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Not just any toilet – women’s solutions to sanitation in informal settlements in Nairobi

Samantha Winter , Francis Barchi and Millicent Ningoma Dzombo

ABSTRACT

Evidence suggests sanitation development is more effective when women are involved. The purpose of this study was to provide women with an opportunity to share their perspectives and solutions to sanitation in informal settlements. Data were collected through 55 in-depth interviews with women in Mathare Valley informal settlement in Nairobi, Kenya. The most common solution was to build more toilets, but women had a variety of suggestions – including gender-specific solutions. Findings from this study suggest that it is imperative to start addressing women-specific burdens associated with sanitation in informal settlements.

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Environment (built and natural); Gender and diversity; Social sector – Water and sanitation; Sub-Saharan Africa

Introduction

Around the world, people living in informal settlements are burdened by lack of access to sanitation (Isunju et al. 2011). Indeed, inadequate sanitation has become part of the very definition of an informal settlement, that is, an area that combines, to varying degrees, inadequate access to safe water, sanitation and/or other infrastructure; poor housing; overcrowding; and insecure residential status (Hove, Ngwerume, and Muchemwa 2013). Almost a third of the world’s population lives in slums, with sub-Saharan Africa having the highest proportion of its urban population living in these settlements (Hove, Ngwerume, and Muchemwa 2013). In Nairobi, Kenya, for example, approximately 60% of its three million residents live in informal settlements (Corburn and Karanja 2014). In these densely populated communities, hygiene conditions are unacceptably low and there is a strain on the few essential resources available (Hove, Ngwerume, and Muchemwa 2013).

Women in slums are particularly burdened by the lack of sanitation (Corburn and Hildebrand 2015). They suffer not only from pathogen-related health issues, but from female-specific challenges such as vaginal infections, violence, and indignity (Corburn and Hildebrand 2015). During menstruation, in particular, women need safe, private and hygienic sanitation alternatives (Khanna and Das 2016; O’Reilly 2016); yet in these settlements they frequently lack access to such facilities (Corburn and Hildebrand 2015).

The importance of involving women in sanitation-related interventions is globally recognised (O’Reilly 2016). Research has shown that water and sanitation projects work better when women are included (Rahman, Hoque, and Makinoda 2011; O’Reilly 2016). A recent study by the International Water and Sanitation Centre (IRC) in 15 countries found that community water and sanitation projects designed and run with the full participation of women were more sustainable and effective (UN-Water 2006). In fact, some research suggests the effectiveness of projects involving women is up to seven times higher than when they are not (Rahman, Hoque, and Makinoda 2011).

Women's involvement in sanitation development is, however, affected by contextual social, cultural, and religious restrictions (Bongartz et al. 2010). With increased emphasis on gender mainstreaming efforts in the development sector, women are often given the responsibility for implementing projects, but in many contexts they lack the authority to influence decision-making (Adeyeye 2011). Gender mainstreaming in development can sometimes be interpreted as a threat to men in the community – benefiting women at the expense of men (Adeyeye 2011). Thus, many community-based sanitation programmes have found that even when women are given the same leadership positions as men, they do not have the same influence as their male counterparts (Adeyeye 2011). In addition, because of gendered divisions of labour in many countries, women sometimes find it difficult to balance the additional burden of sanitation development with their daily responsibilities (Bongartz et al. 2010).

In Kenya, these issues are pronounced. According to a 2014 nationally-representative survey, 72% of married women have lower cash earnings than their husbands, less than 8% own land or a house independently, and only about 30% own land or a house jointly with their husbands (Kenya National Bureau of Statistics et al. 2015). In informal settlements, these gender discrepancies are often worse. A recent study suggests women in these settlements are 5 times more likely to be unemployed than men (Oxfam et al. 2015). In addition, female-headed households – making up the majority of households in many informal settlements in Kenya – are more likely to be poor and further below the poverty line than male-headed households (Kenya National Bureau of Statistics 2018). While unemployment, poverty, and lack of assets do not always equate to poor participation in development, they can constrain women's overall economic influence and ability to exert pressure on policy and development agendas (McGranahan 2015).

Women's decision-making power and status in the community can further limit their ability to participate fully in development. Survey data from Kenya suggest that only about half of married women have any say in how theirs or their husbands' earning are spent. Approximately one-quarter of women report their husbands are exclusively responsible for making decisions about women's health care, major household purchases, and women's visits with family or relatives, and an additional half report that their husbands are involved in such decisions (Kenya National Bureau of Statistics et al. 2015). In informal settlements men's perceptions of women's role in community development can present another obstacle to women's involvement in sanitation development. Data from a recent qualitative study involving male residents in two informal settlements in Nairobi found that men believe they are much better suited to lead and oversee community development and know better than women what is good for their communities (Izugbara, Tikkanen, and Barron 2014). They reported that, without proper control, women can destroy communities; and that controlling and disciplining women, even if it causes occasional harm to them, is necessary to community progress and well-being.

Thus, despite the burdens women endure from lacking access to basic services and international pressure to include women, their voices are often muffled in the development process. The purpose of this study was to bring the sanitation conversation to women in informal settlements in Nairobi, Kenya – giving them the opportunity to share their perspectives about and offer solutions to sanitation issues in their communities.

Methods

Study site

Mathare Valley is located approximately 6 km from the central business district of Kenya's capital city, Nairobi (Corburn et al. 2012). The settlement is one of the oldest and largest in Kenya. People began moving into Mathare in the 1920s. Although the settlement was demolished by British colonials in 1952, residents quickly returned and the settlement has been growing rapidly since (Corburn et al. 2012). With a growth rate of about 4%, today's Mathare has close to 300,000 residents living in 3-

square kilometres (Lundine, Kovacic, and Poggiali 2012). The informal settlement area of Mathare – the specific site for this study – sits on less than a square-kilometre and has over 100,000 residents (Kenya National Bureau of Statistics 2012). This area is sub-divided into 11 villages. Recent estimates suggest there are approximately 144 shared/publicly accessible toilets in this area and about 167 shared/publicly accessible water taps (Kovacic 2014).

Residents in Mathare primarily live in dwellings made of iron sheets with dirt floors, low-cost apartment buildings or plots (a piece of land in a settlement usually demarcated with a wall, fence, hedge, or iron sheets), or other non-permanent structures (Corburn et al. 2012; Lundine, Kovacic, and Poggiali 2012). Estimates suggest about 83% of residents are renters and 17% own their homes (Corburn et al. 2012). Women make up about 46% of the population. About 41% of residents are under the age of 25, 71% have a primary and/or secondary education, 32% are unemployed, and 87% rely primarily on informal businesses and/or casual labour (e.g. clothes washing for women or construction labour for men) (Kovacic 2014). The average monthly income of households is less than KES 8,500 (approximately US\$85) – just above the absolute poverty line in Kenya (KES 6,500 per month) (Corburn et al. 2012). Average monthly household expenditures in Mathare, including rent (about KES 1,200/month), are over KES 9,100 (~US\$91) – suggesting most residents have a monthly deficit that has to be met through other means (Corburn et al. 2012). Access to water and sanitation in Mathare is limited. Only 11% of residents have access to an in-home piped water supply (Corburn et al. 2012). About 83% of residents rely on shared toilets, but over two-thirds regularly revert to using flying toilets (plastic bags), buckets or open defecation (Corburn and Karanja 2014).

Data and sample

Data were drawn from a study conducted over the period of 18 months starting in 2016 in Nairobi, Kenya. In-depth, semi-structured interviews were carried out with 55 women from Mathare informal settlement to help the researchers build a richer, contextualised appreciation for women's day-to-day experiences with and perceptions of sanitation in Mathare and their solutions to sanitation challenges. The Chief of Mathare, chairmen from each village, and a local women's organisation helped recruit women for introductory meetings about the study in each village. Women interested in participating signed up and provided basic demographic, sanitation, and contact information. Of these, 55 women were invited to participate. Since this study focused primarily on sanitation, participants were iteratively selected to represent a broad range of sanitation practices (e.g. open defecation; flying or bucket toilets; public facilities; shared, private facilities; and private sanitation facilities). Early in the research process, we realised access to different sanitation alternatives varied across villages due to differences in geography; accessibility; governmental, non-governmental, and private infrastructure investments; population densities; and land ownership (some villages are almost entirely owned by the government, others are a mosaic of public, private, and cooperative land). Thus, we stratified the sample – ensuring we included five women from each village.

Analysis strategy

Audio recordings from the interviews were transcribed in full and imported into Atlas.ti v.7. Because the lead investigator was a foreigner in Kenya two researchers (the principal investigator and a local female researcher, more familiar with Swahili and the Mathare context) independently reviewed and coded women's responses. A working list of themes and accompanying codes was developed based on an initial review of the transcripts. Coders added to the list as they progressed. After each coder completed the coding, files were merged and assessed for inter-rater agreement. Inter-rater agreement was approximately 95%. New codes and/or codes which did not match were discussed one-by-one by the research team until a consensus was reached.

Results

The participants

The women we interviewed in this study were diverse. Just under half of them were between the ages of 25–34, but the ages of the sample ranged from 18 to 72 years. About a quarter of the women reported monthly household incomes below KES 5,000 (about US\$50), another quarter reported incomes between KES 5,000 and 10,000, and another quarter did not know their household's income. Almost three-quarters of the women had completed primary school, but less than a quarter had completed secondary school. About one-half of the women were married and almost all had at least one child. One-half of the women reported having a business, but only about one-third reported having formal employment.

Very few women reported having access to a private toilet. Rather, the majority reported using public toilets during the day. Some women also reported having access to a building or plot toilet during the day, but others said they relied exclusively on bags or buckets. At night almost three-quarters of the participants relied on bags or buckets. Several women also had access to toilets in their buildings or plots, and a few women reported using open defecation.

Women's solutions

In this study, many women identified the need for more toilets to be built and offered ideas about what kinds should be built and who should be responsible for building them. For example, *"every landlord should remove one of his rooms to make one toilet and one bathroom"* (Mary, Village 6). Many women felt very strongly that the responsibility of toilet provision lay strictly with landlords and/or government entities; others suggested that successful strategies for toilet provision would involve collective action among tenants/residents as well as co-production between multiple actors (e.g. tenants, landlords, and government). Some women suggested that collective action among residents/tenants of Mathare might, for example, be an optimal strategy for persuading landlords to provide space for toilets and to hold them accountable for doing so. A few others suggested involving local government representatives and the media to ensure systems of accountability. For example:

"My solution is that the people of Mathare bring together all the landlords. They should be told, 'no matter how many rooms you have, at least one room should be put aside to construct a toilet and a bathroom, or even two toilets and two bathrooms.' According to me, that is a solution. That's the first one. The second solution would be for all tenants to come together and designate one space for the construction of a toilet. They should also report the landlord to the area Division Officer through the Chief. The village elders are also involved in land grabbing; so if this reporting happens it will force them to give up land for a toilet. These village elders are the ones with the most houses and they keep on oppressing the villagers; so, if this report gets to the Division Officer through the chief maybe they will convene a meeting with all landlords, and, if possible, it will be aired on television and the radio in all slums. All the landlords will be given maybe six months or one year with a warning: if your plot does not have a toilet within that duration of time it will be closed. I think that solution will work because they will be afraid of losing rent money if the plot is closed." (Mwa, Village 9)

Several women also recommended renovating, adding to, cleaning, or fixing existing toilets. Women highlighted the need to better maintain current toilets in Mathare, suggesting that much of the responsibility for these maintenance and renovation activities could lie, at least in concept, with residents, tenants, groups and/or toilet managers. For example:

"We first have to maintain the toilets that we have. They need to be cleaned. If they need to be renovated, then renovate them first. Then maybe we can get the space to build a toilet. The problem in the slum is space to build a toilet. Like NYS [National Youth Service] came and brought the project of the toilet, but when they started running it, somebody else came with a title saying, 'this is my property.' Yeah, that is the problem. But the solution, maybe, is to talk with the owners so that you don't start building a toilet. Then you find out you have wasted all your materials and it is demolished." (Nan, Village 4)

The previous passage suggests some women feel they, collectively, have a role to play, not only in the upkeep and renovation of existing toilets, but also in the process of expanding or building more toilets. For example, by engaging local groups (e.g. the National Youth Service – a government-funded programme that employs youth in service-based projects) and having a transparent discourse between residents, land owners, managers, and/or local government.

Several women provided additional suggestions about ways in which current toilets could be better maintained or improved either through the collective efforts of residents/tenants to take action themselves or to encourage other groups, such as the managers of toilets, to make improvements. These suggestions included making sure that toilets were clean and unblocked:

“We could do it [clean] the toilets ourselves. See, most of the time [the managers of the toilet] do not clean ... But some time ago, they used to put water in a drum outside the toilet. When you entered the toilet you could collect water, and when you were finished you could flush with water and you could leave the toilet as clean as you found it. I see that as the best solution.” (Sus, Village 5)

And had consistent water, lighting, and security:

“We need to have another public toilet. Not the residential toilets – a public toilet. This public toilet should have good management because when it is just there, unmanaged, we’ll just misuse it. So, we need good management. Also, people should be sensitised. They need to know that the toilet is there to serve the whole community; so, they need to use it wisely.” (Car, Village 1)

“Okay, for our case, let’s say when the lights are there we are able to go the toilet during the night and when there is security outside [the plots and toilets] the people in the village will not fear going to the toilet at night. So, it will be easy for them to go to the toilet during the night.” (Sha, Village 7)

And were made available at low- or no-cost to residents, e.g.,

“People should have those toilets where you do not have to pay. It would at least be better. Then, at least everyone would be able to help themselves.” (Pur, Village 4)

Others recommended renovating existing toilets, for example:

“There is no space to build a lot of toilets here. So, I think we should do repairs to the toilets here. If we do repairs, the walls and floor will be smooth; so, they will be easy to wash. If the holes [toilet bowls] are eroded, the water won’t flush. But if it is made well, it is straight and if you have put tiles, you will be able to scrub it with a brush and it will be clean quickly.” (Jen, Village 10)

Several women thought more financial stability and decision-making within their homes would also help to overcome sanitation issues. Many stated that toilet fees combined with a lack of money was a critical barrier to regularly using a toilet. For example:

“If a woman does not have money to pay, she won’t go. She thinks if she goes there [to the toilet] the men [managers] will embarrass her until she feels bad ... Instead of going there and being pushed around by the men, it is better she goes home [to use a bucket/bag]. Or maybe you have 50 bob or 30 bob [about US\$0.50 or US\$0.30] and maybe that 30 bob has been allocated to eat because here in Mathare, food is not really expensive. Even if you have 20 bob or 30 bob you can eat. But you will get a mama who has maybe 10 bob and that money is for food. So now, she sees it is better to forego going to the toilet.” (Sha, Village 11)

In some cases, women highlighted lack of control over household resources as an additional barrier to accessing sanitation. For example:

“You see, many women are housewives. If her husband only leaves her money for the vegetables and she doesn’t have an extra 5 shillings [about US\$0.05], you see, that is your problem. You will just struggle. And your children will struggle. This is a problem that constantly causes distress for women.” (Elz, Village 9)

In response to women’s economic challenges, a few women discussed business, employment, and access to money as key solutions to women’s sanitation problems in Mathare. For example:

“I wish it was possible for every mama to not be supported by her husband alone. She has her own business. She gets even 50 bob [about US\$0.50] of her own; she doesn’t have to beg people. Let’s say a woman is just staying in

the house without a business, without a job. She has no other option. If life is like that, she has to forego even using the toilet ... so just that small money could make a change." (Eli, Village 9)

Many women also spoke about specific gendered solutions to sanitation. For example, some women advocated for provision of a free and private place to change pads:

"You see like for men they have these urinals and whatever, they don't pay. So, I feel for the ladies we need to have like those bins, you don't need to pay because sometimes maybe you are on your periods and now you don't have the money and you need to dispose your pads so I think maybe they can set aside a room for the bins and women won't pay. Maybe you go for a long call [defecation]. Maybe for that you must pay, but for the disposal, me, for on my side, I just feel like it needs to be like for the men." (Car, Village 1)

Some of these women even suggested taking over management for such spaces, for example:

"It would be nice to be allowed to manage a women's toilet – for us to socialise with women and put that bin for women. In the men's toilet you will find a urinal and it is free. Why is it that men are being given so many priorities that cannot be given to women? ... Why don't women also be given a free urinal?" (Cla, Village 1)

Relatedly, several participants talked about ensuring that toilets have separate gender stalls:

"There are no toilets that are actually just for women ... There is one side labeled women's and the other men's, but both sides are used by men ... Like that CDF [Constituency Development Fund] toilet, if you enter inside, there isn't even a nail [to secure the door]. You think to yourself, 'if a person were even to push this door ...' Those men, if they see you are alone in that toilet, there is no other thing he is thinking. But if there could be a ladies' toilet, like the one that is labeled 'ladies' and it were actually run by women, it would be good. But most of the time, they are used by men." (Kav, Village 1)

Discussion

Gendered solutions to sanitation are few despite recognition of the key role that gender plays in solving sanitation problems around the globe (O'Reilly 2016). The study aimed to look, specifically, at women's perceptions of and solutions to sanitation issues in an informal settlement in Nairobi, Kenya. This study also served as an opportunity for women to focus not just on the problems associated with sanitation in their communities, as most previous research has done, but as a chance to visualise a different sanitation environment – one in which they are able to meet their daily sanitation needs with dignity, privacy, safety, and ease. Study results suggest that there is unlikely to be a one-solution-fits-all model to improving sanitation conditions for women in Mathare because the challenges they face are numerous and complex. Nevertheless, the solutions present an important perspective – that of female residents – on how sanitation conditions might be improved for women in these settlements and what obstacles need to be overcome in order to help foster change.

Demand-driven approaches to sanitation gained a lot of traction in the 1980s and 1990s.

Advocates for demand-driven approaches, such as the popular Community-Led-Total-Sanitation (CLTS) campaigns, frequently call on women to be the drivers of change for sanitation (O'Reilly 2010). There are, for example, programmes that provide microfinance and subsidies to women to build toilets because studies suggest women prioritise household sanitation over men. Yet, in many contexts, women lack the decision-making power in the home to ensure money is spent on toilets (Khanna and Das 2016). Some findings from this study are consistent with this literature, suggesting that women may not have the financial or decision-making power within their households to have control over their daily sanitation needs. Some women in this study pointed out that their sanitation access is limited by their husbands' or personal finances. As part of the solution, some women suggested that having more personal money, separate from their husbands', would, at the very least, give them the freedom to access public toilets on a regular basis. While this may be a viable solution for some women, other research suggests that women living in households with very limited resources may be unable to prioritise sanitation over other pressing household needs such as food or their children's health and education (Khanna and Das 2016; Routray et al. 2017). Accordingly, demand-driven approaches to sanitation could prove difficult for some women in these

environments if they are unable to access sufficient funds to invest in sanitation and/or the onus of responsibility for improving sanitation is placed squarely on the shoulders of a socially and economically disadvantaged group that has yet to see equal decision-making power in the household and community (Khanna and Das 2016; Khosla 2000; O'Reilly 2010, 2016). These findings highlight a need for further research that investigates the conditions in which women in these environments *are able* and *do* seek to overcome these obstacles to improving sanitation.

Recent literature suggests that the politics of sanitation in informal settlements, i.e. the relationships between different stakeholders (e.g. residents, landlords, non-governmental organisations, government, and public/private service providers), further complicates the notion of responsibility for sanitation in these settings, particularly for residents who are often very limited in their decision-making power (Isunju et al. 2011). Results from this study corroborate this literature – suggesting that the majority of women in Mathare do not perceive sanitation to be a household-level responsibility, but rather view it as the responsibility of landlords and/or local governments. These findings are consistent with evidence from other studies focused on sanitation decision-making and responsibility in informal settlements in East Africa that suggest tenants are often unwilling to pay directly for sanitation improvements because they feel landlords will be the ultimate beneficiaries (McGranahan 2015; Simiyu, Swilling, and Cairncross 2017). Landlords often benefit more from investments in long-term sanitation improvements than tenants do because they can charge higher rent and evict tenants who are unable to afford associated rent increases (Isunju et al. 2011; McGranahan 2015; Simiyu, Swilling, and Cairncross 2017).

Many residents of informal settlements may not be aware of Kenya's recent Environmental Sanitation and Hygiene Policy that corroborates residents' perceptions that landlords should be responsible for sanitation improvements in informal settlements. The policy admits that Kenya's government has lacked the public financing and institutional structure to properly coordinate sanitation financing and provision in all areas, particularly those with the poorest residents, such as informal settlements (Ministry of Health 2016, 10). It also places the responsibility for future sanitation improvements on landlords, stating that, "*landlords in peri-urban slums shall bear the cost of providing, improving and maintaining environmental sanitation and hygiene including the costs of operation and maintenance of the technology chosen*" (Ministry of Health 2016, 76). Yet, despite the government's and residents' preference to transfer the responsibility for sanitation onto landlords, findings from several studies suggest that many landlords in informal settlements also lack finances to invest in sanitation (Simiyu, Swilling, and Cairncross 2017). Some of the findings from this study and others suggest that obstacles to sanitation improvements in informal settlements are pervasive especially considering a common externalisation of responsibility for sanitation by actors at all levels; however, women's solutions in this study also opened the door to collective action and collaborative co-production strategies for sanitation improvements.

Findings suggest, for example, that while interventions that target women in informal settlements as the exclusive agents of sanitary change may not yield sustainable sanitation improvements, efforts aimed at collective action and co-production of sanitation may, at the very least, be a step towards improvement. Participants suggested, for example, that women in combination with other residents, should come together to renovate, better maintain (e.g. clean), and follow-through on small-scale solutions (e.g. putting lights and water in toilets). Others suggested that women/residents should collectively hold other groups (e.g. toilet mangers) accountable for doing these things. Several participants also talked about women/residents collectively holding landlords accountable for providing land/space (e.g. a room in a plot or building) and/or building toilets. Others recommended that residents, property owners, landlords, tenants, local groups, and government representatives should have more transparent dialogues about sanitation in Mathare. Still others suggested that there were not only opportunities for women and residents of Mathare to collectively push landlords to provide sanitation, but to also hold local government representatives accountable for providing alternative sanitation options for residents who cannot afford to live in a plot or building with a toilet.

A number of scholars (e.g. McGranahan 2015; Simiyu, Swilling, and Cairncross 2017) have pointed out some serious obstacles to collective action and co-production of sanitation development in informal settlements. These include landlords' inability to pay for sanitation improvements (Simiyu, Swilling, and Cairncross 2017); governments' inability to raise public funds to subsidise/provide sanitation for the poorest populations (McGranahan 2015); and/or residents', particularly women's, lack of economic and political power to collectively demand improved sanitation in informal settlements (McGranahan 2015; Simiyu, Swilling, and Cairncross 2017). However, these scholars, like the women in this study, provide some helpful suggestions about how collective action and co-production can also be used to overcome these obstacles. Women in this study suggested, for example, engaging the media and local government representatives to ensure the collective efforts of settlement residents are given the attention and power they need to hold landlords/toilet managers fully accountable for sanitation improvements. Even Kenya's government, through its Environmental Sanitation and Hygiene policy, supports co-production of sanitation by, for example, encouraging micro-finance institutions, merry-go-round savings groups, investment clubs, and other credit organisations to provide sanitation development financing to households and landlords in informal settlements who lack the funds to make improvements on their own (Ministry of Health 2016, 76). In order to assist women and residents in these collective efforts and to ensure successful co-production strategies to improving sanitation in informal settlements in Kenya, however, it seems imperative to provide opportunities to educate women, residents, tenants, landlords, and even local government representatives about the mandates, financing opportunities, and responsibilities of the various actors (e.g. households, landlords, the private sector, and government) laid out in the Environmental Sanitation and Hygiene Policy.

For many women in this study, solutions to the current sanitation challenges in Mathare also included a number of gender-specific changes. Studies have shown that urban governments have, historically, provided women with less access to toilets than men (O'Reilly 2010). In some cases, authorities, funders, and developers in charge of providing sanitation have neglected women's needs altogether. Without spaces designated to provide safe and hygienic environments for women's sanitation and menstrual needs, women often suffer a number of consequences, for example, missed days at school and higher risk of toxic shock syndrome and vaginal infections (Khanna and Das 2016). Findings from previous research in combination with women's solutions in this study highlight a critical need for strategies that enable women and girls to safely manage their sanitation and menstrual needs. Women in this study provided solutions that include coming together to advocate for gendered sanitation improvements (e.g. provision of bins for pads) and/or to take more direct control of their sanitation environments (e.g. by collectively managing a public toilet/women's side of the toilet).

While women in this study provided some interesting solutions to sanitation challenges in informal settlements, results also suggest that there may be a disconnect between women's solutions to sanitation issues in Mathare and other factors found to be associated with women's sanitation practices in these environments. Findings from a recent study focused on factors influencing women's sanitation utilisation in Mathare suggested that social disorganisation (especially presence of serious crimes), access to water, and insecurity were common factors associated with women's access to and utilisation of sanitation (Winter, Barchi, and Dreibelbis, *in revision*). Very few women in this study identified solutions to address these factors. Instead, the majority of women identified greater availability of toilets; government and landlord responsibility for sanitation improvements; renovation and/or better maintenance of toilets; better financial stability and decision-making for women; and gendered improvements (e.g. adding bins for pads and private places to change pads). In other words, the majority of the women's solutions seem to reflect more widely publicised beliefs about the factors that influence people's sanitation behaviours, for example the lack of availability of toilets or lack of demand (willingness to pay) (Isunju et al. 2011), rather than less-commonly known factors associated with women's sanitation utilisation in Mathare (Winter, Barchi, and Dreibelbis, *in revision*). This disconnect suggests there may be, not only a need to expand the perspectives of

sanitation scholars, policies, and developers to consider a broader range of factors that influence women's ability to access and utilise sanitation in informal settlements, but also to find meaningful ways to help women learn about and access information about these other, less-publicised factors. Findings from this study suggest that even participatory research, itself, can be an opportunity for women to think about and engage with less-commonly discussed sanitation topics and factors.

Conclusion

While there are serious obstacles to improving sanitation in informal settlements, findings from this study suggest that women in these settlements, backed by scholars and, to some extent, the government of Kenya, believe that collective action and co-production may be key to overcoming sanitation development challenges. At first glance, some of the solutions women provided in this study seem to externalise the responsibility of sanitation improvements to others (e.g. landlords, governments, and toilet managers); however, many women also provided solutions that encourage collective action among themselves and other residents in Mathare. They also suggested co-production strategies that call for groups at multiple levels to be involved in sanitation improvements in informal settlements. Additionally, findings in this study emphasised, as did findings from previous research, that there is a need to recognise and correct for additional, less-commonly known factors influencing women's ability to access and utilise sanitation such as safety and fear of crime (O'Reilly 2010).

These solutions have important implications for future policy and intervention strategies. They highlight the complexity of obstacles facing sanitation development in informal settlements especially for women; however, they also suggest that future sanitation strategies need to provide encouragement and support for women's/residents' collective efforts and co-production strategies to overcome these obstacles. Women, residents, and tenants, for example, should be given opportunities to learn about local and national sanitation policies that outline who is responsible for making sanitation improvements in informal settlements so that they can devise meaningful strategies for collectively holding those parties accountable. Landlords and local government representatives should also be educated about where funds and resources can be accessed to carry out sanitation improvements. Findings from this study also suggests that, in addition to providing information about sanitation policies, women, residents, landlords, and even government representatives need to be provided with opportunities to expand their understanding of the links between less-commonly cited factors (such as security) and women's access to and utilisation of sanitation in informal settlements. Policymakers, researchers, and developers need to start putting women's sanitation needs at the top of the list rather than trying to include them as an afterthought if they have any chance of achieving international and national sanitation goals by 2030.

Disclosure statement

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