Determinants of usage of communal sanitation facilities in informal settlements of Kisumu, Kenya

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ABSTRACT Residents of informal settlements in developing countries are faced with various challenges, including a lack of household sanitation facilities, which leads to use of alternative methods such as open defecation. The lack of household sanitation facilities and consequent use of improper methods necessitated the introduction of communal sanitation facilities in informal settlements as a way of increasing access to and use of sanitation facilities. However, little is known about their use and effectiveness, particularly in Africa's informal settlements. This study used a number of quantitative and qualitative methods to assess determinants of use of communal sanitation facilities in informal settlements of Kisumu, a city in Kenya. Findings reveal that factors such as location/siting, inadequate maintenance, economic aspects, and gender issues influence the use of communal facilities, and they should therefore be included in future sanitation interventions.

KEYWORDS communal sanitation / informal settlements / Kisumu / sanitation / shared sanitation

I. INTRODUCTION

Informal settlements are faced with various challenges, including a lack of household sanitation facilities. This lack of household sanitation facilities is due to challenges such as lack of space/overcrowding, insecure land tenure, and difficulties in determining an appropriate sanitation technology.(1) As a result of this lack, residents may use methods such as open defecation, or they may share the few sanitation facilities available in their settlements. Out of the 2.5 billion people without sanitation facilities globally, 784 million share sanitation facilities. In sub-Saharan Africa particularly, the proportion of people using shared sanitation facilities has been increasing, from 14 per cent in 1990 to 19 per cent in 2012.(2)

Sharing of sanitation facilities happens at different levels – at the household, community and public levels – as discussed comprehensively by Mazeau and colleagues.(3) Communal sanitation facilities (sometimes called community-based sanitation facilities or communal toilet blocks), unlike public facilities, are located within a community, owned and managed by the community, and used by residents of the community.(4) They have gained popularity in informal settlements as a means of increasing access to sanitation, amidst the challenges of lacking or inadequate household sanitation provision. The use of communal

1. Lüthi, C, J McConville and E Kvarnström (2010), "Community-based approaches for addressing the urban sanitation challenges", *International Journal of Urban Sustainable Development* Vol 1, Nos 1–2, pages 49–63.

2. WHO and UNICEF (2014), *Progress on Drinking Water and Sanitation: 2014 Update*, World Health Organization, Geneva.

3. Mazeau, A, B Tuffuor and K Sansom (2011), *No Household Sanitation Facilities: What Options Remain For Urban Dwellers?*, Ministry of Water Resources, Works and Housing, Ghana, page 66; also Mazeau, A, B Reed, K Sansom and

sanitation facilities has been documented in countries such as India,[5] Ghana,[6] Kenya,[7] Uganda[8] and South Africa.[9] Just like other shared facilities, they are not considered "improved" sanitation facilities by the Joint Monitoring Programme (JMP).[10]

Communal sanitation facilities are intended to provide a solution to defecation needs of populations in areas like informal settlements, where sanitation facilities are lacking, and it is difficult to provide household sanitation facilities. Often, they are within a community, have a caretaker, and operate on a pay-per-use basis. Charges may be determined by the cost of construction (such as raw materials and labour), but often, these charges are subsidized; thus the assumption is that people will pay for the services offered.[11] They are thought to be an avenue for behaviour change in informal settlements (such as reduction in open defecation), especially if combined with sensitization and awareness.[12]

The effectiveness of communal sanitation facilities has however been varied; in India, for instance, they have been successful in Mumbai,[13] while in Bhopal, they were not effective in reducing open defecation.[14] In Kenya, they have been introduced in Nairobi, being lauded as the most feasible option in informal settlements.[15] They have also been introduced in Kisumu, but their usage and effectiveness, unlike in Nairobi, still remain unclear.

II. METHODS

a. Study area

Kisumu is a city in Kisumu County, and is the third largest city in Kenya, with an estimated population of approximately 420,000.[16] Over the years, the city's population has grown rapidly, resulting in urbanization challenges such as growth of informal settlements. More than half of the city's population is classified as "poor",[17] and approximately 60 per cent of the city's population lives in informal settlements.[18] The main informal settlements are Manyatta A and B, Manyatta Arab, Nyalenda A and B, Bandani, Kaloleni, Obunga and Kibos.

These informal settlements are mostly served with pit latrines and a few septic tank connections, often provided by household owners.[19] It is estimated that half of the population in the settlements lacks sanitation facilities, and consequently "flying toilets"[20] are rampant.[21]

In recent times, non-governmental organizations (NGOs) have introduced other sanitation technologies such as household ecological sanitation toilets and communal biogas toilets. The communal facilities are pay-per-use toilets owned and managed by the community. After consultations with community members, NGOs such as Sustainable Environment and Community Development (SECODE)/Umande Trust provided finances for construction of the facilities. At least one communal facility was constructed in each of Nyalenda B, Bandani, Obunga and Manyatta, after which management was handed over to the community as end users. The community was organized into self-help groups, which then became management committees of these communal facilities. The management committees would ensure the smooth running of the facilities, by appointing a caretaker to ensure the facilities were open and kept clean, and that users paid for the services.

R Scott (2014), "Emerging categories of urban shared sanitation", *Water and Environment Journal* Vol 28, No 4, pages 592–608.

4. See reference 3, Mazeau et al. (2014); also Burra, S, S Patel and T Kerr (2003), "Community-designed, built and managed toilet blocks in Indian cities", *Environment and Urbanization* Vol 15, No 2, pages 11–32.

5. See reference 4, Burra et al. (2003); also Biran, A, M Jenkins, P Dabrase and I Bhagwat (2011), "Patterns and determinants of communal latrine usage in urban poverty pockets in Bhopal, India", *Tropical Medicine & International Health* Vol 16, No 7, pages 854–862.

6. Adubofour, K, K Obiri-Danso and C Quansah C (2013), "Sanitation survey of two urban slum Muslim communities in the Kumasi metropolis, Ghana", *Environment and Urbanization* Vol 25, No 1, pages 189–207.

7. Wegelin-Schuringa, M and T Kodo (1997), "Tenancy and sanitation provision in informal settlements in Nairobi: revisiting the public latrine option", *Environment and Urbanization* Vol 9, No 2, pages 181–190; also Schouten, M and R Mathenge (2010), "Communal sanitation alternatives for slums: A case study of Kibera, Kenya", *Physics and Chemistry of the Earth, Parts A/B/C* Vol 35, Nos 13–14, pages 815–822; and Thieme, T (2010), "Youth, waste and work in Mathare: whose business and whose politics?", *Environment and Urbanization* Vol 22, No 2, pages 333–352.

8. Günther, I, A Horst, C Lüthi, H-J Mosler, C B Niwagaba and I K Tumwebaze (2011), "Where do Kampala's poor 'go'? - Urban sanitation conditions in Kampala's low-income areas, Research for Policy 1, ETH Zurich, available at http://mpra.ub.uni-muenchen.de/45832/.

9. Roma, E, C Buckley, B Jefferson and P Jeffrey (2010), "Assessing users' experience of shared sanitation facilities: A case study of community ablution blocks in Durban, South Africa", *Water SA* Vol 36, No 5, pages 589–594.

10. See reference 2.

11. Katukiza, A Y, M Ronteltap, C B Niwagaba, J W A Foppen, F Kansiime and P N L Lens (2012), "Sustainable sanitation technology options for urban slums", *Biotechnology Advances* Vol 30, No 5, pages 964–978.

12. See reference 11.

13. Patel, S and the SPARC team (2015), "The 20-year sanitation partnership of Mumbai and the Indian Alliance", *Environment and Urbanization* Vol 27, No 1, pages 55–72.

14. See reference 5, Biran et al. (2011).

15. See reference 7, Schouten and Mathenge (2010).

16. Republic of Kenya (2013), *Kisumu County First County Integrated Development Plan 2013-2017*.

17. UN-Habitat (2005), *Situation Analysis of informal settlements in Kisumu*, United Nations Human Settlements Programme, Nairobi.

18. UN-Habitat (2008), *UN-Habitat and the Kenya Slum Upgrading Programme Strategy Document*, United Nations Human Settlements Programme, Nairobi.

19. Letema, S, B van Vliet and J B van Lier (2014), "Sanitation policy and spatial planning in urban East Africa: Diverging sanitation spaces and actor arrangements in Kampala and Kisumu", *Cities* Vol 36, pages 1–9.

20. "Flying toilets" describes the practice of defecating in a bag and flinging it away.

21. Karanja, I (2010), "An enumeration and mapping of informal settlements in Kisumu, Kenya, implemented by their inhabitants", *Environment and Urbanization* Vol 22, No 1, pages 217–239. In the settlements, sanitation facilities are shared among a number of households living in a plot (between 2 and 10 households). Thus, according to Karanja's study, approximately half the plots in the settlements lacked sanitation facilities. Similarly, preliminary studies conducted in Bandani, Obunga, Nyalenda

Apart from toilets, the facilities have shower cubicles, as well as water points for the sale of water. Proceeds from the sale of these services are used for repair and maintenance of the facilities.[22] However, as discovered during fieldwork, other private individuals also operated communal facilities that offered toilet and showering services, also on a pay-per-use basis.

Interventions like construction of communal facilities are meant to address the lack of sanitation facilities and consequent use of improper methods such as open defecation or flying toilets. However, less is known on the use and efficiency of these communal facilities in the informal settlements, which was the basis for this study. The research was carried out in Nyalenda A, Nyalenda B, Bandani and Obunga settlements, and was limited to communal facilities located within them.

b. Research design and methods

This study used a combination of qualitative and quantitative methods in a sequential explanatory design approach. Such an approach includes having an initial quantitative study, which is followed by qualitative methods that give further explanation of the (sometimes unexpected) results of the initial quantitative study results.[23]

Initial cross-sectional survey and methods

An initial cross-sectional survey[24] had been conducted in Nyalenda A, Nyalenda B, Bandani and Obunga settlements, and it sought to identify, among others, where residents relieved themselves. Kaloleni, Kibos and Manyatta Arab settlements were excluded because they had few households. The sample size was calculated based on findings from an earlier preliminary study, and the calculation led to a required sample of 160 respondents. This sample size was distributed equally among the four settlements. A sampling interval was determined by dividing the total number of respondents in each settlement by the required sample size. The first respondent was selected randomly at the starting point, which was one end of each settlement. The rest of the respondents were selected by systematically skipping three or four plots (as per the determined interval), while moving towards the other end of the settlement, until the desired sample size was attained and the whole area had been covered. Selected respondents were interviewed by researchers who were guided by questions in a structured interview guide. During the interviews, respondents often gave more information on their responses (which was beyond the scope of the survey and the interview guide), explaining their choice for or against using communal sanitation facilities.

Quantitative data was entered into Epi Info,[25] cleaned, and transferred to STATA,[26] where simple descriptive analysis was performed. The results gave a snapshot of where residents relieved themselves (which fulfilled the objective of the survey anyway), but some data (albeit insufficient) had been gathered from informal discussions during the survey. This insufficiency pointed to the need for a qualitative study that would give further explanation to the use of communal facilities.

Qualitative study and methods

A qualitative study thus followed, using a number of methods: observations, semi-structured interviews and scrutiny of usage records at communal facilities (if available).

All communal facilities in Nyalenda A, Nyalenda B and Obunga[27] were visited and inspected for cleanliness and maintenance using an inspection checklist. The questions on the checklist assessed whether there was faecal matter or flies in the toilets, whether there was any smell, and cleanliness of the toilets.

Caretakers at these facilities were interviewed on management and use, as well as challenges faced in operation and maintenance. Records that the caretakers kept (if any) were also scrutinized. These records detailed the number of people visiting the facility, reasons for visiting, and daily proceeds from the facilities.

Semi-structured interviews were then conducted with five community leaders, at least one from each settlement, with the main questions being about usage of the facilities, as well as reasons why community members use/do not use communal facilities.

After interviews, structured observations were conducted at the communal facilities to observe patterns of use. The observers were stationed where they observed usage patterns at the facilities with minimal interference on users, and further noted what they observed.[28] The main aspects that were noted were gender of users, number of users, and reasons for visiting the facilities. Observations were carried out between 8am (often observers arrived before 8am) and 7pm, due to safety and security concerns (such as mugging and robbery) that had been reported in the settlements.

Beginning with Obunga, observations were carried out for two days at each of the facilities. The first day was devoted entirely to observations, and on the second day, interviews were carried out alongside the observations. The first day gave an indication of usage patterns in order to determine sampling procedures for the second day. On the second day, interviewers approached the first user who visited the facility and used the toilet. The respondent was interviewed only if he/she was willing and gave consent. Interviewers skipped the second user, then approached the third; and this process continued until the close of day.

Male users were interviewed by a male interviewer, and female users were interviewed by a female interviewer. Initially, the users were interviewed at the communal facility site, but it was realized that they gave "socially acceptable" responses, probably out of embarrassment or fear of evaluating the facilities in the presence of other users or the caretaker. After realizing this, the interviews were conducted at a distance away from the facility, thereby encouraging the users to give honest critiques of the communal facilities. Most interviews took place in Obunga (which had more users), while no interviews were conducted in one facility in Nyalenda B, because of refusals and/or the low number of users. The emphasis during this stage was not on the numbers per se, but on ensuring that there was enough information to support the explanation of use/misuse of communal facilities (theoretical saturation).[29] A total of 18 (complete) interviews were conducted, by which time it was felt that new information was not forthcoming.

Data from inspection of communal facilities, and that from observations of users, was entered and summarized in an Excel sheet. All interview data

A and Nyalenda B in 2012 estimated that 52 per cent of plots lacked sanitation facilities. In general, there is scanty and unreliable data on households with sanitation facilities (either shared on the plot or individual sanitation) in the settlements, but individual household facilities are few.

22. See reference 19; also Simiyu, S (2015), "Socio-economic dynamics in slums and implications for sanitation sustainability in Kisumu, Kenya", *Development in Practice* Vol 25, No 7, pages 986–996.

23. Ivankova, N V, J W Creswell and S L Stick (2006), "Using Mixed-Methods Sequential Explanatory Design: From Theory to Practice", *Field Methods* Vol 18, No 1, pages 3–20; also Klassen, A, J Creswell, V Plano Clark, K Smith and H Meissner (2012), "Best practices in mixed methods for quality of life research", *Quality of Life Research* Vol 21, No 3, pages 377–380; Teddlie, C and A Tashakkori (2006), "A general typology of research designs featuring mixed methods", *Research in the Schools* Vol 13, No 1, pages 12–28; Teddlie, C and F Yu (2007), "Mixed Methods Sampling: A Typology With Examples", *Journal of Mixed Methods Research* Vol 1, No 1, pages 77–100; and Punch, K F (2013), *Introduction to social research: Quantitative and qualitative approaches*, SAGE.

24. This research was conceived during fieldwork while undertaking PhD research. The PhD research included an initial cross-sectional survey to investigate economics of household sanitation in the informal settlements of Kisumu. The procedures described here are those that were followed during the survey. It was the responses and findings from the survey that prompted further qualitative investigation of the use of communal sanitation facilities in the settlements.

25. Epi Info is software developed by the Center for Disease Control and Prevention (CDC) that allows designing of

questionnaires, data entry and analysis. For this research, Epi Info was used to design the tool for data entry and ensure that the data was entered correctly. Website: https://wwwn.cdc.gov/epiinfo/index.htm.

26. STATA is statistical software that can be used for quantitative data analysis as well as graphical representation of data. Website: http://www.stata.com/.

27. The facility at Bandani was unfortunately not included in the qualitative study because after more than one visit to the facility and waiting for more than two hours, there was no caretaker on site, and the toilet cubicles were locked. Households living next to the facility were interviewed, and they indicated that the facility was not commonly used by community members for defecation.

28. Cohen, L, L Manion and K Morrison (2007), *Research Methods in Education*, 6th edition, Routledge, Oxon.

29. Bryman, A (2012), *Social research methods*, Oxford University Press, New York.

30. See reference 29.

31. Atlas.ti is a computer-assisted software tool that supports qualitative data analysis. Website: http://atlasti.com/.

32. These results are from discussions that began during the initial quantitative survey, as well as qualitative data collected during the follow-up phase. Both of these data sources are described in section IIb.

(some of which was audio recorded) was summarized and/or transcribed. Qualitative data analysis was an iterative process[30] that had begun during the initial cross-sectional survey and continued during (qualitative) data collection until the end of data collection. Summaries of observations and transcripts of interviews were first read and then re-read to gain a deeper understanding. Concepts that emerged from this process of reading and re-reading were then coded using Atlas.ti (V.7).[31] The codes were then grouped into main themes, which were used to explain the results.

III. RESULTS

a. Quantitative results

During the initial cross-sectional survey, 180 respondents were interviewed, 91 of whom lacked sanitation facilities. Twenty-four per cent of these respondents who lacked sanitation facilities indicated that they mainly relieved themselves in communal facilities. Most communal facility users (73 per cent) lived in Obunga (Table 1). Seventy-seven per cent of the communal facility users were women (overall women comprised 82 per cent of respondents in the survey). Most of the respondents who reported using the communal facilities lived close to the facilities. However, further discussions (usually after the completion of the interview) revealed that they mentioned using communal facilities because it was an "acceptable" response. More often than not, they relieved themselves in their neighbours' toilets, where they were not required to pay per use, and only used communal facilities when it was absolutely necessary.

b. Emergent themes from qualitative data[32]

Themes have been summarized into management aspects, economic aspects, use factors, and challenges in operation and use of communal facilities.

Management aspects

All the communal facilities were situated at accessible locations in the settlements. The two facilities in Nyalenda A (Table 2) were situated along a major road and within a busy trading area. All facilities, except those privately owned, were managed by community groups. Construction of these community-managed facilities had been financed by NGOs and/or the municipality. Each had (at the very least) shower and toilet facilities, though others had additional services as detailed in Table 2. There was a caretaker, who was in charge of their daily operation, including cleaning and record keeping, and handing over of daily proceeds. The caretaker received monthly pay for his/her services (Table 2). Record keeping was practised in only two facilities.

Opening times varied, and were often determined by availability of users and the caretakers' time.

> "…Once it is 6pm and starts getting dark, I have to close…we have no electricity…"

TABLE 1
Cross tabulation of informal settlements and areas where respondents without sanitation facilities mainly relieved themselves

Main defecation facilities/places	Area				
	Bandani	Nyalenda A	Nyalenda B	Obunga	Total
Neighbour (%)	15	21	18	5	59
	25.4	35.6	30.5	8.5	64.8
Communal (%)	0	1	4	16	21
	0	4.8	19	76.2	23.1
Flying toilet/open defecation (%)	0	1	2	1	4
	0	25	50	25	4.4
Others[(a)] (%)	3	0	3	1	7
	42.9	0	42.9	14.3	7.7
Total (%)	18	23	27	23	91
	19.8	25.3	29.7	25.3	100

NOTE: [(a)]Others included a nearby mosque, toilets shared by more than one plot, and four respondents who had toilets in their compound, but which were not in useable condition (and thus used neighbours' toilets).

> "…I close at 8.30pm, but if I still have users, I open until 9pm. If there are no users, I close at 7.30pm. During the rainy season, I close at 6pm…"

Inspection of the facilities for cleanliness showed that though they were fairly clean, some were smelly, while two facilities were dirty (Table 2). Interviews with caretakers and observations revealed that cleaning was done at least once a day.

> "…I only clean once a day, in the morning…. I clean up again only if a user has left the toilet dirty…"

One side of the communal facility in Nyalenda B was used by the community, and the other side was used by a local school. These toilet cubicles in the school section were very dirty and seemingly not in use.

Economic/business aspects

The communal facilities operated on a pay-per-use basis, with different rates charged for each service that was offered (except for Obunga St. Margaret – Table 2). In all cases, users were given some toilet paper for toilet use and a piece of soap for showering.

> "…I measure it [toilet paper] out for them. If they complain of it being little, I tell them that this is business…if they need more, they should bring their own…"

TABLE 2
Management, economic and use aspects of communal facilities in Kisumu's informal settlements

	Nyalenda Municipality	Nyalenda Private[a]	Nyalenda Bio-centre	Obunga Bio-centre	Obunga Private[a]	Obunga WATSAN	Obunga St. Margaret
Management							
Length of operation	4 years	1 year	3 years	3 years	10 years	8 years	9 years
Location	Nyalenda A	Nyalenda A	Nyalenda B	Obunga	Obunga	Obunga	Obunga
Management	Community	Privately owned	Community	Community	Privately owned	Community	Community
Opening times	6/7am–7/8pm	6/7am–7/8pm	6/7am–6/7pm	6/7am–8/9pm	6/7am–8/9pm	6/7am–8/9pm	6/7am–8/9pm
Services offered	Shower, toilet	Shower, toilet	Shower, toilet, sale of water	Shower, toilet, biogas, hall hire, office space[b]	Shower, toilet, sale of water	Shower, toilet, sale of water	Shower, toilet
Record keeping	No	No	Yes	Yes	No	No	No
Cleaning frequency	1–2 times daily	2–3 times daily	1–2 times daily	1–2 times daily	1–2 times daily	Once daily	1–2 times daily
Person in charge	Caretaker	Owner	Caretaker	Caretaker	Caretaker	Caretaker	Caretaker
Payment to person in charge[c]	3,000[d]	No	2,000	3,000	3,500	2,500	1,000
Toilet cubicles	2[e]	2[f]	3[g]	4[g,h]	2[i]	2[j]	3[g]
Shower cubicles	1[e]	2[f]	2[g]	2[g,h]	3[i]	4[j]	2[g]
Rate of cleanliness	Dirty	Clean	Clean/ smelly	Clean/ smelly	Clean/ smelly	Dirty	Clean
Maintenance issues	Women's toilets not functional	None	Leaky taps	Leaky taps	Leaky taps	Leaky taps, toilet not flushable	None, though only the men's side was in use
Economic							
Toilet service benefits	Toilet paper	Toilet paper	Toilet paper	Toilet paper	Toilet paper	Toilet paper	Toilet paper
Shower service benefits	Soap	Soap and lotion	Soap and lotion	Soap and lotion	Soap	Soap and lotion	Soap and lotion
Other services	None	None	Sale of water	Biogas, hall hire	Sale of water	Sale of water	None
Toilet charge[c]	5	10	2	3	5	5	10
Shower charge[c]	10	15	10	10	10	10	10
Daily proceeds[c]	300–400	300–600	300–400	800–1,000	900–1,200	300–500	200
Use							
Frequently used service	Shower and toilet	Shower	Shower	Shower and toilet	Shower	Shower	Shower

(Continued)

TABLE 2 (CONTINUED)
Management, economic and use aspects of communal facilities in Kisumu's informal settlements

	Nyalenda Municipality	Nyalenda Private[a]	Nyalenda Bio-centre	Obunga Bio-centre	Obunga Private[a]	Obunga WATSAN	Obunga St. Margaret
Busiest period	Late afternoon into the night	Late afternoon into the night	Late afternoon into the night	Late afternoon into the night	Late afternoon into the night	Late afternoon into the night	Late afternoon into the night
Frequent gender	Men	Men	Men	Men	Men	Men	Men
Types of users	Passersby, business people	Passersby, business people	Passersby, business people	Passersby, factory workers, community	Passersby, factory workers, community	Passersby, community	Passersby, community
Number of daily toilet users[k]	10	Total of 20[l]	10	60	Total of 80[l]	10	10
Number of daily shower users[k]	20	Total of 20[l]	20	60	Total of 80[l]	20	20
Variations in use	Low numbers in rainy season	Low numbers in rainy season	Low numbers in rainy season	Low numbers in rainy season	Low numbers in rainy season	Low numbers in rainy season	Low numbers in rainy season
Observation of use							
Female shower users (Day 1)	0	0	0	1	0	0	0
Female toilet users (Day 1)	0	0	0	5	0	0	1
Male shower users (Day 1)	2	5	6	17	10	5	4
Male toilet users (Day 1)	2	2	3	13	5	3	2
Female shower users (Day 2)	0	0	0	2	0	0	0
Female toilet users (Day 2)[m]	1 (1)	0 (0)	1 (1)	7 (3)	0 (0)	0 (0)	0 (0)
Male shower users (Day 2)	6	5	6	20	10	5	4
Male toilet users (Day 2)[m]	4 (1)	3 (0)	4 (1)	15 (6)	6 (3)	4 (1)	3 (1)
Total observed users[m]	12 (2)	13 (0)	18 (2)	79 (9)	29 (3)	15 (1)	13 (1)
Incomplete/ unreliable interviews[n]	1	1	1	3	1	1	1

NOTES:

[a]These two facilities are privately owned, and in the strict sense, do not qualify as communal sanitation facilities. However, they were included in the study to investigate if there were any differences in their use.

(Continued)

TABLE 2 (CONTINUED)
Management, economic and use aspects of the communal facilities in Kisumu's informal settlements

[b]Obunga Bio-centre had a hall that was hired out for meetings, at a cost of KES 600 per day. It also had office spaces that had been rented out, all these being sources of income. The cost of using biogas was from as low as KES 5.

[c]The amounts indicated are in Kenyan shillings (KES). The Kenyan shilling (KES) is the currency used in Kenya. As at October 2015, US$ 1 = KES 104.

[d]The caretaker did not disclose the information about payment, though previous interviews indicated an amount of KES 3,000.

[e]The facility had two toilets on each side for men and women, but only one shower, which was in the men's section.

[f]The facility had two shower rooms and two toilet cubicles that were used by both women and men.

[g]Nyalenda Bio-centre, Obunga Bio-centre and St. Margaret's had separate sections for men and women. The figure indicated is the number of cubicles on each side of the men's and women's sections.

[h]Obunga Bio-centre had four toilets on the men's side and three toilets on the women's side. It had two shower cubicles on each side.

[i]The facility had two toilets and three shower rooms that were used by both men and women.

[j]The Obunga WATSAN facility had four shower rooms and three toilets, which had not been separated by gender; thus they were to be used by both men and women. At the time of the visit, only two toilets were functional.

[k]The figures given on number of users are maximum numbers reported by the caretakers.

[l]The owner could not estimate the number of users of the showers and toilets, but rather mentioned an estimate of the total number of users per day.

[m]The numbers in parentheses are the numbers of respondents who agreed to be interviewed and completed the interview sessions.

[n]These are the numbers of respondents who consented to be interviewed but either gave "socially acceptable" responses, or did not complete the interview (as explained in section IIb). All were men, except one woman using Obunga Bio-centre. Their responses were not included in the final analysis, though the information they gave was not any different from that of respondents who completed interviews.

Generally, NGO-financed communal facilities (bio-centres) had lower charges than the privately owned facilities. Obunga Bio-centre had an option of group membership for members from one household, where three members paid a total fee of KES 100 monthly, and four members or more paid KES 200 monthly. The privately owned facility in Obunga also had an option of group membership, and members would pay KES 1,000 for registration, and then pay a monthly fee of KES 300. In both facilities, three groups had signed up for group membership. With membership, group members were given membership cards, with which they could use the toilet as many times as they wished. However, they still paid for the other services. Daily proceeds from services at the communal facilities ranged from a minimum of KES 200 to KES 1,200 (Table 2).

TABLE 3
Summary of observation data on usage of communal sanitation facilities in informal settlements of Kisumu

	Women		Men		
	Shower	Toilet	Shower	Toilet	Total
Day 1	1	6	49	30	86
Day 2	2	10	56	48	116
Total	3	16	105	78	202
Total	19		183		

NOTES:

Percentage of female users: 9.4

Percentage of male users: 90.6

Total shower users: 108

Total toilet users: 94

Shower use as proportion of total use: 53.5

Toilet use as proportion of total use: 46.5

Use factors

Caretakers at all the facilities estimated that there were more shower users than toilet users. These numbers were further reflected in the records, and from observations, in which 54 per cent of all observed users of communal facilities used the showers (Tables 2 and 3).

> "…Many people use the showers, very few use the toilet…" (A caretaker)

Most of the users frequented the facilities late in the afternoon through the evening. For instance, during observations, the busiest facility had a maximum of five users in a period of five hours during the day, while others recorded no users during the same period. In the evening, the busiest facility recorded a maximum of 25 users in 1.5 hours.

> "…Most users come here from 3 or 4pm till about 8pm. During the day time, I only serve 3 or 4 people…" (A caretaker)

In addition, caretakers reported that the facilities were frequented by men. Researchers confirmed that 91 per cent of all observed users were men (Table 2 and 3). Upon further probing, there were various sentiments explaining the low number of female users, mainly due to privacy.

> "…Ladies shy off [from using the facility] because they feel embarrassed…" (A male user)

"…No, I would rather go to my neighbour…I cannot go there [the communal facility], that is an embarrassment…" (A female non-user)

Most users were either passersby or traders who worked close to the facilities. In Obunga, the busiest facility served workers from nearby factories, while in Nyalenda, the busiest facility served traders who worked close by, because of its location.

"…Most users are passersby, visitors, people from the fish factory, neighbours…" (A caretaker)

"…More men who pass by this road use this facility. We serve very few women…" (A caretaker)

During peak hours (late in the afternoon into the night), some users were from the community, and from compounds without sanitation facilities. This was especially the case in Obunga at the bio-centre, probably due to its location within the community. For instance, out of all nine respondents interviewed from the bio-centre, four were from the community.

In all the facilities, the lowest number of toilet users recorded per day was two, while the maximum was 22 (Table 2).

Caretakers at all the facilities reported that the number of users reduced during the rainy season because few people visited the facilities. Kisumu experiences long rains in April after a hot and dry period between January and March. The rains are experienced in the late afternoon, which is coincidentally when most residents use communal facilities. The reduction in numbers was therefore because most people preferred not to be out in the rain, and also because others felt it was "too cold" to take a shower.

"…When it rains, people do not buy water… they do not shower …very few people use the toilet…" (A caretaker)

Non-users (from the survey) and users alike revealed that open defecation was still being practised, probably because of the need to defecate at night after closure of the communal facilities.

"…At 9pm you will find people squatting…people blame it on children, but it is adults who do it, because they have nowhere to go…" (A female user)

"…There are people who still defecate in the open …especially at night …" (A male non-user)

Users and non-users further expressed concerns about high costs of using the communal facilities for defecation, especially since there was need for more than one toilet visit per day. Thus the larger the household,

the more they would have to spend on using the toilet. Non-users who lived closer to the facilities and community leaders alike expressed the same sentiments. For instance, households living next to the communal facility in Bandani did not use it because they preferred to use their resources on other items (such as food), rather than pay to use the communal facility. Despite its convenient location (next to a marketplace), the facility in Bandani showed no signs of being operational.

> "…How much would we spend if we all [household members] used it [the communal facility]…?" (A non-user)

> "…Why would anyone spend KES 5 to use the toilet [at the communal facility] when they do not have cooking oil at home…?" (A community leader)

> "…The cost of using the toilet [at the communal facility] has been reduced to KES 2, to encourage people to use the facility, but still, people do not use it…they do not want to pay…" (A community leader)

Responses during the survey revealed that households who lacked sanitation facilities preferred to pay to use their neighbours' facilities as opposed to using communal facilities. Residents reported paying between KES 100 and KES 200 per month to their neighbours when they used their sanitation facilities. Non-users also mentioned the challenge of distances that had to be covered to access the facilities. Although some of the facilities were located near roads where they were easily accessible even to the public, non-users from the community felt they had other options that were closer to their houses, especially in the case of urgent need for use of a toilet. Such distances also contributed to some community members paying to use their neighbour's facilities, and not the communal facilities.

> "…I would rather request my neighbour to allow me to use their toilet….why should I walk to the bio-centre?" (A non-user)

Challenges faced in the operation and use of the facilities

A number of challenges were reported and observed:

Technical/functionality challenges

It was noted that some facilities needed repairs, as some parts were broken or leaking. In addition, some facilities were dirty, while others were smelly (Table 2). Some users also aired concerns that the facilities were sometimes dirty.

Users' lack of funds and improper use of the facilities

Caretakers reported that there were incidents of toilet users who lacked money to use the facilities. Some of these incidents were noted during the observations, and in one facility, one section had been closed off because users snuck in due to lack of funds.

> "…Someone would ask for soap to shower. As you see, these are

> toilets, and directly opposite are shower rooms. They probably would have toilet paper in their pocket. When I notice that it has taken them long to turn the taps on, I check and realize that they are using the toilet. When I ask, all they say is 'showering and using the toilet go hand in hand'…" (A caretaker)

Caretakers further reported several cases of improper use of the facilities.

> "…Some leave the toilet dirty, without flushing. When I ask, they say that they have paid for it…"

IV. DISCUSSION

a. Construction and operation of communal facilities

Financing for construction of communal sanitation facilities in informal settlements may be arranged by NGOs, as has been the case in India,[33] Uganda, Tanzania,[34] Bangladesh,[35] Kenya[36] and South Africa.[37] Facilities are usually managed by the community and users pay per visit, with the proceeds being channelled towards repair and maintenance. Since the facilities are meant to improve access to sanitation facilities, they usually have a number of toilet cubicles, and may also have showering cubicles. They also offer additional services that increase profits and ensure the sustainability of the projects,[38] since the profits are meant to be used for operation and maintenance while creating employment opportunities for community members. In Kisumu, the bio-centres, constructed with funding from NGOs, had more toilet cubicles, a clear indication that the aim was to improve access to sanitation facilities. Obunga Bio-centre offered additional services, which increased its popularity in the settlement. Privately run facilities were seemingly mainly focused on profit making as they did not have separate toilet cubicles for men and women, and/or had more shower cubicles.

Nevertheless, even with the benefits and additional services, the success of communal facilities depends to some extent on the community's involvement, which ought to be from the initial planning stages. Communal facilities have a better chance of success when they are co-produced with the community.[39] Co-production is reported in India, and it resulted in skill improvement and empowerment of community members,[40] in addition to success of the communal toilets. It also enables residents to lobby for better services from their leaders.[41] If co-production of communal facilities does not happen, the community may not have a feeling of ownership of the facilities, which might have been the case in Kisumu's informal settlements.

b. Use of communal sanitation facilities

Contrary to usage patterns in Bhopal, where a 2011 study found that most users used the toilet,[42] in this study, most users visited communal facilities to shower. The high use of shower services as opposed to toilet services is surprising, because it was not the intended aim of the facilities; but again, it points to the lack of (and hence the need for) shower facilities in the settlements.

33. See reference 4, Burra et al. (2003); also see reference 5, Biran et al. (2011); and McFarlane, C (2008), "Sanitation in Mumbai's informal settlements: state, 'slum' and infrastructure", *Environment and Planning A* Vol 40, No 1, pages 88–107.

34. Isunju, J B, S Etajak, B Mwalwega, R Kimwaga, P Atekyereza, W Bazeyo et al. (2013), "Financing of sanitation services in the slums of Kampala and Dar es Salaam", *Health* Vol 5, No 4, pages 783–791.

35. Hanchett, S, S Akhter, M H Khan, S Mezulianik and V Blagbrough (2003), "Water, sanitation and hygiene in Bangladeshi slums: an evaluation of the WaterAid–Bangladesh urban programme", *Environment and Urbanization* Vol 15, No 2, pages 43–56.

36. See reference 11.

37. Mels, A, D Castellano, O Braadbaart, S Veenstra, I Dijkstra, B Meulman et al. (2009), "Sanitation services for the informal settlements of Cape Town, South Africa", *Desalination* Vol 248, No 1, pages 330–337.

38. Katukiza, A Y, M Ronteltap, A Oleja, C B Niwagaba, F Kansiime and P N L Lens (2010), "Selection of sustainable sanitation technologies for urban slums — A case of Bwaise III in Kampala, Uganda", *Science of the Total Environment* Vol 409, pages 52–62.

Aside from the high usage of showers, fewer women used the communal facilities, just like in Bhopal[43] and Ghana.[44] The use of sanitation facilities among women is a much more private issue in comparison to men. Women have to contend with issues of embarrassment, long walking distances to defecation places and insecurity when they have no access to sanitation facilities;[45] and for such reasons, women may prefer private sanitation facilities.[46] Feelings of embarrassment were explicit in the responses given by caretakers and non-users – a finding that adds to the already established importance of sanitation facilities that are private, safe and convenient for women. It is also important that women, and their hygiene needs, be taken into consideration when planning for communal sanitation facilities.

Also implied by this study is the influence of location of communal facilities on their use. Location determines accessibility for the market population, since a larger market size leads to higher profit returns. In this study, the location of communal facilities at convenient/accessible locations increased their use, mostly to passersby. However, the location did not favour community members, especially if they had a considerable distance to walk. Similar results are reported in Ghana by Adubofour et al.,[47] that the long distance travelled to access communal sanitation facilities contributed to low use. Isunju et al.[48] are of the opinion that communal facilities located in residential neighbourhoods may not be financially sustainable because of the low number of users. The reason for the low numbers is that use of communal facilities is compromised if there is a considerable distance to be travelled by community residents. Users will more often opt for an alternative that is closer to their dwelling.

Distance, however, may not be the only factor that explains low use of communal facilities. In this study, even though costs of using the toilet at the communal facilities were lower than those of shower services, probably because an individual may visit the toilet a number of times during the day, there still were fewer toilet users. There were also cases of individuals who lacked resources to pay for toilet use. However low the costs of using communal sanitation facilities are, informal settlement residents will more likely opt for a sanitation alternative that is closer to their dwelling.

Costs and payment for sanitation services at communal sanitation facilities in informal settlements show the intricate mix of poverty and sanitation. Residents are faced with a dilemma, as they have to make decisions on whether to buy food (or another urgent need) or "buy" sanitation services. Availability of "cheaper" and "convenient" sanitation alternatives often leads to users choosing other basic needs over sanitation. Households with more members are even worse off because they may spend more for sanitation services. In Ghana, Nimoh et al.[49] illustrate this finding by stating that households spend more when they use public sanitation facilities, especially since every member may use the toilet more than once every day. On the one hand, the choice of other urgent needs may be an indication of poverty; but on the other hand, it shows a trade-off for convenient and private sanitation alternatives. Therefore, while it is assumed that people may be willing to pay for services at communal sanitation facilities,[50] findings from this study indicate that there are other factors that equally determine usage aside from costs.

One such factor determining usage of any form of sanitation is cleanliness. For sustained use, a toilet needs to be accessible, clean and functional. Some facilities observed in this study were dirty and smelly,

39. McGranahan, G (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.

40. See reference 13; also Chaplin, S E (2011), "Indian cities, sanitation and the state: the politics of the failure to provide", *Environment and Urbanization* Vol 23, No 1, pages 57–70.

41. McGranahan, G (2013), *Community-driven sanitation improvement in deprived urban neighbourhoods*, SHARE research report, London School of Hygiene and Tropical Medicine, available at http://researchonline.lshtm.ac.uk/1236350/1/FINAL_Community_drive_sanitation_improvement_in_deprived_urban_neighbourhoods_McGranahan_June_2013.pdf.

42. See reference 5, Biran et al. (2011).

43. See reference 5, Biran et al. (2011).

44. Arku, F S, E N Angmor and J-E Seddoh (2013), "Toilet is not a dirty word: close to meeting the MDGs for sanitation?", *Development in Practice* Vol 23, No 2, pages 184–195.

45. Parikh, P, K Fu, H Parikh, A McRobie and G George (2015), "Infrastructure Provision, Gender, and Poverty in Indian Slums", *World Development* Vol 66, pages 468–486.

46. Reddy, B S and M Snehalatha (2011), "Sanitation and Personal Hygiene: What Does It Mean to Poor and Vulnerable Women?", *Indian Journal of Gender Studies* Vol 18, No 3, pages 381–404.

47. See reference 6.

48. See reference 34.

49. Nimoh, F, K Poku, K Ohene-Yankyera, F Konradsen and R C Abaidoo (2014), "Households' Latrine Preference and Financing Mechanisms in Peri-urban Ghana", *Journal of Economics and Sustainable Development* Vol 5, No 16, pages 63–73.

50. See reference 11.

while others needed repairs. When users choose to pay for a sanitation service when they would otherwise use an alternative, they should get their money's worth, part of which is a clean and functional toilet. Lacking or inadequate management leads to dirty or broken-down communal facilities that may be unpleasant to use, thereby not fulfilling their purpose.[51] Users therefore are likely to revert to other alternatives. A functional toilet is one that can be used whenever there is need for use. Unfortunately, challenges within the informal settlements such as insecurity limited the operation of facilities at night, hence anyone needing to use the facilities had to find an alternative.

One such alternative was open defecation. It was deduced from the results that open defecation was still being practised, even though the introduction of communal facilities was meant to be an alternative to open defecation. Notably, Biran et al.[52] also conclude that communal facilities may not be the solution to ending open defection in informal settlements. On the contrary, though, Schouten and Mathenge[53] advocate for communal sanitation facilities as the best alternative for informal settlements. Schouten and Mathenge's conclusion, though, was from a study in Kibera (Kenya) in which responses were only taken from users of communal facilities. These two contrary opinions reflect the different social, cultural and economic conditions of informal settlements, even within the same country. What has been successful in one informal settlement may not necessarily be so in another settlement of the same country.

The results however show that communal facilities in Obunga are seemingly "busy" compared to the facilities in Nyalenda. There may be several factors that explain this observation. The bio-centre in Obunga was located within the community where residents could easily access it. It was also conveniently located for workers from nearby factories, who also frequented it, and it had the option of group membership to attract more users. Informal discussions[54] with representatives from the NGOs that partnered with the community suggested better community organization and management of the facility. The facility was also a two-storey building that could be seen from afar, commonly known within the community as "bio-tower" (perhaps due to its towering over other structures in the settlement). It also offered a number of services (Table 2), making it a popular structure within the settlement (Photo 1). It had an electricity connection that enabled longer opening periods compared to the facilities in Nyalenda, which did not have electricity or/and were disadvantaged by security concerns at night. The privately owned facility in Obunga on the other hand was conveniently located next to a road, where it was patronized by workers from nearby factories and construction sites. On the whole, however, whether the facilities were privately or community managed did not influence usage by community members. The only difference was that privately run facilities focused more on making profit, e.g. by offering shower services (which essentially cost more), and having more shower cubicles, which were used by both males and females.

Finally, results and the preceding discussion indicate that community sanitation facilities are faced with challenges that limit their intended purpose. They may not be the "ideal" solution since households would prefer to have sanitation facilities within their dwelling,[55] but it is important to understand users' needs, deficiencies in the facilities, and

51. See reference 39; also Subbaraman, R, L Nolan, T Shitole, K Sawant, S Shitole, K Sood et al. (2014), "The psychological toll of slum living in Mumbai, India: A mixed methods study", *Social Science & Medicine* Vol 119, pages 155–169.

52. See reference 5, Biran et al. (2011).

53. See reference 7, Schouten and Mathenge (2010).

54. These were informal discussions with NGO representatives that were not included in the results of this study.

55. Satterthwaite, D, G McGranahan and D Mitlin (2005), *Community-driven development for water and sanitation in urban areas: Its contribution to meeting the Millennium Development Goal targets*, Water Supply and Sanitation Collaborative Council.

PHOTO 1
The bio-centre in Obunga

NOTES:

Toilets, shower rooms and biogas for cooking are on the ground floor. The first floor has offices to rent, and the second floor has a hall that is hired out to groups that need a venue for meetings.

proposed solutions.[56] This study is an attempt at addressing some of these gaps. Figure 1 summarizes factors that determine usage of communal sanitation facilities in the informal settlements of Kisumu. According to the figure, the main factors that determine the use of communal facilities are community involvement, gender, location, economic factors and management factors. Additional services in the facilities will also attract users. Competing needs such as other hygiene needs also have an effect on usage of sanitation facilities, and it is crucial that they are not ignored in future considerations.

56. Satterthwaite, D, D Mitlin and S Bartlett (2015), "Is it possible to reach low-income urban dwellers with good-quality sanitation?", *Environment and Urbanization* Vol 27, No 1, pages 3–18.

V. CONCLUSION

These findings from the informal settlements of Kisumu have highlighted a number of issues related to use of communal sanitation facilities. Residents in informal settlements have to contend with a dilemma of payment for sanitation services (against other urgent needs) at communal facilities that may not be close to their dwellings, vis-à-vis cheaper, convenient and private sanitation alternatives. Communal sanitation facilities that have been co-produced with the community, which offer additional services, are close to community members and are adequately maintained, have a high probability of success. Otherwise, communal facilities may be serving a purpose that may not have been the primary purpose for their construction.

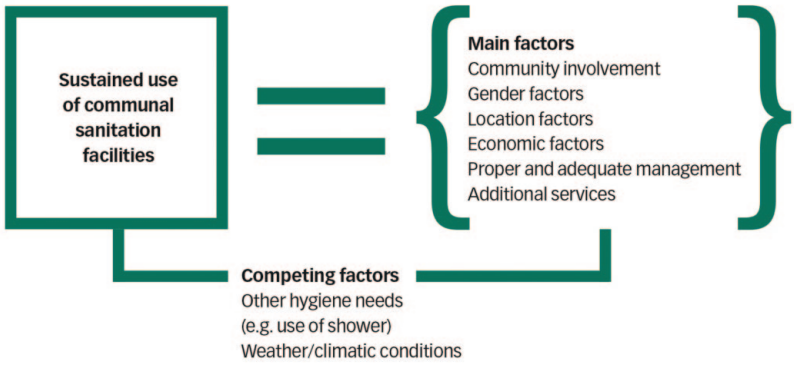

FIGURE 1
Factors influencing use of communal facilities in informal settlements in Kisumu

VI. RESEARCH AND POLICY IMPLICATIONS

Further research should focus on the other hygiene needs that attract users to communal facilities (such as showering). For planning and policy, the community should be included in future sanitation interventions, and this should be done from the very beginning, while including various stakeholders. By so doing, sanitation interventions (communal or otherwise) will reflect the communities' needs, including the needs of women. Security measures should also be enhanced in the settlements to enable the opening of sanitation facilities during the night.

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