SANITATION IN PERI-URBAN AREAS

5 CASE STUDIES
based on research carried out

by

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CASE 1

THE BALDIA SOAKPIT PILOT PROJECT

Excerpt from : From Sanitation to development: the case of the Baldia soakpit pilot project by Quratul Ain Bakhteari and Madeleen Wegelin-Schuringa, IRC International Water and Sanitation Centre, 1992.

The Baldia Soakpit Pilot Project was a community-based project for development with social and technical dimensions, carried out from 1979 to 1986. Its objective was to introduce improved on-site sanitation in Baldia, a low-income area in Karachi, Pakistan.

Baldia is a peri-urban area located on arid land at the fringe of Karachi. The soil is made up of sand, silt and gravel and in some areas rocks are encountered at four meter depth. At the time of the project, water was supplied in public standposts for about two hours every second day. Most houses had bucket latrines which were emptied by sweepers and the contents collected in containers attached to a bicycle. When these were full, they were taken to a disposal point or dumped onto a nearby drain, gully or on vacant land. The traditional latrines that existed had off-set pits located in the street and a depth from two to eight meters and were filled with stones to prevent collapse. A pipe was connected to the latrines inside the compound and frequent blockages occurred.
As part of a plan to regularize and improve the area under a new law, an assessment was made for the improvement of sanitation conditions and water seal pour-flush latrines with double pits were recommended as the most appropriate method for human waste disposal. A project team with people from two local NGOs implemented the project for UNICEF, the municipal authorities were not involved in the implementation of the project because on-site developments were considered outside their concern.

Neighbourhoods for project implementation were selected on the basis of socio-economic and environmental conditions by the project team. During the first visits, contacts were established with existing community organizations, and the objective of the project was explained. Then a visit to the demonstration area (where the project had started and had been very successful) was organized for those who were interested and discussions were held with the sanitation committee there, latrines were shown and the technology explained. The fact that people who already had a latrine were satisfied with it, had a tremendous impact on interest in the new technology.

The organizations were asked to establish a sanitation committee, if they wanted to be included in the project. This sanitation committee was responsible for the planning and organization of the work in their neighbourhood, in addition motivation visits were made by the community organizer. The project had established a maximum amount of subsidy per ward. Four categories of assistance to households were distinguished, varying from full subsidy (for the poorest households) to technical assistance only (for those able to pay). The selection of households for each category was left to the sanitation committee and those wards which had the highest number of people interested, had a priority for inclusion. Thus there was an incentive for the sanitation committees to motivate as many people as possible to contribute to the construction of the latrines. There was also an incentive to reduce the cost of latrines because with the same total amount of subsidy per ward, more latrines could be built.

In all, six types of latrines were constructed during the project and the cost was reduced from Rs 2000 per unit to Rs 800. At the end of the project a total of

1146 latrines were constructed with subsidy and 3721 latrines with only technical assistance, while for every dollar spent in latrine construction by the project, the community spent almost three dollars. Moreover, because local masons were constructing the latrines and were very motivated to spread the technology which they had helped to develop, the latrines were also constructed outside the project in other low-income areas. To date (1990), most soakpits are still in use and functioning well. The quality of construction was such that not many problems in operation and maintenance have been encountered.

However, a major obstacle to the sustainability of the soakpits has been the construction of open drains in most roads to provide a means for sullage disposal. Because
when pits had to be switched or emptied often masons were called. Masons in some areas then advised the owners to let them construct an outlet into the open drain, assuring them that this eliminated the need for emptying and was therefore cheaper. This way they earned an additional income. The drains have become a source of pollution and many residents now want a (small bore) sewer system. In fact, the municipal authorities are planning to construct these sewers, but will make use of the exisitng soakpits wherever possible.

CASE 2

OPERATION AND MAINTENANCE OF SANITATION SYSTEMS IN URBAN LOW-INCOME AREAS IN INDIA

Excerpt from the final report on the research project on operation and maintenance of sanitation systems in urban low-income areas in India and Thailand, carried out by Human Settlements Management Institute (Delhi, India), National Housing Authority (Bangkok, Thailand), Chiang Mai University (Chiang Mai, Thailand), IHS Institute for Housing Studies (Rotterdam, The Netherlands) and IRC International Water and Sanitation Centre (The Hague, The Netherlands), November 1993.
In India, the study was carried out in ten towns; the excerpt is from the chapter on the interpretation of findings and operational recommendations.

1 TECHNICAL ASPECTS

Standardization of design to be adapted to local environmental conditions

Although technical adaptations of the standard double pit design exist for different soil conditions, all double pit systems constructed under the different programmes follow the same standard design. While this has certain advantages such as facilitating planning, cost calculation and supervision of technical construction, it also has a number of distinct disadvantages.

First of all, local soil conditions are not sufficiently taken into account. In Shajapur, the clayey black cotton soil does not have a sufficient leaching capacity, with the result that the pits fill up quickly. Both local contractors and beneficiaries were aware of the conditions of the soil, but did not have the technical knowledge to improve the design in such a way that hygienic standards are ensured. Experiments with the design should have been carried out on location by technical experts and local contractors before starting the programme on a large scale.

In Silchar, Mangaldai and Agartala, high groundwater tables lead to submersion of the pits during the monsoon time. Although high groundwater tables do not necessarily negatively affect the process of decomposition in the pits, the overflowing of pit contents when the pits get submerged is definitely not desirable. Moreover, construction of latrines becomes more difficult and where groundwater is used for water supply, this supply will become polluted. The contents of the pit also do not dry and cannot be shovelled out. The raising of the pits should be indicated in towns where groundwater levels are high and concrete rings could be used for pit lining to facilitate construction.

Standardization usually not only applies to design, but also to construction materials used for the pits. Even in areas where natural stone cut from rock is cheap and abundant, bricks are used for the pit lining. These are always more expensive than stone and where they are not readily available, extra cost for transportation is added. Apart from stones as a material for pit lining, other local materials may well be suitable, such as impregnated bamboo or logs.

Standardization does not promote experimenting with design and materials used. This not only applies to adaptations to local soil conditions and materials used, but also to the dimensions and the shape of the pits. The fact that in 70% of the double pits in the sample, the first pit had not even been filled after 5 years, indicates that the capacity of the pits may be too large. However, it was pointed out in the seminar that the pits are likely to fill up faster after the first emptying because of a gradual reduction of the leaching capacity of the soil

surrounding the pit. Also, the number of actual users may be less than the pits are designed for, explaining the low pit filling rate. A minimum acceptable design interval between successive manual desludging could be one year. But to provide flexibility in removing the pit contents, it is advisable to keep this interval at two years.

Sufficient water availability to be ensured

The majority of the respondents use more than two litres of water per flush and most use one or more buckets of water to clean their latrines. In four towns more than half of the respondents professed to have shortage of water for flushing of their latrines. Although most towns officially have an average production of water of more than 40 lpcd, this amount is obviously not available in all parts of the towns, and specifically not in the low-income areas where the sanitation programmes are carried out. In a number of towns this shortage of water leads to non-use of the latrines. The use of grey water (without detergents and chemicals) for flushing could be promoted in these towns. Where availability is too low even for that, it may be necessary to discontinue promotion of pour-flush latrines and promote a dry technology such as VIP-latrines instead.

Superstructures to be provided or not?

In three towns, Coonoor and Magadi and part of Srikakulam, the superstructures were provided as part of the programme and all superstructures are made of permanent material. But many latrines are used for other purposes than intended. In Shertallai, the percentage of permanent superstructures is lowest, but latrine use is the highest in the whole research.

There is a discussion going on whether or not superstructures should be included in all low-cost sanitation schemes. The extent of non-use of latrines found in the follow-up survey, supports the importance of this discussion. Those in favour maintain that if superstructures are included, the latrines are more likely to be used and less likely to get choked by dust, leaves or other debris, eventually leading to non-use. So far, the superstructures which are constructed as part of the programmes are all made of permanent materials, which has the advantage that they last long, but also has certain disadvantages.

First of all, permanent superstructures are expensive, thus increasing the overall cost to the government or the beneficiary (if loans are paid back). Secondly, if the superstructures are much better than the houses of the beneficiaries, they may well not be used as latrines but for other purposes such as storeroom or bathroom. This situation was observed in Magadi and Coonoor. To reduce costs and avoid the latrines being used for other purposes, it may be possible to include superstructures of less permanent materials, which the beneficiaries can upgrade themselves at a later stage.

Those against including superstructures argue that the latrines are already subsidized to such an extent that the least the beneficiaries can be expected to do, is to construct a superstructure. This would not only reduce the costs to the government, but could also be used as a yardstick to ensure that those receiving a latrine are indeed motivated to have one. If awareness campaigns have not been carried out and motivation is low, the superstructure may not be constructed at all because beneficiaries are not willing to invest in a latrine. This was indeed the case for 40% of the households (covered in the follow-up survey on the extent of non-use), who did not use their latrine.

However, the type of material used for the superstructure does not need to be expensive and permanent, as long as the superstructure gives sufficient privacy and protection against rainwater and debris entering the pans, as has been done in the sanitation programme in Shertallai. If demonstration latrines are being built in the town to ensure a technical design adapted to local conditions, superstructures of local specific materials should also be included as an example. The beneficiaries could be requested to have materials for the superstructure in their possession before work on the substructure is started, in order to assure that the superstructure is indeed built.

2 USER RELATED ASPECTS

Motivation campaigns and user involvement increase success

The main issue with respect to the beneficiaries of latrine programmes, is the lack of awareness creation campaigns and involvement of the communities in the implementation of the schemes. Only in Shertallai, a systematic effort was taken to involve the community. This resulted in a successful sanitation programme. The community leaders interviewed in the other towns generally feel that they have been insufficiently informed, which in turn is reflected in the lack of interest in the sanitation schemes in the community at large. Yet, in programmes in other places in India or elsewhere where the community has been involved from the start, motivation for latrines is much higher.

Effective demand for latrines to be created

Both at the national Indian workshop and the inter-country seminar in April 1992, discussions were held on the need for effective demand for latrines before a sanitation scheme can succeed. It was stressed that a distinction has to be made between the approach for conversion of bucket latrines and completely new construction of latrines. Where latrines are converted, people are already motivated to use a latrine and often the superstructures already exist. Thus emphasis should be put on operation and maintenance aspects of the new technology. Where the scheme involves first introduction and new construction, efforts should first be directed towards awareness and motivation to create an effective demand.

Knowledge on technical operation of the systems to be increased

The daily or weekly requirements for operation and maintenance of the latrines such as using water for flushing and regularly cleaning of the pan and latrine slab are professed to be carried out by almost all latrine users and generally do not pose problems if there is sufficient water available. Most people who are using the latrines are very satisfied with the technology. But this does not imply that they understand how the latrine system functions. This is understandable because almost half of the respondents has not received any instructions on operation and maintenance of their latrines.

Organized support needed for emptying and service

The double pit system is promoted as a system which can be maintained by the householder themselves, but the research outcome indicates that people may not be willing to do this because it is culturally unacceptable. Contact with excreta, even if dry, is traditionally confined to distinct groups in society. This in itself is no problem, because at least the scavengers do not run a health risk when emptying the pits. But it stresses the need for organized service support. This

could be carried out by municipal sweepers or by private scavengers. They should however be trained to understand the technology, not only for switching and emptying, but also to help when there are other problems such as blockages.

Alternatively, a guarantee system, such as Sulabh International is giving in Agartala for the first five years after construction, could be required from all implementing agencies. It is obvious that in Agartala where this guarantee exists, it has an impact on the motivation of people to have a latrine.

3 INSTITUTIONAL ASPECTS

Local bodies to be more involved in planning and implementation

In almost all towns, the local bodies do not have an adequate organization for operation and maintenance activities. It is felt that this situation is largely due to the fact that local bodies are not enough involved in planning and implementation of the low cost sanitation schemes. Usually, the state level organizations are responsible for implementation and supervision. Because engineers at local level are not involved in implementation or trained in the technology, they are often not aware of the technical and other requirements needed to sustain the schemes. This not only concerns the technology, but also possible approaches to carry out motivation and awareness creation programmes. It also results in lack of motivation with the local bodies to carry out the responsibilities for operation and maintenance at a later stage. Generally local bodies are treated as weak, incompetent and ill-equipped and the tendency exists to strengthen the nodal agencies at state level to make up for the deficiencies at local level. It was stressed that this trend needs to be reversed and local bodies should become involved in all stages of planning, implementation and post installation phases of low cost sanitation schemes.

Responsibilities for operation and maintenance need to be clearly defined

Another reason for inadequate support for operation and maintenance by the local bodies is the fact that responsibilities are usually not clearly defined. Within the local bodies different departments may be involved in sanitation, such as health, public works and water supply. They each have their own role, but coordination between the departments is lacking, resulting in an inefficient organization where activities are overlapping or not being carried out at all. Operation and maintenance problems always have to be seen in a broader urban context, taking into account the linkages between the different departments. Interventions in the past usually focused too much on the individual infrastructure sectors and consequently did not lead to an improvement.

Need for capacity building at local level

Within local bodies training activities will have to be conducted to enable the staff to carry out their tasks in planning and implementation of low-cost sanitation and post construction operation and maintenance. Municipal engineers need to get a better understanding of low cost sanitation technologies in order for them to instruct contractors, masons and sanitation staff at local level and to be able to supervise construction. Other staff needs to be equipped with skills for the administration of loan applications and management of large sanitation schemes. In addition staff, male and female, has to be trained on how to promote low cost sanitation and how to conduct awareness creation programmes. If such staff is not available and/or outside support is needed, local non-governmental organizations should be encouraged to become involved. At community level, local leaders and/or community based

organizations, should be approached to assist in motivation and promotion. Funds for training and promotion need to be part of the funds earmarked for low cost sanitation at state level.

Demand driven approach required for loans and grants

The funds available for a sanitation scheme and the number of latrines to be constructed are determined at state level. They also decide the division between grant and loan, the interest rate for the loan component and the repayment period. These decisions are not based on demand for sanitation programmes from the municipalities nor on income level of the intended beneficiaries. Little effort is directed to raise the interest of the local bodies or the beneficiaries who they represent. Yet, the administration of the loans and repayment schedules is the responsibility of the local body. Many of the local bodies were found not to be aware of the procedures involved in the low-cost sanitation schemes and this led to a number of problems. For instance, if the loan is channelled through HUDCO, the application for the loan has to be processed through the municipal body. Because they are not sufficiently informed on the schemes, it often takes a very long time before all formalities are fulfilled, leading to a delay in the scheme. When the funds are finally transferred, they may be insufficient due to interim price rises.

Unit cost need to reflect cost at local level

The unit cost of the latrines is determined by the state and does not take variations in material cost and labour cost into account. Very often, the amount is not sufficient to cover the cost per latrine, for instance if construction materials have to be brought in from elsewhere. This makes it difficult to find contractors who are interested in the scheme, but also implies that only large scale contracting is attractive. In addition, there is no price rise clause in the contracts, while it takes at least a year and often longer to construct all latrines for the scheme. By that time the price of materials may have risen. The result is that fewer latrines are constructed than planned. Where the scheme is planned as a whole town approach to eradicate scavenging, the obvious result is that not all dry latrines are converted and the town does not become scavenger free.

Uniformity needed with regard to subsidies and loans provision

There is a lack of uniformity in the low-cost sanitation schemes, not only between states, but within the state and even within the towns if more than one scheme is being carried out. This makes monitoring of the schemes extremely difficult. At town level, it may lead to refusal of beneficiaries to pay back loans if they are aware that other sanitation schemes are provided with a full grant.

Loan recovery in all cases is very poor. Part of the problem may be that the payments collected cannot be kept by the municipal authorities, but have to be channelled to the state. This reduces incentive for the municipalities to collect the repayments. Both in the national workshop and at the inter country seminar it was suggested that a percentage of the loans recovered should be given to the municipal authorities on the condition that a proper loan recovery system is set up. In some towns, loans are collected as part of a sanitation tax, in other towns they are collected together with other taxes or separately. In any case, loan recovery should begin immediately after construction is completed and not long afterwards as is now the case. Moreover, beneficiaries have to be made aware of the obligation of loan repayment, while sanctions should be determined and adhered to in case of default.

CASE 3

SANITATION IN KIBERA, A PERI-URBAN AREA IN NAIROBI

Excerpt from the paper: Sanitation in Kibera: a case outline and some future directions by M. Wegelin-Schuringa, J. Gitonga and T. Kodo, 1994 (unpublished).

INTRODUCTION

Kibera is the largest peri-urban area in Nairobi, covering an area of 225 hectares, with an estimated population of 470.000 people and an estimated yearly growth rate of about 12%. The land belongs to the State and temporary occupation licences are obtained through the municipal authorities. The majority of the residents are tenants (98%) and although many consider themselves to be temporary residents in Kibera, the length of stay of most people is more than five years. About two-third of the landlords are resident, the rest is absentee landlord. There are many community organizations active, such as church groups, self-help groups and women groups. These groups consist of both landlords and tenants.

The settlement is built on one side of a valley, sloping from a ridge towards the bottom of the valley where there is a lake and a small river. There are steep slopes, flat ground and even marshy areas near the bottom of the valley, while a number of streams run through the area. In some parts the ground consist of hard rock, but most is stone with a layer of soil on top. The ground is generally stable and permeability is reported to be adequate for latrines. Most dwelling units are rooms of 10 m.sq.in row houses in a compound, usually made of mud-and-wattle walls, which are sometimes plastered but also wooden walls are found. The floors are either made of mud or cemented. Almost all have corrugated iron roofs. The average monthly rent is Ksh. 340, with a range from Ksh. 80-600.

INFRASTRUCTURE PROVISION

Access

There are two unsurfaced roads which allow vehicular access and a number of small roads which are wide enough to allow carts. All other access roads are footpaths. All roads are poorly maintained with potholes, natural drains in the middle or on the side and during the rainy season most of them are hardly passable.

Water supply

There are several water mains running through Kibera. A metered connection to the mains can be obtained through the City Water Commission, after permission from the chief at a cost of about Ksh. 2000 for meter and license. The cost of the waterpipes from the main to the village also have to be borne by the applicant. Pressure in the various mains differs and as a result of a general water shortage in Nairobi as a whole, some of the mains may have very little or no water for weeks, especially at the end of the dry season. During the whole year, many mains have water only for restricted hours per day, usually early morning.

Most people obtain their water through water kiosks which are usually owned by private persons, who sell the water for 1 to 3 shillings per 20 litre container. There are also kiosks run by water committees which have been established with the help of KWAHO, a local NGO, and are funded by UNICEF. These kiosks

have aluminum tanks, which enable the sale of water even when the mains are dry. Water there is sold at Ksh. 1 per 20 litre container. The number of kiosks in Kibera is estimated to be around 500, and in general long waiting lines for water are rarely seen. The price of water and the restricted hours of supply result in a level of water use which endangers personal and environmental hygiene and indeed water and sanitation related diseases and skin infections are very common.

Solid waste disposal

There is no solid waste collection system within or from the area and heaps of garbage are scattered throughout. In some villages, communities have organized themselves and have dug pits in which they burn the waste, but due to increasing densities most of these pits have become mountains. The places where the garbage is dumped are infested with flies and rats, and there is a pervasive stench.

Waste water disposal

Waste water is simply allowed to drain away through the roads. Natural drains have formed in the roads, either at the side or in the middle. In many places there are pools of stagnant water and during the rainy season the roads and paths turn into a muddy nightmare. Where man made drains exist, these are often full of waste. There are a number of streams in the area, in which the water from the roads drain but all are unlined and full of garbage. The streams run into the river and the lake, which are so severely polluted that the water is not used at all.

Human excreta disposal

Excreta disposal is principally covered by traditional pit latrines. There are sewer lines through the area, but no connections are allowed because Kibera is considered an illegal settlement and city services are therefore not provided. Although almost all households have access to a pit latrine, actual access is limited as many latrines serve between 50 and 200 persons. Apart from the insufficient number of latrines, the main problem with the latrines is the difficulty to empty the full pits, as space to dig new pits is often not available. Emptying services are provided by the city council, but most of the pits cannot be reached, the service is very expensive (Ksh 1000 per load) and unreliable (fees have to be paid in advance and the vehicle may come after some months or may not come at all). This situation forces people to look for alternatives to empty their pits and one of the methods in use is to open the pit during the rainy season and let the contents spill out and drain away over the roads. The implications of this for environmental and health conditions are obviously very severe.

CONSTRUCTION AND MAINTENANCE OF LATRINES

Latrines are considered the responsibility of the landlords. Usually a landlord owns a rowhouse divided up in rooms which are rented out separately. The number of rooms varies from 5 to 40 and often only one latrine for all tenants is provided, usually on the plot, but sometimes away from the plot in an open space. There are no separate latrines for men and women and usually each tenant household has a key to the latrine. Many landlords construct as many rooms as possible, leaving very little space for the latrine, and resulting in inadequate space to shift the latrine when full.

The latrine pits have a depth varying from 10 ft to 20 ft with an average 4 feet diameter. The soil is very stable and therefore most pits are unlined. The slabs are usually made on top of a base made of termite resistant wood and consist of wooden planks with a square hole in the middle. Sometimes galvanized sheeting is put on top of the planks. The slab is mortared only rarely, as people find this too expensive. The superstructure is generally made of temporary materials such as matting, wooden sticks or planks. Although some of the pits smell, especially when they are almost full, most are quite odourless. But all are very difficult to keep clean, due to the materials used for the slab, and therefore quite unhygienic. In addition, flies abound and other vectors such as rats are also present.

Generally people feel sanitation is inadequate, because of the insufficient number of latrines and the unhygienic state most are in. But tenants are not willing to get involved in the improvement of sanitation facilities, they pay rent and therefore they hold the landlord responsible for the provision of latrines. If there is no latrine or the latrine is full, people use the latrine of a neighbour, use the wrap-and-throw method or defecate in the open spaces where garbage is thrown or along the railway line at night.

KWAHO has been constructing VIP latrines as demonstration in Kibera between 1984 and 1989. The latrines are mainly constructed in communal places and at institutions. Most of these latrines are still functioning well, the only problem being the virtual impossibility of having them emptied. However, very few individuals have followed the demonstration examples because the VIP latrines are considered to be too expensive with an estimated present cost of Ksh. 18,000.

In 1990, KWAHO obtained a mini vacuum tanker, especially meant for operation in congested areas. The service was in great demand and was functioning very well. Management of the services was carried out from the Kibera KWAHO office until november 1991. Per 2 m3 load of sludge Ksh 150 had to be paid by the client. The sludge collected by the tanker, was disposed of in the Nairobi sewers leading through Kibera with permission of the Sewerage Department and without any cost. Problems experienced with the van were the bad state of the roads, causing frequent break-downs, difficult access to some of the latrines and the solidity of the sludge. Water needed to liquidify the sludge was often not available. The service stopped when the local chief took over the management and did not keep a fund for operation and maintenance; when the vehicle needed repair, the available funds were insufficient.

OPTIONS FOR IMPROVEMENT

Although the densities in Kibera would indicate the feasibility of some form of reduced cost sewerage to improve sanitation conditions, the scarcity and cost of water and the fact that people use solid materials (paper, corncobs, leaves) for anal cleansing more or less preclude any option for a sanitation system using water. Also, experience in other peri-urban areas in Kenya shows that sewered latrines become blocked within a few months because the users cannot adapt to the different requirements of a water borne system. Moreover, since landlords already spent funds on digging pits and constructing latrines, it seems advisable to concentrate on options to upgrade the existing types of latrines. However, people are unlikely to be willing to spend funds on improvement if the main problem, that is inability to empty the pits, is not dealt with simultaneously.

Presently, with help from UNICEF, KWAHO is looking into possibilities to reobtain custody of the mini vacuum tanker and to repair it. It has become clear, however, that the charges per load have to be increased considerably to

cover not only operation and maintenance, but also amortization of the capital cost. At present rates, the cost per load should be somewhere between Ksh 500 and Ksh 700. Landlords were asked how much they would be willing to pay for emptying and the figure of Ksh 500 seemed acceptable and Ksh 700 would probably also be acceptable as it is still lower than the rates charged by the Nairobi Sewerage Department, while the service is more reliable.

But the mini tanker is not able to serve all houses as many can only be reached by the footpaths. Therefore, another emptying system is needed to complement the exhauster van. In Dar es Salaam, Tanzania, a manual pit emptying technology (MAPET), has been developed by a consultant in support of the Dar es Salaam City Council and has proved to be technically feasible.

Both emptying systems have the advantage that the pit can be emptied through the drophole. The slab does not have to be demolished and this may well induce people to start improving their slabs. The best option to do this would be the SAN-plat, which was developed in Mozambique and was subsequently modified and implemented in Malawi.

For those compounds which are difficult to reach and have sufficient space to allocate two pits, there are two options. The first one is to shift the SAN-plat to a second pit when the first one is filled. The contents of the first one can be taken out manually after about two years and the pit could be used again. A more expensive option is to construct a double-pit VIP latrine. The advantage of the double pit latrine is that the depth may be reduced from the presently common 10-15 ft, depending on the number of users.

Reduction of depth of the latrines would reduce the cost considerably. Traditionally people prefer to have deep pits, but if there is a reliable emptying service, it may well be that people will consider reducing the depth. A comparative research on performance and effectiveness of three emptying technologies in Tanzania, that is large vacuum tanker, mini vacuum tankers and MAPET, shows that in practice, all of the technologies empty the pits only partially because most customers do not pay for more than one tank load at a time.

CONCLUSIONS

There is ample scope for sanitation improvements in Kibera and the technological basis for most of these improvements does already exist. However, the current situation shows that environmental conditions can only be improved with an integrated approach. If water availability increases by the addition of watertanks, drainage of waste water has to be tackled at the same time to avoid the increase of stagnant waste water. Similarly if drainage is being improved, the problem of solid waste has to be approached, otherwise all drains will be clogged by garbage, resulting in even worse environmental conditions than present. The same applies for sanitation. If latrines are improved, but nothing is done about the problem of emptying the latrines, the situation can get worse, especially if full pits are opened up in the rainy season to drain away the contents.

CASE 4

SANITATION IS THE MAIN PROBLEM IN GITARI MARIGU

Excerpt from a study done by M. Wegelin-Schuringa in Nairobi for the Urban Poverty Alleviation Programme of the Directorate General for International Cooperation of the Netherlands Government, 1995.

Introduction

The settlement of Gitari Marigu is located between the Dandora sites and services scheme, funded by the World Bank in 1980, and the Nairobi river. Plots in Gitari Marigu have been allocated to people resettled from other areas in Nairobi, where they were evicted. They have been given a temporary occupation licence by the authorities. Because the area was regarded as temporary (re)settlement, no reservation has been made for any public facilities or roads. The plots measure 5m by 7m and have all been allocated. Many of the people to whom the land has been allocated had no funds for construction and have sold the land to others, who generally do not live in the area themselves. Tenancy in some areas reaches 95%.

The old part of Gitari Marigu is very densely occupied with mainly mud and wattle row-houses in very bad condition.
The ground is sloping towards Nairobi river. Footpaths are extremely narrow and very slippery. Most rowhouses are entirely occupied by tenants, who pay rents of Ksh. 250-300. Average room occupancy is 8 people, mainly families with children. Most tenants are very poor, there is no organization and the ethnic composition is mixed.
Near the river are vegetable plots, solid waste dumps and latrines. There is not much vacant land. Residents have been staying here on average from 8-10 years, but the settlement is much older.

The border of the southern part of the settlement is more or less defined by the sewer line of the Dandora scheme. This sewer line is in several places broken, the holes either completely blocked by solid waste or form the start of a sewage river down to Nairobi river. This is the case in at least two places, the sewage running through natural drains in between the houses. Moreover, in quite a number of places the manholes are missing or are used as a latrine, a superstructure is built on top of the manhole.

Water

There are kiosks selling water at Ksh 1 per jerrican, but in some places waterpipes have broken in the street and water is collected from the hole which has formed in the ground. In one case this 'source' is located near a garbage collection point and the water causes skin diseases, yet it is free and thus used for cleaning and washing (and sometimes drinking). Water supply is in itself not a problem as it is regular and sufficient, but the price of water poses a restriction on the use. In order to lower this price, it may be possible to try to form water management committees who could sell water at a lower price, while still being able to manage the kiosk and keep a reserve for operation and maintenance. But this depends on the feasibility of organizing a water committee. Experience shows that it is almost impossible to create such organizations with tenants only. However, since they suffer most from the inability to buy as much water as they need, a water committee may well be a good entrance for community participation.

Sanitation

Sanitation is considered the main problem in infrastructure services as there are insufficient latrines (in an area of 500 compounds, only 10 latrines were available). Thus, many people do not have access to latrines and have to defecate outside or do the 'wrap and throw' method. The latrines in itself are in bad condition and unhygienic. Because the latrines are build on a slope and not lined, they tend to collapse in the rainy season. The distance to the houses is considerable, which means that at night they cannot be used as it is difficult to reach them in the dark and moreover unsafe, especially for women. The pits are shallow because below about 6 feet the ground becomes rocky. Therefore pits are filled up fast; they are then abandoned and a new pit is dug. There is no possibility of desludging the pits because of difficult access.

Residents feel that latrines are the responsibility of the owner, but the owners do not want to construct them nearer to the houses (there is not much room anyway). Another issue is the fact that because the latrines are away from the houses, the building materials of the superstructure get very easily stolen. This is apparently happening on a large scale, preventing any possible initiative to build proper latrines.

If pit latrines would be upgraded and improved, the issue of desludging still remains. This has to be discussed with the Nairobi City Council in order to ascertain the sustainability of the improvements. Owners are unlikely to invest in latrines if they know beforehand that they have to construct a new latrine within a few years. Therefore, the feasibility of double pit latrines should be assessed, especially in areas which are unreachable for a desludger.

Solid waste

In some places there are solid waste dumps between the houses, but in general waste is dumped near the river and not much is scattered around. There is room for improvement and the residents seem to be willing to participate in such improvement. This could be in the form of cemented garbage dumps, but the secondary collection will need to be resolved first. At present no collection takes place, although the city garbage dump is very near.

Drainage

Waste water and rain flow along the footpaths and natural drains. Some areas become badly flooded in the rainy season; even water enters the houses. It is however impossible to construct any drains along the footpaths due to the narrowness of the paths. A possibility could be to construct drains in front of the houses draining into the vegetable plots and into the sewage gullies.

CASE 5

LESSONS FROM TWO SANITATION PROJECTS IN YEMEN

Excerpt from a study done by M. Wegelin-Schuringa in Yemen for the Support Rural Water Supply Project, funded by the Directorate General for International Cooperation of the Netherlands Government, 1995.
Although the study focused on rural sanitation, it is still relevant because villages in the mountainous areas in Yemen are densely built up and houses have two or more storeys. Thus conditions are similar to urban areas.

Introduction

Private latrine projects have been carried out in two villages, Bani Muwallad in 1989 and Bani Salama in 1991.
In both villages, the project provided cement, pipes (6 metre), pan, pit covers, steel bars, steel door and window (for latrines located outside the house). The contribution of the people was the digging of the pit and the construction of the superstructure (if needed). In both villages, all houses are occupied by the owners.

Bani Muwallad

Bani Muwallad is located in a remote area in the mountains, rather difficult to reach. Most of the ground consists of hard rock. Latrine coverage in the village is almost 100%, the houses which do not have a project latrine are built after the project. Of these, most also have a latrine as this is now considered the norm. The waterpump installed by the project has been out of order since a year and although the water representative has tried to get the pump repaired, he was so far not successful.

For several reasons, the latrines are not used any more for defecation purposes and people have reverted to outside defecation. The main reason for non-use at present is the fact that the water supply to the houses has stopped and the latrines start to smell because too little water is available for proper flushing. Before the water supply stopped, the pits filled up very rapidly because seepage from the pits in the rocks is very slow. The rapid filling is mainly a result of the design of the latrines which incorporates a shower and a tap in each latrine without a special outlet for the waste water. The latrines were extensively used as washing and bathing place. As soon as people realized that the pits filled up fast, they stopped using the latrine consistently as latrine. Some would use it on alternate days or only when they felt the water in the pit had gone down sufficiently. They kept using the latrines as bathroom however and still do so, be it with less water as they now have to haul the water from a distance.

Most of the pits are located some distance away from the houses due to land disputes or impossibility of dynamiting pits near the mud houses. Thus, a fair amount of water is required to flush the faeces to the pits. Apart from the lack of water, the complaint of the people concerns the fact that their pits are full and they do not know how to empty them.

In a few houses, the latrines are still being used and the pits have not filled, because the latrines are not used for bathing and washing. The women in these houses obviously value the latrines for defecation purposes and have seen the consequences of using the pit for waste water in other houses.

Bani Salama

In Bani Salama, all latrines are still being used and no problems are encountered. The design of the latrines is similar to the design of Bani Muwallad and the latrines are also used for bathing and washing, but the ground conditions are very different. This ground soaks up the water very rapidly and none of the pits is filled, according to some people not even half way. Moreover, water supply in this village is not as abundant as it used to be in Bani Muwallad. The groundwater level in the area has receded more than 12 meters, necessitating to deepen the borehole, which the committee has done. Population densities in the area served by the borehole have increased as well. Therefore water supply is now restricted to one day a week for each of the thirteen villages. As most people have a water tank, this is not considered a big problem, but it does stimulate careful water use.

As in Bani Muwallad, the health education component of the project has been very effective. All people interviewed remember the messages and all latrines visited were very clean, as well as the general environment in the village.
When asked what they would do if the pits filled up, people answered they would get a desludger from Dhamar. This is not difficult as the village is located along a main road.

Conclusions

The latrine projects in the two villages show that the incorporation of a shower and water tap in the latrine with no separate outlet for the waste water, may lead to fast filling of the pits. Thus absorbtion capacity of the ground should be determined before the design is finalized.

Having the pits located at a considerable distance of the latrine requires so much water for flushing that in case of water shortage, the use of the latrine may be abandoned.
Because all pits are single pits, the issue of desludging has to be taken into account at the time of planning and options have to be discussed with the beneficiaries.

With regard to the latrines in Bani Muwallad, it is clear that there is a need for the project to go back to help the people solve the pit problems and assist them in the repair of the pump. Because most latrines have not been used for the past year for defecation, the sludge is most probably pathogen free. It should be possible to bring a small pump to desludge all pits, if they are indeed full. At the same time, the design of the latrines has to be adapted to avoid the fast filling of pits with waste water. This entails a separate outlet for waste water, but at the same time, a solution has to be found for this waste water to avoid standing pools in the streets. It will also be necessary to educate the people on the functioning of the system and on the requirements for operation and maintenance.