

# Editorial: Is it possible to reach low-income urban dwellers with good-quality sanitation?

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## I. SANITATION NEEDS

All urban dwellers need safe, quick, easy access to clean toilets, day and night – without fear, without a long walk, without a long wait in line, and without the need to plan ahead or to spend more than they can easily afford. They should be able to count on privacy, cleanliness and the means to wash anus and hands quickly and conveniently, which is difficult if there is no water piped on the premises.<sup>(1)</sup> These toilets need to serve everyone – girls and boys, women and men of all ages and conditions. Women who are menstruating should have not only a way to wash but a place to put their waste safely and privately. People with impaired mobility should not have to add toilets to the list of challenges they face.<sup>(2)</sup> Small children should be able to meet their needs without someone having to pick up and dispose of their waste or accompany them to a distant facility. Older children should be able to count on sufficient well-maintained toilets at school. And all toilets need to function so that toilet wastes do not end up contaminating anyone's food, water or hands.

In high-income countries, nearly all urban dwellers can access a toilet the moment they want to or need to. There is no need to consider “do I have time to do so now?” or “do I have the money to be able to pay?” They seldom have to worry about the toilet being occupied, when there are only a few people per toilet, as is

the case in most houses or apartments in high-income countries. But how different this is for households where the person/toilet ratio is much higher – especially when there are also tenants renting rooms or adult children and their families who remain in their parents' house because they cannot afford their own house. This problem is doubled or tripled when the toilet is shared with one or two other households.

Most of those reading this editorial probably have toilets in their home that are not shared with other households and that fulfil all the above needs. We have become so accustomed to never having a problem accessing, using and paying for toilets that we don't realize how difficult it is for those without them. We not only have immediate access to one or more toilets in our home (most with basins and hot water for washing too) but also clean, easily accessed toilets in the workplace, in hotels, railways stations, airports and most petrol stations when we travel, in most restaurants and cafes, and in many public spaces. In addition, when we need to or choose to move to another location, all the housing choices come with good provision for sanitation (and piped water, drainage and solid waste collection). There may be instances of unmet needs that certainly should be addressed but the proportion of those inadequately served is very low.

**Acknowledgement:** We are very grateful to a group of sanitation and drainage specialists who advised us on how to develop this issue and helped us review the flood of papers submitted – Sandy Cairncross, Ian Douglas, Pete Kolsky, Jonathan Parkinson and Kevin Tayler. We received so many good papers on this topic that we decided to devote two issues to it. This editorial also draws on the papers that will be published in the October 2015 issue (although most of these will be available online well before this).

1. Water piped on premises is recognized as important for good provision for water – but it is also important for hand washing after defecation and so perhaps it should be considered part of adequate sanitation.

2. See the guidelines for toilet and water provision for those with limited mobility: Jones, Hazel and Jane Wilbur (2014), *Compendium of accessible WASH technologies*, WaterAid, London.

Almost all urban dwellers in high-income countries also live in neighbourhoods with regular water supplies piped to all homes, functioning storm drains and regular collection of household solid wastes. Because provision for sanitation meets almost everyone's needs and is equitable in terms of standards, there is no trade-off between universal coverage and the quality of provision.<sup>(3)</sup>

Yet the system that meets sanitation needs so well in high-income and some upper-middle income countries usually serves only a small proportion of the urban population in low-income and most middle-income countries. Most of the urban population of sub-Saharan Africa and a high proportion in Asia lack a regular piped water supply to their home and there is no public provision for sewers and effective covered storm drains. If there is, it reaches a small proportion of the population.<sup>(4)</sup> These gaps in provision prevail in an astonishingly long list of cities with several million inhabitants,<sup>(5)</sup> as well as a far longer list of smaller urban centres. Most urban centres in these countries appear to lack the technical and financial capacity to install, expand, maintain and pay for a comparable system – and the regulatory framework to support this. It is not just the vast deficiencies in provision for toilets and for managing their wastes that need addressing but also provision for the regular water supplies that are essential for washing and for flush toilets to work, as well as drainage and solid waste collection.

So what happens if the conventional systems that serve almost all urban dwellers in all high-income and some upper-middle income countries, in their homes, at work and at school, are not possible? How do we respond to the need for universal provision of high-standard sanitation in the absence of the

systems that ensure it, or when those with funds and influence judge it not to be a priority? In contexts characterized by high proportions of the population in informal settlements and low capital investment budgets, there is a dearth of ideas about how sanitation might best be addressed. There are many very local initiatives, but too little thought or investment for scaling them up.

## II. HOW BAD PROVISION FOR SANITATION IS IN URBAN AREAS

For 40 years, so much has been promised on water and sanitation and not delivered. Governments and international agencies made commitments to achieve universal provision for water and sanitation in 1976 (at Habitat I, the first UN Conference on Human Settlements) and then at the UN Water Conference in 1977. Universal coverage was meant to be achieved by 1990. The 1980s were even designated by the UN as the International Drinking Water Supply and Sanitation Decade. So why the massive deficit in sanitation provision in urban areas today?

Official UN statistics suggest that 27 per cent of the urban population in what they term “developing regions” lacked basic sanitation in 2012; for the least developed countries it was 52 per cent.<sup>(6)</sup> The Millennium Development Goal target for halving the proportion of the population without improved or basic sanitation will clearly not be met in urban areas. Between 1990 and 2012, there was no increase in the proportion of the urban population with improved sanitation in sub-Saharan Africa and not much increase in Southern Asia and Oceania.<sup>(7)</sup> There is also a long list of countries where the proportion of the urban population with improved sanitation was lower in 2012 than it had been in 1990.<sup>(8)</sup>

But even these figures greatly under-represent the scale of the problem. The UN definition of “improved” or “basic” sanitation sets the bar very low and includes forms of provision that are inappropriate for most urban contexts. No consideration is given to the fact that the same

3. It is likely that there are substantial numbers of urban dwellers in high-income countries who live with inadequate provision for sanitation – for instance, homeless people or those with very low incomes who rent or share accommodation or who pay for beds in hostels (often contravening official standards) that have poor-quality provision. These may include illegal migrants who cannot access public services relating to housing. But these represent a much smaller proportion of the urban population than in low- and most middle-income countries.

4. See details of this for 40 African cities in <http://www.iwaterwiki.org/xwiki/bin/view/Articles/AfricanCitiesSanitationStatus>. See also the paper in this issue on the IWA WaterWiki by Chloe Parker.

5. Mitlin, Diana and David Satterthwaite (2012), *Urban Poverty in the Global South: Scale and Nature*, Routledge, London.

6. WHO and UNICEF (2014), *Progress on Drinking-Water and Sanitation: 2014 Update*, Joint Monitoring Programme (JMP), WHO and UNICEF, Geneva, 80 pages.

7. See reference 6.

8. This can be seen when reviewing the WHO and UNICEF JMP data. See also reference 5.

solutions may not be effective or practical where there are dense concentrations of people. We are also concerned that national sample surveys that include questions on sanitation may not fully cover those who live in informal settlements or informal sub-divisions in formal areas. One of the complications of assessing sanitation is that attention has to be given to both the toilet (and issues such as privacy, cleanliness and maintenance) and the waste removal. Waste removal is divided into off-site (where waste is quickly removed via sewers) and on-site (where waste is temporarily or permanently stored on-site; for example, in pit latrines or septic tanks). High residential densities mean that on-site sanitation can be particularly problematic unless there is good provision for toilet wastes to be stored safely and emptied. As elaborated below, alternatives to household toilets include shared toilets (within a defined group of households that themselves control access) and public toilets. Public toilets may be managed by communities, local government, utilities or a private enterprise; individuals may pay either per use or through a monthly subscription.

**Most papers in this issue and the next provide details on how little has been achieved in urban sanitation** in particular cities or settlements. Four papers on India highlight different aspects. Two provide a nation-wide perspective. The paper by Kavita Wankhade<sup>9</sup> shows that most of India's urban population (and most of its 5,000-plus urban centres) have no sewer connections. Figures on the proportion of the urban population with sewers are also overstated – they have been shown to include households in cities that do not even have a sewer network. Even those actually served by sewers have frequent blockages, as there is hardly any preventive maintenance. The paper by Sridhar Vedachalam and Susan J Riha includes an assessment of sanitation in 421 cities in India based on 19 indicators of provision for waste water, storm water and solid waste collection and the extent of open defecation. None of the cities achieved scores that suggest healthy and clean cities. Most of the cities that performed best were not among the largest cities (Surat was an exception).

9. Wankhade, Kavita (2015), "Urban sanitation in India: key shifts in the national policy frame", *Environment and Urbanization* Vol 27, No 2. This will be available in print in October 2015 and on OnlineFirst before then.

The paper by Anupama Nallari provides a very detailed insight into the implications of inadequate sanitation in the lives of adolescent girls in low-income families in Bengaluru (formerly Bangalore). Here, in settlements where sanitation facilities are lacking, adolescent girls face many deprivations (not attending school, lack of privacy and independent mobility) and risks (including sexual harassment and assault and health risks). Bengaluru has one of the most successful economies in India. Yet less than a third of its metropolitan area is served with underground drains or sewer networks; the existing system is a hundred years old and it leaks, causing groundwater contamination and polluting water pipelines. Many of the problems faced by the adolescent girls in Bengaluru are also faced by women and girls in other cities, as described in the paper by Marni Sommer, Suzanne Ferron, Sue Cavill and Sarah House.

For sub-Saharan Africa, the paper by Mark O'Keefe, Christoph Lüthi, Innocent Kamara Tumwebaze and Robert Tobias<sup>10</sup> highlights the situation in Nairobi's and Kampala's informal settlements, where few use a latrine that is not shared or public. In Nairobi, only 5 per cent of the population surveyed had private toilets. Public toilets are often not open at night and so people resort to open defecation, flying toilets or the disposal of excreta with solid wastes. The paper by Evans Banana, Patrick Chikoti, Chisomo Harawa, Gordon McGranahan, Diana Mitlin, Stella Stephen, Noah Schermbrucker, Farirai Shumba and Anna Walnycki highlights the high percentage of the populations of Blantyre (Malawi), Chinyoyi (Zimbabwe), Dar es Salaam (Tanzania) and Kitwe (Zambia) that have very inadequate provision for sanitation.

It appears that official sanitation providers, whether municipal/public departments or private utilities, are overwhelmed by the task. They are also not set up to support low-cost sanitation provision<sup>11</sup> – and many forms of such provision may contravene regulations. Urban sanitation is

10. O'Keefe, Mark, Christoph Lüthi, Innocent Kamara Tumwebaze and Robert Tobias (2015), "Opportunities and limits to market-driven sanitation services: evidence from urban informal settlements in East Africa", *Environment and Urbanization* Vol 27, No 2. This will be available in print in October 2015 and on OnlineFirst before then.

11. McGranahan, Gordon (2015), "Realizing the Right to Sanitation in Deprived Urban Communities: Meeting the Challenges of Collective Action, Coproduction, Affordability and Housing Tenure", *World Development* Vol 68, pages 242–253.

increasingly treated as a private good with little or no regard to the cost inefficiencies of this solution, or to the subsequent exclusion of most low-income urban residents who cannot afford this approach.

Of course, if we had papers on countries or cities where there have been substantial improvements in provision for sanitation, this editorial would perhaps be less pessimistic. But even for countries where official UN statistics show great improvements, these may be far from universal – see the paper by Deljana Iossifova<sup>(12)</sup> on sanitation provision in Shanghai. In addition, a recorded increase in sanitation provision does not necessarily mean an improvement in the adequacy of provision. Is 87 per cent of Angola's urban population actually well-served with sanitation? The UN suggests that this percentage had improved provision in 2012.<sup>(13)</sup>

### III. SIGNS OF HOPE

Although the UN figures on “improved” sanitation are a very weak (and misleading) basis for assessing progress in urban areas, there are other sources that show considerable progress in many countries. According to census data primarily, there are many cities in Latin America that have dramatically increased the proportion of their populations living in accommodation with sewer connections and piped water.<sup>(14)</sup> This is true also for some cities in South Africa. However, a substantial proportion of the population there also lacks sewer connections – especially in informal settlements in peripheral areas.

The most important examples, perhaps, are not those in the wealthier and more successful cities in the global South where government has extended sewer coverage (and usually increased sewage treatment), but those where large sections of the low-income population have been successfully reached with better provision, through new models of co-production. Here, the

urban poor work with local government. They find solutions even without external funding. These are difficult situations to compare because each works with a very specific local context. Each has had to find a balance between affordability and solutions that work well for children, women and men across the key criteria for good sanitation. In many urban contexts, these have to rely on shared or communal provision because even the cheapest in-house latrine is too expensive or takes up too much room. But this often means having to contravene official regulations, and doing that while keeping local government on board is never easy. Solutions also have to be devised that are not dependent on sewers, and for households that do not have piped water.

The sanitation system championed and supported by the Orangi Pilot Project Research and Training Institute (OPP-RTI) is perhaps the best known example of large-scale co-production using sewers. It is unusual in having found ways to reach households with sewer and drainage connections at a cost they could afford. This pioneered co-production, as community-managed work laid the “small pipes” and local government provided the sewer/drainage mains into which these could connect – the so-called “component sharing” approach.<sup>(15)</sup> This is a well-documented case that showed the importance of agreement in each lane, both on the works to be undertaken and on the way the costs would be covered. The condominium sewers in the north-east of Brazil are another example of the potential of co-production.<sup>(16)</sup>

Three papers in this issue focus on co-production of sanitation for informal settlements and share some characteristics with the OPP

12. Iossifova, Deljana (2015), “Urban development, everyday sanitation and sociospatial differentiation in contemporary Shanghai”, *Environment and Urbanization* Vol 27, No 2. This will be available in print in October 2015 and on OnlineFirst before then.

13. See reference 6.

14. United Cities and Local Governments (UCLG) (2014), *Basic Services for All in an Urbanizing World*, Third Global Report on Local Democracy and Decentralization, Routledge, London.

15. For the early history, see Orangi Pilot Project (1995), “NGO Profile: Orangi Pilot Project”, *Environment and Urbanization* Vol 7, No 2, pages 227–236. See also Hasan, Arif (2006), “Orangi Pilot Project: the expansion of work beyond Orangi and the mapping of informal settlements and infrastructure”, *Environment and Urbanization* Vol 18, No 2, pages 451–480; and Hasan, Arif (2008), “Financing the sanitation programme of the Orangi Pilot Project: Research and Training Institute in Pakistan”, *Environment and Urbanization* Vol 20, No 1, pages 109–120.

16. Nance, Earthea and Leonard Ortolano (2007), “Community participation in urban sanitation: experiences in northeastern Brazil”, *Journal of Planning Education and Research* Vol 26, pages 284–300. Condominium sewerage is described in the paper as “a decentralized, low-cost approach to wastewater collection” that costs less than conventional systems due to less expensive material, householders’ participation and the placement of sewers under property blocks.

experience – community management, the mobilization of funds from households, and the measures to keep costs affordable for low-income households. But these cases take different routes, based on what proved possible in each settlement. The first is the city-wide community-managed public toilet programme in Mumbai, described in the paper by Sheela Patel and the Indian NGO SPARC. Here, after years of effort to engage local government to take communities' evolving solutions to scale, a very large-scale community toilet programme was finally possible because the municipal government covered the capital costs. The toilets had to cover their own operating and maintenance costs, but this was usually possible from user revenues, even though the price per household was kept down to US\$ 1–2/month.

The second paper, by Banana and eight co-authors, reflects on what has been learned from community-led investment in sanitation in Blantyre (Malawi), Chinhoyi (Zimbabwe), Dar es Salaam (Tanzania) and Kitwe (Zambia), where city and national federations of slum/shack dwellers tested what was possible in informal settlements with very low-income groups. These aimed for sanitation improvements that were affordable to users and that required no subsidy so that, as with OPP,<sup>(17)</sup> they could be implemented on a much larger scale with the support of local government. Local constraints in each case included little or no external support, limited piped water supply systems in many settlements and, for most, no city sewers to connect to. This meant on-site sanitation that included the safe collection and disposal of toilet wastes, with the additional costs and responsibilities this represents for households. The paper discusses the very real difficulties for low-income households that can only afford US\$ 3–4 per month for sanitation, and considers the forms of loan finance that can support such an approach. Most households financed it using savings and loans from their federations' funds. Most households preferred shared latrines to public latrines – in part because the technology used (skyloos) required proper use. This is easier to ensure in toilets shared between neighbouring households, in part because they are closer to home. Shared toilets within plots also made it unnecessary to identify and secure public land. A

serious shortcoming of the strategy is that tenants may not be able to access the improvements, even if they are prepared to contribute, unless landlords agree and other tenants are willing to share costs. The third paper, by Evans Banana, Beth Chitekwe-Biti and Anna Walnycki, goes into more detail on sanitation co-production in Chinhoyi and the community-led data gathering that informed this.

#### IV. CONTEXT, CONTEXT, CONTEXT

Within the discussions of sanitation (and water) within the United Nations and around the Sustainable Development Goals (SDGs), there is little or no mention of context. The entire statistical base for assessing progress defines improved provision the same way for all areas, as if sanitation needs were the same for rural herders, those living in low-density villages or urban settlements with large plot sizes (where pit latrines can be accessed and new ones dug if needed), urban households in neighbourhoods with tens of thousands of persons per square kilometre and no empty space, and those in multi-storey apartments where pit latrines are difficult or impossible beyond the ground floor. Assessing who has “basic” or “improved” sanitation needs to take account of these vast differences in context. This broad brush approach on the part of United Nations agencies is then reflected in much development literature, which is not informed by a detailed understanding of these basic realities. Different needs in the same localities are also ignored – for instance the fact that tenants' needs are different from those of landlords. Where a toilet is in a common space, tenants find it easy to use; when it is within the landlords' space, it may be more difficult.

For urban dwellers, the overwhelming preference for is for toilets in their homes with a water seal (WCs or pour flush) where they are not responsible for the removal of toilet wastes. Connection to a sewer provides this – the water seal keeps down smells and flies and the sewers remove both toilet and other liquid wastes with no need for action by users. The connection also takes up little space, unlike a septic tank. Sewers should also prevent the contamination of ground water. This system does not work well if water supplies are expensive or irregular, and it depends on sewer pipes being well-maintained

17. However, note that the OPP model involves the subsidized provision of secondary drains, main drains and waste treatment plants.

and functional, and on dwellings being large enough to accommodate toilets.

The preference for safe toilets within the home is particularly strong for households with children and other members who find it particularly difficult or unsafe to use a public toilet (adolescent girls, heavily pregnant women, those with limited mobility). However, very few of those living in informal settlements benefit from toilets connected to sewers, even when they live in concrete block dwellings. In the absence of provision, there is a wide range of alternatives including toilets shared by multiple families living within the plot or building, and public and/or private provision.

Lack of space and very low incomes may make household toilets an unreachable solution for many people and acceptable alternatives need to be considered. Shared and public toilets are not included in the UN definition of “improved” provision. But in some urban contexts, these have proved to be the most effective local response. As papers in this issue discuss, how well or badly such toilets work depends so much on local context – on design, management, maintenance, costs, opening hours, distance from people’s homes, number of toilet seats per user, provision for different needs, and safety, especially at night.<sup>18</sup>

Thus, it is important to understand the different forms of toilet provision beyond the household level. These can include toilets shared on the plot or in the house (often by landlords and tenants) and those shared off-plot but on private land (for instance at the point where plots meet or on one person’s plot but with shared access). Then there are different forms of public toilet arrangements. There are commercial public toilets managed by a private enterprise in a public space for a fee, which vary in size from one or two toilets to larger toilet blocks; these also vary in the scale and extent to which they have washing facilities and in the charges made for toilet use and washing. There are community-managed public toilets run by a group of community members. And there are local government or utility-managed toilets – as above, but run by a council/utility employee or under contract. The

public options vary depending on whom they serve – for instance clients and regular users living close by or passers-by in busy areas like markets.

Shared toilet provision is also necessary in schools and workplaces. It is important to consider sanitation provision in local schools and its suitability for girls and boys. As the paper by Anupama Nallari notes, it is important for schools to open early enough to allow their use by (girl and boy) students before classes start. Also important are the scale and nature of provision in market areas, where traders may spend long hours far from home.

Before public or shared toilets are dismissed as appropriate solutions, is it not worth asking their users what their needs are, what is deficient, what should be done to address this, by whom and with what funding? Where there isn’t universal provision for high-quality sanitation, it is only by engagement with those needing solutions in each location that effective, appropriate solutions will be developed. Many papers in this issue challenge us to rethink provision for sanitation by working with those who lack it. As Sheela Patel and co-authors points out, if community toilets are inappropriate or dangerous, why would grassroots organizations formed by women living in informal settlements in Mumbai have chosen this solution and become the designers, builders and managers of toilet blocks that serve hundreds of thousands of low-income households? In some circumstances, community-managed toilets offer the best choice possible. The understanding that context is important leads to an acknowledgement that the choices have to be made locally by people informed by an understanding of the range of potential solutions. In many cases, too few choices are offered by external funders or local governments and there is too little opportunity for households to work with local government or utility managers to modify designs. Many aspects need to be redesigned. Communities may need to make inputs to the physical unit, the installation process, and the financial and management systems for installation as well as ongoing maintenance and day-to-day care.

The experiences of the African slum/shack/homeless people’s federations affiliated to Shack/Slum Dwellers International<sup>19</sup> demonstrate the

18. See the paper by Sheela Patel and SPARC in this issue. For a longer history of how community sanitation evolved see Burra, Sundar, Sheela Patel and Tom Kerr (2003), “Community-designed, built and managed toilet blocks in Indian cities”, *Environment and Urbanization* Vol 15, No 2, pages 11–32.

19. See the papers in this issue by Banana and eight co-authors and Banana and two co-authors.

importance of residential density on various fronts. It determines the suitability of waste management technologies that can ensure that on-site sanitation does not contaminate ground water and create additional local environmental risks. It also influences the nature of public toilet blocks. With lower densities, communal provision can become problematic – people may have too far to walk, and with smaller numbers using the facility, the costs of a caretaker and maintenance may become difficult to cover. In these circumstances, shared sanitation is usually preferred because the risk of facilities being misused is lower.

In many African informal settlements the land is organized into compounds with a resident landlord and between two and ten families renting rooms. Sanitation is frequently on-site and the quality is usually poor.

### a. Gender

Many papers remind us that women generally take responsibility for managing the sanitation needs of households (as well as fetching water if it is not piped to the dwelling). They also bear the brunt of the hardship when needs are not met. As described in the paper by O’Keefe and co-authors,<sup>(20)</sup> in informal settlements in Kampala and Nairobi, many households share latrines and their cleaning – with the cleaning usually done by women. The many deprivations and risks faced by adolescent girls in Bengaluru, as described in the paper by Anupama Nallari, are exacerbated when they have to rely on public toilets. These difficulties apply also to women and girls in other cities – as detailed in the paper by Sommer and co-authors, who describe, for instance, the risk of sexual violence when toilets are too far away and paths and toilets are poorly lit at night. In some settlements, even to step out of the house to use an outside latrine located within the plot is considered too dangerous, and pots are used indoors at night. Sommer and co-authors point out the more generally gendered nature of sanitation and water inequalities – men and boys can more easily relieve themselves in open spaces or wash in public than women and girls. In addition, women’s added need for privacy, especially during menstruation, augments the burden of inadequate provision in densely settled urban environments.

20. See reference 10.

### b. Tenants

Several papers raise the issue of the particular disadvantages experienced by tenants in informal settlements or informally divided buildings – including access to toilets, the quality of maintenance and the likelihood that rents will be raised if facilities are improved.<sup>(21)</sup> Tenants’ access to toilets depends often on the organization of the dwellings. If the toilet is in the landowner’s house, then access is likely to be limited to particular times of the day. If the toilet is on communal space shared by tenants and the landlord, then better access is more likely. When a toilet is provided, generally the tenants have to clean it (usually women tenants), although the landlord may take responsibility for maintenance and emptying. Those living and working in informal settlements have long recognized that improving sanitation is likely to increase rents. The paper by Banana and eight co-authors describes an agreement introduced by the Tanzanian federation, whereby landowners receiving federation loans for sanitation in Dar es Salaam would not increase rents for existing tenants for at least three years after the toilet was built. Because of the range of difficulties faced by tenants, they may stand to benefit particularly from well-functioning community or public toilets or, for children, good-quality toilets at school.

## V. ACCEPTING OTHER FORMS OF SANITATION PROVISION

For much of the urban population in low- and many middle-income countries, on-site sanitation is all that is possible. Most inhabitants of informal settlements in sub-Saharan Africa and a large proportion in Asia have to adapt to the near complete lack of publicly funded sanitation options – and provide for themselves or use (and pay for) informal or small-scale service providers (for water and sanitation). There are many cities where there is no financial or institutional capacity within local governments to extend sewer systems to serve informal settlements.

It also seems that shared and public toilets have importance for improving sanitation, despite the fact that they are not included in the UN definition of “improved sanitation”. Underlying

21. See reference 10.

the reluctance to include shared and communal facilities in this definition is the recognition that many public facilities are not well-maintained and are not kept clean. The community-managed blocks in Mumbai work well because the capital subsidy from the government means that the monthly subscription required from households to keep the blocks clean and well-maintained can be affordable. They also work because the density of these informal settlements, which prevents anyone from having a private solution, motivates the majority of residents to manage a public block. This density also means the distance between home and the toilet is short, and there are many people to share costs. The members of Mahila Milan are clear that this system works for them, but it may be less appropriate in a lower-density neighbourhood.

Many international agencies have been reluctant to support improvements in urban sanitation – in large part justified by the official UN statistics that are so inaccurate in assessing who within urban contexts has sanitation to a standard that significantly reduces health risks. Donors appear to be emphasizing household investments and encouraging these improvements through partial subsidies and/or the availability of loan finance. Where there are no sewers to remove waste from the plot, this means on-site sanitation, with all the tasks and responsibilities this shifts to households and usually to women. Generally, insufficient consideration is given to the accompanying health risks, and to the reality that on-site household investments are unaffordable for many of the urban poor and achieving scale is unlikely.

## VI. GENERATING THE DATA THAT SUPPORTS LOCAL ACTION

One important innovation by the organizations and federations of slum/shack dwellers has been detailed surveys of informal settlements.<sup>(22)</sup> These have stimulated the attention of local governments, alerting them to just how bad

sanitation is and informing discussions of how best to address this.

In Mumbai and in Blantyre, Chinhoyi, Dar es Salaam and Kitwe, the work on sanitation was preceded by the gathering of detailed data on existing provision for sanitation by the federations. This was usually the first time in these cities that there was detailed data on provision. The paper by Banana, Chitekwe-Biti and Walnycki describes the community-led household surveys, discussion groups and mapping to document the inadequacies in provision for water and sanitation in Chinhoyi. This engagement of local residents led to the development of affordable responses (even if these contravened local bylaws) and the co-production of sanitation facilities with local government. Conventional practice in planning, plot layout and infrastructure provision that meets local regulations in Zimbabwe would cost around US\$ 5,000 a plot. In the past, local authorities would pre-finance the costs and charge beneficiaries. But local governments no longer have the capital and much of the population has never had the income to pay for conventional solutions, either through the purchase of serviced plots or through user charges. The Zimbabwe federation has sought to lower costs – for instance through water from communal facilities and non-water based sanitation; members visited the federation in Malawi to learn how these “skyloos” (a form of ecological sanitation, or ecosan) worked. A further motivation for using non-water based sanitation is that piped water supplies may be unreliable.

This paper and several others show that local governments are often more ready to support local processes if there is a community organization in place with which they can work. They are also more likely to focus on the solutions they are familiar with (even if these are inappropriate), although the Zimbabwe paper shows that local governments may be willing to consider new solutions, as they become conscious that older approaches are not possible any more.

## VII. SANITATION CAPITAL AND RUNNING COSTS

Many papers provide estimates for the costs of sanitation per toilet or per household. Some point to ways of reducing toilet costs or increasing

22. See Patel, Sheela, Carrie Baptist and Celine d’Cruz (2012), “Knowledge is power: informal communities assert their right to the city through SDI and community-led enumerations”, *Environment and Urbanization* Vol 24, No 1, pages 13–26. See also other papers in *Environment and Urbanization* Vol 24, No 1, available at <http://eau.sagepub.com/content/24/1.toc>.

affordability by using household savings and loans.<sup>(23)</sup> Others point to how cost can be cut by sharing toilets or using public toilets. Toilets shared between two or three households are usually preferred to public toilets – but not, as pointed out, in very dense settlements where there are space constraints.

In the paper by O’Keefe and co-authors, construction and maintenance costs of different types of toilets in East African cities are compared. Construction costs range from US\$ 60–200 for an unlined pit latrine to US\$ 800–3,000 for a toilet with a septic tank and soak pit (soakaway). The Zimbabwean paper also compares costs. The federation innovated considerably to reduce the cost of an ecosan (skyloo) toilet to US\$ 250 per unit, which could be shared by up to three households. They tried to lower this cost further, but found it required too many design compromises with the separation of urine and faeces. In the Shackleton settlement, 37 of these units served 90 families, with loan finance from the federation’s Gungano fund. In a second settlement, Gadzema, where provision had to be made for those living in both family homes and council hostels, there was agreement finally on reconstructing two community-managed toilet blocks, each with eight seats. The city authorities provided some of the materials, waived planning approval fees and provided plumbers. The overall cost per household was US\$ 22 for the 60 households that used these compared to the US\$ 250 skyloo cost, itself lower than US\$ 450 for a flush toilet. Management and maintenance will be a challenge for the community, however. In a third settlement, Mupata, the local authorities are transferring tenure to the inhabitants and this encourages them to invest in sanitation. Some households are close enough to use existing sewer lines; connection fees are US\$ 120, payable over time, and the Gungano fund is paying for building materials and plumbing.

In the sewers and drains supported by OPP-RTI, the connection cost was US\$ 20 per household, with a further US\$ 20–30 for the toilet in the house. And sewer connections bring

large advantages in not having emptying costs and, in dense settlements with little room per person, taking up much less space than on-site sanitation.

In dense urban settlements, many forms of on-site sanitation face emptying costs as densities are such that the pit cannot be closed and another one dug. Emptying costs vary from US\$ 15 (informal emptying) to US\$ 60<sup>(24)</sup> – with annual costs dependent on how often the pit has to be emptied or the septic tank desludged. There are cost trade-offs between capital and maintenance costs – larger pits and tanks need emptying less often but cost more. The ecosan solution discussed above uses the human waste to produce compost that can be used on vegetable gardens. O’Keefe and co-authors note that in Nairobi’s informal settlements, most pit emptying is by hand, while in Kampala it is mostly by vacuum truck (largely because of lower population densities and more space through which trucks can access latrines). In Dar es Salaam’s informal settlements, rehabilitating pit latrines and finding support for emptying them was an effective way of improving provision for sanitation.

Some papers present sanitation costs in terms of daily, weekly or monthly costs to individuals or households, a more appropriate measure for those who pay to use public toilets. A monthly cost per household is also useful for considering how loans might support the construction of toilets – where the loan covers most or all of the costs of construction and becomes affordable if this can be paid off with relatively low monthly payments and low interest rates. The paper by Patel and co-authors describes community-managed toilet blocks with washing facilities in Mumbai that can be covered by charges of US\$ 1–2 per household each month. The paper by O’Keefe and co-authors points to costs per use for public toilets of US\$ 0.02–0.11 in Nairobi and US\$ 0.04–0.08 in Kampala. The Sanergy pay-to-use toilets described in this paper (see below) cost US\$ 0.05 per use. Even when payment per use is kept down to US\$ 0.05, this can be unaffordable for many households. A family of six, each using the toilet four times a day, would incur a daily cost of US\$ 1.20 or US\$ 36 a month – a lot more than the Mumbai solution. To put this cost into

23. Mitlin, Diana, David Satterthwaite and Sheridan Bartlett (2011), “Capital, capacities and collaboration: the multiple roles of community savings in addressing urban poverty”, Human Settlements Working Paper No 34, IIED, London, 56 pages; also d’Cruz, Celine and Patience Mudimu (2013), “Community savings that mobilize federations, build women’s leadership and support slum upgrading”, *Environment and Urbanization* Vol 25 No 1, pages 31–45.

24. These are costs reported by O’Keefe and co-authors for East Africa; see reference 10.

context – while it is difficult to generalize, in most informal settlements in sub-Saharan Africa (excluding South Africa), the lowest-income households rent rooms from upwards of US\$ 15 a month, less than they may be spending to use a public toilet. To save money, individuals may choose to use the public toilet only for defecation, but this raises the issue of where they (and especially women and adolescent girls) can urinate safely.

The paper by Sebastien Tilmans, Kory Russel, Rachel Sklar, Leah Page, Sasha Kramer and Jennifer Davis describes a container-based sanitation system in informal settlements in Cap Haitien, Haiti, which provides each household with its own toilet and a regular emptying service. The cost per household is US\$22 and this covers both the toilet and the emptying service. This is more than most low-income households can afford (and, as the paper notes, in many locations is more than the cost of installing sewers), but economies of scale have the potential to reduce the unit costs over time. This is a system that needs no pit or sewer connection and can be easily installed within each household. Since it requires little modification to the house, it is suitable for tenants. The October 2015 issue will have a second paper on this system – that examines its local impacts.<sup>(25)</sup>

The Sanergy toilets reported on in the paper by O’Keefe and co-authors is a new private provision system introduced into one informal settlement in Nairobi. Individuals or businesses pay Sanergy for one or more toilet units with washing facilities that they manage and charge for. This is within a larger system managed by Sanergy that includes sales and marketing of facilities, provision of loans to customers, collection of user fees, manufacturing of toilets, construction of facilities, collection and transport of wastes, treatment of wastes, sale of organic fertilizer and linking with external regulatory environment quality control standards. Over 500 units have been installed and customers are happy with their good maintenance and provision for hand washing. These can be more dispersed than conventional public toilets, shortening distances between home and the

toilet; their disadvantage is that they may have longer queues.

## VIII. THINKING ON CITY-WIDE SANITATION

As Gordon McGranahan notes, sanitation combines our most private behaviours with very public impacts.<sup>(26)</sup> Where there is inadequate provision, residents face high health risks from faecal matter – and this needs collective responses; neighbourhoods cannot be kept clean if there is still open defecation and dumping of toilet wastes. As the paper by Wankhade emphasizes, sanitation’s public goods benefits only accrue if everyone has access to adequate sanitation services. So even getting 80 per cent of households using safe, hygienic toilets does not remove health risks if the rest are defecating in the open or using toilets that do not dispose of excreta safely. City-wide sanitation solutions are an essential objective.

Many papers emphasize that a key part of on-site sanitation systems is the management of toilet waste (faecal sludge). As densities increase this has to be collected from pits or septic tanks and transported to a facility where it can be treated and disposed of.<sup>(27)</sup> This is relevant where solutions like pit latrines can be safely provided given geological conditions and settlement densities, but where there is not enough space to build another pit when the first is full. On-site sanitation may seem cheaper, especially for local authorities, because costs and responsibilities for faecal sludge management are transferred to households. But a sewer network can be a far more cost-effective use of funds, especially if designed to operate with minimal water use. This requires planning at the settlement and city scale, however, as well as capital. The SDI federations in the four city studies (as discussed by Banana and eight co-authors) recognize the potential value of decentralized waste water treatment systems in which a local sewer network removes waste to somewhere close to the settlement where it can safely be treated. But they also recognize that this requires land for the waste water treatment,

26. See reference 11.

27. This is discussed in Scott, Pippa, Andrew Cotton and M Sohail (2015), “Using tenure to build a ‘sanitation cityscape’: narrowing decisions for targeted sanitation interventions”, *Environment and Urbanization* Vol 27, No 2. This will be available in print in October 2015 and on OnlineFirst before then.

25. Russel, Kory, Sebastien Tilmans, Sasha Kramer, Rachel Sklar, Daniel Tillias and Jennifer Davis (2015), “Impacts of a container-based, household toilet and waste collection service in Cap Haitien, Haiti”, *Environment and Urbanization* Vol 27, No 2. This will be available in print in October 2015 and on OnlineFirst before then.

and that informal settlements may require some reblocking (rearranging of dwellings to create space for roads, paths and pipes). Early experimentation on this has been useful but remains small in scale.

Two papers point to another city-wide issue – the links between sanitation and drainage systems. The paper by Francis Odemerho describes how in the city of Warri in Nigeria, until the 1980s, flooding was kept off streets and confined to existing natural drainage sinks. But this broke down as the city authorities lost the capacity to prevent illegal building, the dumping of refuse into drains and the uncontrolled development of informal settlements on swamp lands. So problems with flooding increased because of the lack of land use planning, lack of drainage facilities, blockage of natural drains and building on flood plains.

The paper by Domingos José de Almeida Neto and Léo Heller<sup>(28)</sup> (in the next issue) describes how rapid population growth in the city of Rio Branco, Brazil overwhelmed the capacity of the local authority and led to new settlements developed on land that gets periodic flooding from the river Acre. But the paper also documents how many of those at risk do not want state solutions.

## **IX. KEY SANITATION ISSUES: COMMITMENTS, COVERAGE, CONTEXT, CO-PRODUCTION, COSTS, CAPITAL, CITY-WIDE...**

The SDGs commit to addressing everyone's needs and "leaving no-one behind". So they demand universal provision for water and sanitation (and much else besides). But the safe, convenient solution for sanitation that serves almost all urban dwellers in high-income and many upper-middle income countries is considered to be too expensive and beyond the capacity of local governments or utilities in low- and many middle-income countries. Here, universal provision will require cheaper solutions. As discussed in the paper by Banana and eight co-authors, universal provision is

what is emphasized, not equality in the quality of provision. But a commitment to universal provision also means that all disadvantaged or excluded groups can use this commitment to press for their needs to be addressed. There has been too little investment in thinking through ways in which universal provision might be secured.

The earlier section on context emphasized that solutions within each unserved or inadequately served settlement need to be developed locally so they fit local contexts and engage those who are inadequately served in devising the most appropriate responses. Unless there is generous external funding available (and at present there is not) these responses need to be cheap enough to allow their application at city scale in settlements where people have very limited capacity to pay. As shown by several papers, *co-producing* sanitation solutions with representative community organizations can bring down costs, help generate more revenue, and make shared and community solutions work where a toilet for each household is too expensive. But this does mean that equity is sacrificed, especially where middle- and upper-income groups have sewer connections and water piped to their homes. The experiences reported here also suggest that a lot more local experimentation is required if more effective strategies for scaling up are to be identified.

Although examples of sanitation co-production show great variety in what they actually do, they have some common elements. In each settlement, residents are active in discussions of what should be done (to what standards, at what cost, who pays what and how payments are structured) and who should be involved in the planning and during implementation. They have to make the trade-offs among what they would like, what can be afforded and what support they get from local authorities, and their decisions have to factor in the needs and priorities of different household members – especially women, children and those with impaired mobility.

The genius of the OPP-RTI interventions was that they insisted on all households in a lane agreeing to the intervention and raising the funds to cover the costs before work started. They also developed an intervention that could be introduced prior to local authority support being secured. Co-production is important too

28. Almeida Neto, Domingos José de and Léo Heller (2015), "Which is riskier: life on the floodplain or in housing imposed from above? The case of flooding regions in Rio Branco, Acre, Brazil", *Environment and Urbanization* Vol 27, No 2. This will be available in print in October 2015 and on OnlineFirst before then.

for making the local authority or utility aware of what can be brought to local solutions by those it does not serve. It also means that communities can help supervise public agencies and the contractors they hire and hold these contractors to account if they do not deliver what was agreed. One common issue raised by members of the federation in India, and also mentioned by some federations in other countries, is the challenge of getting contractors to adequately fulfil the water and sanitation work they were commissioned to undertake, and on time.<sup>(29)</sup>

Costs for sanitation need to factor in not only the capital costs that households have to pay (for instance, the cost of building a toilet and connecting it to the sewer) but also recurrent costs (for instance, monthly charges for maintenance or local authority charges through rates that may include a contribution to capital costs). For those without sewer connections, there are the capital costs of the latrine and the pit or septic tank into which their toilet wastes go; and in the more dense residential areas there are also the recurrent costs of emptying these. The cost per household can be cut when toilets are shared. Capital costs for public toilets are generally paid by the local government, an NGO or a sanitation entrepreneur, but often with user charges that include a contribution toward capital costs. Costs per use must also cover maintenance and running costs (for instance for water and electricity) – and the costs of staff to manage these, take payments and keep the toilets clean.

Much of the innovation described in papers in this and the next issue is not in toilet technology but in the roles and tasks of low-income households and community organizations, in funding to support them and in support from local authorities (that often involve co-production). Provision for sanitation, including the removal of faecal sludge, can be viewed more as a service people pay for than as the provision of hardware. It has become more common to consider sanitation costs in terms of daily, weekly or monthly costs to individuals or households. One of the challenges is finding better sanitation solutions for what low-income households can afford – say US\$3 or 4 per household per month. We noted earlier that even

relatively low charges for pay-to-use toilets add up over a month and can still be unaffordable.

The hope that privatization (and private capital investment) would come to have a major role in installing or expanding high-quality provision for water and sanitation in urban areas proved to be vastly overstated. Corporatized and privatized utilities (as well as traditional public ones) have been given the task but have been found wanting.

Perhaps the focus on markets should have looked more closely at what market solutions were providing on the ground, the challenges they (and their users) face and the ways the successful initiatives might be enhanced or expanded. Many innovations described in papers in this and the next issue depend on demand to cover some or all of their costs. Many also look to ways of using markets – for instance, loans to households for sanitation improvements or cheaper, more effective latrine-emptying services. Sanergy is seeking to provide better-quality and more accessible public toilets in informal settlements in Nairobi through selling franchises. The Reinvent the Toilet Challenge,<sup>(30)</sup> supported by the Bill & Melinda Gates Foundation, is a welcome catalyst for rethinking sanitation but should emphasize more solutions that are safe and convenient (for women, men and children) and that cost households no more than US\$ 3–4 per month. And within any settlement, commercial enterprises will serve those who can afford to pay – and not produce the settlement-wide or city-wide systems that sanitation needs.

One of the difficulties has been that the focus of sanitation solutions is either on the household or immediate neighbourhood, or else on sewer networks for the city. There is a need for innovation at the settlement level, i.e. for solutions that work for between 200 and 10,000 households.

### a. Don't dismiss sewers

We should not ignore the sewer systems that transformed health and convenience for everyone in cities in high-income and many upper-middle income countries and that almost everyone reading this editorial enjoys. If sewers are too expensive “for the poor”, how have so many Latin American

29. d’Cruz, Celine, Sonia Fadrigio Cadornigara and David Satterthwaite (2014), “Tools for Inclusive Cities: The Roles of Community-Based Engagement and Monitoring in Reducing Poverty”, IIED working paper, IIED, London.

30. <http://www.gatesfoundation.org/What-We-Do/Global-Development/Reinvent-the-Toilet-Challenge>.

cities reached close to universal provision? And how has the Orangi Pilot Project Research and Training Institute in Pakistan managed to support community-installed sewers and storm drains for all households with full cost recovery, persuading local government to provide the mains into which these community-level pipes are integrated? And although much still needs to be done in South African cities, the proportion of their populations with good-quality sanitation is much higher than in the rest of the region.

Sewers get bad press in both environment and development circles. Yet when competently installed in dense settlements, the unit costs per household for a toilet and sewer can be cheaper than on-site sanitation. Sewers also provide for the disposal of other household waste waters and cut costs by eliminating the need to empty pits or septic tanks or manage wastes on-site. In many local contexts, sewered systems may well be the best option – although more work may be needed to cut water use in toilets and to treat sewage. If done properly they also provide benefits over many decades. Look at how much London (and many other European cities) still benefits from sewers constructed 150 years ago.

We noted already how in some locations, a system of localized sewer networks may be the best solution, where land is available for decentralized waste water treatment. This is likely to require both capital from governments (to subsidize the installation of the system) and the provision of land for the treatment process. Costs could be shared – with households contributing prior to connection and loan finance increasing the likelihood that such costs would be affordable. Costs would also be considerably less than for a full city-wide sanitation network. In the longer term, the local authority or utility could invest in linking up these decentralized systems; the land used for the decentralized waste water treatment would then be available for green space or other public facilities or be sold to help finance the costs of the additional investment required.

## **b. Where sewers are not possible**

What can be done for those with very inadequate or no provision for sanitation when there is little or no external support, no piped water supply and no sewers to connect to? Where households can only afford US\$ 3–4 per month for sanitation, what are the viable options? Without sewers,

low-cost provision poses many institutional challenges. Households have to cooperate and contribute. Shared on-site sanitation emerges as a viable solution where densities are relatively low. Such sanitation can be upgraded through investments in septic tanks (which can also be shared to reduce costs). The lowest-income groups will struggle, however, to afford their contribution when wages are low and there are multiple demands on small incomes.

## **c. The extra benefits of ecosan need testing**

Externally funded initiatives for on-site sanitation are often justified as the most appropriate solution because they can produce energy (methane/biogas) and fertilizer from faecal sludge. On-site sanitation, done well, can reduce the pollution of water bodies better than sewer systems without treatment facilities. Toilets needing little or no water are essential where there is no regular water supply piped into each home. But household toilets are unlikely to generate much methane. Is it worth the cost of tapping it? Can composted/treated toilet wastes be sold at a price that covers both the capital costs of good-quality waterless toilets and the cost of collection, treatment and delivery to local farmers? Might the desire of external agencies to be seen to be more “ecological” be promoting solutions that are less effective at reducing risks to health from faecal contamination?

## **d. Upgrading**

Much of the sanitation improvement in urban areas in Latin America and some Asian countries came from “slum” upgrading schemes that addressed a range of needs – including water, housing quality, tenure and, when done well, high-quality sanitation. Most urban upgrading in Latin America, and some in Asia,<sup>(31)</sup> included the installation or extension of sewers and their connection to households. Care is needed to focus not only on sanitation but also on measures such as upgrading that contribute to (and may help fund) better sanitation.

31. Boonyabancha, Somsook (2005), “Baan Mankong; going to scale with ‘slum’ and squatter upgrading in Thailand”, *Environment and Urbanization* Vol 17, No 1, pages 21–46.

## e. Regulations

Many of the solutions that work well for low-income groups described in the papers contravene regulations. When local authorities first see the data produced by the federations from their city-wide sanitation surveys, a common response is that this situation is appalling and environmental health regulations should be enforced. But such a response will simply compound the problem, as low-income households are further penalized. Regulations can be helpful guides – but many need revision. Considerable collaboration between local government and organized communities is likely to be required to develop regulations that are appropriate.

## f. Getting the data on which to act

We have discussed the lack of accurate data with which to measure global progress. Much of the official data on sanitation comes from national sample surveys, including the Demographic and Health Surveys. Not only do these provide inadequate detail on sanitation provision, but their sample size is too small to provide relevant data for cities, let alone for the more local scale (street, neighbourhood, ward...) that is needed for assessing where needs are.

We need data that informs and guides a much increased number of local solutions, including those that fill the gap between the household and the city. This requires detailed local assessments by district and street. Census data should provide this but this is rarely available in a form that local authority and civil society groups can use and at best it is only available every 10 years. We have examples, however, of the needed data being generated by community-driven enumerations and mapping of informal settlements – as illustrated by the paper on Chinhoi. The OPP-RTI support for sanitation also included detailed local assessments and maps of each district to provide the basis for sanitation improvements.<sup>(32)</sup> Such information is social (how many people need toilets, are there special needs), related to the built environment (what provision exists, what quality is it) and

32. Orangi Pilot Project - Research and Training Institute (2002), *Katchi Abadis of Karachi: Documentation of Sewerage, Water Supply Lines, Clinics, Schools and Thallas* - Volume One: The First Hundred Katchi Abadis Surveyed, Orangi Pilot Project, Karachi, 507 pages.

geo-physical (what are the gradients, what might this mean for sewers and drains).

## g. City-wide sanitation

For improved health outcomes, every city dweller needs access to acceptable sanitation that safely disposes of their wastes – avoiding defecation in the open or into plastic bags or waste paper dumped wherever possible (often in drains). Every city needs a city-wide system for drainage that works and can cope with storms. Most on-site sanitation lacks sufficient protection from seasonal floods, which can spread toilet wastes all over the flooded areas. City-wide community-driven surveys of sanitation have proved important in promoting city-wide strategies.

## h. What role for external funding?

If we accept that solutions must be locally devised with the full engagement of those who are inadequately served, this means a complete rethink of external funding systems for sanitation. Donors need the capacity to listen to, work with, and support local governments and civil society organizations to develop locally appropriate solutions including co-production. This means a rethink from conventional donor strategies that focus on support for national policies. For these and for international NGOs, this also has to go beyond supporting a few innovative “community” initiatives. It means developing the financial and institutional means to support this at scale. This may include support for forms of provision that many funders don’t fund at the moment (shared toilets, community toilets) and for organizations they do not fund (especially representative organizations of slum/shack dwellers and where possible local government).

It is often assumed that urban sanitation improvements in low- and middle-income countries need external financing. But the OPP model shows this is not always so – indeed, OPP sought to avoid external funding because it always comes with (often inappropriate) conditions and is often far more costly than locally developed solutions.<sup>(33)</sup> It is likely that most of the funding for the extension of piped water and sewers in Latin American countries was

33. See reference 15, Hasan (2006).

provided by national and local governments. The sanitation systems being developed by the federations in urban centres in Malawi, Zimbabwe, Tanzania and Zambia recognize both the importance of solutions that can be scaled locally and the critical need for donor investments in innovation – as well as provision of investment capital. What will transform the quality and extent of provision for sanitation in urban areas (and much else) are competent and accountable local governments working with those who are inadequately served – often with co-production as the most effective response. This provides a challenge to official aid agencies and development banks as their funding systems are not suited to supporting this.<sup>(34)</sup>

**The finance system must change where households have to take on new responsibilities.** As the paper by Priyam Das<sup>(35)</sup> illustrates so clearly, it is not community participation to simply dump toilet management and maintenance tasks onto urban poor groups.

Of course there is also the issue of the funding needed to put city-wide systems in place,<sup>(36)</sup> even if most new provision for sanitation is on-site – for piped water (and water treatment), for solid waste collection and management, for faecal sludge disposal, and for storm and surface drainage. Such city-wide systems can bring enormous advantages to low-income groups.

## REFERENCES

Almeida, Neto, Domingos José de and Léo Heller (2015), “Which is riskier: life on the floodplain or in housing imposed from above? The case of flooding regions in Rio Branco, Acre, Brazil”, *Environment and Urbanization* Vol 27, No 2.

Boonyabanha, Somsook (2005), “Baan Mankong: going to scale with ‘slum’ and squatter upgrading in Thailand”, *Environment and Urbanization* Vol 17, No 1, pages 21–46.

Burra, Sundar, Sheela Patel and Tom Kerr (2003), “Community-designed, built and managed toilet blocks in Indian cities”, *Environment and Urbanization* Vol 15, No 2, pages 11–32.

34. Satterthwaite, David and Diana Mitlin (2014), *Reducing Urban Poverty in the Global South*, Routledge, London.

35. Das, Priyam (2015), “The urban sanitation conundrum: what can community-managed programmes in India unravel?”, *Environment and Urbanization* Vol 27, No 2. This will be available in print in October 2015 and on OnlineFirst before then.

36. See reference 27.

Das, Priyam (2015), “The urban sanitation conundrum: what can community-managed programmes in India unravel?”, *Environment and Urbanization* Vol 27, No 2.

d’Cruz, Celine, Sonia Fadrigio Cadornigara and David Satterthwaite (2014), “Tools for Inclusive Cities: The Roles of Community-Based Engagement and Monitoring in Reducing Poverty”, IIED working paper, IIED, London.

d’Cruz, Celine and Patience Mudimu (2013), “Community savings that mobilize federations, build women’s leadership and support slum upgrading”, *Environment and Urbanization* Vol 25 No 1, pages 31–45.

Hasan, Arif (2006), “Orangi Pilot Project: the expansion of work beyond Orangi and the mapping of informal settlements and infrastructure”, *Environment and Urbanization* Vol 18, No 2, pages 451–480.

Hasan, Arif (2008), “Financing the sanitation programme of the Orangi Pilot Project: Research and Training Institute in Pakistan”, *Environment and Urbanization* Vol 20, No 1, pages 109–120.

Iossifova, Deljana (2015), “Urban development, everyday sanitation and sociospatial differentiation in contemporary Shanghai”, *Environment and Urbanization* Vol 27, No 2.

Jones, Hazel and Jane Wilbur (2014), *Compendium of accessible WASH technologies*, WaterAid, London.

McGranahan, Gordon (2015), “Realizing the Right to Sanitation in Deprived Urban Communities: Meeting the Challenges of Collective Action, Coproduction, Affordability and Housing Tenure”, *World Development* Vol 68, pages 242–253.

Mitlin, Diana and David Satterthwaite (2012), *Urban Poverty in the Global South: Scale and Nature*, Routledge, London.

Mitlin, Diana, David Satterthwaite and Sheridan Bartlett (2011), “Capital, capacities and collaboration: the multiple roles of community savings in addressing urban poverty”, Human Settlements Working Paper No 34, IIED, London, 56 pages.

Nance, Earthea and Leonard Ortolano (2007), “Community participation in urban sanitation: experiences in northeastern Brazil,” *Journal of Planning Education and Research* Vol 26, pages 284–300.

O’Keefe, Mark, Christoph Lüthi, Innocent Kamara Tumwebaze and Robert Tobias (2015), “Opportunities and limits to market-driven sanitation services: evidence from urban informal settlements in East Africa”, *Environment and Urbanization* Vol 27, No 2.

Orangi Pilot Project (1995), “NGO Profile: Orangi Pilot Project”, *Environment and Urbanization* Vol 7, No 2, pages 227–236.

Orangi Pilot Project - Research and Training Institute (2002), *Katchi Abadis of Karachi: Documentation of*

- Sewerage, Water Supply Lines, Clinics, Schools and Thallas* - Volume One: The First Hundred Katchi Abadis Surveyed, Orangi Pilot Project, Karachi, 507 pages.
- Patel, Sheela, Carrie Baptist and Celine D'Cruz (2012), "Knowledge is power: informal communities assert their right to the city through SDI and community-led enumerations", *Environment and Urbanization* Vol 24, No 1, pages 13–26.
- Russel, Kory, Sebastien Tilmans, Sasha Kramer, Rachel Sklar, Daniel Tillias and Jennifer Davis (2015), "Impacts of a container-based, household toilet and waste collection service in Cap Haitien, Haiti", *Environment and Urbanization* Vol 27, No 2.
- Satterthwaite, David and Diana Mitlin (2014), *Reducing Urban Poverty in the Global South*, Routledge, London.
- Scott, Pippa, Andrew Cotton and M Sohail (2015), "Using tenure to build a 'sanitation cityscape': narrowing decisions for targeted sanitation interventions", *Environment and Urbanization* Vol 27, No 2.
- United Cities and Local Governments (UCLG) (2014), *Basic Services for All in an Urbanizing World*, Third Global Report on Local Democracy and Decentralization, Routledge, London.
- Wankhade, Kavita (2015), "Urban sanitation in India: key shifts in the national policy frame", *Environment and Urbanization* Vol 27, No 2.
- WHO and UNICEF (2014), *Progress on Drinking-Water and Sanitation: 2014 Update*, Joint Monitoring Programme (JMP), WHO and UNICEF, Geneva, 80 pages.