Barriers and opportunities for management of shared sanitation facilities in low-income settlements in Kenya

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Abstract

Background
Sharing of sanitation is commonly being practiced in low income areas in Sub-Saharan Africa. However, the JMP categorizes shared sanitation as a limited sanitation service due to concerns of cleanliness and safety. The shared facilities are often the only option available for most of the residents in low income settlements, and improving the management is key to reducing open defecation and risk of disease. This study sought to investigate barriers and opportunities for improved management of shared sanitation in low income settlements of Kisumu in Kenya.

Methods
Thirty nine In-depth interviews and 11 Focus group discussions were held with residents, including tenants and landlords. Analysis followed a thematic approach to define the problem, specify the target behaviour and define what needs to change.

Results
Pit latrines were commonly shared among landlords and tenants. Shared sanitation facilities were unclean due to poor use and lack of cleaning. As respondents specified attributes of clean and useable shared toilets, they also identified behavioural, physical, social and motivational opportunities for improvement, and the key stakeholders that should be involved in shared sanitation interventions. Social opportunities such as clear cleaning plans, communication, and problem solving mechanisms between landlords and tenants were most commonly reported.

Conclusion
The results highlight the need to focus on social aspects for improvement of shared
sanitation management in low income settlements. Through a social approach, shared sanitation facilities can be managed appropriately to afford the millions of low income dwellers an opportunity to access sanitation. This study provides further evidence on approaches for improved management of shared sanitation facilities in line with the JMP’s recommendation for well managed shared facilities.

BACKGROUND

Over the last years, countries of the world have been experiencing a growth of the urban population. This growth has led to the urbanisation of poverty, inequality, and the expansion of low-income settlements. In Africa, approximately 62–70% of the urban population lives in low-income settlements [1]. These settlements are faced with challenges such as inadequacy in provision of basic services such as water and sanitation, and due to this inadequacy, most households share sanitation facilities with other households. Through sharing, residents who lack sanitation services gain some form of access to sanitation.

Although the Joint Monitoring Program (JMP) of the World Health Organisation (WHO) admits that ‘high quality’ shared sanitation facilities may be the best interim solution in low-income settlements, sanitation facilities that are shared by two or more households are considered a ‘limited sanitation service [2, 3]. This classification, it is argued, could result in investments and improvements not being directed towards users of these shared facilities since such interventions do not count towards meeting the SDG targets [4].

The JMP classification of shared sanitation services as a limited service is due to increased health risks and human rights concerns relating to dignity and safety [2, 3]. The health risks emanate from the low levels of cleanliness of shared sanitation
facilities that expose users to faecal matter. Indeed, studies have indicated that with an increasing number of users, shared sanitation facilities are less likely to be clean [5-10]. These low levels of cleanliness are related to factors such as lack of cooperation among users in maintaining the cleanliness of the shared facilities. Unfortunately, since shared sanitation facilities are often the only option available for the residents in low-income areas, users can revert back to open defecation practices if the facilities are not kept clean [9].

Interventions to improve the cleanliness of shared sanitation facilities are therefore needed. Studies focusing on such intervention are few, but communication and behaviour change interventions have been tested in Bangladesh [11] and Uganda [12]. These interventions indicate improved and sustained cleanliness of shared sanitation with increased awareness and increased communication among users. These studies are indicative that such interventions can result in improved cooperation and cleanliness of shared sanitation facilities. Designing of these interventions however requires an understanding of the prevailing contextual factors, more so in the African context where sharing of sanitation is the highest globally [2] and where the literature is devoid of such interventions. Additionally, the JMP further recommends that such shared facilities should be ‘well managed’ [2]. This study therefore aimed at investigating the contextual factors that enable or hinder proper management of shared sanitation facilities in a low-income settlement in Kenya.

Theoretical approach

The study was guided by the Behaviour Change Wheel (BCW) approach to characterize and design behaviour change interventions [13]. The approach is underpinned by the COM-B model that outlines necessary conditions for a behaviour
to occur: Capabilities, Opportunities and Motivations that enable or inhibit behaviour. Capability is an individual’s psychological and physical capacity and entails having skills and knowledge to engage in an activity. Opportunities are factors in the physical and social environment that enable or hinder behaviour, and motivations are reflective and automatic brain processes that energize and direct behaviour [13]. Automatic motivations involve emotions and impulses arising from associate learning and/or innate disposition, and reflective motivations are brain processes that involve evaluations and plans [13].

The BCW has been applied to understand behavioural determinants and design interventions aimed at instilling good hygiene habits in schools in Uganda[14], development of caregiver hygiene behaviour measures[15] and other health related interventions [16–22]. The approach involves three stages: (1) Understanding the behaviour and identifying what needs to change (2) Identifying Intervention Functions (3) Identifying content and relevant ‘Delivery mode’ for the intervention. This paper focuses on the first stage of understanding aspects that need to change. This stage further entails four steps: (i) Problem definition; (ii) selection of the target behaviour(s); (iii) specification of target behaviour; and (iv) identification of what needs to change.

METHODS

Study area

This study was conducted in the low-income settlements of Kisumu city in Kenya. Kisumu city is located in Kisumu County in the Western region of Kenya, and is the third largest city in Kenya. The city had an estimated population of 420,000 as of 2013 [23] and a projected population of over half a million persons by 2022 [24].
Sixty percent of this population lives in low-income areas characterised by overcrowding, poor housing, and lack of basic services [25]. Land ownership in the settlements is mainly freehold, with families handing down land to successive generations and/or to spouses [26]. Housing structures are organised in compounds (often called plots) that comprises several single adjoining unit houses occupied by different households, most of whom are tenants. Some landlords reside within the compound while some live away [26]. Basic services such as water, sanitation and solid waste disposal are shared among compound members, and landlords are usually required to ensure that these services are provided. Decisions among residents, including those related to sanitation, are often handled by members of the compound [27].

It is estimated that approximately 65% of residents in the settlements use improved sanitation technologies [28]. Sharing of these facilities at the compound level is common, with studies indicating that most of the shared facilities are soiled with faeces [7, 28].

Study design and respondent selection

This was a qualitative study conducted in Nyalenda A. Nyalenda A is divided into four clusters (called units) namely Central, Western, Kamakowa and Dago. Community Health Volunteers (CHVs) worked with field assistants to identify the boundaries of each of the units. Each CHV worked within their unit, and was paired with a research assistant. Compounds were purposely selected if there was a sanitation facility that was shared between two or more households. Within the compound, first priority was given to landlords. If a landlord was not available, a caretaker was selected, and if unavailable, a tenant was selected. Participants had to be at least 18 years and users of the shared sanitation facility within their
Data Collection

Data was collected through In-depth Interviews (IDIs), which continued until saturation—the point when new information was not forthcoming [29]. The interviews were guided by an in-depth interview guide that had questions related to the use and management of the shared sanitation facilities within the compound. Information was captured through notes and by an audio recorder, and the interviews lasted approximately 30 minutes.

Focus Group Discussions (FGDs) were also held with residents in the settlement. Participants were selected if they were users of shared sanitation facilities within their compounds, and if they had not been selected for the IDIs. CHVs assisted in identification and selection of landlords and tenants from each of the community units. All the FGDs were held at a central location that was easily accessible by all residents, and consisted of 8–12 participants who had similar residential arrangements, (for example, resident landlords, and tenants from compounds without a resident landlord). For each category of discussants, male and female participants held their discussions separately. Each FGD had a moderator, a note taker and an observer. The moderator was guided by an FGD guide with questions on management practices, challenges and opportunities for improvement. The proceedings were captured in note books and through a recording device, and the discussions lasted for 60–90 minutes. The total number of FGDs was not determined a priori, rather emphasis was placed on ensuring that FGDs were held with all people involved in management of shared sanitation facilities.

Data quality control
Research assistants were trained before data collection begun. During the training, role play was used to demonstrate the principles of good research practice. Meetings were held with CHVs and the research team to discuss good research practices such as selection of participants for the study. Debrief sessions were held at the end of each day to evaluate progress and adjust accordingly. Supervisors worked with research assistants to ensure that data collection and probing were done sufficiently. All the recordings were transferred to protected computers and backed up online.

Data management and analysis

Interaction with the data begun during data collection. If the information given was not sufficient, research assistants further probed the respondents. All the recordings were transcribed verbatim onto Microsoft Word and later translated to English. The translated documents were read by a third party to verify that information was not lost in the translation. The transcripts were read and re-read to understand the ‘story’ and tease out the emergent themes. The transcripts were then transferred to ATLAS.ti where analysis followed a thematic approach. Coding was based on the pre-defined themes and questions, as well as emergent words or issues, e.g. dirty/clean toilet, cleaning etc. These codes were merged into categories such as cleaning practices, users, etc. Some categories were later merged into themes that had been identified based on the theoretical model. During the analysis, any issues that were deviant called for further probing to understand the positive or negative deviation, and/or the reasons for the deviation. Some transcripts were read by another researcher to ensure that all the information had been captured adequately.
RESULTS

Thirty nine in-depth interviews and 11 FGDs were held. Twenty two of the interviewees were landlords and seventeen were tenants. The FGDs were held with male tenants living with resident landlord, female tenants (living with and without resident landlords), resident male and female landlords, caretakers, and two FGDs with both landlords and tenants.

1. Characteristics of sharing

a. Living arrangements and sharing

All the sanitation facilities were pit latrines shared among households living in compounds with the various living arrangements. Latrines had single cubicles or 2-3 cubicles over the same pit. Often times, resident landlords constructed more than one cubicle and separated one of the cubicles for their household use and had the tenants sharing the other cubicles.

b. Number of households and users.

Respondents reported sharing one cubicle with a minimum of 4 and a maximum of 13 households. The actual number of users was dependent on the number of people in each household. It was also reported that other residents in the settlement, who were not from the compounds often used the toilets. These other users were often from compounds without toilets or compounds whose toilets were full. Whereas some respondents mentioned the actual number of users, e.g. “Approximately twenty” and “We are thirty four people”, it was also commonly reported that the actual number of users was not known, and respondents often said “we are many” to express the high number of users. Some landlords also admitted that in their compounds, the users were ‘so many [they could not] approximate the number or
2. Problem Definition

Shared sanitation cleanliness

Unclean toilets, high number of users, and high fill up rates of pit latrines were cited as the main challenge of sharing of sanitation facilities. Some residents described their toilets as being clean, and others stated that their toilets were not clean. Resident landlords or tenants who lived on compounds with resident landlords often reported that their toilets were clean, whereas tenants who lived on compounds with an absentee landlord often admitted that their toilets were unclean. Unclean toilets resulted from improper disposal of human faecal matter, often on the toilet slab and which discouraged others from using the toilets.

“When you visit the toilet you’ll find it really dirty, sometimes someone has messed it up that you cannot even use it” (Participant in a male tenant FGD).

Improper usage also extended to other behavioural practices, e.g.:

“There is a man who normally gets drunk and he vomits on the slab of the toilet.” (Participant in an FGD with female tenants from a compound without resident landlord).

Toilets were also dirty because other non-compound members soiled the toilets. These users gained access to the compound toilets forcefully, by sneaking in without permission, or by befriending the compound residents.

“There are those who come and access my toilet without my permission...so I find the toilet very dirty...they use it the way they want” (Participant in an FGD with female resident landlords).

Respondents noted that such users accessed the toilets when they [the toilets] were not locked. While respondents suggested that locking the toilets was preferable to
keep off these non-compound users, others admitted that sometimes the keys got lost hence leaving the toilets unlocked and easily accessible.

“Even when you lock it [the toilet] they [outsiders] break the padlock ... it is [then left] open” (Participant in male landlords FGD).

Respondents complained that there was a high number of users per cubicle, some of whom were not willing to take part in cleaning the toilets.

“The toilet becomes dirty each and every time and no one is willing to do some cleaning.... the problem lies in cleaning.” (Participant in an FGD with female tenants in Dago).

Some tenants were not willing to clean toilets because they felt it was not their responsibility.

“These tenants find it hard [to clean the toilet] and are not always happy to clean. They think that is not their work and if they do they are to be paid” (Participant in an FGD with male landlords in Dago).

“...Some go as far as telling you that once he cleans the toilet then he/she might become sick [if they clean the toilets].” (Participant in an FGD with female tenants residing in compound without resident landlord).

Resident landlords admitted that they sometimes cleaned the toilet as it was not easy to identify the individuals who had soiled the toilet. In tenant only compounds, tenants, often times women who had children, volunteered to clean the toilets. Quarrels and disagreements ensued among compound residents when users soiled the toilets but did not participate in cleaning.

“Other people feel that cleaning the toilet is a hard job and it brings disagreement.” (IDI with landlord).

Residents disliked the foul odour from the dirty toilets and expressed fears that
dirty toilets posed risks of disease spread especially to women and children, citing diseases like cholera and syphilis

“...Another challenge is the stench from the latrines, they are built not far from where the houses are...” (Participant in an FGD with male tenants).

“You can be infected by microorganisms, you can contract cholera, and flies come out of there and land on people’s food which results to diseases.”

( Participant in an FGD with male tenant)

“...It's easy for women and children to get infection because when they just bend they collect dirt unlike us men who stand when we urinate” (Participant in an FGD with male landlords).

Respondents also disliked the high number of users which led to queueing; and indiscriminate disposal of solid waste in the toilets, both of which led to fast fill up of the pit latrines. Such waste included diapers, sanitary towels, pieces of clothing etc. On the other hand, respondents also described a ‘clean’ and ‘useable’ toilet using attributes summarised in table 1:

3. Selection of the target behaviour

Respondents identified behavioural and social strategies in improving the cleanliness of shared toilets. Tenants and landlords were categorical that all users ought to use the toilet in a proper manner and participate in cleaning.

“People ...should squat well when using the toilet...so that faeces go directly into the pit... what you have used [anal cleansing material] should go into the pit after finishing... then you lock the toilet’s door using a padlock, take clean water and soap and clean it.” (IDI with female tenant).

“Everyone should participate in cleaning the toilet...the task should not be left for one person.” (IDI with Landlord)
Landlords and tenants admitted that the cleanliness of the toilets was related to the number of households/users, with some admitting that they were comfortable sharing with fewer households. A landlord for instance admitted that “They are few...I take them as my family, but if it was a large number of tenants, I would not be free because some tenants are tough headed.” (Participant in an FGD with male landlords in Dago).

A tenant also admitted that in addition to the smaller number, households cooperated in cleaning of the shared facilities. Other individual level behavioural strategies that were suggested included cleaning the toilets with the right cleaning products (water, soap) and disinfectant, and avoiding the disposal of diapers and sanitary towels in the pit latrines.

Individual social strategies entailed improving communication between landlords and tenants, and among tenants, and commending individuals who cleaned the toilets.

“Yes...just talk to people...tell them to try and maintain the cleanliness of the toilet” (IDI with landlady).

“For tenants like us it is difficult... you may quarrel with others [because of] cleaning of the toilet......so, we agreed that cleanliness should continue ....and when it is clean you {can offer to} commend the person.... [telling them] they know how to clean the toilet.” (Participant in an FGD with female tenants residing on compound without resident landlord).

Respondents further pointed out that cleanliness of the toilets also depended on strategies implemented as a group or at the compound level, such as restricting access for other non-compound users, cooperation with compound residents in purchasing cleaning items, and through cleaning schedules that included all
households. A female tenant in an FGD for instance reported that the reason why their toilet was clean was “We have got a gate and whenever [outsiders] want to access the toilet then he/she has to ask…. we contribute money for buying brooms since we scrub the toilet with broom…. we are aware of how we are cleaning... each and every person is aware of his/her week of cleaning.....” (Participant in an FGD with female tenants residing on compound without resident landlord).

Proper management of the shared toilets was attributed to agreements and cooperation among users in the compound, with a landlady stating that “When there is no agreement [on cleanliness], the toilets will definitely not be clean.” (IDI with landlady).

At the compound and/or group level, regular discussions among tenants and landlords were proposed, with discussions focusing on the maintenance of the shared toilets.

“Landlords should partner with their tenants, for example, once in a month [they should] have a meeting to discuss the state of cleanliness, who cleans and who does not, and the number of users should be known” (participant in an FGD with female tenants and landlords).

It was noted that social strategies lead to open discussions among the households, solving of contentious issues, a united group of households, and an improved management plan. Participants in the landlords and tenants FGD further suggested the use of community based groups or individuals who offer cleaning services to toilets within the settlement at a fee.

“There should be someone to clean... have a caretaker and pay him... he will ensure that toilets are kept clean” (IDI with landlord).

The need for education and creation of awareness was underscored by most
respondents, as it was deemed that residents needed to understand the importance of keeping their toilets clean and the need to use cleaning materials during cleaning (why shared toilets should be clean, and how they should be cleaned). Such strategies were proposed for all residents within the compounds (including children).

“...Educate the public on how to keep the toilet clean, those who will hear will benefit from the advice” (IDI with landlord).

Other proposed suggestions included penalties for individuals who did not participate in cleaning, continued monitoring, and provision of bins for the segregation of waste

“Tenants who do not want to clean the toilet should be given notice to vacate from the house.” (Participant in an FGD with female tenants residing on compound without resident landlord).

4. Specifying the Target Behaviour

These results were used to specify aspects of any targeted behaviour intervention as summarised in table 2.

5. Understanding what needs to change

The next stage entailed identifying psychological and physical capabilities, social, and motivational opportunities and barriers.

a. Capabilities

**Psychological and physical abilities**

Generally, residents knew and understood that toilets should be cleaned. Because of this knowledge some residents cleaned the toilets before or after use.

“I know that the latrines have to be clean....if I get the latrine dirty, I have to
clean it up first before using it.” (Participant in an FGD with male tenants).

Some women understood the importance of and their responsibility in cleaning the
toilets before and after their children used the toilet.

“...Since I know that when my child goes to the toilet he stands and urinates, it
is my responsibility to clean the toilet when the child goes to the toilet ...” (IDI
with a tenant).

b. Opportunities

Physical opportunities and barriers

Cleaning materials such as water, a broom, and detergent facilitated cleaning.

These materials were bought by landlords, or by tenants who contributed money for
buying the materials.

Compounds that were fenced or had a gate restricted other users who soiled the
toilets. Compounds without a gate/ fence were more likely to be dirty because of
intruders who soiled the toilets. Tenants in such compounds were less motivated to
clean their toilets.

“Majority of the plots do not have a fence and so you find that it is easy for
other compound users to get access to use the toilet.” (IDI with tenant).

Other obstructions included the use of padlocks which ensured that other users did
not gain access. However, landlords highlighted that tenants lost the keys, or that
other users broke the padlocks in order to use the toilets.

Social opportunities and barriers

Resident landlords were strict about the cleanliness of the toilets, which led to the
toilets being clean.

“Our landlord has a stern rule that he does not want to find anyone destroying
or misusing the toilet. He keeps quarrelling on this matter, and this has helped
*in maintaining the cleanliness of the toilet.*” (Participant in an FGD with female tenants residing on compounds without resident landlord).

Other compounds had strict rules, adhered to by all tenants, about cleaning the toilets. These rules were sometimes part of the ‘contract’ when a new tenant moved into the compound, and included the mandatory cleaning for all, often in the form of a cleaning schedule. The schedule was not always written, but was an informal rota understood and accepted by the residents. A household’s turn to clean the toilet for example was determined by the housing order within the compound, or by the day of the week. Thus, it was common to hear that a household would clean after another household, or on a certain day of the week.

“When you move into this plot there’s a rule that states that we have a toilet...and when one person cleans it today, then another will clean it tomorrow...it is cleaned every day without failure.” (ID with a caretaker)

Both landlords and tenants further proposed that the rules should be mandatory and tenants who do not adhere should be asked to vacate from the compound. The cleaning schedule was often a reminder to the individuals themselves and to other compound members. Individuals cleaned the toilets when it was their turn, and if they forgot, their neighbours and/or landlords reminded them

“...When I find that our toilet is dirty, I check from the list [to find out] who was to clean.... then I remind him/her that is their day of cleaning (Participant in an FGD with female tenants in Dago).

Some landlords however, noted that the cleaning schedule was sometimes not effective because tenants did not adhere.

Landlords in the combined FGDs confessed that tenants did not always clean the toilets, and as such they took on the responsibility by cleaning the toilets
themselves, task the caretakers to clean the toilets, or paid for the toilets to be cleaned by other individuals or community groups. For example, a landlord had confessed that since the tenants did not adhere to cleaning, he had assigned the responsibility to the caretaker, noting that “When I find out that the toilet is dirty, I ask my caretaker why the toilet is not clean…. that is why I have a caretaker …” (IDI with Landlord).

Respondents admitted that sometimes the cleaning schedule included the landlords and the tenants, and such arrangements were often agreed upon in meetings and by all compound members. A landlord for instance explained that he called for a meeting and told his tenants that he would be responsible for [buying] the detergents, but they would be responsible for cleaning ….. He continued to explain that the arrangement worked well because ‘when tenants requested, he provided the detergent’. He noted that the advantage was that the tenants ‘took it as their responsibility.’ (Participant in an FGD with male landlords).

The compound meetings were also called for when solving issues affecting the tenants. In an FGD among male tenants and landlords, a respondent reported about another landlord saying “In certain occasions he [the landlord] calls for meetings, writes letters to tenants telling them that on a certain date we have a meeting…. during the meeting, he will communicate if there was a mistake someone did… and...corrects mistakes...if a child soils the latrine, he tells them that it's the role of the parent to clean it.”

Within tenant only compounds, tenants had agreements among themselves about cleaning their toilets. Within such compounds the social agreements and arrangements ensured that all tenants participated in cleaning. E.g. a tenant noted that they made a plan to clean and that when anyone was not available to clean the
toilet on their day, they made arrangements to clean the toilet the next day, implying that such agreements ensured that all members participated in cleaning. Results further highlighted the roles played by men and women, and which were also agreed upon at the compound level. Often times, men bought the cleaning materials while women cleaned the toilet, “We use liquid soap, detergents like ‘Omo’ and a hard broom.... the men buy the brooms and women do the cleaning.” (Participant in an FGD with female tenant residing on compounds without landlords). Compounds with children were more likely to have dirty toilets, especially if the toilets were not cleaned after the children soiled the toilets.

“There are children whose parents will tell them to use the toilet without following up.... the children deposit their waste outside the hole.” (Participant in an FGD with male tenants).

“When children are away in school it remains clean up to 2 or 3 pm, but it becomes dirty thereafter when they come back.” (Participant in an FGD with female landlords).

c. Motivations

Automatic motivations

Users admitted that they cleaned the toilet because they desired to be comfortable when using the toilet.

“I maintain the cleanliness because the toilet is a room where you would wish to go and feel comfortable, so it is should be clean... you are like someone in jail when it is dirty because you cannot be comfortable there.” (IDI with landlady).

Some users cleaned the toilets when they found them dirty mainly because of the ‘urgent’ need to use the toilet.
“I take water and clean it up thereafter, I use it since when the toilet is dirty then even the urge of relieving yourself gets lost.” (Participant in an FGD with female tenants residing on compounds with resident landlord).

Dirty toilets discouraged use, and unlike some who cleaned the toilets before use, other users were less motivated to clean dirty toilets, and used the toilets without cleaning.

“When I go to the toilet and find it dirty, there is no need to clean since I will go back and again find it dirty... so I use it and leave it the way I found it.” (Participant in an FGD with female tenants residing on compound with resident landlord).

The quality and structure of the toilet motivated or discouraged cleaning; e.g. toilets whose superstructure did not offer privacy, toilets whose slab was wooden, or toilets that were full. A tenant, when asked who cleaned the toilet, responded, “Nobody... it is not in a good state...people just go for the sake of going... the toilet is almost full and it can cave in any time.” (IDI with tenant).

Finally, some households cleaned the toilets in order to prevent the foul smell from infiltrating into their houses, especially when their houses were next to the toilets.

**Reflective motivations**

Women cleaned toilets because of the fear of contracting diseases or because of the fear of their children contracting diseases.

“I first wash it because I cannot use a dirty toilet, it can bring diseases.” (IDI with female tenant).

“We are mothers.... We clean the toilet because if a child uses the toilet he/she will get infected...I have a child so I clean... and my neighbour also cleans because she has a child...it can be cleaned even twice a day” (IDI with tenant).
These capabilities, opportunities and motivations have been summarised in table 3.

**DISCUSSION**

These results have highlighted the status of sharing sanitation facilities in low income settlements of Kisumu city in Kenya. Sharing is a common practice in the settlements, with the dominant sanitation technologies being pit latrines. Some of the toilets were reportedly clean, and others were dirty, mainly because they were not cleaned regularly. The main users of these toilets were individuals within the compound, and in other instances, individuals who were not resident in the compound. Respondents noted that non-compound members soiled the toilets because they did not clean the toilets. Social and physical opportunities for improving the management of shared toilets were most evident, with respondents acknowledging that positive relationships, communication and cooperation among users, agreed upon cleaning plans, and the quality of the toilet influenced the cleanliness of shared toilets.

The context within which the users live and the individuals involved are important considerations in identifying management strategies. Whereas absentee landlords are common in low-income settlements [30, 31], the low income settlements of Kisumu had landlords that were resident and others that were absentee. The results suggest that resident landlords influenced the cleanliness of the toilets as they instituted rules of use, monitored the cleaning, and discussed with the tenants any matters related to cleanliness of toilets. Similar results were reflected in Zambia where landlords were instrumental in improving the structural quality of shared sanitation facilities [32]. Seemingly, tenants on compounds with resident landlords may be less involved, especially if the landlord takes an active role in management
of the toilets. This may be because they are temporary residents in the settlements and are not owners [27, 33]. Consequently, agreed upon plans, communication and education were suggested as possible strategies by both landlords and tenants. Tenants in compounds with absentee landlords also ensured that their shared toilets were clean by having agreed upon standards of practice that guided the day to day management of toilets and spelt out the roles of users, monitoring systems, and frequency of cleaning.

These operating standards may be co-designed or co-created with users (as was the case in compounds with absentee landlords) or they may be instructional; handed over to the users from the landlords. Studies have shown that involvement of individuals in creating solutions to their challenges leads to better ownership and uptake of the interventions [34, 35]. Evidently, these results are indicative that co-created interventions, especially between landlords and tenants may be easily adopted. However, users should ensure that new compound members are informed about the operating standards within the compound as it is noted that behaviour can be influenced by the prevailing social norms [36] and as such the new individuals may adapt to positive behaviour suggested by the operating standards. In addition, the results have also highlighted the importance of involvement of all stakeholders (men, women, landlords, tenants, CHVs, village elders etc.) since they have all have a role to play, at an individual, compound and community level [37].

A number of social barriers and opportunities were identified. Previous studies have indicated a shift from WASH behaviour change interventions that focus on health towards motives and nudges for behaviour change interventions [38, 39] Whereas this focus may apply in some settings, this study suggests that shared sanitation management intervention messages should focus more on social dynamics including
the role played by social cohesion, good communication, and improved social relationships, as alluded to by studies from Uganda [12]. According to these results, improving the social aspects leads to improved management (e.g. cleaning on behalf of another), solving of any sanitation related issues, combined effort towards improving management (e.g. joint purchase of cleaning materials) and better relationships among the compound members. Evidently, these aspects not only lead to improved health outcomes, but to additional social benefits (e.g. better relationships, less conflicts) some of which may not be easily quantified in the short term. Similarly other sanitation studies have highlighted indirect benefits such as psychological well-being as a result of improved sanitation [40].

Finally, these results have highlighted that quality and management of shared sanitation facilities are dependent on each other, for example, individuals man not be motivated to participate in management of poor quality sanitation facilities (e.g. dirty and poor structural quality), and yet improved management (such as cleaning) also improves the quality of shared sanitation. As shown by other studies, attributes such as cleanliness, privacy, hygiene and maintenance are preferred by users and are associated with higher sanitation use [41, 42] Therefore as the JMP calls for high quality shared sanitation facilities [2], this study shows that quality and management of these shared facilities must be considered in tandem, as one affects the other. Interventions therefore should target these different attributes of sanitation that are preferred by users. Education and awareness is important, and there may be need to highlight the opportunities (including the social opportunities) lost if proper management practices are not followed, e.g. the lack of privacy, risks of infection to children and women, quarrels in the compound; as well as the benefits of improved management of shared facilities e.g. better social relations
and better quality of life.

CONCLUSION AND IMPLICATIONS

Using the Behaviour change wheel approach, this study has highlighted the barriers and opportunities for shared sanitation management within low-income settlement in Kisumu, Kenya. The results are suggestive that interventions should understand the local context and target the social aspects of shared sanitation, both in the design and implementation of interventions. Such interventions should be cognisant of and be co-designed with users of the shared facilities. Education and sensitisation about proper management of shared facilities is critical, and it should target all stakeholders including landlords, tenants, men, women, children, Community leaders, and the local government. The Behaviour change wheel has led to a contextual understanding of the problem, and these results will be used in subsequent steps, including identifying the intervention functions and policy categories, and specifying the behaviour change techniques and delivery of the intervention. From a global perspective, this study has provided evidence on approaches for the management of shared sanitation facilities, in line with the JMP’s recommendation for such facilities. Policy makers, practitioners and researchers can use this evidence to inform policy, design interventions and further the discussions on the classification of shared sanitation facilities.

Abbreviations

BCW-Behaviour Change Wheel

CHV-Community Health Volunteer

COM-B-Capabilities, Opportunities and Motivations for Behaviour
Ethical approval was obtained from the institutional ethics committee of the Great Lakes University of Kisumu GLUK (Ref: GREC/001/285/2018), and a research permit from the Kenya National council of science and Technology (Ref: NACOSTI/P/18/5546/24979). Permission was sought from authorities at Kisumu County and those from within the community before commencement of study activities. Research assistants explained these contents of the information sheet to the respondents, including the purpose of the study, the study procedure, duration of the interviews, their rights as participants, measures to ensure confidentiality, contact information of the researchers, and utilisation of the data. Participants received the information sheet and were allowed to ask questions. Once respondents were satisfied, they received, signed and retained a copy of the consent form to show their voluntary participation in the study.

Consent for publication

Not Applicable

Availability of Data and materials

All data generated or analysed during this study are included in this published
article. Transcripts are available from the author on reasonable request

**Competing interests**

The authors declare that they have no competing interests

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**Authors’ contributions**

SS was involved in study design, led data collection, analysis and writing of the manuscript. RK was involved in study design, data collection, and data analysis. PA-A and KAA were involved in study design. All authors read and approved the final manuscript

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### tables

**Table 1: Attributes of clean and useable shared toilets**

| Attributes                                      | Quotes                                                                 |
|-------------------------------------------------|------------------------------------------------------------------------|
| Smell                                           | "...It is clean if you find the surrounding slashed or if you don't encounter smell." (IDI with a tenant) |
| Cleanliness of the area around the toilet       | "If cleaned, the smell is not as pungent and the houseflies reduce." (IDI with a landlady). |
| Absence of flies                                |                                                                        |
| Structural strength and appearance of the toilet| "What shows that a toilet is clean is when it is stable and you do not fall inside." (IDI with a landlord). |
| Full pit latrines                               | "When the toilet is full then it looks dirty even if it is cleaned." (Participant in FGD with female tenants in Dago). |
| Privacy                                         | "When you go to the latrine, you go to hide your body... you can be in and when inside and squatted, someone outside can see you... you w. a hurry... when iron sheets are used for constructing the latrines, they and someone can see from the outside" (Participant in an FGD with caretakers). |
|                                                 | "...The problem with our toilet is that it has no roof and its sides are not sheet... you can see someone who is inside." (Participant in an FGD w caretakers). |
Table 2: Specification of aspects of the target behaviour

| Behavioural aspects                        | Responses                                                                 |
|--------------------------------------------|---------------------------------------------------------------------------|
| Who should be involved                     | Tenants                                                                   |
|                                            | Landlords                                                                 |
|                                            | Women                                                                     |
|                                            | Men                                                                        |
|                                            | Children                                                                  |
|                                            | Caretakers                                                                |
|                                            | Community cleaning groups                                                |
|                                            | Community educators                                                      |
| What should be done differently to achieve | Improve communication                                                     |
| the desired change                         | Regular meetings and discussions among users                              |
|                                            | Develop a plan for cleaning shared toilets                                |
|                                            | Cooperate in compound level plans to keep toilets clean                   |
|                                            | Cleaning the toilets                                                      |
|                                            | Keep off users who soil toilets                                           |
|                                            | Use detergents in cleaning                                                |
|                                            | Lock toilets                                                              |
|                                            | Involve individuals or community groups to clean                          |
|                                            | Provide solid waste disposal receptacles/bins                             |
|                                            | Avoid dumping waste into shared toilets                                  |
|                                            | Monitoring                                                                |
|                                            | Awareness on the need to and importance of keeping toilets clean          |
|                                            | Penalties or punishment for not cleaning                                  |
| Where the actions should be done           | Individually                                                              |
|                                            | Household                                                                 |
|                                            | Compound                                                                  |
| How often they should be done              | Every day                                                                 |
|                                            | Once every two days                                                      |
|                                            | Weekly                                                                    |
|                                            | Fortnightly                                                               |
|                                            | Monthly                                                                   |
| With whom they should be done | Community health volunteers |
|-------------------------------|-----------------------------|
|                               | Community leaders           |
|                               | Landlords                   |
|                               | Village elders               |

Table 3: Capabilities, opportunities and motivations for shared sanitation management

| Capabilities | Opportunities |
|--------------|---------------|
| Psychological ability | Physical opportunity |
| An awareness that toilets need to be cleaned | Availability of cleaning aids e.g. water, detergents, disinfectant |
| Awareness that toilets should be cleaned after being soiled by children. | broom/brush. |
| Need to increase awareness on use and cleanliness of toilets. | Individuals who clean, e.g. caretaker and youth groups. |
| | A fence/gate to the compound. |
| | Locking of toilets. |
| | Non-compound members who use the toilets (negative). |
| | Social opportunity |
| | Presence of a stern/strict/firm resident landlord. |
| | A cleaning schedule. |
| | Cleaning rules adhered to by all. |
| | Landlords and tenants reminded other users to clean. |
| | Designed and agreed upon cleaning plans between landlords. |
| | Designed and agreed upon cleaning plans between tenants. |
| | Shared responsibilities among landlords and tenants. |
| | Communication and problem solving mechanisms between tenants. |
| | Communication and problem solving mechanisms between landlords. |
| | Quality of the toilet e.g. complete superstructure |
| | Children in the compound who soiled toilets. |
| | Sharing responsibilities between men and women. |
Supplementary Files

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