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PATH FINDER 2011: URBAN SANITATION

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Sanitation and Hygiene Applied Research for Equity

Urban Sanitation Pathfinder

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ABSTRACT

This paper discusses the common constraints to the provision of improved sanitation services to people living in low-income urban communities in Africa and makes suggestions on improved practice. The paper also highlights the current research gaps that SHARE could potentially examine over the next five years. Over the years, both African and Asian countries have faced enormous backlogs in the provision of sanitation services, especially in urban poor communities, resulting partly from the use of inappropriate service approaches. This is coupled with limited financial resources and rapid urbanisation and population growth. This paper also shows that for the Millennium Development Goal target on sanitation to be achieved, there is need to develop effective links between communities and sanitation agencies and to use cheaper alternative sanitation technologies. Areas where sanitation improvements have been made there is normally a good relationship between the communities and the authorities. This paper is based on literature, work experience, interviews and SHARE country visits. The paper also draws on a paper presented by the author at the 2nd International Congress on `Wastewater Treatment in Small Communities' in Seville in 2007.

Although this paper touches on health and hygiene, equity and sanitation markets, it does not discuss them in great depth as these themes will be addressed in other pathfinder papers. The paper is broken down as follows:

Section I: This section provides a brief overview of the sanitation situation globally and in Asia and Africa. The latest statistics showing access to basic sanitation coverage in the SHARE priority countries are presented. This section also looks at the current sanitation systems in use in urban settings of Africa and Asia. Desludging, wastewater and solid waste management are also discussed. This section concludes with a discussion of the challenges to sanitation in low-income countries.

Section II: In this section, suggestions for improved planning and practice in the sanitation sector in low-income countries are presented.

Section III: In Section III, the research gaps and questions in urban sanitation are presented.

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EXECUTIVE SUMMARY

The proportion of the urban population using improved sanitation in the four SHARE focus countries – Bangladesh, India, Malawi and Tanzania – ranged from 32-55 per cent in 2008. The lack of appropriate sanitation facilities, poor drainage, and inadequate solid waste disposal combined with water shortages in poor urban areas result in dangerous living conditions, leading to a heavy disease burden. According to the 2010 JMP statistics, many African and Asian countries are unlikely to achieve the Millennium Development Goal target for sanitation by 2015 if current trends continue.

Urban sanitation becomes increasingly important as developing countries urbanise rapidly. Sanitation issues are complicated by the informal nature of many urban settlements, a decrease in the amount of land and space available in urban areas, and an increase in the environmental contamination from solid waste.

1.What do we know now?

Sanitation access
Access to adequate sanitation is generally a problem in most urban poor communities in Africa and Asia due to poor service provision by sanitation agencies, dense populations, and limited availability of land to build new latrines once the old ones are full. The term 'adequate sanitation' in an urban setting takes on a wide range of meanings. However, it is clear that appropriate sanitation solutions must be specific to income and relevant to resources available to the family or community. These solutions can include a VIP latrine, a pour flush toilet, an ecological sanitation solution, an aquaprivy, or a whole host of other sanitation solutions.

Land tenure/informal settlements
As the urban population continues to expand, more families are living in informal settlements. Urban poor communities are growing far more rapidly than formal urban areas in Africa and Asia. It is difficult for these urban poor communities to lobby for better sanitation as their informal settlements are not recognised by the government. The communities are also reluctant to invest in improved water and sanitation services when they lack land security. Lack of home ownership is also a stumbling block to many residents because they are not motivated to make sanitation investments to property that is not theirs. Many tenants fear that if they install a toilet their landlord may increase the rent or object. In the case of squatters, installing toilets may imply permanency to the authorities and may increase the threat of eviction.

Lack of space (including desludging)
Another consequence of rapid urbanisation is the depleting amount of space available for building sanitation solutions. On-site sanitation solutions (e.g. pit latrines) – a common choice in urban areas – eventually must be replaced or desludged. There is a limited amount of space available in the community to build another on-site sanitation method. The safest and most convenient way of removing fluid sludge from a pit latrine is with a vacuum truck. Several successful versions of a sludge vacuum have been designed and used in local municipalities. However, there remains the issue of what to do with the waste once it has been removed from the pit. At least 200 million tonnes of human waste are untreated every year.

Lack of information and baseline data
One of the major reasons given by government agencies for their failure to extend services to slums and squatter settlements is the lack of baseline data about these settlements. Knowledge of the issues of urban sanitation may motivate government agencies to act. The success of sanitation projects is greatly affected by socio-cultural and political factors in poor urban areas. Data collection will also enable project implementers to better understand these factors and focus programmes accordingly.

2. On the basis of what we know, what do we need to do?

There are a whole host of locally-driven initiatives that solve many of the problems listed above. For example, the Orangi Pilot Project in Pakistan addresses issues such as legislative agreements and sanitation mapping. It would be beneficial to SHARE to utilise the experiences of such initiatives to discover creative and adaptable solutions that can be replicated at scale. Themes include the collection of local information through mapping, and community financing and organisation.

In nearly all the SHARE focus countries, land tenure was identified as critical to finding sanitation solutions in urban poor neighbourhoods. One way of dealing with this issue could be through the provision of public latrines. However, due to issues of safety, comfort, and cleanliness, public toilets are not always an ideal solution. Other solutions to the problem of land tenure should be assessed.

3. What do we need to know to do better?

Baseline data
A survey and documentation of physical conditions, social actors, and relationships, and economic conditions is very important. This will enable SHARE to effectively carry out research and interventions appropriate to urban settlements, informing the consortium what already exists and needs to be improved upon.

Desludging
Several solutions for desludging have been developed and used in local municipalities. It is necessary to discover how these solutions can be performed on a large scale. What to do with the waste once it is removed from on-site sanitation is an issue that must be resolved. SHARE and its partners should determine the most effective way of disposing of pit latrine waste in an urban area on a large scale.

SECTION I

1.0 Introduction

One of the major development challenges that the majority of African and Asian countries face is that of providing safe sanitation services in both urban and rural areas. While effort has been made by some governments to provide a basic level of these services to the population, the coverage levels have remained insufficient and only 61 percent of the global population uses improved sanitation facilities.

At least 2.6 billion people in the world are estimated not to have access to basic[1] sanitation, of which 72 percent live in Asia and 565 million are in Africa (WHO/UNICEF, 2010). Diseases related to contaminated drinking-water, unsanitary food preparation, unimproved excreta disposal and unclean household environments constitute a major burden on the health of peoples in the developing world and are among the leading causes of ill-health (UNICEF, 2005). Results from a study undertaken by the WSSCC (2001) show that around 4 billion cases of diarrhoea are experienced annually, resulting in 2.2 million deaths of children under the age

[1] The Millennium Task Force on ater and Sanitation defines basic sanitation as the lowest cost option for securing sustainable access to safe, hygienic and convenient facilities and services for excreta and sullage disposal that provide privacy and dignity while ensuring a clean and health living environment both at home and in the neighbourhood of users (Lenton et al., 2005).

of five. Every year, millions of poor people in developing countries die from preventable diseases (such as diarrhoea) caused by inadequate water supply and sanitation services. The poor in developing countries are burdened by the indignity, shame, and sickness that result from a lack of hygienic sanitation. Contrary to earlier beliefs, most experts now believe that most of the diseases are in fact sanitation related and not water related.

The sanitation coverage in Africa and Asia varies from country to country but the worst affected countries are in Southern Asia although there are also large numbers in Eastern Asia and Sub-Saharan Africa (WHO-UNICEF, 2010).

Access to adequate sanitation is generally a problem in most urban poor communities in Africa and Asia due to poor service provision by sanitation agencies, high population densities and limited availability of land to build new latrines once the old ones fill up (Wegelin-Schuringa, 1997). In several of these countries, the majority of people rely on pit toilets and other on-plot sanitation systems. In Dar es Salaam, Tanzania, for example, virtually all the urban informal settlements rely on pit latrines but these regularly over-flow and the public authorities only have the equipment to empty a tiny proportion of them. The rocky ground conditions in some settlements also make it difficult and expensive for residents to build their own sanitation facilities such as pit latrines. In some settlements, the instability of the soil requires pits to be lined with brickwork or bottomless oil drums, practices that are more often than not beyond the means of the majority of residents in low-income urban settlements.

According to the 2006 Human Development Report, two in three people in Kibera identify the ‘flying toilet’ as the primary mode of excreta disposal available to them. With neither public nor private latrines available, many of Kibera's residents resort to defecating in plastic bags which they dump in ditches or throw on the wayside. Recent WHO/UNICEF (2010) statistics show that between 1990 and 2008, open defecation increased in urban areas from 140 million to 169 million people. In such cases, a household having sanitation facilities does not help much in public health terms if their neighbours do not have such facilities. It is also common practice in most African and Asian countries to let children defecate in the open even in settlements well served with improved sanitation facilities because of the belief that children’s excreta is not as harmful as that of adults; in some cases the adults just cannot be bothered to take the children to the toilets. Such practices expose entire communities to harmful pathogens. Research on health benefits has shown that the greatest impact on diarrhoeal disease comes from a wide adoption of three key practices: clean sanitary toilets used by all, hand washing by all with soap or soap alternatives, and safe storage and drawing of clean water (Sijbesma, 2008). Recent research also shows that the net returns from investment in improved sanitation are positive and yield greater benefits than expenses. Many experts believe that these diseases could be avoided if all people had sustained access to safe drinking water and sanitation services because people’s actions are clearly interdependent and individuals acting independently do not have any significant incentive to manage the public environment properly (Cairncross and Valdmanis, 2006; UNICEF, 2000; McGranahan et al., 1999). With this in mind, this paper argues for the improvement of sanitation facilities not only at individual household level but also at community level.

Although the sanitation coverage is much lower in the rural areas compared to the urban areas, those living in urban areas face a greater risk to health. This is due to the much higher population densities in the informal settlements where the worst environmental health conditions prevail, resulting in illness and death (see Hardoy and Satterthwaite, 1989 and Mulenga et al., 2004). Most of the informal settlements have grown up rapidly on the edge of major African and Asian cities due to the failure by authorities to plan for their development. While overall urban sanitation coverage may appear high and strides have been made in the past two decades, coverage rates tend to be much lower for the urban poor (Wright, 1997; Wegelin-Schuringa, 2000). In Africa, only 44 percent of the urban population has access to improved sanitation facilities. According to the WHO/WSSCC/UNICEF (1996), between 1990 and 1994, sanitation coverage had actually declined in urban areas from 67 percent to 63

percent and from 20 percent to 18 percent in rural areas. The lack of appropriate sanitation facilities, poor drainage and inadequate solid waste disposal combined with water shortages in poor urban areas result in dangerous living conditions which result in a heavy disease burden. Current sanitation statistics show that coverage in urban areas of Bangladesh had actually decreased between 1990 and 2008 as indicated in the table below. Over the same period, sanitation coverage in rural areas of Bangladesh increased.

Table 1: Proportion of the population using improved sanitation in urban areas of SHARE focus countries

Country	1990	1995	2000	2005	2008
Bangladesh	57 (28)*	56 (33)	56 (40)	56 (48)	55 (52)
India	49 (7)	50 (10)	52 (14)	54 (18)	54 (21)
Malawi	50 (41)	50 (46)	51 (50)	51 (55)	51 (57)
Tanzania	27 (23)	28 (23)	29 (22)	31 (22)	32 (21)

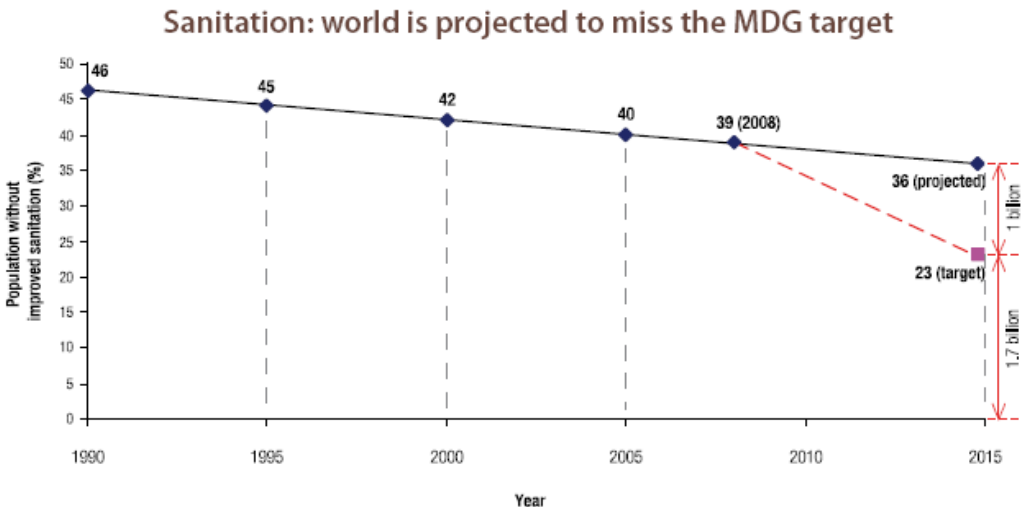
Source: Millennium Development Indicators (2010) - http://unstats.un.org/unsd/mdg/SeriesDetail.aspx?srid=669&crid=
* Rural sanitation coverage in brackets

According to the 2010 JMP statistics, many African and Asian countries are unlikely to achieve the MDG target for sanitation by 2015 if the current trends continue, as illustrated in Figure 1 below. In Sub-Saharan Africa, this target would not be met until 2072 based at the current rate of progress (Lancet, 2008). Some analysts in international development circles argue that the MDGs are based on misleading statistics.

There is indeed danger that targets based on misleading statistics about water and sanitation coverage could affect the achievement of the MDGs. In a Waterlines Journal discussion, Evans pointed out that making the system robust and universal has resulted in inaccurate reporting and over attention to hardware aspects of sanitation[2]. Kristoef Bostoen in response to Evans points out that although tools to measure sanitation coverage for the MDGs may be crude, sanitation coverage has become part of the political agenda. In fact, the evidence-based approach of the Global Water Supply and Sanitation Assessment 2000 represents an important step forward from previous efforts, which relied primarily on the response of government officials (McGranahan and Satterthwaite, 2006). The results though can at times be misunderstood to imply that household sanitation problems are not a major problem in urban settlements. However, despite all the limitations, the sanitation target provides a good basis for achieving the MDGs.

[2] For more information on sanitation monitoring, see Bostoen and Evans (2008) and Cotton and Bartram (2008).

Figure 1: Global progress towards the MDG target: trend in use of improved sanitation 1990-2008, projected to 2015



Sanitation and hygiene are fundamental to all the MDGs, not just in the rural areas but also in the urban settings, and they deliver broad development outcomes. Target 10, point out Cotton and Bartram (2008), is closely related to the earlier goals since sanitation and hygiene support and increase the effectiveness of other development-led investments. The interconnections of sanitation and hygiene increase the impact of health, education, livelihoods and other domains make them a cornerstone of development.

The next section is an overview of the different sanitation systems used across Africa and Asia. The section also looks at desludging, wastewater and solid waste management.

1.2 Sanitation facilities in urban settings

Introduction

There is a range of sanitation facilities in use all over Africa and Asia including the following: unimproved pit latrines, bucket latrines, chemical toilets, Ventilated Improved Pit (VIP) latrines, pour flush latrines, ecological sanitation, aquaprivies, septic tanks and waterborne sewerage. According to WHO/UNICEF JMP (2010), the following technologies are considered as "improved": connection to a public sewer, connection to a septic system, pour flush latrine, simple latrine and the VIP. Service or bucket latrines, public latrines and latrines with an open pit are considered "not improved".

The commonest sanitation methods in low-income areas are dry sanitation methods because they do not use water as a carrier. There is a chronic shortage of water in most African and Asian countries, making the use of waterborne sanitation an unrealistic option. The cost is also a major constraint.

Unimproved pit latrine

The ordinary unimproved pit latrine is the commonest form of latrine technology for the urban poor because it is affordable, simple to build and serves the purpose of excreta disposal and is used by as many as 201 million people across Africa (WHO/UNICEF, 2008). In Ouahigouya, Burkina Faso, for example, 96 percent of households use unimproved pit latrines (Koanda et al., 2006). In fact, up to 70 percent of people living in urban areas of Sub-Saharan Africa depend on this system for excreta disposal. Apart from cost constraints, the households in the majority of cases are also ignorant of alternatives apart from the conventional waterborne flush toilets. This form of latrine basically has a top structure around and sometimes over the pit as well. It is generally unlined where soil conditions allow, with a pedestal or a squat plate.

Households without separate bathing quarters use their latrines for this purpose. This practice, however, results in foul odours and the breeding of insects. Also, this practice greatly reduces the life span of the latrine. In most cases the pit latrines are also poorly constructed because the residents do not get technical assistance from sanitation agencies (see Figure 2 below). The greatest disadvantage of pit latrines is the possibility of contaminating groundwater, especially in many urban poor communities that are not served with piped water and where people depend on wells where the water table is high. In most cases the threat of groundwater contamination may not be as serious as the danger posed by not having access to sanitation facilities.

Figure 2: Unimproved pit latrine in an urban informal settlement in Ndola, Zambia

Photo by Martin Mulenga

However, even though a pit latrine may seem inadequate in most urban contexts, it is an option that households can build and manage themselves without depending on an external agency (Satterthwaite and McGranahan, 2007). It functions without a regular piped water supply (unlike flush toilets). In 1989, as many as 87 percent of the population in Freetown, Sierra Leone, and presently most of the urban population in Dar es Salaam, Tanzania, use pit latrines (Pickford, 1995).

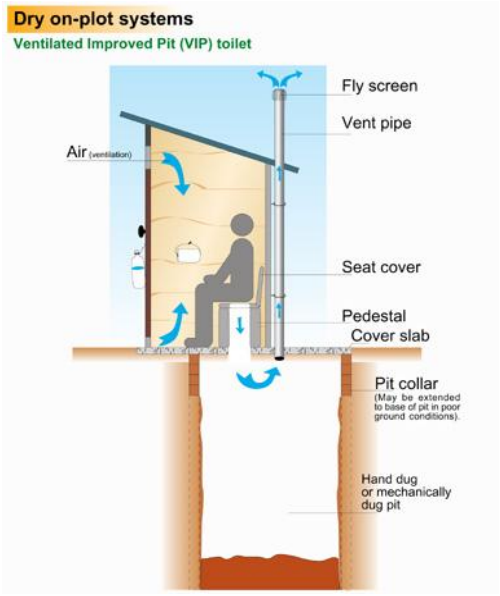
In Mozambique, the quality of the ordinary pit latrine has been improved by the use of a concrete latrine slab called the SanPlat. The dome-shaped SanPlat is easy to produce and has the potential to reduce the sanitary health burdens because it can easily be cleaned. Once the pit is full, the SanPlat can easily be moved to another pit. More information can be accessed at: http://www.sanplat.com. Pickford (1995) observes that simple pit latrines can be improved further if: the pit is deep and kept dark, so that it is unattractive to flies; the floor is smooth and impervious and is kept clean; the floor rests on a base which prevents surface water entering; and at least the top metre of the pit is lined to prevent collapse.

Ventilated Improved Pit (VIP) latrine

The VIP latrine is constructed just like an ordinary pit latrine except for a vent pipe, which is included in this system (see Figure 3 below). The vent pipe is included to improve ventilation and reduces smells significantly. The vent pipe, which is covered with a fly screen at the top, allows light into the latrine attracting insects into the pipe where they are trapped. In this system, human excreta are deposited into the pit where organic material decomposes and liquids percolate into the surrounding soil. VIP latrines are quite common in some parts of South Africa, Ghana and Zimbabwe. The VIP facility cannot be placed inside the house and has the potential to contaminate ground water if not correctly located. Most failures of this system have to do with poor user education and/or poor design and construction (DWAF,

2002). In some cases, the VIP can be built with two pits, so that when one fills up, the vent pipe and the defecation holes are sealed and the other pit used (see Figure 4 below). The principle of operation is exactly the same as for the single pit VIP, but however, the double pit version can have shallower pits and is often encouraged in places where the ground is rocky or groundwater conditions prohibit deep excavation (DWAF, 2002).

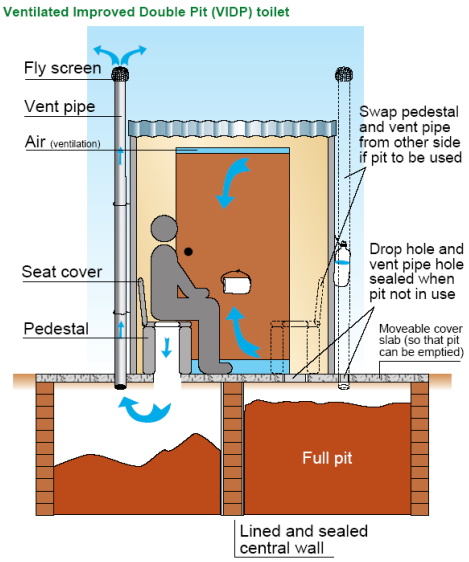
Figure 3: VIP latrine



Source: DWAF (2002) Sanitation for a Healthy Nation: Sanitation Technology Options. www.dwaf.gov.za/dir_ws/content/lids/PDF/Technical.pdf.

This technology though is reluctantly encouraged in urban settlements in some African countries. The argument is that the system does not meet the planning regulations, which require only waterborne systems to be provided in urban areas. In Durban, South Africa, thousands of households have been serviced with VIP latrines over the years although a problem has emerged over the desludging of these toilets.

Figure 4: Double-pit VIP



Source: DWAF (2002) Sanitation for a Healthy Nation: Sanitation Technology Options. www.dwaf.gov.za/dir_ws/content/lids/PDF/Technical.pdf.

Bucket latrines

In bucket latrine systems, excreta are collected in a bucket, which is placed underneath a latrine hole. The manual handling of the bucket emptying results in spillages and soiling of the bucket surroundings thus creating a health hazard to the users and to the nightsoil collectors. Such a system is also smelly because the excreta are close to the user. This form of excreta disposal is unhygienic and there are plans in many countries to discontinue it. Bucket latrines are used in many parts of Africa and most notably in West Africa. In SAEMA, an informal settlement in New Takoradi, Ghana, for example, out of six public toilets, five use the bucket system. In South Africa, the Minister for Water Affairs and Forestry confessed that, while the department was on track to rid "formal" settlements of the bucket system in a few years' time, there will still be people with this system because informal settlements mushroom and develop daily (Mail and Guardian, 2007). At the World Summit on Sustainable Development (WSSD) in 2002, the participating nations took a decision to eradicate all bucket latrines worldwide (Mail and Guardian, 2007) but at the current rate it does not look likely that such a feat will be achieved. In February 2008, the Mail and Guardian further reported that bucket latrines would remain part of the South African landscape despite earlier promises by government officials that by the end of 2007 they would eradicate the dehumanising bucket system in formal establishments. The authorities claim that their task is made more difficult by the ever-mushrooming informal settlements in urban areas.

Chemical toilets

These utilise a water-diluted chemical in a receptacle below the toilet seat to render excreta harmless and odourless. Chemical toilets are generally standalone units and not very common in Africa apart from South Africa because they are very expensive. In South Africa, they are provided to some informal settlements on a temporary basis by local authorities. The chemical toilets are not popular in informal settlements because the authorities rarely clean them. In most cases more than 20 families share one toilet. They are also common in South Africa on a commercial basis where they are hired out for large outdoor events.

Pour flush toilets

The construction of a pour flush toilet is similar to that of a pit latrine, except that it uses a pour –flush pan instead of a squatting plate with a hole in it. This form of technology is popular and much more common in Asia than in Africa. In Angola, however, it is increasingly becoming common because people there feel that it is a superior method to other cheaper alternatives. In fact, a number of people in Angola have been able to convert their ordinary dry-sanitation latrines to the pour flush toilet although the adaptation is rarely carried out properly without professional assistance. In this sanitation system, excreta are flushed down the pan with a few litres of water, and the water retained in the pan provides a seal against odour, flies and mosquitoes.

Figure 5: Pour flush toilet

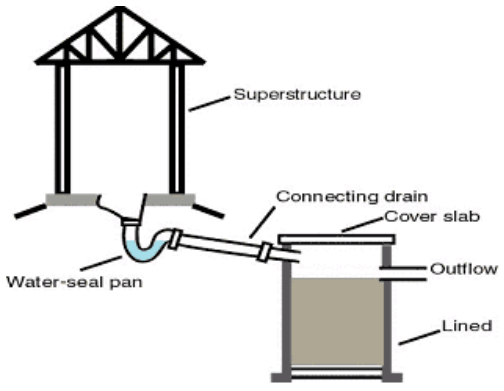


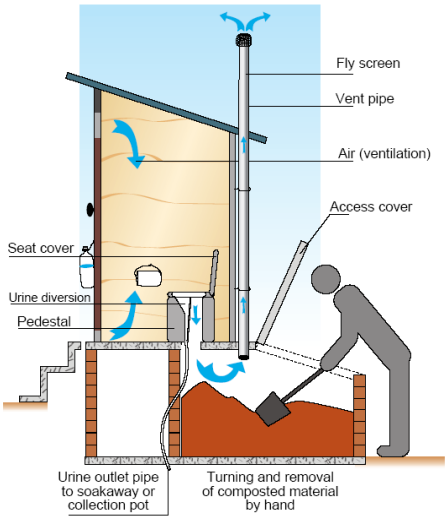
Figure 9: Pour flush latrine pan.

Source: UNEP (2008) On-site wastewater treatment systems. http://www.unep.or.jp/ietc/publications/freshwater/sb_summary/img/fig9.gif

Ecological sanitation

Eco-sanitation, which takes an ecosystem perspective, emphasises the closure of material flow cycles, including the recycling of human excreta and water from households. Returning urine and faeces to the soil makes wastewater treatment much cheaper (Satterthwaite and McGranahan, 2007). This system requires good management to control odours, keep the toilets clean, and avoid flies.

Figure 6: Composting/urine diversion



Source: DWAF (2002) Sanitation for a Healthy Nation: Sanitation Technology Options. www.dwaf.gov.za/dir_ws/content/lids/PDF/Technical.pdf.

Although ecological sanitation is not yet common across Africa and Asia, there are known uses in Malawian, Ethiopian, Zimbabwean and South African urban poor communities and rural areas. The system used in these countries is called the 'composting/urine diversion' toilet because urine and faeces are separated at the point of use. This helps in nutrient recycling and on-site decomposition (UNDP, 2006). In this system, waste is deposited in the chamber and dry absorbent organic material, such as wood ash, straw or vegetable matter is added after each use to deodorise the decomposing excreta or control moisture and facilitate biological breakdown (DWAF, 2002; Tilley, 2008). Moisture has to be controlled because if the contents become too wet, decomposition slows down and the vault may be difficult and unhygienic to empty. The facility must be designed in such a manner that the household can have easy access to the vault for emptying and manual turning of compost. Durban Metropolitan Council in South Africa has provided thousands of urine diversion toilets in low-income urban settlements.

One of the disadvantages of the urine diversion toilet is that it needs child seats to be provided to keep their urine and faeces separate. This system also requires regular emptying of excreta. Although human urine and excreta have been used extensively in many parts of the world as fertiliser in agriculture, there is a lack of studies on its public health implications especially in urban settings. SHARE could undertake studies to investigate the health risks of using ecosan toilets and how to avoid them. Another area requiring SHARE intervention is what to do with the waste in urban settings where agriculture may not be the main activity of the residents. Marketing has been floated as a possible solution, but how this can be achieved is unclear.

Aquaprivy

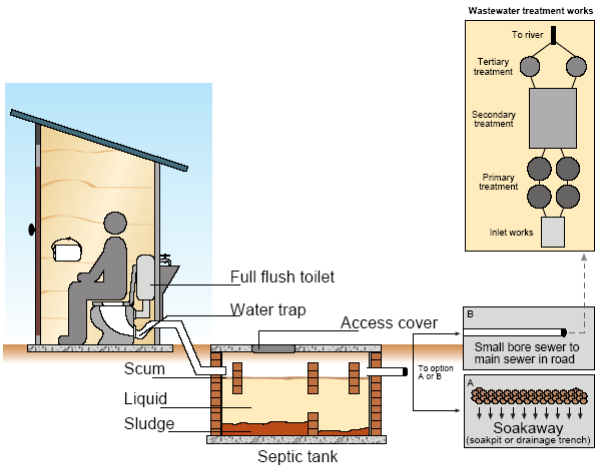
An aquaprivy is an underground watertight tank, filled with water, which is connected to a flush toilet or defecation hole. The tank is located directly underneath the toilet and separates solid matter from liquids (Pickford, 1995). The tank can also be used to dispose of greywater. Over time, the solid matter in the tank degrades anaerobically. A soak field absorbs the effluent;

however, sludge must be removed from the tank every 1-5 years (Herron, 2007). Usually a vacuum tanker or service crew performs this task. Examples of aquaprivies can be found in low-income urban areas of some towns in Zambia. Most of them were built over 40 years ago, but there is no record of new ones being planned.

Septic tanks

A septic tank is similar to an aquaprivy, except that a septic tank can be located outside the house. The toilet used with a septic tank also has a U-trap water seal. As with aquaprivies, septic tanks can be used to dispose of greywater and must be periodically emptied of sludge. They also require the use of a soak field for the secondary treatment of effluent. The disadvantages of this form of technology include cost, danger of contaminating groundwater and the comparatively large amount of water used in the operation of the system. The process of desludging the septic tanks also involves health hazards. Very few people in low-income settlements can afford this system and only richer residents therefore normally use it.

Figure 7: Septic tank



Source: DWAF (2002) *Sanitation for a Healthy Nation: Sanitation Technology Options*. www.dwaf.gov.za/dir_ws/content/lids/PDF/Technical.pdf.

Waterborne sewerage (conventional)

Although this is not a common system in many low-income urban poor settlements, some countries like South Africa have been able to provide some areas with this form of technology. Sewage from toilets flows in a system of underground pipes to treatment facilities or directly into receiving waters. Conventional sewerage consists of house connections to a reticulation sewer system. Reticulation includes pumping stations and rising mains to the trunk sewer system. Manholes provide access to critical pipe sections (e.g. bents, joints, connections) for maintenance and cleaning. Construction is based on conservative design criteria, which results in very high capital cost.

The number of pumping stations, manholes and required pipe diameters (and thus the cost of the system) largely depends on the demographic and topographic characteristics of the area. Skilled engineers, contractors and labour are required for construction as well as maintenance. There is no self-help potential. The cost of conventional sewerage systems is very high, up to ten times that of on-site sanitation (Sinnatamby, 1990). The high cost shows why very few cities in both Africa and Asia are fully served with waterborne sewerage systems. In Lagos, Nigeria, for example, only five percent of the city is served by a waterborne sewerage system.

Communal toilets

In many urban poor communities, sanitation facilities are provided communally due to limited space and due to the high number of tenants without access to sanitation facilities (Wegelin-Schuringa, 1997). These toilets use different technologies including the bucket system, VIPs and septic tanks. The use of public toilets is, however, problematic because they tend not to be maintained by the authorities and the fee-paying facilities may be unaffordable to the poorer residents. Elderly members of the community, the sick (especially HIV/AIDS patients) and children find such facilities difficult to access and many people end up reverting to unsafe means of excreta disposal such as the 'flying toilets' mentioned above. Communal toilets also pose security concerns for women and girls, especially at night. The majority of the pay communal toilets are filthy, especially those run by individuals. In some urban areas, NGOs have built public latrines which they run with the help of community-based organisations, but these facilities do not have the capacity to cover all the residents. Examples of such NGOs include Maji na Ufanisi and AMREF in Kibera, Nairobi. Notable NGOs that work with communities in the provision of communal toilets in Asia include SPARC and Mahila Milan (SDI affiliates) in India and DSK in Bangladesh.

Desludging

The problem with most of the on-site sanitation methods mentioned above is that they need to be desludged at some point. This problem has been identified as one of the major problems faced by the urban poor in many parts of Africa and Asia as the country visits to the SHARE focus countries show. At least 200 million tonnes of human waste go untreated every year (Lancet, 2008). For those residents with limited space around their yards, which is the case in most places, there is no option of building a new pit. The cost of having the existing pits emptied is, however, unaffordable to many. In a study carried out in Southern Africa, it was found that the cost of having a pit emptied privately in Durban was US$123. Heavily subsidised services by the eThekwini (Durban) Metropolitan Council cost only US$4.50 but this service was only available in legal settlements (Mulenga, 2003; Mulenga et al., 2004). In December 2007, Akim, a community leader in Sukura, Accra, Ghana, pointed out that it cost residents as much as £60 to have their KVIP latrines desludged by vacuum tankers. He further commented that some residents needed their KVIP latrines emptied at least twice a year. The prevailing exorbitant cost of emptying pits therefore creates problems for the urban poor who often cannot afford the charges. Pit latrines are normally emptied using either manual or mechanical methods. Thicker sludge can usually be dug out by hand while the more fluid waste can be removed with buckets. In Ouahigouya, Burkina Faso, for example, latrine emptying is mainly conducted by manual emptiers (70 percent) and mechanically (30 percent) (Koanda, et al., 2006).

The safest way, and most convenient way of removing fluid sludge, however, revolves around the use of vacuum trucks where atmospheric pressure forces the pit contents along a hosepipe into a vacuum tank. Because of the limited space around houses in most urban poor communities, use of conventional vacuum trucks is not feasible (see Figure 10 below). To counter this problem, UN-HABITAT together with Manus Coffey Associates developed a small and sturdy vehicle known as the 'vacutug' to operate in the more restrictive areas where conventional systems are unable to penetrate, such as in Kibera, Nairobi (TVE, 2000). The vacutug, however, remains a pilot project and its use has not been scaled up since its introduction. One of the major constraints has been its unreliability and dependence on imported spares (Black and Fawcett, 2008).

Another potable desludging machine developed by Steven Sugden, a member of the SHARE consortium is called the 'Gulper'. The Gulper is a manually operated pump for emptying the contents from wet pit latrines and drain interceptor tanks and it is ideal for the dense low-income urban settlements. It has been used successfully in the informal settlements of Dar es Salaam, Tanzania.

Figure 8: The vacutug

Source: www.memoireonline.com

Due to the high cost of desludging on-site toilet systems, some households depend on manual pit emptiers who normally carry out their work without any protective clothing, as can be seen in the picture below. In many cases, they operate at night due to the stigma attached to the job and there have been incidents, at least in Nigeria, where they have been stoned by children because of the work they do. Lack of protective clothing such as boots, gloves and face masks exposes them to all sorts of health risks. At times they also suffer cuts caused by sharp objects that pit users dump into the pits. Pit emptiers in Kano, Nigeria may charge between N1000 and N1500 per pit (Musa and Kwaru, 2007).

Figure 9: A frogman in a latrine pit in Dar-es-Salaam

Source: Rémi Kaupp (2006)

Although the people who desludge the pits and other toilet systems play an important role, the public health benefit may be minimal because the sludge is normally discharged of inappropriately in open drains within or just on the outskirts of settlements. There are, however, some local authorities who have provided facilities for the safe disposal of sludge.

The issue of waste management once toilets fill up is a crucial concern, and many local partners in SHARE focus countries would like to see the consortium address this challenge.

Wastewater drainage

No storm and wastewater drainage facilities exist in most of the urban poor communities in Africa and Africa. Where they exist they are open, and unlined, neglected and clogged-up with solid waste. In some settlements, they have become much wider and deeper than normal due to uncontrolled erosion. In most countries, the local authorities never clean the few drains that exist and individual community households are forced to clean the sections of the drains adjacent to their homes but the frequency of the cleaning is not consistent. Due to the lack of storm and wastewater drains, in many informal settlements during the rainy season some pit

latrines flood spilling excreta all over and ultimately endangering the health of the community members.

Foul water from bathing and other household purposes is disposed of in various places such as yards, roads and gardens. Some people even dispose of their grey wastewater in pit latrines. This practice, however, reduces the life span of the latrines because they tend to fill up much more quickly than when less water is thrown into them. Excess water in pit latrines also leads to strong odours. Discarding domestic wastewater indiscriminately also provides ideal breeding conditions for disease vectors such as mosquitoes and flies. The terrain on which most settlements are built and the layout of houses also make it impossible for water to be drained easily.

The need for adequate storm water and wastewater drainage in urban Africa and Asia is particularly more urgent now than ever before, due to the persistent floods in most countries brought about by changes in climatic patterns. In the past seven years, several African and Asian countries including Algeria, Angola, Bangladesh, Burundi, Ethiopia, Ghana, Kenya, Mozambique, Nigeria, Pakistan, Rwanda, Tanzania, Uganda, and Zambia have experienced severe flooding leaving a number of people dead and displacing thousands. Without urgent and significant investment, appropriate management and governance, climate change will add additional flood hazard onto drainage systems that are unable to cope with current rainfall (Satterthwaite et al., (2007).

Solid waste management

Solid waste management in most African urban poor communities is either erratic or completely non-existent. Garbage is collected irregularly, sometimes weekly, monthly or even yearly in the case of some Zambian settlements. And in other cases, sanitation agencies only collect garbage in low-income urban settlements when there is an outbreak of diseases such as cholera or dysentery. The lack of waste disposal facilities forces households to dump their waste indiscriminately or to burn the waste. Inevitably this causes a negative impact on the environment and health. Most roads in most urban poor communities are also in advanced states of disrepair and solid waste disposal trucks cannot reach them. There have been some innovative ways of dealing with such a problem at least in Durban, South Africa. Community-based organisations have been sub-contracted by the Durban Metropolitan Council to collect the waste from their settlements and then transfer it to places where the trucks can collect the waste.

Figure 10: Blocked wastewater drains in Kibera, Nairobi

Source: (http://www.oikoumene.org/index.php?id=2985)

In the next section challenges to poor sanitation in low income settlements are identified.

1.3. What are the causes of poor sanitation coverage?

There are several factors that lead to poor provision of adequate sanitation in both African and Asian countries including the ones discussed below.

Land tenure and security

A notable obstacle to service provision in low-income settlements in Africa and Asia is that of the lack of access to land tenure and security. Millions of urban poor in Africa and Asia live on land that does not belong to them (Teodoro, 2009). Consequently, urban poor communities are reluctant to invest in improved water and sanitation services when they lack security (Mulenga et al., 2004). Lack of home ownership is also a stumbling block to many residents because they are not motivated to make any sanitation investments to property that is not theirs. Owner occupiers have a direct interest in improving their sanitary facilities but those who rent their housing may face a complex decision. Many tenants fear that if they install a toilet, their landlord may increase the rent or object. In the case of squatters, installing toilets may imply permanence to the authorities and may increase the threat of eviction. The long term perspectives of landlords and their tenants can be quite different to those of owners - the incentives of landlords and their tenants to invest in improved infrastructure is generally much weaker (Schaub-Jones, 2005). It is difficult to induce landlords to invest, even where building regulations exist to oblige them to install adequate sanitation. There is also a possibility that if landlords are made to pay through plot charges or taxes they will pass on the charges to the tenants who may not be able to afford them.

Urban sanitation agencies are also generally not mandated to extend services to areas that are considered illegal even though large populations of people live there. Although some NGOs still operate in such places with no tenure and security, it is difficult for them to come up devise sustainable solutions.

How to deal with sanitation in situations where the majority of households are tenants is a key issue that the SHARE consortium may have to investigate. In nearly all the SHARE focus countries, this issue was identified as being critical to finding sanitation solutions in the urban poor neighbourhoods. In Kibera, Nairobi, reports Schaub-Jones (2005) 90 percent of the residents are tenants. Some studies show that one way of dealing with this problem could be through the provision of public latrines (Wegelin-Schuringa, 1997). Public toilets are, however, not always effective at meeting the needs of all the residents, especially the women and children.

Poor links between sanitation agencies and urban poor communities

Another major barrier to improved water and sanitation services in deprived urban areas is the lack of strong, transparent and effective linkages between sanitation agencies and the communities. The institutional and financial arrangements and the approaches adopted do not suit the socio-cultural context, nor the needs and priorities of the urban poor. As a result services do not meet the expectations of the people in urban poor communities or are not provided at all. Historically, points out Schwartz (2007), public utilities have not excelled at being customer oriented because of the way they have been funded over the years. A large number of utilities received most of their funds from government.

Although the aims of the Millennium Development Goals, for example, to halve the number of people without water and sanitation services by 2015 are admirable, such an approach will not work without a stronger focus on local institutions and processes (Toulmin, 2005). What is disturbing, particularly about debates related to ways of increasing sanitation coverage, points out McGranahan (2007), is that institutional as well as technical options are debated in the international arena as if they could be solved at that scale. Instead, the relevant decisions

ought to be made locally, preferably in arenas where the intended beneficiaries have influence. For instance, every year international conferences and workshops are held to find the best solutions to improve the sanitation coverage, but the people in the low-income settlements are never given a platform to express their views. And yet, there are many innovative examples of locally driven initiatives that improve water and sanitation provision in low-income urban areas such as local information collection through mapping, and community financing and organisation.

In the majority of African countries, there are still no clear lines of communication between governments or private sanitation agencies and communities. Most of the low-income settlements across the continent have some form of community-based organisations in place through which the sanitation agencies could work with communities, but this is rarely carried out. Another argument given by governments is that they would like to discourage more people from developing informal settlements. A study in Zambia and South Africa also noted that the inadequate information flow between policy-makers and grass root implementers has also worsened the situation (Mulenga, 2003). Local councillors who are meant to be a useful link between communities and local authorities have a poor record with communities because of their political inclinations and misrepresentation of community priorities. Without the active involvement of these constituencies, it seems unlikely that sanitation services can be successfully implemented in urban poor settlements.

A study in Southern Africa found that the voluntary nature of community participation in projects has a negative impact on community organisation (Mulenga et al., 2004). This has been exacerbated by the unfavourable economic situation in the majority of African countries which makes it difficult for community members to devote more time to non-paying community work at the expense of income-generating activities.

The lack of social integration and coordination in the urban informal settlements in Africa in general can also be blamed on organisations such as NGOs working in these areas, and failing to link up with other similar organisations working in the same areas and with similar goals. As a result, efforts in the past to resolve water and sanitation problems in the urban informal settlements have often been disjointed.

In some countries there are existing institutional units that are supposed to deal with service provision to the urban poor, but such units are normally understaffed and lack the skills to coordinate with other departments or institutions. An example is the Peri-Urban Section at the Lusaka City Council in Zambia which is responsible for running the affairs in the peri-urban settlements in the city. The Peri-Urban Section has a clear mandate to address development projects in the informal settlements of the city but, due to understaffing, lack of skilled manpower and financial problems it has been unable to fulfil its mission. Obstacles are also encountered due to the lack of interest, knowledge and commitment by the authorities to serving the urban poor.

In the absence of technical support from local authorities and other agencies such as NGOs, communities have remained poorly organised, making it difficult for them to be engaged in the process of selecting, financing, implementing and managing water and sanitation facilities based on expressed demand. The lack of capacity at local authority level has further exacerbated the problem.

Institutional issues

Another constraint to the provision of sanitation services to low-income urban communities is due to lack of capacity coupled with poor administration at institutional level. In many African countries, there are no institutions that deal specifically with sanitation issues. Absence of a specific institution or department with the responsibility for sanitation to poor urban areas results in their being left out. Sanitation provision spans sectors and the absence of key

brokering or coordinating institutions has led to serious service problems. The coordination of multiple institutions or departments in the sanitation sector is often problematic due to jealousies, misunderstandings and different priorities among different institutions and departments (Mulenga, 2003). Many government-run agencies in a number of African countries are currently undergoing donor-led reforms. Transformation is, however, a complex process needing a range of skills, which are currently in short supply in nearly all African countries. There is also very little understanding of how to communicate new responsibilities and implications to senior management and local government and how to be accountable to customers within a service delivery framework. These challenges are great even for the most skilled staff in developed countries, so several years of training and promotion are required for the necessary capacity to be developed and before the sanitation agencies will be effective in their work.

A lack of political will was identified by the UN Secretary General, Ban Ki-Moon , as the greatest obstacle to efforts to reduce the number of people without access to basic sanitation and safe drinking water. Without political will and champions who exert influence both over the public and politicians, the chances of increasing improved sanitation coverage to the urban poor in Africa will be minimal. Accelerating progress in improved sanitation provision rests on mobilising greater amounts of political will and capacity, especially in institutional reform.

Lack of information

One of the major reasons given by government agencies for their failure to extend services to slums and squatter settlements has been the lack of baseline data about these settlements. National sample surveys which are normally carried out in most of Africa and Asia do not generate data that are useful locally because their sample size is too small to provide statistics of relevance (Satterthwaite, 2005). National surveys do not identify inadequacies in sanitation provision and if the MDGs and other sanitation initiatives are to be met, details are needed of all households lacking adequate provision in each urban settlement. Some locally-based organisations in Africa and Asia have used locally-gathered or processed information to help drive local action. Some involves using high-tech equipment such as GPS technology, much of it is map-based, and almost all of it serves a clear strategic purpose.

To initiate action and dialogue with government agencies, the local organisations carry out detailed slum enumerations and surveys that draw information from each household and develop detailed maps with the participation of the residents. The maps provide a basis for detailed plans for development. Mapping is a very useful tool to gather information about existing conditions in areas where they work. Through mapping, communities have been able to gain more knowledge about their situation, and feel empowered to challenge and find solutions to the issues they face. Development Workshop, an NGO based in Angola, for example, has successfully prepared maps for most of the urban poor settlements in Luanda, and these now provide a city-wide picture that allows planning for city-wide systems, as well as providing the basis for community-managed investments in each settlement. OPP in Pakistan, SDI affiliates across the world, and WaterAid have also utilised community mapping in their work. Such mapping initiatives, though effective, are not utilised in many African and Asian countries in the quest to improve adequate sanitation coverage.

One of the key mechanisms used by SDI affiliates to enhance members' skills and capacities is exchange visits between communities (Ndezi, 2009). These are horizontal community-driven strategies that empower communities in various development processes. A programme of constant exchange visits between settlements in the same city, in different cities and different countries has resulted in the transfer of skills to thousands of slum dwellers all over the world. Together with the transfer of knowledge comes the growth of unity and solidarity, resulting in a stronger voice of the poor, at city, country and international level (SDI, 2010). In the recent past, government officials have been invited by SDI to be part of the exchanges and communities; officials participate on a level playing field so they learn together and return home

with new ways of doing business.

Although information technology has become more advanced and more accessible the world over, the same cannot be said about Africa and low-income settlements in Asia. The majority of the urban poor there do not have easy access to information. Even though there are a number of innovative sanitation solutions, not only in other parts of Africa but even within countries, disseminating this information is complex in most cases. This situation creates problems when it comes to attempts to scale up or replicate the initiatives.

Legislative arrangements

Despite the positive attention that the creative initiatives such as the Orangi Pilot Project in Pakistan have attracted over the years, very few projects have been replicated due to a number of reasons. In most countries the institutional and legal frameworks are not responsive enough to new initiatives. Often legal frameworks limit the type of sanitation systems that can be used in urban areas and as a result inhibit the possibility of using innovative systems such as the one used in Orangi. Existing legislation also tends to be dominated by water supply and few countries have specific sanitation policies that are distinct for rural areas, towns and the urban poor (Sijbesma, 2008;Lancet, 2008). Sanitation policies tailored to the needs of the urban poor would offer guidance to all stakeholders on how to best provide services to such communities. Urban informal settlements are in most cases considered illegal which restricts sanitation agencies to extend services to such places even if they have the capacity to do so. Such legislation also affects the investment in sanitation by households and NGOs because they are not guaranteed that the settlements will not be demolished by government authorities. In 2005, the Zimbabwean government displaced as many as 500,000 urban poor people from what it termed illegal informal settlements. Many people had lived in the settlements for over 10 years and invested in decent infrastructure.

Rapid urbanisation and population growth

Coping with rapid urbanisation and strong demographic growth rates and their consequences for cities constitutes another major challenge facing both Africa and Asia today. Without adequate planning control, rapid urbanisation and population growth leads to the development of urban poor communities. Urban poor communities are poorly serviced, resulting in problems in sanitation, water supply, air pollution, overcrowding and social issues (Watson, 2009). Africa is the fastest urbanising continent in the world and is well on the way to European levels of urbanisation – but without the economic base to sustain it (Kombe, 2005; Commission for Africa, 2005). Half of the world's population now lives in urban areas compared to 30 percent fifty years ago and only 10 percent a hundred years ago (Leitmann, 2003). According to the UN(2004), urban populations are growing at a much faster rate than rural populations; 85 percent of the world's population growth between 2000 and 2010 will be in urban areas, and most of this growth will be in Africa, Asia and Latin America.

Although concerns regarding rapid urbanisation tend to focus on large cities, a quarter of the world's population (and half its urban population) lives in 'small urban centres' with fewer than a million inhabitants (Satterthwaite, 2006). Hundreds of millions more live in same regions in 'large villages' that have urban characteristics.

Urban poor communities are growing more rapidly than formal urban areas. This rapid growth and informal status has resulted in low levels of environmental services. In most cases, government agencies use the lack of the informal settlement's legitimate title to land as a reason for their failure to provide services to such areas. However, the lack of these services threatens not only the public health and environment of the peri-urban areas, but also the formal urban areas as a whole. There is an urgent need to invest in sanitation for the coverage to improve. Urbanisation in itself is not to blame, rather the incompetence of governments in Africa that have failed to manage it.

Poor sanitation priorities

For sanitation agencies to be able to provide appropriate, efficient and sustainable services, they should understand the needs and priorities of the urban poor and design programmes accordingly. The urban poor face a wide range of problems, which they prioritise differently, given the different socio-economic environments in which they live. Several studies in Africa and Asia have shown that sanitation is not always given the highest priority by the urban poor due to other competing needs which they may find more important. Of all the services, water is typically the priority of local residents (Mulenga et al, 2004). And yet from a public point of view, sanitary improvements have a greater impact than water supply or quality improvements (Bateman et al., 1993). Even at institutional level, the neglect for sanitation is just as conspicuous in the majority of the African and Asian countries because it normally falls under the water sector. This, point out McGranahan and Owen (2006), is a reflection of the simplicity of water distribution and water being generally a more saleable commodity than sanitation. The poor sanitation priority has implications for the improvement of sanitation coverage and there is therefore need to develop strategies such as sanitation marketing in order to overcome this challenge. The declaration of 2008 as the International Year of Sanitation and the inclusion of sanitation in the MDGs is also a positive development that would help raise the sanitation profile on the international development agenda (Lancet, 2008).

Choice of technology

Standards are necessary to ensure that sanitation facilities are safe and serve the intended purposes during their lifetime. However, the tendency by many sanitation agencies and governments in Africa to limit the type of sanitation systems may push the cost beyond the reach of urban poor communities. Over the years, increasing criticism has been targeted at misspent revenues on inappropriate technology and Western-type provision of services that only meets the needs of the few (Potter and Lloyd-Evans, 1998). In Zimbabwe, for instance, the Urban Councils Act of 1996 compels sanitation agencies to provide waterborne sewerage systems only in urban areas, regardless of their limited resources and despite the inability of the residents in low-income areas to pay for such an advanced service. The more affordable on-site facilities such as VIP latrines are restricted to rural areas.

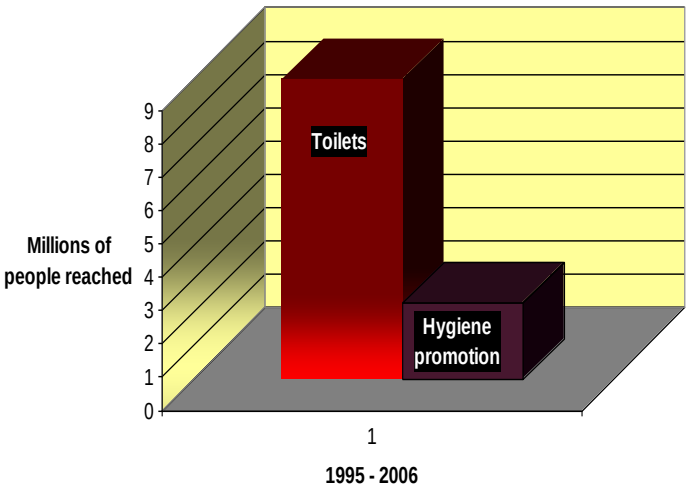
In terms of excreta disposal, there are various alternatives that are far cheaper than conventional waterborne sewerage systems and sewage treatment plants, but far more effective and hygienic than the standard pit latrine or bucket latrine systems (Hardoy and Satterthwaite, 1989). Some of these alternatives have been discussed above. The location of most informal settlements is problematic and renders almost all possible sanitation technologies unfeasible. The limited yard spaces and random layout of houses have also made it difficult even for some individual households to provide themselves with any form of sanitation system. These problems are coupled with the lack of assistance from sanitation agencies. In the cases where the agencies have intervened, they have opted for expensive technology that many urban poor cannot afford. Seeking to reach everyone with adequate provision does not mean reaching everyone with the same form of provision. Links are therefore needed between policy-makers, planners, designers and users in order to ensure that technologies meet the needs and capacity of the poor.

Health and hygiene in urban settings

It must be noted, however, that sanitation is not just about technology, but should take into consideration different dynamics existing in different countries. The tendency by most governments and international agencies has been to promote the construction of sanitation infrastructure at the expense of health and hygiene education. Many experts argue that good hygiene behaviour is actually more important in the reduction of sanitation-related diseases than even having access to improved sanitation facilities. In South Africa, for example, over 9 million people were served with sanitation facilities between 1995 and 2006, whereas only 2.9 million were reached through health and hygiene promotion programmes over the same period as indicated in Figure 13 below (Eales, 2007). In some countries such as Bangladesh, India,

Kenya, Tanzania, Uganda, Malawi, Sudan, Zambia, Egypt and Nigeria, a new approach known as Community-Led Total Sanitation (CLTS) has been adopted mostly in rural areas to among other objectives achieve open defecation free (ODF) communities. There are no examples yet of CLTS in the urban settings but SHARE could investigate the possibility of carrying out this approach with some of the Southern partners, especially as it has proved to be an effective tool for promoting good hygiene behaviour in communities.

Figure 11: Numbers of people reached with sanitation facilities and hygiene promotion



Source: Eales (2007)

Cost of sanitation provision

Most of the people in low-income urban settlements in Africa and Asia live in abject poverty and as a result cannot afford to pay significant tariffs for sanitation services. The fact that sanitation is also not a major priority in many urban poor communities as indicated above ultimately makes it difficult for sanitation agencies to recover costs. Low-income families have neither the money to invest in infrastructure nor the support of others who could lend them money. However, many local authorities in Africa do not have the resources themselves. Hardoy and Satterthwaite (1989) comment that many developing countries have such a shortage of resources and so little chance of developing a stable and prosperous role within the world market that it is possible to question seriously their viability as nation-states. The limitation of resources at sanitation agency level are further compounded by poor cost recovery mechanisms. On top of that, few countries permit sanitation agencies to charge tariffs that are both economically sensible and capable of yielding enough in revenue to meet expanding local needs (UN-HABITAT, 1996). Some countries have in the recent past put in place policies and plans to achieve full cost recovery. Schwartz (2007), however, notes that current tariffs in many countries remain below levels of full cost recovery. Utilities are as a result forced to depend on government or donor support for their operations. If in future, cautions Schwartz, the government or donor support is withdrawn or reduced because of political turmoil or other reasons, it will most likely have immediate impact on the performance of the utilities.

The limited availability of government resources primarily affects low-income areas that are unplanned. The acute shortage of funding for clearing the backlog and expanding the services as urban populations continue to grow rapidly shows why sanitation agencies need to change their strategies and work with local communities to come up with cheaper and sustainable sanitation solutions. Some local organisations and communities have in fact shown that effective sanitation solutions could be developed at a price that is affordable to the majority of households. The Orangi Pilot Project in Pakistan is a good practical example.

Currently, the majority of sub-Saharan African and South Asian countries depend on foreign aid

for investment in the sanitation sector. No week passes without reading in the newspapers that an African country has been loaned a substantial amount of money to improve water and sanitation services although there is little evidence to show improvements on the ground. Organisations such as the Orangi Pilot Project Research and Training Institute (OPP-RTI) in Pakistan, however, argue that loans tend to raise costs and give rise to wastage. OPP believes that when a community pays for a project on a purely self-help basis, where they provide or pay for the labour and supervise the work, costs are immediately cut – designs are simplified, methods of construction become cost-efficient, profiteering and kickbacks, as well as professional fees for contractors, engineers and supervisors are eliminated (Hasan, 2006).

SECTION II

2.0 What could be done to improve the sanitation situation in urban settings?

Reversing the current negative trends of sanitation coverage in urban poor communities in Africa and Asia may not be easy, but addressing some of the issues discussed below may help improve the situation. However, the suggestions in this paper should be applied with due regard to the prevailing local conditions.

Approaches to sanitation provision

Inappropriate approaches pursued by urban sanitation agencies in Africa have largely been to blame for the poor sanitation coverage in most urban areas. In order to reach a far higher proportion of those in need of services at a cost that is affordable both to the users and to the government, Hardoy et al. (1990) identify two preconditions. The first is developing the capacity within local government to work with local populations in identifying local problems and devising the most appropriate local solutions. The second is for local government to develop new ways of working with community organisations formed by low-income groups in their settlements. To improve the situation, what is needed in each urban centre, therefore, are more competent agencies in which those who are unserved or ill served have influence (Satterthwaite and McGranahan, 2007; Mulenga et al., 2004). The approaches adopted should ensure that the sanitation service provided meets community needs, socio-cultural characteristics and local practices. Use of community information gathering methods, such as mapping and demand responsive approaches, would ensure that community organisation and the people's needs are understood and considered in projects.

Sanitation agencies should also aim to solve sanitation problems within the context of poverty alleviation, by treating it not just as a health issue but as a first step to poverty alleviation, and as a condition for economic and social development. Sanitation projects are more attractive to communities if they create employment or provide training opportunities for local residents, and should be linked with health, education, and income-generating projects, since each household faces all these problems.

Small water and sanitation enterprises in low-income urban settlements have been neglected in the debates on private sector participation despite the fact that such enterprises have long had key roles in low-income urban settlements in both Africa and Asia. There is growing recognition that utilities and governments need to acknowledge the strengths of these enterprises and work with them rather than against them. There are constraints to achieving this, however, which include government regulations and price controls but they could be addressed if there is political will. If sanitation is to be improved, a demand must be created, with the financing to back it up. There are numerous ways in which local companies have become involved in sanitation services, whether by constructing sanitary platforms, emptying latrines and septic tanks, selling ecological sanitation systems, constructing sewers, or building wastewaterdisposal systems (McGranahan and Owen, 2006).

One of the major reasons given by water and sanitation agencies for their failure to extend services to slums and squatter settlements has been the lack of baseline data about these settlements. A survey and documentation of physical conditions, social actors and relationships, and economic conditions is very important because this will show what already exists and what needs to be improved upon. It must also be noted that, in the absence of such documentation, realistic and cost effective planning cannot take place (Hasan, 2006). Several locally-based communities and NGOs have used locally-gathered or processed information to help drive local action. Some information gathering involves using high-tech equipment, much of it is map-based, and almost all of it serves a clear strategic purpose.

To initiate action and dialogue with government agencies, the communities or NGOs may carry out detailed slum enumerations and surveys that draw information from each household and develop detailed maps with the participation of the residents. The maps provide a basis for detailed plans for development. Mapping has proved to be a useful tool for gathering information about existing conditions in urban poor communities. Through mapping, communities can gain more knowledgeable about their situation and be empowered to challenge and find solutions to the issues they face. OPP-RTI, for example, has successfully prepared maps for all informal settlements in Karachi, Pakistan, and these now provide a city-wide picture that allows planning for city-wide systems, as well as providing the basis for community-managed investments in each settlement. OPP-RTI has also prepared handbooks for local councillors to show them what is needed to improve services in their constituencies. Development Workshop, an NGO working in Angola, has also invested considerable time and resources in the development of tools appropriate for local administration staff and residents' committees to monitor service provision and to gather all available information in one place. Development Workshop also encourages local administrators to use the information generated locally to lobby provincial and central government for further allocation of resources.

The improvement of data collection at community level could also complement a new initiative that promotes *benchmarking* of urban water and sanitation facilities. Benchmarking involves identifying industry best practices, measuring and comparing one's own performance against others, identifying key areas for improvement and upgrading to match the best (WSP, 2007). In India for instance, it is reported that the Ministry of Urban Development is committed to institutionalising benchmarking because of its potential to improve urban services.

The success of sanitation projects is to a great extent affected by socio-cultural and political factors in poor urban areas. Sanitation should therefore use diagnostic studies to understand the needs, perceptions and practices of the urban poor. A well-known and proven method of collecting data about communities is through community mapping. The mapping can be done manually or with the aid of the Geographic Information System (GIS) as is the case in Angola where Development Workshop utilises the technology.

Although most agencies now accept the importance of health and hygiene promotion, the approaches which have been applied have not been effective in changing behaviour. There is a need to link health and hygiene messages with the cultural beliefs and practices of the urban poor. Messages should be based on the community's definitions and understanding of health, dirt and hygiene. Use of local animators and health clubs would help to encourage hygiene practices. The example of South Africa in the previous Section just goes to show how little prominence is given to hygiene promotion in sanitation programmes.

For links between agencies and communities to succeed structures and capacities should be put in place to facilitate community empowerment. This requires democratically elected civic structures, which are competent to manage the services established on the behalf of communities. The leaders have to be strong enough to promote community cohesion, while the structure and policy-framework should empower the ordinary community members to have a meaningful role in decision-making, holding the leaders and the system accountable and participating in the development of programmes.

Despite the importance of community participation being recognised in many African countries, there is still more work to be done as this directly influences the provision of sanitation services. Some officials still view community participation, as an obstacle to the speedy implementation of projects, especially the projects sponsored by donor organisations, which have to be implemented within a limited time frame. The difficulty of balancing the need for participation against the pressure for rapid improvements in service delivery is a major barrier to many sanitation agencies. The limited capacity at community level is also an issue that hinders the sanitation agencies in the implementation of community-based projects. Although many low-income settlements have some form of community organisation, some are poorly organised and lack effective leadership.

For decades external agencies have managed to work successfully with rural based-communities. Urban sanitation agencies, however, have failed to copy successful examples of rural sanitation projects partly because these lessons are difficult to replicate in urban settings where individual demand must be aggregated and community demand balanced against the needs and constraints of the urban system. The diverse nature of urban poor settlements also makes it difficult for community participation to be implemented. At times there is apathy within communities which, after being promised services that were never delivered, are no longer interested in any new promises from the authorities. Local government officials in some cases also view communities negatively because they believe that communities do not look after the services provided to them and are incapable of paying for them.

Whilst there are benefits of engaging communities in sanitation management, this can place a considerable burden on the already impoverished social organisations. In many sub-Saharan African countries, it has been observed that the local authorities have taken advantage of the new development strategy that encourages the involvement of communities in service provision. They have literally abrogated their responsibilities to the communities to whom they give very minimal or no support at all. Communities have, however, no capacity to undertake fully the responsibilities that the local authorities have imposed on them. At the moment, only development actors such as NGOs undertake some capacity building at grassroots level but their contribution is minimal due to the sheer size of most urban poor communities. This has led to slow delivery of services as most of the time is spent on capacity building activities. Experience in India and Pakistan shows that successful local sanitation initiatives tend to have the backing of well-performing NGOs or local governments.

Although at times, such approaches may enable the state and global institutions to abandon their responsibilities, it is increasingly being recognised that small-scale community developments are making a real difference to people's lives. In fact, poor urban communities across the developing world have been organising themselves through initiatives such as the urban poor federations and making their voices heard.

The institutional context

According to DFID (1998), to maximise the impact and prospects of sanitation programmes, institutional aspects need to be addressed comprehensively, as part of a collaborative approach with cooperating partners (McCommon et al., 1998). Strong and competent institutions are therefore required at all levels for sanitation services to be extended to the low-income urban settlements.

In areas where they exist, NGOs should strive to influence the relationship between communities and sanitation agencies. The relationships among sanitation agencies, NGOs and community-based organisations should be formalised, to ensure transparency and accountability. NGOs should also enlighten communities about sanitation and the different sanitation players. Civic education could also help to ensure sustainable improvements in sanitation services through effective community participation and accountability. Civic education is also vital in ensuring effective linkages between sanitation agencies and the urban

poor.

Experience across Africa shows that there are major problems in the administration of service providers, especially regarding the lack of skilled manpower and the unclear delineation and fragmentation of departments within local authorities that leads to inter-departmental rivalry (Mulenga et al., 2004). Departments still tend to function within their own areas of interest, and the implementation of policies, where they exist, that promote cross-sectoral actions has been slow. Communication breakdown between local authorities and central government and the communities was highlighted as an issue needing immediate attention in the SHARE country visits to Bangladesh, India and Malawi. Local authorities also lack financial capacity to enable them to extend and improve services to all the settlements under their jurisdictions. The existence and absence of certain policies have in the past been identified as affecting the extension of services in the peri-urban areas by the local authorities.

Coordination of multiple institutions or departments in sanitation provision is often problematic due to misunderstandings and differing priorities among institutions and departments. Sanitation provision spans sectors and the absence of key brokering or coordinating institutions has led to serious service problems. Absence of a specific institution or department with the responsibility for sanitation provision to the poor in most African and Asian countries results in their being left out. Budget constraints also foster intense competition between various departments and this often motivates against cross-departmental cooperation (Mulenga et al., 2004). The poor coordination of departments dealing with the provision of sanitation is an obstacle to the extension of sanitation services to low-income urban areas because the contributions of all those departments are vital to the smooth running of successful sanitation programmes.

There are other problems that need to be resolved if any meaningful partnerships between sanitation agencies and communities can be sustained. Due to limited capacity at sanitation agency and community levels, it may be very difficult to legally define their respective responsibilities and levels of accountability. Even for agencies that have community participation departments, very few have the ability to involve the public meaningfully at a very large scale and over a prolonged period of time.

Many African and Asian countries are undergoing a transformation in their sanitation sectors. Transformation is, however, a complex process needing a range of skills which are currently in short supply in most countries. There is very little understanding of the role and function of local government in relation to other levels of government and there are few interactions between the various line departments. There is also still very little understanding of how to communicate new responsibilities and their implications to senior management and the local council, and how to be accountable to customers within a service delivery framework. These challenges are great even for the most skilled staff and councillors, so several years of training and promotion are required for the necessary capacity to be developed and before the legal requirements will be effectively fulfilled. The South African local government structure, has for example, been undergoing changes since 1994; the changes have been so great that many local authorities are still struggling to cope with the new expectations.

The failure to understand community demand has also led to the continued use of supply-led frameworks in service provision. A case in point is that of the South African government, which continues to grant housing and sanitation subsidies in a supply-driven manner despite having policies that promote demand responsive approaches.

Many decisions made at central government level are not implemented due to the lack of resources to implement the decisions, demonstrating the weak linkages between policy and resources. There is no legal framework or effective strategies to guide the provision of sanitation services to the urban poor communities.

The clarification of responsibilities is critical to the success of an activity and its institutionalisation, advises Miller (1998). The institutional framework should clearly indicate the functions, roles, and responsibilities of institutions at all levels, and how they interrelate otherwise attempts to scale up may be affected. IRC (2001) further adds that not only should the roles and responsibilities be clear and agreed upon by all actors but should be backed by training as well.

Community management is one of the few viable solutions in an economically marginal environment with a low capacity government (IRC, 2001). Community management can play an important role in situations where the public or private business cannot be trusted and fails to provide services to poor people. Community management, insists IRC (2001), is the starting point to getting an improved water supply and sanitation system. From there it may evolve to other types of management systems as access to finance improves. Community management is often small scale and therefore facilitates transparency. Equally, notes IRC (2001), it can easily be adapted to local supporting mechanisms and make best use of potential capacity of all stakeholders.

The IRC (2001), however, cautions that community management requires significant capacity building, which requires substantial human resources. This is particularly so where the technology is complex or the size of project is large. Communities would therefore require regular support. Kähkönen (1999) also advises that coordination of activities within the community is not enough to ensure effective management of water and sanitation systems; coordination of activities between government agencies and water user groups at the community is also needed. Community management is highly reliant on external facilitation and support.

Community management models require institutional support. Arrangements must be put in place to provide institutional support for community management, including support for activities that the community may not be able to fulfil on its own. Building up national and local capacities is a complex process, involving institutions and people (UN-HABITAT, 1996). This is echoed by Abbott (1996), who claims that as a result of low levels of understanding of communities by authorities, implementation of community managed models are hindered in complex operating environments, such as those prevailing in urban informal settlements. However, in many countries in the South, attempts to improve institutional support to communities are also hampered by inadequate skilled staff, financial and technical resources (Mulenga, 2003).

Kirk and Standing (2006) note that the existence of a local NGO with pre-existing relations with the constituency appears to be a key factor in scaling up successfully. This is further supported by UNDP (2006) which observes that partnerships between communities and local governments under the umbrella of effective national strategies hold the key to scaling up.

All institutions involved in water supply and sanitation must be held accountable for fulfilling their responsibilities. Mechanisms, suggests IRC (2005), must be put in place – and given adequate support and resources – for communities to hold government and service providers to account for both water supply and sanitation policy. A legal and institutional framework, advises Wright (1997), provides the groundwork for all water and sanitation investments and should define roles and responsibilities of local government and higher tier governments, beneficiaries, non-formal institutions, government utilities, private sector enterprises, NGOs, and external support agencies. For community management to work, it is also important that the policy environment is conducive for community management and communities need to have the legal right to organise themselves (Ostrom, 1992).

The lack of capacity coupled with poor administration and coordination at both community and sanitation agency levels are major barriers to the implementation of sanitation services to the urban poor because sanitation is interdisciplinary in nature.

Legislative environment

Pivotal to the success of sanitation programmes in urban areas is the presence of a comprehensive sanitation policy clearly targeted at poor urban areas. The policy should clearly specify the ultimate goal and the roles and responsibilities of all agencies, including the poor communities themselves. Creating and sustaining enabling environments are the critical factor in establishing change, points out UNESCO and UNGEI (2005).

Sector policy must establish the vision and goals and define the norms and institutional model for water supply and sanitation provision in the country and legislation must support and enforce these (IRC, 2005:14). National policies for service provision should clearly outline the vision and goals for water and sanitation services for the whole country. Policy should support the adaptive management approaches at district and community levels to identify and implement locally suitable solutions. The legal framework should indicate how the policy will be enforced and facilitate the legal recognition of community-based organisations. Where genuine participation is a commitment, communities will be in a better position to set the terms of their engagement with state policy, and own and manage reform at local level (UNESCO and UNGEI, 2005). Support to leadership alongside consultative policy frameworks (Rose, 2003) can allow genuine local ownership with appropriate support and spaces for weaker members of communities to be represented.

All institutions involved in water supply and sanitation must be held accountable for fulfilling their responsibilities. The National Water Supply and Sanitation Council (NWASCO) in Zambia is a good practical example of a regulator created to monitor the performance of water and sanitation utilities. The regulator runs a Devolving Trust Fund (DTF) for service extension to urban poor communities. A key step to gaining government buy-in to sanitation issues is to demonstrate the linkages between poor sanitation and its impacts on human development, advises DFID (2005). DFID further suggests that an understanding of these linkages can often act as a starting point for government reform, and provide developing countries and donors alike with a compelling basis for ramping up investment in sanitation.

Political will

Political champions could play a critical role in helping governments deal with backlash against particular pro-poor policies. In the face of resistance and lack of widespread public support for increased service provision to urban poor communities, scaling up is likely to encounter challenges. For scaling up to happen, the capacity of the innovation and its champions to negotiate and advocate must be strengthened, so that space is generated for innovation within the public system, which is otherwise closed to change (UNESCO and UNGEI, 2005).

UNDP (2006) notes that despite the different policy paths followed by China and Lesotho, both countries have succeeded in scaling up water and sanitation services because their political leaders have sent a clear signal that water and sanitation should be part of the national development. UNDP furthers points out that although Poverty Reduction Strategy Papers provide a focal point for national plans, plans without credible and sustained political backing do not deliver the optimal results.

In terms of sanitation, the biggest barrier is the unwillingness of national and international political leaders to put excreta and its safe disposal on the international development agenda (UNDP, 2006). Without strong champions to raise awareness, mobilise resources and scale up the partnerships to make a difference, inadequate sanitation will remain one of the most powerful drivers of poverty, ill health and disadvantage – and among the greatest threats to the Millennium Development Goals project (UNDP, 2006).

The declaration of 2008 as the International Year of Sanitation was a positive move and especially if the awareness that was raised during that year can be sustained. Several African and Asian countries took up the declaration seriously as was observed by the various activities that took place during the week preceding World Water Day on 22 March. In Ghana in 2008,

for example, the Minister of Local Government, Rural Development and Environment, Kwodwo Adjei-Darko, promised that his ministry will put in place institutional and policy framework aimed at ensuring a sustainable delivery of sanitation in the country (Ghana, 2008). The 2010 Millennium Development Summit in New York also helped to remind governments and international agencies about the challenges that still need to be addressed in order to achieve the MDGs by 2015.

In Rumbek, Southern Sudan, the authorities have a deliberate policy that requires the construction of a pitlatrine as part of the formal allocation of plots. The practice if implemented properly may be an effective way of encouraging households to invest in latrine construction. The poorer people may, however, be denied the opportunity of acquiring plots legally if they are unable to pay for pitlatrine construction, especially if there are no measures in place to subsidise the poor. For such interventions to have a positive impact on health, they will need to be accompanied by health and hygiene promotions and adequate financial support.

IRC (2005) advises that mechanisms for ensuring good governance, accountability and transparency at all levels must be included in policies, legal and regulatory frameworks. At an IRC conference (2001) the participants concluded that scaling up at community level will only work if the management is trusted. They noted that this trust could be built through transparency, communication and democratic processes.

Decentralisation is essential to, and provides the framework for, scaling up community management. Corrales (1999) suggests that the incentives for the states to decentralise authority arise from particular situations – the need to bolster legitimacy when it is threatened, to transfer responsibilities in contexts of conflict, or when they lack the information for planning – in the absence of which states may lose interest in decentralisation. The civil service may in some cases strongly resist decentralisation, viewing it as a reduction of their powers and authority. A government that is willing to devolve control to the community needs an institutional and policy framework, especially to enable scaling up (IRC, 2001). Supporting arrangements for both implementation and sustainability must be provided, although they need to be dealt with separately and may involve different actors.

Sanitation priorities

One of the reasons given for low-sanitation coverage in low-income urban areas is attributed to the low priority accorded to it by residents. Many development professionals therefore believe that one way of overcoming this obstacle is to invest in sanitation promotion using approaches such as CLTS , which is described in Box 1 below. This approach, however, has mostly been carried out in rural areas and there are no examples of its use in urban settings. There are therefore questions as to whether this approach would work in urban areas considering the heterogeneous nature of most urban neighbourhoods.

Box 1: Community-Led Total Sanitation (CLTS)

The CLTS approach developed by WaterAid and the Village Education Resource Centre (VERC) in rural Bangladesh can also be utilised in marketing sanitation in deprived urban areas. CLTS focuses not on toilets, but on the shamefulness and unacceptability of open defecation. It also stresses communal responsibility and social pressure to put an end to this practice. To this purpose, external facilitators organise a transect walk to all local open defecation sites. This is followed by a public session in which people calculate the weight of human stools thus deposited over increasing periods of time. These actions lead to a rejection of open defecation and a commitment to an Open Defecation Free (ODF) community. Aided by local volunteers, the facilitators then encourage individual households to build and use the kind of toilets they want and can pay for, no matter how simple or temporary. Social pressure helps everyone to conform. The approach has become popular because it leads to quick results in toilet construction.

Source: Sijbesma (2008)

Sanitation policies should be more explicit on the use of on-site sanitation systems because they are the commonest in urban poor settlements. Fifty per cent of sanitation systems in Tokyo are on-site rather than sewered showing that this does not have to be an inferior technology (Black and Fawcett, 2008).

Offering people low-cost choices and stimulating local creativity to reduce costs is one of the reasons for the relative success of CLTS (Sijbesma, 2008). A number of African countries including, Ethiopia, Kenya, Tanzania, Zambia, Zimbabwe, Uganda, Malawi, Sudan, Zambia, Egypt and Nigeria have started using CLTS and sanitation marketing approaches and the results so far have been encouraging. However, most of the work has been carried out in rural areas. An example of sanitation marketing in Ethiopia is given in Box 2 below. International experience also shows clearly that comprehensive management of sanitation facilities, in association with water supply points, is essential for these to be hygienic and well-maintained, and therefore well-used.

Box 2: Marketing sanitation in Ethiopia

Sanitation coverage in Ethiopia is among the lowest in Africa. In 2003, the government started new approaches to sanitation in the Amhara region, seeking to increase coverage and ensure success to 100 percent of the population. Amhara region has a population of 19 million, and 90,000 children under the age of 5 die annually from diseases related to water and sanitation. When the project began, sanitation coverage in the area was just 3.8 percent with approximately 100 latrines being constructed annually in each district. By 2005, the average number of latrines being constructed per district was 26,400 per year, 90 percent of which are in use.

The main reasons for such dramatic increases in coverage were the mobilisation methods used. The approach shifted from the production and distribution of latrine slabs to social marketing. Increasing community knowledge and an understanding of sanitation and its linkages to health created demand for improved services and resulted in behaviour change. Working in an integrated manner with local leaders and extension agents, and using schools as the focal points for change helped to increase access and stimulate demand. The project focus was not just on individual behaviour change but on social change of the entire population, resulting in full coverage. Household subsidies were completely removed and appropriate and affordable technologies were introduced for which people were willing to pay.

Source: WHO/UNICEF (2006)

The technical and environmental context

In order to be effective, sanitation technologies should meet community needs and complement current practices. Communities should choose technologies and service levels which they understand, want and can afford. Technologies should be environmentally friendly and simple, so that the communities can manage them. Where possible communal facilities should be avoided; where this cannot be avoided, the responsibility for operation and maintenance should be clear.

The sanitation agencies also need to increase the capacity of the urban landscape, make improvements to urban drainage, adjust storm-sewer design, and improve land-use planning and zoning to avoid locating structures/buildings in risky areas (Satterthwaite et al., 2007), especially now when the world is experiencing severe weather conditions.

Technology must be appropriate for the physical and socio-economic environment. The range

of technological options available to communities should be sufficiently flexible to support both the achievement of full coverage at minimum service levels, and the ability to respond to changing demand for higher service levels. This is supported by Miller (1998), who comments that technologies used must be appropriate to the technical and financial capacity of the communities. Over the years, increasing criticism has been targeted at misspent revenues on inappropriate technology and Western-type provision of services that only meets the needs of a few (Potter and Lloyd-Evans, 1998). These sentiments are supported by Hardoy and Satterthwaite (1989), who point out that although many governments argue that they have been unable to extend services to all because of huge expenses involved, their claim is usually based on the cost of systems in Europe and North America.

Involving the local communities can identify low-cost appropriate technology to improve coverage, as with the Condominial programme in Brazil and the Orangi Pilot Project in Pakistan. Some progressive local authorities in South Africa have been offering a broader range of technologies, which could be more affordable to communities. The Metro Councils in Johannesburg and Durban have been trying out the low-cost condominium sewer systems (see Box 3 below).

Box 3: Shallow Sewer Project: Ethekwini Pilot Project

WRC WHAT DOES THIS STAND FOR? studies conducted with the support of Ethekwini communities have shown that the shallow sewer system, which has been implemented successfully in Brazil, Greece, Australia, the US, India, and become the norm in Pakistan, can be an effective low-cost solution to the contentious problem of sanitation provision in low-income and informal settlements in South Africa. The technology is also well-suited to community upgrading projects in high-density settlements. The concept involves relaxation of the design parameters of conventional sewerage systems, allowing for shallower pipe-laying depths, smaller-diameter pipes and flatter gradients. What is particularly attractive about the application is that very few residences need to be relocated to accommodate the infrastructure. The concept also includes the empowerment of communities to construct, operate and manage sewerage systems through acquisition of the necessary technical and organisational skills. A group of citizens, living together in a micro-drainage catchment area (condominium), work to install, operate and manage their own sewer system. This not only helps community members to better their circumstances, but also reduces the operational load on service providers. The local authority needs only to provide one connection to the catchment area. Like a conventional waterborne sanitation system, shallow sewers are gravity systems, with collector mains designed and constructed to full waterborne standards. Condominium sewers, however, are in areas of little traffic, so can be laid much shallower. The Ethekweni trials showed the cost of installing such systems to be about half the cost of full waterborne sewers. The systems have generally been well-received by participants.

The implementation and management of this project was based on the successful model used in La Paz, Bolivia. The two pilot communities, Briardale and Emmaus, were selected based on the results of a social evaluation of five potential communities in Ethekwini.

The benefits include:
a. In densely settled areas, this system may provide the only technical solution. Their shallow depth reduces the amount of excavated material, allowing access to areas which are not accessible to conventional sewers. The cost savings of this simple layout is substantial. Soil volumes are reduced; pipes are laid above the rock and water table, reducing costs even further.
b. This project provides the means for a "South Africanised" development technology. A range of models can be developed to suit a number of different situations.
c. This system improves the householder's quality of life by offering the convenience of health benefits of a water supply and waterborne sanitation to each home.
d. This system can be installed at significantly reduced capital costs –an approximate saving of 50 percent compared with conventional sewerage.
e. Environmentally shallow sewers have a similar impact to that of waterborne sanitation, protecting watercourses, people and the environment in general from human waste.

Source: Water Research Commission (2005)
http://www.wrc.org.za/archives/news%20archive/2005/sewers_apr05.htm

Experience in Brazil has, however, shown that there could be problems with the condominial systems as well if not properly implemented. Despite satisfaction among service providers and users in most Brazilian project cities, development experts have been disappointed by the unpromising outcome of a much anticipated feature of the condominial systems: user maintenance (Watson, 1995). What seemed to project engineers and development professionals a foolproof strategy for user involvement and cost reduction at the inception of the systems in the 1980s has in many cases failed to deliver on its promises. Most condominial projects that started off relying on user maintenance evolved away from it so that by the time they were evaluated in the early 1990s, some alternative form of maintenance was in place. Most of the problems faced were in the form of poor community participation including the following (Roszler, 2002):

- Users cannot depend on public agency to maintain the public components of the system, leading eventually to blockages in the communal or household components of the system.

- Residents often find it uncomfortable to communicate about personal issues of human waste.
- Users who do not know their neighbours cannot access neighbouring inspection boxes. Access to neighbouring inspection boxes is crucial for users experiencing blockages. Users with blockages must open and check their downstream neighbour's inspection boxes to discover the location of the blockage and to push it out.
- High resident mobility in poor communities offers households moving out a disincentive to maintain their connections. Households moving into the community after the initial implementation of the system may never receive any information on proper maintenance of the system.
- Maintenance problems accrue differently across the system. For example, low-lying households are privy to the brunt of maintenance problems.

Although the above initiatives may not necessarily be replicable in every situation, they nonetheless prove that the right blend of technological and scientific knowledge, decentralised managerial responsibility, and system costings that match community willingness and ability to pay, can and, with vision, will enable the poor to have access to improved sanitation (Black, 1998).

For sanitation services to be sustainable, it is imperative that consumers are involved in the selection of technology. However, the limitation in technological choices in urban areas by town planning regulations has had a negative impact in that it limits poor households to expensive sanitation systems. This issue is compounded by the bad physical locality of many informal settlements in many countries. The rocky conditions of settlements like Kanyama in Lusaka, Zambia, and Jeffsville in Pretoria, South Africa, may make it impossible for the construction of more affordable systems such as VIPs. In South Africa vast amounts of money have been spent on inappropriate technology and Western-type services that only meet the needs of the few. Meanwhile, the local authorities face financial problems and the use of expensive technologies erodes the possibility of servicing more communities using the little available resources.

There is political pressure to provide as many latrine facilities as possible within a limited time and of a particular technology. Donor organisations have a similar tendency to put emphasis on the number of toilets built using their money without any serious regard for community participation or sustainability. The donor and government interference in the way sanitation services are provided to the poor communities may act as a barrier because it removes the possibility of community participation in the choice and in the running of sanitation projects.

The issue of technical choice is one of the major obstacles to the extension of sanitation services in urban poor areas due to the insistence by the local authorities to provide only waterborne toilets. Conventional waterborne toilets are unaffordable to the majority of the poor and because of the high cost the authorities do not have enough resources to provide such a system to all the urban areas. This effectively limits the community or households to only one form of technology even if they may not have the ability to pay for it. Archaic planning laws must therefore be repealed and others updated to reflect the current situation.

Table 2 below provides a summary of sanitation options and costs. The table clearly shows that alternatives to the waterborne toilets are more affordable.

Table 2: Sanitation Options and Costs

Type of Provision of Sanitation	Cost Per Household (Dollars)	Benefits and Drawbacks
A flush toilet connected to a sewer or septic tank within each home plus piped water to home for personal hygiene	400-1500	Costs per person rise a lot if provision is made for sewage treatment using conventional treatment plants with high levels of treatment
Condominial sewers (the Orangi Pilot Project model of "component sharing")	40-300	With high densities and strong community organisation input, unit costs per household can compete with pit latrines.
An "improved" pit latrine or pour-flush toilet linked to a latrine within each home	40-260	No need for sewers. Improved latrines control smells better than conventional pit ones and limit or prevent insect access to excreta. Difficult to find space for this in most urban contexts; not suitable for multi-storey buildings. Children often frightened of using them (dark, large pit).
Eco-sanitation	90-350	In most models, no need for sewers. Many models with provision for urine diversion, which has advantages for nutrient recycling and on-site decomposition but usually adds significantly to unit costs.
Basic latrine	10-50	No need for sewers. If well managed, can be as healthy as more expensive options but difficult to find space for most urban contexts; not suitable for multi-storey buildings.
Access to a public or communal toilet/latrine (assuming 50 persons per toilet seat)	12-40	Effectiveness depends on how close it is to users, how safe to use at night, how well maintained, and how affordable by poorest groups.
Possibility of open defecation or defecation into waste material	none	Obvious problems both for those who defecate and for others in the community.

SOURCE: UNDP (2006)

The financial context

Financing of sanitation services and cost recovery are among the key issues that affect project sustainability. In Africa, many utilities are faced with financial problems resulting from low tariffs, poor revenue collection and inefficient billing (Mwanza, 2004). Tariffs should be based on the cost of providing services and the willingness of communities to pay for those services. Willingness to pay surveys and full cost accounting should be used to set tariffs which are affordable to the communities and that cover at least operations and maintenance. Given the level of poverty in poor urban areas, some subsidies are inevitable. However, the subsidies should be well targeted and should not introduce market distortions.

For the improved sanitation coverage to increase there is need for efficient cost recovery mechanisms in the communities. In several African countries, cost recovery measures are central to the government's promise to provide household sanitation. Currently, however, cost recovery is very low. At community level, there are problems related to the management of the cost recovery due to their limited capacity. The expectations of the communities to manage financial transactions in sanitation projects may contribute to unsuitability of sanitation services in urban poor communities. User charges are at times unpopular with government agencies because of the high cost of administration and widespread problems of misappropriation of cash by workers. It is therefore unrealistic to expect the communities which lack guidance and the skills to manage their finances, especially in an environment where the communities do not even trust their leadership.

Commercial utilities in Zambia have been created to take over the provision of services on a full cost recovery basis in line with the National Water Policy of 1994. These commercial utilities are, however, as yet untried and not fully operational and do not have a track record for service delivery. All the utility companies are staffed mostly by staff from local authorities of which the

majority lack the skills to operate in a private environment. There is therefore a big possibility that these commercial utilities will end up under-performing like the local authorities and this might impact on the possible extension of sanitation services by these commercial utilities.

Significant challenges remain, particularly relating to financing arrangements at both community and institutional levels. A major financial barrier to the provision of sanitation services to low-income settlements is balancing financial sustainability and poverty reduction objectives. Financial cost is already a significant barrier preventing many urban poor communities from accessing improved sanitation facilities.

Financing and cost recovery are key issues for sustainable water and sanitation schemes. Financial planning must take account of all costs associated with service delivery: planning costs, capital costs, recurrent costs and support costs. Service levels, advises IRC (2005:17), must be consistent with available financial resources.

The first priority for subsidies should be to ensure access by the poorest to a minimum acceptable service level. The community, with reference to local and national norms, must decide service levels. South Africa is one of the notable countries where access to a minimum level of service has been implemented. It must be noted, however, that households in urban informal settlements, which are considered illegal, do not qualify for services.

Local government also views the lack of resources, delays in procedure and their lack of autonomy as potential problems in their quest to extend services to all areas under their care. The active involvement of the community in what has traditionally been a public sector responsibility requires a more flexible approach, and legal and regulatory frameworks need to change to reflect this. In some circumstances, such as in large urban programmes, close coordination with users may be more difficult than in rural areas, but in all circumstances the financing mechanism selected must be carefully chosen to ensure that it meets the basic goals, e.g. in maintaining continuity of service, matching willingness to pay, allowing sufficient consumption to meet health and welfare goals and ensuring equity.

It has also become clear in Africa that private sector involvement, as it was envisioned and implemented in the 1990s, is not the ‘golden solution’ that many had believed it to be a decade earlier (Schwartz, 2007). Schwartz further points out that although private operators have expressed interest in engaging in the water sector of this region through management contracts, the willingness to provide capital is small.

Scaling up

Despite the observation in international development circles that the urban poor communities are badly served with water and sanitation services, the local authorities have in most cases remained unresponsive. The majority of urban poor have ended up building their own water and sanitation facilities which are often of poor quality due to lack of support from the local authorities. However, there are numerous small-scale models of successful sustainable community-managed water and sanitation projects, but most remain models. The common criticism of many such innovative water and sanitation projects is that they cannot deliver at scale. At one level, this is supremely unfair. In many of the most deprived urban communities, local groups collaborate to improve water and sanitation services, often under very difficult circumstances. Authorities and donors should be striving to find ways to support and link up to such initiatives, and not just criticise them for not going to scale. If these initiatives do not all follow the same reproducible blueprint, this may be because adaptability is a critical element of success. The obstacles to expanding community-driven programmes are as likely to lie in the policy environment as in the community-level strategies. Both the duration and nature of the community engagement vary considerably among the partners to this project, as do their strategies for going to scale. Among partners, there may be value in sharing strategies. It is also an issue of critical concern in the international arena, and one that could become the centrepiece of the project’s international profile.

There are few examples of donors who are supporting replication and providing adequate capital for well-conceived strategies, but many more are needed if the challenges facing the majority of the urban poor are to be addressed. If scaling up is to occur and proven ideas are to spread, support is needed at both community and national levels. Failure to work with more coordinated approaches, pooling resources to work with governments on a coherent agreed set of policy reforms has contributed to the failure to scale up successful water and sanitation projects. Project approaches have also been divisive of international agencies, often leading to competition rather than coordination, and resulting in fractured policy agendas. The funding patterns which promote short duration projects also conspire against building strong organisations ideal for scaling up processes. Further, there has been a concern that the project approach has 'tended to accelerate rather than retard the deterioration of local institutions and to undermine the foundation needed for long-term sustainability. Problems include bypassing local capacity development, creating small islands of excellence promoted under special conditions not shared by those institutions or providers outside the project environment, and reducing a push for nationally developed and owned policy strategies that signal long-term commitment to change.

Conclusions

This paper has shown that extending sanitation services to the urban poor communities in Africa's rapidly expanding urban communities will remain an enigma unless a comprehensive analysis of all the factors that impede implementation is undertaken at both community and sanitation agency level. This will depend mostly on more effective pro-poor local organisations being involved in determining what should be done, doing it, and monitoring progress. Satterthwaite and McGranahan (2007) observe that in many of the cities where provision has improved it was not the technological innovation that drove the improvements, but financial and management innovations, underpinned by responses to demands from those without adequate provision. Sanitation systems promoted should also take into consideration the local institutional, financial-economic, social-cultural, legal-political, and environmental context. Sanitation agencies should build on successful local sanitation initiatives because they have in most cases proven to be more effective.

Attitudes are slowly changing in some African countries, but in most cases the poor are still being marginalised. It appears that the sheer size of the problems of the unplanned urban poor settlements overwhelms the authorities. Negative official attitudes towards the urban poor continue to exist side-by-side with overall policies and poor people may want sanitation badly but they are powerless to express that desire in financial or political terms.

In the next section, current urban sanitation research gaps are presented.

SECTION III

Research gaps

This section identifies some of the key urban sanitation research gaps that SHARE could try to solve or highlight. These research gaps are drawn from the following sources:

a. SHARE country reports (Bangladesh, India, Malawi and Tanzania)
b. Discussions with sanitation experts[3]
c. Discussions with SHARE partners
d. Sections I and II of this report

[3] See acknowledgements

The research gaps identified in this section are not exhaustive and there is therefore room for SHARE partners to identify additional issues that they may find of importance.

Faecal sludge management

There is currently very limited accessible information available on successful pit-emptying initiatives and SHARE could therefore help identify and document successful examples of safe and efficient emptying of pits. What makes the difference: is it the latrine design, space, access, emptying technology? Even more important, which institutional mechanisms work and how do you ensure the sludge gets taken somewhere safe, rather than dumped in the nearest dump or swamp? Experience with the vacutug in Kibera shows that dumping sludge from pits in sewers may put the system at risk and alternatives options have to be found. What are the health impacts of shared latrines and how can they become more acceptable to JMP? What can be learnt from the Gulper initiative? Do big cities have the ability to absorb large increases in waste? WaterAid Bangladesh has in the past experimented with a pit emptying service using a Land Rover-mounted vacutug whereby middle class customers cross-subsidised the poor users, but this service was not sustainable. One of the reasons identified was the lack of entrepreneurial skills by the operators which made it difficult to recover the costs. What sort of help can SHARE provide to help overcome such problems?

SHARE could also build on other initiatives such as the waste management project by Sandec in Egypt. Sandec has undertaken a lot of work on faecal sludge management but there are still a lot of unanswered questions. At the municipal level Sandec is addressing the entire range of sanitation chain issues, especially the safe disposal/treatment and reuse options. This is a Swiss-funded 5-year project in the Nile delta. Any solutions developed to deal with faecal waste need to distinguish between the dense inner city slums and the far less dense peri-urban areas because the situations are completely different.

Ecosan toilets have been identified by a number of experts as a possible solution to the problem of faecal waste in urban settings. However, there are several questions that need to be answered in order to make this sanitation option viable. Who are the people investing in ecosan toilets in urban areas? Is it people with urban gardens or not? Is there a market for waste in urban settings? If there is no market for waste, what is the best way of dealing with the waste? Can ecosan be used in two storey buildings? Can sanitation models be developed in urban areas which can be used by NGOs and other sector players? How can urban sanitation be made a priority by the government? How can public toilets be made to work in markets and other public places? What are the potential pathogen pathways in ecosan toilets? Can a simple test be developed to determine whether waste has fully decomposed? What is the chemical, microbiological and pathogen content of ecosan waste at different stages of decomposition. What are the health implications arising from the way in which human waste from ecosan toilets is handled? What risk is posed by ascaris egg survival in compost from ecosan? What are the health benefits associated with increased yields resulting from the use of ecosan compost? How do ecosan users currently manage their latrines, what are the impacts of sub-optimal management on latrine performance and what are the implications for safe and sustained use? What are the agricultural benefits (e.g. is this primarily a soil conditioner rather than a fertiliser?) provided by ecosan compost and how can these be improved? What is the rate of dropout from ecosan use, what reasons underlie this and how can this understanding be used to help ensure that people are offered sanitation products that best suit their needs? What are the barriers to scaling up ecosan uptake and how can these be overcome? Is ecological sanitation feasible on a large scale?

Land tenure and home ownership

Lack of access to land tenure and home ownership in low-income urban neighbourhoods is one of the major barriers households face in the quest to gain access to improved sanitation facilities. How do you develop sustainable sanitation services areas where the majority of

households live in rented accommodation or on land that does not belong to them? What effective mechanisms could be developed to oblige landlords to provide improved sanitation facilities to their tents?

SHARE could potentially build on studies by BPD Water and Sanitation. Practical Action has undertaken some studies in Africa on the provision of sanitation in areas where most of the households are tenants. SHARE could also identify and document successful tenure options that have worked elsewhere. SDI is very experienced in this area and could lead the initiative.

Community and public toilets

In so many urban places there is neither the money nor the space to meet the ideal of one sanitation facility per household and public or community toilets is the only feasible solution. But what can we learn about those facilities shared between families? What are the usage patterns of shared toilets? Do women and children use them or is their access restricted? A lot of attention has been directed towards public and community toilets, but what about toilets shared between two or three families, or between four or five families? What's going on in "shared facilities" in the SHARE focus countries? When do they work and when don't they work?

Infant or child stool management

Even in places where sanitation facilities exist, it is not uncommon to see children defecating in the open. In the focus countries, SHARE could try to document what is going on. How is children's excreta handled? What are the risks? What could be potential interventions?

Small scale independent providers

In most low-income urban settlements, sanitation agencies do not extend services to such places and as a result, an informal market has developed that has taken advantage of the lack of services. Informed intervention is however, difficult without knowing more about what brings sanitation entrepreneurs into the market to begin with. Is sanitation seen as a business opportunity in itself, or merely an extension of other activities? Does it depend on family or professional ties? What impact does stigma attached to sanitation have on the development of the sanitation market? What role do barriers to entry as well as barriers to exit play in defining the market? How can small scale providers be incorporated in the bigger sanitation picture? There is currently a poor understanding of how robust sanitation businesses are and whether they have the capacity and ambition to grow. SHARE could usefully explore what support sanitation providers really need: training, access to credit, technical advice? Action research with communities, small scale independent providers and municipalities could help answer some of these questions.

Community-Led Total Sanitation (CLTS) for urban contexts

CLTS has proved a major success in rural areas of many countries including those in the SHARE focus countries. Although there are no equivalent examples in the urban settings, several of the most highly regarded urban sanitary programmes, including those of OPP in Karachi in Pakistan and Mahila Milan in Pune and Mumbai in India, have developed out of community-led initiatives, with supply and demand negotiated together, locally. Under what conditions are such initiatives most likely to succeed? How can federations of urban poor groups, including the affiliates of SDI, support the sort of sanitary improvements their members desire? What can local governments do to identify and support successful initiatives?

In a number of SDI affiliates, organized groups formed by the urban poor (especially savings groups) are directly engaged in improving sanitation either through house construction or improvement, or through their involvement in the design, construction and management of communal toilets and washing facilities. An increasing number of city or municipal governments are now working in partnership with these organisations. Collaborative research will assess the effectiveness of these initiatives, compare their organisational and technological models, investigate their capacity to scale up to the city level and identify health impacts.

Legislation
What kinds of policy and legislative environment will best serve the urban poor, where local government is not yet equipped to provide a reliable and affordable sanitation service, and must work in tandem with others?

Is improved regulation – pro-poor or otherwise – even relevant, when the key service partners are generally informal, small-scale and so numerous as to make conventional regulatory approaches prohibitively expensive and unworkable?Although sanitation entrepreneurs are numerous, regulatory frameworks and mechanisms tend to assume that sanitation is provided by a state utility. There is little guidance on how regulatory frameworks (policies, by-laws, standards, strategic planning) can support the activities of independent sanitation providers. Ways to adapt regulatory frameworks to the actual reality of independent sanitation provision need to be found.

Institutional issues
Two areas of concern in relation to sector coordination were raised during the country visits to Bangladesh and Malawi. These were lack of coordination between implementing agencies and lack of coordination between agencies engaged in applied research. Related issues raised include the lack of a strategic plan for urban sanitation and the lack of an agreed framework for monitoring and evaluation. There may be an opportunity for SHARE to identify and build on existing networks to increase and improve the exchange of information and extent of coordination within the sector. The overlaps, lack of coordination and poor clarity of roles are an impediment to the implementation of urban sanitation programmes because sanitation is generally institutionally complex due to the large number of players involved. How can the failures in urban sanitation planning be addressed at a city-wide level and is there a role for SHARE?

Going to scale
One of the notable failures of urban sanitation has been the inability to scale up some of the successful initiatives. In the SHARE focus countries, is there substantive evidence of success in scaling up? To what extent can community groups learn from each other in the scaling up process? To what extent can networks or federations of community groups help drive water and sanitary improvements? Can best practices or common principles of engagement be promoted by third parties? What role can local/international NGOs play in supporting community-driven initiatives? Can governments be convinced to support community-driven initiatives, and if so what should this support involve in practice? What of international donors? What are the resource constraints in scaling up? What are the knowledge/informational constraints to scaling up? What are the costs of going to scale and who bears them?

Information
With the water and sanitation targets of the Millennium Development Goals, considerable international attention has been devoted to monitoring the number of people in different parts of the world with and without reasonable access to improved water and sanitation. The international basis for such estimates is acknowledged to be very weak. Much could still be done to improve their accuracy and international comparability. Yet it is doubtful whether they could ever reach a point where they provide a useful basis for local action, or for measuring local progress. National sample surveys may eventually serve global and national monitoring but cannot realistically be expected to identify where the inadequacies in provision actually are and who suffers from them. Moreover, the goal of international comparability serves to divert attention from location specific issues, and the notion that comparable estimates of adequate water and sanitation provision can ever be obtained may be an illusion.

While comparable estimates of adequate sanitation provision may be illusory, there may be comparable lessons to be learned from local information strategies. From a wide array of examples of the effective use of information to drive local action, it may be possible to answer a variety of questions, many of which relate to who controls and who engages with the

information. For example, under what circumstances is household enumeration a useful tool for community groups and the NGOs that support them? What sort of technologies and tools help, rather than hinder, local engagement with information systems? When can providing information to the press help drive improvement? Can participatory mapping be used to challenge formal mapping systems? Can formal mapping systems provide the basis for constructive negotiation between local authorities/utilities and community groups and/or NGOs?

Working in partnership

Partnership has been a buzz word in development circles, though it is now somewhat unfashionable. Community-driven water and sanitation improvements are very limited if they are pursued by communities acting on their own and indeed, the same applies to private, market-driven improvement efforts, and to government-driven schemes, at least when it comes to improving conditions in the most deprived urban areas. Much depends on the relations between these communities, government authorities and water and sanitation providers, both formal and informal.

Under what conditions is it possible to improve provision with a clear division of responsibilities, including community responsibility for part of the system? What sort of strategies work for community groups trying to get public utilities to improve provision? And does it matter if the utility is privately operated? How can NGOs avoid simply presenting themselves as the mouthpiece for the communities they work with, and actually give voice/influence to the local residents? What role can community organisation play? How is it possible to distinguish between constructive engagements between government authorities (or utilities) and groups of the urban poor, and empty consultations? Are city-wide sanitation strategies feasible and how can they be achieved?

Health and hygiene

The problem of risk perception and behaviour change is a critical area which needs further probing. What are the health impacts of shared latrines and how can they become more acceptable to JMP? What constraints do facilitators of sanitation and hygiene face? How can health and hygiene behaviour be sustained in urban settings?

Sanitation priorities

Despite the importance of sanitation in the battle against poverty and ill-health, it attracts very little political prioritisation. What can be done to sensitise governments, donors, multi-lateral agencies and civil society agencies about sanitation? When does sanitation become a priority for poor households? How do you stimulate household demand? How do the urban poor make decisions on sanitation? How can DIY sanitation become a product and how do you make it work? Is there a role for big business in improving urban sanitation? Is there a commercial solution to urban sanitation? How do you deal with urban sanitation in small towns and big towns and cities considering their differences?

Equity

Provision of sanitation in urban settings is already a problem but what is an even bigger challenge is ensuring that there is equitable access to this service by everyone. A number of research questions therefore need addressing in order to overcome this problem. Are the facilities accessible to all – children, women and the physically challenged? If not, what can be done to ensure that sanitation facilities are accessible to all? To what extent do pay toilets exclude the poor from accessing them? To what extent do the low-income households have access to planning and decision-making for sanitation services? To what extent can commercialisation bring about social equity for sanitation users as well as improve the service provision? To what extent are people in small towns excluded from accessing services that may be available in bigger urban centres? Comparing households with sewer connections to those using on-site sanitation what is the amount spent annually on sanitation both as an absolute figure and as a percentage of household income?

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