REPORT ON

HEALTH AND HYGIENE PRACTICES AT PRIMARY SCHOOLS OF BANGLADESH

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Executive Summary

This comprehensive study examines health and hygiene knowledge and practices among primary school students in Bangladesh, addressing critical gaps between policy aspirations and ground realities. Drawing on data from 1,070 students, 306 teachers, 11 Assistant Upazila Education Officers (AUEOs), and observations from 55 schools across diverse geographical contexts, the research provides an evidence-based assessment of how health and hygiene education is integrated into the primary education system.

Key Findings

1. National Policy Evaluation and Strengths:

- Policies from 2010-2023 demonstrate progressive understanding of WASH needs, showing concrete infrastructure standards and gender-sensitive approaches.
- PEDP4 sets ambitious targets including 58,000 gender-segregated, disability-accessible WASH blocks, 15,000 safe water points, and specific toilet-to-student ratios of 1:50 for girls and 1:75 for boys.
- The National Education Policy 2010 frames hygiene as core to primary schooling, emphasizing habit formation through hands-on learning rather than theory alone, and integrating hygiene into continuous student assessment systems.
- However, A significant disconnection exists between infrastructure mandates and maintenance budgets, with no policy addressing recurrent costs for consumables like soap despite substantial infrastructure investment commitments.
- The National Strategy for Water Supply and Sanitation identifies that only 35% of the population has basic hygiene access yet lacks standardized inspection frameworks or mechanisms to enforce compliance with stated standards.

2. Textbook Content Analysis

Coverage Patterns Across Subjects:

- English textbooks contain the most hygiene content with 17 instances, followed by Bangla with 15 instances, Science with 12 instances, and Bangladesh and Global Studies with only 5 instances across all grade levels.
- Among thematic areas, 'handwashing' and 'clothing and cleanliness' appear in 8 textbooks each representing the highest coverage, while 'waste disposal and sanitation' appears in 7

textbooks and 'body hygiene' in 6 textbooks. Oral hygiene, environmental hygiene, food hygiene and nutrition, and water cleanliness and safety each appear in only 5 textbooks, representing the lowest coverage among identified themes.

- Mathematics textbooks contain zero health and hygiene content across all grade levels from Class 1 through Class 5, representing a missed opportunity for integrated learning.

Grade-Level Distribution Patterns:

- Class 3 English textbooks contain the maximum number of themes with 7 of 8 identified hygiene topics covered, while Class 4 Science textbooks also cover 7 themes, indicating these are peak years for hygiene education.
- Class 5 Bangla textbooks contain no health and hygiene content whatsoever, representing a concerning gap in the final year of primary education when students should be consolidating knowledge.
- Class 1 and 2 Science textbooks contain no relevant health and hygiene content, missing critical early years when foundational habits are most effectively established.

Critical Content Gaps:

- A complete absence of menstrual hygiene education exists across all textbooks in all grades and subjects, leaving girls without essential information for managing their reproductive health and school attendance.
- Illness prevention content remains limited, with only some discussion of waterborne and infectious diseases appearing in Science texts, providing insufficient preparation for disease prevention.
- No COVID-19 or pandemic-related content appears in any textbooks despite the post-pandemic context, missing crucial opportunities to teach about masks, distancing, sanitization, and public health measures.

3. Students' Knowledge and Practices

Awareness Levels and Knowledge Sources:

- Near-universal awareness exists with 98.7% (1,056 out of 1,070) students reporting they have heard about health and hygiene, indicating successful reach of basic health messages.
- Teachers serve as the primary knowledge source mentioned by 81.4% of students, followed by parents at 61.9%, textbooks at 55.8%, TV/Internet at 26.9%, and friends at 17.0%, demonstrating the critical role of schools and families.

- An urban-rural divide emerges in knowledge sources, with urban students citing more media sources while rural students rely more heavily on teachers and parents due to limited access to digital resources.

Self-Reported Hygiene Practices:

- High-frequency practices include handwashing with soap reported by 95.5% of students, brushing teeth by 65.4%, and using water after toilet by 63.7%, indicating strong adoption of headline hygiene behaviors.
- Low-frequency practices reveal gaps, with only 6.9% reporting regular bathing, 2.5% practicing nail cutting, 3.5% consistently drinking safe water, 1.7% eating nutritious food, and just 0.6% wearing clean clothes regularly.
- Minimal environmental practices are reported, with only 0.3% cleaning their environment or classroom, 0.2% practicing proper waste disposal, and 0.1% engaging in exercise, suggesting these habits remain largely unintegrated into daily routines.

Handwashing Knowledge and Behavior:

- Nearly all students (98.8%) report washing with soap and water after toilet use, though small percentages rely only on water (0.95%) or resort to rubbing hands on clothing (0.19%), indicating some continued risky practices.
- The vast majority (97.3%) recognize the necessity of handwashing, with 63.42% understanding it disinfects hands and 27.86% associating it primarily with visible cleanliness rather than germ removal.
- Recognition of infection risk from not washing hands stands at 95.1%, though critical timing gaps exist with 33.6% washing before and after meals, 33.1% after toilet use, but only 5.7% specifically washing before meals.

Oral Hygiene Patterns:

- Most students (89.3%) report brushing teeth twice daily, though 5.6% brush only once daily and 3.3% brush only "when dirty," indicating some students lack consistent routines.
- Timing patterns show 55.7% brush before and after sleeping, 25.5% specifically after waking up, and 17.7% before sleep only, revealing varied interpretations of "twice daily" that may not align with optimal dental health practices.

- Motivations for brushing include removing odor (42.5%), preventing tooth decay (32.1%), whitening teeth (17.7%), and minimizing gaps between teeth (7.4%), showing a mix of practical health concerns and cosmetic considerations.

Safe Water Understanding and Sources:

- Health understanding is moderately strong, with 49.7% linking safe water to preventing diarrhea and disease, while 32.4% note that dirty water spreads sickness, though some cite only taste (9.5%) or energy (7.7%) as reasons.
- Tube wells dominate as the primary source at 59.4%, followed by tap water at 19.9% and supply water at 15.3%, showing reliance on these relatively safer sources.
- Risky water sources persist with 2.1% reporting river use, 2.1% using drains, and 0.5% relying on ponds, indicating a small but concerning fraction remains exposed to potentially unsafe water despite awareness.

Daily Practice Consistency:

- Consistent practices with over 90% reporting "always" include handwashing before and after meals (97.2%), after toilet (98.3%), daily bathing (97.1%), wearing clean clothes to school (94.6%), and covering nose and mouth when sneezing (91.7%).
- Personal item sharing reveals inconsistent practice, with only 45.1% "always" avoiding sharing combs and towels, while 33.7% "sometimes" share and 21.2% "never" avoid sharing, indicating hygiene messages about personal items have not been fully internalized.

Barriers to Hygiene Practice:

- Toilet cleanliness and smell constitute the primary constraint reported by 28.9% of students, with many describing such severe conditions that they avoid using facilities altogether or reduce water intake to minimize toilet visits.
- Water availability and safety issues affect 25.5% of students, with reports of cloudy or strange-tasting water causing stomach discomfort and inadequate access on upper floors forcing reliance on limited taps.
- Soap, tissue, and handwash shortages impact 15.2% of students despite high knowledge levels, illustrating the gap between awareness and ability to practice due to missing supplies.

- Environmental issues including dust, garbage, flooding, and noise affect 9.1% of students, while electricity and power supply problems disrupt 4.3%, and notably 16.8% report no problems, indicating uneven distribution of hygiene challenges across schools.

Student-Identified Priorities for Improvement:

- Toilet conditions emerge as the overwhelming concern, with 192 mentions of unclean latrines and 159 references to overpowering smells, with students describing avoiding toilets entirely because conditions "give them the ick."
- Handwashing supply gaps receive 108 mentions, with students expressing frustration that "I want to wash my hands with soap after using the toilet, but sometimes there's no soap," highlighting that knowledge exists but infrastructure doesn't support practice.
- Water quality concerns generate 91 mentions, with students describing tap water that "tastes strange and makes my stomach hurt afterwards," indicating both supply and safety issues remain unresolved.
- Additional priorities include cleaner classrooms (84 mentions), soap and tissues in toilets (24 mentions), better waste disposal systems (22 mentions), separate toilets for boys and girls (21 mentions), and accessibility improvements (6 mentions) including the poignant observation that "my friend can't use the toilet because she uses a wheelchair."

4. Teachers' Support and Capacity

Knowledge and Training Gap:

- Nearly all teachers (97.7%) report having knowledge about health and hygiene, with only 2.3% indicating otherwise, suggesting high confidence in their understanding.
- A stark training gap exists with only 10.1% having received formal training on health and hygiene while 89.9% have not, indicating that knowledge is largely self-acquired rather than professionally supported through structured capacity building.
- The contrast between self-reported knowledge and formal training suggests teachers rely on personal understanding and experience rather than systematic preparation, potentially leading to uneven quality in hygiene education delivery.

Perceptions of Importance and School Conditions:

- Teachers demonstrate near-unanimous recognition of hygiene importance, with 99.7% rating it as "very important" and only one respondent (0.3%) considering it unimportant.

- Complete consensus (100%) exists on the importance of safe water for students' health, indicating teachers clearly recognize hygiene and safe water as non-negotiable elements of student well-being.
- Most teachers (86.6%) report their schools have adequate hygiene materials, though 12.7% note shortages and 0.7% are unsure, suggesting resource availability varies across schools.
- Daily cleaning is reported by 87.9% of teachers, with 11.1% reporting weekly cleaning and 1.0% quarterly, while overall satisfaction with cleanliness stands at 96.4% (25.8% very satisfied, 70.6% satisfied), though about one in eight teachers identify resource gaps.

Student Absenteeism and Academic Impact:

- Nearly all teachers (95.4%) observe student absences due to sickness, with only 4.2% not observing this pattern and 0.3% uncertain, confirming health-related disruptions are widespread.
- Most describe the extent of sickness-related leave as low to very low (78.4% combined: 23.2% very low, 55.2% low), though 19.6% rate it as average and 1.9% as high to very high.
- A clear majority (91.8%) believe sickness-related absences negatively affect academic results compared to only 8.2% who disagree, highlighting teachers' recognition that even infrequent illness disproportionately impacts learning outcomes.

Teaching Practices and Student Support:

- Nearly all teachers (99.3%) provide advice to students for maintaining hygiene, with only 0.7% not doing so, while 77.8% provide advice regularly and 21.5% sometimes.
- Similarly, 99.3% monitor students' hygiene practices with only 0.7% not monitoring, while 69.9% monitor regularly and 29.7% sometimes, demonstrating high levels of teacher commitment despite limited formal training.

Teacher-Recommended Strategies for Strengthening Hygiene:

- Awareness building and knowledge development received 174 mentions for discussion meetings and workshops, with particular emphasis on Ma Shomabesh (mothers' meeting) mentioned 38 times as powerful tools for extending hygiene practices into homes.
- Creative teaching methods receive 10 mentions including songs, posters, and skits to make lessons memorable for young children, while weekly assemblies (10 mentions) provide regular platforms for reminding students about practices like nail trimming and dental care.
- Infrastructure improvements generate 77 references total, with 38 mentions specifically for upgraded toilets, wash blocks, and disability-friendly spaces, plus 12 mentions for drainage systems to reduce waterlogging and 11 for cleaner, more modern classrooms.
- Water and hygiene supplies are emphasized through 46 mentions for water access including arsenic-free tube wells and filters (30 mentions) and reliable water on every floor (10 mentions), while basic supplies including soap, handwash, tissues, and sanitizers receive 38 mentions and first aid kits 20 mentions.
- Systemic support recommendations include 32 requests for government-funded cleaners with teachers insisting "we need government-funded cleaners to keep toilets and classrooms tidy - teachers can't do it all alone," plus 62 mentions of parental involvement through mothers' meetings and 14 mentions of health services like vaccinations.
- An urban-rural divide appears in recommendations, with urban teachers suggesting modern solutions including solar panels and reward systems, while rural teachers focus more on fundamental needs like functional toilets and reliable water access.

5. Supervisors' Support and Monitoring

Infrastructure Assessment and Challenges:

- Assessments reveal mixed conditions, with 54.5% of AUEOs reporting all schools have safe water facilities while 45.5% report shortages, and only 45.5% stating existing facilities are sufficient for practicing health and hygiene while 54.5% deem them inadequate.
- A critical shortage of WASH blocks is reported by 81.8% of AUEOs, with only 18.2% confirming all schools have adequate toilet facilities, representing the most severe infrastructure deficit identified by supervisors.

- Positive findings include 81.8% reporting soap and hand wash available after toilet use, 100% affirming teachers make students aware of hygiene practices, and 90.9% stating students practice hygiene regularly, though infrastructure limits practice quality.
- Safe drinking water facilities exist in 63.6% of schools according to AUEOs, while 36.4% lack adequate safe water provision, indicating substantial gaps in this fundamental requirement.

ATEO/AUEO Recommendations for Hygiene Education and Awareness:

- Installation and maintenance recommendations emphasize deep tube-wells in schools wherever feasible, ensuring all tube-wells and water sources are arsenic-free and safe for drinking while keeping them functional throughout the year.
- Alternative water solutions for challenged areas include rainwater harvesting in saline-prone regions, safely storing lake water or other usable surface water for school use, and installing submersible pumps in dry seasons or remote char regions.
- Water purification and filtration measures include installing water filters in schools to purify drinking water and encouraging students to bring boiled water from home as supplementary strategies.
- Educational innovations include showing videos on health awareness to generate student interest, discussing health and hygiene rules daily in class, and organizing seminars on health and hygiene topics.
- Textbooks and curriculum improvement through increasing health and hygiene content in textbooks and using role-play in teaching to develop awareness through active learning methods.
- School-based initiatives include celebrating "Cleanliness Day" at schools, providing hands-on hygiene training for teachers and students, and rewarding students who demonstrate good hygiene practices as positive reinforcement.

6. School Infrastructure and Physical Conditions

Water Facilities and Accessibility:

- Safe water is available in 89.1% of schools, with 74.5% having water sources tested for safety, though only 54.5% provide water facilities on each floor, forcing upper-floor students to rely on limited ground-floor taps.

- Despite availability of school water sources, students in 43.6% of schools bring water from home, indicating either lack of trust in school water quality or inadequate supply to meet daily needs throughout the school day.

Toilet and WASH Block Conditions:

- Positive conditions exist with 87.3% of toilets deemed neat and clean, 80% having proper water facilities, 78.2% providing soap and hand wash, and 90.9% containing necessary equipment, showing many schools maintain functional sanitation.
- Critical gaps undermine these positives, with 38.2% lacking enough toilets for their student population, 40% having no separate toilets for boys and girls, and a severe 81.8% lacking any facilities for students with disabilities. (According to Observation Checklist)
- Gender segregation issues extend beyond toilets, with 54.5% having no separate wash blocks by gender, while 50.9% have wash blocks that are not child-friendly and 43.6% have facilities deemed inappropriate for proper use by children.
- Drainage and sanitation infrastructure proves inadequate in 34.5% of schools that lack proper safety tanks and drainage systems, leading to water pooling and unhygienic conditions around toilet areas.

Classroom Conditions:

- All classrooms (100%) are reported as neat and clean, while 90.9% have enough ventilation and 80% maintain proper distance from toilets, indicating schools generally succeed in maintaining clean learning spaces even when sanitation facilities lag behind.

Geographical Disparities in Facilities:

- Coastal areas face water availability concerns with 4 of 10 schools lacking safe water, plus inadequate sewerage lines and safety tanks in 5 of 10 schools, likely related to salinity and flooding challenges. Char areas struggle most with toilet adequacy, having insufficient toilets in 8 of 10 schools and inadequate sewerage systems in 7 of 10 schools, reflecting the temporary nature of char settlements and infrastructure challenges.
- Mountain and hill areas demonstrate better performance with all 10 schools having gender-segregated toilets and 5 of 10 providing disability-accessible facilities compared to zero in coastal and char regions. Plain land schools generally show better facilities across indicators, while haor areas demonstrate moderate conditions that are better than coastal and char regions but still face significant challenges during monsoon seasons.

School Type Comparisons:

- Government primary schools demonstrate slightly better coverage than newly nationalized schools across most indicators, with 91.7% GPS versus 84.2% NGPS having safe water.
- Both school types struggle significantly with accessibility for special needs students, with only 16.7% of government schools and 21.1% of newly nationalized schools having appropriate toilet facilities for students with disabilities.

Urban-Rural Infrastructure Divide:

- Urban schools demonstrate significantly better facilities particularly in gender-segregated toilets (70.6% versus 55.3% rural) and accessibility for special needs students (23.5% versus 15.8% rural), reflecting greater resource availability and infrastructure investment.
- Surprisingly, rural schools show better soap and hand wash availability at 84.2% compared to urban schools at 64.7%, possibly due to targeted rural hygiene programs or different measurement timing.
- Rural schools face greater water safety challenges with 5.3% lacking safe water compared to 23.5% in urban areas, though the absolute numbers are small and may reflect sampling variation rather than systematic urban advantage.

Overall Infrastructure Assessment:

- A persistent gap exists between policy mandates and ground reality, with awareness and some dedicated leadership present but schools-especially rural ones-facing harsh realities of unreliable facilities, stretched resources, and environments preventing consistent cleanliness.
- Urban schools perform marginally better but remain not immune to challenges, particularly regarding steady supplies of hygiene materials and maintaining functionality of facilities once constructed.

The research concludes that improving health and hygiene practices in Bangladesh's primary schools requires a three-pronged approach: (1) bridging the policy-implementation gap through sustainable financing for hygiene consumables and infrastructure maintenance, (2) mandating comprehensive WASH training for teachers as part of professional development, and (3) establishing robust monitoring systems that assess behavioral outcomes alongside physical facilities. Without addressing these systemic weaknesses, the aspirational goals articulated in national policies will remain disconnected from students' daily life experiences.

Chapter 1: Introduction

1.1. Introduction

Health hygiene refers to practices that promote good health and well-being. It involves taking care of oneself and one's surroundings in order to prevent the spread of illnesses and diseases. This includes personal hygiene practices such as regular hand-washing, bathing, and brushing teeth, as well as maintaining a clean and sanitary living environment. Overall, health hygiene is an important aspect of maintaining a healthy lifestyle. According to the World Health Organization (WHO, 2009), "Hygiene refers to conditions and practices that help to maintain health and prevent the spread of diseases."

Proper health hygiene is essential for overall health and well-being. By practicing good hygiene habits, individuals can reduce their risk of getting sick and improve their overall quality of life. After the Covid-19 pandemic, the importance of health and hygiene practices in Bangladesh has become more crucial than ever before especially for the school going children. The virus has highlighted the need for schools to prioritize the health and safety of their students by promoting good hygiene habits. For this health and hygiene practices have become extremely important in primary schools. These practices not only contribute to the physical well-being of students but also impact their overall development and academic performance. These hygiene practices play a crucial role in maintaining good health and preventing communicable diseases. Hand hygiene is crucial in preventing infections and maintaining overall health, particularly among primary school students (Vishwakarma, Bagati, 2025). Furthermore, promoting health and hygiene practices in primary schools instills lifelong habits that can lead to a healthier adulthood. As most of the hygiene related outbreaks occur among primary schools, it is important to ensure that students practice good hygiene practices (Leta, Abate, Geremew, Kuse, 2024). This, in turn reduces absenteeism and ensures that students are able to fully participate in school activities. By teaching students the importance of taking care of their bodies and surroundings, we are setting them up for a lifetime of good health. School plays a significant role in cultivating proper hygiene through infrastructure provision and targeted education (Patel, Gupta, Murugan, 2025). So, it is essential for schools to prioritize and promote these practices to ensure the well-being of their students.

1.2. Background of the study

Childhood is a pivotal stage for establishing health and hygiene practices that shape lifelong habits, promote physical and mental well-being, and foster positive attitudes toward health and healthcare services. These habits are essential not only for a healthy childhood but also for long-term disease prevention and productive adulthood. In Bangladesh, a densely populated nation of approximately 169 million people with a population density of 1,061 persons per square kilometer (Worldometer, 2025), primary school children represent a significant demographic group. These children are especially vulnerable to health risks arising from poor hygiene, unsafe water, and inadequate sanitation. The country's socio-economic profile, with a GDP per capita of US$2,820 (BBS, 2025) and a Human Development Index ranking of 129 out of 193 countries (UNDP, 2024), highlights the urgency of addressing public health issues, particularly in school environments where children spend a substantial portion of their formative years.

PEDP4 is a critical initiative by the Government of Bangladesh aimed at improving the quality of primary education. One of its key components is promoting health and hygiene practices among students, which is essential for reducing disease transmission, improving attendance, and enhancing learning outcomes. Research indicates that PEDP4 has improved access to safe drinking water and sanitation in primary schools across Bangladesh (Asian Development Bank, 2022). Previous PEDP programs also improved school sanitation system of the primary schools of Bangladesh (Ahmed & Hossain, 2019). Hossain, et. al., (2020) found increased handwashing practices because of water, sanitation, and hygiene (WASH) interventions that resulted in a reduced diarrheal disease (Khan et al., 2021). PEDP4 integrates hygiene education into the curriculum, teaching students' proper handwashing techniques and the importance of cleanliness (UNICEF Bangladesh, 2021) which is helpful in increasing awareness among teachers and students.

PEDP-4 aimed to install 58,000 WASH blocks in government primary schools, addressing the need for gender-segregated toilets, safe drinking water, and handwashing facilities. Literature indicates that these improved facilities impacted positively on students' well-being, particularly for female students (Bangladesh Ministry of Primary and Mass Education, 2023). According to Alamgir (2024) about 62% of planned WASH infrastructure had been completed before 2023, improved access to sanitation in previously underserved schools. However, there are still some challenges. Many schools still do not have water availability in latrines or soap at handwashing stations which

limit effective hygiene practices. Easy accessibility and safety are still a vital issue at school toilets (UNICEF, 2023).

Moreover, Infrastructure development without behavior change intervention tends to yield short-lived improvements Sultana et al., (2023). Without behavioral change, all other changes will not sustain. To address this issue Directorate of Primary Education formulated a 'Behavioral Change Communication (BCC) strategies' (DPE, 2022) under PEDP4 so that students can practice a lot.

Despite global and national efforts to improve school health conditions, there is limited empirical evidence on what Bangladeshi primary school students know and practice regarding health and hygiene. Similarly, the extent to which teachers support and guide these practices is not fully understood. This research aims to fill that gap by exploring the current state of hygiene knowledge and behavior among primary school students, assessing the awareness and involvement of teachers, and identifying practical steps to strengthen hygiene education in schools.

1.3. Statement of the Problem

Although Bangladesh has progressed in many cases, health and hygiene practice in primary schools remains poor. Poor hygiene practice increases the spread of various infectious diseases among the children. A notable portion of government primary schools, especially in remote areas, have limited access to safe drinking water and adequate sanitation facilities, including toilets and hand washing stations. This directly impacts the health of the school going students, increasing their susceptibility to diseases like diarrhea, cholera, dysentery and typhoid. This leads to the poor attendance and academic performance of the students. (Islam *et al*., 2015). 88% of diarrheal deaths in the world occur due to use of contaminated water, insufficient sanitation facilities and lack of good hygiene practices (Pati *et al*., 2014). Students often face problems with health and hygiene practices, particularly due to poor infrastructure, lack of awareness, and inadequate resources. Besides, teachers working in primary schools are not well trained on health and hygiene practices. Some primary schools lack separate toilets for boys and girls or sometimes the toilets are unclean and unavailable, or poorly maintained. This can lead to poor hygiene practices and increases risks of the spread of diseases. Some schools have limited access to proper handwashing facilities with essential hygiene supplies. This aggravates hygiene practices and makes it more difficult for students to practice good hygiene.

1.4. Significance of the Research

This study takes a close look at where public health and education meet in Bangladesh - specifically, how hygiene is taught, learned, and lived out in primary schools. It's not just about checking whether the curriculum mentions handwashing; it's about seeing how policies translate into classroom habits, what students and teachers actually know, and the role educators play in turning hygiene from theory into daily routine. Good hygiene education at this stage isn't a luxury- it's one of the surest ways to prevent infections, keep kids in class, and support their overall well-being.

Plenty of evidence backs that up. A randomized trial found that skill-based health lessons could boost both hygiene know-how and actual practices among rural primary students (Omura et al., 2025). Even simple acts like regular handwashing or wearing sandals have been linked to better nutritional outcomes (Hakim, 2015). In Dhaka, a school health program didn't just raise awareness among adolescents -it shifted everyday behaviors around food and hygiene (Werven, 2012). And semi-urban surveys have shown consistently high rates of positive habits like nail trimming, handwashing, and using sanitary toilets (Akther et al., 2021).

The stakes are high. In Bangladesh, waterborne illnesses -cholera, dysentery, diarrhea -still take thousands of lives every year, with around 50,000 children among them (Kabir et al., 2021). Globally, the numbers are just as sobering: something as basic as handwashing could cut diarrheal disease by nearly half and respiratory infections by almost a quarter (Pati et al., 2014). Improved sanitation facilities and steady hygiene habits don't just reduce illness by up to 40%; they also keep kids from missing school (Waddington et al., 2009; Mbakaya et al., 2017).

By spotting where awareness, practice, and policy still don't line up, this research aims to offer practical ways forward -from strengthening teacher training to upgrading school facilities. With primary school as the launchpad for lifelong habits, and with 63% of the population now in their working years (Worldometer, 2025), these findings speak directly to Bangladesh's public health future and to global priorities like the Sustainable Development Goals (UNDP, 2024) -healthier schools, fewer preventable illnesses, and children better equipped to thrive.

1.5. Research Objectives

This study aimed to address students' knowledge and practice level of the students. This study will help the Education professionals and policymakers to understand teacher knowledge and students' knowledge and practice of health and hygiene to choose what actions need to be employed. To achieve this overall aim, the study focuses on several related objectives:

1. To explore how national-level education and health policies, particularly those developed and revised in recent years, address the issue of health and hygiene among primary students.
2. To examine how concepts of hygiene, personal care, nutrition, and disease prevention are presented and integrated within primary school textbooks.
3. To understand the knowledge, attitudes, and everyday practices of students regarding health and hygiene both inside and outside the classroom.
4. To investigate the role of teachers in guiding, encouraging, and modelling good hygiene practices among their students.
5. To study how school supervisors and administrative staff support, monitor, and promote hygiene-related activities and awareness within the school setting.
6. To evaluate how the physical conditions of schools, including infrastructure, sanitation facilities, and access to clean water, facilitate or limit students' ability to maintain healthy habits.

Through these objectives, the research aims to build a comprehensive picture of how health and hygiene are interpreted and practiced at the primary level in Bangladesh.

1.6. Research Questions

1. How do national policies address health and hygiene practice among primary students?
2. What health and hygiene components are embedded in primary textbooks?
3. What knowledge and practice do primary students have regarding health and hygiene issues?
4. How do teachers support students in practicing health and hygiene in primary schools?
5. How do supervisors support students in practicing health and hygiene in primary schools?
6. How do the infrastructure of primary schools' support health and hygiene practices among students?

Chapter 2: Literature review

2.1. Concept of Health and Hygiene

The concept of hygiene has deep historical roots, evolving over centuries through cultural traditions, religious practices, and scientific advancements. Ancient Egypt had ritual handwashing; the Crusades brought soap into wider use across Europe (Firdaus & Anwar, 2024). For centuries, it was largely about keeping clean in a cultural or spiritual sense. Then came the late 19th century, and with it, germ theory -suddenly hygiene wasn't just tradition, it was evidence-based medicine. This shift turned everyday habits into public health essentials.

For a long time, "hygiene" simply meant removing dirt and killing germs. But modern science has poked holes in that all-or-nothing view. Researchers like Vandegrift et al. (2016, 2017) say it's less about eradicating every microbe and more about cutting down the spread of disease-causing ones. That means respecting the helpful bacteria we live with -skin microbiota, for example -while still keeping the dangerous pathogens in check.

And hygiene isn't only about scrubbing hands. Nicolle (2007) lists everything from oral and respiratory hygiene to mental and industrial hygiene as part of the bigger picture. In communities, basic measures like handwashing, cleaning living spaces, and safe food handling can make a tangible dent in gastrointestinal disease rates. Yet Nicolle also warns against going overboard with antibacterial products, which can backfire, and admits we still don't fully grasp how hygiene measures play out during disease outbreaks.

Global bodies have tried to capture this broader scope in their definitions. WHO (2019) frames hygiene as the conditions and practices that protect health and prevent disease. Bloomfield et al. (2007) focus on the everyday -handwashing, bathing, oral care. UNICEF (2009) expands the lens further, pulling in access to clean water and decent sanitation. In schools, hygiene is both personal habit and institutional setup -clean toilets, soap and water that actually flow, and waste systems that work (WHO & UNICEF, 2018).

Across the literature, hygiene emerges as layered and dynamic-rooted in ancient custom, reshaped by science, and now guided by an understanding of our microbial companions. It's no longer a quest for total sterility, but a balanced strategy: healthy habits, sound infrastructure, and microbial awareness all working together. For children, especially, this isn't just about cleaner hands -it's about safeguarding their health now and setting patterns that protect them for a lifetime.

2.2. Components of Health and Hygiene

International agencies have long-framed hygiene not as a single behavior but as a cluster of everyday practices that together sustain health, particularly in school environments where children spend much of their time. Handwashing with soap emerges again and again as the centerpiece of this framework - WHO describes it as one of the simplest yet most effective barriers against disease transmission, especially when practiced before eating or after using the toilet (WHO, 2009). Around this, other areas branch out: safe handling and preparation of food, for instance, with guidance on cooking thoroughly, separating raw and cooked items, and ensuring access to safe water (FAO & WHO, 2006). Beyond individual routines, WHO and UNICEF underline the physical setting itself - classrooms that are clean, well-ventilated, and free of pests, with garbage disposed of properly and sanitation systems that encourage toilet hygiene and post-defecation handwashing (WHO & UNICEF, 2021).

The scope of hygiene, however, extends beyond the immediate to the social and developmental. UNICEF, for example, draws attention to menstrual hygiene management, stressing not only the availability of sanitary products but also the dignity and continuity of girls' schooling that such provision makes possible (WaterAid & UNICEF, 2018). Safe drinking water, accessible handwashing stations near toilets, and effective waste management systems are likewise seen as crucial to reducing school absenteeism and maintaining environments where children can learn without avoidable health disruptions (UNICEF, 2012; 2016).

Meanwhile, the CDC brings the focus back to the level of personal upkeep - bathing regularly, wearing clean clothes, trimming nails, brushing teeth - all seemingly ordinary habits but ones that have substantial consequences for children's wellbeing (CDC, 2020). Oral hygiene, in particular, is highlighted as foundational for preventing dental disease and promoting lifelong health. Respiratory etiquette - covering coughs and sneezes, using tissues or elbows, and discarding tissues properly - has also gained prominence, especially in crowded school contexts where infections can sweep quickly through classrooms.

UNESCO doesn't usually get framed as a hygiene authority - its home ground is education policy - but its influence in this arena is still striking. Through the lens of Education for Sustainable Development (ESD), the organization insists that hygiene isn't a "side lesson" but part of what it means to deliver a rounded education. Within that framework, everyday routines - washing hands, putting on clean clothes, using safe toilets, keeping one's body tidy - are treated not merely as

habits but as teachable behaviors to be folded into the curriculum (UNESCO, 2016). A related initiative, the FRESH framework (Focusing Resources on Effective School Health), which UNESCO shaped in collaboration with WHO and UNICEF, takes the idea further by pressing schools to build hygiene into their very structure: policy, environment, and day-to-day rhythms (UNESCO, 2000).

WaterAid, meanwhile, enters the picture from a more practical angle. Rather than focusing on the *curricular*, it zeros in on the physical conditions that make hygiene possible in the first place - functioning latrines, running water, and handwashing stations that don't fall apart after a few months (WaterAid, 2020). What sets its advocacy apart is the push for gender-sensitive facilities: private corners for changing, systems for safe disposal of menstrual products, and the recognition that without these, many girls simply withdraw from schooling altogether (WaterAid & UNICEF, 2018). Put together, UNESCO's curricular vision and WaterAid's infrastructural emphasis sketch a picture of hygiene not just as a set of behaviors but as something woven into the full fabric of school life.

Maintaining hygiene among schoolchildren isn't just about washing hands; it's a cluster of habits and conditions that together create healthier school environments. Think of it as a mix of safe waste disposal, avoiding shared personal items, regular bathing, clean clothes, and a generally tidy surrounding. These practices form the bedrock of well-being and keep the invisible spread of disease at bay.

For the purpose of this study, a set of key components was narrowed down to align with the research goals: handwashing, oral care (like brushing teeth), body hygiene (nail trimming and bathing), cleanliness of clothing, environmental hygiene, food hygiene and nutrition, waste disposal and sanitation, and finally, the safety and cleanliness of water.

Take waste management, for example. Safe disposal - whether through dustbins or proper sanitation tanks - is often the technical backbone of a hygienic school. The *Swachh Vidyalaya* campaign in Indian government schools is often cited here; it underscored not just toilets and sinks, but waste management systems that actually worked, cutting down hygiene-related diseases (Puri & Gulati, 2022). But the story looks different in Bangladesh. In rural Chattogram, researchers observed that although children and teachers were aware of hygiene needs, the absence of basic infrastructure - no bins, poor maintenance, patchy facilities - undermined the effort (Dutta, 2024).

Some habits, however, fly under the radar. Sharing toothbrushes, combs, or towels might seem harmless to children, but it's one of those hidden routes for spreading lice, fungal infections, or skin diseases. Evidence shows that when schools intentionally teach about these risks, the practice declines sharply (Shrestha, 2014). Yet without structured guidance, it's an easy oversight.

Bathing, often considered the most straightforward routine, is also one of the trickiest. Studies in India showed that before a school-based program, barely 60% of children bathed daily; afterward, it jumped to nearly 78% (Puri & Gulati, 2022). Ethiopia revealed a similar picture - practices requiring higher water use (bathing, washing clothes) were the least observed (Vivas et al., 2010). Bangladesh isn't an exception either. Children often know bathing is essential, but water scarcity, lack of soap, broken facilities, or crowded and uncomfortable washrooms push the practice aside (Dutta, 2024).

And then there's clothing. Wearing clean clothes may seem like a cosmetic detail, but it's also a clear reflection of hygiene behavior. Research links awareness directly with appearance - students who understand hygiene tend to show up in cleaner clothes (Vivas et al., 2010). Still, the knowledge-to-practice gap is visible. Poverty, limited water access, and sometimes simple neglect at home create barriers that even the most aware student can't always overcome (Sultana et al., 2021).

Primary schools are arguably the perfect ground for cultivating health-promoting habits. At this stage, children are impressionable, and habits tend to stick well into adulthood (Park, 2002). Yet many Bangladeshi schoolchildren remain unaware of basics - personal hygiene, balanced diets, even the value of physical activity. To address this, policies such as the National Education Policy and National Health Policy have emphasized safe water, improved sanitation, and health education (Rahman et al., 2019). But what's on paper doesn't always find its way into classrooms. Gaps persist - weak implementation, scarce resources, insufficient training for teachers. And teachers, who could be the most influential actors in shaping hygiene behavior, often lack the knowledge or tools to do so effectively.

Ventilation is important for a favorable Indoor Environmental Quality (IEQ) since it dilutes and removes pollutants, odors andexcessive moisture, while providing occupants with fresh air to breathe (Toyinbo, O.O 2017 as cited in Wargocki et al., 2000). The World Health Organization (WHO, 2009) has emphasised that insufficient ventilation increases the risk of airborne diseases, including the spread of influenza and other communicable infections-making ventilation a vital

element of school health practices. A recent study conducted by Sundell et al. (2011) reported a strong association between improved classroom ventilation rates and reduced absenteeism due to illness. In Bangladesh, where climatic conditions are hot and humid for most of the year, natural ventilation plays a significant role in maintaining indoor air quality. Rahman et al. (2019) point out that overcrowding and poorly designed classrooms in many government primary schools severely restrict airflow, exacerbating health risks among children.

Maintaining proper coughing and sneezing etiquette is an essential component of personal hygiene and public health. According to the Centers for Disease Control and Prevention (CDC, 2012), proper respiratory etiquette, including the use of tissues, disposal of used tissues, and handwashing, forms a fundamental part of infection control. In some research it is found that airborne pathogens are mainly transmitted through coughing and sneezing. The droplets expelled can carry bacteria and viruses, including influenza, rhinovirus, and even more severe respiratory illnesses such as COVID-19 (World Health Organization [WHO], 2020). Regular practice of hand hygiene and respiratory etiquette plays an important role to reduce disease transmission and absentism. A study by Stebbins et al. (2011) implemented a hand hygiene and respiratory etiquette programme in elementary schools and found a substantial decrease in influenza transmission and student absences.

Oral hygiene, particularly regular tooth brushing, plays a vital role of overall health and hygiene for primary school students. Brushing teeth at least twice a day is widely recognized preventative measure against dental caries, gum disease, and bad breath. According to the World Health Organization (WHO, 2012), between 60% and 90% of schoolchildren worldwide have dental cavities, which often go untreated. Petersen & Kwan (2010) found that brushing teeth regularly with fluoride toothpaste significantly helped remove dental plaque, which harbors harmful bacteria. These problems can reduce children's ability to concentrate and participate in school activities, ultimately affecting their academic performance (Jackson et al., 2011).

Maintaining clean and trimmed fingernails is a critical aspect of personal hygiene, particularly for primary school students. According to the Centers for Disease Control and Prevention (CDC, 2021), unclean nails are a common vehicle for transmitting pathogens that cause gastrointestinal infections, such as diarrhoea and intestinal worms. In many primary schools, health and hygiene education includes handwashing, but nail care is often overlooked. A study by Curtis & Cairncross (2003) explored that the majority of fecal bacteria are found under the fingernails. Another research

suggested that when hands were washed, the area under the fingernails could retain harmful pathogens unless nails are properly cleaned (Guinan, McGuckin, & Sevareid, 2002). For healthy life it is very important to maintain clean and trimmed fingernails.

2.3. Health and hygiene practices

Health and hygiene among Bangladeshi primary school children has been written about quite extensively, usually sitting at the crossroads of public health, nutrition, and education. The emphasis is obvious: these everyday practices - washing hands, brushing teeth, keeping clean - aren't just about looking neat, but about cutting off disease transmission, improving nutrition, and even laying the groundwork for healthier lifelong behavior. What's interesting in much of the literature is how knowledge, attitudes, and habits constantly intersect, while social class, gender, and geography keep tugging at the outcomes in their own ways. Drawing on studies from 2013 through 2024, this review pulls together findings on children's knowledge, actual hygiene routines, the nutritional angle, and how well interventions have worked.

2.4. **Knowledge and Awareness of Hygiene Practices**

Researchers don't all agree on how much Bangladeshi school children *know* about hygiene. Some findings are optimistic. For example, Ghosh et al. (2020), surveying primary kids in Noakhali, reported that nearly four out of five (78.4%) demonstrated good knowledge, and girls tended to edge out boys. Awareness translated into practice too, hinting that attitudes and behaviors flow from what children know. Likewise, Dutta's (2024) work with rural Chattogram children painted a mixed but somewhat encouraging picture: roughly two-thirds (65.6%) showed moderate to strong knowledge, with over 80% stressing the importance of handwashing and soap use. Still, a few blind spots remained, and curiously, boys in this sample outscored the girls.

But it's not all reassuring. Going back a bit, Ali et al. (2013) found semi-urban secondary students alarmingly uninformed - 59% had little or no health knowledge, and fewer than 5% used soap after defecation. Even though the focus there was secondary schools, the implications spill over into primary education, where foundational awareness starts. Oral hygiene is another recurring weak spot. Bhuiyan et al. (2020), studying rural primary kids, reported poor knowledge of oral health routines, stressing the need for explicit school-based programs. Taken together, the evidence feels

uneven: some groups score well, others show deep gaps. The variation - by gender, geography, and school setting - makes it clear that awareness campaigns can't be one-size-fits-all.

2.5. Hygiene Practices and Behaviors

When it comes to *actual practice*, children in Bangladesh seem to manage the basics fairly well, though cracks appear in less visible habits. Akther et al. (2021), surveying semi-urban primary children, found that handwashing before meals (91.3%) and after using the toilet (100%) was nearly universal, while other habits - like trimming nails, daily bathing, and using sanitary latrines - were also close to perfect. A Dhaka-based study (Md et al., 2014) echoed this, noting that every child washed hands before and after meals. Similarly, Hakim (2015) and Hakim et al. (2015) spotted positive behaviors across northern and central Bangladesh: handwashing, regular tooth brushing, and even wearing sandals in toilets all linked to better nutrition.

Yet the story doesn't stay that neat. Jewel and Hossain (2020), looking at older students, showed that knowledge doesn't always translate into behavior - other forces like age, family income, and even religion mediated the outcomes. Kabir et al. (2021) extended this line of thought, emphasizing how infrastructural and social conditions, not just awareness, can pull down hygiene practices. And circling back to oral hygiene, Bhuiyan et al. (2020) once again found rural children falling behind, often sticking to traditional cleaning methods instead of toothbrushes and paste.

2.6. Linkages Between Hygiene, Nutrition, and Health

The relationship between hygiene and nutrition among Bangladeshi children is difficult to overlook. Several investigations have shown that inadequate hygiene often compounds nutritional deficiencies, while better health practices can soften the blow of widespread undernutrition. For example, Hakim (2015) observed that nearly 68.3% of primary school students in North Bengal were underweight; nonetheless, those who maintained consistent hygiene routines tended to show relatively better nutritional outcomes. A follow-up study by Hakim et al. (2015) echoed these concerns in central Bangladesh, where underweight rates varied by class level, but where hygiene behaviors - such as handwashing and safe sanitation - still played a mitigating role.

Other research nuances this picture. Md et al. (2014), studying urban children in Dhaka, highlighted the coexistence of persistent malnutrition with comparatively good hygiene practices. This paradox indicates that hygiene alone, while beneficial, cannot fully counter nutritional deficits without complementary measures like dietary improvements. Van Werven's (2017) evaluation of

an adolescent program in Dhaka adds another dimension: by linking hygiene awareness with food-related behavior, the program fostered healthier choices. The study went as far as recommending teacher training and infrastructural upgrades, underscoring that hygiene education should not stand in isolation but be woven into broader health and nutrition frameworks. Taken together, these findings reaffirm that the hygiene–nutrition connection is less a single thread than a complex weave, requiring integrated interventions to meaningfully improve child well-being.

2.7. Interventions and Program Effectiveness

Evidence from intervention studies paints a cautiously hopeful picture. School-based programs, when thoughtfully designed, appear capable of transforming hygiene habits. Omura et al. (2024), through a randomized controlled trial in rural Bangladesh, demonstrated the power of skill-based health education (SBHE). Their study revealed marked improvements in school sanitation, children's handwashing, and even dental care. Interestingly, simply providing soap had negligible effects, whereas SBHE interventions proved both cost-effective and influential, even spilling over into nearby non-participating schools.

Complementary findings emerge elsewhere. Van Werven (2017), for instance, documented behavioral shifts among Dhaka adolescents who engaged in a community-based initiative, suggesting that well-structured programs resonate with children and adolescents alike. Scholars such as Kabir et al. (2021) argue that interventions must go beyond awareness-building to tackle infrastructural shortcomings - latrines, clean water, and consistent soap availability remain indispensable. Meanwhile, Akther et al. (2021) and Bhuiyan et al. (2020) emphasize the importance of baseline assessments in designing school-based interventions, particularly to address overlooked areas like oral health literacy.

What becomes clear is that effective interventions require multiple layers: education that cultivates behavioral change, infrastructure that sustains it, and monitoring systems that adapt strategies to shifting needs. Bangladesh's experience illustrates that no single solution suffices; rather, it is the synergy between teaching, facilities, and ongoing support that ensures hygiene education translates into lasting practice.

2.8. Strategies for Promoting Hygiene

Promoting health awareness and hygiene in schools is rarely a matter of a single intervention; it usually calls for a layered strategy - one that ranges from curriculum design to collaborations

beyond the school walls. Bora et al. (2025) underscore how embedding health and hygiene into the curriculum itself can make these lessons stick. Rather than confining the subject to one-off sessions, they recommend weaving it through science, social studies, even physical education - so students encounter health concepts repeatedly in different contexts. The way these ideas are delivered matters, too. Role-playing, experiments, or even storytelling can turn otherwise abstract information into something children can actually grasp. Complementing these are digital tools - animations, educational apps, short videos - that simplify complex health material into formats students find engaging and relatable (Bora et al., 2025; Canton, 2021).

Yet, curriculum is only part of the puzzle. Teachers often set the tone in daily routines. They become, in many ways, the living examples of healthy practices. Puri and Gulati (2022) point out that ensuring soap is always available and reinforcing handwashing at critical times are not minor details but essential practices. Teachers also bring health education to life beyond routine hygiene - by organizing workshops on first aid, mental health, or nutrition - and by being observant enough to spot when a child's condition requires medical attention (Bora et al., 2025; Jakasania et al., 2023). In this sense, they operate as both role models and first responders.

Parents, however, remain central players. Habits children take home are often shaped as much by family practice as by school policy. Research consistently notes that when mothers, in particular, lack education or health literacy, children face higher risks of infection and disease (Nematian et al., 2004). For that reason, many scholars argue that school health programs can't succeed in isolation. Vivas et al. (2010) and others stress the importance of involving families - through parent workshops, newsletters, health updates, or even simple school–home apps designed to share tips. Active parental participation in school initiatives, whether cleanliness campaigns or nutrition projects, also deepens the impact (Bora et al., 2025; Union, 2011).

A health education program rarely succeeds if the broader school environment is unsupportive. Strong policies, adequate infrastructure, and a culture of accountability are the real scaffolding behind classroom instruction. Studies have long shown that school-based hygiene initiatives can dramatically reduce the spread of infectious disease (Lopez-Quintero et al., 2009). Yet, the reality is that success depends on far more than just posters on a wall. Something as simple as assigning "soap monitors" in classrooms, or arranging occasional talks with neighborhood physicians and dentists, can make a tangible difference in daily practice (Puri & Gulati, 2022). In some schools,

children are asked to track their own hygiene routines or to engage in peer monitoring; these small experiments have proven surprisingly effective in cultivating lasting habits.

Formal health policies remain the backbone of such efforts. Without clear regulations - vaccination requirements, regular medical screenings, emergency treatment protocols - schools often struggle to maintain consistency (Bora et al., 2025; WHO, 2000). Infrastructure, too, is non-negotiable. Children cannot be expected to follow hygiene norms without access to soap, clean water, or functioning toilets. Special observances like Global Handwashing Day have been used not only to raise awareness (Sultana et al., 2021) but also to spark enthusiasm, while health clubs provide students with a forum to learn about disease transmission, practice handwashing techniques, and even compete for rewards tied to hygiene (Vivas et al., 2010). Equally important is preparedness: schools need medical kits on hand, trained staff who can act during crises, and a system of health report cards integrated into School Management Committees (Puri & Gulati, 2022; Lahariya, 2018).

Of course, no school operates in isolation. Partnerships with government programs like Ayushman Bharat help bridge resource gaps by offering access to medical examinations and wellness activities. NGOs, too, are frequently the unsung heroes, providing funds, knowledge, and logistical help for campaigns. Regular visits from health professionals give students direct exposure to expert advice and ensure timely intervention for emerging concerns (Bora et al., 2025).

Still, even with these mechanisms in place, challenges are persistent. Limited budgets, entrenched misinformation, and cultural barriers can easily derail well-intentioned initiatives. Overcoming such obstacles calls for both creativity and persistence. Policy advocacy is one lever - pushing for increased public funding so that health education is not treated as an afterthought. Community engagement is another, especially when programs enlist trusted local leaders to help negotiate cultural sensitivities. Building the capacity of teachers is equally vital, since even the most innovative policy falters if educators lack the skills or tools to implement it effectively.

Meanwhile, public awareness efforts - whether through television, social media, or local campaigns - help amplify the broader message that health education is not optional but fundamental. Continuous evaluation, finally, ensures that programs do not lose momentum, holding schools accountable to consistent standards over time (O'Byrne et al., 1996). In short, promoting health awareness in schools is not a single initiative but a layered process, requiring policy, infrastructure, pedagogy, and community support to converge.

2.9. Studies on Health and Hygiene Practice among Students

2.9.1. WHO Publications on Health and Hygiene in Schools

The World Health Organization (WHO) has long been a leading voice in shaping the global dialogue on water, sanitation, and hygiene (WASH) within school environments. Across its publications, the organization consistently underscores that WASH is not merely about infrastructure such as toilets or taps, but about nurturing a culture of health, dignity, and equity within school life (WHO, 2019).

One of its more recent guides, *Improving Health and Learning through Better Water, Sanitation and Hygiene (WASH) in Schools: An Information Package for School Staff*, adopts a notably practical stance (WHO, 2019). The guide functions less as a policy report and more as an implementation toolkit designed for teachers, health workers, and maintenance staff. Beyond emphasizing safe water and gender-sensitive sanitation, it highlights the importance of sustainability through continuous operations, staff training, and consistent budgeting. By providing case studies, monitoring templates, and maintenance checklists, the report argues that long-term success depends not only on construction but also on daily upkeep and active community participation.

Earlier WHO publications show the roots of this thinking. *The Situation of WASH in Schools in the Pan-European Region* (WHO, 2016) presented a sobering view of systemic inequities, with many schools reporting unreliable access to clean water and poorly maintained facilities. The study highlighted that children in rural areas, those from low-income communities, and students with disabilities faced the greatest disadvantages. Recommendations centered on assigning institutional responsibility, securing dedicated budgets, integrating hygiene routines into daily practice, and establishing effective monitoring mechanisms. In the same year, WHO and the United Nations Economic Commission for Europe (UNECE) jointly released *Prioritizing Pupils' Education, Health and Wellbeing: WASH in Schools in the Pan-European Region*, a follow-up that drew attention to weak enforcement and fragmented governance, particularly in the gap between national policy commitments and actual implementation (WHO & UNECE, 2016). Importantly, this report introduced a rights-based dimension by calling for the inclusion of children's perspectives-especially in menstrual health management-within school facility design and decision-making.

By 2019, WHO's focus began shifting toward accountability and data systems. *Surveillance of Water, Sanitation and Hygiene in Schools: A Practical Tool* (WHO, 2019) emphasized the need for reliable monitoring frameworks to track progress and identify systemic weaknesses. It proposed standardized indicators to measure access to clean water, adequacy of sanitation, menstrual hygiene management, and handwashing facilities. The publication also encouraged governments to employ digital tools, school inspections, and student-led monitoring to ensure transparency and ownership at all levels. Notably, the report referenced the COVID-19 pandemic as a moment that exposed the fragility of existing hygiene practices, reinforcing the importance of institutionalizing WASH systems.

Taken collectively, these WHO reports argue that sustainable school-based WASH programs require more than infrastructure. They depend on continuous teacher and staff engagement, stable financing, inclusive design, and integration into the everyday fabric of school operations. As WHO consistently notes, WASH directly supports several Sustainable Development Goals: SDG 3 (good health and well-being), SDG 4 (quality education), and SDG 6 (clean water and sanitation).

The *Progress on Drinking Water, Sanitation and Hygiene in Schools* report by the WHO/UNICEF Joint Monitoring Programme (JMP) extends this perspective into the global monitoring domain. Rather than detailing Bangladesh's national policy, it frames the country's performance through the lens of the Sustainable Development Goals, particularly SDGs 4.a and 6, which shape educational and health priorities (WHO & UNICEF, 2022, p. 6). These targets demand schools that are inclusive, accessible to students with disabilities, gender-sensitive, and equipped with safe drinking water and adequate sanitation (pp. 6–7).

Measured against these standards, Bangladesh shows progress but with inconsistencies. The proportion of schools without water service dropped from 10% in 2015 to 5% in 2021, and basic sanitation coverage reached roughly half of all schools nationwide (WHO & UNICEF, 2022, pp. 15, 19). Yet, the report also indicates that while infrastructure expansion is evident, sustained hygiene education and facility maintenance remain weak. Hygiene behavior among students is closely tied to access: when soap and water are unavailable, even motivated children cannot practice handwashing consistently (WHO & UNICEF, 2022, p. 20).

Teacher capacity emerges as another key concern. The report notes systemic training gaps, limited guidance on disability-inclusive WASH design, and insufficient preparedness for public health crises (WHO & UNICEF, 2022, pp. 6–7, 12). In Bangladesh, these challenges are compounded by

inconsistent data systems and weak programmatic support for teacher-led initiatives. Similarly, many schools face chronic maintenance problems, with 14% still struggling with limited water supply and sanitation (WHO & UNICEF, 2022, pp. 15, 19–20).

To address these challenges, the report outlines a comprehensive agenda: upgrading infrastructure to meet basic service levels, strengthening rural and urban monitoring systems, expanding teacher training on hygiene and menstrual health, and engaging community stakeholders in regular WASH assessments (WHO & UNICEF, 2022, pp. 6–10, 19–20). For Bangladesh, these recommendations align closely with WHO's earlier guidance-emphasizing that facilities, behavior, and policy must evolve together.

Seen through this combined lens, WASH in Bangladeshi schools reflects both progress and persistent gaps. Infrastructure development has gained policy attention, yet hygiene education, teacher capacity, and community engagement still lag behind. The synthesis of WHO and WHO/UNICEF reports suggests that meaningful improvement will require long-term commitment: integrating hygiene into the school curriculum, ensuring inclusive design, training teachers as "hygiene ambassadors," and maintaining systems for monitoring and accountability. Only through such a coordinated approach can Bangladesh move from uneven progress toward sustainable, equitable school health outcomes.

2.9.2. UNICEF publications on Health and Hygiene in Schools

UNICEF has long stood at the forefront of promoting sanitation and hygiene in schools, making the case that access to clean water and safe facilities is not merely a health issue but also an educational one. Children learn best when they are healthy, and UNICEF's efforts consistently highlight that lesson. Its School Sanitation and Hygiene Education (SSHE) programs, often cited as models of good practice, illustrate how hygiene instruction and adequate infrastructure can work hand in hand to nurture healthier schools and stronger communities.

One striking example is the SWASTHH program in India, which UNICEF helped to launch as a way of embedding hygiene into the everyday rhythm of school life (Snel & Shordt, 2002). The program did more than provide toilets or clean water points - it sought to cultivate a culture where children practice handwashing, safe drinking, and other protective behaviors at school and then carry these habits back to their families. In fact, this emphasis on "spillover" into homes and villages was central to UNICEF's thinking: schools were treated not only as places of learning but as entry points for wider social change.

The wider international conversation picked up on these ideas too. As researchers like Kalam, Gautam, and Basu (2003) observed, hygiene education in primary schools contributes not just to immediate health gains but also to progress on global development targets such as the Millennium Development Goals (MDGs). By reducing preventable illnesses, keeping children in classrooms, and cutting the costs of care for families, such programs tie together education, health, and poverty reduction in one coherent package.

The measurable impact of these initiatives has been compelling. UNICEF's WASH-related work has been credited with preventing countless child deaths linked to unsafe water and poor sanitation (Water and Sanitation, 2022). The benefits are not only medical. Schools with safe toilets and clean water report higher attendance and better concentration among pupils, a reminder that the physical environment strongly shapes learning outcomes (Snel & Shordt, 2002; OECD, 2022).

But perhaps the most enduring strength of UNICEF's model lies in its attention to community ownership. Facilities alone rarely transform behavior; what sustains progress is the sense that schools and families together are custodians of hygiene. Snel and Shordt (2002) argue that shared responsibility is what keeps sanitation systems functional and effective, while Kalam et al. (2003) note how classroom lessons ripple outward, reshaping family practices and community norms. In this sense, UNICEF's programs are not simply about hygiene - they are about reimagining schools as engines of social change.

Of course, there are hurdles. Persistent inequalities, particularly in rural or underfunded regions, mean that many children still go without adequate facilities. Scholars such as Kusumawardhana and Auliya (2020) caution that without ongoing partnerships - between governments, local communities, and international actors - gains may not last. The challenge is not only about infrastructure but also about designing inclusive, culturally appropriate facilities and ensuring that hygiene education continues to influence daily behavior over time.

Taken together, UNICEF's SSHE initiatives reveal both achievement and unfinished business. They demonstrate how tightly interwoven health and education really are, showing that a latrine or a handwashing station can have as much impact on learning as a new set of textbooks. Yet the persistence of inequities reminds us that this work requires patience, fresh investment, and a willingness to keep communities at the center of the process.

2.9.3. World Bank publications on Health and Hygiene in Schools

The Water, Sanitation, Hygiene, and Nutrition in Bangladesh report paints an uneven and somewhat fragmented picture of hygiene promotion in schools. Over the years, several strategies have touched on the issue in passing, including Sanitation (2005), Hygiene Promotion (2012), and the draft Water Supply and Sanitation Strategy (2014), yet few have managed to establish a cohesive direction. The Sanitation Strategy focuses broadly on expanding coverage but barely acknowledges primary schools. The Hygiene Promotion Strategy ventures a little further, recommending school-based education, but it stops short of offering practical guidance on implementation. Even the 2014 draft, which introduces the idea of hygiene education within a multi-sectoral framework, remains stuck in policy limbo. The result is a policy environment where school hygiene seems peripheral rather than central.

On the ground, this policy disconnection is mirrored in the realities of student behavior and school infrastructure. Awareness among young children remains troublingly low. Only about 13 percent of children aged three to five wash both hands with soap, a figure that underscores how fragile basic hygiene habits still are. Infrastructure tells a similar story. While sanitation access has improved nationally, only 57 percent of the population uses "improved" facilities. For schoolchildren, that often means broken toilets, scarce water points, and handwashing stations that rarely function. Contaminated water at the point of use compounds the problem, turning what should be daily hygiene practices into a distant ideal.

Teachers occupy a difficult position in this landscape. Many receive little or no professional preparation on hygiene education, as training programs tend to emphasize nutrition while skimming over WASH principles. Without clear modules or in-service development opportunities, teachers are left improvising. Some try to promote better hygiene habits, but they do so within tight constraints, including no soap, no functioning taps, and no consistent institutional direction. Their attempts become situational rather than systemic, shaped by what facilities happen to exist that day.

Interestingly, these findings from Bangladesh echo the global concerns voiced by the World Bank. The Bank has long argued that sanitation is not merely about cleanliness, but about building healthier children, stronger schools, and ultimately more resilient societies. Improved WASH facilities, it emphasizes, create the conditions for learning and growth, enabling students to attend regularly, stay focused, and thrive. In its 2022 feature *Improving Sanitation to Secure Communities*

and Their Human Capital, the Bank underlined that clean facilities reduce disease and malnutrition among learners and often inspire communities to follow suit. Tanzania's "Nyumba ni Choo" campaign offers compelling evidence. Between 2020 and 2021, nearly ten million people gained access to safer sanitation, and open-defecation-free villages rose from 31 to 189.

Still, the global data remain sobering. As the World Bank's Policy Brief on WASH in Schools (2021) notes, roughly three in ten schools worldwide lack basic sanitation, leaving about half a billion children to learn in unsafe conditions. The gendered consequences are especially severe. Inadequate facilities contribute to absenteeism among girls during menstruation, while the absence of privacy, disposal bins, or running water discourages school attendance altogether. In many cases, these gaps have measurable cognitive and developmental effects, as seen in Tanzania, where poor sanitation has been linked to significant learning losses and millions of missed school days.

Examples from other contexts illustrate what progress can look like. In Indonesia, grants of IDR 150 million helped more than 2,300 madrasahs upgrade their sanitation facilities, making schools cleaner and more welcoming. In Malawi, a World Bank-supported initiative in 2023 introduced reliable water points and newly constructed toilet blocks, resulting in improved attendance and student engagement. These cases demonstrate that sanitation is more than infrastructure, it is a catalyst for long-term behavior change and better learning outcomes.

At the same time, even the Bank acknowledges that progress remains uneven. Its 2021 brief recorded that while 79 percent of schools reported access to improved drinking water, only 44 percent had functional, sex-segregated toilets. Hygiene facilities fared even worse, with just 26 percent of schools having water and soap near toilets. Menstrual health was almost absent from the data, with only 1 percent of schools providing disposal bins and 2 percent offering water in girls' cubicles. Students with disabilities were often excluded entirely due to inaccessible facilities, and cultural silence around menstruation meant these topics rarely entered classrooms or curricula.

Both the national and global evidence converge on similar causes, including weak policy coordination, chronic underfunding, and inconsistent monitoring. Hygiene is sometimes taught, but rarely reinforced through daily routines or supported by adequate resources. Education data systems may count toilets and taps, but seldom assess whether they actually function or meet students' diverse needs. The result is a persistent disconnect between infrastructure, behavior, and institutional accountability.

Moving forward, both the World Bank and national frameworks like Bangladesh's 2014 draft strategy outline similar priorities. Policy alignment is essential, and hygiene standards must be integrated into education, health, and gender policies with clear benchmarks for menstrual health management. Infrastructure must improve. Schools need reliable water supply, gender-sensitive toilets, and accessible handwashing stations equipped with soap. Teachers also require well-designed training modules that link hygiene directly to child health and learning outcomes, enabling them to translate WASH concepts into classroom practice. Broader awareness campaigns involving parents and communities could further normalize hygiene as a shared responsibility rather than a school-only issue.

Ultimately, hygiene in schools cannot be reduced to infrastructure, policy, or awareness in isolation. It is the interaction of these forces, policy commitment, teacher preparedness, and functional facilities, that will determine whether schools in Bangladesh and beyond can nurture healthier, more confident, and more resilient generations.

2.9.4. UNESCO publications on Health and Hygiene in Schools

UNESCO has long argued that learning and health are inseparable. Children who are nourished, active, and safe are not only less likely to fall sick but also more likely to concentrate, persist, and succeed in their studies. And the reverse is just as true: education tends to ripple forward into healthier lives, better nutrition, lower mortality, and stronger well-being across communities. This belief underpins frameworks such as the FRESH (Focusing Resources on Effective School Health) initiative and the Global Standards for Health-Promoting Schools, which push schools to see themselves not just as places of instruction but as hubs for policy, health services, and community connection.

The evidence backing this philosophy is striking. One influential source UNESCO points to is the U.S. Centers for Disease Control and Prevention's report *Health and Academic Achievement* (2014). It showed clearly that students who ate well and exercised regularly weren't just healthier -they performed measurably better in the classroom. The report went even further by tracking something called a multi-asset health index. Urban students with nine or more "health assets" -think adequate sleep, family meals, healthy weight -were over twice as likely to hit proficiency in reading, writing, and math than peers with fewer assets. Each added asset bumped their chances of success by about 18 percent. The message was plain: stacking positive health habits multiplies

academic benefits, whereas piecemeal actions (like banning soda machines alone) rarely move the needle much.

That logic has fed into whole-school frameworks such as the WSCC (Whole School, Whole Community, Whole Child) model, which pushes for daily physical activity, healthier meals, mental health supports, and safer school environments. These approaches work especially well in high-poverty areas, where health and education gaps compound each other. Physical activity, in particular, stands out as a double win: children not only stay healthier but also focus longer, process information better, and score higher academically.

Fast forward to 2023, when UNESCO, alongside UNICEF and the World Food Programme, published *Ready to Learn and Thrive: School Health and Nutrition around the World*. The findings were sobering. Some 73 million marginalized children still had no access to school meals. A third of schools globally lacked safe water or sanitation facilities. Beyond that, many learners contended with unsafe school environments, weak mental health support, and ongoing issues around adolescent well-being. These are not side concerns; they cut directly into equity, attendance, and achievement.

Threaded through these reports is a consistent point: WASH -water, sanitation, and hygiene -is not a “nice to have” but a foundation. When toilets are functional, water is safe, and soap is available, children are healthier, girls can attend during menstruation with dignity, and marginalized learners are less likely to be excluded. Without these basics, no amount of curriculum reform can fully deliver.

But achieving this requires more than infrastructure alone. Sustainable change depends on strong national policies, stable funding streams, and schools working hand in hand with families and communities. When these pieces align, schools become genuine engines of human development, reinforcing both public health and education goals.

2.9.5. CDC publications on Health and Hygiene in Schools

The U.S. Centers for Disease Control and Prevention (CDC) has long recognized that schools are not just places of learning, but also spaces where illness can spread quickly if everyday precautions are overlooked. To address this, it has crafted a set of guidelines - grounded in solid scientific evidence - that aim to make school environments healthier and, by extension, ensure children miss fewer days of class. The message is clear: better hygiene equals better attendance, and better attendance translates into stronger learning outcomes.

At the heart of the CDC's advice lies the simple, almost mundane, but incredibly effective act of handwashing. Children are encouraged to wash with soap and water for at least 20 seconds - a ritual that may sound basic but has proven to dramatically cut the spread of infection. Schools, the CDC suggests, should go beyond casual reminders: set up scheduled handwashing breaks, stock restrooms and classrooms with soap and paper towels, and where water isn't always available, provide alcohol-based sanitizers (≥60% alcohol). And since kids rarely stop at clean hands, respiratory etiquette comes next - teaching them to cover coughs and sneezes with tissues that are promptly thrown away or, failing that, to use the crook of their elbows. Naturally, this should be followed by another round of handwashing.

But hygiene doesn't end with the students. Surfaces matter too. High-touch areas - desks, doorknobs, light switches - require regular cleaning and disinfection. During times of heightened illness, the CDC advises schools to tighten these routines, often in consultation with local health officials, to respond quickly and effectively to outbreaks.

The guidelines also stress preparedness. Schools are urged to weave infectious disease prevention into their emergency operation plans, not as an afterthought but as a standing priority. Clear policies on when sick students should stay home, when they may return, and how staff should respond to outbreaks make the difference between swift containment and widespread disruption. School nurses and local public health departments are key partners in setting these policies.

What gives these recommendations real weight is the evidence behind them. A CDC Science Brief from 2022 reviewed 158 studies and concluded that preventive steps - like hand hygiene, cleaning protocols, ventilation upgrades, and chortling - significantly reduce respiratory and gastrointestinal infections. In other words, these aren't just good intentions; they work.

When illness is circulating at higher-than-usual levels, additional precautions may be warranted. Masking, chortling, greater physical distance, and widespread testing are part of the toolbox. Ventilation improvements, whether through HVAC upgrades or portable air filters, are singled out as particularly important - not just during crises but also during routine construction or building renovations. Vaccination, too, is highlighted as a cornerstone of long-term protection, ensuring resilience against diseases that schools cannot afford to have resurface.

Finally, the CDC places a strong emphasis on equipping educators and staff with the resources they need to put all this into practice. Schools are advised to keep track of absenteeism, monitor illness trends, and activate protective measures - like distancing or masking - when outbreaks

threaten continuity. Training materials, ready-to-use posters, and online tools from the CDC are designed to support this ongoing effort.

Taken together, these recommendations advocate for more than clean hands and tidy classrooms. They argue for a proactive, evidence-based approach to sustaining in-person learning by protecting the health of students and staff alike. The underlying message is simple, though not simplistic: a school that prioritizes hygiene and disease prevention is one where children are healthier, teachers can teach without constant disruption, and learning is less likely to be derailed by waves of preventable illness.

2.10. Conceptual framework of the study:

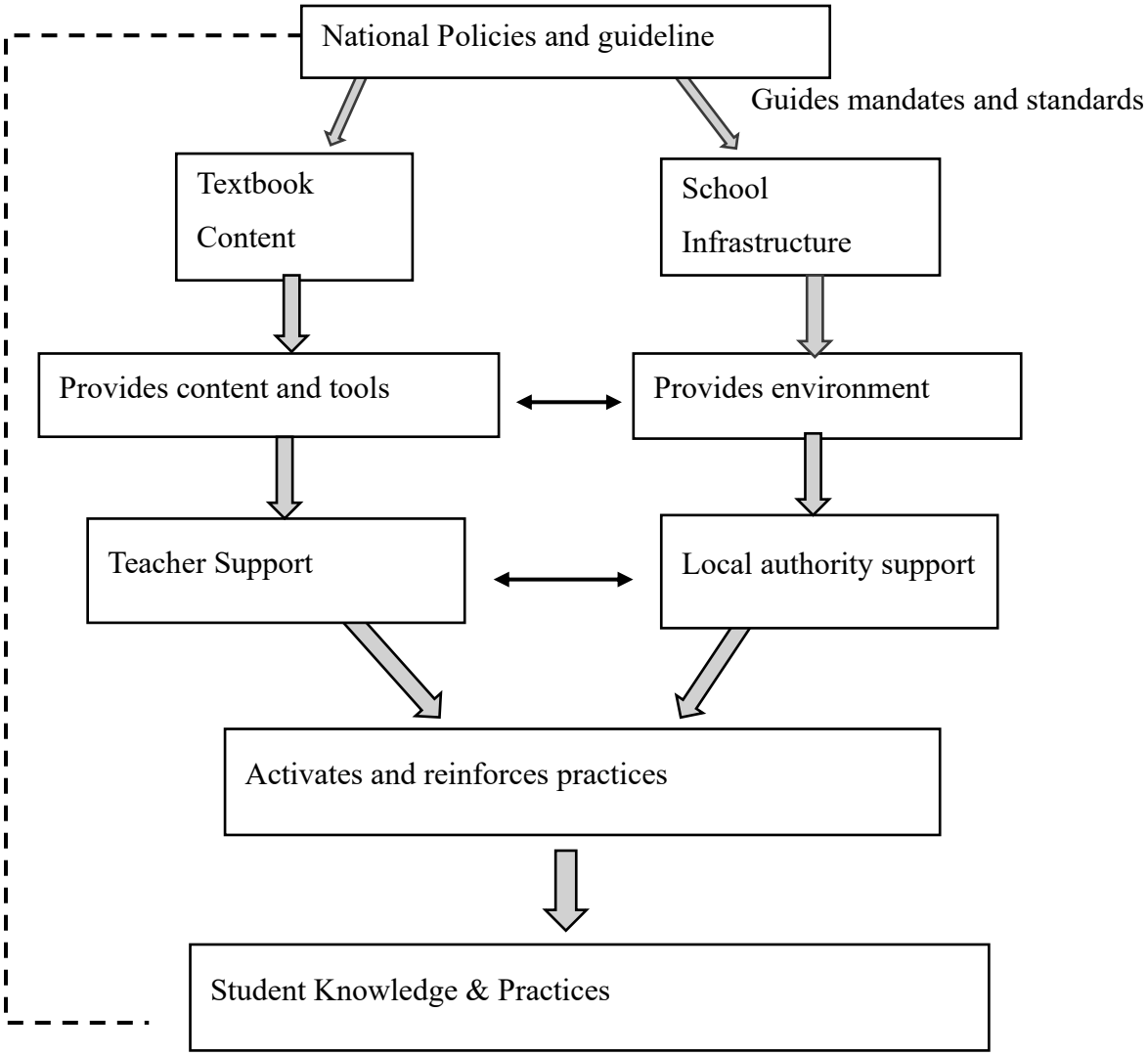

Figure 2. 1: Conceptual framework of the study

Chapter 3: Methodology

The Methodology chapter describes research design, sampling techniques, data collection tools, and analytical framework used to investigate the practice of health and hygiene of the primary school students of Bangladesh. Additionally, this chapter elaborates on the data collection process and the strategies for triangulating and analyzing the data.

3.1. Research Design

This study adopted a mixed-methods approach following the convergent parallel research design to investigate the health and hygiene practice of the primary school students of Bangladesh. Quantitative data were collected through semi-structured questionnaire for teachers, students, interview schedule for ATEOs/AUEOs and school observation.

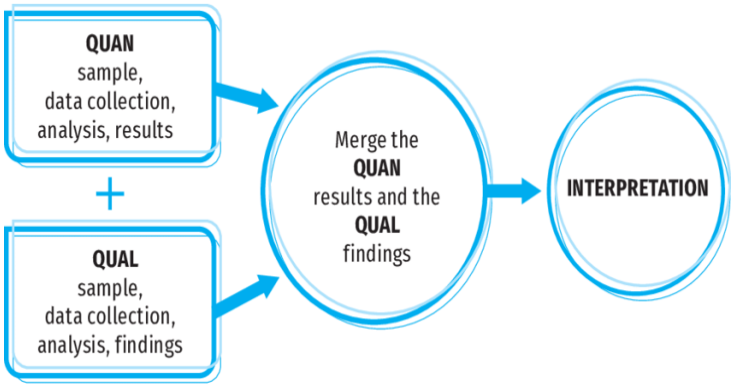

Figure 3. 1: Convergent Parallel Mixed Methods Design (Plano and Creswell, 2015)

Qualitative data was gathered through interview, questionnaires, observation and document analysis. In a convergent parallel mixed-methods design both qualitative and quantitative data are collected simultaneously, analyzed separately, and then merged for comparison (Creswell & Plano Clark, 2018). The purpose of a convergent (or parallel or concurrent) mixed methods design is to simultaneously collect both quantitative and qualitative data, merge the data, and use the results to understand a research problem' (Creswell, 2012).

3.2. Population and Sample Selection

This study employed a mixed-methods approach, including classroom observation, semi-structured questionnaire and face to face Interview The sampling technique varies based on the specific data collection methods and the need to represent the study locations. A total of 55 schools were selected, considering five major geographical areas such as plain land, char, hawr, coastal and hill track areas for this research. According to APSC (2021) these four regions (plain land, char, hawr, coastal) have the highest number of schools and the hilly regions have the lowest number of schools. Schools were selected focusing on school category (GPS and NNGPS), which

got support for their health and hygiene and school location (urban and rural) and considering school's location also. The selection of schools ensured equal representation from each division and included diverse demographics and characteristics. The school selection criteria were presented in a matrix below:

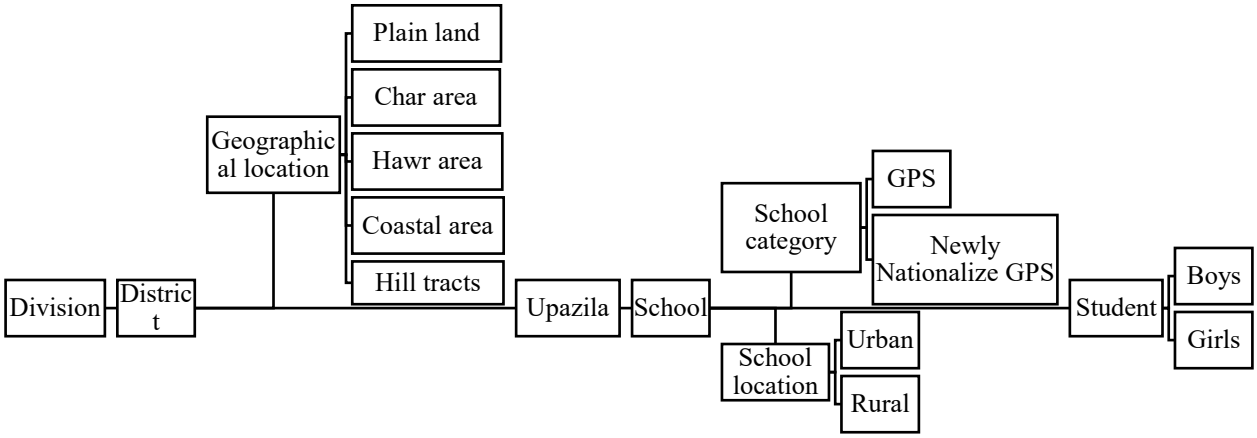

Figure 3. 2: School selection process presented in matrix

The study population included grade 5 students who were at the terminal level of primary education. They had achieved the knowledge of class one to four. Teachers of that schools were included to address how much did teachers help students to practice health and hygiene. ATEOs of that selected areas were also selected as samples for the research. The sample matrix is presented below:

3.3. Table 3. 1: Sample selection strategy and sample size

Division	District	Upazila	School	Students	Teacher	ATEO
8	10 (considering 5 geo locations)	1 ×10 =10 (Except: for Dhaka City, two Upazilas- Slum & Urban)	5×11=55 (considering school location & categories)	1070	306	1X11=11
	Purposive			Grade 5	All teachers	Purposive

As the population size of the students is large (greater than 20,000) the following formula was used to determine the statistically representative sample size:

$$Sample\ size = \frac{Z^2 \times P(1-P)}{e^2} \quad \text{(Cochran, 1963)}$$

[Here, Z=1.96 (for 95% confidence level), e=0.05, P=0.5]

By solving the equation sample size was found to be 384. To avoid the risk, the required sample size was determined as 1100 to 1200. Finally, a total of 1070 students were traced for data collection.

3.4. Data Collection

In a convergent parallel mixed-methods design both qualitative and quantitative data are collected simultaneously.

3.4.1. Quantitative data collection

This study covered 55 schools from ten districts of eight divisions. In each selected schools all students of class 5, all teachers of the schools and school premises were considered as the source of quantitative data.

3.4.2. Qualitative data collection

To obtain an in-depth understanding of the study objectives and research questions, primary school teachers, students and ATEOs were selected as the qualitative data source for the study. The study team interviewed those ATEOs who were the local authority of the selected schools.

3.5. Research Tools

Several data collection tools were used to collect the primary and secondary data from the study locations as follows:

a) Structured questionnaire for students

To gather students' insight about knowledge and practice of health and hygiene, data was collected from students through face-to-face question- answer by using semi-structured questionnaire. The face-to-face question answer focused on students' knowledge and source of knowledge, students' regular practice and challenges of practice regarding health and hygiene issues.

b) Semi-structured questionnaire for teachers

Semi-structured questionnaire for teachers were used to gather teachers' knowledge about health and hygiene, their opinions about the school's facilities regarding health and hygiene, and types and scopes of teachers' collaboration in students' health and hygiene practices and challenges of the students during practicing health and hygiene.

c) Interview schedule for ATEOs

Data was collected from local school authorities (ATEOs/AUEOs) through face to face interviews about health and hygiene practices of the respected schools, the status of facilities for hygiene and practice of those schools. Beside that data was also collected to address what actions were needed to ensure facilities to ensure the practice of health and hygiene, and what should be done to create awareness and promote health and hygiene practices among teachers and students.

d) Observation checklist

An observation checklist was used to gather information regarding school facilities and challenges regarding health and hygiene practices.

e) Document analysis

Different national and international documents were analyzed to determine expected knowledge and practice of the **p**rimary school level students. Different documents like Primary Education Development Program (PEDP-4), Different Publications and program reports of different organizations like WHO, UNICEF, UNESCO, World Bank and CDC on Health and Hygiene practice in Schools were analyzed to gather the in-depth insight regarding the issue.

Table 3. 2: Study Matrix

Research Questions	Data source	Sampling technique	Tools
What knowledge and practice do primary students have regarding health and hygiene issues?	All the students of grade 5 of the respected schools	Purposive	Semi-structured Questionnaire
How much do primary school teachers know about health and hygiene practices?	All the teachers of the selected schools	Purposive	Semi-structured Questionnaire
How much support do primary school teachers provide for students to practice health and hygiene?	All the teachers of the selected schools	Purposive	Semi-structured Questionnaire

How does the infrastructure of primary schools' support health and hygiene practices among students?	Selected schools	Purposive	Observation checklist
What steps can be taken to improve the health and hygiene practices in primary schools?	ATEOs	Purposive	Interview Schedule
How do the National Policies address the health and hygiene practices for primary school students?	Different national and international documents		Document analysis

3.6. Data Collection process

To ensure the validity, reliability, and appropriateness of the research instruments, the draft tools were piloted with the non-sampled respondents at Mymensingh Sadar and Gopalganj Sadar upazila. The pilot data was analyzed to evaluate each question of the questionnaire and necessary revisions were made based on the findings and feedback by the research team.

Due to the limitation of human resources of NAPE, PTI instructors, TEOs , ATEOs and others field level primary Education officers were engaged in data collection along with NAPE personnels. Different teams were engaged in different districts for collecting data. Each team consisted of NAPE personnel and other field level officers. An online orientation program was arranged for data collectors before going to collect data.

After collecting all the primary data, data was inserted in kobo toolbox for next activity. A day long orientation program for inserting data in kobo toolbox was arranged by NAPE for all the data collectors.

3.7. Data Analysis and Data Presentation

A mixed-methods approach was employed to analyze our data and ensure a comprehensive understanding of our results. For quantitative data, descriptive statistics like mean, percentage distribution were used to summarize the key patterns and trends. For these statistical computations Statistical Package for Social Science (SPSS) trial version software package was used.

Qualitative data analysis techniques, such as thematic analysis, were employed to identify patterns, themes and trends within the data.

To analyze the qualitative data collected from the students, teachers, education officials and content analysis, data-driven thematic analyses were incorporated (Braun and Clarke, 2006). According to Braun and Clarke (2006), a six-phase approach to thematic analysis includes-

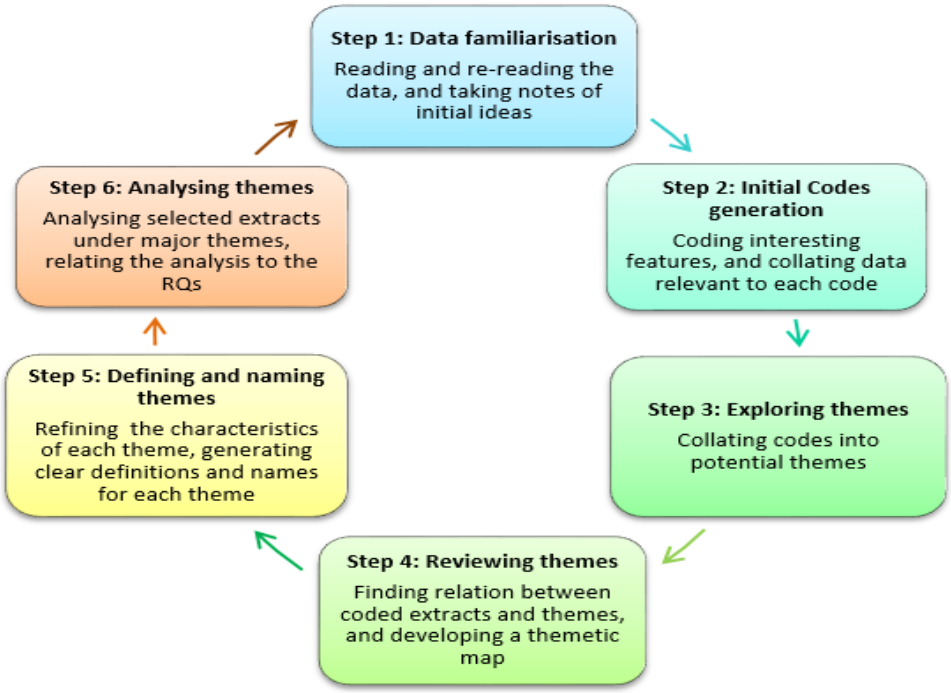

Figure 3. 3: Data-driven thematic analysis cycle (Adapted from Braun and Clarke, 2006, p. 87)

3.8. Data triangulation

Data triangulation refers to the use of multiple methods of data collection to investigate a research question, thereby counterbalancing the inherent weaknesses of a single method with the strengths of another (Denzin, 1978; Patton, 1999). In this study data collected from formatted questionnaires, interview and observation has triangulated to have a more comprehensive and credible understanding about student's knowledge and practice of health and hygiene.

3.9. Ethical Consideration

Ethical considerations were prioritized throughout the research process. Informed consent was obtained from all participants, and their confidentiality was ensured. Participants were informed about the study's objectives, procedures, and their rights to withdraw their statement at any time. Data confidentiality and anonymity were maintained during data collection, storage, and analysis.

Chapter 4: Findings and Data Presentation

This chapter presents the findings from a detailed study on health and hygiene practices among primary school students in Bangladesh, addressing the research questions set out in the study. The analysis uses data from various sources, including document reviews, student and teacher surveys, supervisor insights, and school inspection observations, to give a clear picture of health and hygiene education and practices in primary schools. The findings are organized into six clear sections for easy understanding.

Section 4.1 looks at the document analysis results, showing how national policies and guidelines handle health and hygiene for primary school children, pointing out what works well and where improvements are needed. Section 4.2 examines health and hygiene topics in primary school textbooks, focusing on the content and methods used to teach students about hygiene. Section 4.3 explores students' knowledge and practices related to health and hygiene, covering their sources of information, how they learn, what they do in practice, and the challenges they face. Section 4.4 reviews how teachers support students in practicing health and hygiene, looking at their knowledge, encouragement efforts, and limitations. Section 4.5 covers the role of supervisors, especially Assistant Upazilla Education Officers, in promoting hygiene through awareness and resource support. Finally, Section 4.6 assesses the infrastructure in primary schools, identifying key issues with wash blocks, toilets, water supply, and overall cleanliness that affect hygiene practices.

4.1. Health and Hygiene in Primary Education: Insights from National Policy Frameworks

4.1.1. Studies on the Fourth Primary Education Development Program (PEDP4)

The Fourth Primary Education Development Program (PEDP-4), implemented by the Directorate of Primary Education (DPE) since 1 July 2018, represents the Government of Bangladesh's comprehensive strategy to enhance both physical infrastructure and the overall learning environment in government primary schools. Within its broad framework, the component titled *Suitable Access and Participation* incorporates Sub-component 2.4 on *Water, Sanitation and Hygiene (WASH)*, which directly addresses the provision of adequate health and hygiene facilities for students.

Under this sub-component, PEDP-4 set ambitious infrastructure targets, including the construction of approximately 58,000 gender-segregated and disability-accessible WASH blocks, and the installation of 15,000 safe water points to ensure that every school has convenient access to drinking water. The program also allocates resources for the maintenance of 28,500 WASH blocks and the repair of an additional 10,000, reflecting a recognition that infrastructure sustainability is as critical as initial construction.

The policy outlines specific standards for toilet-to-student ratios - one toilet for every 50 girls, one toilet for every 75 boys, and one urinal for every 50 boys - and stipulates design requirements to ensure facilities are functional, safe, and inclusive. Each WASH block is to contain three toilets (including one designed for persons with disabilities), a hand wash basin, and a foot wash basin, while male facilities must also include at least two squatting urinals. Gender segregation is enforced through separate male and female blocks or, where space is limited, through opposite-facing entrances. The policy further mandates privacy measures, durable waterproof materials, impervious flooring and walls, and child-friendly design elements such as low steps, reachable handles, and appropriate lighting and ventilation.

Access to safe drinking water forms a parallel priority. PEDP-4 requires at least one potable water source per school, with the standard of one tube well or water point per 100 students. Options for water provision include piped supply, wells, springs, ponds, tube wells, and rainwater harvesting, with local hydro-geological conditions guiding selection. Where piped water is available, schools are encouraged to connect to municipal systems, complemented by storage in underground and overhead tanks. Crucially, all water sources must undergo microbiological and chemical testing before being handed over to schools, ensuring compliance with national quality standards.

To address water safety, the policy highlights treatment processes such as filtration, distillation, reverse osmosis, and desalination, aimed at removing contaminants and ensuring year-round availability of potable water. The design of drinking water points is also regulated, requiring that facilities be clearly identifiable, safe, and sufficiently numerous, with at least one drinking water provision per floor in multi-storey school buildings.

4.1.2. National Education Policy (2010)

The National Education Policy 2010 treats health and hygiene not as side issues but as core elements of primary schooling, tying them directly to the goal of building lifelong habits in children (Ministry of Education, 2010). From the early years, schools are tasked with embedding

simple routines - washing hands thoroughly, keeping nails trimmed, brushing teeth regularly - through practical, hands-on lessons rather than just theory (p. 16). The policy is equally clear about the environment in which children learn: clean surroundings and proper sanitation are considered essential, with explicit calls for gender-segregated toilets and safe facilities (p. 14). Interestingly, the same section that discusses hygiene also discourages corporal punishment, framing a healthier, more welcoming school culture as part of the broader health agenda (p. 14). Alongside these provisions, the policy advocates school meal programs - especially in rural or economically disadvantaged communities - acknowledging nutrition as an inseparable piece of the child health puzzle (p. 14).

While hygiene education is highlighted as a priority, the policy does not actually provide much evidence on what children *know* or *do* in practice. It encourages schools to integrate hygiene into classroom activities, aiming for habits to develop through repetition and participation (p. 16). And because classroom participation is part of the continuous assessment system, one might assume hygiene-related behaviors are being observed and reinforced in subtle ways (p. 57). Still, the absence of concrete data leaves a gap - without surveys or focused studies, it is difficult to judge whether these efforts are really shifting children's day-to-day hygiene practices.

On the teaching side, the policy signals clear intentions but, again, only partial follow-through. Teacher training is meant to include modules on child health and hygiene, with Primary Training Institutes encouraged to expand their coverage of these topics (p. 63). At the classroom level, science is positioned as the subject most suited to carry hygiene lessons (p. 13). Yet the policy does not spell out in detail what competencies teachers are expected to master, leaving room for uneven knowledge and patchy delivery. Stronger, more structured training programs could help ensure teachers are genuinely equipped to embed hygiene education across the curriculum.

Teachers, in fact, are placed at the center of hygiene promotion. They are expected not only to teach but also to observe and encourage habits like handwashing as part of daily routines (p. 16). The policy casts them as mentors and guides, tasked with counseling students and weaving health awareness into everyday school life (p. 60). However, the degree to which teachers can fulfill this role depends heavily on whether schools have adequate infrastructure and whether teachers themselves have received enough preparation. Without those supports, the policy's vision risks staying aspirational rather than becoming practice.

To make its ambitions tangible, the policy outlines several actionable steps. More frequent workshops and refresher courses would help teachers update their skills on hygiene and sanitation (p. 63). At the same time, schools need the basics in place: safe water, functioning toilets, and spaces that allow hygiene practices to be carried out (p. 14). Expanding school feeding programs more widely - beyond just the most disadvantaged areas - would complement hygiene efforts by tackling nutrition (p. 14). Awareness campaigns inside schools, with vivid demonstrations of handwashing and teeth cleaning, could reinforce lessons in memorable ways (p. 16). And finally, the policy underscores the importance of monitoring: inspections, periodic health surveys, and accountability systems to track whether hygiene and health standards are actually being met (p. 74).

4.1.3. National Strategy for Water Supply and Sanitation (2021)

The National Strategy for Water Supply and Sanitation 2021 casts health and hygiene not as peripheral but as fundamental to schooling, situating WASH (Water, Sanitation, and Hygiene) interventions directly within the educational agenda (p. 13). Building on the earlier National Hygiene Promotion Strategy of 2012, it pushes for hygiene lessons to be fully integrated into the school curriculum - recognizing that habits acquired in childhood often persist for life. Beyond curriculum reform, the strategy stresses infrastructure: functional toilets, reliable handwashing stations, and gender-sensitive facilities. Provisions for menstrual hygiene management (pp. 13, 22) signal an attempt at inclusivity, especially for girls, whose school attendance is often disrupted in the absence of such supports. By fostering partnerships with the Ministry of Primary and Mass Education, the policy seeks to ensure that hygiene instruction is not sporadic or symbolic but systematically embedded into daily school routines (p. 23).

Yet these ambitions run into stark realities. Nationwide data paint a sobering picture: only 35% of the population enjoys access to basic hygiene facilities, while more than half - 54% - depend on limited facilities, often without soap or sufficient water. A further 11% lack any facilities whatsoever (p. 1). Schools inevitably mirror these shortcomings. Many still struggle with nonfunctional toilets, broken taps, or absent handwashing points (p. 6). Even when some awareness exists, students' ability to practice basic hygiene - like washing hands after using the toilet - remains constrained by this scarcity. The strategy itself acknowledges the persistence of behavioral gaps, hence its call for focused campaigns to instill proper habits (p. 13).

Teachers emerge repeatedly as central actors, though their capacity is uneven. The strategy envisions them not only as instructors but as leaders of hygiene promotion campaigns within schools (p. 13). It also recommends that teachers be embedded in school-based WASH committees to oversee implementation and reinforce daily practices (p. 23). In practice, however, variations in training and the absence of robust monitoring leave teachers' knowledge inconsistent (p. 26). While some may integrate hygiene seamlessly into lessons, others operate with minimal preparation. Strengthening teacher training - making it systematic rather than ad hoc - seems critical if schools are to deliver uniform, reliable hygiene education.

At its core, the strategy proposes a three-pronged pathway: strengthen infrastructure, deepen education, and tighten monitoring. Equipping schools with adequate sanitation systems and reliable water access is non-negotiable (p. 22). Alongside this, hygiene awareness must be woven into curricular content and reinforced through nationwide campaigns (pp. 13, 23). Teachers, properly trained, become the linchpin in translating these goals into practice (p. 23). Finally, regular inspections and school-level audits are urged to ensure standards do not drift (p. 26). In this way, the strategy attempts to move beyond lofty aspirations, grappling instead with the messy realities that shape how Bangladeshi children learn - and practice - hygiene on a daily basis.

4.1.4. National Strategy for WASH in Health Care Facilities (2019-2023)

The National Strategy for WASH in Health Care Facilities 2019–2023, though written with hospitals and clinics in mind, sets out a framework that inevitably spills over into schools. By treating safe water, sanitation, and hygiene as inseparable from national health goals, the policy indirectly gestures toward classrooms as sites where those same objectives must be nurtured (p. 23). It names the Ministry of Education as a stakeholder (p. 27), which, though briefly mentioned, signals that hygiene education in schools is not an afterthought but part of the wider fabric of social health. Interestingly, the document repeatedly highlights *community engagement* (p. 38) - a theme that easily translates to the schoolyard, where parental involvement, neighborhood campaigns, and student clubs often shape the culture of hygiene as much as textbooks do.

That said, the text stops short of speaking directly to children's day-to-day practices. Nowhere do we find statistics on how many students wash hands before meals or whether they understand the link between sanitation and disease. Instead, the emphasis is on *community-based promotion* (p. 50), suggesting that students may learn not inside classrooms but via spillover effects: local campaigns about handwashing, healthcare workers modeling safe practices, or posters from

WASH programs appearing in village schools (pp. 27, 45). The strategy's silence on actual student knowledge makes one thing clear: more targeted surveys are badly needed if policymakers want to understand the lived reality of hygiene education in primary schools.

Teachers, meanwhile, appear in the narrative only obliquely. The strategy invests heavily in training healthcare workers (p. 50), but its "theory of change" (p. 47) assumes knowledge will filter outward into other sectors. In practice, that means educators might absorb WASH messages from community drives (p. 42) or informal exposure rather than through systematic training. There is a curious absence here: if doctors and nurses require structured hygiene modules, why would teachers - responsible for shaping daily habits of hundreds of children - not need similar preparation? The document hints at possibilities (p. 50) but never names them, leaving teacher knowledge patchy, uneven, and reliant on personal initiative.

Still, the policy offers building blocks. Community-led advocacy (p. 45), if extended into the education sector, could draw teachers into campaigns as local champions. Likewise, the strategy's call for *monitoring systems* in health facilities (p. 57) provides a ready-made blueprint for school-level audits, where teachers might oversee hygiene routines alongside headteachers and school management committees. Partnerships with educational administrators (p. 58) also open the door, albeit indirectly, to positioning teachers as frontline promoters of WASH in schools.

If one were to translate the health-care strategy into the classroom, a few steps seem obvious. First, borrow the training framework designed for nurses and health workers (p. 50) and adapt it to teacher training colleges - this would move hygiene from peripheral to professional. Second, broaden the community awareness campaigns (p. 42) so they explicitly include school initiatives, allowing teachers and students to co-own the message. Third, no matter how much awareness is raised, without water taps that work and toilets that function, progress will stall - hence the infrastructure imperative (p. 45). Fourth, school-level monitoring, modeled after hospital audits (p. 57), could normalize accountability. And finally, teachers themselves can be reframed not only as instructors but as advocates, echoing the document's vision of community-driven change (p. 45).

Taken together, the 2019–2023 WASH in Health Care Facilities strategy never really speaks to schools - but its principles seep outward. What is absent in explicit terms (student data, teacher guidelines) becomes visible in implication, leaving policymakers and educators to do the interpretive work of carrying those ideas across sectors.

4.1.5. National Hygiene Survey (2018)

The Government of Bangladesh has long recognized that healthier schools mean healthier children. Its commitment is visible in both policy and practice, most recently underscored in the *National Hygiene Survey 2018*. Tied directly to Sustainable Development Goal 6 (SDG 6) - which calls for universal access to safe water, sanitation, and hygiene - the survey reflects ongoing efforts to improve hygiene conditions in schools. Building on the earlier *National Hygiene Strategy 2012*, the framework pushes beyond infrastructure alone: it urges integration of hygiene education into the curriculum, the installation of gender-segregated toilets, and the provision of handwashing stations stocked with soap and clean water. The larger vision is to cultivate habits that students can carry well beyond the schoolyard.

Still, the survey paints a mixed picture. On the one hand, the majority of students claim they do wash their hands - 91% before eating and 89% after using the toilet (p. 45). These figures suggest a general awareness of hygiene's importance. But scratch the surface, and the gaps become apparent. For instance, only 10% of students recognize that handwashing before preparing food is crucial. Likewise, while 80% of schools have some kind of designated place for handwashing, soap and water are far less consistently available - just 37% provide soap, and only 36% ensure both soap and water (p. 46). Observations confirm these shortcomings: fewer than half of students actually washed both hands with soap, and only 38% had visibly clean hands (p. 47). Clearly, infrastructure shortfalls undermine even the best of intentions.

The role of teachers is harder to measure, since the survey did not directly assess their hygiene knowledge. Yet indirect findings hint at limitations in both training and resources. For example, only 11% of schools deliver menstrual hygiene education (p. 48), and just 7% distribute hygiene kits with basics like soap and disinfectant (p. 50). Meanwhile, nearly half of schools (47%) test drinking water for arsenic contamination, reflecting at least some awareness among staff of broader water safety concerns (p. 41). The picture that emerges is one of teachers constrained by systemic issues: they may value hygiene education, but without proper facilities, materials, or training, their capacity to promote strong practices is curtailed.

Infrastructure challenges weigh especially heavily on female students. Only 51% of schools have separate, unlocked latrines for boys and 53% for girls, and merely 32% of those provide both water and soap (p. 44). Menstrual hygiene is where the gaps are most striking: 43% of girls reported missing school in the past six months due to menstruation, while just 6% of schools had sanitary

pad disposal bins and 35% had changing rooms with hygiene supplies (pp. 50–51). Such absences highlight how the lack of supportive infrastructure directly interrupts girls' education, and how limited resources hamstring teachers' ability to intervene.

Against this backdrop, the survey points to several avenues for improvement. Expanding menstrual hygiene education - which currently reaches only a small fraction of schools - is one urgent step. Boosting awareness about proper handwashing, especially before food preparation, would complement this effort. Infrastructure upgrades are equally crucial: ensuring that toilets are not just gender-segregated but also stocked with soap and water, expanding access to sanitary pad disposal bins, and replenishing hygiene kits (pp. 44, 46, 50–51). Teacher training deserves renewed emphasis too, equipping staff with both knowledge and resources to make hygiene education practical rather than theoretical. And because safe water underpins all other hygiene practices, scaling up water quality monitoring - particularly for contaminants like arsenic - is another essential measure (p. 41).

Taken together, these findings remind us that promoting hygiene in schools is more than ticking boxes for infrastructure or curriculum requirements. It is about enabling environments where teachers are supported, students are equipped, and facilities meet the everyday realities of school life. The *National Hygiene Survey 2018* offers a foundation, but the path forward lies in closing the gaps between policy aspirations and the lived experience of Bangladesh's primary school students.

4.1.6. Health Education and Promotion (HEP) under HPNSDP (2011-2016)

The Operational Plan for Health Education and Promotion (HEP) under the HPNSDP (2011–2016) placed a striking emphasis on weaving health and hygiene education into the everyday fabric of primary schools, framing it as a pathway toward instilling lifelong healthy practices (Directorate General of Health Services, 2011, pp. 8–9). Rather than treating hygiene as an add-on, the plan sought to embed it directly in the curriculum - urging collaboration with the Ministry of Education so that textbooks could carry lessons on sanitation, nutrition, and personal cleanliness (p. 12). This curricular strategy was complemented by a more community-facing approach: schools were encouraged to go beyond classrooms, staging folk songs, debates, and seminars to bring hygiene awareness into the cultural rhythms of rural life (pp. 14–15). The idea was clear - if children absorbed these messages at school and saw them echoed in their communities, behavior change would be far more sustainable.

Interestingly, while the HEP did not carry out direct surveys of students' hygiene knowledge, its reliance on Behavior Change Communication (BCC) tools - posters, leaflets, simple booklets - reveals how it imagined children would internalize core practices like handwashing, toilet use, and illness prevention (pp. 4–5, 10–11, 16). Yet the plan itself acknowledged a recurring obstacle: socio-economic inequities. These disparities, it noted, often made it difficult for students to consistently retain or apply what they learned (p. 9). In that sense, parental reinforcement and community engagement were viewed as critical: what happened at home mattered as much as, if not more than, the hygiene lessons taught at school (p. 9).

Where the plan seems less robust is in its treatment of teachers. Training modules were largely reserved for health professionals, leaving schoolteachers without a structured capacity-building mechanism on hygiene issues (pp. 18, 39). Teachers were certainly not invisible in the plan - IEC materials and school display boards were meant to support them in passing messages along (pp. 13, 17), and they were occasionally brought into broader social mobilization campaigns (pp. 16, 44). Still, without systematic training, their role remained somewhat ad hoc, shaped more by available resources and local initiative than by formal guidelines. This gap raises questions about consistency: how effectively could teachers promote hygiene if they themselves were not systematically oriented?

Even so, the plan contained a vision for strengthening school-based hygiene that remains instructive. Among its proposals: equipping teachers through national-level training workshops (pp. 18, 39), tightening the integration of hygiene topics into curricula with proper monitoring (p. 12), and giving schools a stronger role in awareness-building by creating hygiene committees and introducing annual student health surveys (p. 16). The document also underscored infrastructure - acknowledging that without reliable water supply, toilets, or soap, behavior change campaigns would quickly lose traction (pp. 9, 21–25). Finally, it pointed to the value of stronger intersectoral collaboration, recommending that schools partner with health experts for periodic assessments, thereby keeping knowledge fresh and practice aligned with public health standards (p. 14).

Taken together, the HEP under HPNSDP was ambitious in scope - working on curriculum, community, and communication fronts - but uneven in execution. Its strongest legacy perhaps lies in recognizing that hygiene cannot be taught in isolation: it depends on teachers who are confident, families who are supportive, and schools that have the basic facilities to make healthy practices possible.

4.1.7. Consolidated table on insights from policy directives:

Table 4. 1: Consolidated table on insights from policy direct

Policy Document	Health & Hygiene Directives	Infrastructure Requirements	Implementation & Monitoring	Stakeholder Roles	Gaps & Challenges
PEDP4 (2018-2023) (DPE)	•Mandatory handwashing facilities •Hygiene education integrated into grants	•Toilets: 1:50 girls, 1:75 boys + urinals •Water: 1 source / 100 students, tested •Disability-accessible design	•Targets: 58,000 WASH blocks, 15,000 water points •Maintenance plan for 28,500 blocks	•DPE: Oversight •SMCs: Maintenance •Contractors: Construction	•No recurrent soap budget •Contractor-dependent quality
National Education Policy (2010)	•Mandates hygiene education (handwashing, nail/teeth cleaning) (p.16) •School meal programs for nutrition (p.14)	•Requires gender-segregated toilets (p.14) •Safe drinking water provision	• Continuous student assessment includes hygiene behaviors (p.57) • School inspection system (p.74)	• Teachers conduct hygiene education (p.16) • PTIs to train teachers on child hygiene (p.63)	•No specific hygiene competency standards for teachers •No soap provision mandate •Rural meal programs underfunded
National Strategy for Water Supply and Sanitation (2021)	•Mandates hygiene education integration in school curricula (p.13) •Promotes lifelong hygienic habits through behavior change campaigns •Special focus on menstrual hygiene management (p.22)	•Gender-sensitive sanitation facilities required •Handwashing stations with soap and water •Only 35% of population has basic hygiene access (p.1)	•Recommends regular hygiene compliance monitoring (p.26) •Nationwide awareness campaigns proposed •No standardized inspection framework	• Teachers to lead hygiene campaigns (p.13) • School WASH committees for oversight (p.23) •MoPME collaboration for curriculum integration	•11% of schools lack any hygiene facilities (p.1) •Inconsistent teacher training (p.26) •No enforcement mechanisms for infrastructure standards
National Strategy for WASH in Health Care Facilities (2019-2023)	•Indirect influence on school hygiene through community programs (p.45) •Emphasis on handwashing/sanitation awareness (p.27)	•Focus on healthcare facilities (not school-specific) •Implied infrastructure standards for water/sanitation	•Healthcare facility monitoring systems (p.57) •No school-specific inspection framework	• Ministry of Education as secondary stakeholder (p.27) • Potential teacher involvement in community WASH (p.45)	• No direct school hygiene targets • Teacher training not addressed • Infrastructure gaps in schools not covered

National Hygiene Survey (2018)	• Mandates hygiene education in curriculum (p.1) • 91% students wash hands before eating (p.45) • Only 10% know to wash before food prep (p.45)	• 80% schools have handwashing stations • Only 36% provide both soap+water (p.46) •51%/53% have gender-separate toilets (p.44)	•47% schools test water for arsenic (p.41) • No systematic hygiene practice monitoring	• Teachers deliver hygiene education • Only 11% schools teach menstrual hygiene (p.48)	• 43% girls miss school due to menstruation (p.50) • Only 6% have pad disposal bins • 32% toilets have soap+water (p.44)
Health Education and Promotion (HEP) under HPNSDP (2011-2016)	• Behavior Change Communication (BCC) strategies for hygiene education (pp.4-5) • Integration with school curriculum via MoE collaboration (p.12) • Community campaigns (seminars, folk songs) in schools (pp.14-15)	• Mentions need for hygiene materials (posters, booklets) (pp.10-11) • No specific water/sanitation facility standards • Model Village program includes school hygiene components (pp.43-44)	• School-based health surveys proposed (p.16) • Model Village evaluations track progress (pp.43-44) • No national monitoring system established	• Teachers use IEC materials (posters, guides) (pp.13,17) • Health-education sector coordination meetings (p.14) • No mandated teacher training programs	• Teacher training focused on health workers, not educators (pp.18,39) • Socioeconomic disparities limit knowledge retention (p.9) • No recurrent budget for hygiene materials

This study reveals a mix of progressive frameworks and persistent implementation gaps across several policy documents from 2010 to 2023. The policies collectively demonstrate an evolving understanding of WASH (Water, Sanitation, and Hygiene) needs in primary schools, with later documents like PEDP4 (2018-2023) and the National Strategy for Water Supply and Sanitation (2021) showing more concrete infrastructure standards and gender-sensitive approaches compared to earlier versions. Notably, the National Hygiene Survey (2018) provides crucial data-driven insights, exposing stark disparities between policy ambitions and ground realities - particularly the alarming statistic that only 36% of schools provided both soap and water at handwashing stations. The policies consistently emphasize hygiene education integration and infrastructure development as twin pillars for improvement. However, they suffer from three systemic weaknesses: First, a disconnection between infrastructure mandates and maintenance budgets, with no policy addressing recurrent costs for consumables like soap. Second, inadequate teacher empowerment - while teachers are routinely tasked with hygiene promotion, most policies (except for vague

mentions in NEP 2010) fail to mandate comprehensive WASH training programs. Third, monitoring mechanisms remain fragmented, focusing largely on physical infrastructure rather than behavioral outcomes or educational quality.

Recent policies show promising specialization, with PEDP4 excelling in technical specifications for toilet-to-student ratios and disability access, while the 2021 National Strategy breaks new ground in menstrual hygiene management. However, the Health Care Facilities strategy (2019-2023) represents a missed opportunity to create health-education synergies. The analysis ultimately reveals Bangladesh's school hygiene governance as a work in progress - strong on visionary frameworks and quantifiable targets, but weak on accountability systems, cross-sector coordination, and sustainable financing for basic hygiene provisions that could transform student health outcomes nationwide.

4.2. Health and Hygiene issues in Primary textbooks

Table 4. 2: Health and hygiene issues in primary textbooks

Class	Subject	Hand washing	Oral hygiene (brushing teeth)	Body hygiene (nails, bathing)	Clothing and cleanliness	Environmental hygiene	Food hygiene and nutrition	Waste disposal and sanitation	Water cleanliness and safety
Class 1	Bangla	✓	✓	✓	✓	-	-	-	-
	English	-	-	-	-	-	-	-	-
	Math	-	-	-	-	-	-	-	-
Class 2	Bangla	✓	-	-	✓	✓	-	✓	-
	English	✓	✓	✓	-	-	-	-	-
	Math	-	-	-	-	-	-	-	-
Class 3	Bangla	✓	-	-	✓	-	-	✓	-
	English	✓	✓	✓	✓	✓	-	✓	✓
	Math	-	-	-	-	-	-	-	-
	Science	-	-	-	-	-	✓	-	✓
	BGS	-	-	-	✓	✓	-	✓	-
Class 4	Bangla	✓	×	✓	✓	-	-	✓	-
	English	-	✓	✓	✓	-	✓	-	-
	Math	-	-	-	-	-	-	-	-
	Science	✓	✓	✓	✓	-	✓	✓	✓
	BGS	-	-	-	-	-	-	✓	✓
Class 5	Bangla	-	-	-	-	-	-	-	-
	English	✓	-	-	-	✓	✓	-	-
	Math	-	-	-	-	-	-	-	-
	Science	-	-	-	-	✓	✓	-	✓
	BGS	-	-	-	-	-	-	-	-

Upon analyzing the textbooks, it was found that across different classes/grades, English textbooks cover the hygiene contents in maximum numbers (17), followed by Bangla (15), Science (12) and Bangladesh and global studies (5) textbooks. Out of 15 textbooks, this study found contents related to 'handwashing' and 'clothing and cleanliness' are present in the highest number of textbooks (8). Followed by contents related to 'waste disposal and sanitation' in 7 textbooks and 'body hygiene' in 6 textbooks. Contents related to oral hygiene, environmental hygiene, food hygiene and nutrition, waste disposal and sanitation, water cleanliness and safety are found in the lowest number of textbooks (5).

Table 4. 3: Health and hygiene issues in Bangla textbook

Theme	Class 1	Class 2	Class 3	Class 4	Class 5
Handwashing	✓	✓	✓	✓	-
Oral hygiene (brushing teeth)	✓	-	-	-	-
Body hygiene (nails, bathing)	✓	-	-	✓	-
Clothing and cleanliness	✓	✓	✓	✓	-
Environmental hygiene	-	✓	-	-	-
Food hygiene and nutrition	-	-	-	-	-
Waste disposal and sanitation	-	✓	✓	✓	-
Water cleanliness and safety	-	-	-	-	-

Among 5 textbooks analyzed, handwashing and Clothing and cleanliness contents have been found in 4 textbooks except the textbook of class 5. Contents related to food hygiene & nutrition and water cleanliness & safety have been found in no textbook. Class 5 textbook contains no contents on health and hygiene.

Table 4. 4: Health and hygiene issues in English textbook

Theme	Class 1	Class 2	Class 3	Class 4	Class 5
Handwashing	-	✓	✓	-	✓
Oral hygiene (brushing teeth)	-	✓	✓	✓	-
Body hygiene (nails, bathing)	-	✓	✓	✓	-
Clothing and cleanliness	-	-	✓	✓	-
Environmental hygiene	-	-	✓	-	✓
Food hygiene and nutrition	-	-	-	✓	✓
Waste disposal and sanitation	-	-	✓	-	-
Water cleanliness safety	-	-	✓	-	-

In English textbooks, no contents have been found in class 1. Class 3 contains the maximum number (7) of themes except food hygiene and nutrition.

Table 4. 5: Health and hygiene issues in mathematics textbook

Hygiene theme	Class 1	Class 2	Class 3	Class 4	Class 5
Handwashing	-	-	-	-	-
Oral hygiene (brushing teeth)	-	-	-	-	-
Body hygiene (nails, bathing)	-	-	-	-	-
Clothing and cleanliness	-	-	-	-	-
Environmental hygiene	-	-	-	-	-
Food hygiene and nutrition	-	-	-	-	-
Waste disposal and sanitation	-	-	-	-	-
Water cleanliness and safety	-	-	-	-	-

No contents on health and hygiene issues have been in any mathematics textbook.

Table 4. 6: Health and hygiene issues in Science textbook

Hygiene theme	Class 1	Class 2	Class 3	Class 4	Class 5
Handwashing	-	-	-	✓	-
Oral hygiene (brushing teeth)	-	-	-	✓	-
Body hygiene (nails, bathing)	-	-	-	✓	-
Clothing and cleanliness	-	-	-	✓	-
Environmental hygiene	-	-	-	-	✓
Food hygiene and nutrition	-	-	✓	✓	✓
Waste disposal and sanitation	-	-		✓	-
Water cleanliness and safety	-	-	✓	✓	✓

Class 4 science textbook contains the maximum number (7) of themes except environmental hygiene. class 5 contains three themes- environmental hygiene, food hygiene & nutrition and water cleanliness & safety, class 3 contains two themes- Food hygiene & nutrition and water cleanliness & safety. However, no contents have been found in class 1 and 2 textbooks.

Table 4. 7: Health and hygiene issues in Bangladesh and global studies textbooks

Hygiene theme	Class 1	Class 2	Class 3	Class 4	Class5
Handwashing	-	-	-	-	-
Oral hygiene (brushing teeth)	-	-	-	-	-
Body hygiene (nails, bathing)	-	-	-	-	-
Clothing and cleanliness	-	-	✓	-	-
Environmental hygiene	-	-	✓	-	-
Food hygiene and nutrition	-	-	-	-	-
Waste disposal and sanitation	-	-	✓	✓	-
Water cleanliness and safety	-	-	-	✓	-

'Bangladesh and global studies' textbook contains three themes in class 3 and two themes in class 4. No other textbooks contain any of the health and hygiene themes.

Gap identified in textbooks

- There are contents on illness prevention but in limited number. Science textbooks contain some discussion on waterborne and infectious diseases.
- In the post covid-19 period where the use of mask, keep distancing and sanitization are being emphasized, primary textbooks lack this type of content.
- In developing the behavior of students, the scope for modeling of these behavior using role play or demonstration is limited in primary textbooks.

4.3. Students' Knowledge and Practice Regarding Health and Hygiene Issues

4.3.1. Students' Demographic Info (N=1070)

Criteria		N	Percentage
Gender	Male	462	43.18 %
	Female	608	56.82 %

The study involved 1070 primary school students, comprising 462 males and 608 females, drawn from a diverse sample of urban and rural schools across Bangladesh. This gender distribution reflects a slightly higher representation of female students, potentially indicative of enrollment patterns in the sampled schools. The findings illustrate the primary sources from which these students acquire knowledge about health and hygiene, revealing the pivotal roles of educational institutions and family networks, alongside contextual disparities.

4.3.2. Students' Knowledge on Health and Hygiene

Table 4. 8: Students' Awareness and Sources of Knowledge (Percentages are calculated based on the total number of respondents, n = 1070).

Category	Item	Frequency (n)	Respondents mentioning the source (%)
Awareness of Health & Hygiene	Heard about health & hygiene – Yes	1056	98.7
	Heard about health & hygiene – No	14	1.3
Sources of Knowledge	Teacher	871	81.4
	Parents	662	61.9
	Textbook	597	55.8
	TV / Internet	288	26.9

	Friends	182	17.0
	Others	18	1.7

[**Since respondents were allowed to select more than one option, the total percentage exceeds 100%**.]

The findings show that awareness of health and hygiene is almost universal, with 1,056 out of 1,070 respondents reporting that they have heard about it. In terms of sources of knowledge, teachers were mentioned most frequently (871 respondents), followed by parents (662) and textbooks (597). TV/Internet (288 respondents) and friends (182 respondents) were less commonly cited. Overall, the results indicate that schools and families are the main channels for health and hygiene information, while media and peers play a supportive but secondary role.

4.3.3. Sources of Students' Hygiene Knowledge

Teachers, without much contest, are the main torchbearers here - named 291 times as the most influential source of health and hygiene knowledge. They're not just passing along tips; they're weaving hygiene into the fabric of lessons. One student put it simply: *"My teacher taught us to wash hands before eating to avoid germs. She makes it clear why it's important, and I trust her lessons"* (S10101). You can almost see the classroom - chalk in hand, a reminder before tiffin break.

Parents come in as the second big force, mentioned 174 times, and their style's more hands-on, more in-your-face. And in rural homes, where other resources might be scarce, this kind of personal enforcement becomes the hygiene police, so to speak. Textbooks show up 48 times. Not glamorous, but steady. Pages with little illustrations about brushing teeth twice daily, diagrams of germs, bright enough to catch a child's eye. One student recalled, "Our book has pictures about brushing teeth twice a day, and I learned why it keeps my mouth healthy" (S10107).

Schools themselves - assemblies, wall charts, the occasional hygiene week - were mentioned only 11 times. Media sources like TV or the internet (10 mentions) and the beloved Meena Cartoon (3 mentions) are creeping in, more so in cities. One rural student remembered, *"I saw Meena on TV showing how to wash hands properly, and I try to do it like her"* (S15303). That's the kind of cultural hook that sticks, even without high-speed internet.

The rest are scattered - a couple of mentions each for grandparents, friends, doctors, elder siblings, even private tutors. Tiny ripples in a big pond. Urban kids tend to name more media; rural kids lean hard on teachers and parents. Not surprising, given the digital gap. But across the board, the

backbone of hygiene knowledge still rests on the familiar shoulders of teachers and parents, with textbooks and the odd TV show adding some color around the edges.

4.3.4. Students' Self-Reported Health & Hygiene Practices

Table 4. 9: Students' Self-reported Health & Hygiene Practices

Practice	Frequency (n)	% of respondents
Wash hands with soap	1023	95.5
Brushing teeth	700	65.4
Use water after toilet	682	63.7
Bathing regularly	74	6.9
Hand washing (before/after eating, after toilet/play)	43	4.0
Drinking safe/pure water	37	3.5
Nail cutting	27	2.5
Eating nutritious food	18	1.7
Wearing clean clothes	6	0.6
Face/mouth/eye cleaning	5	0.5
Cleaning environment/classroom	3	0.3
Proper waste disposal	2	0.2
Exercise	1	0.1
Others (toilet shoes, tissue, sleep)	5	0.5

[***Since respondents were allowed to select more than one option, the total percentage exceeds 100%.***]

Washing hands with soap dominates the list - 95.5% of students mentioned it, which isn't shocking given how often it's drilled into school routines. Brushing teeth (65.4%) and using water after the toilet (63.7%) follow, showing that the basics are there, at least in name. But after that, the numbers tumble. Bathing regularly is just 6.9%. Nail cutting is practiced barely at 2.5%. Drinking safe water, eating nutritious food, wearing clean clothes - each were barely registers.
A few mentioned cleaning their surroundings (0.3%) or proper waste disposal (0.2%), almost as an afterthought. Exercise, at 0.1%, is practically invisible in the conversation. It's clear that while students can name the "headline" hygiene habits, the smaller, equally important practices - things that make a difference over time - are slipping under the radar.

Table 4. 10: Students' Hand -Washing Knowledge and Practices

Category	Item	%
After Toilet Activity	Wash with soap & water	98.8
	Wash only with water	0.95
	Rub with clothes	0.19
	Do nothing	0.6
Necessity of Hand Washing	Yes	97.3
	No	0.7
Importance of Hand Washing	Disinfect hands	63.42
	Clean hands	27.86
	Perfume hands	5.43
	Keep hands cold	2.91
	Don't know	0.38
Consequences of Not Washing Hands	Can get infection	95.1
	Hands will be clean	3.6
	Nothing will happen	1.3
Occasions for Hand Washing	Before & after meal	33.6
	After using toilet	33.1
	When dirty	25.1
	Before meal	5.7
	After playing	1.7
	After meal only	0.7
	Don't know	0.3

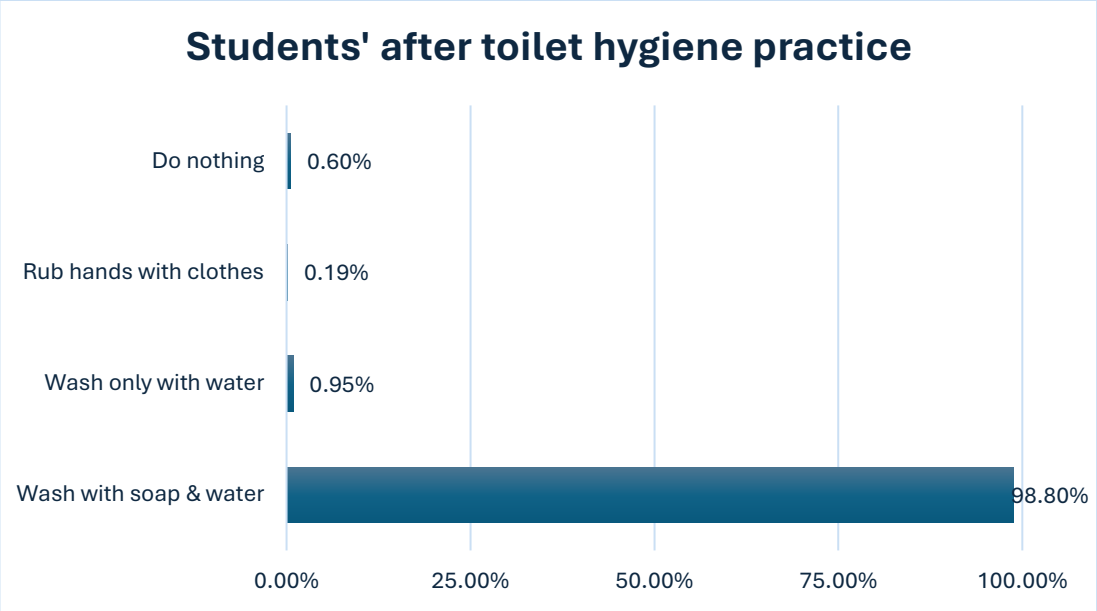

Figure 4. 1: Students' After toilet hygiene practice

The findings indicate that handwashing awareness among students is broadly strong - 98.8% report using soap and water after toilet use - yet 0.95% rely only on water and 0.19% resort to rubbing hands on clothing. Germ removal is the most frequently cited purpose (63.42%), though 27.86% associate it mainly with visible cleanliness and smaller proportions mention fragrance or keeping hands cool.

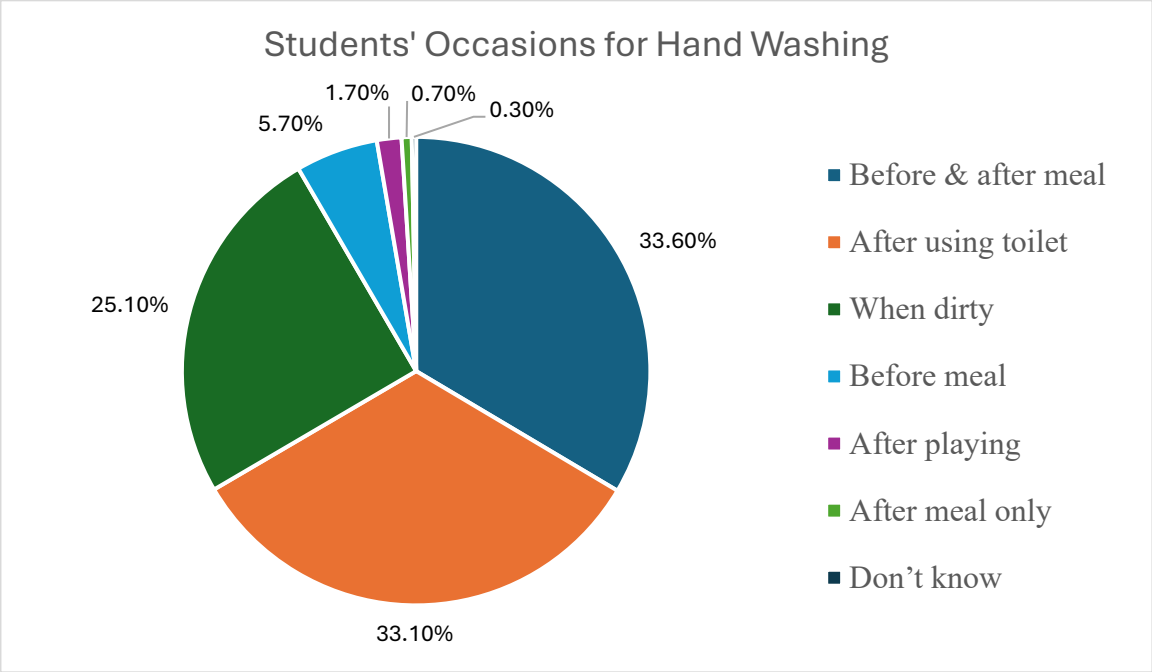

Figure 4. 2: Students' occasions for hand washing

While 95.1% acknowledge infection as a likely consequence of neglect, a few believe nothing adverse would occur. Handwashing is most often linked to before-and-after meals (33.6%), after toilet use (33.1%), and when hands are visibly dirty (25.1%), suggesting some inconsistency in how the practice is embedded in daily routines.

4. 11: **Students' Oral Hygiene Practices**

Category	Item	% (of total)
Tooth Brushing Frequency	Twice a day	89.3
	Once a day	5.6
	When dirty	3.3
	Don't know	1.8
Brushing Occasions	Before & after sleeping	55.7
	After waking up	25.5
	Before sleep	17.7
	Any time	1.0

	Don’t know	0.2
Reasons for Brushing Teeth	Remove odor	42.5
	Prevent tooth decay	32.1
	Whitening	17.7
	Minimize gap	7.4
	Don’t know	0.3

Most students seem to have a solid brushing routine, with 89.3% doing it twice a day, though a small group sticks to once daily (5.6%) or only when teeth “feel dirty” (3.3%). The most common timing is before and after sleeping (55.7%), but far fewer brush specifically after waking up (25.5%) or just before bed (17.7%), which hints at some overlap in how they interpret “routine.” Fresh breath is the top motivator (42.5%), followed by preventing tooth decay (32.1%), while about 18% see whitening as the goal. A smaller cluster even mentions “minimizing gaps” between teeth , showing a mix of practical and cosmetic reasons driving their oral hygiene habits.

Table 4. 12: Students’ Safe Water Practices

Category	Item	%
Reasons for Drinking Safe Water	Prevent diarrhea/disease	49.7
	Dirty water spreads sickness	32.4
	Good taste	9.5
	Gives energy	7.7
	Water same everywhere	0.6
Sources of Safe Water	Tube well	59.4
	Tap water	19.9
	Supply water	15.3
	River	2.1
	Drain	2.1
	Pond	0.5
	Don’t know	0.7

Most students seem to connect safe water with health protection 49.7% mention preventing diarrhea or other diseases, while 32.4% point out that dirty water can spread illness. A smaller share bring up taste (9.5%) or the idea that it “gives energy” (7.7%), and barely 1% think all water is basically the same. Tube wells dominate as the main source (59.4%), though some rely on tap water (19.9%) or supplied water (15.3%). A few still report using riskier sources like rivers or drains or ponds, suggesting that while awareness is high, a small fraction may still be exposed to unsafe options.

Table: 4.13 Students' Other Hygiene and Nutrition Practices

Category	Item	%
Importance of Cutting Nails	Yes	99.1
	No	0.9
Eating Fruits & Vegetables Daily	Yes	87.6
	No	12.4

Nearly all students (99%) agree that keeping nails trimmed matters, with only a tiny fraction saying otherwise. Daily fruit and vegetable consumption is also fairly common 87.6% report doing so - though about one in eight admit they don't, hinting at a small but notable gap in healthy eating habits.

4.3.5. Students' Response on Daily Health and Hygiene Practice

Table 4. 13: Students' response on daily health and hygiene practice

Hygiene Practice	Never (%)	Sometimes (%)	Always (%)
I wash my hands before and after meals	0.6	2.2	97.2
I wash my hands after using the toilet	0.1	1.6	98.3
I wash my hands after playing	1.2	11.1	87.5
I wash my hands with soap/hand wash	0.5	13.6	85.8
I brush my teeth twice a day	1.0	11.2	87.8
I take a bath every day	–	2.9	97.1
I come to school wearing clean clothes	0.5	4.9	94.6
I don't share my comb, towel, or other personal items	21.2	33.7	45.1
I don't throw waste here and there	2.8	13.9	83.3
I cover my nose and mouth while sneezing or coughing	0.8	7.5	91.7

Students' self-reported data shows that they practice health and hygiene issues well enough. All the good habits are practiced by more than 83% students. However, regarding to share comb, towel, or other personal items, there are mixed responses. 33.7% of the students sometimes share these things with others, while 21.2% students always share these things with others.

4.3.6. Key Hygiene Practices Prioritized by Students

Among the many practices students spoke about, handwashing surfaced as the single most important habit, appearing in 354 responses. Children repeatedly described it as a shield against

sickness. One boy explained it simply: “I wash my hands with soap before eating and after using the toilet because my teacher said it stops germs” (S10109). Such comments reveal how deeply this practice has been normalized through school routines and teacher guidance.

Alongside handwashing, cleanliness - both personal and environmental - featured prominently (100 mentions). Students pointed to the need for clean clothes, tidy bodies, and orderly surroundings. As one urban student put it: “Keeping the school clean makes it nice to study” (S10102, male, urban). This highlights a shared sense that hygiene is not only about health but also about creating a pleasant learning atmosphere.

Other practices were mentioned less often but still carried weight. Drinking safe water (82 responses) and bathing regularly (68 responses) stood out, especially among urban children who had better facilities at their disposal. Yet, disparities emerged. A rural boy admitted, “I try to drink clean water, but sometimes the school tap water looks dirty” (S10302, male, rural). Such remarks hint at structural inequalities that shape what students can actually practice, despite knowing the “right” behavior.

Less frequently, students talked about diet and personal grooming. Eating vegetables and fruits (14 times), brushing teeth (14), taking nutritious food (9), and trimming nails (8) all appeared but did not dominate conversations. Hygiene practices linked to social etiquette, like covering the mouth while sneezing (4), keeping toilets clean (3), or proper waste disposal (1), barely surfaced - perhaps because these are not consistently reinforced in classrooms.

Interestingly, a few responses broke away from the common themes altogether. One student mentioned going to the doctor as a hygiene-related action, while another referred to studying books. These singular remarks suggest that children’s understandings are not monolithic; rather, they reflect individual experiences and the varied messages children pick up in different environments.

4.3.7. Problems that Students’ Face in Practicing Health and Hygiene

Table 4. 14:Problems in Practicing Health and Hygiene

Category	frequency	Percentage
Toilet cleanliness/smell	311	28.9%
Water availability/safety	273	25.5%
Soap/tissue/handwash facilities	163	15.2%
Environmental issues (dust, benches, garbage, flooding, noise)	97	9.1%
Electricity/power supply	46	4.3%

No problem / blank responses	180	16.8%

Sanitation emerges as the primary constraint: **28.9%** of students report toilet cleanliness and odor as major barriers. **25.5%** face water scarcity or unsafe supply, while **15.2%** note shortages of soap and tissue that hinder routine hygiene.

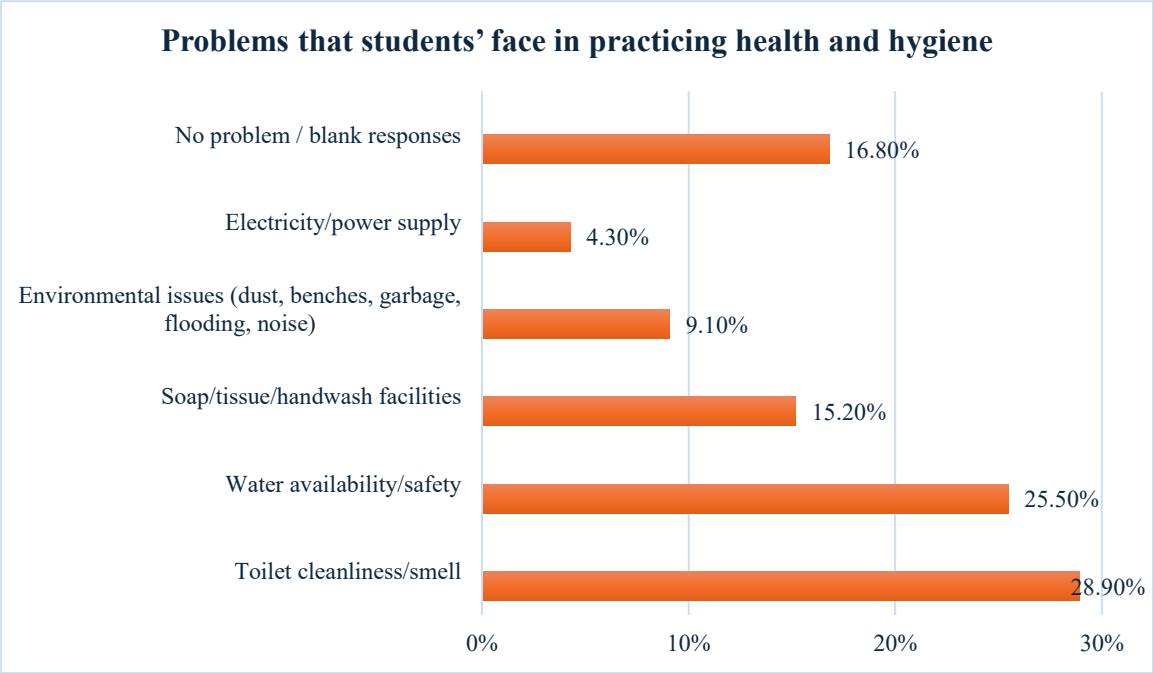

Figure 4. 3: Problems that students' face in practicing health and hygiene

Environmental concerns such as dust, garbage, flooding, and noise affect 9.1%, and 4.3% experience disruptions linked to electricity outages. Notably, 16.8% report no difficulties, indicating uneven distribution of hygiene challenges across schools. Few students reported facing problems in practicing health and hygiene. Among them, problems of water supply are the highest (4.1%) and broken infrastructure is the lowest (0.6%) mentioned.

4.3.8. Hygiene Practices Requiring Greater Emphasis in Schools

When students were asked about areas that schools should focus on, one issue loomed larger than the rest: toilets. Unclean latrines came up again and again (192 mentions), often with a sense of frustration, even disgust. A rural girl did not mince words: "The toilets at school are so dirty, it's hard to use them. Sometimes I don't go to the toilets because it gives me the ick to even think about the dire situation!" (S10109, female, rural). Her complaint was echoed by others who described both the dirt and the overpowering smell (159

references). In fact, some admitted to drinking less water just to avoid going there. One boy confessed:

“The toilets smell terrible, and no one cleans them. Sometimes, we avoid drinking water so we don’t have to use them” (S10108, male, rural).

Handwashing was the other big concern, though it was not so much about knowledge as it was about means. Students wanted to wash with soap, but the soap was not always there. An urban boy put it bluntly:

“I want to wash my hands with soap after using the toilet, but sometimes there’s no soap” (S1122, male, urban). In total, this was mentioned 108 times - making it clear that awareness is high, but infrastructure does not keep pace.

Drinking water also surfaced as a pressing worry (91 mentions). Some described taps that produced cloudy or odd-tasting water. One rural girl recalled, “The water from our school tap tastes strange and makes my stomach hurt afterwards” (S11501, female, rural).

Here again, the issue was not ignorance but rather the availability of safe, trustworthy sources. Beyond these three headline concerns, students also drew attention to the smaller, everyday details that shape hygiene. They wanted cleaner classrooms (84 mentions), soap and tissues in toilets (24), and better waste disposal systems (22). The absence of separate toilets for boys and girls (21) was another repeated theme. A rural girl spoke up:

“Boys and girls use the same toilet, and it’s not nice. I want separate toilets.” (S1381, female, rural).

Accessibility was raised too, though by fewer voices (6 occurrences). Still, the stories were poignant. One urban girl pointed out her friend’s difficulty:

“My friend can’t use the toilet because she uses a wheelchair. A ramp would help her a lot!” (S10910, female, urban).

Other complaints added layers to the picture: waste scattered around playgrounds (97 mentions), inadequate wash blocks (52), occasional electricity problems (9), and struggles with personal hygiene like dirty nails or unwashed clothes (33).

A clear pattern emerged between rural and urban experiences. Rural students faced harsher barriers - dirty toilets, unsafe water, missing infrastructure. Urban students fared somewhat better, but even they repeatedly highlighted the absence of soap.

Altogether, these voices show that children are not unaware of hygiene norms. They know what should be done - washing hands, drinking clean water, keeping spaces tidy. What frustrates them is the gap between that knowledge and what schools actually make possible. The findings underscore that infrastructure and resources are not luxuries but prerequisites if schools want hygiene practices to move from aspiration to reality.

4.4. Teachers' Supports for Students in Practicing Health and Hygiene

4.4.1. Teachers' demographic data (N=306)

Criteria		N	Percentage
Gender	Male	87	28.4
	Female	219	71.6
Type of school	GPS	43	14.1
	NGPS	263	85.9
	Rural	197	64.6
	Urban	108	35.4
	Coastal	48	15.6
	Char	46	14.9
	Hill	56	18.5
	Plain	99	32.5
	Haor	57	18.5

The demographic data of the teachers (N = 306) reveal some important contextual insights into their knowledge and practice regarding health and hygiene issues. In terms of gender distribution, a clear majority of teachers are female (71.6%), while male teachers constitute 28.4%. With respect to the type of school, the overwhelming majority (85.9%) are from Non-Government Primary Schools (NGPS), whereas only 14.1% are from Government Primary Schools (GPS). Considering the geographical distribution, most of the teachers are from rural areas (64.6%), while 35.4% are from urban locations, indicating a predominance of rural representation. The data further show diversity in ecological zones: 15.6% of teachers are from coastal areas, 14.9% from char regions, 18.5% from hilly regions, 32.5% from plain lands, and another 18.5% from haor areas. This variation highlights that the study captures perspectives from a broad range of socio-ecological contexts, which may influence teachers' knowledge and practices related to health and hygiene.

4.4.2. Teachers' perception on health and hygiene practice in their schools

Table 4. 15: Teachers' Knowledge and Training on Health and Hygiene

Questions	Response	Number	Percentage
Do you think that you have knowledge on health and hygiene?	Yes	299	97.7
	No	7	2.3
Do you have training on health and hygiene?	Yes	31	10.1
	No	275	89.9

The data show that almost all teachers reported having knowledge about health and hygiene, with 97.7% affirming this, and only a very small fraction (2.3%) indicating otherwise. However, when it comes to formal training, the picture changes significantly. Only 10.1%) of teachers had received any training on health and hygiene, while the vast majority 89.9% had not. This contrast suggests that while teachers generally feel confident about their knowledge, their understanding is largely self-acquired rather than supported by structured professional training.

Table 4. 16: Teachers' Perception of the Importance of Hygiene and Safe Water

Questions	Response	Number	Percentage
How important it is to maintain hygiene?	Very important	305	99.7
	Not important	1	0.3
How important safe water is for students' health?	Yes	306	100
	No	0	0

Teachers almost unanimously emphasized the significance of hygiene, with 99.7% rating it as very important. Only one respondent (0.3%) considered it unimportant. On the question of safe water, there was complete agreement - 100% affirmed its importance for students' health. This strong consensus indicates that teachers clearly recognize hygiene and safe water as non-negotiable elements of student well-being and learning. The insight here is that the challenge in schools is unlikely to be teachers' awareness or prioritization, but rather the availability of resources and infrastructure to act on these values.

Table 4. 17: Teachers' Views on Hygiene Materials, Facilities, and Cleanliness

Questions	Response	Number	Percentage
Are there enough materials for maintaining hygiene in your school?	Yes	265	86.6
	No	39	12.7
	Not sure	2	0.7

To what extent the school and classrooms are cleaned?	Daily	269	87.9
	Weekly	34	11.1
	Quarterly	3	1.0
Are you satisfied with the cleanliness of your school?	Very satisfied	79	25.8
	Satisfied	216	70.6
	Unsatisfied	8	2.6
	Not sure	3	1.0

Most teachers felt their schools had adequate hygiene materials (86.6%), and nearly all reported daily cleaning (87.9%). Satisfaction levels were high, with 96.4% either satisfied or very satisfied. Still, about 1 in 8 teachers noted gaps in resources, suggesting that while overall conditions are good, some schools face shortages.

Table 4. 18: Teachers' Observations on Students' Health, Absenteeism, and Academic Impact

Questions	Response	Number	Percentage
Do students absent from school due to sickness?	Yes	292	95.4
	No	13	4.2
	Not sure	1	0.3
Extent of leave	Very low	71	23.2
	Low	169	55.2
	Average	60	19.6
	High	5	1.6
	Very high	1	0.3
Does sickness leave affect academic result?	Yes	281	91.8
	No	25	8.2

Nearly all teachers (95.4%) observed student absences due to sickness, most describing the extent as low to very low (78.4% combined). Still, a clear majority (91.8%) believed these absences negatively affect academic results. While illness-related absenteeism may not be frequent, teachers recognize its disproportionate impact on learning outcomes, highlighting the importance of stronger health and hygiene measures to minimize disruptions.

4.4.3. Teachers support students to practice health and hygiene

Table 4. 19: Teachers support students to practice health and hygiene

Questions	Response	Number	percentage
provide advice to students for maintaining hygiene	No	2	0.7
	Yes	304	99.3
Extent of providing advice	Rarely	2	0.7
	Regularly	238	77.8
	Sometimes	66	21.5

Monitor students' hygiene practices	No	2	0.7
	Yes	304	99.3
Extent of monitoring	Rarely	1	0.3
	Regularly	214	69.9
	Sometimes	91	29.7

99.3% teachers reported that they provide advice to students for practicing good hygiene habits and monitor students' practice. 69.9% teachers monitor the practice regularly. 4.6 Observing school facilities regarding health and hygiene issues

4.5. Strategies for Strengthening Hygiene Practices in Schools

4.5.1. Raising Awareness and Building Knowledge

Teachers repeatedly underscored that the first step toward healthier schools is awareness. They spoke of discussions, workshops, and small gatherings as powerful tools - 174 mentions in total. One urban teacher reflected: "Holding discussion meetings with mothers helps them understand why hygiene matters. They can guide their kids better at home" (T20204, female, urban). Such exchanges are not limited to classrooms; Ma Shomabesh (mothers' assemblies, 38 references) and community seminars give parents and caregivers the confidence to reinforce good habits beyond school walls. Creative touches - songs, posters, even short skits - were also suggested (10 mentions) as ways to make lessons memorable for young children. Some schools already hold weekly assemblies where teachers remind students about nail trimming or dental care (10 mentions). Altogether, these small but steady initiatives nurture the hope of a school culture where hygiene is second nature.

4.5.2. Improving Sanitation and Environmental Infrastructure

Alongside awareness, teachers placed strong emphasis on facilities - toilets, wash blocks, and disability-friendly spaces (38 mentions). In total, 77 references highlighted the urgency of infrastructural upgrades. A rural teacher captured it vividly: "The school's entryway is muddy and unsafe. Improving the roads around would help keep the premises clean" (T21001, male, rural). Environmental concerns also stretched to drainage systems (12 mentions) to reduce waterlogging and cleaner, more modern classrooms (11 mentions). Though these details may sound mundane, they form the foundation of a hygienic learning environment.

4.5.3. Ensuring Safe Water and Hygiene Materials

Water, unsurprisingly, was a recurring theme - 46 mentions in all. Teachers spoke about the need for arsenic-free tube wells, filters (30 mentions), and reliable water access on every floor (10 mentions). A rural teacher noted: “We need clean water during floods to ensure students can drink safely” (T22401, female, rural). Yet water alone is not enough. Teachers stressed the importance of basic supplies - soap, handwash, tissues, sanitizers (38 mentions) - and first aid kits (20 mentions). An urban teacher lamented, “We often run out of soap and handwash in the toilets” (T20407, female, urban). Such gaps make it hard for schools to turn knowledge into practice.

4.5.4. Strengthening Systemic Support

Several teachers turned their focus to the systemic side of hygiene management. Thirty-two of them asked for government-funded cleaners, insisting that maintaining sanitation cannot rest solely on teachers’ shoulders. As one rural teacher put it: “We need government-funded cleaners to keep the toilets and classrooms tidy. Teachers can’t do it all alone!” (T20401, male, rural). Parental involvement - again often through mothers’ gatherings (62 mentions) - was described as equally crucial, ensuring consistency between home and school. Teachers also mentioned everyday routines such as handwashing, clean clothes, and dental care (30 mentions), alongside more structured health services like vaccinations and check-ups (14 mentions). These proposals highlight the need for sustainable systems, not just ad-hoc fixes.

4.5.5. Addressing Additional Challenges

Beyond the core issues, teachers raised other concerns - closing down unhygienic food stalls near schools (4 mentions), tackling noise pollution (4), experimenting with solar panels (2), or even rewarding good hygiene habits (3). Interestingly, urban teachers leaned toward modern solutions, while rural teachers focused more on basics like toilets and water.

Taken together, these varied recommendations paint a picture of teachers as both practical realists and hopeful reformers. They are acutely aware of the gap between knowledge and practice, and their suggestions - ranging from road repairs to posters, from soap supplies to systemic staffing - signal that improving hygiene in schools is as much about community and infrastructure as it is about awareness.

4.6. Supervisors’ Support for Students in Practicing Health and Hygiene

Education supervisors’ perception on health and hygiene practice in their schools-

4.6.1. AUEO's Demographic data (N=11)

Criteria		Frequency	Percentage
Geographic location	Urban	3	27.3
	Rural	8	72.7
Age	11-15 years	5	45.5
	16-20 years	3	27.3
	21-25 years	3	27.3
Gender	Female	2	18.2
	Male	9	81.8

The demographic profile of the Assistant Upazila Education Officers (AUEOs) (N = 11) reflects a predominantly rural representation, with 72.7% working in rural areas compared to 27.3% in urban settings. This suggests that the majority of AUEOs are positioned in rural contexts where health and hygiene issues may be more challenging due to limited infrastructure and resources. Regarding years of service, nearly half (45.5%) have 11–15 years of experience, while 27.3% each fall within the 16–20 years and 21–25 years categories. This indicates a workforce with considerable professional experience, which may positively influence their monitoring and guidance roles in promoting health and hygiene practices. In terms of gender distribution, the AUEOs are predominantly male (81.8%), with only 18.2% female representation, highlighting a significant gender imbalance in this role. The data suggest that AUEOs bring substantial experience and rural-focused oversight, though the gender disparity may reflect broader structural issues within the education administration.

4.6.2. AUEO's response to health and hygiene facilities in their schools

Table 4. 20: AUEO's (N=11) response to health and hygiene facilities in their schools

Criteria	Response	Frequency	Percent (%)
Do all schools have safe water facilities?	Yes	6	54.5
	No	5	45.5
Are the existing facilities sufficient for practicing health and hygiene?	Yes	5	45.5
	No	6	54.5
Do teachers make students aware of hygiene practices?	Yes	11	100.0
Do students practice hygiene regularly?	Yes	10	90.9
	No	1	9.1
Do all schools have WASH blocks/toilets?	Yes	2	18.2

	No	9	81.8
Is there soap/hand wash available after using toilets in schools?	Yes	9	81.8
	No	2	18.2
Do all schools have safe drinking water facilities?	Yes	7	63.6
	No	4	36.4

About half of the participant AUEO's reported that there shortage of water facility in their schools. They think the existing facilities in their schools is not enough. 81.8% of the participant reported shortage of wash blocks.

4.6.3. AUEOs' suggestion for measures to be taken to ensure safe water availability

Measures to be taken to ensure safe water availability

Installation and maintenance of water sources

- Installing deep tube-wells in schools wherever feasible.
- Ensuring all the available tube-wells and water sources are arsenic-free, safe for drinking and keep them functional throughout the year.

Alternative Water Solutions for Challenged Areas

- Rainwater harvesting can be a effective way in difficult like the regions that is saline prone.
- Storing lake water or other usable surface water safely for school use may be another way.
- installing submersible pumps in dry seasons or remote areas like char regions.

Water Purification and Filtration

- Water filters can be installed in schools to purify the drinking water.
- Students can be encouraged to bring boiled water from home.

Measures to be taken to improve health and hygiene practice in primary schools

Hygiene Education and Awareness

- Videos on health awareness can be shown to generate student interest.
- Health and hygiene rules can be discussed daily in class.
- Seminars on health and hygiene can be organized.
- Contents related to health and hygiene issues can be increased in textbooks.
- Using role-play in teaching health and hygiene content can be a good way to develop awareness.
- "Cleanliness Day" can be celebrated at schools.
- Hands-on hygiene training for teachers and students can be provided.

- Students who demonstrate good hygiene practices can be rewarded.

Parental and Community Engagement

- Raise awareness among parents through parent and mother assemblies.
- Encourage parental involvement in promoting hygiene at home.
- Community support can be asked for organizing health programs in schools.

Teacher Involvement and Capacity Building

- Spread health messages through teachers during school assemblies.
- Assign one female teacher per school to receive health-related training.
- Encourage teacher sincerity and active participation in hygiene promotion.
- Introduce special allowances (e.g., for remote/char areas) to support teacher motivation.

School Environment and Infrastructure

- Construct quality WASH blocks in every school.
- Install water filters for drinking water.
- Keep school benches, desks, and other furniture clean.

Staffing and Maintenance

- At least one cleaner should be appointed in every school.
- Cleaning, maintenance, and repair of toilets and WASH blocks should be on a regular basis.

Provision of Materials and Resources

- Provide essential hygiene materials (soap, hand wash, sanitary items, etc.) to every school.
- Students should be instructed to use soap after using the toilet.

4.6.4. Strategies for Raising Health and Hygiene Awareness

Assistant Upazila Education Officers (AUEOs) described a wide range of ways they try to build hygiene awareness in schools. The most common was the morning assembly, mentioned seven times, which they see as a natural space for reminders and demonstrations. One rural officer reflected: *"I've seen demonstrations of handwashing transform habits - showing proper techniques in schools ensures the community embraces hygiene"* (A309, male, rural). Beyond assemblies, some officers talked about weaving hygiene into classroom lessons, particularly during physical education (4 mentions), while others highlighted special events such as Global Handwashing Day or Thursday gatherings (2 mentions total). These occasions, though less frequent, were described as memorable for students and good for drawing attention to health.

A few went further, stressing the value of parental involvement - especially mothers' meetings - as a way of extending learning beyond the school gates. As one urban officer put it: *"Involving mothers in discussions helps reinforce hygiene practices at home, creating a stronger impact"* (A304, male, urban).

Several AUEOs also emphasized the power of practical demonstrations: showing how to wash hands properly, trim nails, or keep the body clean (4 mentions in total). Teachers role-playing hygiene routines, or using pictures and videos (3 mentions), were described as particularly useful for younger children who respond well to visual cues.

On the training side, officers pointed to workshops, hands-on activities, and student-led initiatives (5 mentions). One example was the "Little Doctor" team, where students themselves act as hygiene ambassadors for their peers. Others mentioned posters, skits, or short plays that dramatize the dangers of dirty environments - methods that mix learning with entertainment and, in their view, leave a deeper impression.

Interestingly, patterns differed between urban and rural contexts. Urban officers leaned toward media and visual aids, reflecting better access to technology, while rural officers stressed practical demonstrations and parental involvement, approaches more suited to their settings.

Altogether, the responses suggest that AUEOs hold a grasp of awareness-raising strategies - balancing assemblies, lessons, events, and community links. Their ideas underline a recognition that hygiene habits are best built not just through instruction, but also through repeated practice, parental reinforcement, and engaging, hands-on activities.

4.6.5. Practice of Health and Hygiene

Existing Hygiene Practices

According to AUEOs, students already engage in several hygiene routines, though their consistency often hinges on resources and teacher supervision. Handwashing with soap came up most often (5 mentions), and one officer pointed out that this habit is strongest in schools where soap is reliably available: *"Handwashing with soap is common in schools where teachers supervise, but consistency depends on soap availability"* (A304, male, urban). Other practices include washing hands before and after meals (3 mentions) and after toilet use (3 mentions). Officers also described smaller but meaningful efforts: students carrying personal water bottles, drinking from safe sources, brushing teeth twice daily, trimming nails weekly, and wearing sandals

in toilets. Some even observed children coming to school in clean clothes, or in rarer cases, covering their mouth with a mask or tissue when sneezing. These fewer common habits, though sporadic, suggest that hygiene awareness is not absent - just uneven.

Required Facilities and Actions

The officers were equally clear that good habits cannot flourish without proper facilities. Several stressed the urgent need for durable wash blocks (3 mentions), with one officer asking, *"Every school urgently needs well-built WASH blocks. Without them, how can we expect children to maintain hygiene?"* (A301, male, urban).

The call for dedicated cleaning staff (3 mentions) was particularly strong, especially from rural respondents: "Unless schools have dedicated cleaning staff, it's unrealistic to expect clean toilets and WASH areas. Teachers alone cannot manage this" (A305, female, rural). Equally pressing were appeals for a steady supply of soap, handwash, and cleaning agents (3 mentions). Officers observed that even motivated students sometimes avoid washing hands when soap runs out. As one noted, *"I've noticed kids hesitate to wash hands when soap runs out. A steady supply of soap and handwash can solve the problem"* (A309, male, rural).

Alongside these basics, some officers mentioned wash blocks fitted with electricity or solar connections to ensure usability, as well as reliable tube wells and handwashing basins (2 mentions). Budget allocation and better coordination (3 mentions) were described as the backbone for sustaining these improvements.

Finally, awareness-building activities - workshops, campaigns, and regular classes - were mentioned as a way to foster responsibility among students. But without the physical backbone of functioning WASH facilities and cleaning staff, such efforts risk becoming symbolic rather than transformative.

Encouraging Hygiene Practices

AUEOs described a range of strategies to help children not just learn, but actually *practice* good hygiene. Hands-on activities were at the center of many suggestions: supervised handwashing drills, sessions on using handkerchiefs, tissues, or sanitizers, and regular practice at fixed times of the day to turn hygiene into a routine rather than a lesson. Others stressed the power of awareness-building in classrooms - reminding students of the benefits of cleanliness and the risks of

neglecting it, often through short talks or interactive discussions. Several officers emphasized the role of media and demonstrations - showing hygiene-related videos, staging quick demonstrations in assemblies, or even incorporating hygiene into short skits. These activities, they noted, grab children's attention in ways lectures alone cannot. Incentives also came up: recognizing or rewarding students who consistently maintain hygiene was seen as a small but meaningful way to reinforce good habits.

Importantly, AUEOs did not see schools working in isolation. They frequently highlighted parental involvement, especially through mothers' meetings, as essential for sustaining hygiene at home. One rural officer explained, *"Parents need to be involved through regular meetings to ensure hygiene is practiced at home"* (A305, female, rural). Beyond parents, collective activities - seminars, distribution of hygiene kits, or awareness programs - were also mentioned as ways to nurture a school-wide culture of hygiene.

Challenges with Toilet Facilities

Yet, enthusiasm for these initiatives often runs up against a stubborn obstacle: the state of school toilets. In schools without proper wash blocks, children are left to use makeshift structures, sometimes financed by parents or local communities. In many cases, a single toilet serves both boys and girls, creating obvious discomfort and privacy issues. Some children, unwilling to use poorly maintained or unhygienic toilets, simply go home during school hours or rely on neighboring houses.

AUEOs from erosion-prone areas described an even more precarious situation - temporary toilets set up while new wash blocks are under construction, often inadequate for daily needs. Typically, schools have only one or two toilets, and even where separate facilities for boys and girls exist, maintenance is often lacking, leaving them in poor condition.

While urban officers acknowledged shortcomings, they tended to report somewhat better facilities compared to their rural counterparts. Rural AUEOs, by contrast, repeatedly flagged funding shortages and fragile infrastructure as central barriers to maintaining hygienic conditions.

4.7. Primary Schools' Infrastructural Support for Practicing Health and Hygiene Practices

The observation checklist data were compiled from inspections across 55 primary schools in Bangladesh, involving a range of urban and rural settings. The inspections focused on identifying hygiene-related issues and practices. The findings highlight both knowledge dissemination efforts and practical challenges in maintaining health and hygiene, revealing systemic issues in infrastructure and resource availability that impact students' ability to practice hygiene effectively.

4.8. Result of Observing School Facilities

Table 4. 21: Health and hygiene facilities in observed primary schools

Facilities		N	%
1. Safe water available in schools	No	6	10.9%
	Yes	49	89.1%
2. Students bring water from home	No	31	56.4%
	Yes	24	43.6%
3. Authority has tested if the water is drinkable	No	14	25.5%
	Yes	41	74.5%
4. Drinkable water on each floor	No	25	45.5%
	Yes	30	54.5%
5. Classrooms are neat and clean	No	0	0%
	Yes	55	100.0%
6. Enough ventilation in classrooms	No	5	9.1%
	Yes	50	90.9%
7. Enough toilets for students	No	21	38.2%
	Yes	34	61.8%
8. The toilets are neat and clean	No	7	12.7%
	Yes	48	87.3%
9. Proper distance between the toilets and classrooms	No	11	20.0%
	Yes	44	80.0%
10. Proper water facility in toilets	No	11	20.0%
	Yes	44	80.0%
11. Necessary equipment in the toilets	No	5	9.1%
	Yes	50	90.9%
12. Enough soap/hand wash facility for washing hands	No	12	21.8%
	Yes	43	78.2%
13. Separate toilets for boys and girls	No	22	40.0%
	Yes	33	60.0%
14. Toilet facilities for special/physically challenged students	No	45	81.8%
	Yes	10	18.2%
15. Separate wash-blocks for boys and girls	No	30	54.5%
	Yes	25	45.5%

16. Wash-blocks are child friendly	No	28	50.9%
	Yes	27	49.1%
17. Wash-blocks are appropriate to use	No	24	43.6%
	Yes	31	56.4%
18. Proper safety tanks and drainage system	No	19	34.5%
	Yes	36	65.5%

This study found 89.1% primary schools having Safe water availability where 74.5% schools water source is tested. 54.5% schools have water facilities in every floor. In spite of that, students in 43.6% schools bring water from home.

Regarding wash block or toilet facilities, the findings is mixed. Available toilets are neat and clean in 87.3% schools. There are proper water facility in 80% schools, 78.2% have sufficient soap/hand wash facility. However, in 40% schools, there is no separate toilet for boys and girls, 81.8% have no facility for special needed students. In 50.9% schools, wash blocks are not child friendly. 34.5% schools have no proper safety tank and drainage system.

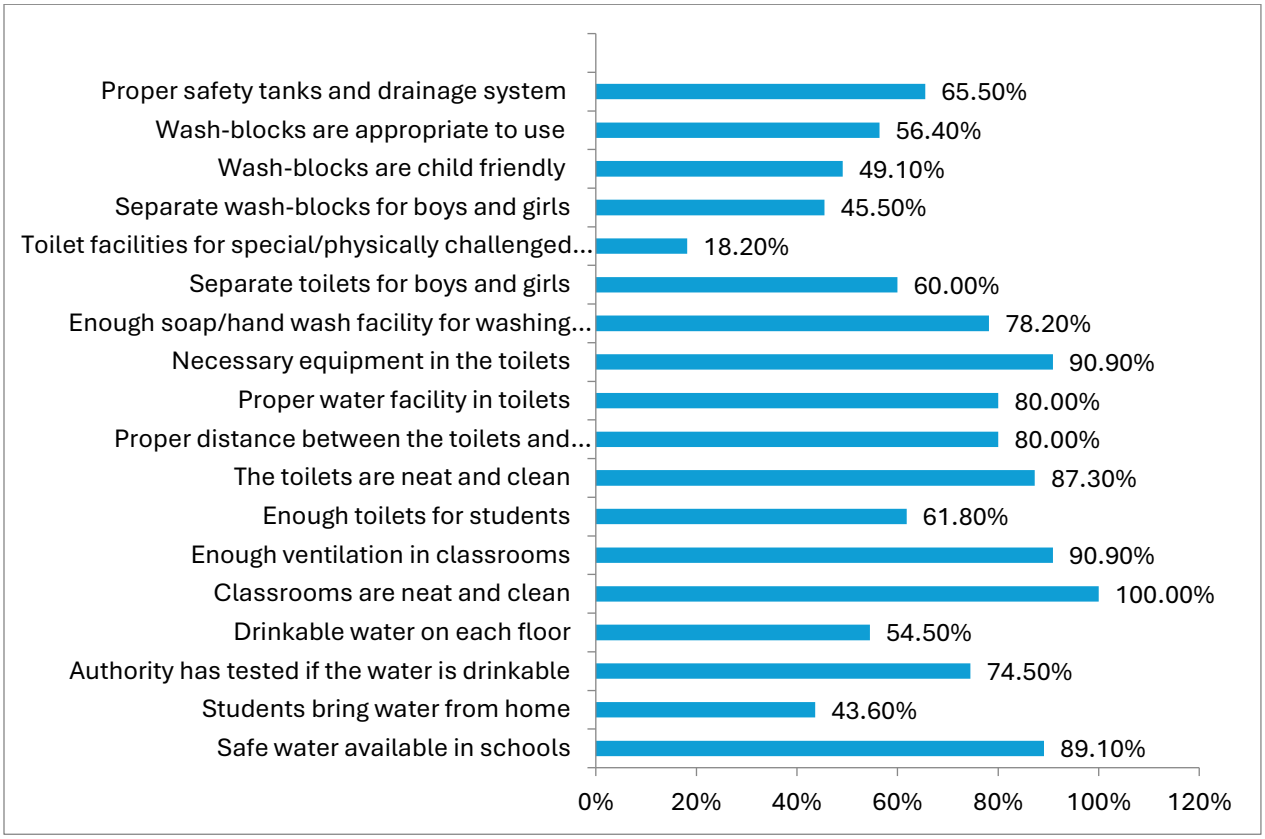

Figure 4. 4: Health and hygiene facilities in primary schools

Table 4. 22: Some important health and hygiene facilities according to geographical location

facilities		Coastal	char	mountains	Plain land	Haor	Total
Safe water availability	No	4	0	1	1	0	6
	Yes	6	10	9	14	10	49
Enough toilets	No	5	8	2	4	2	21
	Yes	5	2	8	11	8	34
Soap/hand wash availability	No	3	2	3	2	2	12
	Yes	7	8	7	13	8	43
Separate toilets for boys and girls	No	6	7	0	5	4	22
	Yes	4	3	10	10	6	33
Toilets suitable for special need/physically challenged	No	10	10	5	12	8	45
	Yes	0	0	5	3	2	10
Proper sewerage line and safety tank	No	5	7	1	4	2	19
	Yes	5	3	9	11	8	36
Total		10	10	10	15	10	55

In coastal areas, availability of safe water is a concern as well as the proper sewerage line and safety tank. In char areas, there are not enough toilets.

Table 4. 23: Some important health and hygiene facilities in government and new nationalized schools

facilities		Government	New nationalized	Total
Safe water availability	No	3	3	6
	Yes	33	16	49
Enough toilets	No	13	8	21
	Yes	23	11	34
Soap/hand wash availability	No	8	4	12
	Yes	28	15	43
Separate toilets for boys and girls	No	13	9	22
	Yes	23	10	33
Toilets suitable for special need/physically challenged	No	30	15	45
	Yes	6	4	10
Proper sewerage line and safety tank	No	9	10	19
	Yes	27	9	36
Total		36	19	55

The findings show that, in general Government schools generally have slightly better coverage than new nationalized schools for most facilities, but significant gaps remain, particularly for special needs toilets and gender-segregated facilities**.**

Table 4. 24: Some important health and hygiene facilities in urban and rural schools

Facilities	Urban	Rural	Total
Safe water availability	4	2	6
	13	36	49
Enough toilets	5	16	21
	12	22	34
Soap/hand wash availability	6	6	12
	11	32	43
Separate toilets for boys and girls	5	17	22
	12	21	33
Toilets suitable for special need/physically challenged	13	32	45
	4	6	10
Proper sewerage line and safety tank	5	14	19
	12	24	36
Total	17	38	55

The above table indicates that, Urban schools generally have better health and hygiene facilities than rural schools, particularly in gender-segregated toilets and accessibility for special-needs students.

4.9. Knowledge of Health and Hygiene

Efforts to raise hygiene awareness were observed in limited but intentional initiatives, with awareness programs for students, parents, and teachers noted in three instances. These programs, often conducted through assemblies, aim to educate stakeholders on hygiene practices. One inspection report noted, "Parent and mother assemblies are being used to create awareness about hygiene practices, ensuring better understanding among families" (Ob11, urban school).

These initiatives focus on engaging the school community, particularly through parent gatherings, to reinforce hygiene knowledge at home and in school. However, the low frequency of such programs suggests that awareness-raising efforts are not widespread, potentially limited by resource constraints or lack of prioritization, particularly in rural schools. This limited focus on knowledge dissemination sets the context for understanding the practical barriers to hygiene practices observed across schools.

4.10. Practice of Health and Hygiene

4.10.1. Wash Block and Toilet Facility Challenges

Perhaps the most persistent obstacle to sustaining hygiene in schools is the state of their wash blocks and toilets. Across multiple inspections, officers repeatedly pointed to the absence of proper wash blocks or to facilities so deteriorated that they were hardly usable. In some schools, wash blocks had collapsed altogether, while in others there was no clear separation between boys' and girls' facilities - an issue that made many students uncomfortable. Structural flaws added another layer of difficulty: cracked or dilapidated walls, drainage lines that frequently clogged and left pools of stagnant water, and toilet fixtures designed for adults rather than children. As one report bluntly observed, *"The wash blocks are in poor condition, with clogged drains making them unhygienic for use"* (O19, rural school).

There are signs of improvement in a few cases. Ongoing construction projects were noted, with some wash blocks scheduled for completion by mid-2025, though progress has been uneven. In the meantime, the toilet situation remains troubling. Inadequate cleaning, too few functional toilets, and in some cases even unsafe paths leading to the facilities were cited as common problems. Girls, in particular, were found to be disproportionately affected, since the lack of secure and separate toilets often discouraged them from using school facilities at all.

4.10.2. Safe Water Supply and Hygiene Materials

Hygiene practices also falter was schools struggle with water availability. In several schools, inspectors reported that taps were scarce or unreliable - especially on upper floors, where children often had no access to running water. One officer noted with frustration, *"There's no reliable water supply on upper floors, forcing students to rely on limited taps"* (Ob23, urban school). In some rural areas, nearby water bodies created additional environmental obstacles, either restricting access or posing risks of contamination. Even where water was present, the absence of basic hygiene supplies - soap, handwash, tissues, or even an adequate number of dustbins - left students unable to follow through on hygiene routines. *"Without soap or handwash, students cannot maintain proper hygiene after using toilets"* (Ob27, rural school), one report emphasized. These shortages were most acute in rural schools, where financial and infrastructural constraints are sharper.

4.10.3. School Environment and Cleanliness

Accounts of school cleanliness paint a mixed picture. In some cases, inspectors encountered tidy premises that seemed to mirror the head teacher's personal commitment. One report commended this, noting, *"The school's clean environment reflects the head teacher's commitment to hygiene"* (Ob14, urban school). These positive examples were not isolated - several schools clearly benefitted from head teachers who took cleanliness seriously and motivated staff to follow suit. Teachers' personal dedication, mentioned more than once, appeared to make a visible difference.

But the contrast was sharp. Other schools struggled with less tidy surroundings: ground floors in need of attention, corners overlooked, and, most commonly, disruptions caused by ongoing construction. In multiple sites, new wash blocks or classrooms were being built, forcing children into temporary sheds while sanitation facilities were either demolished or inaccessible. As one rural report bluntly put it, *"Construction work has left the school without proper wash facilities"* (Ob30). Though these disruptions are temporary, they nonetheless undercut daily hygiene practices in the short term.

4.10.4. Additional Systemic Issues

Beyond cleanliness, inspectors flagged a handful of systemic barriers that complicate hygiene management. Safety cropped up as a concern, especially unsafe paths to toilets that left some students - girls in particular - hesitant to use them. Low enrollment was another recurring theme; in a number of schools, community-level factors like parental unawareness or environmental barriers (such as schools near water bodies) discouraged attendance.

There were also glimpses of schools trying to stay on top of sanitation: septic tanks were cleaned at least twice during the review period, in July 2024 and again in February 2025. Yet these efforts were often offset by resource shortages. Several reports highlighted the absence of support staff - no peons to manage small but essential tasks - and poor communication systems that slowed down coordination. Physical limitations added further pressure: cramped school land left little room for new facilities, and in coastal areas, some buildings had the added burden of doubling as cyclone shelters.

What emerges is a gap between intention and infrastructure. While awareness of hygiene and some dedicated leadership exist, schools - especially rural ones - face harder realities: unreliable

facilities, stretched resources, and environments that simply don't allow for consistent cleanliness. Urban schools, though marginally better off, were not immune either, particularly in maintaining steady supplies of hygiene materials. Together, these findings underline the urgency for systematic interventions that look beyond awareness campaigns and tackle the material deficits directly.

Chapter 5: Discussion

This study provides comprehensive insights into the health and hygiene practices in primary schools across Bangladesh, examining the interplay between national policies, educational resources, student knowledge and practices, institutional support systems, and infrastructure. The findings reveal a complex picture of progress and persistent challenges that collectively shape the health and hygiene outcomes for primary school students in Bangladesh.

RQ-1: How do national policies address health and hygiene practice among primary students?

Bangladesh's primary education sector presents a complex and somewhat paradoxical picture when it comes to health and hygiene. On paper, policies appear ambitious and forward-thinking, yet in practice, significant gaps persist. Reviewing seven major policy documents spanning 2010–2023 reveals a gradual evolution in understanding WASH (Water, Sanitation, and Hygiene) needs, with newer frameworks offering more concrete standards for infrastructure and a clearer focus on gender-sensitive approaches. Still, these progressive policies often stumble in implementation, with weak follow-through in areas like sustainable financing, teacher training, and monitoring systems.

Policy Evolution and Growing Institutional Awareness

Over the past decade, Bangladesh's approach to school hygiene policy has clearly matured. Early documents such as the National Education Policy (2010) laid the groundwork by recognizing hygiene as essential, while later frameworks-PEDP4 (2018–2023) and the National Strategy for Water Supply and Sanitation (2021)-demonstrate a deeper understanding of infrastructure and inclusivity. This mirrors global trends, as outlined by WHO (2019), which frames hygiene as the set of conditions and practices preventing disease, and UNICEF (2009), which broadens the lens to include environmental factors like safe water and adequate sanitation.

Recent policies reflect this shift in sophistication. Specific toilet-to-student ratios (1:50 for girls, 1:75 for boys) and disability-accessible designs in PEDP4 signal alignment with international best practices (WHO & UNICEF, 2018), showing that policymakers increasingly see school hygiene as a multi-dimensional challenge, encompassing both personal behaviors and institutional provisions.

The Implementation Gap: Policy vs. Reality

Despite these progressive intentions, the gap between policy and practice is stark. The National Hygiene Survey (2018) highlights that only 36% of schools actually provide both soap and water at handwashing stations, underscoring a pronounced "implementation deficit." Many policies emphasize infrastructure but neglect recurring operational costs. Soap, cleaning materials, and maintenance require ongoing support, yet this crucial aspect is largely absent in policy design. Without it, even the best-laid infrastructure plans cannot sustain effective hygiene practices.

Teacher Capacity and Role Challenges

Teachers are often cast as the frontline of hygiene promotion, tasked with everything from reminding students to wash hands to delivering hygiene lessons. Yet, policies rarely ensure these educators receive the training needed to fulfill such roles effectively. While the 2010 National Education Policy vaguely references training through Primary Teacher Institutes (PTIs), more recent policies largely overlook teacher capacity building. This gap is significant, as teacher leadership is widely recognized as a critical driver of student hygiene behaviors-an opportunity that remains underutilized in Bangladesh's policy landscape.

Weak Monitoring and Accountability

Another persistent challenge lies in monitoring. Policies frequently emphasize infrastructure targets but fail to track whether facilities are functional or whether hygiene behaviors are actually changing. This focus on physical completion rather than outcomes reflects broader governance challenges, where accountability systems remain fragmented. The result is predictable: soap shortages, unusable toilets, and poor hygiene habits persist even when policies appear "compliant" on paper.

Coordination and Sectoral Integration

Limited collaboration between health and education sectors further complicates implementation. For instance, the National Strategy for WASH in Health Care Facilities (2019–2023) offers potential synergies that remain largely untapped in school settings. International best practices emphasize intersectoral coordination-between ministries of health, education, environment, and

finance-as essential for embedding WASH into educational systems. Bangladesh's fragmented approach helps explain why policy intentions often fail to materialize at the school level.

Emerging Priorities and Progressive Trends

Amid these challenges, there are signs of progress. The 2021 National Strategy's focus on menstrual hygiene management addresses a long-standing barrier to girls' education, while PEDP4's attention to disability-accessible facilities reflects growing awareness of inclusive education principles. These steps suggest that policy frameworks are beginning to respond to diverse student needs and align with international standards. Yet, translating these progressive elements into real-world implementation remains a pressing challenge.

RQ-2: What health and hygiene components are embedded in primary textbooks?

The textbook review paints a picture of health and hygiene education in Bangladesh's primary schools as patchy and inconsistent. Across Classes 1–5, certain themes appear here and there, but coverage is superficial at best, far from the comprehensive approach envisioned by national policies or international benchmarks.

Uneven Presence Across Subjects

Some surprising patterns emerge when examining subjects individually. English textbooks, for instance, lead with 17 references to hygiene, followed by Bangla with 15 and Science with 12. Meanwhile, Bangladesh and Global Studies barely register, with only five mentions, and Mathematics remains completely silent. Among the eight key hygiene themes tracked, handwashing and clothing cleanliness appear most frequently-each appearing in eight different textbooks. Yet several critical topics are entirely missing. Menstrual hygiene, illness prevention, and even post-COVID guidance such as mask use, distancing, or hand sanitization are nowhere to be found.

This patchy distribution hints at underlying assumptions in curriculum design: hygiene seems treated more as a reading or comprehension exercise than as actionable knowledge for daily life. Even Mathematics, predictably absent in hygiene content, could have provided creative entry points-problem sets on water use, soap distribution, or handwashing frequency-but such opportunities remain untapped. Science performs slightly better, particularly in Class 4, yet the

integration still falls short of the cross-disciplinary approach recommended by UNESCO's *Health and Academic Achievement* framework.

Policy Aspirations vs. Textbook Reality

What makes these gaps particularly concerning is the mismatch between policy intentions and textbook content. The 2010 National Education Policy explicitly recognized hygiene education-including teeth cleaning, nail care, and handwashing-as a core element of primary schooling. The 2021 National Strategy for Water Supply and Sanitation went further, highlighting menstrual hygiene management. Yet, these priorities are inconsistently reflected in textbooks. Class 5 Bangla stands out as a stark example: no hygiene content appears at all, precisely when children are forming habits that could last a lifetime. This disconnect suggests that textbook developers struggle to translate policy directives into practical, age-appropriate material.

Falling Behind International Peers

Compared internationally, these gaps become even more striking. In Kenya, Anthonj et al. (2021) documented primary science textbooks with substantial lessons on water hygiene, disease prevention, and environmental health, even if personal hygiene and menstrual topics were only partially addressed. In Iran, Kazemian et al. (2014) found hundreds of health-related lessons across primary curricula. Portugal's textbooks, analyzed by Torres and Sá (2021), were criticized for weak handwashing coverage-but even they surpass the scattered and brief references in Bangladesh's textbooks. The absence of illness-prevention content is especially worrying in a context where waterborne diseases remain endemic and the COVID-19 pandemic has underscored the stakes of everyday hygiene practices.

Blind Spots in Critical Health Areas

Two glaring omissions demand attention. Menstrual hygiene is almost entirely absent. The National Hygiene Survey (2018) reported that nearly half of adolescent girls miss school during menstruation, with very few schools providing proper disposal facilities. Textbook silence on this issue perpetuates misinformation and cultural taboos. Equally striking is the lack of post-COVID guidance. One might expect at least basic adaptations-mask-wearing, physical distancing, and hand sanitization-to appear by now, but textbooks have been slow to adjust. This rigidity

underscores the urgent need for a more agile system of textbook revision that can respond quickly to emerging health priorities.

RQ-3: What knowledge and practice do primary students have regarding health and hygiene issues?

The study paints a rather mixed picture of health and hygiene practices among Bangladeshi primary school students. On the one hand, awareness is impressively high-almost every child surveyed (98.7%) claimed familiarity with basic hygiene ideas. Unsurprisingly, handwashing with soap emerged as the practice most often cited (95.5%), trailed by tooth brushing (65.4%) and proper toilet hygiene (63.7%). Yet, beneath this strong surface knowledge lie striking gaps in the more practical, everyday aspects of hygiene. Only 6.9% mentioned regular bathing, 2.5% nail cutting, and a mere 0.3% environmental hygiene. The message is clear: while children know the basics, putting that knowledge consistently into action remains uneven and incomplete.

Interpretation of Knowledge Patterns

A Strong Foundation in Core Practices

That nearly all students had at least heard about health and hygiene points to the reach of school-based awareness efforts, many of which trace back to policy commitments such as the National Education Policy (2010) and PEDP4 (2018–2023). Teachers stood out as the main transmitters of this knowledge (81.4%), a finding that echoes UNESCO's Health and Academic Achievement (2014) framework which views schools as central hubs for health promotion. Equally, the near-universal mention of handwashing (95.5%) reflects the global prominence of this behavior in WHO-led WASH campaigns. Similar arguments are made by Bloomfield et al. (2007) and WHO (2019), both of whom position handwashing as the cornerstone of disease prevention in learning spaces.

Where Knowledge Falls Short of Practice

The cracks, however, appear once one compares what children *know* with what they actually *do*. Brushing twice daily was claimed by 89.3%, but only 65.4% listed it as a practice-suggesting either overreporting or inconsistency in execution. The tiny proportions for bathing and nail care

highlight the same issue: intellectual recognition without everyday follow-through. This disconnect echoes findings by Kabir et al. (2021) and Jewel & Hossain (2020), who argue that knowledge alone rarely shifts behavior when family habits, infrastructure, and socioeconomic factors intervene. More recent work by Omura et al. (2024) underscores this point, showing that skill-based health education interventions are needed to bridge the gap.

Sources of Knowledge and Their Implications

Teacher-Centered Transmission

Teachers dominated as conveyors of hygiene messages, cited by over four-fifths of students. This aligns with Bora et al. (2025) and Puri & Gulati (2022), who stress the pivotal role of teachers in shaping student health routines. Yet a troubling gap emerges here: only 10.1% of teachers had formal training in hygiene education, suggesting that responsibility far outstrips preparation. Parents also played a strong role (61.9%), consistent with Vivas et al. (2010) and Nematian et al. (2004), who argue that family reinforcement is key to sustaining healthy habits. Textbooks, though available everywhere, were less influential (55.8%), perhaps reflecting the limits of passive learning compared to active instruction (see Torres & Sa, 2021).

Media and Peer Influence

Television, internet, and peers were relatively minor sources of information, cited by just 26.9% and 17.0% of students respectively. Still, the mention of *Meena Cartoon* by rural respondents is telling: culturally tailored media can resonate where general campaigns fail, echoing UNESCO's recommendations on multimedia approaches.

Practice Patterns and Their Significance

Strength in Basic Behaviors

Self-reported routines such as handwashing before and after meals (97.2%), toilet hygiene (98.3%), and daily bathing (97.1%) [Table 4.13] point to successful internalization of foundational habits. These encouraging figures mirror results found in Bangladesh by Akther et al. (2021) and Md et al. (2014), both of whom documented how schools can, with the right resources, foster meaningful change.

Persistent Gaps in Personal Hygiene

Yet troubling blind spots remain. Less than half (45.1%) avoided sharing personal items like combs or towels, while 21.2% admitted always sharing them-a practice that directly fuels the spread of lice, fungal infections, and skin diseases, as Shrestha (2014) notes. This suggests that hygiene education has tended to emphasize hands and toilets while neglecting equally important but less visible risks.

Environmental and Advanced Practices

Mentions of environmental hygiene (0.3%) and waste disposal (0.2%) were almost absent. Clearly, students' hygiene awareness is framed around individual routines rather than community or ecological health, a gap that contradicts the integrated vision set out by WHO & UNICEF (2018).

Infrastructure as a Limiting Factor

Structural shortcomings partly explain these inconsistencies. While most schools (89.1%) reported access to safe water, nearly half of students (43.6%) still brought water from home-hinting at doubts about quality or accessibility. Soap supplies were missing in over one-fifth of schools, and 40% lacked gender-segregated toilets. Such barriers mirror World Bank (2021) analyses, which identify weak infrastructure as a central constraint on WASH sustainability.

Rural–Urban Disparities

Finally, the study's observations point to marked rural–urban divides. Rural schools lagged behind in wash block maintenance, water reliability, and supply availability, all of which likely contribute to weaker hygiene practice uptake. These disparities, though not quantified in student responses, are crucial for interpreting the unevenness of reported behaviors.

RQ-4: How do teachers support students in practicing health and hygiene in primary schools?

The evidence from this study points to a teaching force that is deeply committed to student wellbeing. Almost every teacher surveyed (99.3%) reported giving regular advice on hygiene and monitoring children's practices. Yet their efforts operate under considerable strain. Weak infrastructure, patchy training, and scarce resources blunt the impact of what is otherwise a near-universal recognition of hygiene's importance (99.7%). The most striking gap lies in professional

preparation: although 97.7% claimed knowledge of health and hygiene, only 10.1% had ever received formal training. This mismatch between intention and institutional support defines much of the story the data tell.

Teacher Knowledge and Preparedness

High Awareness, Limited Training

Teachers appear to "know" hygiene well enough in a broad sense, but their knowledge is largely experiential, built through day-to-day practice rather than shaped by structured training. With formal preparation reaching only one in ten (10.1%), the system leaves teachers improvising their way through health education. Bora et al. (2025) have noted this very tension: teachers positioned as front-line actors but left without sufficient professional development. This is particularly problematic in light of UNESCO's (2014) observation that each additional health intervention amplifies student outcomes by about 18%. Bangladesh's National Education Policy (2010) mandates hygiene education, yet nowhere does it outline what competencies teachers should be expected to demonstrate - a silence that becomes glaring when seen against these findings.

Universal Recognition of Importance

At the same time, awareness and commitment are not lacking. Nearly all teachers rated hygiene (99.7%) and safe water (100%) as critically important. This echoes Puri and Gulati (2022), who observed that teachers inevitably serve as role models in hygiene behaviors. But the contradiction is hard to ignore: commitment is high, facilities are weak, and formal preparation is minimal. Motivation, on its own, cannot compensate for structural deficits.

Teacher Support Mechanisms

Direct Student Engagement

Teachers' engagement with students goes well beyond the formal curriculum. An overwhelming majority (99.3%) reported giving hygiene advice, and nearly four-fifths (77.8%) did so regularly. From morning assembly reminders to impromptu classroom demonstrations, teachers weave hygiene into the school day. This approach mirrors WHO's (2019) call for whole-school strategies where healthy routines become part of the learning environment itself. The frequency of creative activities - songs, discussions, workshops, and skits (174 mentions in total) - also suggests that

teachers are conscious of the need for more than rote instruction. Omura et al. (2024) found that skill-based interventions are far more effective in shifting behavior, which underlines why teachers' informal, inventive methods matter, even if not always standardized.

Monitoring and Supervision

Equally notable is the investment teachers make in monitoring. Almost all (99.3%) kept watch over students' hygiene behaviors, with 69.9% doing so consistently. Van Werven (2017) argued that sustained supervision is key to lasting behavioral change - a point clearly resonating here. Still, the effect of such vigilance is inevitably blunted when schools themselves lack soap, functional toilets, or reliable wash blocks, as the observation data showed.

Systemic Constraints on Teacher Effectiveness

Infrastructure as a Limiting Factor

Teachers themselves are acutely aware that their work is hampered by physical conditions. Calls for improved sanitation (77 mentions) and steady hygiene materials (38 mentions) surface repeatedly in the qualitative accounts. The school observations confirm their concerns: more than one-fifth (21.8%) had no adequate soap, and two in five (40%) lacked gender-segregated toilets. These figures reinforce the World Bank's (2021) argument that infrastructure remains the foremost bottleneck for WASH in education. Teachers' concern with drainage, classroom cleanliness, and overall school environments reflects a basic truth: education on hygiene cannot thrive in unhygienic surroundings. UNICEF (2022) reached the same conclusion, stressing that infrastructure and instruction are interdependent.

Resource Allocation Challenges

Beyond physical facilities, the lack of resources compounds the problem. Requests for government-funded cleaners (32 mentions) and reliable supplies echo findings from the National Hygiene Survey (2018), which revealed that only 36% of schools consistently provided both soap and water. In other words, policy pronouncements have not translated into sufficient, on-the-ground support.

Innovative Approaches and Community Engagement

Creative Educational Strategies

Faced with limitations, many teachers turned to improvisation. Posters, songs, role plays, and drama became tools for transmitting hygiene concepts in accessible ways. Such participatory strategies resonate with Bora et al. (2025), who argued for interactive pedagogy in hygiene education. Particularly with younger children, the power of song or performance often goes further than textbook explanation.

Parental and Community Involvement

The repeated references to *Ma Shomabesh* (mothers' assemblies) and community seminars (38 mentions) suggest that teachers view hygiene as a shared responsibility. This aligns with Kalam et al. (2003), who showed that school-based hygiene programs ripple outward into households and communities. Still, as teachers themselves acknowledged, the success of these efforts is uneven - shaped heavily by parental literacy and socioeconomic context.

RQ-5: How do supervisors support students in practicing health and hygiene in primary schools?

The picture that emerges from this study is both encouraging and sobering. Supervisors at the upazila level - the AUEOs - show clear commitment to promoting health and hygiene in primary schools. Every single one acknowledged that teachers raise students' awareness, and the vast majority (90.9%) believed that students practice hygiene regularly. Supervisors described a wide range of strategies, from morning assemblies and practical demonstrations to teacher mentoring and community meetings. Yet their efforts are constantly undercut by structural constraints. More than four-fifths of schools (81.8%) lacked proper WASH blocks, and nearly half (45.5%) had facilities judged insufficient. In short, supervisors are trying to sustain behavioral change with very little material support - awareness is high, but infrastructure remains the weakest link.

Interpretation of Supervisory Support Mechanisms

Awareness-Building and Educational Strategies

Morning assemblies, mentioned seven times, surfaced as the most common supervisory tool. This emphasis on embedding health messages into the daily rhythm of school life echoes Bora et al.'s (2025) framework, which stresses routine integration as a way of normalizing hygiene. Supervisors

also leaned heavily on demonstrations and visual cues, reflecting an appreciation of what works with young learners - an approach that resonates with UNESCO's call for comprehensive school health cultures (UNESCO, 2014).

At the same time, the reliance on awareness campaigns hints at something else: a coping strategy. With inadequate toilets and unreliable soap supplies, supervisors often fall back on raising awareness because other levers are simply not within reach. Knowledge transmission becomes the tool of necessity rather than part of a fully rounded supervisory model.

Community Engagement and Parental Involvement

A notable strength in the supervisory approach lies in how often families, particularly mothers, are brought into the fold. AUEOs pointed to mothers' meetings as central to sustaining hygiene practices, echoing Vivas et al. (2010), who showed that family involvement prolongs the impact of school-based programs. In rural areas, supervisors leaned even more on this approach, using community networks and practical demonstrations in place of digital media. Far from being accidental, this reflects the realities of context: where technology is scarce, social ties become the infrastructure.

This "community-first" orientation sits comfortably within WHO & UNICEF's (2018) WASH framework, which highlights family and community collaboration as essential to sustainability. Whether this is a deliberate strategy or an improvised response to resource gaps, supervisors appear to recognize the interdependence of schools and households.

Infrastructure Challenges and Supervisory Limitations

The infrastructure–Supervision Disconnect

Perhaps the most striking contradiction in the data is the one between supervisors' commitment and the facilities available to them. AUEOs clearly understand how to promote hygiene - but 81.8% of their schools lacked adequate WASH blocks, and over half (54.5%) had facilities deemed insufficient. This mismatch underscores how supervisory effectiveness is curtailed by barriers beyond their control. International frameworks often assume that strong supervision can compensate for limited resources, but in Bangladesh this assumption breaks down. As the World Bank (2021) argues, governance reforms matter - yet these findings suggest that no amount of supervisory quality can fully substitute for missing infrastructure.

Resource Allocation and Maintenance

Repeated requests for cleaners (three supervisors mentioned it explicitly) and reliable soap supplies illustrate the persistence of operational gaps. Rahman et al. (2019) note that implementation in low-resource contexts often stumbles on recurrent costs, and the present study affirms that observation. Policy documents may set ambitious targets, but without maintenance budgets and supply chains, supervisors find themselves pushing for hygiene education in environments that undermine their very message.

Rural–Urban Disparities

The study also uncovers sharp contrasts in how supervision plays out across geography. Urban AUEOs leaned on media and visual tools, while rural supervisors put more weight on demonstrations and community engagement. Kusumawardhana and Auliya (2020) argue that local adaptation is essential for school health interventions, and these findings appear to support that claim. Still, one wonders whether rural supervisors' strategies represent optimal practice or simply the best they can manage with limited resources.

Geographic and Environmental Constraints

Finally, supervisors in coastal and char regions face challenges of a different order. Here, infrastructure is not just inadequate but unstable, with erosion and flooding forcing temporary toilets and constant rebuilding. These accounts extend the conversation beyond static infrastructure deficits - pointing instead to dynamic environmental risks that existing frameworks rarely account for. The data suggest that supervisory models need to be flexible not only to resource levels but also to the shifting physical landscapes in which schools operate.

RQ-6: How do the infrastructure of primary schools' support health and hygiene practices among students?

The findings present a mixed landscape of progress and persistent challenges. On the positive side, 89.1% of schools now have access to safe water, and 87.3% report keeping toilets clean. Yet these achievements are offset by significant gaps: 40% of schools still lack gender-separated toilets, 81.8% provide no facilities for children with disabilities, and roughly half (50.9%) operate with wash blocks that are not child-friendly. In other words, while Bangladesh's policies show a progressive understanding of WASH requirements, there remains a wide gulf between policy

aspirations and the everyday realities in schools - particularly in terms of sustainable maintenance and inclusive design.

Infrastructure Adequacy: Progress and Ongoing Gaps

Safe water availability in 89.1% of schools marks real progress - especially when set against the WHO/UNICEF Joint Monitoring Programme (2022), which found that globally only 79% of schools had access to improved drinking water sources. Bangladesh's numbers suggest that investments under initiatives like PEDP4 (2018–2023), which aimed to install 15,000 water points, have produced visible results.

But the story is complicated: 43.6% of students still bring water from home. This hints at concerns over quality, reliability, or insufficient supply, showing that the mere existence of water sources does not guarantee functionality. The World Bank (2016), in *Water, Sanitation, Hygiene, and Nutrition in Bangladesh*, had already pointed out this very problem - availability on paper does not always translate into meaningful access. UNESCO (2023) makes a similar point globally: 73% of schools may report "basic" water services, but quality and reliability vary widely, especially in resource-poor contexts.

Gender Equity and Inclusion: Persistent Deficits

The lack of gender-segregated toilets in 40% of schools remains a major obstacle for girls, undermining both dignity and attendance. This reality directly contradicts the National Strategy for Water Supply and Sanitation (2021), which mandates gender-sensitive infrastructure. Disability inclusion is even weaker: 81.8% of schools provide no facilities for students with special needs.

The global picture is not much better. According to the World Bank's *WASH in Schools Policy Brief* (2021), only 44% of schools worldwide had functioning, sex-segregated toilets, and disability-friendly options were "virtually absent." The same brief highlighted another neglected issue: menstrual hygiene. Just 1% of schools globally had disposal bins for menstrual products. This resonates with the present study's observation that Bangladesh's schools have yet to integrate gender-responsive and inclusive WASH infrastructure into daily reality.

Child-Friendly Design: A Missing Perspective

Another striking finding: 50.9% of wash blocks in primary schools are not child-friendly. This points to a design flaw - facilities often reflect adult needs rather than children's size, comfort, or developmental stage. As a result, even when toilets exist, younger students may avoid them altogether. Hygiene education in such settings loses much of its practical impact.

This aligns with UNICEF's *School Sanitation and Hygiene Education* program, which Snel & Shordt (2002) emphasized must prioritize children's perspectives. WHO (2019) has also cautioned that simply building infrastructure is not enough; it must be accessible, usable, and maintained to actually support behavior change.

Maintenance and Sustainability: Weak Links in the System

On the surface, 78.2% of schools providing soap and handwashing stations looks promising. But student and teacher complaints about soap shortages reveal the fragile nature of these systems. Infrastructure is created, but without reliable budgeting for consumables or routine upkeep, the facilities quickly lose effectiveness. PEDP4 (2018–2023) is emblematic: its targets focus heavily on installation numbers but remain largely silent on recurrent financing for maintenance. The WHO's *Surveillance of Water, Sanitation and Hygiene in Schools* (2019) underscores this point globally - without stable supply chains and institutionalized budgeting, even ambitious infrastructure projects risk collapsing into disuse. Bangladesh's case reflects this broader pattern.

Geographic and Institutional Disparities

The study also highlights uneven progress across locations and types of schools. Coastal areas struggle with water salinity and sewerage, while char schools face shortages of toilets altogether. Rural schools lag consistently behind urban ones in terms of WASH facilities, reinforcing long-standing inequalities in education. Interestingly, established government schools tend to fare better than newly nationalized schools, suggesting that institutional history and stronger administrative systems make a difference in maintaining infrastructure. This mirrors UNESCO's (2023) observation that marginalized and geographically challenged communities - rural, coastal, or otherwise disadvantaged - experience the greatest barriers to equitable infrastructure.

Policy vs. Practice: A Disconnect That Lingers

Perhaps the most consistent theme across the findings is the disconnect between policy and implementation. Documents like the *National Hygiene Survey* (2018) clearly articulate standards - handwashing stations, gender-sensitive toilets, inclusive design - but everyday practice lags behind. For instance, 25.5% of schools have never tested their water quality, despite explicit requirements to do so. This is not unique to Bangladesh. The WHO's *Pan-European WASH Report* (2016) highlighted similar struggles across countries: fragmented enforcement, weak monitoring, and underfunded systems that leave progressive policies only partially realized. Bangladesh's case shows how ambitious strategies without robust follow-through often remain aspirations rather than realities.

Chapter 6: Recommendations

This chapter presents comprehensive recommendations based on the research findings regarding health and hygiene practices in primary schools of Bangladesh. The recommendations are organized according to the six research questions and are designed to address the identified gaps and challenges in policy implementation, textbook content, student knowledge and practices, teacher support, supervisory roles, and infrastructure development.

6.1. Recommendations

The recommendations derived from this study are presented in different domains. policy-level measures, curriculum and textbook enhancement and focuses on improving student knowledge and practice, Together, these areas provide a comprehensive framework for improving health and hygiene practices in primary education.

6.1.1. Policy-Level Recommendations

Strengthening Policy Integration and Coordination

The policy makers can:

- Create a dedicated Health in Schools Task Force comprising representatives from the Ministry of Primary and Mass Education, Ministry of Health and Family Welfare, and Ministry of Local Government, Rural Development and Cooperatives
- Develop a unified National School Health Policy that consolidates existing policies and eliminates overlapping mandates
- Establish clear roles and responsibilities for each ministry in implementing school health initiatives
- Implement quarterly monitoring visits by designated officials to assess policy compliance
- Mandate annual reporting on school health outcomes by education supervisors
- Introduce performance-based funding for schools demonstrating excellence in health and hygiene practices
- Take necessary steps to arrange hygiene education training for all primary school teachers Ensure 100% of schools have separate, child-friendly toilets for boys and girls
- Take steps to install disability-accessible WASH facilities in all schools (currently only 18.2% have them)

- Take measures to establish reliable water supply systems with backup options for all schools

Maintenance and Sustainability

Infrastructure without maintenance proves ineffective:

- Appoint dedicated cleaning staff for every school cluster (5-6 schools)
- Establish school-level WASH committees including students, teachers, and parents
- Create preventive maintenance schedules with quarterly facility checks
- Develop community-based maintenance partnerships for long-term sustainability

Quality Standards and Monitoring

Ensuring facilities meet health and safety standards:

- Develop and enforce national standards for school WASH facilities
- Implement third-party facility audits annually
- Create student feedback mechanisms for facility quality assessment
- Establish rapid repair and replacement protocols for damaged facilities

6.1.2. Curriculum and Textbook Enhancement

Comprehensive Content Integration

The analysis revealed significant gaps in health and hygiene content across primary textbooks:

- Integrate health and hygiene themes systematically across all subjects, not just science and social studies
- Incorporate COVID-19 prevention measures, including mask usage, social distancing, and respiratory hygiene
- Add content on mental health awareness and emotional well-being
- Create separate modules addressing hygiene challenges specific to coastal, char, hill, and haor regions
- Develop textbook supplements in regional languages for ethnic minority areas

Interactive Learning Materials

Current textbooks lack engaging, practical content for behavior change:

- Develop activity-based learning modules with role-play scenarios for hygiene practices
- Include QR codes linking to digital hygiene demonstration videos

- Create teacher guides with step-by-step instructions for practical hygiene demonstrations
- Introduce hygiene practice checklists for student self-assessment
- Include culturally sensitive hygiene practices that respect local customs

6.1.3. Student Knowledge and Practice Enhancement

Structured Hygiene Education Programs

- Establish "Hygiene Ambassadors" programs where students lead peer education
- Create school-based hygiene clubs with regular activities and competitions
- Develop age-appropriate hygiene curricula with progressive skill-building modules

Behavioral Change Interventions

The gap between knowledge and practice requires targeted interventions:

- Introduce daily hygiene practice sessions before classes begin
- Implement positive reinforcement systems for consistent hygiene behaviors
- Create visual reminders and hygiene practice charts in classrooms
- Establish peer monitoring systems where students support each other's hygiene practices

Conclusion

The recommendations presented in this chapter address the multifaceted challenges identified in promoting health and hygiene practices in primary schools of Bangladesh. Success in implementing these recommendations requires coordinated action across policy, educational, health, and community systems. The implications extend far beyond schools, with potential to transform community health practices, reduce disease burden, and contribute to Bangladesh's achievement of Sustainable Development Goals related to health, education, and water, sanitation, and hygiene.

The investment required for comprehensive school health and hygiene programs is significant, but the returns - in terms of improved health outcomes, educational achievement, and human capital development - are far greater. Bangladesh has the opportunity to become a regional leader in school health, building on its existing strengths in education access and health service delivery while addressing the critical gaps identified in this research.

Implementation of these recommendations will require sustained commitment from government, development partners, communities, and schools themselves. However, with proper planning,

adequate resources, and strong coordination, Bangladesh can ensure that all primary school children have access to the knowledge, facilities, and support needed for lifelong health and hygiene practices.

Limitation of the study

While the study offers valuable insights, several limitations should be noted. These include the absence of teacher perspectives, lack of longitudinal tracking, reliance on self-reported data, limited geographic coverage, and a narrow focus on individual factors. In addition, infrastructure assessment was partial, sustainability aspects were excluded, and the sample size was relatively small. Together, these constraints should be considered when interpreting the findings.

- **No longitudinal tracking** – The cross-sectional design prevents assessment of how knowledge, practices, and curriculum use change over time or in response to interventions.
- **Self-reported data bias** – Heavy reliance on self-reported measures may have led to overestimation of compliance rates due to social desirability bias. There were no independent tests or observations to verify participants' claims.
- **Limited geographic representativeness** – While participants came from varied locations, the study may not fully represent all ecological and socioeconomic contexts in Bangladesh, particularly coastal, char, and hill areas.
- **Narrow focus on individual factors** – The study concentrated mainly on individual knowledge and practices, with less attention to broader social and environmental **determinants of hygiene behavior.**
- **Partial infrastructure assessment** – Infrastructure data were collected through visual inspections in 55 schools, which may not capture all functional aspects such as water quality or seasonal performance variations.
- **Exclusion of sustainability factors** – The analysis did not explore maintenance systems, budget allocations, or community engagement, which are critical to the long-term effectiveness of WASH facilities.
- **Sample size constraints** – The number of schools and participants studied was relatively small, which may limit the generalizability of the findings.

Reference

Ahmed, S., & Hossain, M. (2019). Impact of PEDP3 on school sanitation in rural Bangladesh. *Journal of Education and Development, 15*(2), 45–60.

Akther, N., Begum, M., Islam, F., Khan, S. S., Doha, M., & Shara, S. (2021). Practices of hygiene among primary school children in a selected semi urban area of Bangladesh. *Asian Journal of Medical and Biological Research, 7*(1), 52–58. https://doi.org/10.3329/ajmbr.v7i1.52791

Akter, F., Rashid, S. M., Alam, N., Lipi, N., Qayum, M. O., Nurunnahar, M., & Mannan, A. (2022). Knowledge, attitude and practice of diabetes among secondary school-going children in Bangladesh. *Frontiers in Public Health, 10*, 1047617.

Aiello, A. E., & Larson, E. L. (2002). What is the evidence for a causal link between hygiene and infections? *The Lancet Infectious Diseases, 2*(2), 103–110.

Alamgir, M. (2024, October 11). Primary schools barely looked after. *The Daily Star*.

Anthonj, C., Githinji, S., Hoser, C., Stein, A., Blanford, J., & Grossi, V. (2021). Kenyan school book knowledge for water, sanitation, hygiene and health education interventions: Disconnect, integration or opportunities? *International Journal of Hygiene and Environmental Health, 235*.

Ashutosh Shrestha, F. (2014). Impact of health education on the knowledge and practice regarding personal hygiene among primary school children in urban area: An interventional study [Doctoral dissertation, KLE University].

Asian Development Bank. (2022). Supporting Fourth Primary Education Development Program: Environmental Monitoring Report.

Awan, N. U., Malik, U., Azam, M., Nasrullah, A., Tahir, F., Zulfiqar, R., & Awais, A. (2024). Behavioral and emotional difficulties in hearing impaired children and adolescents: A systematic review. *Kurdish Studies, 12*(4), 544–554.

Bangladesh Bureau of Statistics. (2025). Retrieved from [URL]

Bangladesh Bureau of Statistics (BBS). (2020). *National Hygiene Survey 2018*. Ministry of Planning.

Bangladesh Ministry of Primary and Mass Education. (2023). *Fourth Primary Education Development Program (PEDP4): Semi-annual Environmental Monitoring Report*.

Basch, C. E. (2011). Healthier students are better learners: A missing link in school reforms to close the achievement gap. *Journal of School Health, 81*(10), 593–598.

Bloomfield, S. F., Aiello, A. E., Cookson, B., O'Boyle, C., & Larson, E. L. (2007). The effectiveness of hand hygiene procedures in reducing the risks of infections in home and community settings. *American Journal of Infection Control, 35*(10), S27–S64. https://doi.org/10.1016/j.ajic.2007.07.001

Bora, P., Prajapati, A. K., & Chauhan, M. (2025). Promoting health awareness and hygiene in schools. *Voices for Change, 298*.

Centers for Disease Control and Prevention. (2012). *Guidelines for infection control in school settings*. Retrieved from https://www.cdc.gov/flu/school/index.htm

CDC. (2020). *Personal hygiene for kids and adults*. https://www.cdc.gov/healthywater/hygiene/index.html

Creswell, J. W. (2012). Educational research: Planning, conducting, and evaluating quantitative and qualitative research (4th ed.). Pearson Education.

Creswell, J. W., & Plano Clark, V. L. (2018). Designing and conducting mixed methods research (3rd ed.). SAGE Publications.

Dajaan, D. S., Addo, H. O., Ojo, L., Amegah, K. E., Fiagbe, L., Bechala, B. D., & Benjamin, B. B. (2018). Hand washing knowledge and practices among public primary schools in the Kintampo Municipality of Ghana. *[Journal/Report]*, [Volume(Issue)], [Pages].

Directorate General of Health Services. (2011). *Operational Plan for Health Education and Promotion (HEP) July 2011–June 2016*. Ministry of Health & Family Welfare.

Directorate of Primary Education (DPE). (2022). *Fourth Primary Education Development Programme (PEDP4) framework*. http://www.dpe.gov.bd/pedp4

Dua Zahra & Parshu Ram Chaudhary. (2023). Women's nutritional variability and domestic food safety in rural and semi-urban communities. *Dinkum Journal of Medical Innovations, 2*(5), 182–187.

Dutta, D. S. (2024). Knowledge & practice about personal hygiene among primary school students in rural Chattogram, Bangladesh. *Dinkum Journal of Medical Innovations, 3*(2), 72–88.

FAO & WHO. (2006). *Five keys to safer food manual*. https://www.who.int/publications/i/item/9789241594639

Firdaus, S., & Anwar, A. I. (2024). History of hygiene: An overview. *International Journal of Unani and Integrative Medicine, 8*(2), 7–10.

Hakim, M. A. (2015). Nutritional status and hygiene practices of primary school goers in gateway to the North Bengal. *International Journal of Public Health Research, 3*(5), 271–275.

Hossain, M. I., Rahman, M. M., & Sultana, N. (2020). Effectiveness of school-based WASH programs in improving hygiene practices among primary students in Bangladesh. *International Journal of Environmental Health Research, 30*(4), 456–470.

Islam, M., Benjamin-Chung, J., Sultana, S., Unicomb, L., Alam, M., Rahman, M., ... & Luby, S. P. (2021). Effectiveness of mass media campaigns to improve handwashing-related behavior, knowledge, and practices in rural Bangladesh. *The American Journal of Tropical Medicine and Hygiene, 104*(4), 1546.

Islam, M., Rahaman, M., & Sarker, M. (2015). Water supply and sanitation facilities in primary schools of Gaibandha District in Bangladesh. *Journal of Environmental Science and Natural Resources, 6*(1), 113–116. https://doi.org/10.3329/jesnr.v6i1.22050

Izadi, S., Omrān, E. S., Vājargāh, K. F., & Beltarak, M. A. (2010). Analysis of primary school textbooks based on the components of health education. *Journal of Educational Innovations, 9*(1), 139–162.

Jackson, S. L., Vann, W. F., Kotch, J. B., Pahel, B. T., & Lee, J. Y. (2011). *Impact of poor oral health on children's school attendance and performance*. *American Journal of Public Health*, 101(10), 1900–1906. https://doi.org/10.2105/AJPH.2010.200915

Kabir, A., Roy, S., Begum, K., Kabir, A. H., & Miah, M. S. (2021). Factors influencing sanitation and hygiene practices among students in a public university in Bangladesh. *PLoS ONE, 16*(9), e0257663.

Kazemian, R., Ghasemi, H., Movahhed, T., & Kazemian, A. (2014). Health education in primary school textbooks in Iran in school year 2010–2011. *Journal of Dentistry, Tehran University of Medical Sciences, 11*(5), 536–544.

Khan, A. R., Sarker, S., & Alam, M. (2021). Water, sanitation, and hygiene (WASH) in Bangladeshi schools: Challenges and opportunities. *Journal of Public Health in Developing Countries, 7*(1), 12–25.

Local Government Division, Ministry of Local Government, Rural Development & Co-operatives. (2021). *National Strategy for Water Supply and Sanitation 2021*.

Lopez-Quintero, C., Freeman, P., & Neumark, Y. (2009). Hand washing among school children in Bogota, Colombia. *American Journal of Public Health, 99*(1), 94–101.

Mahmud, I., & Mbuya, N. (2016). Water, sanitation, hygiene, and nutrition in Bangladesh: Can building toilets affect children's growth? World Bank Group.

Mbakaya, B. C., Lee, P. H., & Lee, R. L. T. (2017). Hand hygiene intervention strategies to reduce diarrhoea and respiratory infections among schoolchildren in developing countries: A systematic review. *International Journal of Environmental Research and Public Health, 14*(4), 371.

Ministry of Health and Family Welfare, Bangladesh. (2019). *National strategy for WASH in health care facilities 2019-2023*. Directorate General of Health Services.

Mohammed, G., Nihar, D., Bashayer, A., Hiba, I., Rasha, A., & Zaid, A. (2016). Knowledge and practice of personal hygiene among primary school students in Sharjah-UAE. *Journal of Health Sciences, 6*(5), 67–73.

Mukherjee, A., Sinha, A., Taraphdar, P., Halder, D., Sinha, D., & Sinha, M. (2014). Effectiveness of an educational intervention on personal hygiene among school children in slum area of Kolkata, India. *Journal of Dental and Medical Sciences, 13*(12), 13–17.

National Education Policy 2010. Ministry of Education, Government of Bangladesh.

Nematian, J., Nematian, E., Gholamrezanezhad, A., et al. (2004). Prevalence of intestinal parasitic infections and their relation with socio-economic factors and hygienic habits in Tehran primary school students. *Acta Tropica, 92*(3), 179–186.

Nicolle, L. (2007). Hygiene: What and why? *CMAJ, 176*(6), 767–768.

Nida Ishfaq & Yang Chan. (2022). An analysis of nutritional awareness among diabetic patients. *Dinkum Journal of Medical Innovations, 1*(1), 13–18.

Nomoto, M., Nonaka, D., Mizoue, T., Kobayashi, J., & Jimba, M. (2011). Content analysis of school textbooks on health topics: A systematic review. *BioScience Trends, 5*(2), 61–68.

Nonaka, D., Jimba, M., Mizoue, T., Kobayashi, J., Yasuoka, J., Ayi, I., Jayatilleke, A. C., Shrestha, S., Kikuchi, K., Haque, S. E., & Yi, S. (2012). Content analysis of primary and secondary school textbooks regarding malaria control: A multi-country study. *PLoS ONE, 7*(5), e36629. https://doi.org/10.1371/journal.pone.0036629

Nusrat, S. (2022). Knowledge and awareness of medical students regarding the neglected tropical diseases in Chattogram [Doctoral dissertation, Chattogram Veterinary & Animal Sciences University].

O'Byrne, D., Jones, J., Macdonald, H., & Sen-Hai, Y. (1996). WHO's global school health initiative. *World Health, 49*(4), 5–6.

Park, K. (2002). *Textbook of preventive and social medicine* (23rd ed.). M/S Banarsidas Bhanot Publishers.

Pati, S., Kadam, S. S., & Chauhan, A. S. (2014). Hand hygiene behavior among urban slum children and their care takers in Odisha, India. *Journal of Preventive Medicine and Hygiene, 55*(2), 65–68.

Pengpid, S., & Peltzer, K. (2012). Hygiene behaviour and health attitudes in African countries. *Current Opinion in Psychiatry, 25*(2), 149–154. https://doi.org/10.1097/YCO.0b013e32834fda33

Petersen, P. E., & Kwan, S. (2010). The 7th WHO Global Conference on Health Promotion – promoting health and development: Closing the implementation gap. Oral Health & Preventive Dentistry, 8(3), 183–188.

Plano Clark, V. L., & Creswell, J. W. (2015). Understanding research: A consumer's guide (2nd ed.). Pearson Education.

Prasad, R. K. (2005). School health. *Indian Journal of Community Medicine, 30*(4), 109–110.

Puri, S., & Gulati, N. (2022). School hygiene: A study of select government schools in Delhi. *Towards Excellence, 14*(1), [Pages].

Rahman, M. M., Ali, M. A., Parvez, A., Shahriar, M., Rahman, T., & Shameem, D. (2019). Knowledge and practice of personal hygiene among primary school students in Dhaka, Bangladesh. *Journal of Pharmaceutical Sciences and Research, 11*(9), 3140–3144.

Rahman, M., Karim, R., & Hossain, M. (2019). Impact of school environment on student health in primary schools of Bangladesh: A study on ventilation and sanitation. Bangladesh Education Journal, 18(2), 45–59.

Rajbhandari, A. K., Dhaubanjar, R., GC, K. B., & Dahal, M. (2018). Knowledge and practice of personal hygiene among secondary school students of grade nine and ten. *Journal of Patan Academy of Health Sciences, 5*(2), 107–113.

Sachan, B., Idris, M., Jain, S., Kumari, R., & Singh, A. (2012). Social determinants and its influence on the prevalence of morbidity among adolescent girls. *North American Journal of Medical Sciences, 4*(10), 474.

Save the Children. (2021). Global Humanitarian WASH Guidance 2019–2021.

Shilunga, A. P., Amukugo, H. J., & Mitonga, K. H. (2018). Knowledge, attitudes and practices of primary schools learners on sanitation and hygiene practices. *[Journal]*, [Volume(Issue)], [Pages].

Siddique, A. B., Deb Nath, S., Mubarak, M., Akter, A., Mehrin, S., Hkatun, M. J., ... & Amin, M. Z. (2023). Assessment of knowledge, attitudes, and practices regarding menstruation and menstrual hygiene among early-reproductive aged women in Bangladesh: a cross-sectional survey. *Frontiers in Public Health, 11*, 1238290.

Snel, M., & Shordt, K. (2002). *School water and sanitation towards health and hygiene in India*. Loughborough University Repository.

Stebbins, S., Cummings, D. A. T., Stark, J. H., et al. (2011). Reduction in the incidence of influenza A but not influenza B associated with use of hand sanitizer and cough hygiene in schools: A randomized controlled trial. The Pediatric Infectious Disease Journal, 30(11), 921–926. https://doi.org/10.1097/INF.0b013e3182218656

Sultana, M. S., Razon, A. H., Sarwar, M. T., & Ahmad, T. (2021). Assessment of the prevalence of menstrual complications with knowledge, attitude and practice regarding menstruation of rural girls in Jashore, Bangladesh. *Science, 9*(5), 162–168.

Sultana, N., et al. (2023). Behavioural change in hygiene through participatory school approaches. *Journal of Water and Health*.

Sundell, J., Levin, H., Nazaroff, W. W., Cain, W. S., Fisk, W. J., Grimsrud, D. T., ... & Weschler, C. J. (2011). *Ventilation rates and health: multidisciplinary review of the scientific literature*. Indoor Air, 21(3), 191–204. https://doi.org/10.1111/j.1600-0668.2010.00703.x

Torres, J., & Sá, S. (2021). Health promotion in primary education: How do textbooks foster hygiene and prevention of infections? *ICERI2021 Proceedings*, 9330–9334. https://doi.org/10.21125/iceri.2021.2150

Toyinbo, O. O. (2017). *Indoor environmental quality, pupils' health and academic performance* (Doctoral dissertation, Itä-Suomen yliopisto).

UNESCO. (2000). *Focusing resources on effective school health: A FRESH start to enhancing the quality and equity of education*. https://unesdoc.unesco.org/ark:/48223/pf0000123683

UNESCO. (2016). Education for sustainable development goals: Learning objectives.

United Nations Children's Emergency Fund (UNICEF). (2012). *Water, sanitation and hygiene (WASH) in Schools*.

United Nations Development Programme (UNDP). (2024). *Human development report 2023/24: Breaking the gridlock – Reimagining cooperation in a polarized world*. https://hdr.undp.org/

United Nations Educational, Scientific and Cultural Organization (UNESCO), United Nations Children's Fund (UNICEF), & World Food Programme (WFP). (2023). *Ready to learn and thrive: School health and nutrition around the world* (ISBN 978-92-3-100573-2). https://doi.org/10.54675/DSHQ1076

UNICEF. (2009). Water, Sanitation and Hygiene (WASH) in Schools.

UNICEF. (2012). WASH in schools: A companion to the child friendly schools manual.

UNICEF. (2016). *UNICEF WASH Strategy 2016–2030*. https://www.unicef.org/reports/wash-strategy-2016-2030

UNICEF Bangladesh. (2021). Country Office Annual Report 2021.

Vandegrift, R., Bateman, A. C., Siemens, K. N., Nguyen, M., Wilson, H. E., Green, J. L., … & Hickey, R. J. (2017). Cleanliness in context: Reconciling hygiene with a modern microbial perspective. *Microbiome, 5*(1), 76. https://doi.org/10.1186/s40168-017-0294-7

van Werven, I. (2017). Health and hygiene school program initiative for adolescents in Dhaka, Bangladesh. [Unpublished master's thesis].

Vivas, A., Gelaye, B., Aboset, N., Kumie, A., Berhane, Y., & Williams, M. A. (2010). Knowledge, attitudes, and practices (KAP) of hygiene among school children in Angolela, Ethiopia. *Journal of Preventive Medicine and Hygiene, 51*(2), 73–79.

Waddington, H., Snilstveit, B., White, H., & Fewtrell, L. (2009). *Water, sanitation and hygiene interventions to combat childhood diarrhoea in developing countries: A systematic review*. International Initiative for Impact Evaluation (3ie).

WaterAid. (2020). *State of School WASH*. https://washmatters.wateraid.org/publications

WaterAid & UNICEF. (2018). *Menstrual hygiene matters: A resource for improving menstrual hygiene around the world*. https://washmatters.wateraid.org/publications/menstrual-hygiene-matters

WHO. (2008). The global burden of disease: 2004 update. WHO Press.

WHO. (2009). Hand hygiene: Why, how & when?

WHO. (2016). The situation of water, sanitation and hygiene (WASH) in schools in the Pan European Region.

WHO. (2016). Prioritizing pupils' education, health and well-being: Water, sanitation and hygiene in schools in the Pan European Region.

WHO. (2019). Improving health and learning through better water, sanitation and hygiene (WASH) in schools: An information package for school staff.

WHO. (2019). Surveillance of water, sanitation and hygiene in schools: A practical tool.

WHO. (2019). Water, Sanitation, Hygiene, and Health: A Primer for Health Professionals.

WHO. (2019). School environment: Policies and current status: WHO European Region and overview of selected countries (ISBN 978-92-890-5200-9).

WHO. (2019). Water, sanitation and hygiene in schools: Supplement to the European regional assessment report 2019 (WHO/EURO:2019-3124-43178-60436).

WHO. (2020). *Advice on the use of masks in the context of COVID-19*.

WHO. (2022). *Sustainable development and health: An overview of the European Region* (WHO/EURO:2022-6047-45738-65544; ISBN 978-92-890-5439-3).

WHO & UNICEF. (2000). Global water supply and sanitation assessment 2000 report. WHO Press.

WHO & UNICEF. (2018). Core Questions and Indicators for Monitoring WASH in Schools in the Sustainable Development Goals.

WHO & UNICEF. (2018). *Drinking water, sanitation and hygiene in schools: Global baseline report 2018*. WHO & UNICEF. https://washdata.org/sites/default/files/documents/reports/2018-07/JMP-WASH-in-Schools-ENG-2018.pdf

WHO & UNICEF. (2021). Progress on household drinking water, sanitation and hygiene 2000–2020.

WHO/UNICEF JMP. (2022). Progress on drinking water, sanitation and hygiene in schools: 2000–2021 data update (pp. 6–20).

Worldometer. (2025). Countries in the world by population (2025).