was chlorinated at the point of use (Barzilay et al., 2010).

The drinking water quality measured using *E. coli* as an indicator, in Khayelitsha, seemed to have been of good quality. Households in Groblersdal, where standpipes as well as other types of sources of water used, showed that 66% of the samples did not comply with drinking water quality guidelines. A wider study should be undertaken in Groblersdal and authorities should be informed of the actual water quality and appropriate action to improve the situation should be planned. In the rural areas visited during this study such as in Ukhahlamba, people were wholly dependent on spring water. The springs were not protected in any way and animals had free access to the water. The quality reflected this and all the samples had unacceptable high *E. coli* counts. Rural areas like these are so isolated that costs and the necessary infrastructure to provide piped water seems almost impossible. A possible solution is point-of-use disinfection.

5.2.1 Safe Sanitation

The HIV and AIDS epidemic has highlighted the tremendous importance of proper sanitation facilities and the degree to which proper sanitation can reduce diarrhoea in humans. As many studies have asserted, diarrhoea is a massive killer of children and key to its control is provision of quality water, safe sanitation and proper hygiene. It is estimated that diarrhoea risk reductions of 48, 17 and 36%, associated respectively, with hand-washing with soap, improved water quality and excreta disposal is possible (Cairncross et al., 2010).

Studies aimed at addressing the needs of HIV and AIDS infected individuals have highlighted aspects regarding the size, distance from the household and the type and construction of toilets, and especially pit toilets (Bester et al., 2000; Potgieter, 2008). In some areas and under certain circumstances people have no choice but to relieve themselves in the bush, in an open space close to the house or the street. During the last stages of HIV, sick individuals suffer from serious debilitating diarrhoea resulting in weakening of the patient. It becomes almost impossible for these patients to walk to toilets some distance away from their homes. Often toilets are constructed in a way that allows access for one person only. This creates difficulties in cases where patients need support inside the toilet. It also results in diminishing the dignity of patients and carers (Potgieter et al., 2000; Potgieter, 2008).

The current survey showed that toilet availability is high in both Khayelitsha and Groblersdal. However, communal toilets and pit toilets are the most common types recorded in the two areas. Anecdotal and observed information obtained from the community in Khayelitsha is that the communal toilets are often vandalised, very dirty and long distances away from the households and that the sick especially females and children have to use their yard or the bush for defecation. Women feel especially vulnerable to use the pit latrines especially at night. About 20% of the respondents indicated that they have to share their toilet with neighbours. This practice is known to increase diarrhoea incidences in communities. This practice also increases the exposure of immune-compromised people to possible infections.

The responsibility to provide basic sanitation facility lies with both the residents the government. Toilets provided by the government should be easily accessible to a household, the sustainable operation of the facility, including the safe removal of human waste and wastewater from the premises, where this is appropriate and necessary, and the communication of good sanitation, hygiene and related practices lies with the government. In rural areas and many of the townships people build their own structures which mostly consist of pit latrines that are often of very low standard.

5.2.2 Diarrhoea, tuberculosis and coughing

Diarrhoea, tuberculosis and coughing are illnesses that are closely associated with people living with HIV and AIDS. Tuberculosis is well known for its effect on the lungs of patients and coughing and the extent of tuberculosis in the HIV and AIDS population is known to be high. Diarrhoea is a common ailment of HIV and AIDS patients that is associated with parasitic and fungal infections but with malnutrition. As the illness progresses malnutrition becomes manifested through vitamin deficiencies caused by persistent diarrhoea. A deficiency in zinc, especially in children, for example, is associated with coughing which in turn is associated with diarrhoea (Penny and Lanata, 1995; Bhandari et al., 2008).

This survey investigated the prevalence of these diseases to get some understanding of the extent of these illnesses in the communities and whether or not they could be related to the water and sanitation status quo at the time of the survey. Positive associations with sharing the pit toilet was observed in Groblersdal, while in Khayelitsha, where great numbers of people had to share one standpipe, an association with coughing (and therefore indirectly diarrhoea) were observed, for instance. In Khayelitsha, using the bush for toilet functions was associated with increased diarrhoea and coughing, but not associated with either an associated with either an increase or decrease in tuberculosis. More information is available in XXX and XXX. Although the statistical analysis strictly only provides circumstantial evidence for these associations (i.e. not proof of the mechanism, but just what you would expect if that mechanism was operating) some of the associations could seemed to have a rational and logic explanation. The analysis, to some extent, related the ailments with the level of water and sanitation and HIV and AIDS in the areas highlighted the need for adequate water and sanitation for those with HIV and AIDS.

5.3 Water Service Provider- based results

In general, Municipalities have scored commendable progress in terms of raising awareness, offering voluntary counselling and education, providing ART and other numerous forms of support to HIV and AIDS-infected employees at workplaces. In big municipalities like the city of Cape Town, they have created Wellness Centres so as provide on-job care, counselling and psycho-social support for HIV and AIDS employees. But despite seemingly wide array of support, persistent fear of discrimination and stigma at workplaces have discourage uptake of HIV and AIDS testing. Currently very low proportion of municipal employees (<1%) participate in these wellness activities and as a result the prevalence rate of HIV and AIDS at workplaces within municipalities remains unknown. This makes it difficult for the government to plan and strategize especially as the HIV and AIDS pandemic intensifies. In this section, we use insights drawn from questionnaire and discussion with human resource managers to provide a 'rough assessment' of HIV and AIDS prevalence at municipal workplaces specifically targeting water and sanitation sectors as shown in **Table 4.4**. Estimates indicate HIV and AIDS prevalence rates within water and sanitation sectors ranging between 1.5-10% and slightly lower compared to the manufacturing sector. Across all sectors, semi-skilled labour force is the worst affected. Below we make a number of important observations:

5.3.1 Illusion of size:

With respect to large municipalities, the impact of HIV and AIDS within WSH sectors tends to be minimal (at least in the short-run) due to the 'illusion of size'. In this case, it does not make much of difference if a few employees are affected by HIV and AIDS pandemic as the municipality has the capacity to absorb shocks resulting from losses in skilled labour due to HIV and AIDS-related illness or death. Under such circumstances, the marginal impact on labour productivity due to loss of skilled labour force within WSH sectors in large municipalities will be very minimal. But as the situation persists in the long-run, large municipalities will gradually feel the impact of the loss resulting in higher replacement, recruiting and training costs.

In contrast, for smaller municipalities loss even of single skilled personnel within WSH sectors can severely disrupt the operations of the entire district. For instance, within municipalities of Ukhahlamba and Greater Sekhukhune districts we observed that water and sanitation works are mostly handled by semi-skilled personnel due to critical shortage of skilled staff,

5.3.2 Inability to deliver is severe in small municipalities

The ability or inability to deliver efficient WSH services depends directly on pool of skilled labour available within municipalities (engineers, artisans, plumbers, etc.). Most of small municipalities are working with depleted labour force within WSH for a number of reasons: first, many municipalities continue to face critical shortage of skilled manpower; second, most small municipalities have failed to provide attractive incentives to lure skilled manpower work in remote rural areas; third, because of severe budget constraint, many small municipalities cannot afford meet replacement and training costs necessitated by loss of skilled labour force either due to prolonged illness or death; fourth, poor and/or unfavourable working conditions have discouraged skilled labour force to work in rural municipalities. In sum, workforce available in WSH sectors within smaller municipalities may be so overburdened and/or overworked to discharge their functions in the most efficient manner. These sentiments were also expressed by human resource managers we interviewed who stressed that HIV and AIDS is a 'silent catastrophe' wrecking havoc particularly in small rural municipalities hampering efforts to deliver on water and sanitation services.

5.3.3 Sanitation sector worst affected

Most human resource managers pointed to sanitation as relatively the worst affected sector. In Table 4.5 estimated prevalence rates are higher within sanitation sector for both semi-skilled (9.5%) and skilled (6.5%) workers compared to water. A similar trend is observed within the manufacturing sector where highest prevalence rate of 11.7% is recorded among semi-skilled workers. In some rural municipalities (e.g. Gariiep municipality in Eastern Cape) the shortage of skilled labour force is so severe that sanitation works are handled non-skilled personnel.

5.3.4 Absence of medical aid

Across many municipal employees medical aid is absent. Most human resource managers interviewed indicated that very few employees can afford it even though it is subsidised. This makes it difficult for the affected employees to seek private medical assistance.

5.3.5 Wide differences in counselling services

In large municipalities there are well established counselling services that cater for HIV and AIDS employees. Counselling services aims to promote on-job-care, moral and psycho-social support to the infected employees. But counselling services offered to infected employees tend differ a lot across municipalities. In the CCT for example a Wellness Centre with a well defined structure and functions has been established as referral point for counselling of HIV and AIDS employees. But due to stigma, not many HIV and AIDS employees are making use of the counselling services and benefits. In contrast, there are no well established counselling services in

smaller municipalities but rather an appointed individual may act as 'support point'. Often times HIV and AIDS sufferers are often referred to private counsellors.

5.4 Estimated losses at Municipal Workplaces

As HIV and AIDS takes its toll on skilled, semi-skilled and unskilled labour force, municipalities incur heavy losses in the process. Three types of losses are identified which include skilled/semi-skilled workforce loss, production loss and loss due to vandalism. Below we highlight the costs associated with these losses.

5.4.1 Cost of skilled labour losses

In order to estimate the replacement cost for skilled and semi-skilled labour following either early retirement or death due to HIV and AIDS, we use estimates provided by Booysen and Molelekoa (2001). Booysen and Molelekoa (2001) estimated that the average cost per AIDS death for semi-skilled and skilled labourer is R70,400 and R190,900 respectively (**Table 4.5**). Using a total labour force of 4,500 employed in large municipality like city of Cape Town, it can be roughly estimated that HIV and AIDS is costing WSH sectors between on average R4.8 million and R14.9 million losses in semi-skilled and skilled labour force respectively per year due to either death or early retirement. Though difficult to determine, most municipalities reported that they experience high costs for replacing skilled and highly skilled labour.

5.4.2 Cost of production losses

As HIV positive employee becomes increasingly sick and less economically active, absenteeism and productivity loss increase. In turn this leads to the general failure and inefficiency in service delivery especially water and sanitation services. According to human resource managers, each HIV and AIDS municipal worker (as well as any other employee) is entitled to 30 annual sick leave days. But as reported by some municipal human resource managers, 30 days sick leave period is often not enough for the HIV and AIDS employee as he/she may need more time seeking medical treatment and recuperation. In some cases municipalities (e.g. Maletswai, Ukhahlamba) provide additional 15 grace sick leave days to their HIV and AIDS employees so as accommodate their need for prolonged absence from work. Added together each HIV and AIDS employee may require on average 45 sick leave days per annum. Within a typical municipality, this means it takes only 8 HIV and AIDS workers to exhaust 360 working days ($\approx$ year) as sick leave days. Overly this translates into huge production losses when aggregated across districts and provinces.

5.4.3 Cost of Vandalism

Vandalism is typically rife in informal settlements and imposes huge and often unplanned cost on maintenance of water and sanitation infrastructure by municipalities. For example in Khayelitsha, every R1.00 invested in water and sanitation, 10-20% goes to repairs and replacements due to vandalism. For instance, considering the budget planned for water and sanitation expansion during the 2010/2011 financial year of R19.6 billion by the city of Cape Town, it follows (holding other things equal) that approximately R1.8 billion will be expended on repairs and replacements due to vandalism. If aggregated across the entire country, this will convert into billions worth of infrastructure lost due to vandalism.



A disabled child drinking safe water from water tap on home yard in rural Elansdoorn, Limpopo

SECTION 6: RECOMMENDATIONS AND CONCLUSION

6.1 Water provision at Community level for PLWHA

6.1 Water provision at Community level for PLWHA

6.1.1 Need to increase national 'free basic water' for people living HIV and AIDS

People living with advanced HIV and AIDS have a much greater requirement for water than healthy people. This is because they need it for cleaning soiled bed linen, extra bathing and medication. It is recommended that consideration be given to ways in which extra free water can be supplied to such people.

6.1.2 Need to increase availability of safe borehole water to supplement municipal services

In rural areas, a significant number of people living with HIV and AIDS only have access to unsafe water sources like rivers and dams. Where feasible, increasing the availability of safe (protected) boreholes will address this problem, making safe water available and easing the pressure on other municipal water supply services. It is recommended that this option be considered.

6.1.3 Households need to take responsibility of maintaining the water sources

Paying for water naturally instils a sense of ownership and responsibility. This empowers households to be their own custodians of water sources. People living with HIV and AIDS and local communities have a very important role to play in maintaining water sources. Ideally they should become the primary decision maker, investor, maintainer, organiser and overseer. Such a bottom-up approach should complement any top-down approach from government.

6.1.4 Educate people on the 'user pays principle'

Our results show that PLWHA are aware of the need to make payment contributions towards water provision. Thus PLWHA take it as their duty (and not the government) to pay for the provision of water. The results help to dispel the belief that PLWHA cannot pay for provision of basic services, including water and sanitation that are so central to their livelihoods. We recommend that, notwithstanding whether the government will subsidize for water provision or not, the 'user pays principle' must be guiding principle conveyed to all users.

6.1.5 Reconsider CD4 count criterion

It was evident during the field study that although people could not qualify for support because their CD4 count was still greater than 200, many were nevertheless still too sick to fend for themselves. It is recommended that the use of this criterion be re-examined to avoid this situation.

6.2 Sanitation provision at Community level for PLWHA

6.2 Sanitation provision at Community level for PLWHA

6.2.1 Minimum standards for pit-latrines construction

In rural areas and many of the townships people build their own structures which mostly consist of pit latrines that are often of very low standard. Consideration should be given to developing and communicating minimum standards for the construction of pit-latrines. This should alleviate the current situation of sub-standard pit-latrines existing in so many rural areas.

6.2.2 Provision of hand-washing facilities near pit-latrines

To every pit-latrines must be accompanied by a hand-washing facility nearby so as promote the habit of 'washing hands after toilet use', a practice which we find largely missing in many communities of PLWHA. Provision of such hygienic facilities will help eliminate faecal-oral diseases especially diarrhoea, a leading cause of death for infants and PLWHA. Hence effort should be directed towards providing hand-washing facilities as close as possible to pit-latrines.

6.2.3 Need to experiment with different toilet models in informal settlements

Currently a significant proportion of households in informal settlements are paying dearly to access clean and safe toilets from neighbours, as they try to avoid use of public toilets which are generally dirty and oftentimes over-flowing with human waste. For PLWHA such toilet facilities become hot-spots for contracting opportunistic infections. To address the serious lack of adequate sanitation facilities, we recommend the following toilet models be investigated:

d. First Best Option (FBO):

Ideally where possible, each household should have its own toilet facility connected to a sewer system or septic tank. This we view it as meeting the basic sanitation service provision comparable with formal households.

e. Second Best Option (SBO):

But we realize FBO model may not work given the haphazard, limiting space and clustered way the shacks are constructed. Hence given the logistical problems associated with the FBO, the next best option is the provision of community-owned managed and maintained blocks of toilets subject to supervision by municipal authority. We coin this second-best option (SBO) model. Under this model emphasis is that ownership and responsibility must be conferred to few households who must be fully in charge and control of toilet facility.

f. Pay-as-you-access (PAYA):

The third model is again a community-based but secured block of toilets with expanded services that include hot water and bath taps in a homely environment to be owned, managed and maintained by the local community subject to authorisation and constant supervision by local council. This should be particularly well-suited to people living with HIV and AIDS and small children.

6.2.4 Emphasis on cost recovery and sustainability

Much effort by the government has been directed towards improving service delivery, water and sanitation included. But however there has been less emphasis on how to sustain service delivery to the poor especially PLWHA.

6.3 Hygiene provision at Community level for PLWHA

6.3 Hygiene provision at Community level for PLWHA

6.3.1 Need to educate people in respect of 'hand washing after toilet use'

The results indicated that there was an apparent lack of understanding of the importance of 'hand washing after using the toilet'. Most of faecal-oral diseases are transmitted via dirty hands including diarrhoeal pathogens, the leading cause of death among PLWHA. Accordingly, it is strongly recommended that District municipalities' Environmental Health Departments include in their educational hygiene campaigns specific emphasis on this issue. Further, it could prove strategic if district authorities could link their hand-washing awareness campaigns with related events such as World Sanitation or Water Day.

6.3.2 Need to promote use of 'tippy-taps' for hand washing

Simple devices like 'tippy-taps' made from local materials and installed near toilet facilities should go hand-in-hand with hygiene education in respect of hand washing after toilet use. These simple devices could be ideal in rural areas.

6.3.3 Need to increase visual communication

Increasing the number of visual communications should improve getting the message across to those with low levels of literacy. Any written communication must also be in vernacular language.

6.4 Challenges Facing Municipal Water and Sanitation Sectors

6.4 Challenges Facing Municipal Water and Sanitation Sectors

Following our recommendations discussed above, next we discuss insights gained from our extensive interaction with water and sanitation managers, human resource managers, environmental health experts and many other local municipal authorities. In sum the insights gained guide us to highlight some of the key challenges affecting municipalities and hence undermining ability and capacity to deliver efficient services especially in water and sanitation sectors.

6.4.1 Shortage of skilled manpower in water and sanitation sectors

One of the main constraints affecting the municipal water and sanitation sectors is the critical shortage of skilled manpower. Many municipalities are enduring without technically skilled and experienced staff within water and sanitation sectors. This compromises the quality and efficiency in service delivery especially in water and sanitation sectors. An interplay of factors key amongst them — impact of HIV and AIDS on skilled labour; emigration of skilled labour to developed countries; poor and unattractive working conditions — have all created a huge vacuum of skilled manpower shortage in municipalities. In some cases technical operations and maintenance of complex water services infrastructure are either manned by semi-skilled labour or at worse the capital equipments lie dysfunctional.

6.4.2 Influx of migrants from rural to urban areas

According to UN-Habitat (2008) prediction, by 2020 a majority of people in Africa would be living in and around major cities in search for employment and better living conditions. Most of these 'new urbanites' would be poor, jobless with a majority living in slum settlements. This predicted trend is particularly true for South Africa where most of the major cities are characterized by

multitude of informal settlements. The situation is worsened by high influx of immigrants from neighbouring countries especially Zimbabwe. This creates headaches for municipal authorities in a number of ways: first, informal settlements grow haphazardly including the invasion of preserved land often not even suitable for human settlement (e.g. flood-prone areas); second, the logistics of providing water and sanitation services under such conditions are difficult to coordinate. Third, with a high influx of migrants moving into cities each year, it is difficult for municipalities to plan, manage and budget for water and sanitation provision in slum settlements. Overly there is a need for national guidelines on the provision of water and sanitation in the informal settlements and backyards.

6.4.3 Rapid economic and population growth add stress to urban water demand

Many cities in South Africa are not only experiencing explosion in population growth but also undergoing rapid growth in industries, agriculture, manufacturing, mines, etc. With such a rapid expansion of economy the demand for water will grow. While new infrastructure for water will be necessary, water supply resources are limited and hence key to sustenance of water resources is effective water conservation and water demand management strategies. Failures in water supply and demand management could entail huge costs that can hurt the entire economy. The challenge is therefore to ensure future water supply that can continue to meet the growing demand for water in urban regions.

6.4.4 Underinvestment in water and sanitation services infrastructure

According to water and sanitation managers, the greatest threat facing many municipalities is gross underinvestment in water and sanitation infrastructure. In particular what has been observed is inadequate investment in the rehabilitation, replacement and maintenance of water services infrastructure across water services providers in South Africa (CCT annual report, 2009/10). As a result the condition of assets has deteriorated, posing great danger to future sustainability of water and sanitation service infrastructure.

For many municipalities the existing infrastructure, particularly the sewer system, is severely worn out due to several years of under-provision of essential maintenance and replacement of aging infrastructure. But replacement costs can be prohibitively high. For instance, just for the city of Cape Town, replacement costs of water and wastewater system are estimated at R19.5 billion. If these costs are extrapolated to include other municipal districts throughout the country, this translates into huge replacement cost that would be required.

6.4.5 Eradication of backlogs in water and sanitation

While many districts have scored commendable progress in water and sanitation provision since the end of apartheid, many still face great challenges in eradicating water and sanitation backlogs. In addition, eradicating the bucket system is also another challenge facing municipalities. According to the CCT annual report (2008/09) this problem arises mainly as a result of two factors: inadequate funds to eradicate water and sanitation backlogs, and lack of experienced personnel within water and sanitation sectors.

6.4.6 Cost recovery and sustainability of services

Most municipalities are operating on huge debts primarily due to non-payment and cost recovery problems associated with water and sanitation provision. This makes sustainability of water and sanitation service delivery difficult to attain within both short and long run. Government subsidies only provide a temporal solution. Sustainable cost recovery measures must be premised on

‘consumer pays principle’. Hence emphasis must be devoted to consumer education and awareness about the need to pay for water and sanitation services.

6.4.7 Government must find appropriate partners.

Quite simply, government cannot do the job alone and need other partners to work together. In HIV and AIDS declaration by the General Assembly of the United Nations (UN, 2006), national governments commit themselves to programmes “supported by international cooperation and partnership”. There are four types of partners:

- International funding agencies to address the issue of lack of financial resources;
- Technical organisations to help solve technical problems;
- Non-government organisations (NGOs) to help address issues on the ground and
- Communities to ensure that their perceptions and specific needs are address.

The above-mentioned types of partners are already used to different extents and degrees of effectiveness. However, it is recommended that the cooperative relationships established with these partners be given higher prominence. This should be done to the extent that cooperation is demonstrably “mainstreamed” into the everyday national, provincial and especially municipal working culture. This means that this cooperation culture should be formally addressed in, for example, municipal strategies, frameworks and plans.

6.5 Conclusion

The HIV and AIDS thrive on human ignorance, poverty and fear. HIV and AIDS is changing the structure of African societies, hampering development progress and worsening poverty levels. Social factors such as gender inequality, human rights violations, stigma and discrimination are social drivers of the disease. The added inadequate sanitation infrastructure, inadequate water quality and quantity, also contribute directly and indirectly to increasing mortality and morbidity of people infected with HIV and AIDS.

The growing awareness of the inter-linkages between water quality and quantity, water provision and livelihoods has led to a general improved understanding of the importance of mainstreaming HIV and AIDS in the water and sanitation sector. Importantly, mainstreaming hygiene education in water and sanitation programmes has become an integral part of the process aimed at making the hygienic environment of people living with HIV and AIDS healthier. Drinking water of a good microbial quality is an essential component of the health of immuno-compromised people living with HIV and AIDS especially in rural and informal settlements. They are particularly vulnerable to opportunistic waterborne pathogens. Exposure to these should therefore be prevented at all costs. Additionally, the absence of a safe drinking water supply has particular implications for HIV-infected breastfeeding mothers unable to ensure safe infant-feeding through the alternative of formula feeding. Within this context, there is a need for an improved understanding of the current quality and quantity of water available to infected people in South Africa and elsewhere, and how it relates to their health. Alternative options, for example in-house water treatment, that offers a short-term solution, warrants further investigation.

In addition to water quality concerns, inadequate quantities of safe water are a recurrent issue. The study highlighted the inadequacy of the free basic water policy for people with HIV and AIDS. This policy provides 6 000 litres of potable water supplied

per formal connection per month per household in the case of yard or house connections. Current estimates of water requirements are highly variable (from 50 to 200 litres and more daily per person) but there are no tangible data to confirm this. The necessity for water sources and adequate sanitation facilities to be located within a reasonable distance to accommodate weak patients is also important. Finally, very little research has been conducted to date on the issue of general and faecal solid waste management, particularly in home-based care settings. Water can play a crucial role for productive purposes and to support livelihoods. A clear understanding of current and future trends in water availability and its impact on livelihoods are important for informing policy development.

Overall the study revealed a wide range of issues in their various dimensions that relate to provision of adequate water and sanitation especially to people living with HIV and AIDS. These dimensions include (a) understanding the currently available WSH requirements for people living with HIV and AIDS in rural, peri-urban and/or informal settlements, (b) assessing the impact of HIV and AIDS at municipal workplaces within water and sanitation sectors, and (c) draw insights and recommendations on needs of WSP and challenges undermining the ability and capacity of municipalities as key WSP to deliver efficient services on WSH. Various insights and recommendations are drawn:

First, irrespective of specific HIV and AIDS-related requirements, the provision of services that satisfy the basic minimum WSH standards will go a long way towards alleviating problems faced by PLWHA in both rural and informal settlements. Effective knowledge flows “upwards” (from household and municipality to national level) and “downwards” (from national to municipal to household) are critically important for a holistic approach to WSH problems.

Second, while at national level South Africa has scored commendable progress in water and sanitation provision since democratic transition (1994), the country still faces daunting challenges in eradicating water and sanitation backlogs especially in rural and informal settlements. Although government’s mandate places the primary responsibility for service provision squarely on its shoulders (national down to municipal), it is prudent to assert that it cannot reasonably be expected to address the backlogs without strategic partnership with other players. The failure to provide adequate WSH needs and improve the livelihoods of people living in slum settlements in general, poses the greatest challenge to the attainment of the MDGs.

Third, the greatest risk threatening the country is the aging water and sanitation infrastructure which has suffered immensely due to inadequate investment in the rehabilitation, replacement and maintenance of infrastructure across water services providers in South Africa. As a result the condition of assets has deteriorated, posing great danger to future sustainability of water and sanitation service infrastructure. For many municipalities in particular, the existing sewer system is severely dilapidated due to several years of under-provision of essential maintenance and replacement of aging infrastructure.

Finally, most municipalities are operating on huge debts primarily due to non-payment and cost recovery problems associated with water and sanitation provision. This makes sustainability of water and sanitation service delivery difficult to attain unless lasting solutions are developed. Cost recovery measures premised on ‘consumer pays principle’ will go a long way towards sustenance of water and sanitation provision. We conclude that to solve these problems requires massive financial and human resource commitment, careful planning at both national and local government level and strategic partnership with other public and private institutions.

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APPENDICES

APPENDIX A: Provincial HIV and AIDS indicators at mid-2006 (*italics* = lowest; **bold** = highest)

	Indicator	W. Cape	E. Cape	Limpopo
Births				
	Uninfected births (over calendar year)	<i>96 000</i>	154 000	149 000
	HIV+ births (over calendar year)	<i>1 800</i>	5 700	3 700
	Infected through breastfeeding	<i>1 200</i>	3 800	2 400
People living with HIV and AIDS				
	Total HIV infected	<i>267 000</i>	667 000	397 000
	Adults (20-64)	<i>251 000</i>	591 000	348 000
	Adult men (20-64)	<i>97 000</i>	237 000	130 000
	Adult women (20-64)	<i>154 000</i>	354 000	218 000
	Adults (15-49)	<i>243 000</i>	584 000	348 000
	Adult men (15-49)	<i>89 000</i>	208 000	115 000
	Adult women (15-64)	<i>154 000</i>	376 000	233 000
	Youth (15-24)	<i>36 000</i>	166 000	102 000
	Male youth (15-24)	<i>6 000</i>	28 000	17 000
	Female youth (15-24)	<i>31 000</i>	138 000	84 000
	Children (0-14)	<i>11 000</i>	41 000	27 000
	New infections	<i>28 000</i>	81 000	47 000
Prevalence				
	Total HIV infected	<i>5.4%</i>	10.0%	6.9%
	Adults (20-64)	<i>8.5%</i>	19.2%	13.7%
	Adult men (20-64)	<i>6.7%</i>	17.2%	11.7%
	Adult women (20-64)	<i>10.2%</i>	20.9%	15.2%
	Adults (15-49)	<i>8.6%</i>	17.4%	12.1%
	Adult men (15-49)	<i>6.4%</i>	13.2%	8.7%
	Adult women (15-49)	<i>10.8%</i>	21.2%	14.9%
	Youth (15-24)	<i>4.1%</i>	10.3%	7.2%
	Male youth	<i>1.3%</i>	3.4%	2.4%
	Female youth (15-19)	<i>6.9%</i>	17.2%	12.0%
	Children (0-14)	<i>0.9%</i>	1.7%	1.3%
Incidence				
	Total Population	<i>0.6%</i>	1.3%	0.9%
	Adults (20-64)	<i>0.8%</i>	2.0%	1.3%
	Adult men (20-46)	<i>0.7%</i>	2.2%	1.4%
	Adult women (20-64)	<i>0.9%</i>	1.9%	1.2%
	At or before birth (of births)	<i>1.8%</i>	3.6%	2.4%
	Breastfeeding (no. infected through breast feeding in year/uninfected births in that year)	<i>1.2%</i>	2.5%	1.6%
Number of adults (14+) infected by stage				
	Stage 1	<i>79 000</i>	206 000	118 000
	Stage 2	<i>57 000</i>	138 000	80 000
	Stage 3	<i>85 000</i>	208 000	124 000
	Stage 4 (not on treatment)	<i>13 000</i>	54 000	33 000
	Receiving antiretroviral treatment	19 900	18 400	<i>13 800</i>

Discontinued antiretroviral treatment	1 900	1 700	1 300
Number of children (<14) infected by stage			
Pre-AIDS	9 000	34 000	22 000
Stage 4 (not on treatment)	1 000	4 000	2 000
Receiving antiretroviral treatment	2 100	3 000	2 500
Discontinued antiretroviral treatment	110	180	140
AIDS sick			
New AIDS sick during 2006	21 000	54 000	33 000
Total AIDS sick mid-year	20 000	64 000	39 000

Source: (Dorrington et al., 2006).

APPENDIX B: Original deliverables and target dates.

Deliverables	Target date
1. Project study site selection	2008/02/01
2. Extensive literature research	2008/05/31
3. Development of guidelines, strategies or recommendations based on the information gained to illustrate the issues underlying the broad context of water, sanitation and hygiene service provision for HIV and AIDS infected individuals from the water, sanitation and hygiene sectors.	2008/08/30
4. Preliminary guideline document to illustrate the issues underlying the broad context of water, sanitation and hygiene service provision for HIV and AIDS infected individuals from the water, sanitation and hygiene sectors	2009/02/28
5. Indicate major policy/programme implications for water supply, sanitation, and hygiene behaviour, and the need for systematic attention to these	2009/10/31
6. Final report	2010/03/31

APPENDIX C: Revised deliverables and target dates.

Deliverables	Target date
1. Project study site selection	2008/02/01
2. Extensive literature research	2008/05/31
3. Summary of findings with recommendations for water and sanitation provision and services at institutional level in relation with HIV and AIDS	2009/03/31
4. Summary of findings with recommendations for hygiene provision at institutional level in relation with HIV and AIDS	2009/07/31
5. Summary of findings with recommendations for hygiene provision at community level in relation with HIV and AIDS	2009/09/30
6. Preliminary guideline document to illustrate the issues underlying the broad context of water, sanitation and hygiene service provision for HIV and AIDS infected individuals from the water, sanitation and hygiene sectors	2009/11/31
7. Indicate major policy/programme implications for water supply, sanitation, and hygiene behaviour, and the need for systematic attention to these	2009/10/31
8. Final report	2010/03/31

APPENDIX D: Statistical correlation and association for various factors and diarrhoea, tuberculosis and coughing

Factor	Ailment:	Diarrhoea		Tuberculosis		Coughing	
		Khayelitsha	Groblersdal	Khayelitsha	Groblersdal	Khayelitsha	Groblersdal
Number of household members	r	0.09142 (±0.1243)	0.2016 (±0.1296)	-0.1682 (±0.1266)	0.09815 (±0.127)	-0.1291 (±0.1258)	0.1935 (±0.1111)
Average age	r	-0.1348 (±0.1229)	-0.2297 (±0.1278)	0.1354 (±0.1248)	-0.269 (±0.1219)	0.0891 (±0.1227)	-0.1854 (±0.1126)
Average education level	r	0.3577 (±0.1086)	-0.0072 (±0.1366)	0.0252 (±0.1313)	0.06156 (±0.1262)	0.1982 (±0.1182)	0.1462 (±0.1133)
Number of people per tap	r	-0.07673 (±0.1245)	-0.1402 (±0.123)	-0.1678 (±0.1257)	0.01718 (±0.12)	-0.3205 (±0.1151)	0.1397 (±0.1126)
Does the household share a toilet?	χ^2	0.0001	44.1946	0.1986	16.6762	5.8187	1.7924
	p	0.9925	2.973×10 ⁻¹¹	0.6558	4.433×10 ⁻⁰⁵	0.01586	0.1806
	phi	-0.03	0.63	-0.07	0.4	-0.26	0.14
Do you have a flush toilet?	χ^2	0.0056	0.0898	0.019	0.6287	0.0113	0.4377
	p	0.9405	0.7645	0.9650	0.4278	0.9152	0.5082
	phi	-0.03	0.03	-0.02	0.13	-0.01	0.11
Do you use a pit latrine?	χ^2	NA	0.0151	NA	0.228	NA	0.2137
	p	NA	0.9025	NA	0.633	NA	0.6439
	phi	NA	-0.03	NA	-0.08	NA	0.07
Do you need to make use of the bush for toilet functions?	χ^2	13.5699	0.6862	0.1213	0.4859	4.799	0.0056
	p	0.0002	0.4075	0.7276	0.4858	0.02848	0.9403
	phi	0.39	-0.04	0	-0.05	0.25	-0.08
Do you burn your waste?	χ^2	0.6392	14.0243	0.0812	5.5049	1.269	0.0113
	p	0.424	0.0002	0.7756	0.01896	0.2600	0.9154
	phi	-0.12	-0.36	-0.07	-0.23	-0.15	-0.03
Do you bury your waste?	χ^2	0.004	0.0742	0.2091	0.0796	1.0084	0.558
	p	0.9494	0.7853	0.6475	0.7777	0.3153	0.4551
	phi	0.03	-0.06	-0.07	-0.01	-0.12	-0.1
Do you treat your water?	χ^2	0.09	39.1651	0.1213	32.9438	0.0153	10.8676
	p	0.7641	3.894×10 ⁻¹⁰	0.7276	9.486×10 ⁻⁰⁹	0.9017	0.0010
	phi	0.06	0.59	0	0.54	0.05	0.32
The household's main water source	χ^2	1.505	37.9941	0.0452	6.9005	1.511	6.3511
	p	0.4712	3.784×10 ⁻⁷	0.8316	0.2281	0.4698	0.2735
	phi	-	-	-	-	-	-

APPENDIX E: Association statistics between diarrhoea, tuberculosis and coughing

Ailment pair		Khayelitsha	Groblersdal
Diarrhoea & tuberculosis	χ^2	0.05	25.3437
	p	0.8231	4.797×10^{-7}
	phi	0.04	0.48
Diarrhoea & coughing	χ^2	25.5413	11.9675
	p	4.33×10^{-7}	0.0005
	phi	0.51	0.34
Tuberculosis & coughing	χ^2	20.3161	5.8891
	p	6.565×10^{-6}	0.01524
	phi	0.46	0.24

Interpretation:

Correlation:

r = point-biserial correlation coefficient (i.e. a correlation coefficient when one variable is dichotomous, e.g. has diarrhoea/does not have diarrhoea).

If $|r| > 0.195$ then correlation is significant at the 5% level

If $|r| > 0.254$ then correlation is significant at the 1% level

If $r > 0$ then prevalence of the ailment increases with increasing factor value

If $r < 0$ then prevalence of the ailment decreases with increasing factor value

Hypothesis test:

H_0 (null hypothesis): The presence of the ailment is not correlated with the factor

H_1 (alternative hypothesis): The presence of the ailment is correlated with the factor

Association:

The phi-statistic is a measure of how strong the association is between two dichotomous variables.

Hypothesis test for the χ^2 test for association:

H_0 : There is no association between the prevalence of the ailment and the factor

H_1 : There is no association between the prevalence of the ailment and the factor

If $p < 0.05$ then there is a significant association between the ailment and the factor

If $\phi > 0$ then a positive response to the question results in an increase in the prevalence of the ailment

If $\phi < 0$ then a negative response to the question results in a decrease in the prevalence of the ailment

APPENDIX F: Sample of the Household Survey Questionnaire

How does the HIV and AIDS epidemic in South Africa impact on the water, sanitation and hygiene sectors?

Interview code: _____

Interview date: _____

Start time: _____

Finish time: _____

Place of interview: _____

Participant's gender: _____

Record 1: Background profiling:

Indicate Household type:

- ☐ Urban formal settlement
- ☐ Urban informal settlement
- ☐ Rural formal settlement
- ☐ Rural informal settlement

1.1 What is your marital status?

- ☐ Single
- ☐ Married and staying with spouse
- ☐ Married but spouse working in city/mine/farm
- ☐ Divorced
- ☐ Widowed
- ☐ Living with a life partner
- ☐ Other (specify) _____

1.2 What is your age? _____ (OK if respondent states month/year or year only)

1.3 Are you the HEAD of this household?

- ☐ Yes
- ☐ No

1.4 If NO to Q1.2 how are you related to the head of this household?

- ☐ Spouse
- ☐ Son
- ☐ Daughter
- ☐ Other (specify) _____

1.5 Let's look at the size of household:

- ☐ How many children are under <10: _____
- ☐ How many children are between 11-17 _____
- ☐ How many adults between 18-29 _____
- ☐ How many adults between 30-50 _____
- ☐ How many adults greater than >50 _____

Record 2: Education and Employment history

2.1 What is the highest education you attained? (indicate)

- ☐ Never attended school
- ☐ Primary: <Grade 4
- ☐ Primary: Grade 5-7
- ☐ High School: Grade 8 -10
- ☐ High school: Grade 11-12
- ☐ College: (specify) _____
- ☐ Other (specify) _____

2.2 Did you receive any formal/professional training?

- ☐ YES
- ☐ NO

2.3 If YES to Q2.2 what training did you receive?

Type of training received _____

2.4 If YES to Q2.2 when did you receive training? When: _____

2.5 From the following select one that describes your current employment status?

- 1st I'm formally employed and report for work
- 2nd I'm informally employed and report for work
- 3rd I'm casually employment and report for work
- 4th I'm unemployed due to illness
- 5th I have never been employed
- 6th I'm fulltime peasant farmer

2.5.1 If response is 1st case (fill responses in Table 2.1 below)

- What is the name of company/organization you are working for?
- What city/place is your company/organization located?
- What is your position in this company/organization?
- What is the nature of your work?
- How long have you been employed?

2.5.2 If response is 2nd case (fill responses in Table 2.1 below)

- What is the name of company/organization you are working for?
- What city/place is your company/organization/individual located?
- What is your position in this company/organization?
- What is the nature of your work?
- How long have you been employed?

2.5.3 If response is 3rd case (fill responses in Table 2.1 below)

- What is the name of company/organization that hires you on casual/seasonal/contractual basis?
- What city/place is your company/organization located?
- What is your position in this company/organization?
- What is the nature of your work?
- How long are does the casual/seasonal/contractual employment last?

Table 2.1 (Fill this table ONLY if response is 1st or 2nd or 3rd case)

	Fill in the space below
Name of Company/organization	
City/place	
Position	
Nature/type of work	
Length of employment	

2.5.4 If response is 4th case

- What was the name of company/organization you were working for?
Name: _____
- What city/place was your company/organization located?
Location: _____
- What was your position in this company/organization?
Position: _____
- What was the nature of your work?
Type of Work: _____
- How long were employed?
Length: _____
- What have you lost as a result of your illness?
Losses: _____
- Now given you are no longer employed due to illness, how are you earning a living?
- How are you earning a living?
 - Means of living/surviving: _____
- Are you a recipient of any form of government support?
 - YES
 - NO
- If YES, what government support are you receiving?
Type of government support (encircle):
 - Child support
 - Disability grant
 - Other (specify) _____
- If NO why are you not receiving support from the government?
 - Reasons: (encircle)
 - 1. CD4 count too high

- 2. Awaiting application
- 3. Support was discontinued
- 4. Other (specify)

2.5.5 If response is 5th case (never employed)

- How are you earning a living?
 - Means of living/surviving: _____
- Are you a recipient of any form of government support?
 - YES
 - NO
- If YES, what government support are you receiving?

Type of government support: (encircle)

 - 1. Pension grant
 - 2. Disability grant
 - 3. Child support
 - 4. Other (specify)
- If NO why are you not receiving support from the government?
 - Reasons: (encircle)
 - 1. CD4 count too high
 - 2. Awaiting application
 - 3. Support was discontinued
 - 4. Other (specify)

2.6 Summary of Income sources

Below let's summarize ALL your income sources and amounts you earn per month including SPOUSE/PARTNER or ANY family member staying with you and contributing to the household. First we discuss your primary sources (own effort/resources) and second your secondary sources (govt grant or remittances or other relief sources).

Source	Place a tick	Amount earned (R/month)
(a) Primary Sources (own effort)		
Salary from formal employment		
Salary from informal employment		
Salary from casual/contract employment		
Earning from self-income generating project		
Earning from own farm activities		
Earning from own business		
Other (specify)		
(b) Secondary sources (from others)		
Income contribution from your spouse/partner		
Income contribution from family member (staying in household)		
Income received from Govt pension grant		
Income received from Govt disability grant		
Income received from Child support grant		
Income received from any other Govt support (specify)		
Income received as Remittances (from relatives/non-relatives not staying in household)		
Other (specify)		

Basic Asset Ownership

2.7 Do you own any of the following assets and if YES indicate number or amount?

a. Immovable assets			
	YES	NO	What is the size? Or How many?
▪ Farmland			
▪ Urban brick-house			
▪ Rural brick-house			
▪ Urban shack-house			
▪ Rural shack-house			
▪ Other (specify)			
b. Financial assets			
	YES	NO	Indicate the amount range (Rs)?
▪ Current account			
▪ Savings account			
▪ Finance clubs			
▪ shares			

▪ Other (specify)			
c. Livestock assets	YES	NO	What is the herd-size?
▪ Cattle			
▪ Goats			
▪ Sheep			
▪ Pigs			
▪ Other			

Record 3: Sickness history

Let's talk about your status. The following questions will focus on when you were diagnosed, where you went for treatment and what kind of support you receive.

3.1 When did you find out that you are HIV positive? When: _____

3.2 Where were you tested for HIV and AIDS? Where: _____

3.3 After diagnosis where did you receive treatment for HIV? Place: _____

3.4 After diagnosis where did you receive support for HIV? *NB: (NGOs/Support groups, Religious/church organizations, friends)* Got support from: _____

3.5 Where is your nearest clinic? Location: _____

3.6 How far is the clinic from the place you reside?

_____ minutes walk

_____ minutes drive

3.7 What mode of transport do you use to get to the clinic?

- ☐ Walk to the clinic
- ☐ Use own transport
- ☐ Use relative/neighbour transport
- ☐ Use public transport (bus/taxi/train)
- ☐ Hire transport to clinic

3.8 If you use public transport or hire, how much do you pay to go to the clinic to and fro?

Transport/hire charges (to and fro): _____

3.9 How many times do you go to the clinic each month? No of times _____

3.10 What ailments/diseases are you currently suffering from?

List ailments/diseases: *(encircle)*

- 1. TB
- 2. High BP
- 3. Diabetic
- 4. Other (specify) _____

3.11 Do you pay for service charges at the clinic?

- ☐ YES
- ☐ NO

3.12 If YES to Q3.11 how much do you pay (per visit)? Payment: _____

3.13 Are you paying for your regular medication you get from clinic?

- ☐ YES
- ☐ NO

3.14 If YES to Q3.13, how much are you paying for regular medication? Payment: ____

3.15 If YES to either Q3.11 or Q3.13, then let's rate affordability of these charges you are paying per month: (explain to the respondent the 5 rating options and ensure he/she understands before answering)

	1	2	3	4	5
	Very affordable	Affordable	Somewhat affordable	Not affordable	Not sure
Medical charges					
Service charges					

3.16 Besides regular medication, is there any other or supplementary medication as prescribed by the doctor that you are using or supposed to use?

- ☐ YES
- ☐ NO

3.17 If YES to Q3.16 what supplementary medication are you using?

Supplementary medication: _____

3.18 How much are you paying for supplementary medication?

Payment: _____

3.19 Do you have any medical insurance to pay for your medical bills?

- ☐ YES
- ☐ NO

3.20 If YES to Q 3.19 how much is your insurance payment per month?

Payment: _____

3.21 If NO to Q 4.14 why do you not have medical insurance?

Reasons: (encircle)

- ☐ 1. Unemployed/too poor
- ☐ 2. Unaware
- ☐ 3. No need since receiving free HIV/AIDS treatment
- ☐ 4. Other

3.22 Are you on any special food diet?

- ☐ YES
- ☐ NO

3.23 If YES to Q3.22 what special food are you taking?

Type of food(s): _____

3.24 If YES to Q4.17, why are you on special diet?

Reason: _____

3.25 Let's us briefly look at the food availability or food security in this household. In general how would you rate the food security situation in this house? (explain to the respondent the 5 rating options and ensure he/she understands)

	1	2	3	4	5
	Always food insecure	Food insecure	Somewhat food insecure	Food secure	Not sure
Household food security status					

Record 4: Traditional healers

Let's talk about traditional healers and how they interaction with you as PLWHA.

4.1 Do you consult a traditional healer as a PLWHA?

- ☐ YES
- ☐ NO

4.2 If NO to Q4.1, why do you not consult a traditional healer?

Reasons: (encircle)

- ☐ 1. No one can cure AIDS
- ☐ 2. Not allowed to mix treatment
- ☐ 3. Do not believe in Traditional Healers
- ☐ 4. Other (specify)

4.3 If YES to Q4.1, why do you consult a traditional healer?

Reasons: *(encircle)*

- 1. Traditional healers are credible
- 2. Mutis can cure HIV and AIDS
- 3. Other (specify)

4.4 If YES to Q4.1, do you pay for the services or remedies provided by the traditional healer?

- ☐ YES
- ☐ NO

4.5 If YES to Q4.4, how much do you pay? Payment: _____

4.6 If YES to either Q4.4 how would you rate affordability of your payments to traditional healer? *(explain to the respondent the 5 rating options and ensure he/she understands)*

	1	2	3	4	5
	Very affordable	Affordable	Somewhat affordable	Not affordable	Not sure
Charges by traditional healers					

4.7 Do you think traditional healers can cure HIV and AIDS?

- ☐ YES
- ☐ NO

4.8 If YES to Q4.7, why do you think a traditional healer can cure HIV and AIDS?

Reason(s): _____

4.9 If NO to Q4.7, why do you think a traditional healer cannot cure HIV and AIDS?

Reason(s): _____

Record 5: Family care

Let's talk about your family. The following questions will focus on how your family contributes to looking after you and your children.

5.1 Is there any of your family members taking care of you on a day-to-day basis?

- ☐ YES
- ☐ NO

5.2 If YES to Q5.1 who exactly is caring of you? *(don't read out the options below, just mark the appropriate response)*

- ☐ 1. Parents (ask ages)
- ☐ 2. Spouse
- ☐ 3. Own children (ask age)
- ☐ 4. Relative (specify)
- ☐ 5. None
- ☐ 6. Other (specify)

5.3 If YES to Q5.1 how is he/she taking care of you? *(don't read out the options below, just mark the appropriate response)*

- ☐ 1. Cooking porridge
- ☐ 2. Bad bath
- ☐ 3. Giving medication
- ☐ 4. Fetching me to clinic
- ☐ 5. Physical exercises
- ☐ 6. Entertaining
- ☐ 7. Other (specify)

Record 6: Water policies

a. Water Policy/legislation

6.1 Is there any government policy/rule/regulation concerning water use or water provision that you are aware of?

- ☐ YES
- ☐ NO

6.2 If YES to Q 6.1 what does this policy/rule/regulation say?

List of policies:

- ☐ 1. Free basic water
- ☐ 2. Save water
- ☐ 3. Pay for water
- ☐ 4. Save and Pay for water
- ☐ 5. Other (specify)

6.3 If YES to Q6.1 how would you assess/rate the effectiveness of this policy/rule/regulation in achieving its intended goal? (explain to the respondent the 5 rating options and ensure he/she understands)

	1	2	3	4	5
	Very effective	Effective	Somewhat effective	Not effective	Not sure
Assess the policy/rule/regulation					

6.4 If response to Q 6.3 "column 4", suggest how you think this policy/rule/regulation should be improved?

Suggestion(s): _____

b. Water Sources

6.5 What is your source of water in this household? (don't read out the options below just mark appropriate response)

- ☐ In-house piped tap water
- ☐ On-yard piped tap water
- ☐ On-yard bore-hole water
- ☐ Outside-yard common piped tap water
- ☐ Out-side yard common bore-hole water
- ☐ River/stream water
- ☐ Dam water
- ☐ Other

6.6 Let me seek your opinion regarding the quality of water you consume in this household. In your opinion what do you regard as quality water? (don't read out options below just mark the appropriate response)

Water Quality means	Place a tick
☐ Tap water	
☐ Clear water	
☐ Water without odour/smell	
☐ Tasteless water	
☐ Water without sediments	
☐ Other (specify)	
☐	
☐	

6.7 How do you rate the quality of water you consume in this household? (explain to the respondent the 5 rating options and ensure he/she understands)

	1	2	3	4	5
	Very good	Good	Somewhat good	Poor	Not sure
Water quality					

6.8 If response to Q6.7 is "column 4", why do you think so?

Reasons: (encircle)

- ☐ 1. Public good and Govt's responsibility
- ☐ 2. Unemployed and too poor
- ☐ 3. Unemployed and too sick
- ☐ 4. Staying in informal house
- ☐ 5. Other (specify)

6.9 How would you rate the availability of water for its various uses/purposes in this household? *(explain the 5 rating options to the respondent until he/she understands, then read out the use category for which respondent answers accordingly)*

Use category	1	2	3	4	5
	Always available	Available	Somewhat available	Not available	Not sure
Drinking					
Cooking					
Hand-washing					
Baby-milk prep					
Dish-washing					
Body-washing					
Laundry					
House cleaning					
Other					

c. Water Price and affordability

6.10 Are you making any payments for the provision of water?

- ☐ YES
- ☐ NO

6.11 If YES to Q6.10, how much are you paying per month? Payment per month: _____

6.12 If YES to Q6.10 how would you rate price of water you are paying? *(explain the 5 rating options to the respondent and ensure he/she understands)*

Water charges	1	2	3	4	5
	Very affordable	Affordable	Somewhat affordable	Not affordable	Not sure
Price of Water					

6.13 If NO to Q6.10, why are you not paying for water?

Reason(s):

- 1. A public good and Govt's responsibility
- 2. Unemployed and too poor/sick
- 3. Staying in informal house
- 4. Never told/asked to pay
- 5. Other (specify)

6.14 In opinion do you think you should pay for water?

- ☐ YES
- ☐ NO

6.15 If YES to Q6.14, why should you pay for water?

Reason(s):

- 1. It's a service and hence obliged to pay
- 2. Only if I own a proper house
- 3. Only if water tap is in-house or on my yard
- 4. Never told/asked to pay
- 4. Other (specify)

6.16 If NO to Q6.14, why should you NOT pay for water?

Reason(s):

- 1. A public good and Govt's responsibility
- 2. Unemployed and too poor/sick
- 3. Staying in informal house
- 4. Never told/asked to pay
- 5. Other (specify)

d. Incidences of Water-borne diseases (WBD)

6.17 Have you or any member of your household suffered or died from any water-borne disease within the past 2 years?

- ☐ YES
- ☐ NO

6.18 If YES to Q6.17, when did this incident happen? When: _____

6.19 Where was the diagnosis carried out? Place of diagnosis: _____

6.20 What was the disease? Disease was identified as: _____

- 6.21 How did you know the ailment is water-borne disease?
- 6.22 How you knew its WBD: _____
- 6.23 What steps have your household/community/local authority taken to prevent any future outbreaks?
Control measures taken: _____

Record 7. Water and Impact on livelihoods of PLWHA

7.1 Do you think the water you are consuming in this household does have an effect on your health?

- ☐ YES
- ☐ NO

7.2 If YES to Q7.1, what effect does the water have on your health?

Effects of water on my health:

- 1. Causes bodily rash/irritation
- 2. Causes diarrhoea
- 3. Fear Cholera and other water-borne diseases
- 4. Other (specify)

7.3 Do have alternative water source if regular water services are not available to you?

- ☐ YES
- ☐ NO

7.4 If YES to Q7.3, what do you think about the water quality of this alternative source compared to regular source?

- ☐ 1. Good
- ☐ 2. Bad
- ☐ 3. No difference
- ☐ 4. Not sure

7.5 Which water source do you prefer to use? *NB: Please give a reason for this answer.*

- ☐ Prefer regular source
- ☐ Prefer alternative source

Reason(s): _____

7.6 What aspects of your livelihood would be most positively impacted by improvement in the provision of water/water services as a PLWHA? *(Use codes below to assist you make the list)*

List below livelihood aspects impacted by improvement in water services	Place a tick	Select ONE aspect MOST impacted

1	2	3	4	5	6	7	8
Improve my health	Reduce opportunistic infection	Reduce risk to diarrhoeal infection	Reduce risk to cholera infection	Reduce risk to water borne diseases	Likely to live longer	Enhance my dignity as PLWHA	Other (specify)