ASSESSMENT OF WASH CONDITION OF TEA GARDEN WORKERS OF ALINAGAR AND SHAMSHERNAGAR TEA ESTATES OF MOULVIBAZAR DISTRICT

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ABSTRACT

Bangladesh, a south Asian country, is one of the world's largest tea-producing countries, with tea being an important agricultural crop and a key contributor to the country's economy. The Water, Sanitation, and Hygiene (WASH) conditions of tea garden workers in Bangladesh are often inadequate, which has a significant impact on their health and well-being, and on the sustainability and productivity of the tea industry in Bangladesh. There is insufficient credible information on the health and hygiene status of tea garden workers in the Moulvibazar district to assess their water, sanitation, hygiene, and waste management practices. The objective of this study is to find out whether the existing water, sanitation, and hygiene practices of tea garden workers are safe and adequate to improve their health conditions or not. To assess the WASH condition in two tea estates of Kamalganj upazila of Moulvibazar district, namely Alinagar Tea Estate and Shamshernagar Tea Estate, a household-based survey of 70 people from each study area has been conducted. According to the findings of this study, both tea garden workers and residents lack access to safe latrines, water supply systems, waste management, and housing. The workers at both tea estates are mostly illiterate, with only 41% of those in Alinagar Tea Estate and 44% of those in Shamshernagar Tea Estate having completed primary school and having a low income, about 70% earning less than 5,000 Taka per month. No water purification techniques, such as boiling or filtration, were practiced due to a lack of resources and awareness. Open defecation is prevalent in Alinagar and Shamshernagar Tea Estates, with 40% in both study areas. Also, 41% and 20% of people in Alinagar and Shamshernagar Tea Estates, respectively suffer from diarrheal diseases due to a lack of safe water and sanitation facilities. In Alinagar Tea Estate and Shamshernagar Tea Estate, people throw excreta on low land and in water bodies at 39% and 46%, respectively. Almost all the people discharge wastewater on low land and in water bodies in both study areas. The results of the study also revealed that the prime constraint to achieving basic sanitation facilities is economic crisis. By improving access to clean water for drinking, ensuring adequate sanitation, promoting good hygiene practices, raising awareness of health issues, and improving the socioeconomic status of tea garden workers, efficient monitoring and evaluation, people's physical well-being can be improved, and Sustainable Development Goals (SDGs) can be achieved.

Keywords: *Tea garden workers, safe drinking water, sanitation facilities, hygiene practices, SDGs*

1. INTRODUCTION

WASH is a term that is commonly used to refer to the provision of clean water, adequate sanitation facilities, and good hygiene practices. Globally 2.2 billion people lacked safely managed drinking water, 3.5 billion people lacked safely managed sanitation, and 2 billion people lacked basic hygiene (UNICEF and WHO, 2023). Improving worldwide access to safe drinking water and sanitation is one of the least expensive and most effective methods to improve public health and save lives (Montgomery & Elimelech, 2007). Access to safe drinking water, sanitation, and hygiene is a prerequisite for proper physical well-being and development. The impact of inadequate WASH facilities results in water-borne diseases which increase morbidity and mortality rates, increased malnutrition, the spread of communicable diseases, and groundwater pollution. Improved hygiene and sanitation can help in the reduction of diarrhea, parasitic infections, morbidity, and mortality, as well as the growth of children (Esrey et al, 1991; Fewtrell and Colford, 2004). According to the World Health Organization (WHO), improper management of human excreta and solid waste can lead to contamination of water, and people have the right to safely managed sanitation, good health, and quality education. The Sustainable Development Goals (SDG) has set 17 goals to ensure the improvement of health, peace, and economic prosperity of all human beings and end open defecation and poverty. To achieve these goals SDG has given the commitment to give every person improved sanitation, hygiene, and provision of safe drinking water by 2030 (Pradhan et al., 2017).

Tea is a predominant agro-industry of Sylhet city which has made an immense contribution to the city's economy. Most of the tea gardens of Bangladesh are in the Moulvibazar district. The WASH condition of these tea garden workers is a major concern and is generally inadequate. Many tea garden workers, especially those in remote and rural areas, have limited access to safe drinking water, improved sanitation facilities, and basic hygiene practices. This is due to a combination of factors, including poverty, limited infrastructure, and poor management by tea garden owners and operators. As a result, they are vulnerable to enormous communicable diseases due to illiteracy, unhygienic sanitation practices, socio-economic conditions, unrealistic cultural myths, and poor living standards (Medhi et al., 2006).

Improving the WASH condition for tea garden workers is essential to ensuring their health and well-being, as well as promoting sustainable and equitable economic development in the tea industry. However, this requires sustained effort and investment by the government, tea garden owners, and other stakeholders. To assess the actual WASH conditions of the tea gardens this study has been done. In this study, a survey was conducted among two tea estates of the Moulvibazar district namely Shamshernagar Tea Estate and Alinagar Tea Estate, and the findings helped to assess the backdrop against access to proper WASH facilities and contribution to paramount health implications.

2. STUDY AREA

Moulvibazar is located in the Sylhet division and situated on the left bank of the Manu River at 24.4778° N 91.7667° E and 360 km from the capital city Dhaka. It is bounded by the Sylhet district on the north and also by the Khasia, Jainta hills of India; Kachhar and Karimgonj district of India on the east and south; Habiganj district on the west. The area is located in the flood plain of the Meghna River. Besides, there are a lot of hills and elevated lands around the area. The study was performed in Alinagar Tea Estate and Shamshernagar Tea Estate at Kamalganj upazila in Moulvibazar district of Bangladesh. According to Bangladesh Tea Board 2023, the Alinagar Tea Estate was established in 1957 with an area of 4463 acres, whereas the Shamshernagar Tea Estate was established in the British period with an area of 4327 acres. The population and number of households in the study areas are shown in table 1, and the study area map is shown in figure 1.

Table 1: Population, household and area of Alinagar Tea Estate and Shamshernagar Tea Estate (Bangladesh Bureau of Statistics, 2013)

Study areas	Area (acres)	Households				Population		
		Total	General	Institutional	Others	Both Sex	Male	Female
Alinagar Tea Estate	4463	1048	1048	0	0	5111	2577	2534
Shamshernagar Tea Estate	4327	2655	2644	7	4	13183	6636	6547

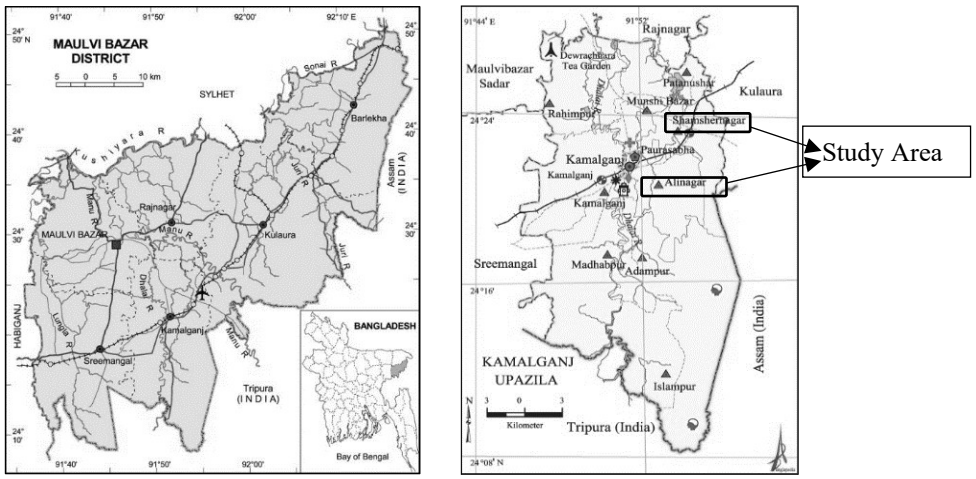

Figure 1: Map of Maulvibazar district (left panel) and Kamalganj upazila (right panel) locating two tea gardens by arrow (Chowdhury et al., 2011).

3. METHODOLOGY

A survey was conducted to assess the availability of water, sanitation, hygiene, and waste management practices in two tea estates in the Moulvibazar district. The survey included an assessment of the residents' proximity to water sources (safe or unsafe), their overall income and literacy level, and the obstacles to basic sanitation. The measures taken by tea garden workers for managing excreta and wastewater were also evaluated.

3.1 Sampling Technique and Determination of Sample Size

To achieve the desired level of confidence and precision while determining the ideal sample size in terms of large populations, Cochran's sample sizing formula is widely used. The sample size was determined for an infinite population as S in equation 1 where p is population proportion, M is the Margin of error and Z is $Z_{(score)}$; which is determined based on the confidence level.
The sample size for infinite population,

$$S = \frac{Z^2 \times p \times (1-p)}{M^2} \quad (1)$$

Now, to adjust the sample size to the required population, then using the following formula in equation 2 for adjusting the sample size:

$$\text{Adjusted sample size} = \frac{S}{(1)+\left\{\frac{S-1}{population}\right\}} \quad (2)$$

Previous research has shown that tea garden workers have a similar lifestyle and socioeconomic condition. A population proportion of 50% and a confidence level of 90% with ±10% precision was used. The adjusted sample size for the total population of Alinagar Tea Estate is 67, and that of Shamshernagar Tea Estate is 68. But, for the accuracy of comparison between the two study areas, the final sample size has been kept the same, which is 70 persons per study area. In this study, a stratified random sampling method was used to collect the data.

3.2 Survey Questionary Queries

The survey aimed to investigate the lifestyle of tea workers. The questions covered the socio-economic conditions, main source of safe drinking water, available sanitation facilities, hygiene practices, and waste management practices. The results showed the monthly income, education level, religion, and lead role of men or women in the family of the tea workers. It also revealed the prime constraints against using hygienic sanitation. The survey revealed the types of available sanitation facilities, ranging from no facility to sanitary latrines with septic tanks. The results showed the frequency of hand washing with soap and wearing shoes while going to the toilet, and other hygiene practices. The results also highlighted the waste management practices, including the management of excreta and wastewater.

The following flowchart in figure 2 illustrates the entire research procedure:

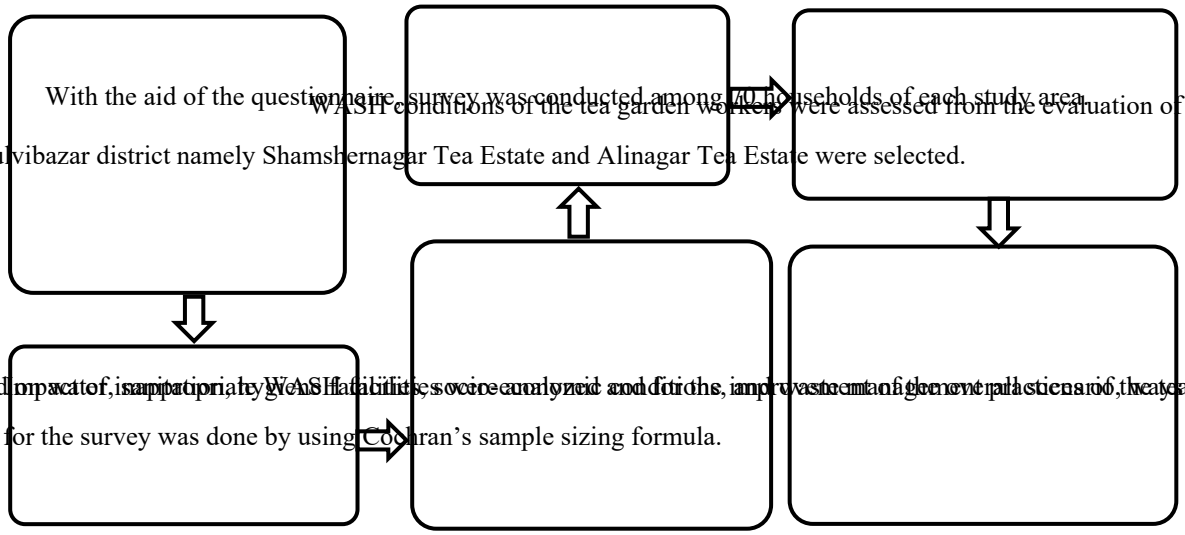

Figure 2: Flow-chart of the entire research procedure.

4. DATA ANALYSIS AND FINDINGS

4.1 Socio-economic Conditions

The workers at Shamshernagar and Alinagar tea estates are mostly illiterate and have a low income, earning less than 5,000 Taka per month, making it difficult for them to improve their health and hygiene. The main obstacles to achieving proper sanitation, access to safe drinking water, hygiene, and waste management are financial difficulties and a lack of awareness. The majority of tea garden workers are illiterate, with only 41.43% of those in Alinagar Tea Estate and 44.29% of those in Shamshernagar Tea Estate having completed primary school (class 1 to 5). In Alinagar Tea Estate,

85.71% of families are led by men, while in Shamshernagar Tea Estate are 92.86%. The comparison of the socio-economic conditions of in Alinagar Tea Estate and Shamshernagar Tea Estate is shown in figure 3.

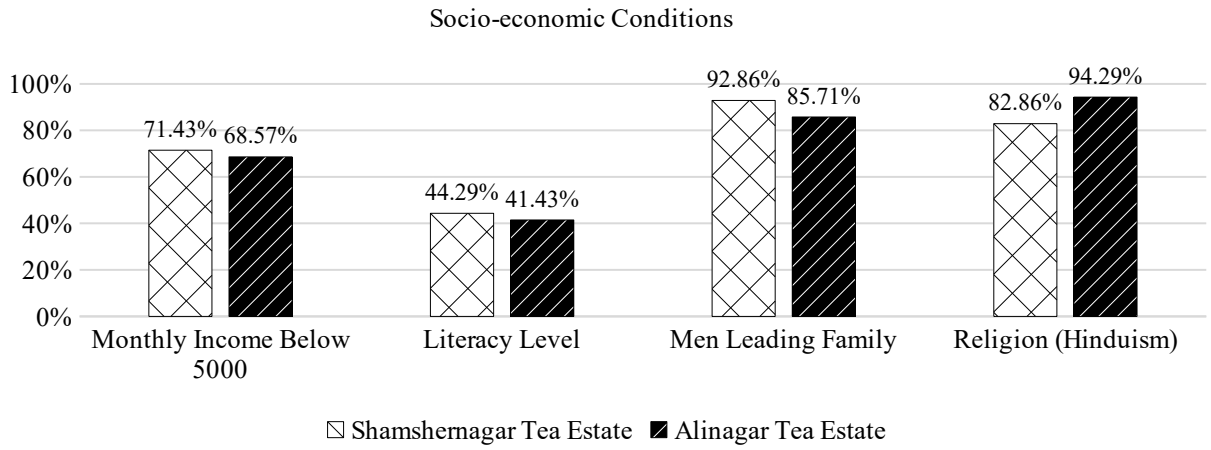

Figure 3: Comparison between socio-economic conditions of both study area

4.2 Source of Safe Drinking Water

All of the households in both study areas rely on tube wells as their primary source of drinking water. In Shamshernagar Tea Estate, 82.86% of households had their own tube well and 17.14% relied on their neighbor's. In Alinagar Tea Estate, 65.71% of households had their own tube well and 34.29% relied on their neighbor's. Both study areas primarily used tube wells for drinking water, with some residents collecting rainwater during the rainy season, but only for non-drinking purposes. No water purification techniques, such as boiling or filtration, were practiced due to lack of resources and awareness. Most tube-well platforms were found to be unhygienic, with the cause being attributed to heavy household work and lack of time for cleaning. Figure 4 illustrates the differences in available drinking water sources between the two study areas.

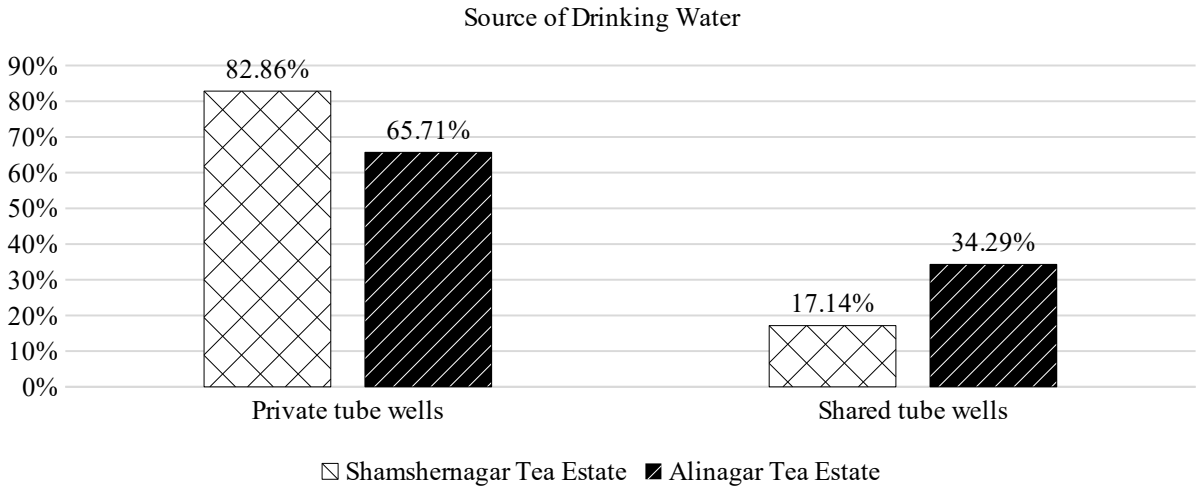

Figure 4: Comparison between source of drinking water of both study area.

4.3 Available Sanitation Facilities

The majority of inhabitants use latrines, with 41.43% of people in Alinagar Tea Estate having sanitary latrines. In Shamshernagar Tea Estate, 51.43% have access to pit latrines and have no sanitary latrine. Open defecation is prevalent at both study areas are 40%, with women using their neighbor's latrines within 100 meter walking distance if they do not have access to a latrine at home. Latrines were found to be unhygienic and dirty, with leaks and inadequate water and soap for hand washing. There was

adequate ventilation and distance between drinking water sources and latrines. The main hindrance to basic sanitation was financial constraints, with tea garden workers unable to afford hygienic latrines due to limited salaries. Figure 5 illustrates the comparison of sanitation facilities in both study areas.

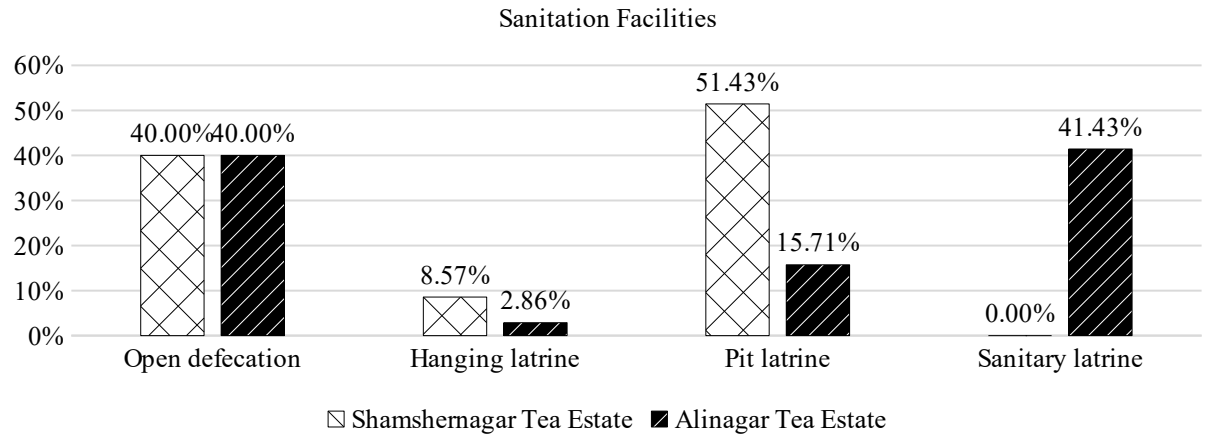

Figure 5: Comparison between available sanitation facilities of both study area

4.4 Hygiene Practices

Water plays a crucial role in maintaining hygiene, but inadequate access to water for hand washing, laundry, food preparation, and cleaning kitchen utensils can lead to the spread of water-borne diseases. In Bangladesh, hand washing is promoted to reduce diarrheal diseases. During a survey, 37.14% of people in Alinagar Tea Estate and 40% in Shamshernagar Tea Estate agreed to washing hands with soap after using toilets. Wearing shoes while using the toilet helps reduce the spread of communicable diseases, with 75.71% of Alinagar Tea Estate and 50% of Shamshernagar Tea Estate reported wearing shoes. Around 55.71% in Alinagar Tea Estate and 61.43% in Shamshernagar Tea Estate use clean water for washing utensils. A comparison of hygiene practices between the two study areas is shown in figure 6.

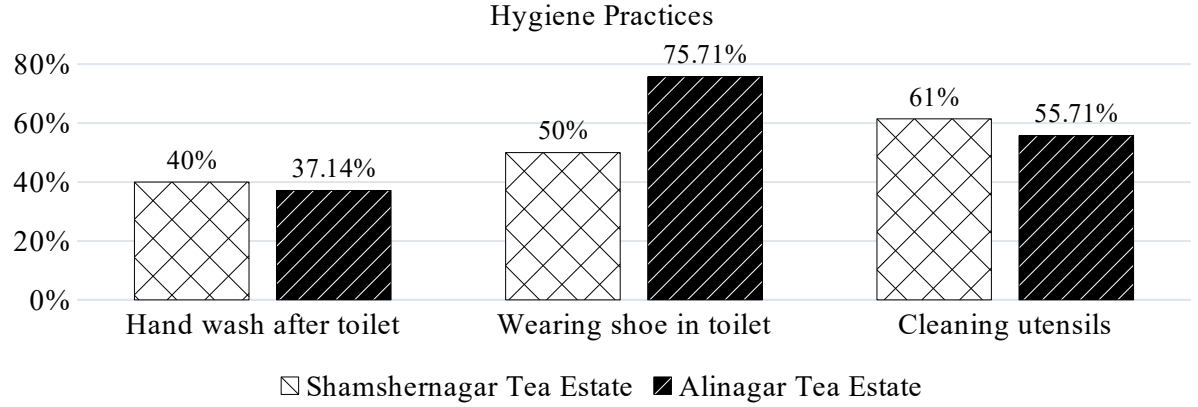

Figure 6: Comparison between hygiene practices of both study areas.

4.5 Waste Management Practices

In Alinagar Tea Estate, 44% of inhabitants don't know where their excreta go, whereas in Shamshernagar Tea Estate, the value is 21%. In Alinagar Tea Estate and Shamshernagar Tea Estate, people throw excreta on low land and in water bodies at 46% and 39%, respectively. A comparison of waste management practices between the two areas is shown in figure 7.

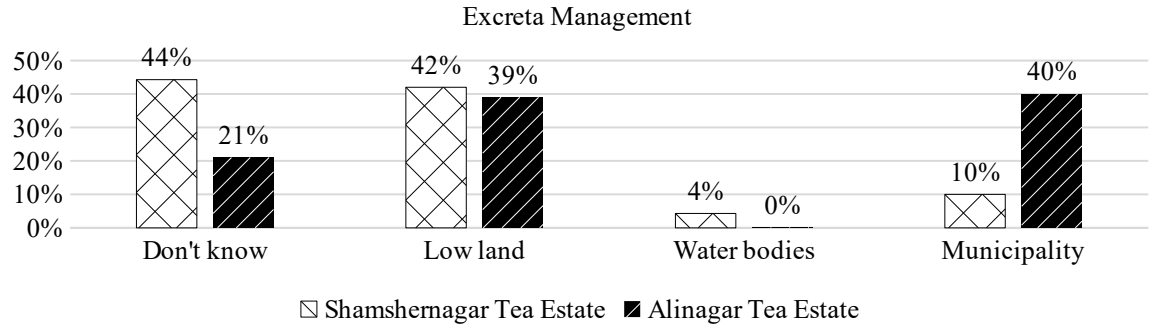

Figure 7: Comparison between excreta management practices of both study areas.

In Alinagar Tea Estate and Shamshernagar Tea Estate in figure 8, almost all of the people discharge wastewater on low land and in drain.

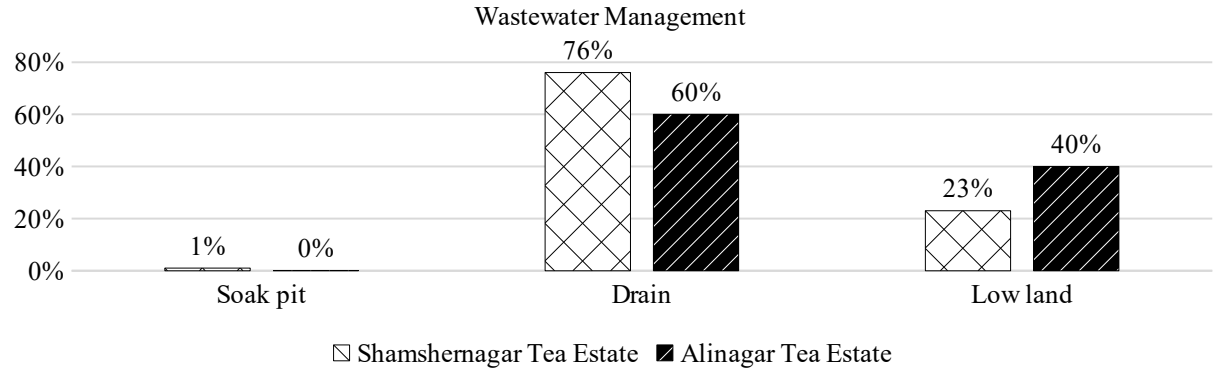

Figure 8: Comparison between wastewater management practices of both study areas.

4.6 Impact of Lack of Access to the Safe Water, Sanitation, Hygiene, and Waste Management Practices

41% and 20% of people in Alinagar Tea Estate and Shamshernagar Tea Estate respectively suffer from diarrheal diseases due to lack of safe water and sanitation facilities. Common symptoms include skin irritation, viral fever, and body aches. Poor hygiene practices such as not washing hands and inappropriate disposal of feces escalate the risk of disease spread. Comparison of the proportion of people affected by water-borne diseases is depicted in figure 9.

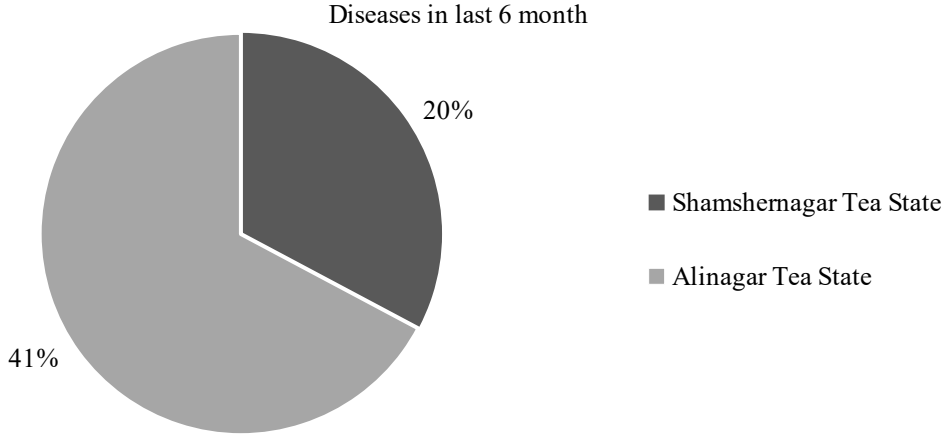

Figure 9: Comparison between people affected by water – borne diseases of study area.

There are significant consequences when people lack access to clean water, hygienic conditions, safe waste disposal, and sanitation. It has a negative impact on health and increases the risk of waterborne infections, which leads to malnutrition. Socio-economically, chronic diseases put a burden on healthcare resources by lowering productivity and reinforcing the cycle of poverty. Degradation of ecosystems and water contamination are examples of environmental impacts. Girls and women use water more often than boys and men do; thus, they are more prone to experience problems.

5. DISCUSSION

Evaluation of sanitation and hygiene related behavior in tea garden areas shows that the shortage of hygienic sanitation facilities is one of the main factors affecting their health and nutrition conditions. To scale up access to improved sanitation, health and hygiene behavioral knowledge, government and other international programs are seeking ways. However, tea gardens workers are not getting proper attention in this regard. There is still enormous need for the assessment of WASH program within tea garden areas.

From the study, it has been observed that most of the residents are getting safe water for drinking, bathing, laundry, and kitchen utensils cleaning but most of them still lack access to improved sanitation facilities and waste management practices. The current sanitation condition of Bangladesh is not up to the mark in tea garden areas. Open defecation is still practiced, and most workers of both tea garden areas do not have access to basic sanitation facilities and safe drinking water. Most of the latrines are located outside the house and during the rainy season household areas get dirty due to rainwater.

However, most of the people of the Alinagar Tea Estate are conscious of using sanitary latrine, using shoes while going to toilet and cleaning toilet with toilet cleaners. They are aware of the fundamental rules of keeping good health including washing utensils with clean water, washing hands with soap before eating and after defecation. On the other hand, in Shamshernagar Tea Estate, health and hygiene related awareness and knowledge has not been established properly. People are not conscious of hand washing and other cleanliness practices. They severely suffer from water-borne diseases such as diarrhea, eye and skin infections, viral fever, dysentery and many more. From this survey, it has been observed that socio-economic conditions play an important role in the livelihood of tea garden workers. But tea garden labor's monthly income is below 5000 Taka in of both study area. Although they understand the basic needs of adequate sanitation facilities, they cannot afford it. Households who do not have private latrine, female members of those families use their neighbor's latrines and male members often practice open defecation. Using soap or ash for hand and utensils cleaning is not practiced frequently in Shamshernagar Tea Estate. Food preparation sites are unhygienic, and people don't practice hand washing after defecation and urination. Compared to latrines facility, safe drinking water is available to most of the households. Almost 97% of people in both study areas use groundwater from deep tube-wells and shallow tube wells as prime sources of drinking water, food preparation, washing and bathing.

5.1 Comparison of Current Access to Water, Sanitation, Hygiene, Waste Management Practices and Socio-economic Conditions of Tea Garden Workers with Previous Scenario:

Tea gardens of similar categories with the study area of this study has been evaluated earlier in other research works. Comparison of the available WASH facilities and socio-economic conditions with previous collected data can be drawn.

Previous studies show that the monthly income of tea gardens workers has not changed remarkably. In 2006, average monthly income of tea gardens workers was below 4000 Taka per month and currently it is around 5000 Taka per month (Ahmed et al., 2006). Almost 80% of gardeners are illiterate, and 20% have not even completed primary school in 2011 (Chowdhury et al., 2011).Present study shows that the literacy rate is below 50%. Whereas the country's literacy rate is 74.66% (Bangladesh Bureau of Statistics, 2022). A study from 2010 shows that social constraints play a great

role before sanitation improvement in tea gardens of Sylhet city. Tea garden workers used to think that sanitary latrine is a prestigious place which should only be used by guests. Another superstition among ethnic communities were that women should not use sanitary latrines after their elder male in laws (Ahmed et al., 2010).These constraints lead to deterioration of health and wellbeing of ethnic minorities in tea gardens. However, this study shows that these social constraints have significantly been reduced and prime constraints against achieving proper sanitation facilities is currently has become financial crisis. A significant improvement in the sector of access to safe drinking water of tea garden workers is found by comparing with previous studies. In 2006, laborers had no access to safe drinking water, and they used to depend on pond water for drinking and other household purposes (Ahmed et al., 2006). Another study from 2010 shows that 60% of the population of tea gardens have access to tube-wells as a prime source of drinking water (Ahmed et al., 2010). However, a current study reveals that 98% of the workers of tea gardens have access to tube-wells which is a safe and hygienic source of water. Another noticeable difference is that the rate of open defecation has significantly reduced. In 2010, around 68% of people used to practice open defecation and the rate is currently reduced to 40% (Ahmed et al., 2010). Whereas nationally, around 1.23% of households don't have any toilet facilities (Bangladesh Bureau of Statistics, 2022). The tea garden authority has taken the responsibility to build sanitary latrines, but all workers have not yet got proper attention in this regard. Due to inappropriate distribution of sanitation coverage, those who are deprived of hygienic sanitary latrines are still suffering the most from communicable diseases. However, health conditions of tea garden workers are improved to some extent and the spread of fecal borne diseases is reduced. Another key observation is that waste management practices have not changed in past years in these areas. Still, they face inadequate drainage and proper solid waste disposal facilities which leads them to dump their garbage to nearby drains, lowlands, or open bodies (Kashem, 2015).

6. CONCLUSION AND RECOMMENDATION

From the study, it was found that a lot of people have problems with hygiene-related issues. After comparing both study areas it was observed that Alinagar Tea Estate has much better WASH facilities than Shamshernagar Tea Estate. However, the following conclusions can be drawn from this study:
Both tea garden areas lack safe water sources, toilet facilities, and hygiene awareness.

- It both study areas, residents who do not have access to a private sanitary latrine and practice open defecation suffer the most from infectious diseases.
- There is no safe way to dispose of domestic waste, and waste from tea garden workers is frequently deposited in nearby drains and lower lands in both study areas.
- Low income, illiteracy, unwillingness, and lack of awareness all play crucial roles in obtaining and maintaining sustainable and safe WASH facilities.

Poor waste management practices can lead to an increase in the spread of water-borne diseases. Contaminated surfaces, such as water, soil, animal, and air, spread diseases more easily, and many government and NGO programs are promoting awareness among tea garden workers about using the hygienic latrine and reducing the rate of open defecation.
To improve the overall quality of human life and well-being, economic development, and environmental protection Sustainable Development Goal (SDG) have set 17 goals which have to be achieved by 2030. Among these goals, goals no 1 to 6 are relevant with this study. According to the findings of this assessment, and based on Sustainable Development Goals (SDG), the following steps are recommended to improve overall WASH conditions of two tea garden study area:

- As the prime constraint before achieving appropriate WASH facilities has found to be financial crisis, tea garden authority should take the responsibility to increase their wages and ensure proper employment facilities so that the workers can fulfill their basic needs. Thus, it can lead to the accomplishment of SDG 1 (No Poverty).
- Achievement of food security, improved nutrition and promotion of sustainable agriculture can fulfill the aim SDG 2 (Zero Hunger).

- To ensure good health and well-being according to SDG 3, Abate of malnutrition and food insufficiency is essential. Initiatives should be taken to provide necessary nutritious food and workers should be capacitated to buy essential food items.
- Corresponding to SDG 4, quality education for all is paramount to increase literacy rate and educate the population about health risk and hygiene practices, environmental protection, and taking promotive and preventive measures to prevent transmission of communicable diseases.
- Gender equality should be ensured so that women can get equal wages as men. Promotion of women empowerment within the marginalized women tea garden workers can help to fulfill SDG 5.
- To achieve SDG 6, it is needed to ensure availability and sustainable management of water and sanitation for all. For this, better sanitation facilities and hygienic latrines should be constructed and to ensure safe sources of drinking water, adequate number of tube-wells should be constructed, and some natural sources of water can be introduced.

The successful implementation of these agendas can lead to an improved and sustainable environment and WASH condition. To adopt these goals in tea garden worker's lifestyle, local authority should take the responsibility because SDG cannot achieve these goals individually without proper implementation and participation of all individuals. Hence, achievement of SDGs goals entirely depends on how these agendas are correlated between development and contribution of people of all levels. The development and monitoring of water, sanitation, and hygiene (WASH) at the household level is vital to achieving the Sustainable Development Goals (SDG) in these areas. Efficient monitoring and evaluation of WASH is necessary to ensure these goals are met.

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