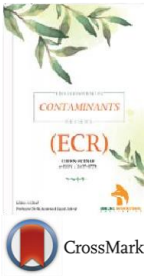
ZIBELINE INTERNATIONAL™ PUBLISHING

ISSN: 2637-0778 (Online)
CODEN: ECRNAE

Environmental Contaminants Reviews (ECR)

DOI: http://doi.org/10.26480/ecr.02.2025.107.115



REVIEW ARTICLE

ASSESSMENT OF WASH SCENARIO AND ASSOCIATED HEALTH RISKS IN ROHINGYA REFUGEES IN BANGLADESH

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ARTICLE DETAILS

Article History:

Received 23 July 2025
Revised 18 August 2025
Accepted 25 September 2025
Available online 08 October2025

ABSTRACT

The Rohingya of Myanmar is one of the most persecuted minorities in the world, and one of the largest groups of stateless people around the world. The purposes of the present study were to explore the present status of water, sanitation, and hygiene, and to find out the risk of health hazards in the study area. A cross-sectional study was conducted between December to June 2023 in the largest Rohingya camp of south-eastern district in Cox's Bazar of Bangladesh. A total of 160 Rohingya people were purposively selected for data collection. A semi-structured questionnaire was applied for the collection of quantitative information and the qualitative data was collected through Focus Group Discussion (FGDs) and Key Informant Interview (KII). The finding of the study revealed that 83.1% of the Rohingya people are illiterate and a few (8.1%) had education up to middle level. On the other hand, 84.4% of them had no income sources and completely depended on the assistance. The study showed that 80.6% of the people depend on tube-well water for drinking and non-drinking purposes. About 83% of the people have faced problem during the water collection period. The Studies revealed that more than half of the refugees whose age at least 5 or over had used communal latrines for defecation, in contrast, 60% of the children age under 5 had used open defecation. The Results also exposed that 56% of the people had used the designated site for household waste disposal. For hygiene practices, more than 46% of the people were facing problem of bathing due to unsafe condition. Besides this, only 44% of the respondents practices hand-washing where only 33% of the child were practiced hand-washing system. Results showed that due to inadequate clean water (91.3%) and latrine facilities (86.9%), lack of health awareness, unsafe environment (68.8%), congested living condition (80.6%), and lack of medical facilities is the major risk of health hazard.

KEYWORDS

Rohingya, Health Risk, Refugee, WASH, Bangladesh.

1. INTRODUCTION

The Rohingya people have long been marginalized group in Myanmar, who mainly reside in Myanmar's Rakhine State, are not recognised as a legitimate, native minority by the government (Rahman, 2015; The Lancet, 2016; Mahmood et al., 2017). This population has been persecuted by the army authority, which involves killings, destruction of their neighbourhoods, imprisonment, torture as well as sexual violence. For this reason, they have fled their homes to bordering country of Bangladesh. Bangladesh has started experiencing Rohingya issue since 1978 when approximately 200,000 refugees came into this country and took shelter (Ahmed, 2009). Again in the year of 1991 and 1992 more than 250,000 Rohingya people fled from Myanmar's western Rakhine state and stated living in the south east district of Cox's bazar (Ahmed, 2009; Pamini et al., 2013). That was just the beginning of the journey of the refugees and it is still proceeding unabated. The total Rohingya population living in the Myanmar bordered Cox's Bazar peninsula has been estimated to be about 950,000 (International Organization for Migration, 2018). This Rohingya issue has now assumed an alarming proportion in Bangladesh because it's an overpopulated state of the world whereas the people face various social and economic difficulties. Nevertheless, the people of Bangladesh has exhibited unprecedented sensibility and warmth in accommodating further refugees (Pocock et al., 2017). Most of these refugees were relocated to Cox's Bazar in south-eastern Bangladesh where registered refugees camps has been established (International Organization for Migration, 2017). The health and hygienic situation in the Rohingya camp is very imperious and this situation is worsening day by day because of the socio-economic condition and psychological behaviour (Sultana, 2011). The groundwater is the main source of drinking water for Rohingya camp. Besides this, they use it for domestic, bathing, and sanitation purposes. They extracted the groundwater by using manually operated shallow tube wells which average boring depth of 25 meter (Chan et al., 2018a; White, 2017). For every 107 refugees has one functioning tube well. But most of the tube wells are not working well. As a result, they depend on river water which is the questionable quality for basic hygiene (White, 2017). Nearly 50% of the refugees don't have easy access to safe drinking water. Some have to walk on average 0.5 kilometres to collect safe drinking water. On the other hand, recent water testing in the settlements showed that 92% of the water was contaminated with Escherichia coli and that 48% was highly contaminated (World Health Organization, 2017a). The outbreaks of waterborne diseases bloody diarrhea, typhoid, and hepatitis E have

Quick Response Code	Access this article online	
	Website: www.contaminantsreviews.com	DOI: 10.26480/ecr.02.2025.107.115

Cite The Article: Miraz Hossen, Md. Touhiduzzaman, Irteja Hasan, Md. Nazrul Islam (2025). Assessment Of Wash Scenario And Associated Health Risks In Rohingya Refugees In Bangladesh. *Environmental Contaminants Reviews, 8(2):* 107-115

been a major concern in the camps (World Health Organization, 2017a). Besides this, highly contagious fecal oral diseases such as hepatitis A and E infections are also common (Chan et al., 2018a). In refugee camps where settlers are predominantly young and there are pregnant women, hepatitis E infection is a significant concern. Although the case fatality rate for hepatitis E in the general population is about 1%, the death rate from hepatitis E infection in pregnant women can increase to 20–25% if the infection occurs in the third trimester (World Health Organization, 2017b). Recent field reports have indicated measles and suspected diphtheria cases in the camp area. In particular, one death from measles and 412 suspected measles cases were reported in November 2017, with 82% of cases occurring in children under 5 years of age. With the support of UNICEF and the WHO, the Ministry of Health and Family Welfare of Bangladesh launched a measles and rubella vaccination campaign in September/October 2017. Nearly 55% of children under 15 years of age (n = 186 929) have been vaccinated, but to achieve the >95% coverage required for herd immunity, the vaccination campaign must be continued and expanded. The purpose of this study was to explore the present status of water, sanitation, and hygiene in the Rohingya Refugees camp and to determine the risk of health hazard.

2. Methodology

This study has been conducted Kutupalong Refugee camp-7 of Ukhia Upazila which is under the Southeast coastal district of Cox's Bazar. It's located between 21º12'45'' and 21º21'26'' north latitudes and between 92º09'48'' and 92º16'34'' east longitudes (Figure 1). This camp is inhabited mostly by Rohingya Muslims that had fled from persecution in neighbouring Myanmar. Kutupalong is the largest official refugee camp in Cox's Bazar area. The total refugees of this camp are 39784, total households are 9,377 and average household size is about 4.3 persons. This was a cross-sectional study carried out among Rohingya refugees camp during the 1st January-30th April 2023. A total of 160 refugees were purposively selected in order to collect data. Both quantitative and qualitative method has been used for collecting the data. A semi-structured questionnaire form was used to collect the data from the sample. The semi-structured interviews consist of several key questions that help to define the areas to be explored, but also allows the interviewer or interviewee to diverge in order to pursue an idea or response in more detail. The author conducted 100 questionnaire surveys to get an idea about the opinion of the local people about the WASH and health diseases. The qualitative data has been collected through Focus Group Discussion (FGD) and Key Informants Interview (KII) methods. The Focus Group Discussion was conducted on both male and female. It was helped to gather a wide range of information in a short time. The participants of the FGD have 10 to 12 people in the camp. A total of 5 FGDs was conducted. Besides this, 10 KII was conducted among the key knowledgeable person in the camp area. The key informants have included the community leaders, media specialist, govt. or non govt. workers, or residents who have first-hand knowledge about the community. A total 10 KII has been performed. After the completion of data collection, tabulation work including editing, coding and tabulation was done manually. Data computation and analysis has been done by using SPSS version 22 and Microsoft office excel 2010 program. Both inferential and descriptive analysis was performed to describe the findings.

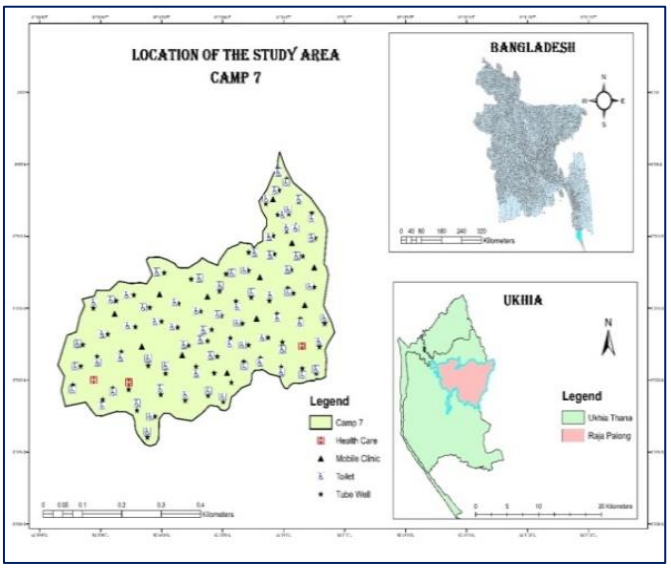

Figure 1: Location of the Study

3. Results And Discussion

3.1 Status of Socio-Demographic

Among the 160 respondents', maximum (38.8%) were in the age group 41-50 years followed by 23.1% in the age group 51-60 years. The mean age was 44.45±12.12 years and the age varied from 22 to 82 years. Majority (66.9%) of the respondents were male and 33.1% was female. Most of the respondents (83.1%) are illiterate and a few (8.1%) had education up to middle level. Most of the respondents (68.1%) were married followed by 20.6% was widow. More than two third of them had a family members 5-7 members. Among the respondents 84.4% have no income sources (Table 1).

Table 1: Socio-demographic Status

Categories	f	%
Gender		
Male	107	66.9
Female	53	33.1
Total	160	100.0
Respondents Age Groups		
20-30 years	19	11.9
31-40 years	30	18.8
41-50 years	62	38.8
51-60 years	37	23.1
61-70 years	7	4.4
71-80 years	4	2.5
Above 80 years	1	.6
Total	160	100.0

Table 1(cont): Socio-demographic Status		
Mean-44.45, Standard Deviation-12.12, Minimum- 22, Maximum-82		
Educational Status of the Respondents		
Illiterate	133	83.1
Preschool	4	2.5
Elementary School	4	2.5
Middle School	13	8.1
High School	5	3.1
Post-Secondary	1	.6
Total	160	100.0
Marital Status		
Married	109	68.1
Unmarried	18	11.3
Widow	33	20.6
Total	160	100.0
Occupational Status of the respondents		
Irregular daily labour/ casual worker	8	5.0
Small business/ petty trade	8	5.0
Firewood collection		
Begging	8	5.0
No income	1	.6
Total	135	84.4
	160	100.0

3.2 Present Status Rohingya

According to the opinion of the respondents the management system in the camp wasn't good enough. More than 78% of the respondents dissatisfied or strongly dissatisfied about the management in the camp followed by 12.5% respondents were satisfied about the management. On the other hand, 98.8% of the respondents reported that the communication system wasn't good. Additionally, about 76.9% of the respondents mentioned that all the camp area is dirty and the camp has no sufficient drainage facility which reported by more than 98% of the respondents (Table 2).

Table 2: People's Opinion about the Present Condition of Rohingya		
	f	**%**
Present Management System of the camp is good enough		
Strongly Dissatisfied	53	33.1
Dissatisfied	72	45.0
Neutral/No Comments	15	9.4
Satisfied	20	12.5
Strongly satisfied	0	0.0
Total	160	100.0

Table 2(cont): People's Opinion about the Present Condition of Rohingya		
Present communication system is good enough		
Strongly Dissatisfied	75	46.9
Dissatisfied	83	51.9
Neutral/No Comments	0	0.0
Satisfied	2	1.3
Strongly satisfied	0	0.0
Total	160	100.0
The statement would best describe your community with regards to garbage management		
Most of the community is dirty	37	23.1
All of the community is dirty	123	76.9
Total	160	100.0
This camp has covered by sufficient drainage system		
Yes	2	1.3
No	158	98.8
Total	160	100.0

3.3 Status of Water facilities

For primary and secondary sources water for drinking purpose over 99% of the household rely on improved water sources (Figure 2). Regarding the primary sources of drinking water, the most commonly reported improved water sources were tubewells (80.6%) and piped water (12.5%) followed by protected dug well 6.9%. For non-drinking water, a similar 91.9% of the household reported reliance on protected sources. Only 8.2% of the respondents reported using unprotected sources, namely surface water (6.9%) and unprotected dug wells (1.3%).

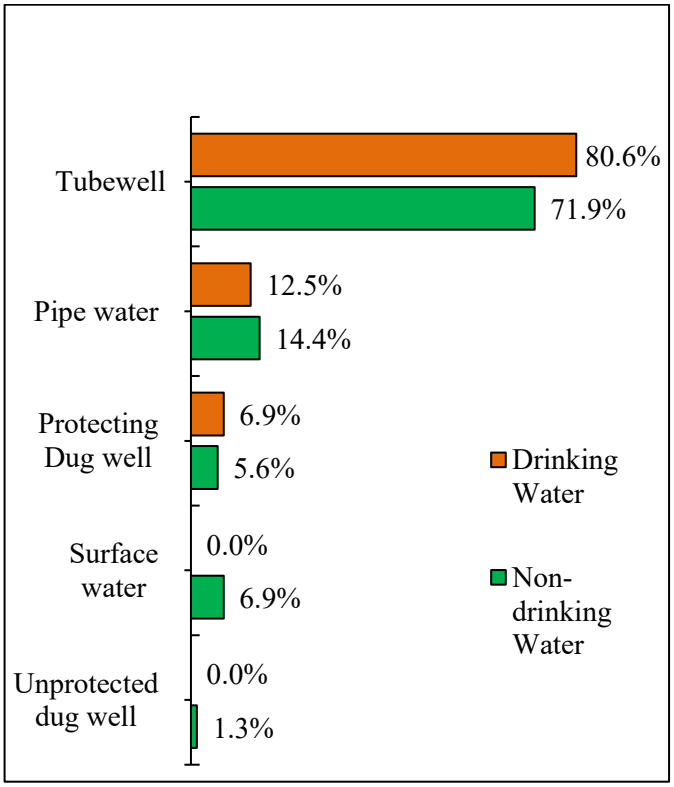

Figure 2: Drinking and non-drinking water source

Regarding on the issues related to the water collection, about 21% of the respondents reported a return trip of over 15 minutes, 17% reported this took more than 30 minutes, and only 9% reported longer than 60 minutes. The waiting time longer than 15 minutes reported 34% of the respondents, more than 30 minutes reported 23% of the respondents, and over 60 minutes reported 12% of the respondents which shown in the figure 3.

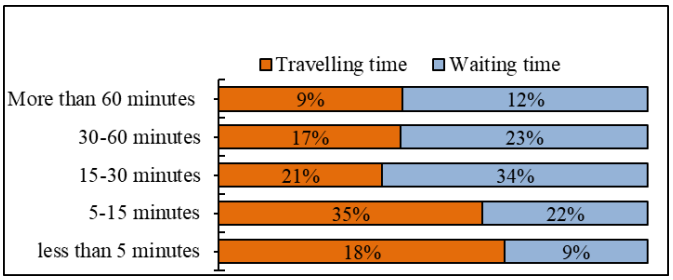

Figure 3: Water collection

In order to collect drinking and non-drinking water from the point sources, 45% of the respondents reported that they facing problem due to the long distance followed by 38% of the respondents reported long wait times and 8% of them reported bad smell, displayed in figure 4.

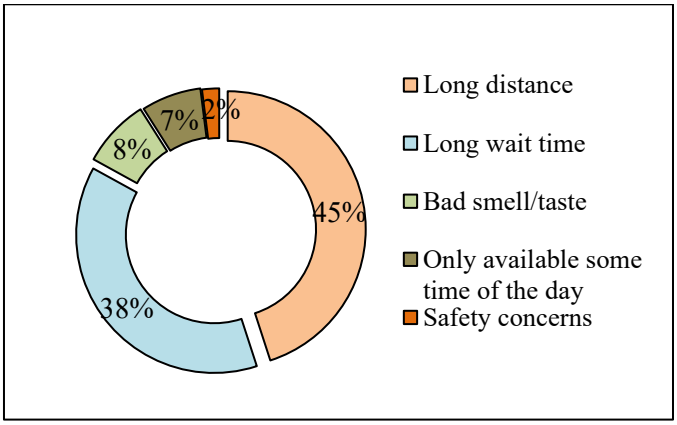

Figure 4: Problem with water accessibility

Overall, 48.8% of the respondents reported that they have used water treatment process. This includes 42.5% of the respondents using disinfection like aquatabs, less than 2% of them boiling the water, and more than 4% of them filtering water by using cloth. On the other hand, more than half of the respondents mention that they haven't used any water treatment process which presented in table 3. For storing drinking water, about 80% of the respondents using alluminium pitcher followed by 12.5% of them using bottle and only 7.5% of them use bucket.

Table 3: Present Water Condition of Rohingya

	f	%
Common Method of Water Treatment		
Boiling	3	1.9
Disinfection (Aqua tabs / PUR / Tab10s / etc.)	68	42.5
Use cloths filters	7	4.4
Nothing/no method	82	51.2
Total	160	100.0
Way of Storage Water		
Alluminium pitcher	128	80.0
Bucket	12	7.5
Bottle	20	12.5
Jerry can	0	0.0
Total	160	100.0

3.4 Status of Sanitation Facilities

The respondents' were asked where adults and children aged 5 and over usually went to defecate, and then asked where children under 5 usually went to defecate, with multiple answer possible in both cases which displayed in figure 5. According to the figure, more than half of the respondents reported that they have used communal latrines for defecation followed by shared household latrine which reported by 38% of the respondents. On the contrary, single household latrines and open defecation were infrequently reported (5%). For children under age 5, latrine use was reported by only 40% of the respondents. With 60% of the children under age 5 usually defecated in open places.

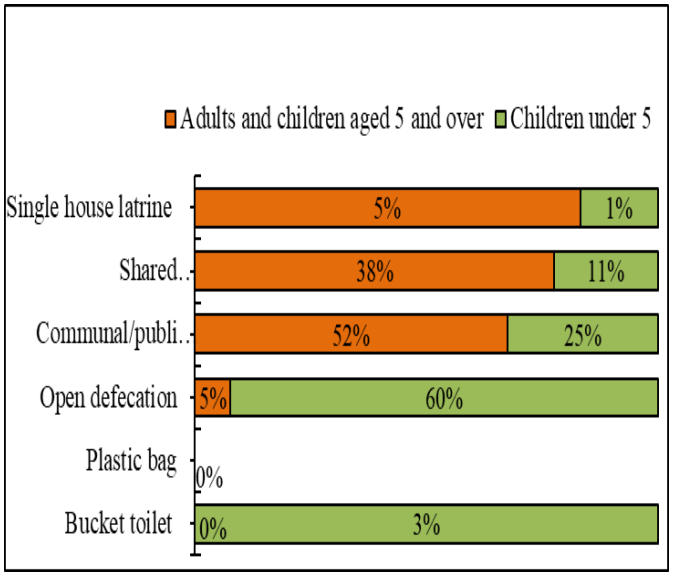

Figure 5: Latrine Facilities

Regarding the latrine accessibility, 29% of the respondents reported overcrowding, followed by far distance reported 17% of the respondents (Figure 6). In terms of cleanliness, 13% reported that the latrines were full, 12% reported latrines were mot clean and bad smell and presence of flies. In terms of safety and dignity, 9% of the respondents reported lace of separation between men and women, followed by only 2% reported latrines were not safe, and 3% reported route to the latrine is not safe.

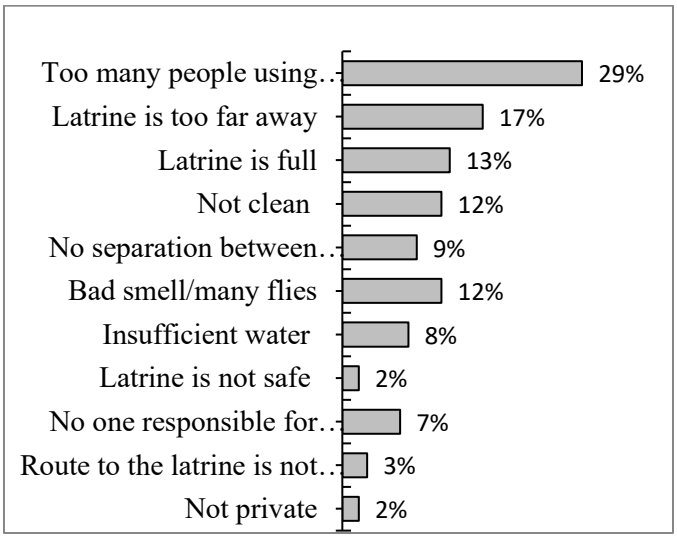

Figure 6: Problem with latrine Accessibility

Inadequate solid waste management presents risks to public health in the camp setting and is further compounded by the densely populated nature of the camps. Presently, more than half of the refuges in the camp reported that they leaving waste in undesignated open areas. In contrast, 27% of the households used communal pit, followed by 24% reported used designated open area to dispose of solid waste. Only 11% of the respondents reported they used household or streets bin in order to dispose of waste (Figure 7).

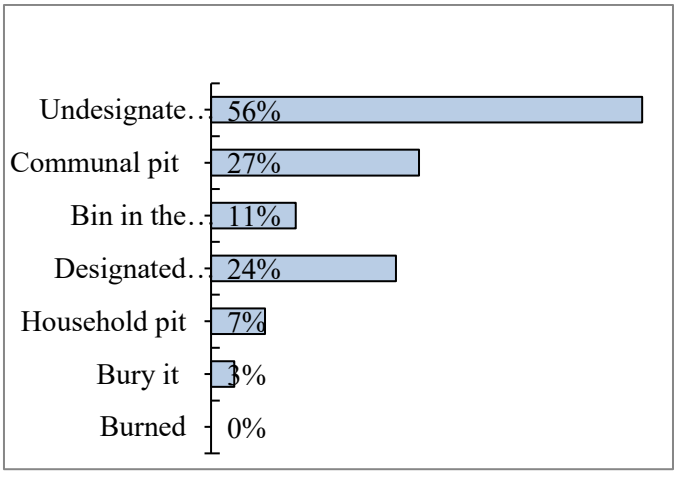

Figure 7: Status of Solid waste manaement

3.5 Status of Hygiene Facilities

Hygiene is an important and effective barrier to the spreading of diseases. It covers household use of bathing facilities (including type of facilities used, problems with bathing, and satisfaction), before examining issues around access to soap (Table 4). Regarding the bathing facilities used 47.5% of the respondents reported they have used designated household area for bathing where 38.1% of them used communal facilities, and only 14.5% reported tubewell platform. On the other hand, 36.3% of the respondents reported that they have faced problem of bathing due to unsafe condition followed by 24.4% reported not enough water for bathing, and no separated way of men and women reported by 20% of the respondents. As a whole, more than 40% of the respondents were satisfied with bathing facilities where more than 30% reported they were unsatisfied with bathing facilities. For hand-washing practices, more than half of the respondents reported they haven't owning soap for hand-washing. About 39.4% reported that soap is unavailable where 33.1% reported it is too expensive. Using soap at latrine, about 41.3% used soap at latrines followed by 29.1% doesn't use soap, and 13.1% used it sometimes.

Table 4: Status of used Hygiene facilities		
Hygiene Facilities	**f**	**%**
Types of Bathing Facilities		
Designated household area	76	47.5
Communal facility/chamber (WASH room)	61	38.1
Tubewell platform	23	14.4
Total	160	100.0
Problems with bathing facilities		
Not enough/too crowded	26	16.3
No/not enough water	39	24.4
Unsafe (i.e. no door or lock)	58	36.3
No privacy/gender separation	32	20.0
Too far away	5	3.1
Total	160	100.0
Levels of satisfaction with bathing facilities		
Very satisfied	16	10.0
Satisfied	76	47.5
Unsatisfied	52	32.5
Very unsatisfied	16	10.0
Total	160	100.0
Owning soap for hand-washing		
Yes	78	48.8
No	82	51.3
Total	160	100.0
Problems with accessing soap		
Soap is too expensive	53	33.1
Unavailable	63	39.4

Table 4(cont): Status of used Hygiene facilities		
Not interested to Use	44	27.5
Total	160	100.0
Access to soap at latrines		
Yes	66	41.3
Sometimes	21	13.1
No	47	29.4
Take own soap and water	26	16.3
Total	160	100.0

This study examined the types of hygiene promotion activities people had practiced in their household and community level (Figure 8). Overall, 44% of the respondents reported they have practiced hand-washing with soap and child hand-washing (33%). Additionally, 42% of the respondents reported they have used aqua-tabs for cleaning the water and 27% reported safe storage of household water. In terms of waste management, 19% reported disposal of household waste and 24% reported they disposal of child faeces, and 29% reported they cleaning the latrines.

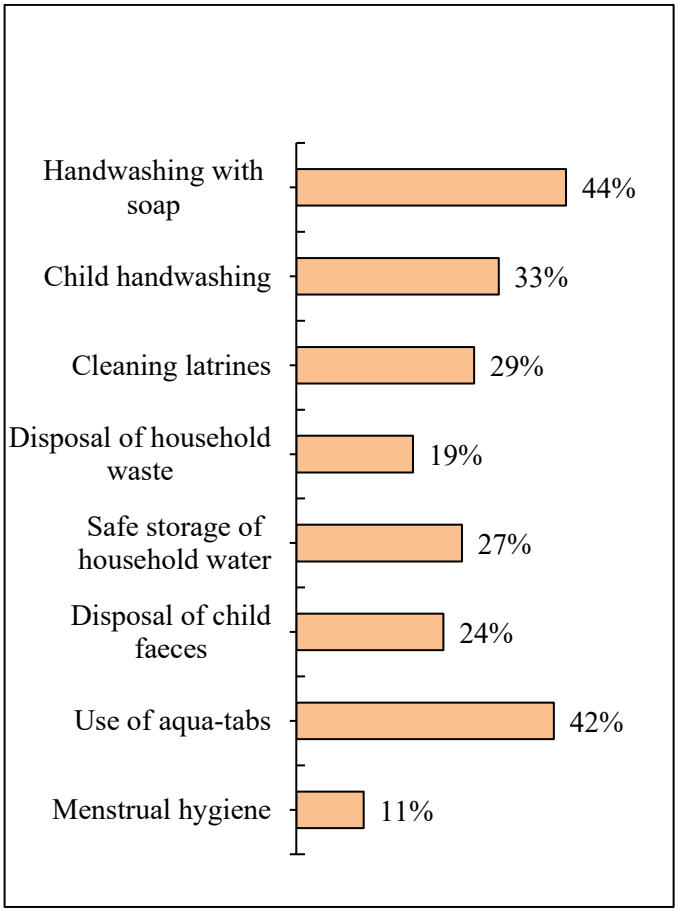

Figure 8: Practices different types of hygiene promotion

3.6 Risk on the Health sector

The main medical camp is located around a kilometre away, making it difficult for this Kutupalong camp-7 people to walk the whole way. It was found from the study that the majority (70%) of the respondents have got medical facilities from nearby community clinic/hospital followed by 30% of them got it from mobile clinic. The distance between nearby health facilities is over 30 minutes away. The results shows that people

Table 5: Status of medical Facilities		
	f	**%**
Way of getting medical facilities when emergency		
Nearby community clinic/hospital	112	70.0
Mobile clinic	48	30.0
Total	160	100.0
Distance of Community clinic/hospital		
Far away	21	13.1
Over 30 minute away	89	55.6
Under 30 minute away	50	31.3
Total	160	100.0

3.7 Accessible Disease in Study area

According to the respondents the major diseases of this area are Fever, Skin infection, Watery Diarrhea, Malaria, Bloody Diarrhea, Respiratory problem, Measles, Lice, etc. which is shown in the figure 4. About 35% of the respondents reported that fever main health problem in the camp followed by 30% of them has suffered from waterway diarrhea. Besides this, more than 18% of the respondents mentioned that skin infection and 6.9% indicate the malaria problem (Figure 9).

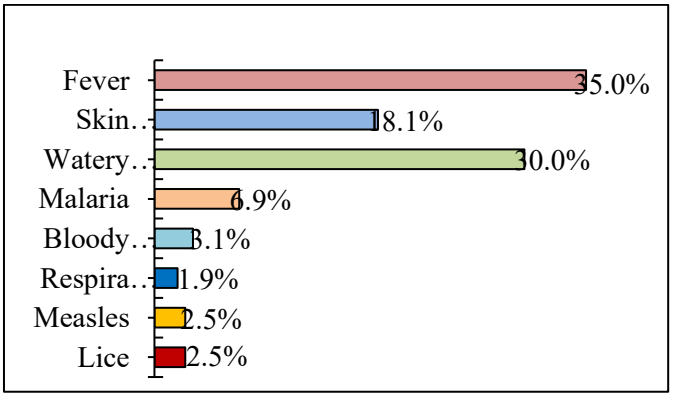

Figure 9: Available health disease in the camp

3.8 Risk of the Health Hazard

Based on the respondents' opinion it was found that lack of safe water facilities is one of the major cause of disease outbreak which was reported by more than 93% of the respondents. Besides this, 89.9% of them stated that inadequate latrine facilities have spread various diseases. On the other hand, congested living condition and unsafe environment in the camp also increased the risk of disease which was reported by 80.6% and 68.8% of the respondents respectively. More than 90% of the respondents mentioned that lack of doctor availability increased the health risk. In addition to, inadequate functioning hand washing system (54.4%) and lack of health awareness (49.4%) have increased the health hazard risk of the Rohingya which showed in the figure 10

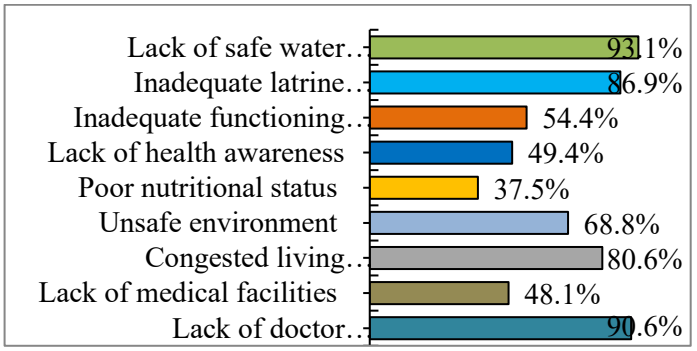

Figure 10: Risk of Health Hazard

4. Discussion

This study was involved 160 participants where 66.9% of male and 33.1% of female. Socio-demographic results of this study revealed the majority of the Rohingya people in the Kutupalong camp-7 had no formal education which also showed in previous studies (Prodip, 2017). On the other hand, most of the people were married and their family very big which a great burden for every Rohingya family because in the camp have had limited livelihood opportunities due to no formal right to work and restriction of movement which limits them from seeking work outside the camps. All of them are relying on life-saving assistance. These results corroborates by previous studies (ACAPS, 2017; WFP, 2017). According to the report of World Food Programme (WFP), the Rohingya family was the sale of food assistance in order to meet other basic needs; mainly to buy other food items not covered in the basket (mostly condiments), firewood, and to cover health-related costs. It was found from the study that condition of the Kutupalong Rohingya camp is very much vulnerable because the congested household, lack of drainage facilities, lack of management of garbage, and the poor communication system.

The findings of the study showed that fresh water is the urgent need for the people of the camp. It was found from the study that 80.6 % of the refugees are reliant on tubewells for drinking and non-drinking purposes. It was also found that most of the shallow tube well hasn't worked well. The tube-wells were set up in the camp in an unplanned manner, which was reported by the local people. Besides this, they also stated that the camp is more than one tube well in some places while many other parts have none. This is causing huge suffering for the refugees. Similarly, a report of indicates that the tube well is the most commonly accessed water sources in 87% of the refugees in the camp (UNICEF, 2018). In addition to these findings also match closely with the results of REACH infrastructure assessments, which indicate that the majority of water sources in the camps are tubewells (79%), followed by water tanks (13%). Taken together, these findings strongly suggest that a large majority of households are using the same water sources for drinking and non-drinking purposes. Studies revealed that in order to collect water for drinking and non-drinking purpose about 47% of the people reported need more than 15 minutes where 69% of the people reported, in the journey waiting for collection of water need more than 15 minutes. These findings align much more closely with Infrastructure Mapping data (REACH, 2018b). According to the data, 51% of the people reported 15 minutes for travelling in the sources of water and 65% of the people reported waiting in the water sources more than 15 minutes. Regarding the long distance and wait times, it was found from the study that approximately 83% of the people have faced it. Previous studies in similar case also showed it (UNICEF, 2018). This study revealed that 84% of the people have faced the long distance and wait time related problem. On the other hand, it was found that 48.8% of the people have used the water treatment process in order to clean the water. This result is similar to the findings where 41% of the respondents were used water treatment process of (REACH, 2018b). For storing drinking water, it was found that 80% of the people have used aluminium pitcher. This results contradicts the findings of (REACH, 2018b).

Studies revealed that more than half of the refugees whose age at least 5 or over have used communal latrines for defecation, in contrast, 60% of the reported that children age under 5 has used open defecation. These findings slightly contrast with the results report where 58% and 55% of the people age 5 or over used communal latrines and 68% and 65% of age under 5 used open defecation, respectively (REACH, 2018b; UNICEF, 2018). Results also displayed that the majority of the refugees face problem in terms of latrine using because of overcrowding and unhygienic condition. Regarding the solid waste management practices of refugees it was found from the study that more than half of the people haven't used designated open area for solid waste disposal which increases the health risk. This result contradicts with the findings of (REACH, 2018; UNICEF, 2018). According to those report people dispose solid waste in open place 45% and 31% respectively. This results indicates that the environmental condition in the Kutupalong Rohingya camp is vulnerable.

Most of the disease spreads due to unhygienic condition. This study demonstrated less than half of the people in the camp area have used designated place for bathing. More than 46% of the people were faced problem of bathing due to unsafe condition. It also found that more than half of the people haven't own soap for hand-washing and less than half of them used soap at the latrines. These results are related to earlier findings (REACH, 2018b, 2018a, 2018c). On the other hand, the close investigation from this study revealed that only 44% of the respondents practices hand-washing where only 33% of the child hand-washing system practised. Result shows that only 42% people have used aqua-tabs in order to clean the water and the waste disposal system was not satisfied level.

It was found that fever and waterway diarrhea is the common disease faced by majority of the people. Several studies also find the same results. Due to low vaccination coverage, living in conditions that could be a breeding ground for infectious diseases like cholera, measles, rubella and diphtheria. Recent field reports have indicated measles and suspected diphtheria cases in the camp area (World Health Organization, 2017a). Study revealed that due to inadequate clean water and latrine facilities, lack of health awareness, unsafe environment, congested living condition, lace of medical facilities is the major cause of health hazard risk in the Kutupalong camp. Similar results also revealed in earlier studies (Chan et al., 2018b; Palma and Jinnat Mohammad Ali, 2017; World Health Organization, 2018)

5. Conclusion

The Rohingya people are the world's largest stateless population. They rarely draw any attention of the local and global policy makers as the most neglected Muslim minority in Myanmar, who subsequently were forced by the Burmese junta to become illegal migrants to neighbouring countries taking refuge mainly in Bangladesh since 1978. In the recent increase in violence in Rakhine state, pre-existing settlements have effectively merged into one densely populated mega settlement of more than half a million people. The present condition in their settlement is much more vulnerable. In this study, investigate the present status of water, sanitation, and hygiene of the Rohingya people and determined the health hazard risk. For both water and sanitation, it was found that the basic coverage of WASH infrastructure is high, with over 99% of the refugees reporting the use of improved water sources and latrines. However, almost half of all households also report problems with the accessibility and quality of this infrastructure. Regarding water collection, distance and long wait times remain a significant problem for many refugees. Additionally, the number of the refugees' families treating their water is extremely low, because the shallow water table was contaminated with wastewater as well as the number of tubewells are less for their need. For sanitation, widespread reported latrine use among the adults is qualified but open defecation among children under age 5 is almost universal. The solid waste management system in the camp is not well as a result of unwanted health risk increases. In terms of hygiene, safety problems are felt by the refugees' families, as a result, many families relying instead on self-built bathing infrastructure at home rather than public facilities. And while soap is present in the majority of households, many still report problems accessing soap and the lack of adequate hand-washing facilities at latrines. The findings from this study will helpful to the policy maker in further action.

Irteja Hasan and Md Shafiqul Islam: Conceived and designed the experiments; Performed the experiments; Analyzed and interpreted the data; Contributed materials, analysis tools or data; Wrote the paper.

Mehedi Hasan Ovi, Dhiman Kumar Roy, Md. Touhiduzzaman, Md Mahmudul Hasan Rakib, Tania Yeasmin and Md. Nazrul Islam: Contributed materials, Analyzed and interpreted the data; Wrote the paper.

Data Availability Statement

Data will be made available on request.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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