Review Article

A Literature Review of User Vulnerabilities Associated with Shared Sanitation Practices in Selected Countries in Sub-Saharan Africa

ABSTRACT

Aims: Shared sanitation was excluded from the basic service levels due to perceived limitations of their hygiene, accessibility and safety. But how does the current body of scientific knowledge influence the narrative? This paper is aimed at reviewing data on the current status and vulnerability issues reported to be associated with shared sanitation in Sub-Saharan Africa (SSA).

Methodology:A literature review was conducted~~Literature was searched~~ using key search terms from nine databases. Additionally,~~s and~~ articles published in English from January 2000 to April 2022 were selected as well as~~in a~~ various~~ddition to~~ reports of individual country studies.

Results: As at 2020, the proportion of population sharing sanitation facilities in SSA was estimated as 19% compared to 7% globally. The review revealed a mixed opinion about issues and vulnerabilities associated with shared sanitation which may have arisen from inconsistencies in the typologies and levels of sharing of facilities among the reviewed studies. Using shared sanitation was found to be associated with increased risk of ~~diarrhoeal~~diarrheal diseases (OR=1.06; 95%CI: 1.03-1.08) and non-partner violence against women (OR=1.52; 95%CI: 1.22-1.82). However, there is also evidence that many shared facilities, particularly those shared by a few (2-3) households, are clean, meet the needs of the users and afford them similar health outcomes as non-shared facilities.

Conclusion: The findings of the review suggest that the outright exclusion of all forms of shared sanitation from basic sanitation potentially underestimates the global efforts and progress towards access to sanitation. There is the need to segregate communal and public toilets from privately shared facilities in future research as well as the progress reporting by the Joint Monitoring Programme (JMP). It is also recommended that steps are taken by the JMP to develop indicators for identifying and incorporating quality shared sanitation facilities into the basic sanitation service level in order to give a more realistic account of the global effort towards sanitation access.

Keywords: Shared sanitation, WASH, Sub-Saharan Africa, Health outcome, User vulnerability

1. INTRODUCTION

Inadequate water, sanitation and hygiene (WASH) is a major cause of diseases and deaths in low- and middle-income countries, representing an estimated 60% of total ~~diarrhoeal~~diarrheal deaths annually [1]. The importance of WASH infrastructure and services

in raising barriers against disease transmission has been highlighted by the COVID-19 pandemic. World leaders;, therefore, place high premium on the importance of improving WASH as evident in its recognition in both the Millennium Development Goals (MDGs) and the Sustainable Development Goals (SDGs). The SDG 6 seeks to ensure safe drinking water and sanitation for all by 2030. While substantial progress has been made in achieving the SDG Target 6.1 (on drinking water), same cannot be said of Target 6.2 (on sanitation). A UN-Water report recognizes the challenge of access to water and sanitation in rapidly growing urban areas and highlights the need to mobilize substantial investment to install sewerage networks and sanitation systems, as well as strengthen the capacity of local and national authorities to manage them [2]. It is estimated that a capital expenditure of 0.64% of the gross sub-regional product is required to close the WASH gap in Sub-Saharan Africa [3].

The WHO/UNICEF Joint Monitoring Programme (JMP) for WASH defines five (5) levels on their SDG-based sanitation service ladder [4] as shown in Fig. 1. Sanitation facilities used by more than one household (termed 'shared sanitation') are placed under 'Limited Service'. Such facilities do not count to countries as contributing to the global progress towards SDG 6.2, which aims at 'basic' and 'safely managed' sanitation.

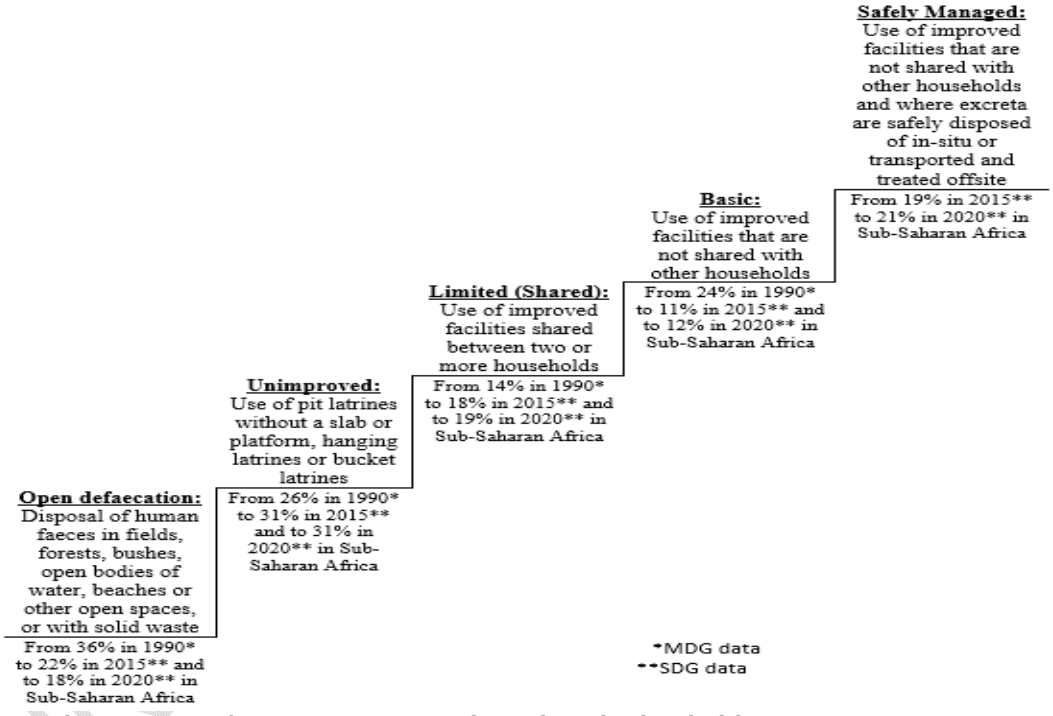

Fig. 1. The new WHO/UNICEF JMP SDG-based sanitation ladder
*(Source: Authors' own construct based on data from *UNICEF/WHO [5] and **UNICEF/WHO [6])*

Limited sanitation comprises facilities shared by more than one households and public toilets [7]. In most less developed and developing countries such as those in Sub-Saharan Africa, shared toilets are used by people residing in compound houses [8, 9], densely populated urban areas, slums and rural areas. Shared sanitation facilities remain the only option for many people in less developed countries.

In SSA shared sanitation usage is widespread with the proportion of population sharing sanitation facilities slightly increasing from 18% in 2015 to 19% in 2020 [6]. The one percent increase in the proportion of population sharing sanitation facilities may have been due to the reduction in the proportion of population practicing open ~~defaecation~~defecation which

declined from 22% in 2015 to 18% in 2020. The sub-region's sharing rate was the highest compared to other regions in the world and the global estimate of 7% in 2020. The sharing rate was 7-percentage points higher than the closest region (Central and Southern Asia). There is wide variation in the proportion of sharing across countries in the Sub-Saharan Africa (See Fig. 2).

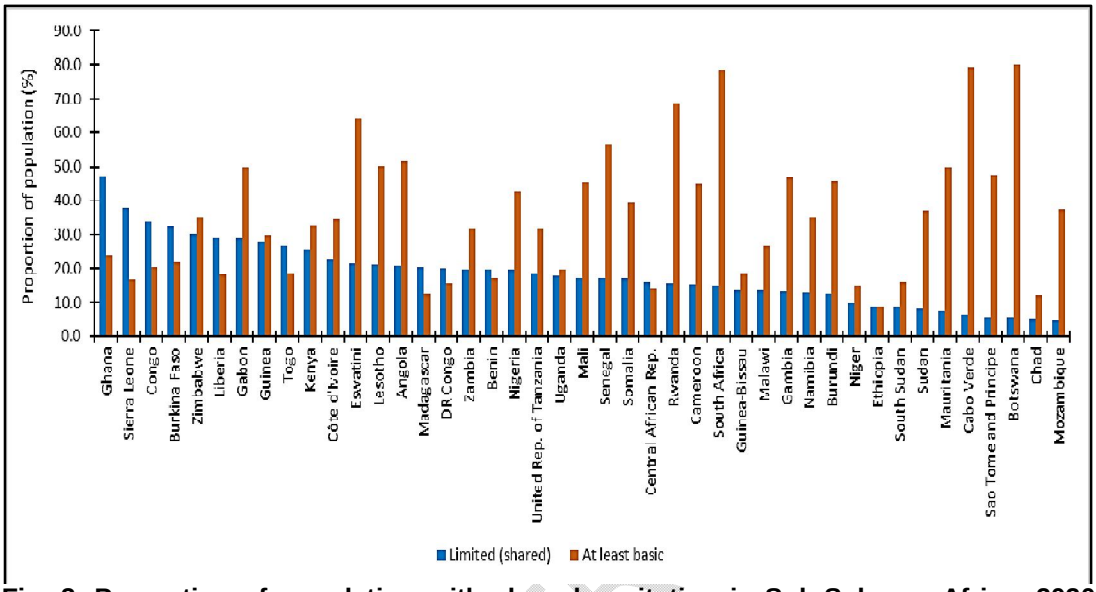

Fig. 2. Proportion of population with shared sanitation in Sub-Saharan Africa, 2020 *(Based on data from UNICEF/WHO [6])*

The highest proportion of population sharing toilet facilities exist in Ghana (47.4%) followed by Sierra Leone (37.9%). Five countries recorded sharing rates lower than the global estimate of 7% and twenty-four countries have a sharing rate higher than the SSA estimate. For most countries (79%), the proportion of population sharing toilets were lower than the proportion with basic service level. But, for nine countries (60% in West Africa) the proportion of population sharing toilets were higher than those with basic service level. The high usage of shared sanitation calls for more attention to be paid to the issues raised about their hygiene status, accessibility and safety. These should inform the extent to which the efforts of nations at moving sections of the population from open defecation to this level of service should be ~~recognised~~recognized.

The decision by the JMP to categorize shared sanitation as 'limited service' has attracted global debate among WASH practitioners, policy makers and researchers. The JMP has cited concerns about cleanliness, maintenance, long distances from users' homes, long waiting time, cost barriers, and difficulty of use by the elderly, disabled and children [10]. Whereas some experts [8, 11, 12] have the opinion that shared sanitation facilities used by limited number of households should be considered for inclusion in basic service level, others believe that shared sanitation is a risk for the transmission of diseases [13-15] and should be considered under 'limited service'. This brings to the fore the divergent views on the issues associated with the use of shared sanitation facilities. But the basis of the decision should be informed by scientific evidence and must be reviewed from time to time to reflect current trends.

Two publications provide a review of the association of shared sanitation and ~~diarrhoea~~diarrhea in Sub-Saharan Africa. The first review by Heijnen [15] included five publications in SSA. The most recent review was conducted with nine papers published in

SSA between 2003-2017 [14]. The current review, however, includes additional five publications (2017-2021) from Ethiopia, Senegal, South Africa and Zambia. The number of publications used for meta-analysis on the association of the use of shared sanitation with health outcome is presented in Table 1.

Table 1. Number of publications reviewed on the association of health outcome with shared sanitation use in SSA

Publications	~~Diarrhoeal~~Diarrheal diseases	
	No. of Publications from SSA	Duration of publications
This review paper	12	2003 – 2021
Ramlal [14]	7 (8)	2003-2017
Heijnen [15]	5 (9)	1983-2012

**Only soil-transmitted Infections*
The figures in brackets are the total number of publications used for the review

The findings from the previous reviews point to shared sanitation use as increased risk of ~~diarrhoeal~~diarrheal diseases but a reduced risk of other health outcomes. However, it is unclear whether inclusion of the new data into the meta-analysis will support the outcome of the two reviews.

Furthermore, many studies from various countries in SSA report on shared sanitation and issues related to usage rate, hygiene, privacy, safety/security, accessibility and use by vulnerable groups (women, disabled, children, and the elderly). The outcome of the different studies shows divergent results on the association between the use of shared sanitation and issues raised by the JMP aside health outcome. However, to the best ~~of the~~ knowledge of the authors, there is no review paper synthesizing the findings of the individual studies to inform policy. The current review seeks to address that gap. Non-partner violence (physical and sexual) against women which is an emerging issue associated with the use of shared sanitation is addressed in this review.

2. METHODS

2.1 Data sources

The review was conducted using data obtained from systematic and extensive literature search. Original research articles, conference papers, and book chapters were retrieved from nine databases. The databases considered were Scopus, Web of Science, ProQuest Central, Medline-Academic, Directory of Open Access Journals (DOAJ), PubMed Central, Springer online Journals, BioMed Central and Taylor & Francis. The choice of these databases was influenced by institutional access. Additional information was obtained from country specific reports published by national governments, UNICEF and WHO. Another~~Of~~ particular reference was the April 2021 updated data from WHO and UNICEF JMP estimates on the use of water, sanitation and hygiene by country (2000 to 2020).

2.2Eligibility

Papers included in this review were those published in English from 1st January 2000 to 30th April 2022 and contained information~~reporting on shared~~ sanitation in Sub-Saharan Africa. Furthermore, only papers whose full-text were available and accessible in the targeted database were included. For the purpose of this review, shared sanitation excludes institutional facilities.

2.3Data extraction and analysis

The search was performed in April 2022. Key search terms ("Shared sanitation" OR "shared toilet", "Shared sanitation" AND "Health outcome", "Shared sanitation AND ~~diarrhoea~~diarrhea", "Shared sanitation AND cleanliness", "Shared sanitation" AND "access OR accessibility", "Shared sanitation AND women OR girls OR children", "shared sanitation AND vulnerable group", "shared sanitation AND aged OR poor", "shared sanitation AND challenges OR problems") which covered the scope of the review were applied. The list of the key search terms and the number of publications from each database are listed in Appendix A. As much as possible, broad search terms were used to ~~minimise~~minimize the chances of overlooking some relevant publications. The publications that emerged out of the searches were combined and scrutinized for duplications. The remaining publications were screened for relevant information based on the eligibility criteria. From the search, 11923 papers were obtained but 10710 were removed for duplication and an additional 1168 papers were excluded based on the criteria stated above. Fig. 3 shows the methodology for selecting publications for this review.

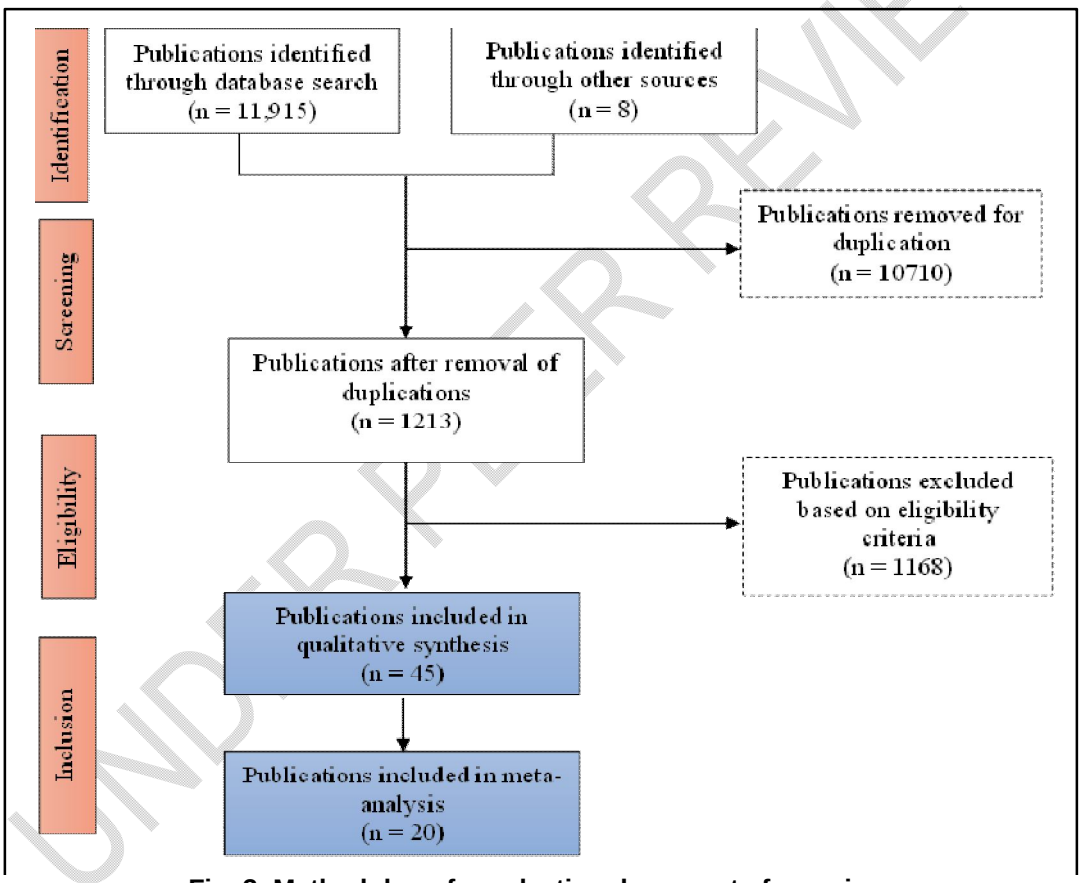

Fig. 3. Methodology for selecting documents for review

The results of the studies on the association of shared sanitation usage with health outcomes as well as non-partner violence (physical and sexual) against women were pooled in a meta-analysis using Stata (version 16.1). Also, the findings from the selected publications on the issues associated with shared sanitation (such as cleanliness, usage rate, availability of handwashing facilities, access and use by vulnerable groups) were synthesized.

3. VULNERABILITY ISSUES ASSOCIATED WITH SHARING SANITATION FACILITIES

The WHO/UNICEF JMP excluded shared sanitation facilities from basic/safely managed sanitation facilities largely due to lack of data on issues bothering hygiene, accessibility and safety of shared sanitation facilities [12]. Studies in Kenya, Ghana and Uganda reported that distance, lack of cleanliness and long queues induced users to practice open defecation or use plastic bags in the home than using shared toilets [16-18]. On the contrary, findings from studies in Dar es Salaam, Tanzania shows that sharing was positively associated with hygienically safe and functionally sustainable sanitation probably due to the possibility of mobilizing higher investment for the facilities [19]. This reveals the varied opinion on potential vulnerabilities associated with the sharing of sanitation facilities. This section of the paper discusses the user vulnerabilities associated with shared sanitation facilities in sub-Saharan Africa.

3.1 Long queues associated with high usage

Shared toilets (particularly public, community-shared and toilet facilities shared by more than 5 households) are heavily used. In Nakuru, Kenya, around two-thirds of 100 shared pit latrines surveyed were shared by 6 households or more [20]. In Mathare, Kenya, Kamau and Njiru [21] reported an average of thirteen households (with household size of five) sharing a sanitation facility. According to Mazeau [22], the mean number of households per cubicle for neighbourhood-shared and public toilets were respectively two and thirty in Ashaiman, Ghana (with household size of 3.5) but 4.5 and 61 in Kampala, Uganda (with household size of 4.5). In Mozambique, a cubicle of shared toilet serves up to 20 residents while compound sanitation blocks serve over 20 residents [23].

A major outcome of high usage is the associated long queues (during peak periods such as mornings) creating more unsanitary conditions and promoting faeco-oral transmission of diseases [11]. This is more characteristic of public shared sanitation facilities. Sixty-seven (67%) percent of community toilet users in Kumasi had to queue for up to 10 minutes to use the toilet [24]. Similarly, a queuing time of up to 15 minutes during peak hours in the morning was reported in Ashaiman, Ghana, for toilets located outside housing premises [22]. In Accra, [25] and Kumasi [26] users of shared facilities identified crowding and long queues as barriers to access. Also in Kampala, 54% of neighbourhood-shared toilet users and 89% of public toilet users reported that they queue to use their toilets [22]. Long queues accounted for residents' dissatisfaction with shared toilet facilities (including public toilets) in Kampala [27].

This situation affects the implementation of control measures to deal with WASH-related epidemics. For instance, measures to prevent the community spread of the COVID-19 virus included social distancing but queuing at shared sanitation facilities contravenes this measure and exposes innocent people to the virus from asymptomatic patients through direct/indirect contact with their respiratory droplets.

3.2Hygiene

3.2.1 Level of cleanliness

Poor level of cleanliness is cited as one of the reasons for the JMP's exclusion of shared sanitation from the basic sanitation service level. Cleanliness of sanitation facilities is a key determinant for users' satisfaction and decision to consistently use a facility [28]. Not only does poor cleanliness discourage people from using the facility, but it is also a route for faeco-oral transmission of diseases. Fifty percent of respondents living in slums in Kibera, Kenya, rated cleanliness as an important determinant for their satisfaction with communal

sanitation facilities [16]. In Nigeria, a survey by Aluko [29] reported that about three-fifth of shared sanitation facilities were dirty with only 45% of the facilities cleaned daily. Studies on shared sanitation facilities in low-income urban areas in Accra [30], Kumasi [31], Southwest Nigeria [29], and Kenya [32] report of users' dissatisfaction with the level of cleanliness of their shared toilet facilities. On the contrary, Massa [33] compared the cleanliness of shared and unshared toilet facilities in Tanzania and found that 74.2% of shared facilities were clean compared with 69.2% of unshared toilets facilities assessed. They observed that the proportion of unshared toilets (6.6%) with ~~faeces~~feces on surfaces were more than shared toilets (5.5%). Therefore, the likelihood of ~~faecal~~fecal matter to be found inside shared toilets was less than in non-shared toilets. Gunther [34] assessed cleanliness of toilets in relation to the rate of sharing in Kampala and noted that, below four households per cubicle, the level of cleanliness of shared toilets were comparable to private facilities (about 80% were clean). However, for toilets with more than 10 households per cubicle, the proportion of clean toilets dropped to 40%. Poor usage and cleaning arrangements of shared sanitation facilities are potential recipe for conflict among users (physical fights, disagreements, exchange of words, or quarrels among compound members), especially when users or their children soil the user interface and fail to clean [35, 36]. Ramlal [37] tested the effectiveness of potential risk-reduction interventions and found that wiping of surfaces (at least twice prior to contact) and washing of hands with soap have the potential to significantly reduce the risk of infection. Users of shared toilet facilities must activate their sense of collective ownership (typical of Africans) to enhance the cleaning practices of their shared toilet facilities.

3.2.2Contamination level of contact surfaces of shared facilities

Several components of the toilet including door handles, taps, lever, flush, lock, toilet seats, bar of soap and toilet roll holder serve as potential germ carriers [38]. Where facilities are poorly cleaned, users tend to spit on the floors and walls exposing other users to pathogens. It is possible that a toilet that looks clean may still transmit pathogens. Few studies (in Tanzania and South Africa) have reported on the level of contamination of contact surfaces of shared sanitation facilities in SSA (see Table 2).

Table 2. Contamination of contact surfaces of shared sanitation facilities in SSA

Type of shared facility	City, Country	Number of facilities studied	Type of contact surface	Type of contamination	Outcome	Daily risks of infection (±90% CI)	Reference
Neighbour-Shared	Temeke, Dar es Salaam, Tanzania	159	Door handle and two points of potential hand contact while seated/ squatting	E. coli	E. coli is 50% lower for shared toilets (9±7 /100 mL) than private toilets (18±9/ 100 mL)	-	Exley [39]
Community-shared	Durban, South Africa	1 male and 1 female	Cistern handle, tap surfaces, Toilet seats, door latches	Potential diarrhoea causative agents	Average count abundance of up to 12 Log10 and prevalence of 3 – 100%	-	Ramlal [40]
Community-shared	Durban, South	4 male and 4	Toilet seats	SARS-CoV-2 RNA	132.9±39.8 gc/cm2	4.3x10-4 (±4.0x10-6)	Amoah

	Africa	female	Cistern handle		69.1±21.6 gc/cm2	2.2x10-4 (±2.1x10-6)	[41]
			Internal latch		60.1±14.5 gc/cm2	1.5x10-4 (±1.6x10-6)	
Community-shared	Durban, South Africa	1 male and 1 female	Cistern handle	E. coli	5.7 Log10 cfu/cm2	2.7x10-2 (±1.0x10-3)	Ramlal [37]
			Internal pull latch		5.8 Log10 cfu/cm2	3.6x10-2 (±4.7x10-4)	
			External door handle		5.7 Log10 cfu/cm2	2.4x10-2 (±2.6x10-3)	
			Tap handle in shower cubicle		5.7 Log10 cfu/cm2	3.1x10-2 (±2.7x10-3)	

cfu – colony forming unit, gc – genome copies CI – confidence interval

Contact surfaces have been found to be contaminated with potential ~~diarrhoea~~diarrhea causative agents and SARS-CoV-2 RNA. Disease-causing organisms such as COVID-19 virus remains viable for several hours (3-92 hours) on surfaces of materials used for common contact surfaces of toilets and latrines [42]. The commonly contaminated contact surfaces are door handles, cistern handles, toilet seats, door latches and tap surfaces/handles. Contamination of surfaces could result from direct contact with ~~faeces~~feces or urine, unclean hands, coughing/sneaking/spitting, flushing of toilets [41]. The contamination levels are quite lower for neighbour-shared sanitation than community-shared facilities (see Table 2). The risk of infection due to contact with these surfaces are 3-4 people out of 100 exposed for E-coli and 2-4 people out of 10,000 exposed for SARS-CoV-2 RNA. On the contrary, Exley [39] found no evidence that shared sanitation facilities (shared by up to 22 households) were more contaminated with E. coli (on hand-contact points within the facility) than privately accessed facilities. Their data showed that as the number of households and number of users sharing a facility increased, the concentration of E. coli within the facility decreased (OR=0.90; 95% CI: 0.81-1.00) About 38% of the 168 shared toilets compared to 22% of the 173 unshared toilets assessed were free from E. coli. This may be attributed to a high level of cleanliness attained by sharing cleaning responsibilities among users of the shared toilets. Frequent hand hygiene and use of clean sanitation facilities could break the barrier for transmission of WASH-related diseases such as the COVID-19 pandemic. Sanitation facilities (shared or individual) which is poorly managed and lacks functional handwashing facilities could be a potential route for transmission of infections.

Women are most vulnerable to the risk of infection due to frequent use (for ~~defaecation~~defecation, urination and menstrual hygiene management), cleaning of facilities, caring for the sick and elderly and waste disposal of ~~faeces~~feces of children, the sick or the elderly [43].

3.2.3 Determinants for cleanliness of shared sanitation facilities

Users of toilets facilities perceive attributes of clean toilets to be absence of ~~faeces~~feces and urine on user interface [44], odour-free, absence of flies, and ventilation [29]. The level of cleanliness of shared facilities are determined by a number of factors which can be grouped under structural and non-structural. Structural factors include type of facility, possibility to lock doors, height of superstructure, superstructure material, availability of slab [45, 46] whereas non-structural factors include defined cooperative agreements, communication among users, commitment to cleaning, availability of cleaning rota, relationship with other toilet users, weather conditions) [29, 36, 47-49].

In Ghana, the level of cleanliness of shared sanitation facilities was identified to be positively influenced by the type of facility (flush toilets were three times more likely to be clean; $p < 0.002$; OR = 2.56), presence of lockable door (three times more likely to be clean; $p < 0.01$; OR = 3.03), and the daily cleaning regime ($p < 0.001$; OR = 2.80) [46]. In urban slums of Kampala, the perceived disgust about using dirty toilets was significantly related to users cleaning intention [44]. In Kisumu, poor use of shared toilets and lack of cooperation in cleaning were the main challenges that led to uncleaned shared toilets [36]. In Addis Ababa-Ethiopia, lack of privacy (OR = 2.95; 95% CI: 1.60–5.43) and security (absence of latch on latrine door) (OR = 4.60; 95% CI: 2.43–8.79) were among barriers to cleaning of shared toilet facilities [50]. Lockable doors limit strangers or unintended users from having access to the latrine. Shared latrine cleaning is also impacted by seasonal weather conditions. In the slums of Kampala city in Uganda, Kwiringira [48], observed that the rainy season worsened the cleanliness of shared sanitation facilities.

In compound houses where residents are transient or tenants, the limited social cohesion results in lack of responsibility for proper operation and maintenance of the shared facilities. Where social cohesion exists, it is reported that tenants and landlords are able to pool resources to build, operate and maintain shared facilities.

3.3 Absence of functional handwashing facilities located close to toilets

Unavailability of functional handwashing facilities characterize many shared sanitation facilities in SSA. This ranges from the complete absence of the facility to lack of soap and/or water. Peprah [30] reported of lack of handwashing facilities (water and soap for customers to use) at public toilets in low-income areas of Accra. Similarly, 81% of shared facilities in Southwest Nigeria and four out of five (81%) of 312 shared toilets assessed in Lagos, Nigeria [29] lacked functional handwashing facilities. Tidwell [51] found that only 3% of shared sanitation facilities in peri-urban Lusaka, Zambia, were equipped with a functional handwashing station. In rural Rusizi District of Rwanda, only 1% of 5212 households assessed had handwashing stations with soap and water [52]. Women in Ghana and Kenya ~~prioritised~~prioritized handwashing stations in shared sanitation facilities for personal hygiene motives compared to men for both mixed and gender separated facilities [53]. In Tanzania, lack of soap for handwashing was noted in more than half of the shared toilets and in about a half of the non-shared toilets. However, the presence of soap was less likely to be noticed in the non-shared latrines as compared to the shared latrines (OR = 1.20; 95% CI: 0.34, 4.19) [33].

Availability and use of functional handwashing facilities are important for promoting hand hygiene and controlling the spread of diseases. Data from the UNICEF multiple indicator cluster surveys across SSA countries reveal high proportion of population (50-90%) lacking functional handwashing facilities. This presents a great challenge in promoting frequent hand hygiene which is a key determinant for controlling the spread of diseases such as the COVID-19 virus.

3.4 Prevalence of ~~diarrhoeal~~diarrheal diseases

The association between shared toilet usage and health outcomes has remained a topical issue. The most studied health outcome is ~~diarrhoea~~diarrhea. Studies on the association between the use of shared sanitation and prevalence of ~~diarrhoea~~diarrhea diseases across SSA is very limited. From 2000 – 2021, studies from nine out of the forty-three countries have reported on such association. The data was pooled in a meta-analysis and the results presented as Fig. 4. Grouping the studies according to countries, there is an increased association of shared sanitation use and ~~diarrhoea~~diarrhea in Kenya (OR=1.55; 95%CI: 1.29-1.81), Mali (OR=1.39; 95%CI: 1.20-1.57), Ethiopia (OR=1.42; 95%CI: 1.08-1.76) and Zambia (OR=1.43; 95%CI: 1.03-1.83). However, for Mozambique (OR=1.36; 95%CI: 0.63-

2.09), The Gambia (OR=1.48; 95%CI: 0.76-2.20), Rwanda, and Senegal, the use of shared sanitation showed a protective effect against ~~diarrhoea~~diarrhea. Moreso, users of shared toilets in South Africa were less likely to report ~~diarrhoea~~diarrhea (OR=0.35; 95%CI: 0.15-0.85). These findings provide a positive sign and confirm the general notion that quality and clean shared sanitation facilities can provide a similar health outcome as individual household toilets. But when all the data were pooled in a meta-analysis (see Fig. 4), the results (Overall OR=1.06; 95%CI: 1.03-1.08) show that the use of shared sanitation is associated with increased risk of ~~diarrhoea~~diarrhea diseases. The overall outcome of the meta-analysis obtained in this study is lower than that obtained by Heijnen [15] (Overall OR of 1.44 [95% CI: 1.18-1.76]) and Ramlal [14] (Overall OR of 2.39 [95% CI: 1.15-8.31]) which included data from other countries outside SSA as shown in Table 1. The outcome of this study reveals that ~~diarrhoea~~diarrhea prevalence rate associated with shared toilet usage in SSA is reducing probably due to the increased interest and debate on shared sanitation.

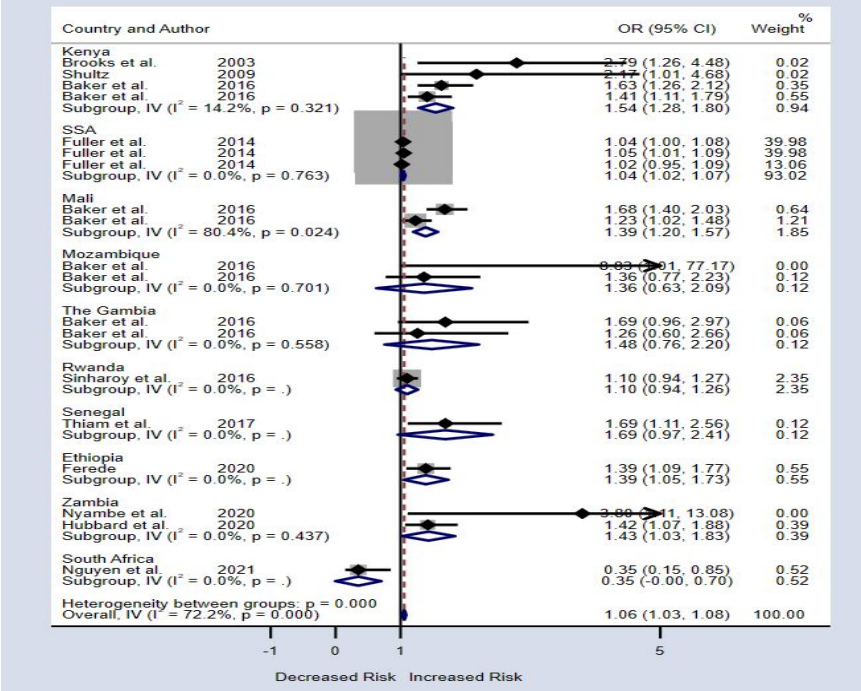

Fig. 4. Meta-analysis of pooled OR on the association between the use of shared sanitation and prevalence of diarrhoeal diseases.

This implies that people in SSA using shared sanitation facilities have 6% higher prevalence of ~~diarrhoea~~diarrhea than people who do not use shared sanitation facilities. Irrespective of the number of people sharing the facility, there is still a negative association with ~~diarrhoea~~diarrhea. Facilities shared by only two households recorded an OR of 1.30 (95%CI: 1.12-1.49) whereas those shared by more than two households had an OR of 1.65 (95%CI: 1.40-1.89). This implies the risk is 35% higher for all shared facilities as compared to those shared by only two households. There is also further evidence that the prevalence of ~~diarrhoea~~diarrhea is associated with increasing the number of households sharing a facility. Using data from 34 countries in SSA, Fuller [13] found the prevalence of ~~diarrhoea~~diarrhea among children under five to be slightly higher for users of toilets shared by more than 5 households (OR=1.02 [95% CI: 0.95-1.09]) than those shared by up to 5 households (OR=1.04 [95% CI: 1.00-1.08]).

3.5 Issues related to access and use by vulnerable groups

In 2010, the United Nations recognized access to safe and clean drinking water and sanitation as a Human right [54]. According to the UN, "the right to sanitation entitles everyone to have physical and affordable access to sanitation, in all spheres of life, that is safe, hygienic, secure, and socially and culturally acceptable and that provides privacy and ensures dignity". Therefore, sanitation facilities (including shared facilities) must always be accessible by all persons irrespective of age, gender, socio-economic status, race, religion and persons physical and mental state. However, many vulnerable groups such as women, the aged, children and the disabled are unable to access or do not feel safe to use shared sanitation facilities.

3.5.1 Privacy, safety, security and accessibility

Privacy, safety and security are influenced by the location of the toilet, presence of lockable door (inside and outside), presence of lighting, height of superstructure and whether the facilities are gender-separated. Accessibility is determined by the availability for use at all times and by all manner of persons (including the vulnerable). Safety was cited as one of the reasons for respondents' dissatisfaction with their toilet service in Kibera and Mathare [32]. Over 83% of households in Mathare, Kenya reported inadequate or no privacy when using a shared toilet [55]. In Tanzania, Massa [33] observed that the likelihood of finding toilets with limited privacy (lack of lockable doors) was significantly higher for non-shared toilets than in the shared toilets (OR = 0.62; 95% CI: 0.40-0.94) even though the difference was not statistically significant. The possibility of being seen by other toilet users or passers-by, which is more associated with communal and public toilets, was cited as the reason for ensuring privacy of shared toilets. Lack of privacy may compel women to wait until night-time before defaecating which increases their level of exposure to physical or sexual assault. But lack of security at night may also force women who utilized public or neighbourhood-shared sanitation facilities to defaecate in buckets or polyethene bags in the night.

On the other hand, when public toilets or other shared facilities are inaccessible, users mostly revert to open defecation at the surroundings of the facility or use other unhygienic methods such as defecating in polythene bags or practicing open defecation. These practices have been reported in Kampala slums of Uganda [18] and Mathare, Kenya [56]. Assessment of seven communal sanitation facilities in the slums of Kibera-Kenya revealed that facilities in the slum are closed during the night due to security issues [16].

Access to and use of shared facilities is also influenced by the distance to the facility. Women in Nairobi who had to walk for 2 minutes outside their homes to access a place to urinate/defecate had double the odds of reporting a case of recent ~~diarrhoea~~diarrhea among members of the household compared to women who did not go outside their house to access a toilet/site for urination/ defecation (OR = 2.0; 95% CI = 1.25–3.34, p = 0.009) [57]. Similarly, lack of physical access to shared toilets were comparable to non-shared toilets in Tanzania [33]. For urban school- and preschool-aged children in Kibera, Kenya, those who lived in households where the primary sanitation facility was located outside the household premises had a higher prevalence of soil transmitted helminth infection than those who lived in households where the sanitation facility was located on the household's premises (PR = 1.33; 95% CI 1.00–1.77, p=0.047) [58].

Absence of disability- and elderly- friendly enhancements make toilet facilities inaccessible to those vulnerable groups. Neighbourhood and communal-shared toilets in Ashaiman-Ghana and Kampala-Uganda were reportedly disability and elderly unfriendly compared to public toilets [22]. Massa [33] reported that non-shared toilets were less likely to be useful for people with disabilities compared to shared toilets. They noted that only 38.7% of shared and 32.7% of non-shared toilets were disability friendly. In the rainy season, vulnerable

people's safety, convenience and access to shared sanitation facilities (especially in the night) are negatively affected [48]. The least use of the toilet by elderly people may be related to their mobility, morbidity, accessibility of the latrine superstructure and distance.

In neighbourhood and community shared toilets, children above five years are encouraged to use the shared toilets, but access is restricted during the peak periods (mostly in the mornings). Poor usage ~~behaviour~~behavior by children have been blame for unclean toilets in compound houses [26]. Children under five years defaecate in potties which are disposed in neighbourhood-shared and sometimes communal shared toilets, but this is affected by the distance to the toilet since it is socio-culturally unacceptable to carry ~~faecal~~fecal matter in potties through the community. This leads to the disposal of the ~~faeces~~feces in the open.

3.5.2 Non-partner violence against women

One of the emerging risks to the use of shared sanitation by women is non-partner violence (NPV) (physical and sexual). Table 3 presents findings from studies on NPV against women in SSA. The data was pooled in a meta-analysis and the result is presented as Fig. 5.

Table 3. Shared sanitation usage and non-partner violence against women in SSA

Reference	Country	Type of shared Sanitation facility	Main outcome	Odd ratios (95% CI)
Gibbs [59]	South Africa	Not defined	Increase of NPV	1.45 (1.17-1.80)
Barchi and Winter [60]	Cameroon	Shared with 1-4 households	Increase risk of NPV	2.04 (1.08-3.88)
	Cote d'Ivoire	Shared with 1-4 households	Increase risk of NPV	7.20 (1.94-26.69)
	Cote d'Ivoire	Shared with ≥5 households	Increase risk of NPV	3.01 (1.14-7.91)
	Gabon	Shared with 1-4 households	Increase risk of NPV	2.61 (1.14-5.98)
	Liberia	Shared with 1-4 households	Increase risk of NPV	6.18 (2.05-18.63)
	Mozambique	Shared with ≥5 households	Increase risk of NPV	13.0 (1.01-167.70)
Shiras [23]	Maputo-Mozambique	Neighbour-shared and Community-shared	73-88% female participants raised fear of physical and sexual assault (moderate to severe risk)	

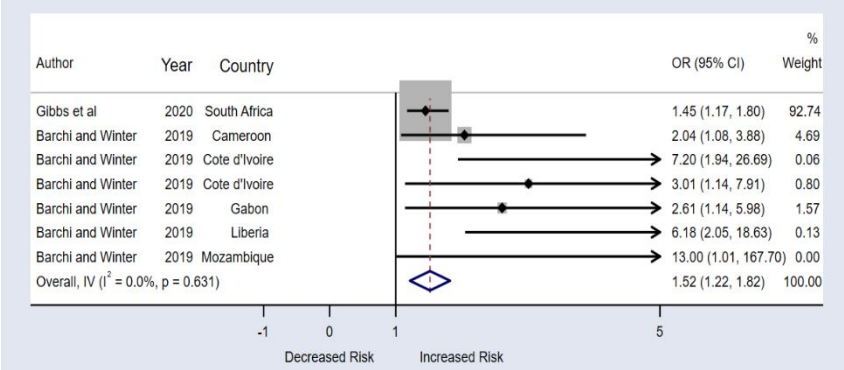

Fig. 5. Meta-analysis of pooled OR on the association between the use of shared sanitation and prevalence of non-partner physical and sexual violence against women.

Studies on sharing sanitation and NPV against women across SSA are very scanty. However, the limited data from South Africa, Mozambique, Cameroon, Cote d'Ivoire, Gabon and Liberia shows that there is a positive association between sharing toilets and NPV against women. The OR from the two studies when pooled together in a meta-analysis returns an overall OR of 1.52 (95%CI: 1.22-1.82) (see Fig. 5). This implies that women who use shared toilets have 52% odds of exposure to non-partner violence. For South Africa, the non-partner sexual violence is reported to be experienced by young women between the ages of 18 and 24years. In all the studies reporting on NPV, the shared toilets were located outside the victims' premises. The number of people sharing had a limiting effect on women risk of exposure to NPV. The risk of exposure was lower for facilities shared by 1-4 households (OR = 2.31, 95% CI = 1.12 – 3.51, p = 0.651) than those shared by ≥5 households (OR = 3.03, 95% CI = -0.36 – 6.41, p = 0.841). The situation could be worsened if the toilet facility is located far away. Therefore, distance to the shared toilet was a risk factor to NPV. Users of communal and public toilets could be at higher risk of NPV because these toilets are mostly located far away from most users. Even though the outcome is based on data from only six countries, the increasing prevalence of NPV in SSA requires urgent attention and calls for the need to determine a threshold distance for shared facilities. This may compel women to resort to unacceptable defecation practices especially in the night such as defecating in polythene bags, near open drains, etc.

4. DISCUSSIONS: WHERE DO WE GO FROM HERE?

4.1 Methodological issues to address

From the review, it was observed that studies that specifically compared shared and non-shared toilets in terms of the indicators such as cleanliness, accessibility, privacy, safety and security are few. Some of the studies that were reviewed (e.g., Kwiringira [18], Simiyu [36], Schelbert [53]) assessed shared sanitation facilities in isolation without relating their findings to non-shared facilities existing in the study setting. For such studies, it is not possible to judge whether the findings made on the assessed indicators are necessarily associated with the sharing of facilities. It could be that the management of the toilet is a reflection of the general ~~behavioural~~behavioral pattern of residents of the study setting. For example, Hailu [50] reported on the barriers to cleaning of shared sanitation facilities in Addis Ababa, Ethiopia and concluded the barriers were, among others, users feeling a lack of privacy during latrine use, lack of locking latch, lack of regular monitoring by a health extension worker and lack of water at home for cleaning. However, the conclusions cannot be

guaranteed to be only associated with shared toilets. Similar barriers may also be found in non-shared toilets in the study area. There is the need for more studies that specifically compare shared sanitation facilities with non-shared in the same locality.

Secondly, distinction is mostly not made among the different typologies of shared toilets (co-tenant-shared, neighbour-shared, community-shared, public toilets). For instance, most of the data included in the meta-analyses by Heijnen [15] and Ramlal [14] either failed to indicate the type of shared toilet or lumped all the different typologies of shared toilets together. Some of the studies were conducted on communal or public toilets. Hence, it may be inferred that some of the negative findings could be disproportionately driven by communal or public toilets which are probably the worst types of shared facilities. It is necessary for future research to segregate the findings on in-house or privately shared facilities from those shared at the communal level. Such an approach could provide a scientific basis for adopting different treatments or placements for the different levels of facility sharing on the JMP's sanitation ladder and also make it easier to compare the results of different studies.The lack of clarity in the categorization of shared sanitation that ~~characterises~~characterizes some recent studies makes it methodologically challenging to compare the findings of different studies. This may partly explain why the conclusions drawn on the association between shared sanitation and some hygiene and health outcomes by different studies have been widely varied and inconsistent.

4.2 Giving some recognition to privately shared sanitation

The JMP's initial monitoring of progress towards improved sanitation under the MDG era paid no attention at all to otherwise improved facilities that were shared by more than one household. This was seen as belittling the hard efforts and sacrifices some countries were making in migrating sections of their populations from open defecation to toilet usage. Subsequently, in the 2008 progress report [61], the JMP segregated the proportions of populations that used unimproved facilities from those that shared an otherwise improved facility with one or more households. This was hailed as a recognition of the efforts made by such households and their governments towards a migration from the use of unimproved facilities and open defecation, which is the riskiest sanitation practice [62]. Nevertheless, access to a shared facility is still not ~~recognised~~recognized as good enough apparently due to negative perceptions about their safety.

As noted above, most of the negative perceptions that are associated with shared sanitation are actually driven by communal and public toilets. Households that depend on communal or public toilets are unarguably in a different situation from those that share a facility with a couple of other households at their place of abode. Considering the fact that sharing a facility is the only viable option available to many households in informal and densely populated settlements in Sub-Saharan Africa and parts of Asia [63], lumping all forms of shared sanitation facilities together and excluding them from the sanitation target underestimates the global effort and progress towards access to sanitation. The JMP needs to consider a further segregation between communal and public toilets, on the one hand, and those shared privately at the household level on the other hand. It is ~~hypothesised~~hypothesized by this paper that toilets shared privately at home (probably by a threshold number of households or users) are likely to offer a significantly different quality of service from communal and public toilets. This hypothesis is consistent with the design of the survey instrument used for collecting data for the UNICEF Multiple Indicator and Cluster Surveys (MICS). The MICS survey categorizes shared toilets into facilities shared from two to five~~by 2-5~~ households, more than five~~5~~ households and public toilets.

4.3 Setting a benchmark for inclusion of 'quality' shared sanitation in basic sanitation service

Shard toilet facilities, which meet some defined criteria, should be considered by the JMP for inclusion in the basic sanitation service level as has been advocated by other experts [8, 11, 12]. A global benchmark or minimum standard for inclusion of shared sanitation in basic service should be set and this should be used to select qualified shared facilities into the basic service level. The status of the facility must be reviewed annually to ensure they remain compliant with the agreed indicators. Based on observations made in Kenya and Ghana (Meili et al. 2021), toilets shared by up to 3 households could be included in the basic service level. According to Meili et al. (2021) toilets shared among 2-3 households in Kenya and Ghana show good quality [64]. On the other hand, the Sanitation Task Team's recommendation of a sharing limit of no more than five families or no more than 30 people [65] may also be considered even though their proposed maximum number of users is too high. Continually excluding shared facilities from the basic service level and, by extension, the nations' progress towards the SDG Target 6.2 could discourage investment in shared sanitation facilities even in areas where no other option is viable. This has been well elaborated by Evans [12]. This would be counterproductive as many people may revert to open ~~defaecation~~defecation or use unimproved facilities. When users view their shared toilet facilities as acceptable, it would be a great incentive for them to work toward ensuring continuous improvement in safety and hygiene.

4.4 Developing indicators for assessing quality of shared facilities

The decision to include a shared toilet in the basic service level should be based on this facility~~e toilet~~ meeting certain defined indicators. These indicators, when clearly defined, may~~can~~ influence people to progressively climb the 'shared sanitation ladder'. From the review, ten (10) indicators were found to be key user priorities for quality shared toilets (Table 4) in at two least countries. The indicators have been grouped under hygiene, privacy, safety/security, number of users and technological factors. Four of the indicators (number of people sharing the toilet, cleanliness, location of the toilet and type of technology) were reported in two-thirds of the countries studied. The indicators presented in Table 4 could serve as a basis for agreeing upon indicators for assessing the quality of shared toilets.

4.5 Collection of national-level data and monitoring of shared sanitation

The reviewed data on the issues associated with shared sanitation (hygiene, safety, security, privacy, health outcomes, accessibility and use by vulnerable groups) shows a divergent outlook. There is generally inadequate national level data and evidence on shared sanitation facilities and their hygiene, accessibility and safety [12]. In countries where data on shared sanitation facilities is collected as part of the local government monitoring activities, the data are not readily available to the public [14]. This is one of the factors that led to the exclusion of shared facilities from the basic service level by the JMP in the first place. Currently, information to assess countries' progress on SDG 6.2, is routinely collected in national level household surveys, i.e., Demographic and Health Surveys (DHS), Multiple Indicator Cluster Surveys (MICS) and population censuses.

To ensure transparency in reporting of data, it must be a requirement for national governments to create an open access database where information on shared sanitation facilities (such as location, size of facility, number of people sharing, technology, privacy and safety issues, hygienic conditions, accessibility by vulnerable groups, etc.) could be readily accessed. Issues of hygiene, safety, privacy and accessibility must be updated half-yearly and validated in consultation with UNICEF and WHO country offices and other development partners in the WASH sector.

Table 4. User priorities for acceptability and use of shared latrines across six countries in SSA

	Country	Ethiopia	Ghana	Kenya	Mozambique	Uganda	Zambia
	Reference	Kefeni and Yallew [66]	Schelbert [53], Meili [64]	Simiyu [35], Schelbert [53], Meili [64]	Shiras [23]	Tumwebaze [27], Tumwebaze and Lüthi [67]	Tidwell [51]
	Study period	Not indicated	Jan. and Jul. 2019	Jan-Dec 2014; Jan. and Jul. 2019	Mar. 2015 and Mar. 2016	Oct. to Nov. 2010	Jun. to Jul. 2017
	Sample size	817	1,147	1,426	96	2,437	1,085
Determinants of quality							
Number of people sharing		√	√	√		√	
Hygiene	Cleanliness	√	√	√		√	
	Water availability for cleaning		√	√			
	Handwashing facility		√	√			
Privacy	Privacy		√	√			
	Gender-separated toilet		√	√			
Safety/	Toilet location/ distance	√	√	√	√		
Security	Presence of lockable door		√	√			√
	Lighting		√	√			
Technical	Type of toilet technology		√	√		√	√

5. CONCLUSION

For many people in the SSA, shared toilets remain the only option available to people residing in compound houses, densely populated urban areas and slums. There seems to be varied opinion on issues associated with the sharing of sanitation facilities. The review confirms that some shared toilet facilities are unclean, associated with long queues, have no functional handwashing facilities, limits access and use by vulnerable groups (women, elderly, children and disabled), and expose women to non-partner violence (physical and sexual). In addition, there is an increased association between shared sanitation and the prevalence of ~~diarrhoea~~diarrhea diseases. But there is also compelling evidence that some shared sanitation facilities are clean, of good quality, addresses the needs of the vulnerable and provides similar health outcome as individual household toilets. Toilets shared by 1-2 households presented 35% lower prevalence of ~~diarrhoea~~diarrhea compared to toilets shared by more than 2 households. Similarly, facilities shared by up to four households had lower exposure risk to non-partner violence against women. The findings suggest that total exclusion of all forms of shared sanitation the from basic service level underestimates the global effort and progress towards access to basic and safely managed sanitation facilities. Besides, it does not encourage investment in the provision of high quality and sustainable shared sanitation facilities even in situations where ownership of individual household toilets is constrained by some socio-economic and technical factors. While recommending additional studies which segregate results from different typologies of shared facilities, it is strongly advocated that the JMP accords facilities shared privately at the household level some 'respect' or recognition by segregating them from communal and public toilets. Furthermore, some criteria should be developed to identity quality shared facilities which may be included in the basic sanitation service level. This would require an efficient national-level data collection and management to allow transparent monitoring in order to facilitate adequate improvements ~~,~~in santitatioin.

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APPENDIX A

Number of publications retrieved from databases for key search terms

Search Term	Scopus	ProQuest Central	Web of Science	Medline-Academic	DOAJ	Pubmed Central	Springer online journals	BioMed Central	Taylor & Francis	Total	Total after removal of duplication
"Shared sanitation" AND "health outcome"	119	111	116	98	95	78	27	20	-	664	134
"Shared sanitation" AND (diarrhoea OR diarrhea)	190	161	175	138	134	105	41	21	-	965	205
"Shared sanitation" OR "shared toilet"	925	811	754	542	476	350	177	-	138	4,173	1,029
"Shared sanitation" AND cleanliness	117	96	107	79	86	59	26	20	9	599	131
"Shared sanitation" AND (access OR accessibility)	93	83	82	54	69	43	15	-	10	449	101
"Shared sanitation" AND (women OR woman)	199	182	178	134	145	99	43	27	-	1,007	219
"Shared sanitation" AND (children OR child)	260	230	236	183	181	139	51	33	-	1,313	288
"Shared sanitation" AND usage	114	92	104	74	79	56	22	14	-	555	120
"Shared sanitation" AND "vulnerable group"	15	17	15	8	12	8	4	-	-	79	19
"Shared sanitation" AND girls	76	72	64	45	54	35	15	10	-	371	83
"Shared sanitation" AND (aged OR elderly)	104	89	96	89	74	66	21	13	-	552	115
"Shared sanitation" AND "poor people"	18	12	11	8	10	6	4	-	4	73	19
"Shared sanitation" AND (problems OR challenges)	225	199	194	133	162	103	47	26	26	1,115	251
Total										1,915	2,714