Adequacy of Water Hygiene and Sanitation Facilities in Different Schools: A Coliform Presence Focused Study in Southern Bangladesh

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Abstract: The current study, therefore, intended to evaluate the sufficiency of WASH facilities in schools within Bauphal, Dumki and Patuakhali Sadar upazila in Patuakhali District, regarding water, sanitation, hygiene facilities, and coliform bacteria in drinking water. This study evaluated the status of WASH facilities and any significant factors affecting their availability. This mixed-method study was conducted in 30 schools for WASH data selected through purposive sampling and 30 water samples were collected for quality test. Analysis of the association of various factors with WASH services in schools was done through a chi-square test using SPSS. Coliform was detected through standard plate count technique followed by spread plate method on EMB agar media. The present study reported notably lower sanitation and hygiene facilities in schools from Patuakhali District. Moreover, urban schools had more access to water and sanitation facilities than rural schools, 92.9%, and 68.8%, respectively. Only 15.4% of government schools and 58.8% of private schools had basic sanitation facilities. Only 33% of schools having basic hygiene services while 40% had none at all. Likewise, 30% of drinking water samples tested positive for total coliform. The study has pointed out the need for the improvement of sanitation and hygiene facilities at schools, especially in rural areas, to establish a healthy and conducive learning environment.

Keywords: Water quality; Hygiene; Sanitation facilities; Schools; Coliform

Introduction

WASH facilities are major necessities in the school environment to provide a healthy and productive learning environment. In schools with WASH infrastructure, students and staff alike have access to reliable sources of safe drinking water, adequate sanitation facilities, and strategically placed hand-washing stations near toilets. Such facilities will go a long way in reducing the prevalence of waterborne diseases like diarrhea that can seriously affect the health, attendance, and general well-being of students. Indeed, washing hands with soap has been proven to prevent the transmission of infectious diseases, thereby improving the general health status of students, which goes a long way in improving the learning environment (Adams et al., 2009; Hunter et al., 2015; Jasper et al., 2012; Adukia, 2017).

Most importantly, access to at least basic WASH services at schools is universally recognized in national policies and global frameworks, especially within the Sustainable Development Goals (SDGs). Most especially, SDG Goal 4 on quality education and SDG Goal 6 on availability and sustainable management of water and sanitation bring into focus the importance of ensuring that schools are appropriately equipped

with WASH services. These goals track the proportion of schools with basic drinking water, single-sex sanitation facilities, and handwashing facilities (WHO, 2017; UN, 2015). Despite recognition of the importance of WASH in schools, many schools, especially in low-income countries, have large gaps in the provision of these services (UNICEF, 2018; Mills and Cumming, 2016). School WASH services remain inadequate in most low-income countries, including Bangladesh. Most schools have also been reported to lack water, sanitation, and hygiene services. According to the Joint Monitoring Program, WHO, and UNICEF, 29% of schools globally lack basic drinking water services, which translates to 546 million children. Equally, 28% lack basic sanitation services, translating to 539 million children. For basic hygiene services, the percentage of schools that lack them stands at 42%, which affects approximately 802 million children (WHO & UNICEF, 2022). A 2016 Joint Monitoring Program (JMP) report showed that 74 percent of schools in Bangladesh had access to basic drinking water services, rising to 81 percent by 2021. But the same report revealed a decline in access to basic sanitation services: by 2021, only 57 percent of schools had met all minimum sanitation requirements, compared to 59% in 2016. Furthermore, hygiene facilities in schools in Bangladesh are poor; only 56% of schools are provided with basic hygiene services; and 5% have no hygiene services at all (UNICEF, 2018; WHO & UNICEF, 2022). These results suggest that although access to water has been slightly improved, sanitation and hygiene service provision in schools falls far short of aspirational values.

These facts notwithstanding, there is a gaping hole in the research concerning the status of WASH facilities in schools in other regions of Bangladesh. The existing research, on the other hand, differs from those and most others that treat WASH status in schools mostly and primarily from an urban perspective or national level data with very little attention to the inclusion of non-urban areas, for instance, in the south like Patuakhali district. Most of the studies conducted regarding WASH status in Bangladesh are old; thus, the present situation can hardly be gauged. There was no study on detection of total coliform in drinking water at school premises. Hence, there is a distinct lack of current regional specifics data, creating an important gap in understanding the WASH situation in schools and spaces for making improvements in the sector. This under-researched area is the focus of a study that aims to make a full assessment of the current status of WASH facilities, including sources of water, drinking water, sanitation, and hand washing facilities. Furthermore, such research would measure the occurrence of coliform bacteria in drinking water, a key parameter to reflect the quality and safety of water. The determinants of the above would be taking into consideration the factors affecting the WASH service delivery in schools regarding school ownership, school geography, and the school level.

This study will enrich the literature by carrying out newer and regional-specific assessments related to WASH facilities in schools in Patuakhali District. The results shall be helpful in making local and national policy recommendations on improvement in WASH services in schools that would eventually give better health, education, and overall development to students in the region. This study, therefore, brings to the fore the inability of WASH services, coupled with factors that influence these services, and helps set valuable insights for policymakers, educators, and health practitioners working toward the improvement in the quality of school environments within Bangladesh.

Methodology

Study Area, Design, and Period

A mixed method study was carried out from July 2023 to June 2024 in Bauphal, Dumki and Patuakhali Sadar Upazilas of Patuakhali, a southern district of Bangladesh. The present study was designed to assess the status of WASH facilities in schools in both urban and rural areas. Overall, 30 schools were selected, ensuring the representation of both government and non-government institutions.

Sampling Technique

Thirty schools were selected through purposive sampling, and ten schools were selected from each Upazila. The sample was balanced in terms of the extent of ownership (government and non-government) and

geographic location (urban and rural). This ensured that the sampling was both proportional and representative for such a study of WASH services.

Data Collection

Data on WASH services were collected using structured questionnaires and validated observational checklists. The questionnaires were adapted from Joint Monitoring Programme (JMP) indicators, which collected information from the school directors (WHO & UNICEF, 2018). The set of questions related to the availability and usage of WASH facilities had been cross-verified with direct observations using checklists assessing water sources, drinking water facilities, sanitation infrastructure, and handwashing facilities. Five trained undergraduate students of Patuakhali Science and Technology University conducted the data collection.

Definitions and Indicators

School WASH services were classified according to the JMP core indicators including:

Basic Drinking Water Service*:* Drinking water comes from improved sources and is available at the school premises during the survey.

Limited Drinking Water Service*:* Drinking water is from improved sources, but water is not available during the survey.

No Drinking Water Service: Water sourced from unimproved sources, or no water provided at the school.

Basic Sanitation Service*:* Schools that have improved sanitation facilities that are single-sex and functional, meaning available, private, and usable.

Limited Sanitation Service*:* Schools with improved sanitation facilities that are either not single-sex or not usable.

No Sanitation Service: Those schools without toilets or having just unimproved sanitation facilities, such as pit latrines without slabs or hanging latrines.

Basic Hygiene Service: The school has handwashing facilities with water and soap.

Limited Hygiene Service: The school has handwashing facilities with water but no soap is provided.

No Hygiene Service*:* No handwashing facilities are available in the school or the available facilities are non-functional (WHO & UNICEF, 2018).

Collection of Water Samples

A total of 30 water samples (100 ml) were collected from drinking water sources in all schools visited. Samples were taken under normal conditions (e.g., taps or wells used by students) and collected in sterile test tubes for subsequent microbial analysis.

Statistical analysis

Data were processed in Microsoft Excel and imported into SPSS version 27 for analysis. Descriptive statistics, including frequencies, percentages, and proportions, were used to assess the availability and effectiveness of WASH services. Cross-tabulation and chi-square tests were performed to examine the relationship between WASH performance and variables such as school ownership, geographic location, and education level. This allowed it to be easier to spot trends and differences in WASH services among various school characteristics. All analyses were performed with a 95% confidence interval, and a significance level set at $p<0.05$.

Microbiological analysis

To assess the microbiological quality of drinking water, coliform contamination was tested using standard microbiological techniques as follows:

Coliform culture on EMB media: The EMB agar medium was employed to count coliform. Appropriate quantities of ingredients were dissolved in distilled water, and sterilized with an autoclave at 121 degrees C for 15 minutes with 15 lbs pressure through gravity-feed techniques. The sterile glassware test tubes and Petri dishes were autoclaved, and Petri dishes were further sterilized at an oven temperature of 180 degrees C for 2 hours (Islam et al., 2022).

Inoculation: The inoculation was done using the standard plate count (SPC) method: 20 ml of sterilized EMB agar medium was poured into Petri dishes and allowed to solidify. A portion of 0.1 ml of solution

serially diluted from each water sample was inoculated onto the agar plates using a micropipette and spread with a sterilized bent glass rod (spreader). All these operations were conducted aseptically in a laminar flow bench.

Incubation: The inoculated EMB agar plates were kept at 37^0 C for 24-48 hours.

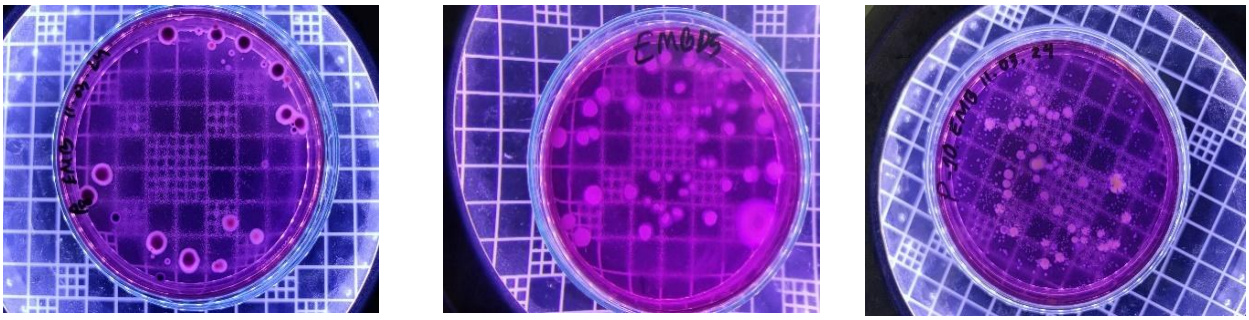

Figure 1. The inoculated plates of coliform.

Ethical Approval

Prior to data collection, informed consent was obtained from school authorities. All data were kept confidential without revealing the identity of the schools and participants.

Result

Characteristics of school and accessibility of WASH service

Table 1 reveals statistical differences in the degree to which schools offer WASH services. In terms of the distribution of the schools concerning authorities, school level, geography, and student gender, we find that government schools account for 43.3% of the sample, and non-governmental schools 56.7%. While secondary schools took 53.3%, primary schools occupied only 46.7%. The geographical location study showed that 46.7% of schools were in urban settings while 53.3% were in rural areas. Based on gender, the number of male students was 45.7% and that of female students was 54.3%. The availability of WASH services in the school varied from one ownership to the other and from a school level to a different geographic area. A greater number of non-government schools (56.7%) had a more improved WASH service, in comparison to government schools (43.3%), especially in terms of water accessibility (82.2% vs. 76.9%), cleanliness (82.4% vs. 46.2%) and hygiene facilities (58.8% vs. 30.8%). Secondary schools (53.3%) appeared to have a higher rate of WASH admission in comparison with primary schools (46.7%) particularly in the aspect of sanitation (81.3% vs. 50%) and the pertinent hygiene factor (62.5% vs. 28.6%). Urban schools (46.7%) registered a remarkable increase in water (92.9%) in comparison to rural schools (53.3% for water and 68.8% for hygiene). On the other hand, the urban schools had lower sanitation (62.5% vs. 71.4%) and hygiene (37.5% vs. 57.1%) (Table 1).

Table 1. Characteristics of school and accessibility of WASH service

Variables	Categories	N (%)	Accessible water (%)	Accessible sanitation (%)	Accessible hygiene (%)
Ownership	Govt.	13 (43.3)	10 (76.9)	6 (46.2)	4 (30.8)
	Non-Govt.	17 (56.7)	14 (82.2)	14 (82.4)	10 (58.8)
School Level	Primary	14 (46.7)	11 (78.6)	7 (50)	4 (28.6)
	Secondary	16 (53.3)	13 (81.3)	13 (81.3)	10 (62.5)
Geography	Urban	14 (46.7)	13 (92.9)	10 (71.4)	8 (57.1)
	Rural	16 (53.3)	11 (68.8)	10 (62.5)	6 (37.5)
Student Number	Male	4348 (45.7)	-	-	-
	Female	5166 (54.3)	-	-	-

Bi-variate association and the status of school WASH service

Table 2 disclosed significant associations between WASH service accessibility and different school characteristics. In the context of the drinking water service, government schools had 100% basic services available, while private schools were a blend of 64.7% basic and 23.5% limited access ($X^2 = 5.75$, $p < 0.05$). Regarding sanitation, government schools had a higher proportion of limited service (84.6%) compared to private schools (29.4%) ($X^2 = 9.24$, $p < 0.05$). Among the primary schools, 100% of them had basic sanitation services, but secondary schools were a mix of 62.5% basic and 25% limited access ($X^2 = 11.25$, $p < 0.01$). The origin of coliform was also significant in terms of hygiene service accessibility, with rural schools representing a higher percentage of limited services (50%) than urban schools (50% basic, $X^2 = 7.81$, $p < 0.05$). Well, here is presented the surprisingly contrastively different from the argument above for urban and rural citizens. The existence of coliform was significantly higher in rural schools (37.5%) than in urban schools (21.4%). The availability of handwashing facilities was more common in urban schools (85.7%) compared to rural schools (50%) ($X^2 = 4.28$, $p < 0.05$). These results prove to us the unequal distribution of WASH service accessibility based on school ownership, type, and location (Table 2).

Table 2. Bi-variate association and the status of school WASH service

		Drinking water service				**Sanitation service**				**Hygiene service**				**Coliform**		**Handwashing facilities**	
Variables		No Service (%)	Basic (%)	Limited (%)	X^2	No Service (%)	Basic (%)	Limited (%)	X^2	No Service (%)	Basic (%)	Limited (%)	X^2	Present (%)	X^2	Yes (%)	X^2
Ownership	Govt.	0 (0)	13 (100)	0 (0)	5.75	0 (0)	2 (15.4)	11 (84.6)	**9.24***	7 (53.8)	1 (7.7)	5 (38.5)	**6.82***	5 (38.5)	0.782	7 (53.8)	1.69
	Private	2 (11.8)	11 (64.7)	4 (23.5)		2 (11.8)	10 (58.8)	5 (29.4)		5 (29.4)	9 (52.9)	3 (17.6)		4 (23.5)		13 (76.5)	
Type	Primary	0 (0)	14 (100)	0 (0)	**6.56***	0 (0)	2 (14.3)	12 (85.7)	**11.25****	7 (50)	1 (7.1)	6 (42.9)	**8.64***	5 (35.7)	0.408	8 (57.1)	1.07
	Secondary	2 (12.5)	10 (62.5)	4 (25)		2 (12.5)	10 (62.5)	4 (25)		5 (31.3)	9 (56.3)	2 (12.5)		4 (25)		12 (75)	
Geography	Urban	0 (0)	13 (92.9)	1 (7.1)	3.05	0 (0)	6 (42.9)	8 (57.1)	1.87	3 (21.4)	4 (28.6)	7 (50)	**7.81***	3 (21.4)	0.918	12 (85.7)	**4.28***
	Rural	2 (12.5)	11 (68.8)	3 (18.8)		2 (12.5)	6 (37.5)	8 (50)		9 (56.3)	6 (37.5)	1 (6.3)		6 (37.5)		8 (50)	
Total		2 (6.7)	24 (80)	4 (13.3)		2 (6.7)	12 (40)	16 (53.3)		12 (40)	10 (33.3)	8 (26.7)		9 (30)		20 (66.7)	

Note: *indicates p-value <0.05, **indicates p-value <0.0

Drinking water facility and functionality status

Figure 2 shows that most of the population has access to improved sources of drinking water 93.3% while 6.7% have no source. The functional water source is utilized by 83.3% while 16.7% do not utilize it. A small fraction, 13.3%, further treats water such as by filtration and boiling while the larger portion, 86.7%, does not further treat their water (Figure 2).

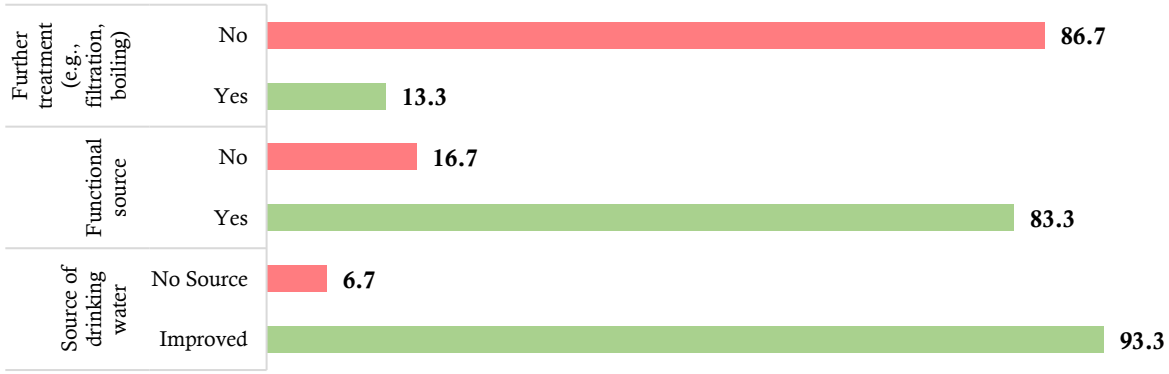

Figure 2. Drinking water facility and functionality status

Note: Data are shown in percentage.

School sanitation facility, privacy, and functionality status

Figure 3 shows that 93.3% of the population uses improved toilets, while 6.7% use unimproved toilets. On the issue of separation of toilets by sex, 53.3% have separate toilets and 46.7% do not. In relation to access to cleansing materials like water or tissue paper, a high proportion, 80%, reported having these materials, and the remaining 20% did not. As far as cleanliness is concerned, 16.7% reported their toilets as clean, 46.7% reported them as somewhat clean, and 36.7% reported them as not clean (Figure 3).

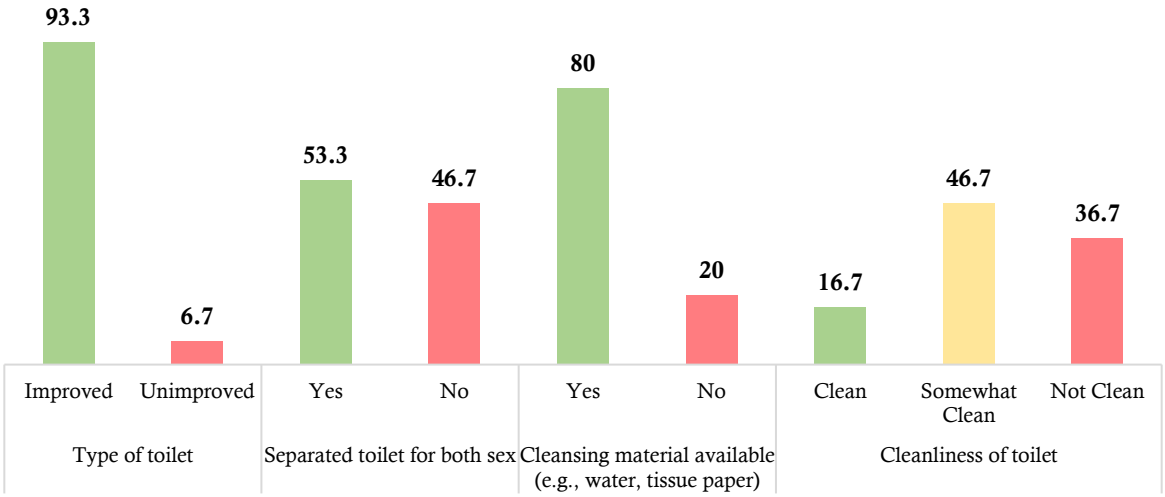

Figure 3. School sanitation facility, privacy, and functionality status

Note: Data are shown in percentage.

School handwashing facility and functionality status

Figure 4 shows that 66.7% of the population has access to a handwashing facility, while 33.3% do not. Among the ones who have a facility, 60% reported it functional, while 40% reported that it was not. On the question of handwashing supplies, 33.3% have both water and soap, 26.7% have only water, and the rest have none at all. On cleanliness, 53.3% of the schoolyard is clean while 46.7% is not. In the classrooms, 66.7% are clean while 33.3% are not. Also, 80% have access to a dustbin while 20% do not (Figure 4).

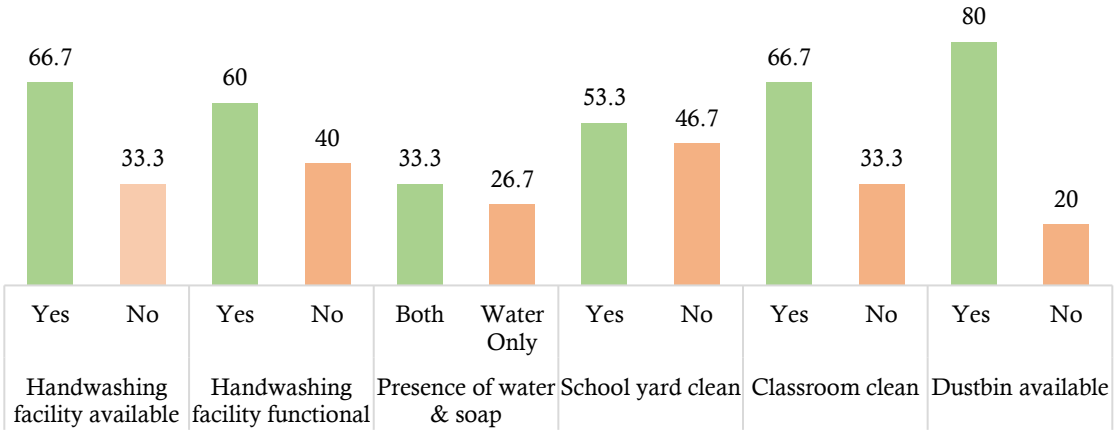

Figure 4. School handwashing facility and functionality status

Note: Data are shown in percentage.

Table 3 presents the number of facilities per student enrolled. Drinking water points for a ratio of 170 students per point, without detailing the gender aspect. On usable toilets, the enrolment-to-facility ratio for male students stands at 45:1 and female students at 53:1. Handwashing points are provided at a student-to-facility ratio of 127 students per point, where no gender-specific ratio stands out.

Table 3. Facilities and their ratio to students

Facilities	N	Male ratio	Female ratio	Student ratio
Drinking water point	56	-	-	170:1
Usable toilets	97	45:1	53:1	
Handwashing point	75	-	-	127:1

Presence of total coliform in drinking water

In Bauphal region, coliform presence was detected in 4 (40%) of schools, whereas Dumki and Patuakhali Sadar exhibited coliform presence in 2 (20%) and 3 (30%) of schools, respectively, within their drinking water systems. Rural areas showed coliform presence in 6 (37.5%) of schools, while urban areas had a lower incidence at 3 (21.4%). Among the 14 primary schools, 9 (64.3%) remained uncontaminated by coliforms, whereas 5 (35.7%) schools were found to be contaminated. Secondary schools fared better, with 12 (75%) schools reporting no coliform contamination, while 4 (25%) did show coliform presence in their water sources. From 13 government schools 8 (61.5%) of them found to be free from coliform contamination whereas 5 (38.5%) were contaminated with coliforms in their water sources and from 17 non-govt. schools 13 (76.5%) of them were not contaminated with any coliform bacteria and only 4 (23.5%) of those schools found to be contaminated with total coliform bacteria in their water supply sources (Table 4).

Table 4: Presence of Total Coliform in drinking water

Variable		Presence of Total Coliform	
		Absent	Present
Location	Bauphal	6 (60%)	4 (40%)
	Dumki	8 (80%)	2 (20%)
	Patuakhali Sadar	7 (70%)	3 (30%)
Ownership	Govt.	8 (61.5%)	5 (38.5%)
	Non-Govt.	13 (76.5%)	4 (23.5%)
Level	Primary	9 (64.3%)	5 (35.7%)
	Secondary	12 (75%)	4 (25%)
Geography	Urban	11 (78.6%)	3 (21.4%)
	Rural	10 (62.5%)	6 (37.5%)
Total		21 (70%)	9 (30%)

Discussion

The study aimed to establish the status of adequacy regarding WASH facilities in schools and looked at the progress toward achieving SDG 6. Overall, our findings highlighted challenges and disparities in WASH services across different types of schools in the region.

Results show that the basic drinking water service in schools within Patuakhali stands at 80%, higher than the global average of 71% reported for schools around the world by JMP (WHO & UNICEF, 2022). The results of Patuakhali also marginally surpass the Bangladesh national average, which was 81% in the 2022 JMP report, and therefore may be relatively satisfactory within this region. However, the research falls short in capturing any perceived risk associated with water quality; perceived risks of coliform-contaminated drinking water, as cited, were reportedly significant issues, especially in rural areas. This regional variation in coliform contamination rates is quite alarming and really calls for focused water quality management, especially in rural areas and government schools, which are more likely to face infrastructure challenges (WHO & UNICEF, 2022).

The sanitation situation in schools in Patuakhali District is far below both national and global averages. According to JMP, 72% of schools worldwide and 57% of schools in Bangladesh had basic sanitation facilities, whereas only 40% of schools in Patuakhali met this standard (WHO & UNICEF, 2022). This represents a substantial shortfall in school sanitation coverage and suggests persistent inequities in WASH service delivery. Similar patterns have been reported in Bangladesh, where school sanitation services have improved over time but remain uneven, particularly in rural and government schools (Jahan et al., 2025). The disparity between government and non-government schools in Patuakhali is also consistent with previous studies from rural Bangladesh. In the present study, only 15.4% of government schools had basic sanitation compared with 58.8% of non-government schools, which may reflect differences in funding, infrastructure investment, and managerial flexibility. Earlier work in rural Bangladesh also showed that government primary schools often lag behind non-government schools in maintaining sanitation services, despite programmatic efforts to improve WASH facilities (NAPE, 2025). This suggests that resource allocation alone may be insufficient unless it is accompanied by strong maintenance systems and institutional accountability.

The hygiene facilities in Patuakhali are substantially poorer than national estimates, with only 33% of schools having basic hygiene access, compared with 56% nationally (WaterAid, 2018). This is also below more recent national findings, where basic handwashing services were reported in 51.7% of schools, showing that many Bangladeshi schools still lack adequate hygiene infrastructure (Karim et al., 2024). Similar studies in rural Bangladesh also report that school WASH outcomes remain strongly shaped by

location, management, and maintenance capacity, with rural and government schools generally lagging behind better-resourced institutions (Jahan et al., 2025; NAPE, 2025). The rural–urban gap in your study is consistent with earlier evidence that hygiene and sanitation services are often weaker in rural schools and improve only when facilities are well managed and financially supported (NAPE, 2025). Overall, the findings suggest that Patuakhali faces a more severe hygiene deficit than many other parts of Bangladesh, reinforcing the need for targeted investment, regular maintenance, and stronger school-level WASH management (Karim et al., 2024; Jahan et al., 2025).

The study showed the differences existing between access to urban and rural schools water and sanitation services. Most urban schools in Patuakhali, about 92.9%, have access to basic water services, while only about 68.8% of rural schools have access. Already, the two schools are heterogeneous and too marked in the distribution of resources and infrastructure cases on the other side being aggravated by the little government funding budgeted for rural schools. Similar to that, rural-urban differences have also been manifested in the approach of sanitation and hygiene facilities. It shows that rural schools are less likely to have functional or accessible ones. Challenges such as the non-availability of water supply (31.3% of schools) and lack of sanitation facilities (56.3%) are faced by rural schools, while urban schools usually enjoy both services.

Another concern raised by the study is the disparity among the genders regarding the availability of toilet facilities. Only 53.3% of the schools provide separate toilets for boys and girls, which raises a major issue of concern, especially for female students who may face difficulties in accessing clean, private places. Gender-segregated sanitation facilities are essential to the comfort and dignity of female students. The lack of such facilities can hinder school attendance and, hence, academic performance. Furthermore, the toilet-student ratio, which is 45:1 for boys and 53:1 for girls, indicates a basic shortfall in toilets therefore available as against the number of students, which makes it further necessary to improve sanitation infrastructure.

Recent findings disclose that 66.7% of schools have handwashing facilities, although doubts regarding their functionality and accessibility prevail. Only 60% of these facilities were functional during the study period, with a student-to-handwashing-point ratio of 127:1 also indicative of an insufficiency of these facilities in relation to the number of students at the respective schools. In addition, the cleanliness situation of only 16.7% of schools indicates the need for proper sanitation and cleanliness of the hygiene facilities. Cleanliness, soap availability, regular maintenance of facilities, and improved student-facility ratios will provide a good backdrop for promoting effective hand hygiene practices in stopping the transmission of infection and diseases.

The presence of coliform bacterial contamination in school drinking water systems is another strong warning flag. This points out the wide regional disparities in drinking water quality and signals the urgent need to improve water treatment and monitoring of systems, particularly in rural schools. It adds weight to the observation that perhaps the management of water quality has been found to be weak in primary schools as compared to higher levels of education since the pollution level in these schools is 35.7% against 25% of secondary schools.

In coastal primary schools, microbial contamination was detected at both source and point of use, and more than half of the samples showed low to high bacterial risk, which is comparable to the contamination pattern observed in Bauphal and rural schools in present study (Hossain et al., 2022). A school study in Chattogram city also reported coliform contamination in about 65% of samples, which was higher than present study (Alam and Dey, 2024). Compared with other school WASH studies, finding observed that government schools were more contaminated than non-government schools is also in line with evidence that weaker infrastructure, poor maintenance, and limited financial support increase contamination risk (Karim et al., 2024). Overall, the results suggest that the bacteriological quality of school drinking water in Patuakhali is still below acceptable safety standards and follows the same pattern of inequity seen in other Bangladeshi studies (Hossain et al., 2022).

While this study provides interesting insights into the status of WASH facilities within Patuakhali schools, it comes with varied limitations. First, the cross-sectional study design leaves little room to establish the

causal relationships of certain school-specific characteristics with the availability of WASH services. Later studies may consider longitudinal designs to assess change over time and its association with causal links. Secondly, the study suffered challenges in the acquisition of approval from some blocks of schools for WASH assessment which limited the overall sample size and thus potentially the generalizability of the findings. Most specifically, the lack of access to certain schools indicated underrepresentation, particularly of schools with extremely poor WASH services. Finally, the study faced a time limitation, and a proper exploratory study would be necessary for a much more profound understanding of infrastructure issues, particularly maintenance and sustainability in the long run.

Conclusion

This study identified serious gaps in the provision of WASH services for schools in Patuakhali, varied from one to another with respect to ownership, location, and levels of education. The drinking water services are fairly adequate; however, it is grossly inadequate for sanitation and hygiene here, especially at government schools and in rural areas. This shows that SDG 6- ensuring availability and sustainable management of water and sanitation for all is not being implemented in Patuakhali. However, there is a need for investment in improved WASH infrastructure at public and rural schools to better health and gender equity and a sustainable, equitable environment for all learners.

Authors Contribution:

Md. Hasanuzzaman: Conceptualization, Investigation, Supervision, Writing – original draft & editing. **Shekh Tanjina Islam Dola:** Conceptualization, Methodology, Formal analysis, Writing – original draft. **Nayeem Rahman:** Conceptualization, Data collection, Data curation, Formal analysis, Writing – original draft. **Abdullah Al Adib**: Conceptualization, Data collection, Data curation, Formal analysis, Writing – original draft. **Md. Jahid Hosen:** Conceptualization, Data collection, Data curation, Formal analysis, Writing – original draft. **Mir Mahedi Hasan:** Conceptualization, Data collection, Data curation, Formal analysis, Writing – original draft. **Md. Hasibul Hasan Torun:** Conceptualization, Data collection, Data curation, Formal analysis, Writing – original draft. **Mohammad Abdullah Al Noman:** Conceptualization, Methodology, Editing. **Md. Shajadul Islam:** Conceptualization, Investigation, Writing – original draft & editing.

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