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"Knowledge, Attitudes, and Practices on Water, Sanitation, and Hygiene among Tea Garden Workers in Sylhet: A Cross-Sectional Study"

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Abstract

Background and objective: Tea Garden workers, often living in remote and underdeveloped areas, face inadequate sanitation facilities and lack access to clean water. This research aims to gather baseline data on tea garden workers' sanitation and hygiene knowledge, attitudes, and practices in Sylhet, Bangladesh. **Methods:** A cross-sectional study was undertaken among 380 respondents in the Moulvibazar districts of Sylhet division from January 2022 to December 2022. A convenient sampling technique was applied. The study employed a pretested, semi-structured questionnaire to gather information on sociodemographic traits and current attitudes, behaviors, and knowledge related to sanitation and hygiene. Software called SPSS 25.0 was used to analyse the data. **Results:** A majority (76%) of respondents demonstrated hand hygiene awareness, with 56% recognizing the importance of clean water. Most participants (90%) believed that water quality impacts health and 91% associated unsafe drinking water with gastrointestinal issues. Further, 78% agreed on the necessity of water treatment for safety. Awareness of handwashing before handling food was high (90%). For waste management, 67% utilized community dustbins, while 81% emphasized home cleanliness as part of sanitation, though only 15% noted proper waste disposal as essential. Indicators of poor sanitation, like visible garbage, were recognized by 83% of the workers. Sanitation knowledge was found to be strongly correlated with both family size ($p = 0.0002$) and socioeconomic position ($p = 0.03$). Hygiene practices were also significantly related to gender ($p = 0.004$), socio-economic status ($p = 0.008$), and family size ($p = 0.0001$). **Interpretation and conclusion:** These findings indicate that while general awareness and practices are high, socio-economic and demographic factors play crucial roles in shaping specific sanitation behaviors and knowledge.

Key words: *Water, Sanitation, Hygiene, Knowledge, Attitudes, Practices, and Tea-Garden worker.*

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Introduction

Sylhet, a region in northeastern Bangladesh, is renowned for its tea estates. The area's fertile soil, favourable climate with high rainfall, and relatively low altitudes provide ideal conditions for cultivating high-quality tea. These factors contribute to the production of tea and this healthy drink is an important part of mornings in most Sylheti homes, whether it's strong or light, with milk or without, or flavoured with spices.

There are 163 tea gardens in Bangladesh across seven districts. In the Sylhet region of Bangladesh, tea garden workers represent a significant portion of the

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population, yet they often face poor living conditions, lack of access to clean water, and inadequate sanitation facilities.[1] Sanitation and hygiene are essential for improving public health, especially in communities with restricted access to healthcare and resources. Inadequate hygiene and sanitation practices are closely linked to the spread of infectious diseases, malnutrition, and a diminished quality of life.[2,3] As of 2022, 27% of the global population (2.2 billion people) lacked access to safely managed drinking water, defined as water that is safe, available, and accessible at home. Similarly, 43% (3.5 billion people) lacked safely managed sanitation, and 25% (2 billion people) did not have a basic handwashing facility with soap and water at home. While global access to safely managed drinking water increased from 69% in 2015 to 73% in 2022, significant disparities remain, with rural areas (62%) and regions like Africa (33%) lagging behind urban areas (81%) and Europe (92%). Safely managed sanitation improved from 49% to 57% during the same period, but coverage in Africa remained critically low (26% in 2022). The global coverage of basic hygiene services reached 75% in 2022, with rural areas showing progress from 53% to 65%. However, urban areas in Africa experienced a decline from 40% in 2015 to 36% in 2022. The treatment of wastewater is also a challenge, with data from 73 countries showing that 76% of wastewater receives some level of treatment, though only 60% undergoes secondary treatment. Despite some improvements, progress remains insufficient to meet the Sustainable Development Goals (SDGs) by 2030. Current trends indicate that 2 billion people will still lack safely managed drinking water, 3 billion will lack safely managed sanitation, and 1.4 billion will lack basic hygiene services by 2030. Accelerated efforts, increased funding, enhanced monitoring, and sustainable management of water resources are essential to address these challenges and ensure universal access to water, sanitation, and hygiene.[4-6] Research has shown that focusing on three critical hygiene practices can significantly reduce the prevalence of waterborne diseases. Poor WASH (water, sanitation, and hygiene) contributes to undernutrition by causing Diarrhoea, intestinal infections, and possibly gut inflammation. In 2018, 149 million children under 5 (21.9%) were stunted, and 49.5 million (7%) were at risk of wasting globally. Diarrhoea is the second leading cause of death in children under 5, and cholera, which can be fatal within hours if untreated, remains a threat in 69 countries, causing around 2.9 million cases and 95,000 deaths each year. WASH-related diseases include infections spread through contaminated water and poor hygiene, chemical exposure in drinking water, and other health and well-being impacts.[7-10] Improved hand hygiene significantly reduces illness. Some studies show a 31% drop in gastrointestinal illnesses and a 21% reduction in respiratory infections when proper practices are followed. According to the CDC, community education on handwashing can further lower diarrhoea cases by 23-40% and respiratory illnesses by 16-21%. Despite these benefits, only about 19% of the global population practices handwashing with soap after contact with excreta. These findings highlight the urgent need for global initiatives to promote hand hygiene, particularly among children, to curb preventable diseases.[11-14]

Practices of sanitation and hygiene are greatly influenced by people's attitudes and knowledge about these topics. There is a shortage of baseline data to represent the tea garden’s existing sanitation and hygiene habits. The lack of relevant data on sanitation and hygiene know-how and practices makes it difficult to identify

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priority needs. According to some, the most useful source of up-to-date information on community hygiene practices and behaviors is research on knowledge, attitudes, and practices (KAP). Therefore, the goal of the current study was to gather baseline data on the target population's current sanitation and hygiene-related knowledge, attitudes, and behaviors.

Materials and Methods

The purpose of this cross-sectional study was to evaluate the knowledge, attitudes, and behaviors of tea garden workers in Sylhet regarding safe water, sanitation, and hygiene. The study aimed to provide insights to guide public health policies and interventions aimed at improving hygiene practices and overall well-being in this vulnerable group by identifying knowledge and behavior gaps. The study was carried out at Sylhet, Bangladesh, between January and December of 2022. Four tea gardens were conveniently selected based on community participation and proximity. A total sample of 380 participants was drawn from these four gardens. Eligible participants were at least 20 years old, resided in the tea gardens, and provided informed consent. Individuals under the age of 20 or those unwilling to participate were excluded from the study. Before participation, the study's objectives were explained to all participants, and written informed consent was obtained. Each participant was assigned a unique code to maintain confidentiality. Data were collected through face-to-face interviews using a modified version of a previously validated questionnaire. Descriptive analysis was performed using univariate statistics to describe the frequency distribution of categorical variables and the means and standard deviations of continuous variables. Chi-square analysis was used to compare the frequency of categorical variables. All analyses were conducted using Excel and SPSS version 25.

Results

Most participants were aged between 20 and 30 years (40%), with a majority being female (79%). The largest religious group was Hindu (56%). The majority of families consisted of 3-5 members (62%), and over half of the respondents (55%) reported a monthly income between 8,000 and 12,000 takas.

Table I: Socio-demographic characteristics of respondents (n=380).

Variables	Frequency	Percentage (%)	Mean ± SD
• **Age (Years)**			
20-30	154	40	
31-40	129	34	
41-50	83	22	34.17 ± 8.92
51-60	14	4	
• **Gender**			
Male	81	21	
Female	299	79	
• **Religion**			
Hindu	214	56	
Muslim	156	41	
Christian	10	3	
• **Family Size**			
1-2 persons	45	12	
3-5 persons	237	62	

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6-10 persons	98	26
• **Educational Status**		
Illiterate	209	55
Class 1- 5	114	30
Class 6- 10	57	15
• **Monthly Income**		
3000 – 7000 takas	146	38
8000 – 12000 takas	208	55
13000 – 17000 takas	26	7

Table II: Respondents' attitudes and knowledge about water, sanitation, and hygiene (n=380).

Variables	Frequency	Percentage
• **Understanding of safe water, sanitation, and hygiene***		
Hand hygiene/cleanliness	289	76
Safe face disposal	92	24
Food hygiene/cleanliness	59	15
Clean/safe water	214	56
Solid waste disposal	97	25
• **Perception about critical times of hand washing***		
Before handling food	341	90
After defecation	363	95
After weaning/changing the baby	109	29
When entering the home from outdoors	61	16
• **Perception about the reasons for hand washing***		
Hygiene: feel clean	305	80
Health: prevent infection	278	73
Appearance: appears good	109	28
Because everyone does	126	33
Don't know	5	1
• **Solid waste disposal***		
Community dustbin	254	67
In open drain	94	25
Burn in open	19	5
Dumping	84	22
Don't know	19	5
• **Perception on ways to maintain good sanitation***		
Clean house	307	81
Use clean water	106	28
Appropriate wastewater and garbage removal	57	15
Safe face disposal	39	10
Don't know	13	3
• **Awareness of indicators of poor hygiene and sanitation***		
Wastewater and garbage in the area	317	83
An unpleasant odor in the surroundings	264	69
Animal faeces in the surrounding	73	19
Don't know	25	7

* There are variables in several answers.

The survey results showed that the majority (76%) of respondents understood the importance of hand hygiene. Most respondents (95%) recognized the need to wash hands after defecation. Hygiene (80%) and health (73%) were the primary reasons for handwashing. Regarding solid waste disposal, the most common method was using a community dustbin (67%). The majority (81%) understood the importance of maintaining a clean house, additionally, 83% identified garbage and wastewater in the surroundings as signs of poor

sanitation.The chart showed that 22% of respondents did not treat their water. Among them, the most common reason was that the water was already clean (50%).

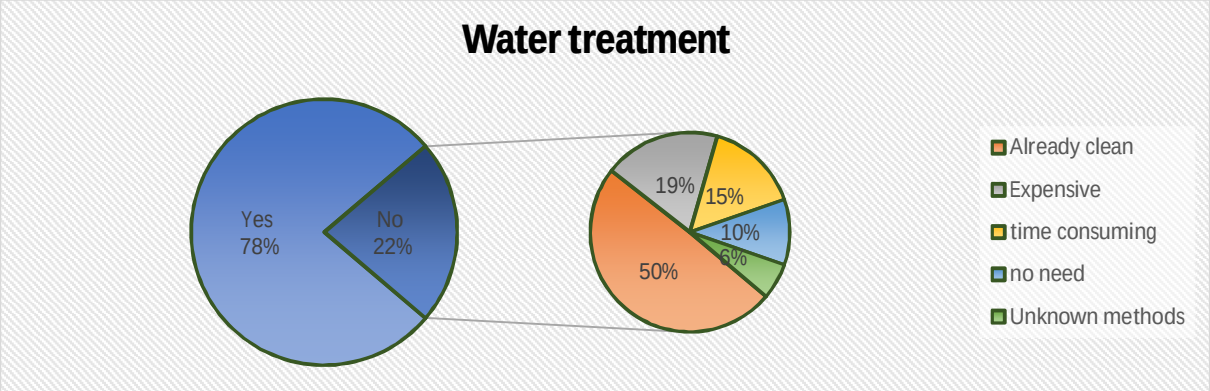

Figure 1: Knowledge about water treatment of the respondents.

The chart presented that 90% of respondents reported that the quality of water affected health, with gastrointestinal disturbances being the most common (91%).

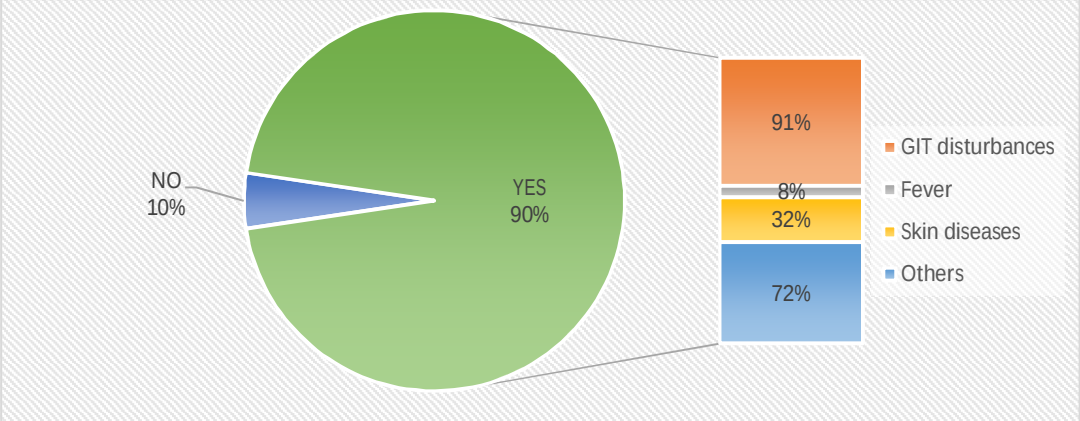

Figure 2: Knowledge about health related to water quality and its role in causing diseases (There are variables in several answers).

Table III: Respondents' Hygiene and sanitation habits (n=380).

Variables	Frequency	Percent
1. Important moments for handwashing		
Following bowel movements	365	96%
Before handling food	350	92%
Always when hands are filthy	126	33%
After cleaning children	98	25%
2. Handwashing material		
Soap and water	256	67%
Ash and water	35	9%
Water only	89	24%
3. Toilet facility		
Household	210	55%
Community	25	6%
Shared	145	39%
4. Toilets types		

Flush/pour flush; to piped sewer system	317	83%
Elsewhere	63	17%
5. Drainage type		
Open	150	39%
Closed	230	61%

There are variables in several answers

Handwashing practices were relatively strong for some reasons. Water and soap were being the primary materials for 67% of participants. In terms of toilet facilities, 55% had household toilets, and most of these (83%) were flush or pour-flush types connected to a sewer system. For drainage, 61% had access to closed drainage systems.

The study reveals that 77% of respondents relied on public water sources, and 22% did not treat their drinking water. Most respondents (59%) cleaned their water containers daily. Regarding solid waste disposal, 77% used community dustbins, with waste disposal occurring daily for 59% of respondents.

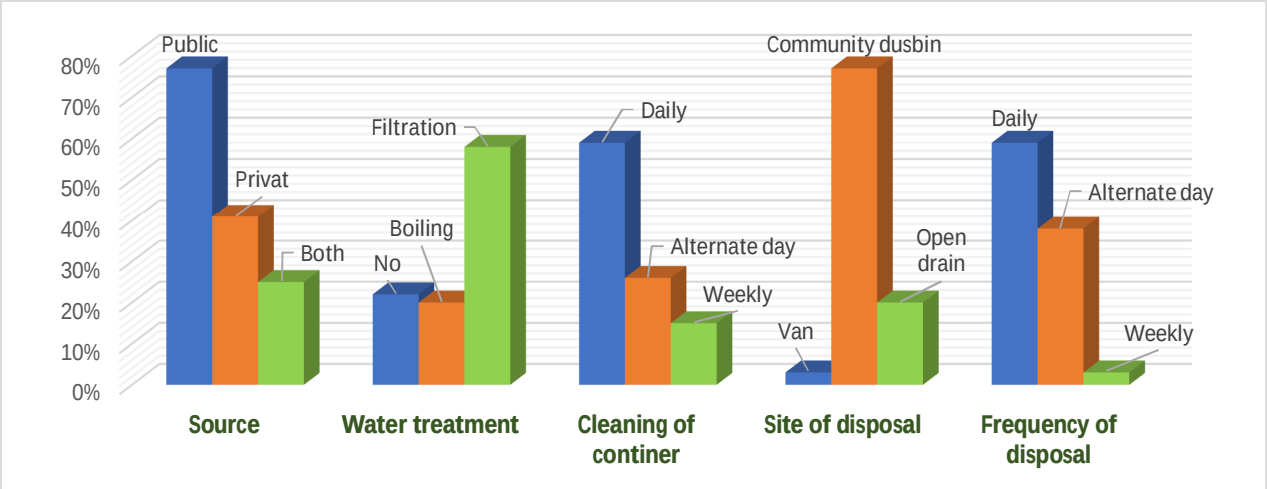

Figure 3: Practices regarding water and waste disposal of the respondents (There are variables in several answers).

Table IV: Knowledge of sanitation and hygiene is correlated with sociodemographic factors (n=380).

Variables	Sufficient knowledge	Insufficient knowledge	X^2	df	p-value
Gender					
Male	51	30	0.52	1	0.47
Female	175	124			
Religion					
Hindu	123	91	0.54	2	0.76
Muslim	84	72			
Christian	6	4			
Socio-economic status					
Lower	90	56	6.87	2	0.03*
Middle	155	53			
Upper	19	7			
Family size					
1-2 persons	31	14	17.28	2	0.0002*
3-5 persons	154	83			
6-10 persons	41	57			

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Both family size and socioeconomic position had a strong correlation with knowledge levels (p = 0.0002) and were strongly correlated with knowledge (p = 0.03).

Table V: Relationship between sanitation and hygiene practices and sociodemographic factors (n=380).

Variables	Good practices	Poor practices	X^2	df	p-value
Gender					
Male	43	38	10.8	2	
Female					0.004*
	209	90			
Religion					
Hindu	123	91		4	0.06
Muslim	128	28	8.96		
Christian	7	3			
Socioeconomic status					
Lower	68	78	13.70	4	0.008*
Middle	119	89			
Upper	20	6			
Family size					
1-2	30	15	22.91	4	0.0001*
3-5	145	92			
6-10	37	61			

In summary, gender, socioeconomic status, and family size were significantly linked to hygiene practices, while religion was not.

Discussion

Clean water and proper sanitation are vital for preventing infectious diseases and reducing related health risks.[15] Access to safe, affordable drinking water is essential for everyone, regardless of gender, socio-economic status, caste, race, or location.[16] Despite progress in Bangladesh's health sector, tea garden workers remain underserved, facing inadequate wages and limited access to health and hygiene services.[17] Denying tea garden workers adequate water, sanitation, and hygiene facilities is outdated, as most tea estates lack proper services.[18] This study assessed the Knowledge, Attitude, and Practices (KAP) on Water, Sanitation, and Hygiene among tea plantation workers in Sylhet, Bangladesh. Key findings revealed that 56% recognized the importance of clean water, 76% valued hand hygiene, but only 24% acknowledged the need for safe fecal disposal, and 25% supported proper solid waste management. These findings align with previous studies showing general awareness of sanitation and hygiene.[17–20] Most respondents prioritized hand hygiene as the key aspect of sanitation, followed by proper waste disposal. They believed handwashing prevents illness and linked dirty environments to diarrhoea.[17,19,21] Diarrheal diseases have become less concerning over the past decade due to improved water, sanitation facilities, and better personal hygiene practices.[18]

In this study, 90% of respondents recognized the health impact of water quality, with 91% identifying gastrointestinal issues as the most common effect of drinking contaminated water. While 78% agreed that water treatment ensures safety, 50% of those who didn't treat their water believed it was already clean, with others citing cost and time constraints. These findings align with Kuberan et al.'s study. It was commonly known that 90% of hands need to be cleaned before handling food and 95% after

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defecating. Only 29% washed their hands after weaning or changing a baby. The main motives for hand washing were hygiene (80%) and health (73%). In a study by Kuberan et al. most of the respondents felt that hands should be before and after meals, while only 32% believed that hands should be washed after defecation.[15]

In this investigation, to maintain good sanitation, 81% emphasized the importance of keeping the house clean, while only 15% highlighted the proper disposal of waste. In an adjacent area, 83% of respondents identified wastewater and garbage as indicators of inadequate sanitation. This research highlighted several key aspects of water, sanitation, and hygiene practices among tea garden workers. Among the respondents, 77% relied on public water sources while 41% used private sources, and 25% accessed both. A study by Boruah PJ found that community water supply was the most common source of water supply. [20] Other studies found that most people were using tube well water.[15,17,18]

We observed regarding drinking water treatment, 58% practiced filtration, 22% did not treat their water, and 20% boiled it. Most cleaned their water containers daily (59%). This was also practiced by participants of other studies. [15,22] According to several research, the majority of individuals were drinking boiling water.[18,20] On the other hand, according to a study by Mohd and Malik, 55.6% of respondents did not use any drinking water purification techniques. Merely 11% of those surveyed said they cleaned their water storage containers every day. [19] A study by Joshi et al. found that three-fourths of the respondents were not using any method to treat the water.[16] Ahmad et al. showed that tea garden workers were not well aware of using safe water. [23]

Handwashing practices were strong in this study, with 96% washing hands after defecation and 92% before handling food. Water and soap were the most common agents used (67%). These practices align with findings from other studies, where participants agreed that handwashing improves hygiene and prevents infection.[15,16,18-20,22]

For toilet facilities, 55% had household toilets, and most of these toilets were flush/pour flush types connected to a sewer system (83%). This was in accordance with other study findings.[1,15-17,20-22,24] Another study showed that 90% of the respondents had toilet facilities and half of the toilets were non-sanitary.[18]

In terms of drainage, we found that 61% had access to closed drainage. Another study finding showed similar result.[15] For solid waste disposal, 77% used community dustbins and 59% of the respondents disposed of the waste daily. Some other studies found that most of the respondent households did not have proper means of waste disposal and had to burn, bury, or dispose of the waste in backyard or community trash bins. There was a lack of a closed drainage system.[15,18,20] Boruah PJ showed in a study that most of the people were cleaning their houses daily.[20] Another study by Mohd and Malik found 53.8% of the participants dispose of solid waste daily.[19]

A study by Mahmud et al. found that hygiene practices among the tea garden workers were not satisfactory. The majority of the tea garden workers did not have hygienic latrines. Most of the people were not accustomed to wash their hands with soap after defecation and before eating. Most of the families did not have access to safe drinking water and household waste management systems leading to many diseases. The tea garden workers had to remain in economically vulnerable conditions due to diseases caused by unsafe hygiene practices.[25] Similar findings were observed in other studies where most of the households were using open space toilets.

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[23,26] and the incidence of water-borne diseases rose as a result of open defecation or toilet sharing with other households.

Bharti et al. revealed in a study that all informants acknowledged the importance of covered drinking water in the prevention of diseases but covered drinking water was found in 96.8% of households. Only 33.5% of participants knew that unsafe water can cause diarrhea. Most of the respondents were aware that boiling or filtering water can prevent waterborne diseases but it was being practiced in 10% of households.[27] There was no significant difference in knowledge levels based on gender ($p = 0.47$) or religion ($p = 0.76$) in our study. Socio-economic status and family size showed a significant association with knowledge levels ($p = 0.03$ and $p = 0.0002$ respectively). Another study reported similar findings.[19] There was a statistically significant association between gender and hygiene practices ($p = 0.004$) where males showed lower good practice rates compared to females. This was consistent with another study finding.[21]

Socioeconomic status and cleanliness habits were shown to be statistically significantly correlated ($p = 0.008$). Those from the lower socio-economic class showed fewer good practices. The association between family size and hygiene practices was statistically significant ($p = 0.0001$) and smaller family sizes were associated with better hygiene practices. A study by Mohd and Malik also found that hygiene practices were significantly associated with socioeconomic status and family size.[19]

Another study discovered a strong correlation between family income, age, education, and occupation with knowledge and practice regarding water, sanitation, and hygiene. Most respondents knew very little about water, sanitation, and hygiene, and they were engaging in risky behaviors. The investigation came to the conclusion that as knowledge grows, practice improves. [22]

The results of the current investigation suggest that while awareness of water quality and hand hygiene is relatively high, certain practices, like hand washing after child care and comprehensive waste disposal are less commonly observed. This highlights potential areas for targeted health education to improve hygiene and sanitation behaviors.

Study Limitations

Because the study was restricted to a certain subset of Sylhet's tea garden labourers, the findings may not be as applicable to other areas or demographics.

Conclusion and Recommendation

The study reports that most tea garden workers of those gardens in Sylhet, had relatively good knowledge and awareness of sanitation and hygiene, including hand hygiene, water quality and the health problems caused by drinking unsafe water. However, disparities in sanitation practices and knowledge are influenced by socioeconomic status, gender, and family size, underscoring the need for targeted interventions that address these factors. Enhancing access to sanitation facilities, clean water, and community education could further improve hygiene practices, fostering a healthier environment for tea garden communities.

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were instrumental in the successful completion of this study.

Disclosure

All of the authors declared no competing interests.

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