WSUP
Water & Sanitation for the Urban Poor

PRACTICE NOTE

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Sewerage or FSM? Sometimes both: 'gradual sewering' in Nairobi

Nairobi's super-slum Kibera is criss-crossed by sewer mains. So why not simply connect latrines to the sewer? Unfortunately it's not so simple, for various reasons including high costs. In partnership with Nairobi Water, WSUP has been developing a 'gradual sewering' approach that aims to bridge the gap between onsite and sewered sanitation. This note looks at experience to date.

Pit-emptiers tip sludge into the holding tank of a public toilet

Most people in Kibera live in single-room dwellings clustered into compounds of 10–20 rooms owned by a single landlord. Sanitation is notoriously bad: plastic-bag defecation is rife, most toilets are unhygienic communal (compound) toilets or pay-per-use public toilets that are emptied infrequently, and most sludge that is collected is just dumped to a local watercourse.

The policy for improving sanitation in slums like Kibera is defined by the *Strategic Guidelines for Improving Water and Sanitation Services in Nairobi's Informal Settlements*, published in 2009 by Nairobi City Water and Sewerage Company. These guidelines formalise Nairobi Water's commitment to providing sanitation services for informal settlements, using onsite and sewered models as appropriate, and including the possibility of sludge disposal to sewers. In line with this policy, WSUP has supported an integrated approach which accepts that any sewerage solution must also deal effectively with non-networked toilets. Specifically, WSUP has supported Nairobi Water to introduce tertiary sewer lines in Kambi Muru and neighbouring areas of Kibera, using two main strategies:

Strategy A: Connect public and communal toilets first

A common failing of sewerage projects in low-income communities is that individual householders simply can't afford connection charges: sewer lines are built, but very few people connect. So to overcome this likely problem, this programme aimed initially to connect only public and communal toilets. In a first phase (2011) of this work we supported construction and connection of toilets with near 100% subsidy; in a second phase we have continued this approach, but with much lower subsidy input, encouraging landlords to construct communal toilets and connect them at their own expense.

Strategy B: Allow sludge tipping to sewers

In the first phase of this work, WSUP supported construction of two public toilets with a novel design: these facilities have a large sewer-connected holding tank that receives not only discharge from the public toilet itself, but also sludge from nearby non-sewered latrines (see photo). The idea is that a hygienic local tipping location will a) reduce costs for pit-emptiers and thus increase their business viability, and at the same time b) reduce illegal tipping. In parallel with the infrastructure construction, a group of independent pit-emptiers were supported to improve their technical and business skills.

How did these strategies work in practice? As discussed overleaf, the technical model has functioned well, but successful implementation raises diverse challenges. Despite these challenges, WSUP considers that sewerage models of this type can work in Kibera.

'Gradual sewering' concept = Connect public toilets first, then some communal toilets + Encourage sludge tipping to public toilets or direct to sewer → Gradually extend coverage to all communal and household toilets

Gradual sewering: ways forward

Although sludge tipping to the sewer has worked in Nairobi, this solution needs careful local evaluation. Fresh nightsoil and liquid sludge components may not cause problems, but consolidated digested sludges (and garbage items in pit latrines) are likely to increase sewer blockages. In addition, digested sludges (whether liquid or solid) may increase sulphide corrosion problems, and may impact on treatment plant function. These problems are perhaps preferable to illegal local tipping of sludge! But partners need to see sludge tipping to sewers as a medium-term solution, to be eventually replaced by alternative systems for faecal sludge removal, or by universal sewerage.

What's working?

- **Connection of communal toilets to the sewer** - A total of 20 sewer-connected communal toilets were built in 2011. In a 2013 survey of these toilets, 18 were functioning well, despite no piped water connection (kiosk water is used for flushing). Occasional toilet blockages were reported, but these were readily resolved.
- **Public toilets doubling as sludge disposal points** - Nairobi Water was initially unwilling to authorise this, because of perceived risks of sewer blockage [see box]. But the system was carefully designed to reduce these risks: for example, the disposal point has a screen to prevent ingress of garbage, and the holding tank is designed to trap and retain large solids. So Nairobi Water accepted this approach, and has subsequently authorised sludge tipping direct to the sewer mains at two other locations in Kibera.

What's proving challenging?

- **Landlord abuse** - 18 of the 20 toilets constructed in 2011 were functioning well in 2013, but half of landlords were charging abusive amounts, or restricting use of the toilet to their own family.
- **Pit-emptier commitment** - Alongside toilet construction, WSUP supported pit-emptiers cooperative Kara, who were provided with a locally adapted Gulper (a pit-emptying device) and equipment like shovels and gloves. Kara members were trained in skills like record-keeping. The aims were to reduce Kara's transport costs and thus increase business viability, and to reduce illegal disposal. But 2 years later, Kara members are only emptying about 8 pits per month, and only 50% of the sludge is being tipped to the authorised disposal points.

Ways forward

- **Minimising landlord abuse** - In the second phase of this work, reduced subsidy is being provided: landlords are being encouraged to upgrade to pour-flush toilets and connect to the sewer at their own expense. Various strategies (including pre-negotiated agreements) are being used to reduce the risk of landlords imposing abusive charges or restricting use of the toilet to their own family.
- **Dynamising the pit-emptying sector** - Kara has not been able to meet the challenge of service expansion, and WSUP is now focusing on entrepreneurs with higher capacity and stronger commitment. Other solutions currently being explored include a higher density of disposal points (to improve business viability) and improved regulation of pit-emptier activities.

Challenges around capital cost and ongoing revenue collection

By end of 2013, 60 landlords had connected to the sewer at their own expense, and another 130 expressed interest. But most of these landlords are within 20 m of existing sewers: persuading more distant landlords to connect will be more difficult and will probably require additional sewer construction. Furthermore, there is a revenue collection challenge for Nairobi Water: sewerage connection is charged through household water bills, but these toilets are flushed with *kiosk* water. Nairobi Water is currently developing an appropriate charging model.

Is sewerage a viable solution for low-income urban communities?

Beyond the specific case of Kibera, WSUP's view is that in many low-income urban communities, sewerage is not financially feasible over medium-term planning horizons, so that institutions and donors must support improved non-sewered models including systems for removing, transporting and treating/reusing faecal sludge. But in *some* low-income settlements, sewerage may be appropriate. In such cases, "gradual sewering" approaches like those used in Kibera may be an effective way of moving from a non-sewered to a sewered system.

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