



ISSN: 0975-833X

Available online at <http://www.journalcra.com>

International Journal of Current Research
Vol. 12, Issue, 08, pp.13269-13275, August, 2020

DOI: <https://doi.org/10.24941/ijcr.38401.08.2020>

INTERNATIONAL JOURNAL
OF CURRENT RESEARCH

RESEARCH ARTICLE

WATER, SANITATION AND HYGIENE PRACTICES AMONG ETHNIC COMMUNITIES IN CHITTAGONG HILL TRACTS, BANGLADESH

Md. Shohel Mahmud^{1,2*}, Shah Mohammad Ashraf ul Amin¹, Md. Abdul Wahab Rashed³ and
Rayhan Mahmud⁴

¹Vulnerability Analysis and Mapping (VAM) Unit, United Nations World Food Programme,
Dhaka-1207, Bangladesh

²Department of Sociology, Mangalore University, Mangalagangothri - 574199, Karnataka, India

³Department of Local Government, Government of the People's Republic of Bangladesh

⁴Department of Business Administration, Noakhali Science and Technology University, Noakhali-
3814, Bangladesh

ARTICLE INFO

Article History:

Received 05th May, 2020
Received in revised form
27th June, 2020 Accepted
14th July, 2020
Published online 30th August, 2020

Key Words:

Ethnic Communities,
WASH, Chittagong Hill Tracts,
Bangladesh.

ABSTRACT

The present study aims to explore the water, sanitation and hygiene practices among ethnic communities in Chittagong Hill Tracts, Bangladesh. This study included all three districts, Rangamati, Khagrachhari and Bandarban of the area. From ten selected villages across all three districts 250 participants, 156 male and 94 female, were selected based on three criteria's, (i) their belonging to ethnic groups in hill tracts, (ii) permanent inhabitation in the hill tracts and (iii) their association with the 'Jhum' agriculture practice. Data were collected from the participants deploying both qualitative (key informant interview and transect walks) and quantitative (questionnaire survey) methods. The result illustrates that the ethnic people in the Chittagong Hill Tracts have limited access to safe drinking water, while their sanitation and hygiene practices were also deplorable. The data reveal that poor water, sanitation and hygiene practices have negative impacts not only on the ethnic people's health as they often suffered from diverse health issues such as diarrhoea, scabies and dysentery but also on their socio-economic lives as they reported often losing income and forced to more expenditure for treatment. The data also show that the mean prevalences' of unhygienic practices among the ethnic people across all the districts were 54.30 per cent (Khagrachhari), 52.20 per cent (Bandarban) and 52.10 per cent (Rangamati), while the mean impacts of unhygienic practices on their health were respectively 44 per cent (Khagrachhari), 42.30 per cent (Rangamati) and 41.30 per cent (Bandarban).

Copyright © 2020, Shohel Mahmud et al. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Citation: Md. Shohel Mahmud, Shah Mohammad Ashraf ul Amin, Md. Abdul Wahab Rashed and Rayhan Mahmud. 2020. "Water, Sanitation and Hygiene Practices among Ethnic Communities in Chittagong Hill Tracts, Bangladesh", *International Journal of Current Research*, 12, (08), 13269-13275.

INTRODUCTION

Access to safe drinking water, proper sanitation and adequate hygienic practices are not only decisive for people's well-being, but these are also fundamental to social and economic development (Mara, Lane, Scott & Trouba, 2010). Approximately a billion people worldwide still lack access to safe drinking water (Centers for Disease Control and Prevention (CDC), 2017; Garn et al., 2017; The World Bank, 2013; Unicef, 2017; Water.org, 2017), while some 3 in 10 people still lack access to safe and readily available water at home (World Health Organization (WHO), 2017d).

*Corresponding author: Md. Shohel Mahmud,
Vulnerability Analysis and Mapping (VAM) Unit, United Nations
World Food Programme, Dhaka-1207, Bangladesh.

When it comes to the improved sanitation, more than 35 per cent of global population, around 2.5 billion people lacks the access (CDC, 2017; Clasen et al., 2014; Garn, et al., 2017; Mara et al., 2010; Montgomery & Elimelech, 2007; Schmidt, 2014; WHO, 2017b). However, this number increases to 4.5 billion (6 in 10) when it comes to safely managed sanitation (WHO, 2017d). Although over the last couple of decades, billions of people gained access to safe drinking water and sanitation, the constant growth of the global population has eclipsed the accomplishments (The World Bank, 2013; WHO, 2017a). A recent U.N. study disclosed that globally, more people have access to cell phones than toilets, as compared to 6 billion people with access to cell phones, only 4.5 billion people have access to working toilets (Wang, 2013). Moreover, around one billion, of the total population who

lacked access to proper sanitation are habituated with open defecation (Wang, 2013; WHO, 2017b).

These numbers come to an alarming stage when referring to the rural areas, as 7 out of 10 people have no access to basic sanitation (WHO, 2017b). According to The World Bank (2017), in 2015, compared to 95.2 per cent of urban people, 80.137 per cent rural people had access to at least basic drinking water services, and compared to 85.12 per cent urban people, only 54.81 per cent rural people had access to safely managed drinking water services. This meagre condition regarding access to safe drinking water and sanitation ultimately leads this massive portion of the world's population to use unsafe water and unhygienic practices and posed severe threats to people's well-being. Consequently, millions of people around the world suffer from a wide range of water and hygiene-related diseases (WHO, 2017c). The intensity of this vulnerable state is significantly higher in developing countries than the developed countries (Bartram & Cairncross, 2010). Due to the poor hygiene and sanitation practices, and lacked access to reliable drinking water, 2.4 million people die globally per year, representing 4.3 per cent of all deaths, most of whom are children from developing countries (Bartram & Cairncross, 2010). The broad impact of unsafe drinking water also reflects in its causing one child death in every 90 seconds (Water.org, 2017).

Over the last couple of decades, in parallel to global development, Bangladesh also achieved significant milestones on improving access to safe drinking water and hygienic sanitation. According to the WHO/UNICEF Joint Monitoring Programme for Water Supply, Sanitation and Hygiene (JMP), in 2015, respectively 98.5 per cent and 69.1 per cent of the country's population had access to improved drinking and sanitation, while 40.3 per cent population found to practice hand-washing with water and soap (WHO/UNICEF JMP, 2017). However, also in Bangladesh, access to safe drinking water and hygienic sanitation were higher in the urban areas than the rural (WHO/UNICEF JMP, 2017). Keeping this in mind, the present study focuses on exploring the water, sanitation and hygiene (WASH) practices and their impacts on the ethnic communities in Chittagong Hill Tracts (CHT), one of the most lag-behind segments of the country's population.

OBJECTIVES

The specific objectives of the study were set to (i) explore water, sanitation and hygiene practices (ii) investigate the reasons of existing water, sanitation and hygiene (WASH) practices and (iii) study impacts of current water sanitation and hygiene practices on health and socio-economic life of the ethnic communities in CHT.

METHODS

Study settings: The present study was undertaken in CHT, located Southeast of Bangladesh, and is remarkably distinctive from the rest of the country, both in terms of geography and topography. The entire CHT is characterised by an extensive range of hills and valleys and comprises three districts, Rangamati (Rang), Khagrachhari (Khag) and Bandarban (Ban). The present study includes all three districts of CHT. Although the CHT is unique than the rest of the country, all three districts in the CHT are remarkably identical to each other, both in terms of geography and topography. From all

three districts, ten villages were selected for the study (Rang-2, Khag-1 and Ban-7), based on the notion that they represent typical villages in the CHT.

Therefore, villages those were too near to the town, and too deep in the hills and valleys were excluded from the study. This measure was taken, taking into account two facts. First, it has been observed that the villages near to the town were influenced by the mainstream culture and had access to better facilities, including WASH than other villages. Hence, these villages do not echo the real WASH state of the ethnic communities inhabiting in the CHT. Second, reaching the villages those were deep in the hills and valleys was not logistically viable, hence were not included in the study. However, the factor played the most crucial role in village selection was the 'Jhum' agriculture practice (Jhum is a shifting cultivation system exclusively practised by the ethnic communities in CHT, Bangladesh). All ten villages selected in the study were predominantly reliant on the 'Jhum' agricultural practice for their vegetation.

Study participants: Our sample comprised 250 participants (156 male, 94 female) from three districts of CHT (Rang-50, 32 men & 18 women; Khag-25, 16 men & 9 women; Ban-175, 108 men & 67 women). From each village included in the study, adopting the proportionate stratified sampling method, 25 participants were selected. There were three fundamental criteria of participant selection: (i) participants must belong to any ethnic group in CHT (ii) participants must be permanent inhabitants of CHT and (iii) participants must be engaged with 'Jhum' agriculture.

Data collection: This study employed both quantitative and qualitative methods to explore the WASH practices of the ethnic people dwelling in Chittagong Hill Tracts, Bangladesh. These methods comprised a semi-structured questionnaire survey, transect walks, and key informant interviews. The questionnaire developed for the study was divided into three sections consisting of 10 questions with multiple choice and open-ended options. The initial section of the questionnaire concentrated on exploring WASH practices among the ethnic people in CHT, while the second and third sections were focused on the causes of existing WASH practices and their influences on health and socioeconomic life of them. In addition, the observational method was utilized during transect walks along the transects of each village to assess the availability of WASH facilities in the villages. Transect walks also created an opportunity to discuss with the study population about the prevailing WASH facilities in their villages. Eight key informant interviews were also conducted with key leaders of the ethnic communities chosen for the study.

Procedure: There were two phases of data collection in the study. In the first phase, ten typical villages across all three districts were selected. The second phase was the data collection phase took place between January 2017 and February 2017. In the phase, participants of the study were selected to collect data. Prior to the data collection phase, the purpose of the study was explained to each participant, and verbal consent was taken from them. In order to avert any language difficulties during the data collection, communication was done in Bengali in the majority of the villages. However, assistance was taken from interpreters in three villages, who

were trained thoroughly on the objectives of the study, as the participants of those villages were not fluent in Bengali and had their distinctive languages. Thereupon, language barriers were avoided.



Figure 1. Map of Chittagong Hill Tracts

The data were then transcribed and interpreted in English. No identity of any participant was disclosed to anyone or any party at any stage and time of the study.

Data analysis: After completion of data collection from each participant, data were reviewed and confirmed. Adhering to the data collection from all participants in one village, the questionnaires were checked comprehensively, question by question, to ensure the data consistency and accuracy. Any inconsistency, whenever found, clarification was sought from the participants on the spot. An excel data entry sheet was developed to enter data collected from the participants in questionnaire form. Data in the paper then presented in frequency in tables and graphs. The qualitative data collected from the key informants and through transect walks were also checked and rechecked, line by line, for accuracy on the spot. Finally, the WASH practices of ethnic people in CHT were analysed for this paper.

RESULTS

WASH practices of the ethnic communities: In this section of the study, data explore the basic WASH practices of the ethnic communities in CHT, Bangladesh (Table 2, Table 3 & Table 4). The overall result of the study implies that WASH practices among the ethnic people in CHT were deplorable and inadequate. Table 2 contains the results regarding drinking water sources of the ethnic communities in CHT. The result explores that spring water (59.2%) was the most commonly available and used water source in CHT. Following spring water, surface water (35.2%) was found to be the second most popular and accessible water origin, while 12 per cent of the participants had access to tube well followed by tapped water (4%). Table 3 illustrates the sanitation practices of the ethnic communities in CHT. The findings show that sanitation habits among the ethnic people were among the lowest. Of the 250

participants, belonged to several ethnic communities and villages across the CHT, only 7.2 per cent respondents were using hygienic latrines, while the large portion of the participants revealed using unhygienic latrines (36%) and was habituated to open defecation (60.8%). Table 4 illustrates the basic hygiene practices among the participants. As the results limit, only 6 per cent participants reported using sandals while going for defecation, although the vast majority (94%) maintained the contrary. Practices of washing hands with soap after defecation, before preparing food and eating were also very meagre among them (16%, 3.2%, & 4%). Apart from household disposal system (23.2%), taking regular baths and cleaning teeth every day, washing hair once in a week, wearing clean clothes and hanging them in the sun were impressive among the ethnic people as 85.2 per cent, 68 per cent, 97.2 per cent, 47.2 per cent and 92 per cent participants respectively reported following these.

Causes of existing WASH practices: In this section of the study, the causes of current WASH practices of the ethnic people in CHT are discussed (Table 5). Table 5 limits that preponderance number of participants pointed at their poor economic condition for their existing WASH practices (70%, 70%, & 54%). For the present water and sanitation practices, 68 per cent and 39.2 per cent participants pointed at complicated geology. Subsequently, scarcity of safe sources was signalled out for poor water (60%) and hygiene practices (10%), while lack of awareness was responsible for existing sanitation (23.2%) and hygiene (30%). Around one-tenth of the participants (10%, 8%, & 8 %) accused the government's indifference in taking necessary initiatives to ensure WASH facilities of ethnic communities in CHT. Some participants also pointed at the unsafe habits of the sanitation (12%) and hygiene (14%) practices. Poor financial position was a familiar scenario among the ethnic communities across all three districts in CHT. One of the leading reasons for this state was ethnic people's lack of opportunities to engage in income-generating activities. Selling agri-products was the main source of income of the ethnic communities across all three districts. However, challenging nature of the lands also plays a crucial role in limiting their farming as they cannot cultivate more land. In addition, some chronic hazards such as epidemic crop disease, wild animal attack, heavy wind, drought, poor-selling price, poor communication and transportation system, distance, etc. also deprive the ethnic people in harvesting and getting ideal prices. However, despite being in poverty and inadequacy of income-generating activities, the vast majority of the participants expressed their reluctance to leave their villages and work outside, even in lean periods that fueled their poor financial status. Challenging geology of CHT also plays very crucial roles in the way of life of the ethnic communities of CHT. The participants mentioned that due to difficult geology, installing tube-well is a very challenging task, and many tube-wells became doctrinarian after some days. Installation of tube-wells in the selected villages was found to be expensive compared to the mainstream areas. As a result, ethnic communities usually depend on the water sources that are easily accessible to them such as spring water, surface water and occasionally rainwater. In addition to the long distance between the local markets and villages, the road communication was abysmal, steep and hilly with an irregular transportation system that also played critical roles in increasing the transportation cost of any commodity for the ethnic communities. Of the ten villages included in the study, in seven villages, there was no vehicle transport

Table 1. Study settings and distribution of participants

Name of the districts	Selected villages in each district	Number of participants selected from each district	Total participants
Rangamati	1. Dhupshil 2. Moddho Para	25*2=50	250
Khagrachhari	1. Augbari 1. Basatlang 2. Artha Para	25*1=25	
Bandarban	3. Menron Para 4. Fainong Para 5. Noktoha Para 6. Mekoha Para 7. Hoiton Khumi Para	25*7=175	

Table 2. Sources of drinking water

Water sources	Settings, n (%)			Total n (%) 250 (100)
	Rang	Khag	Ban	
	50 (100)	25 (100)	175 (100)	
Spring water	28 (56)	16 (64)	104 (59.4)	148 (59.2)
Surface water	17 (34)	8 (32)	63 (36)	88 (35.2)
Tubewell	6 (12)	5 (20)	19 (10.8)	30 (12)
Tap	5 (10)	2 (8)	3 (1.7)	10 (4)
Other	3 (6)	3 (12)	7 (4)	13 (5.2)

Table 3: Common sanitation practices

Sanitation practices	Settings, n (%)			Total n (%) 250 (100)
	Rang	Khag	Ban	
	50 (100)	25 (100)	175 (100)	
Hygienic latrine	4 (8)	3 (12)	11 (6.3)	18 (7.2)
Unhygienic latrine	18 (36)	9 (36)	63 (36)	90 (36)
Open defecation	29 (58)	14 (56)	109 (62.3)	152 (60.8)

Table 4. Hygiene practices of ethnic communities

Hygiene practices	Settings, n (%)			Total n (%) 250 (100)
	Rang	Khag	Ban	
	50 (100)	25 (100)	175 (100)	
Using sandals while going for defecation	3 (6)	2 (8)	10 (5.7)	15 (6)
Washing hands after defecation	9 (18)	3 (12)	28 (16)	40 (16)
Washing hands before preparing food	3 (6)	1 (4)	4 (2.3)	8 (3.2)
Washing hands before eating	2 (4)	2 (8)	6 (3.4)	10 (4)
Household waste disposal system	13 (26)	6 (24)	39 (22.3)	58 (23.2)
Taking bath every day	39 (78)	20 (80)	154 (88)	213 (85.2)
Cleaning teeth every day	30 (60)	16 (64)	124 (70.8)	170 (68)
Washing hair once in a week	50 (100)	23 (92)	170 (97.1)	243 (97.2)
Wearing clean clothes	22 (44)	12 (48)	84 (48)	118 (47.2)
Hanging clothes in the sun	43 (86)	21 (84)	166 (94.8)	230 (92)

Table 5. Causes of existing WASH practices

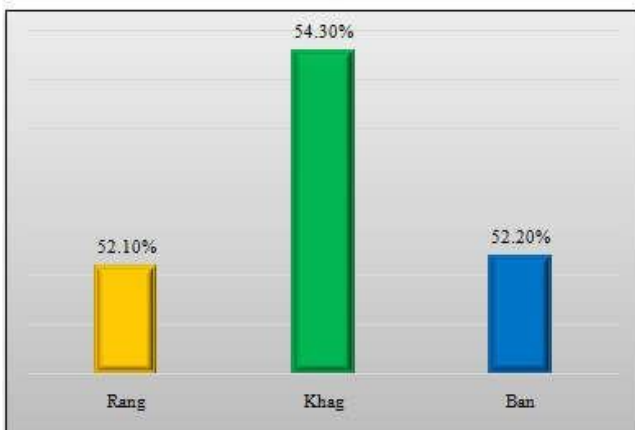
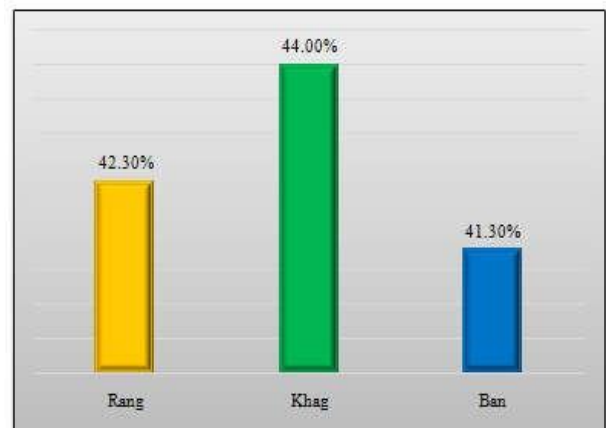
Causes	Settings, n (%)			Water (%) Total n (%)	Settings, n (%)			Sanitation (%) Total n (%)	Settings, n (%)			Hygiene (%) Total n (%)
	Rang	Khag	Ban		Rang	Khag	Ban		Rang	Khag	Ban	
	50 (100)	25 (100)	175 (100)	250 (100)	50 (100)	25 (100)	175 (100)	250 (100)	50 (100)	25 (100)	175 (100)	250 (100)
Poor economic condition	36 (72)	15 (60)	124 (70.8)	175 (70)	40 (80)	17 (68)	118 (67.4)	175 (70)	27 (54)	12 (48)	96 (54.9)	135 (54)
Difficult geology	38 (76)	16 (64)	116 (66.3)	170 (68)	31 (62)	9 (36)	58 (33.1)	98 (39.2)	-	-	-	-
Scarcity of safe sources	34 (68)	9 (36)	107 (61.1)	150 (60)	-	-	-	-	3 (6)	3 (12)	19 (10.9)	25 (10)
Lack of awareness	-	-	-	-	12 (24)	7 (28)	39 (22.3)	58 (23.2)	17 (34)	7 (28)	51 (29.1)	75 (30)
Lack of Govt. initiatives	4 (8)	3 (12)	18 (10.3)	25 (10)	7 (14)	1 (4)	12 (6.9)	20 (8)	3 (6)	2 (8)	15 (8.6)	20 (8)
Unsafe habit	-	-	-	-	4 (8)	4 (16)	22 (12.5)	30 (12)	7 (14)	3 (12)	25 (14.2)	35 (14)
Others	2 (4)	2 (8)	6 (3.4)	10 (4)	3 (6)	1 (4)	9 (5.1)	13 (5.2)	2 (4)	1 (4)	5 (2.9)	8 (3.2)

Table 6: Impacts of existing WASH practices on health

Impacts	Settings, n (%)			Total n (%)
	Rang	Khag	Ban	
	50 (100)	25 (100)	175 (100)	250 (100)
Diarrhoea	39 (78)	20 (80)	144 (82.3)	203 (81.2)
Scabies	32 (64)	17 (68)	111 (63.4)	160 (64)
Dysentery	34 (68)	16 (64)	100 (57.1)	150 (60)
Intestinal worms	16 (32)	9 (36)	55 (31.4)	80 (32)
Trachoma	11 (22)	5 (20)	29 (16.6)	45 (18)
Typhoid	7 (14)	5 (20)	31 (17.7)	43 (17.2)
Others	9 (18)	5 (20)	36 (20.6)	50 (20)

Table 7: Impacts of existing WASH on socioeconomic life

Impacts	Settings, n (%)			Total n (%)
	Rang	Khag	Ban	
	50 (100)	25 (100)	175 (100)	250 (100)
Loss of income	42 (84)	21 (84)	142 (81.1)	205 (82)
Expenditure for treatment	40 (80)	20 (80)	138 (78.9)	198 (79.2)
Insecurity	33 (66)	14 (56)	103 (58.9)	150 (60)
Indignity	28 (56)	13 (52)	97 (55.4)	138 (55.2)
Abuse	14 (28)	8 (32)	53 (30.3)	75 (30)

**Figure 2: Mean number of participants reported poor sanitation and unhygienic practices****Figure 3: Mean number of participants reported health issues due to inadequate WASH practices**

system. As a consequence, in all the villages, ethnic people generally prefer to travel on foot that consumes more time. The participants cited to go to the local market only on the Bazar day (a specific day or two of the week when the local market takes place) of the week when they sell their commodities and buy necessities. All these factors made the ethnic communities reluctant and limited their options to follow proper WASH practices. Side-by-side, during the questionnaire survey and key informant interviews, it has been noticed that the participants lacked the knowledge regarding the benefits of hygienic sanitation and proper hygiene practices in everyday lives. This unawareness also played crucial roles in ethnic peoples poor WASH practices (Table 1, Table 2 & Table 3).

Impacts of the WASH practices of health and socioeconomic levels: This section focused on the third objective of the study, exploring the impacts of WASH practices on health and socioeconomic life of the ethnic people in CHT (Table 6 & Table 7). Table 6 illumines the results regarding the health consequences of current WASH practices of ethnic people of CHT. The data show an extensive body of participants (81.2%) cited suffering from diarrhoea as a result of indigent WASH practices. Subsequent, health issues affected more than half of the participants were scabies (64%) and dysentery (60%). The following health hazards identified prevalent among the participants were intestinal worms (32%), trachoma (18%) and

typhoid (17.2%), while one-fifth of them brought up other issues such as malaria, fever and stomach ache. Table 7 lists the socioeconomic outcomes of WASH practices among the ethnic people in CHT. The first effect of current WASH practices identified was the loss of income (82%), while expenditure for treatment (79.2%) was found to be the following outcome. The study revealed that the ethnic peoples living in CHT have a tendency to remain and work in their villages and are reluctant working outside of nearer villages. This practice has negative impacts on their earning. The data also showed that because of unhygienic WASH practices, the respondents showed regular vulnerability to different health issues (Table 6) that also refrain from work. This introvert way of work and frequent vulnerability to health issues particularly have two broad impacts on the socio-economic life of the ethnic communities; first, they lose their income, full or partial, and second, they need to spend money for treatment. Majority of the participants conceded to sell their livestock such as pig or tree to manage the expenditure of treatment. Many participants also reported selling their labour in advance to manage the cost of treatment or to deal with any hazard or lean period. While the first two issues were related to money, the following issues were non-monetary, such as insecurity (60%), indignity (55.2%) and abuse (30%). These three issues were found to be more severe among women and young girls than men.

The empirical data reveal that the WASH practices among the ethnic communities across all three districts were severely depleted. Figure 2 represents that the mean numbers of participants found habituated with poor sanitation and hygiene practices were similar in all three districts in CHT. However, of the three districts, participants of Khagrachhari district were exposed to the higher meagre sanitation and hygiene practices (54.30%). On the other hand, participants exposed to similar sanitation and hygiene state were almost similar in both Rangamati and Bandarban districts, as the mean number of participants found practising all unhygienic practices were 52.10 per cent and 52.20 per cent respectively. The data reveal a high number of workers also reported suffering from health hazards, caused by the scarce WASH practices (Figure 3). The mean numbers of workers reported health issues in the three districts were 42.30 per cent (Rang), 44 per cent (Khag), and 41.30 per cent (Ban). These numbers were quite high, considering that they present the mean of poor sanitation and hygiene practices and their impacts on health. It was found that most of the participants of the study were habituated with multiple unsafe WASH habits.

DISCUSSION

Our study illuminates the predicament water, sanitation and hygiene practices among ethnic communities in CHT, Bangladesh. The present paper considers safe drinking water, adequate sanitation and proper hygienic practices are the three sides of people's well-being triangle, as without one, ensuring a healthy life is not achievable. Although to our knowledge, the present study is the first to explore the WASH practices among the ethnic communities in CHT, Bangladesh, a number of studies were conducted to explore WASH practices among diverse groups of people in the country (Bakshi, Mallick & Ulubaşoğlu, 2015; Hanchett, Akhter & Khan, 2003; Islam, Alam & Misbahuzzaman, 2015; Mahmud, Miah & Jahan, 2017; Mahmud, Rajath & Jahan, 2017; Nasreen *et al.*, 2010; Pal & Hussain, 2016). The CHT is exceptionally distinctive than the rest of the country, not only in terms of geography and topography but also for its inhabitants (Ali, Molla & Faisal, 2014). Due to this state, it is challenging to resonate the findings of the study with other WASH studies conducted in the country. The two most prevalent causes of the impecunious WASH practices among the target populations were their poor economic status and the complicated geology of the area. An extensive body of the participants pointed at these reasons as the causes of their meagre WASH status. However, their poor WASH practices might also be fueled by their low academic attainment, as most of the participants of the study did not receive any formal education, hence were reasonably unaware about the impact of poor WASH practices. Furthermore, during the transect walks, it has been found that the access to safe water sources was not an easy task for the ethnic people, due to the distance of the sources and challenging way to go there. The difficult access to safe water had a significant role in leading the ethnic people to unhygienic way of living, threatening the entire idea of hygiene to an alarming extent. Almost every participant of the study reported various unhygienic practices at the same time, such as drinking unclean water, eating or preparing food without washing hands. As a consequence of the unsafe water use, the ethnic people were found constant victims of a number of waterborne diseases, e.g. diarrhoea, dysentery and trachoma (Bartram and Cairncross, 2010; Cairncross, Bartram, Cumming & Brocklehurst, 2010; Luby *et al.*, 2018; Mahmud, Rajath & Jahan, 2017; Ministry of Health and Family Welfare, 2011). However, compared to water, our findings

suggest that the vast majority of the ethnic people in CHT still exposed to unhygienic and open defecation. The extensive body of participants also had severely poor handwashing practices with soap after defecation or before eating that ultimately lead them to diseases, like, diarrhoea, scabies, intestinal worms, trachoma etc. (Cairncross *et al.*, 2010; Mahmud, Rajath & Jahan, 2017; Mara *et al.*, 2010). Nonetheless, the impacts of poor WASH practices not only limited in the form of diseases, but it also had financial consequences (Hutton & Haller, 2004) as an extended body of participants asserted to suffer financial loss. However, it was the women and girls, who suffer most from the poor sanitation practices. Many female participants expressed their concerns about it, as they felt unsecured. Due to open defecation practice, many women also mentioned experiencing abuse. Being compelled from this adverse situation, some women further added that frequently they do not go for toilets, even if they need to, until night, to avoid any unwanted events. This unusual practice further caused health complications for them. Based on the overall findings of the study, it is evident that the overall WASH practices among the ethnic people dwelling in CHT are among the worst that had severe impacts not only on their health but also on their socio-economic lives.

STRENGTHS AND LIMITATIONS

The main strengths of the study lie in the vast majority of geographic areas and the number of distinct ethnic communities it covered. The data collection process was implemented by four WASH professionals, with one professional managing the entire process and securing that all the villages in CHT selected in the study received the same overall interventions. Furthermore, to our best knowledge, this study is one of the very first interventions focused on exploring WASH practices, their causes and impacts on the life of ethnic communities living across all three districts in CHT. Nonetheless, CHT covers a vast area, with challenging geography and topography. Many ethnic communities were dwelling in the villages deep in hills and valleys. This study does not include the ethnic communities living in these very hard to reach type villages. This exclusion of the villages could limit the generalisation of the result.

CONCLUSION

This paper has studied the water, sanitation and hygiene practices and their impacts on the ethnic communities living in CHT in Bangladesh. Ethnic peoples' lack of access to safe water, and poor sanitation and hygiene practices exposed them to a wide range of health perils. This predicament WASH practices also played crucial parts to their socio-economic vulnerability. Although the problematic geology of all three districts had roles in forcing the ethnic people towards derisory WASH practices, insufficient initiatives from the government and their obliviousness also played significant parts. The government and other associated stakeholders should take proper initiatives to improve the WASH state among the ethnic communities in CHT. Furthermore, considering the poor economic capability of the ethnic people, low-cost and hill tracts supporting solutions shall be invented and implemented in order to advance the WASH practices among the ethnic communities in CHT.

Funding information: None

Conflicts of interest: None declared

REFERENCE S

- Ali, K. M. B., Molla, M. H., & Faisal, M. M. (2014). Urban Socio-Economic and Environmental Condition of Hill Tracts Bangladesh: A Case Study in Bandarban Municipality. *IOSR Journal Of Humanities And Social Science (IOSR-JHSS)*, 19(4), 36-44.
- Bakshi, R. K., Mallick, D., & Ulubaşođlu, M. A. (2015). Social Capital and Hygiene Practices among the Extreme Poor in Rural Bangladesh. *The Journal of Development Studies*, 51(12), 1603-1618. doi: 10.1080/00220388.2015.1068291
- Bartram, J. & Cairncross, S. (2010). Hygiene, Sanitation, and Water: Forgotten Foundations of Health. *PLoS Medicine*, 7 (11) e1000365, 1-9.
- Cairncross, S., Bartram, J., Cumming, O., & Brocklehurst, C. (2010). Hygiene, Sanitation, and Water: What Needs to Be Done? *PLoS Med*, 7 (11), e1000365, 1 -7 doi:10.1371/journal.pmed.1000365
- Centers for Disease Control and Prevention. (2017). Global Wash Fast Facts. Retrieved from https://www.cdc.gov/healthywater/global/wash_statistics.html
- Clasen, T., Boisson, S., Routray, P., Tronkel, B., Bell, M., Cumming, O., ... Schmidt, Wolf-Peter. (2014). Effectiveness of a rural sanitation programme on diarrhoea, soil-transmitted helminth infection, and child malnutrition in Odisha, India: a cluster-randomised trial. *Lancet Glob Health*, 2, e645-e53. [http://dx.doi.org/10.1016/S2214-109X\(14\)70307-9](http://dx.doi.org/10.1016/S2214-109X(14)70307-9)
- Garn, J. V., Sclar, G. D., Freeman, M. C., Penakalapati, G., Alexander, K. T., Brooks, P., & Clasen, T. F. (2017). The impact of sanitation interventions on latrine coverage and latrine use: A systematic review and meta-analysis. *International Journal of Hygiene and Environmental Health*, 220, 329-340. <http://dx.doi.org/10.1016/j.ijheh.2016.10.001>
- Hanchett, S., Akhter, S., & Khan, M. H. (2003). Water, sanitation and hygiene in Bangladeshi slums: an evaluation of the WaterAid-Bangladesh urban programme. *Environment & Urbanization*, 15(2), 43-56.
- Hutton, G., & Haller, L. (2004). *Evaluation of the Costs and Benefits of Water and Sanitation Improvements at the Global Level* (WHO/SDE/WSH/04.04). Geneva: World Health Organization.
- Islam, T., Alam, O., & Misbahuzzaman, K. (2015). Rural Water Supply, Sanitation and Hygiene in Bangladesh: An Investigation of Lohagara Upazila (BDRWPS 27). Dhaka: Bangladesh Development Research Center.
- Luby, S. P., Rahman, M., Arnold, B. F., Unicomb, L., Ashraf, S., Winch, P. J., ... Colford Jr, J. M. (2018). Effects of water quality, sanitation, handwashing, and nutritional interventions on diarrhoea and child growth in rural Bangladesh: a cluster randomised controlled trial. *Lancet Glob Health*, 1-5. doi: 10.1016/S2214-109X(17)30490-4
- Mahmud, M. S., Miah, M. S., & Jahan, M. N. (2017). Hygiene Practices and Health: A Study on the Tea Garden Workers in Moulvibazar District, Bangladesh. *International Journal of Current Research*, 9(5), 50032-50034.
- Mahmud, M. S., Rajath, V. D., & Jahan, M. N. (2017). Water and Sanitation Practices and Health: A Study on the Tea Garden Workers in Moulvibazar District, Bangladesh. *Journal of Applied and Advanced Research*, 2(3), 139-143. <http://dx.doi.org/10.21839/jaar.2017.v2i3.80>
- Mara, D., Lane, J., Scott, B., & Trouba, D. (2010). Sanitation and Health. *PLoS Medicine*, 7 (11) e1000365, 1-7.
- Ministry of Health and Family Welfare. (2011). *Tribal/Ethnic Health Population and Nutrition Plan for the Health, Population and Nutrition Sector Development Program (HPNSDP) 2011 to 2016*. Bangladesh: Author.
- Montgomery, M. A., & Elimelech, M. (January, 2007). Water and Sanitation in Developing Countries: Including Health in the Equation: Millions suffer from preventable illnesses and die every year. *Environmental Science & Technology*, 17-24.
- Nasreen, S., Azziz-Baumgartner, E., Gurley, E. S., Winch, P. J., Unicomb, L., Sharker, M. A. Y., ... Luby, S. P. (2010). Prevalent high-risk respiratory hygiene practices in urban and rural Bangladesh. *Tropical Medicine and International Health*, 15(6), 762-771. doi:10.1111/j.1365-3156.2010.02531.x
- Pal, J. K., & Hussain, M. M. (2016). Health Care and Hygiene Practices of Older People in Tea Garden: A Study Conducted in Lackatoorah Tea Garden of Sylhet District. *Open Journal of Social Sciences*, 4, 144-154. <http://dx.doi.org/10.4236/jss.2016.45018>
- Schmidt, Wolf-Peter. (2014). The elusive effect of water and sanitation on the global burden of disease. *Tropical Medicine and International Health*, 19(5), 522-527. doi:10.1111/tmi.12286
- The World Bank. (2013). Water, Sanitation & Hygiene. Retrieved from http://web.worldbank.org/archive/website01213/WEB/0_CO-75.HTM
- The World Bank. (2017). Improved water source (% of population with access). Retrieved from <https://data.worldbank.org/indicator/SH.H2O.SAFE.ZS>
- Unicef. (2017). Water, Sanitation and Hygiene. Retrieved from <https://www.unicef.org/wash/>
- Wang, Y. (2013). More People Have Cell Phones Than Toilets, U.N. Study Shows. Retrieved from <http://newsfeed.time.com/2013/03/25/more-people-have-cell-phones-than-toilets-u-n-study-shows/>
- Water.org. (2017). The Water Crisis. Retrieved from <https://water.org/our-impact/water-crisis/>
- World Health Organization. (2017a). Sanitation and wastewater. Retrieved from http://www.who.int/water_sanitation_health/sanitation-waste/en/
- World Health Organization. (2017b). Use of basic and safely managed sanitation services. Retrieved from http://www.who.int/gho/mdg/environmental_sustainability/sanitation/en/
- World Health Organization. (2017c). Water-related diseases: information sheets. Retrieved from http://www.who.int/water_sanitation_health/diseases-risks/diseases/diseasefact/en/
- World Health Organization. (2017d). Water sanitation hygiene. Retrieved from http://www.who.int/water_sanitation_health/en/
- WHO/UNICEF JMP 2017. WHO/UNICEF JMP is the custodian of global data on drinking water, sanitation and hygiene (WASH). Retrieved from <https://washdata.org/data#!/bgd>