
Compliance to Recommended Humanitarian Sphere Standards of Sanitation by the Facilities in Bidibidi Refugee Settlement Located in Yumbe District, Uganda

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DOI: 10.9734/bpi/rdass/v6/2282A

ABSTRACT

Apposite sanitation is very essential for the community health, for it lowers the rate of morbidity and severity of diseases like diarrhea, dysentery and typhoid among others. In Uganda's Bidibidi refugee camp, research was started to understand if the proposed Humanitarian Sphere Standards on sanitation were met. A total of 210 households in the Bidibidi refugee camp were randomly selected, and one adult was interviewed to assess the accessibility of various sanitation facilities, as well as to investigate the sanitation standards of the sanitation facilities in relation to the recommended Humanitarian Sphere Standards in the area. Pit latrines, handwashing facilities, and solid waste disposal areas are the main sanitation facilities used in the refugee camp, according to 81.4 percent, 86.7 percent, and 51.9 percent of respondents, respectively. Despite their accessibility, the standards of the mentioned sanitation facilities are below the recommended standards, which might have contributed to the outbreak of sanitation related diseases ($\chi^2= 19.66$, $df=1$, $P=0.05$) in Bidibidi refugee camp. The respondents in the study area were aware that the presence of the sanitation related diseases was because of the low-level sanitation practices in place ($\chi^2= 4.54$, $df=1$, $P=0.05$). Low levels of education of the respondents are believed to have contributed to the inaccessibility to some sanitation facilities in the area ($\chi^2= 130.37$, $df=1$, $P=0.05$). This means that the sanitation facilities at the Bidibidi refugee camp, particularly the pit latrines and solid waste disposal facilities, need to be modified and enhanced in order to fulfill the minimal Humanitarian Sphere Standards. In addition, more taps with running water should be available in the camp for appropriate washing practices to reduce the spread of sanitation-related diseases.

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Keywords: *Critical infrastructures; humanitarian sphere standards; refugees; Bidibidi; Uganda.*

ABBREVIATIONS

DALYS : Disability adjusted life years;
DF : Degrees of Freedom;
E : East;
JMP : Joint monitoring programme;
N : North;
NRC : Norwegian Refugee Council;
P : Probability;
UNHCR : United Nations High Commissioner for Refugees;
UNICEF : United Nations International Children's Emergency Fund;
WASH : Water, sanitation, and hygiene;
WHO : World Health Organisation;
WSSCC : Water Supply and Sanitation Collaborative Council;
WWDR : World Water Development Report;
 χ^2 : Chi-square;

1. INTRODUCTION

One of the significant facets of community well-being is sanitation [1,2], and it is in most times depicted by proper treatment of human excreta aimed at preserving human health and environment [2-4]. Adequate sanitation creates the first barrier to excreta-related disease, helping to reduce transmission through direct and indirect routes [5], and in a way contributes to the reduction of the rates of morbidity and the severity of various diseases like diarrhea, dysentery and typhoid among others [1,4,6]

Poor sanitation coupled with lack of access to safe drinking water is reported to have accounted to the loss of an average of 5000 children per day worldwide [6-8] and this global burden highly manifests among the poorest of the poor including the refugees [9]. Moe and Rheingans [6] reported that in sub-Saharan Africa, only 36% of the population has access to basic sanitation and it is likely to be worse in refugee camps, hence escalating the spread of sanitation related diseases. Calderon-Villarreal et al. [10] assert that the inaccessibility to sanitation services is some of the contributors to high mortality within refugee camps. Mulogo et al. [11] and Mizzouri et al. [12] state that inadequate sanitation in non-household setting like refugee camps highly and negatively affects the populations' health, education and welfare. Therefore, investing in good sanitation activities is likely to save lives of human beings. This is because, as reported by WHO [13], that for every \$1 invested in sanitation, there was a return of \$5.50 in lower health costs, more productivity and fewer premature deaths.

Safe excreta disposal should be a major priority in most disaster situations including refugee camps to curb the spread of poor-sanitation related diseases [5]. This is because, people affected by crises are more susceptible to illness and

death from disease, particularly diarrheal and infectious diseases which are strongly related to inadequate sanitation and water supplies [1,14].

The Sphere Minimum Standards specify the minimum levels to be attained in the provision of health and relief services and also provide a way of measuring and communicating the impact of programmes as well as the methods used [5, 15, 16]. Griekspoor and Collins [15] adds that the Sphere project aims at establishing technical and possible actions for relief operations for humanitarian communities. Also, the Sustainable Development Goal 6 for 2030 aims to achieve adequate sanitation for all [2]. Fekete et al. [17] states that minimum standards for Critical Infrastructures in places where displaced people live are very essential for the prevention of adverse health effects, since according to Sendai Framework for Disaster Risk Reduction by the United Nations, the standards are a backbone for the provision of vital health services. Despite the call, the world fell short of basic sanitation by over one billion people particularly in Asia and sub-Saharan Africa [2,18] and this is likely to be more pronounced in refugee camps.

Bidibidi refugee camp located in Yumbe district is about 17km to the border with South Sudan and it houses over 214,000 refugees. About 2,000 new arrivals of refugees enter the district on daily basis [19]. The situation therefore, calls for installation of sanitation facilities that are sufficient enough to provide services for the surging numbers of refugees in the camp aimed at preventing any outbreak of diseases that may be related to inadequate or poor sanitation. In order to achieve this, the guidelines as spelt out by the Humanitarian Sphere Minimum Standards must be followed by the agencies concerned when implementing the provision of the sanitation facilities in Bidibidi refugee camp. The purpose of the study was therefore to assess whether the sanitation facilities found in Bidibidi refugee camp conform to the Humanitarian Sphere Minimum Standards as a way to impede the outbreak of sanitation related diseases. Two objectives guided the study which include; (a) Assessing the accessibility of different sanitation facilities by the refugees found in Bidibidi refugee camp, and (b) Exploring sanitation standards in relation to the Humanitarian Sphere Standards in Bidibidi refugee camp.

1.1 Study Area

The study focused on Bidibidi refugee camp found in Yumbe district, north western Uganda (Fig. 1). The district is bordered by South Sudan to the north, Moyo district to the east, Adjumani district to the south-east, Arua district to the south, Maracha district to the south-west and Koboko district to the west. Yumbe district is at coordinates 03 28N, 31 15E and it is about 17km from the border of South Sudan, the youngest country in the world.

Yumbe district is made of thirteen sub-Counties which include Odravu, Kululu, Ariwa, Romogi, Kei, Kuru, Kochi, Town Council, Midigo, Kerwa, Lodonga, Drajini and Apo. Five of these sub-Counties including Romogi, Apo, Odravu, Ariwa and Kululu have refugee camps. Bidibidi zone is located in Romogi and Apo sub-Counties where the research was conducted. Bidibidi zone was selected for the

study because it was the first established zone and has the largest refugee population in Yumbe district with about 56,000 refugees settled [19]. Bidibidi zone is further made of fourteen villages and it is more stable in terms of infrastructure like roads, water and electricity among others, and hence can avail credible data needed for the study.

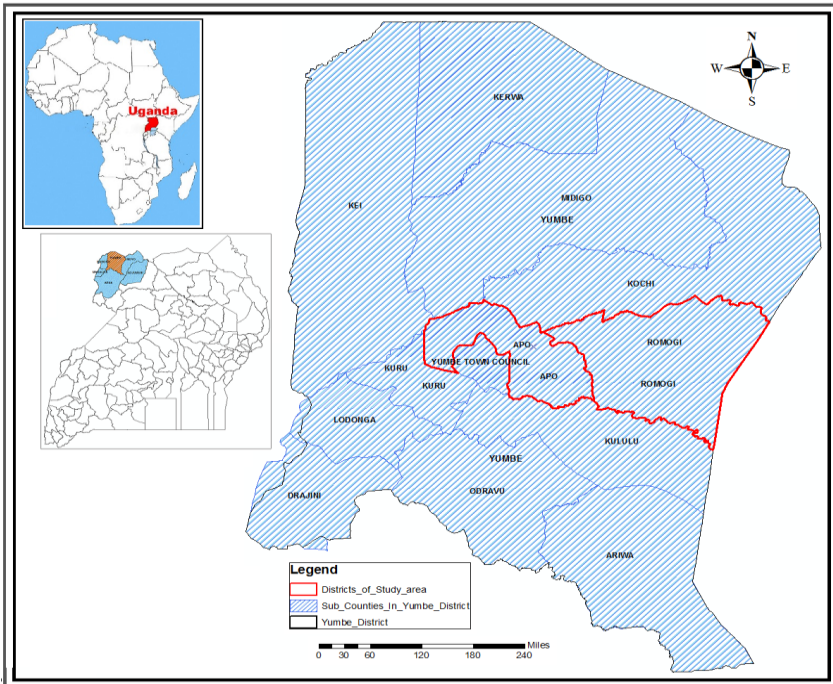


Fig. 1 Map of Uganda showing the location of Bidibidi Zone

2. MATERIALS AND METHODS

The research project focused on determining whether sanitation standards in refugee camps especially in Bidibidi refugee camp found in Yumbe district are being attained, compared to the Humanitarian Minimum Sphere Standards. The study employed a descriptive survey design where both qualitative and quantitative data was obtained from the respondents in order to generate the information needed for determining whether sanitation standards in Bidibidi refugee camp are being attained in comparison with the Humanitarian Minimum Sphere Standards. Qualitative data verified and enriched quantitative data obtained from study as postulated by Sarantakos [20] and Lindlof and Taylor [21]. Observation as a complementary data collection method enhanced the capacity for interpreting the data captured [22].

Primary data from the respondents in the study area was collected using a questionnaire, while the semi-structured interviews were used to collect the qualitative data from the key informants like staff from department of health, water, natural resources and education, UNHCR and its implementing agencies like NRC, Uganda Red Cross Society, Oxfam and Samaritan Purse.

The questionnaire used to collect data from the refugees was pre-tested in one of the other refugee camps apart from Bidibidi and this allowed the interviewers to gain familiarity with the research tool and also provided an opportunity to apply and review the method. The purpose was on assessing how the respondents understood the questions and to identify any problems encountered in providing answers. This allowed the changes to be incorporated into the final questionnaire.

A questionnaire survey was conducted among two hundred and ten households which were randomly selected. There are fourteen villages consisting of thirty households each in Bidibidi refugee camp. This gives a total of 420 households in the entire Bidibidi refugee camp. Using Yamane [23] formula, $n = N / (1 + Ne^2)$; where n =sample size, N =total number of households (420), e =level of confidence (0.05), the calculated sample size (n)= $420 / (1 + 420(0.05)^2) = 205$. If equal number of households were to be selected from the 14 villages, then 14.6 households would be selected. The figure calculated was rounded off to 15 households. This meant that 15 households randomly selected from each village gave a total of 210 households which were used as a representative sample in the study. One adult person (18 years and above) from each household was then selected, approached, briefed and informed that the purpose of the research was purely academic and had no implications whatsoever, and that the respondents were also assured of confidentiality and anonymity. The questionnaire was then administered to the respondent which in most cases was semi-structured in the common language, since majority (65%) had not attained secondary level of education and their level of comprehension of the information in the questionnaire was regarded as low. The response rate of the respondents was 100% since at least one adult person was present in the selected household at the time of collecting data.

A semi-structured interview guide was also designed and administered to some members of staff who occupy managerial positions in the department of health, water, natural resources and education, UNHCR and the implementing agencies who were purposively selected as suggested by Hyman et al, [24] and Sarantakos [20]. The aim was to gather more information concerning sanitation standards in relation to the Humanitarian Minimum Sphere Standards in Bidibidi refugee camp.

In addition, direct field observations were made to check on sanitation facilities that existed in the camp, their conditions and quality. This was done with the help of observation checklist that was developed to guide in data collection. Direct field observations were also used to verify the reliability of the information the research participants had provided to the researcher regarding the study topic.

The state of the sanitation facilities was depicted with the help of digital photographs.

Questionnaire responses were edited, coded and analyzed using SPSS version 16.0 for windows. These informed descriptive statistics concerning sanitation standards in Bidibidi refugee camp. The analyzed data was then accompanied with notes to direct readers' attention to important values for comparison. Percentage values were used to relate what is in the frequency distribution tables together with the likely cause of the outcome. Generalization of the data was made while reporting on the data based on the percentages obtained for particular items in the survey. Generalization as reported by Bryman [25] and Sarantakos [20] ensures extrapolation of the research findings beyond the boundaries of the research sample to the whole population.

Qualitative data collected during key informant interviews was sorted and categorized into themes according to particular items of interest as reported by Sarantakos [20]. In cases where the research participant gave a narrative for a particular response, efforts were made to reproduce the actual words, or conversations that were given from the field, based on the popular themes of the study. In some cases, the Chi-square test was used to test for association of attributes.

3. RESULTS

3.1 Accessibility of sanitation facilities

There are different types of sanitation facilities found in Bidibidi refugee camp. The sanitation facilities as reported by the respondents include pit latrines (81.4%), hand washing facilities after toilet use (86.7%) and solid waste disposal pits (51.9%). Focusing on the sanitation facilities found in Bidibidi refugee camp, their accessibility was implored as presented in Table 1.

Table 1. Accessibility of sanitation facilities in Bidibidi refugee camp (Researchers' questionnaire survey)

Sanitation Facility	Accessibility	Frequency	Percent
Pit Latrines	Less than 30 metres	117	68.4
	More than 30 metres	54	31.6
Hand Washing Facility	Near; <5 metres from latrine	159	86.9
	Distant; >5 metres from latrine	23	13.1
Solid Waste Disposal Area	Near; <10 metres from residence	62	57.5
	Distant; 10–15 metres from residence	31	28.7
	Very distant; >15 metres from residence	16	14.8

The sanitation facilities found in Bidibidi refugee camp are accessible to most respondents. About 68% (n=117) of the respondents stated that the latrines are located within a distance of 30 metres from their places of residence, while about 32% (n=54) respondents reported that their latrines are located at a distance of more than 30 metres. This implies that majority (68%) of the latrines in the refugee camp are accessible since they are located within a distance of 50 metres from the places of dwellings as stated in the Sphere Minimum Standards. The latrines which are less accessible do not encourage the residents to use them. This forces the residents to use alternatives like the bush (open defecation), buckets or plastic containers, polythene bags (flying toilets), and sharing of latrines. The inappropriate disposal of the fecal matter by this section of members of the refugees could have accounted for the outbreak of some sanitation related diseases like diarrhea (36.9%), typhoid (22.4%), cholera (7.9) and dysentery (6.1%) in the refugee camp. It was however revealed that, accessibility to sanitation facilities was associated with the educational level of respondents ($\chi^2=130.37$, $df=1$, $P=0.05$) from Bidibidi refugee camp. This implies that the more educated the respondents in the refugee camp, the more access to sanitation facilities and hence the less likely outbreaks of the sanitation related diseases.

In addition, latrine inaccessibility to some respondents was associated with the outbreak of sanitation related diseases ($\chi^2=19.66$, $df=1$, $P=0.05$) in Bidibidi refugee camp. This is in agreement with one of the Sanitation Health Officers' statements that:

"The main sanitation related diseases in the camp include diarrhea, dysentery, malaria and cholera that accounted for the 52 cases recorded in one month".

Another test was conducted to determine whether the respondents' awareness of the existence of sanitation related diseases were associated with the low state of sanitation. The study revealed that the respondents' awareness of the existence of sanitation related diseases was associated with the low state of sanitation ($\chi^2=4.54$, $df=1$, $P=0.05$) in Bidibidi refugee camp. This implies that despite the respondents having knowledge about the existence of diseases brought about by inappropriate sanitation practices, diseases still cropped up because of poor fecal disposal. This was probably because of some individuals' beliefs like not supposed to dispose of their fecal matter in latrines while others had a belief that they are not supposed to share pit latrines. Some elderly individuals were reported to have difficulty with squirting on pit latrines which compelled them to defecate in open grounds.

3.2 Standards of Sanitation Facilities in the Study Area

The standards of sanitation facilities including pit latrines, hand washing and solid waste disposal in Bidibidi refugee camp were explored. The quality of pit latrines that are used in Bidibidi refugee camp was explored (Table 2). The study focused on the building materials used to construct the pit latrines.

**Table 2. Materials used to construct pit latrines in Bidibidi refugee camp
 (Researchers' questionnaire survey)**

Part of pit latrine	Building material	Frequency	Percent
Pit latrine slab	Wattle and mud	85	49.7
	Plastic	44	25.7
	Iron bars, cement and sand	24	14.0
	Wood	18	10.6
Walls of pit latrine	Papyrus (reeds)	64	37.4
	Bricks and cement	58	33.9
	Wattle and mud	36	21.1
	Grass	13	7.6
Roof of pit latrine	Papyrus (reeds)	62	36.2
	Grass	55	32.2
	Iron sheets	42	24.6
	No roof	12	7.0
Door of pit latrine	Papyrus (reeds)	101	59.0
	Iron sheets	48	28.1
	Used sacks	2	1.2
	No door	20	11.7

Pit latrines as one of the sanitation facilities in Bidibidi refugee camp were constructed using different building materials. It was revealed that almost half (49.7%) of the pit latrines had a slab made out of wattle and mud, followed by those pit latrines (25.7%) whose slab is made of plastic. The pit latrines with a slab made of iron bars and cement and are regarded as strongest were represented by a small proportion of 14% only.

The walls or the side screens of most pit latrines (37.4%) were made using papyrus (reeds) and old tarpaulins, and these are temporally materials as observed in Plate 1 and were almost the same in number (33.9%) as those whose walls were built using bricks and cement (Plate 2).

It was observed that some pit latrines lacked covering lids, others' floor were laid using wood and mud, while some others used temporally screens which worked as pit latrine wall. Such types of walls were not able to offer maximum privacy to the users (Plate 3). Lack of privacy during the natures' call does not encourage the pit latrine users to properly dispose of the wastes into the pit. In some instances, the fecal matter is disposed of on the floor of the latrines (as observed in Plate 3), encouraging the breeding of vectors which then spread sanitation related diseases causing ill health to people in the surrounding areas.

Absence of covering lids may have encouraged insect infestation in the pit latrines that may have accounted for the outbreak of some diseases among the refugees as reported earlier. Slightly over a half (53.3%) of the respondents reported that the insects present in the pit latrines include houseflies (*Musca domestica*), while the rest reported cockroaches (*Periplaneta americana*). These might have acted as vectors of the various reported sanitation related diseases,

since the majority (68%) of the pit latrines were in the proximity of the places of residence (Table 1).



Plate 1. A pit latrine with shields made out of papyrus and old tarpaulins that work as a temporary wall



Plate 2. A pit latrine with walls made out of bricks and cement as recommended by Sphere Minimum Standards (C) 2017



Plate 3. A pit latrine with temporally screens which work as walls and does not have a covering lid. (C) 2017

About a third (36.2%) and (32.2%) of the pit latrines in Bidibidi refugee camp were roofed using papyrus (reeds) and grass (Plate 4) respectively. A quarter (24.6%) of the roofs had iron sheets (Plate 2). However, there are those pit latrines that did not have roofs at all (Plates 1 and 3).



Plate 4. Pit latrine roofed using grass and it is lockable (C) 2017



Plate 5. Hand washing facility in Bidibidi refugee camp (C) 2017

Slightly more than a half (59%) of the doors of pit latrines were temporary, made of the papyrus (reeds) while some other pit latrines (11.7%) did not have doors at all. Majority (71.9%) of the pit latrines have either temporary screens made of papyrus and used sacks or have no door and hence could not securely close when someone is using them. Generally, the pit latrines constructed in Bidibidi refugee camp were of poor quality and were below the Humanitarian Sphere Standards which emphasizes that latrine floor should have a slab made of concrete or sand and cement, walls made of bricks and cement with proper doors and locks. Lack of doors and roofs on pit latrines does not offer maximum privacy to the users and could have encouraged the residents use the surrounding bushes to ease themselves, leaving the fecal matter exposed and encouraging vectors like houseflies transfer disease causing organisms to residents' food. Exposed faeces also have a potential of contaminating the surrounding water sources used for domestic use, especially during the rainy season.

A small proportion (13.3%) of the respondents in the study area did not have a hand washing facility after visiting pit latrines. A bigger proportion (86.7%) of the respondents had hand washing facilities. Of this proportion, 86.9% of the respondents reported that the hand washing facilities were located within 5 metres from the pit latrines while 13.1% of the respondents asserted that the hand washing facilities were in distant places, more than 5 metres from the pit latrines (Table 1). The hand washing facilities were either made of metal taps (8.6%), or plastic container (78.1%) as shown in Plate 5, and only 26.9% of the hand washing facilities had washing soap while the majority (73.1%) had only water for washing after using the pit latrines (Table 3).

Table 3. Hand washing facility and disinfection used in Bidibidi refugee camp (Respondents' questionnaire survey)

Presence of hand washing facility	Frequency	Percent	Disinfectant used	Frequency	Percent
None	28	13.3			
Tap	18	8.6	Soap	49	26.9
Plastic	164	78.1	No soap	133	73.1
Total	210	100		182	100



Plate 6. A rubbish pit used as a solid waste disposal facility (C) 2017

Solid waste disposal facilities as part of the sanitation facilities were also present in Bidibidi refugee camp (Table 1). Slightly over a half (57.7%) of the respondents reported that the solid waste disposal facilities were located within a distance of 10 metres from their place of residence, while a very small proportion (14.8%) of residents stated that the solid waste disposal points were very distant (over 15 metres) from their residences. This could have contributed to some members in the refugee camp (49.1%) not utilize the solid waste disposal facilities found in the study area to dispose of their solid wastes.

The solid waste disposal facilities present in the study area were rubbish pits (41.1%, n=88) as seen in Plate 6, garbage skips (5.1%, n=11) and plastic or metallic containers (4.7%, n=10). The respondents (49.1%, n=105) who did not have access to solid waste disposal facilities indiscriminately disposed of their solid wastes in the bush, valleys and roadside which may contribute as habitats for the vectors responsible for the spread of sanitation related diseases.

As it may be observed in Plate 6, the solid wastes in the rubbish pit are openly burnt to keep the amount at bay. This implies that since a sizable number of the households (41.1%) use rubbish pits to dispose of the wastes, burning them may contribute to the spread of respiratory diseases among members in the refugee camps.

Thus, different sanitation facilities including pit latrines, solid waste disposal and hand washing facilities are found in Bidibidi refugee camp and most of them are accessible by the residents. However, most materials used to construct the pit latrines do not conform to the minimum standards as put forward by the Minimum Sphere Standards while some solid waste disposal and hand washing facilities are inadequate to meet the needs of the big number of the refugees in the camp.

4. DISCUSSION

The sanitation facilities found in Bidibidi refugee camp include pit latrines, hand washing facilities and solid waste disposal areas. Pit latrines and hand washing facilities are the most common sanitation facilities found in Bidibidi refugee camp as reported by over 80% of the respondents. All the sanitation facilities found in Bidibidi refugee camp are located within a distance of 50 metres from the area of dwellings and are accessible by majority of the respondents. This conforms to the Humanitarian Sphere Minimum Standards. The accessibility of the sanitation facilities to most refugees accounted to low incidences of sanitation related diseases among the refugees in the camp and low incidences of open defecation that may encourage the spread of sanitation related diseases. The quality of the majority (86%) of the pit latrines constructed in Bidibidi refugee camp are poor and below the Humanitarian Sphere Minimum Standards. This is exhibited where the pit latrines are constructed using temporary slabs, temporary walls and side screens, and others have no roofs and doors which did not offer maximum privacy and thus encouraged the users to improperly dispose of human wastes.

Temporary slabs as noted by Mara et al. [1], WHO/UNICEF/JMP [18] qualifies pit latrines to be regarded as unimproved and may lead to sanitation related diseases like diarrhea among the populations. The Sphere Minimum Standards as stated by the Sphere Project [5] and Mara et al. [1], assert that latrines and toilets should be located at a maximum of 50 metres from places of dwellings if optimum service delivery to residents is to be achieved. The results obtained from the study area show that the distance for the location of latrines from places of residence conform to the Sphere Minimum Standards.

In terms of quality, the sanitation facilities especially the pit latrines and hand washing facilities found in Bidibidi refugee camp do not conform to the Humanitarian Sphere Minimum Standards and are regarded as unimproved. In relation to the results obtained, Mara et al. [1], Cairncross and Valdmanis [3] argue that the unimproved pit latrines encourage the breeding of flies and mosquitoes, which as stated by Wolf et al. [26], Naughton and Mihelcic [2] and Calderon-Villarreal et al. [10] cause the spread of sanitation related diseases

amongst the residents. Pit latrines in Bidibidi refugee camp lack locks and yet the Sphere Project [5], and Naughton and Mihelcic [2] recommend that latrines should have inside locks, since modern and more advanced shelter as pointed out by Fekete et al. [17] is paramount in the camps of displaced populations. Lack of inside locks in pit latrines is believed not to offer the user maximum privacy and may result into causing stress and gender-based violence as stressed by Schmitt et al. [27]. Furthermore, the results are in agreement with Mulogo et al. [11] who assert that a latrine that does not lock does not ensure the user adequate time and privacy to properly dispose of fecal matter.

Temporary screens used as walls of pit latrines in the study area does not provide privacy and at the same time do not allow users to defecate with dignity as pointed out by Cairncross and Valdmanis [3], and WHO [13]. In relation, Fekete et al. [17] argues that sheltering to the displaced populations does not only consider the logistical supply of essential services such as water, food and others but also guaranteeing human dignity. The improper design of the pit latrines without proper fecal sludge management may contribute to the contamination of local environment and hence lowering the water quality [2, 28] that may contribute to the spread of sanitation related diseases. Birkmann et al. [29] also states that when the Critical Infrastructure is compromised, reduced resilience and increased vulnerability manifests among the displaced persons towards extreme conditions which could lead to loss of lives.

Plastic containers were mainly used to store water for hand washing after latrine use in the study area. Very few taps with flowing water were available in the refugee camp. A few members in the refugee camp used soap while washing their hands after latrine use, the practice that may not be good enough to properly cleanse hands free from microbes which may be responsible for spreading germs. In light of these findings, Birkmann et al. [29] points out that the non-functional Critical Infrastructures like water supply in areas occupied by the displaced persons results in increased human sufferings. This is because according to Griekspoor and Collins [15], access to adequate resources is rarely met during large scale humanitarian emergency responses. In the same vein, the WHO [16] states that absence of sufficient water among the displaced populations like the refugees is one of the causes of ill health. The Sphere Project [5] suggests that water points should be within 500 metres from the places of dwellings where water should be drawn for washing their hands after defecation in order to curb the spread of diseases. Some other authors like Mara et al. [1] and Cairncross and Valdmanis [3] posit that enabling easy access to water for hand washing and oral cleansing to members of the community is one of the humanitarian responses that could contribute to the reduction of public health risks.

However, the results are not in agreement with statements written by some scholars like Griekspoor and Collins [15] who stated that the populations living in places where the displaced have been settled must have access to life sustaining requirements, including adequate water and sanitation [14, 30, 31].

5. CONCLUSIONS

A number of the sanitation facilities are found in Bidibidi refugee camp, Uganda. Such facilities mainly include pit latrines, hand washing facilities and solid waste disposal areas. A bigger percentage of the refugees have been reported to access pit latrines where most of them are built within the recommended distance from places of dwellings as spelt out by the Humanitarian Minimum Sphere Standards. Although the observed coverage of the pit latrines in the study area is high, their design remains below the recommended Humanitarian Minimum Sphere Standards. The pit latrines do not provide adequate privacy in line with the norms of the users and they do not have adequate and regular supply of water.

Water for hand washing after use of pit latrines is accessed by most of the refugees in Bidibidi refugee camps and it is within the recommended distance as provided by the Humanitarian Minimum Sphere Standards. However, it was noted that a few taps with running water are available in the refugee camp. Little or no soap is available for the residents to effectively cleanse their hands after latrine use hence putting members of the local community at risk of contracting sanitation related diseases.

Hence, for sanitation facilities in Bidibidi refugee camp to conform to the Humanitarian Minimum Sphere Standards, the design of pit latrines should be improved in order to offer adequate privacy and safety to the users, more taps with running water installed, soaps and disinfectants for handwashing after use of pit latrine availed and more environmentally friendly methods of solid waste disposal encouraged among individuals living in the camp.

DATA AVAILABILITY

All data supporting our findings are contained in the paper. Details of the full data may be accessed through the corresponding author.

FUNDING

There was no financial support or grant obtained for this study.

AUTHORS' CONTRIBUTIONS

This work was carried out in collaboration among all authors. Author AB Formulated the title and objectives of the study, participated in literature review survey, analyzed the collected data and compiled all the information in the manuscript. Author ZB Participated in literature review survey, data collection in the manuscript. Author AN Participated in literature review survey, Edited the manuscript. All authors read and approved the final manuscript.

ACKNOWLEDGEMENTS

The study team acknowledges the support and participation of all the respondents who participated in this study

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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Research and Academic Experience: He completed PhD on Environmental Geography. He Taught environment related courses, environmental health courses at the University level for a period of 16 years now. He Supervised post graduate students; Masters and PhD students for five years. He is A senior researcher for seven years so far.

Research Area: His Research Area includes Environmental Sciences, Climate Change; Public Health; Medicinal Plants and Essential Oils; Environmental Remote Sensing and GIS.

Number of Published papers: He has Eight published papers in various national and international journals.

Special Award: He was Awarded three (03) Scientific Research Grants by the Africa-UniNet, Austria and the on-going researches are in collaboration with researchers from Maseno University, Debre Markos University, IMC KREMS University, BOKU Vienna, Suez University, Danube University-Krems, Johannes Kepler University, Unizambeze, University of Pretoria and University of Lagos.

One (01) other research award is from Kyambogo University Competitive Research Grants Committee for the research that is on-going.

Any other remarkable point(s): He Presented scientific research papers at various international conferences for information dissemination.



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Any other remarkable point(s): She is doing a research on the roles of traditional and religious healers in health care provision in Yumbe district, Uganda.



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This chapter is an extended version of the article published by the same author(s) in the following journal.
Journal of International Humanitarian Action, 6:(17): 01-10, 2021.