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Evaluation of Water Sanitation and Hygiene Facilities and Practices of Present Status in the Vulnerable Domestic Area: A Study on some selected Areas Mymensingh City of Bangladesh

Touhida Afroj Tani, Md. Rakibul Hassan, Md Shakatul Islam
B.Sc of Environmental Science and Engineering Jatiya Kabi Kazi Nazrul Islam University, Bangladesh
Assistant Professor Department of Environmental Science and Engineering Jatiya Kabi Kazi Nazrul Islam University, Bangladesh
M.Sc of Civil Engineering (Scholar) Technical University of Munich, Germany

Abstract- Mymensingh is the capital of Mymensingh Division in central Bangladesh. Ensuring water sanitation and hygiene in Mymensingh is vital for community health, requiring effective measures and collaboration between authorities, organizations, and residents for sustainable implementation. The objectives of this study were to investigate the water supply and sanitation status of Mymensingh City. Data were collected primarily based on a reconnaissance survey with the help of a structured questionnaire. A cross-sectional survey design was employed to collect data on variables related to water, sanitation, and hygiene in the area. Many homes rely on submersible pumps and deep tube wells for drinking water, while access to piped water is limited. Inadequate water supply and limited access to clean water contribute to waterborne illnesses and negatively impact public health. Sanitation infrastructure in Mymensingh City Corporation varies, with reliance on septic tanks and pit latrines, while limited sewage systems and waste management exist. Inconsistent hygiene practices contribute to waterborne illnesses, highlighting the need for improved infrastructure and behavior change interventions. Improving the drainage system, implementing effective measures for waste management, and promoting hygiene education programs are essential for minimizing waterborne diseases and enhancing residents' quality of life.

Keywords: Water Supply; Sanitation; Hygiene; Waste Management; Sustainable City; Mymensingh City.

I. INTRODUCTION

The city of Mymensingh is in the middle of Bangladesh. It is the capital of the division and district of Mymensingh. The city is on the banks of the Brahmaputra River, which is also called the Jamuna River (Wikipedia 2023). Bangladesh is one of the world's most densely populated countries with 150 million people, 13% of whom live below the national poverty line of US $2 per day (Misha & Munshi, 2016). A lot of people in this country can't read or write. So, they don't know enough about how to plan a family, how to use water and sanitation properly, how pollution affects people and the environment (Roy & Mohanta 2017). Only 47 percent of the total urban population has access to public water supplies and 42 percent to hygienic sanitation (United Nations Children's Fund (UNICEF), 2019). However, poor WASH conditions still account for 842,000 diarrhoeal deaths every year3 and constrain effective prevention and management of other diseases including malnutrition, and cholera (Rana, 2009). Overall, improvements made during the MDG period helped a lot of people make a living and cut

down on the number of diseases caused by unclean WASH (World Health Organization and UNICEF, 2006). About half of its people have one or more diseases or infections that were caused by dirty water or lack of proper sanitation. Still, there are still differences in access to water, sanitation, and hygiene (The Lancet, 2021). Because Asia and the Pacific haven't put enough money into water, sanitation, and hygiene, 1.2 billion people don't have safe water to drink and 2.5 billion don't have safe places to go to the bathroom. We are way off track to meet our commitments for Sustainable Development Goal 6, which is about water and sanitation, on a global scale (Mustafa et al. 2022). To reach the 2030 goals, the rate of progress in sanitation needs to increase by four times. On World Toilet Day, November 19, WHO and UNICEF released the State of Sanitation report. This was made possible by big improvements in water and sanitation. Overall, improvements made during the MDG period helped a lot of people make a living and decreased the number of diseases caused by unclean WASH (WHO, 2018). The goal of the research was to find out how people in Dhopakhola, Kachijhuli, Sarda Ghosh Road, Boundary Road, Horijon Polli, Notun Bazar, Pandit Bari, Khachari Road, Thanaghat, Ampotti, Noumahal, and Nandibari got water and kept themselves clean, as well as to educate the community about safe water and good sanitation.

Objective:

- To access the water sanitation condition of the household area in Mymensingh city and observe the facilities available to them.
- The total sources of drinking and daily usage of water.
- Sanitation infrastructures and their conditions to know the conditions of present hygiene practices.

II. RELATED WORK

Based on the 75th Round National Sample Survey, the study found that there are a lot of diseases related to water, sanitation, and hygiene (WASH) in India. In 2017-18, these diseases were the cause of 5.7% of all outpatient visits and 6.9% of all hospital admissions. Also, factors at the community level were found to have a big effect on how common these diseases were (Sarkar & Bharat, 2021). This things like training programs for safe hygiene practices, encouraging the use of latrines for getting rid of feces, and getting the local government more involved in making the area's sanitation better. (Shaibur, 2019). Even though many students washed their hands with water and soap after using the bathroom (Swain & Pathela, 2016).

Only 60.7% of households had basic sanitation, and only 56.3% had the right facilities for hygiene (Ahmed et al. 2021). Among all 64 districts of Bangladesh, comparatively lower coverage of WASH facilities in the South and South-East regions and relatively higher in the households of the North and North-Western regions (Bangladesh Bureau of Statistics (BBS) and UNICEF Bangladesh, 2014). The North and North-Western regions have more WASH facilities. (Ahmed et al. 2021). Approximately 56% of the respondents reported being affected by diarrhoea (Rana & Ghosh, 2016). Based on the study's findings, it was recommended to establish strict environmental monitoring of the sanitation system to minimize potential environmental impacts. (Badhan et al, 2017)

The study reveals that a significant proportion of households in Pakistan experience deprivation in one or more dimensions of WASH poverty (Qurat-ul-Ann & Bibi, 2022). The incidence of multidimensional hygiene poverty is found to be 54.6 percent, indicating that a significant portion of households struggle with maintaining proper hygiene practices in relation to both food and personal cleanliness (Qurat-ul-Ann & Bibi, 2022). The availability of WASH and HCWM services was examined based on facility locations, types, and managing authorities (Meshi et al. 2022). The study emphasizes the need for a multifactorial approach to address the identified determinants of WASH access, including addressing socioeconomic disparities and geographical variations, to ensure equitable access to WASH services for all households in Benin. (Gafan et al. 2022). The study emphasizes the importance of policy interventions to address these challenges and meet the needs of climate migrants in urban slums, improving their living conditions and enhancing their livelihood prospects. (Khan, 2022).

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III. METHODOLOGY

Water, sanitation, and hygiene are essential elements for ensuring public health and well-being in any community. In Mymensingh, a household area with its unique characteristics, a comprehensive methodology for water sanitation and hygiene is vital to safeguard the health of its residents and prevent the spread of waterborne diseases. A cross-sectional survey research design was adopted in the study. A cross-sectional survey is relatively quick, easy, and cheap to perform. Again, a cross-sectional survey is good for descriptive analysis and data generation. Data on all variables are collected once and multiple outcomes can be studied.

Study Area

Mymensingh is a city located in central Bangladesh, about 120 kilometers north of the capital city, Dhaka. Mymensingh municipality had an estimated 2018 population of 471,858 in an area of 91.315 square kilometers (35.257sq mi). The district of Mymensingh is situated between 24°02′03" and 25°25′56" North latitude and 89°39′00" and 91°15′35" East longitude. Mymensingh city is clearly marked by the old Brahmaputra River flowing along its north (Wikipedia, 2023). The study area Dhopakhola, Kachijhuli, Sarda ghosh road, Boundary Road, Horijon Polli, Notun Bazar, Pandit Bari, Khachari Road, Thanaghat semi-slum, Ampotti, Aqua Hajibari, Noumahal, Nandibari is located under the Mymensingh municipality and ward no 7, 8, 10, 11, 13.

Data Collection Method

The survey was conducted among 100 households selected randomly in Mymensingh Municipality. The respondents were of different ages, financial backgrounds, and professions.

There are two types of processes in data collection. These are,
1) Direct data collection method and
2) Indirect data collection method.

Table 1 Socio Economic Condition of Mymensingh City.

Ward	13 No. ward	10 no Ward	08 no Ward	07 no Ward	11 no Ward
Total Population	(Approx.) 18476	(Approx.) 15680	(Approx) 17890	(Approx.) 13480	(Approx.) 16550
Major Profession	Service holder, Government employee, garment worker, small traders etc.	Vendor, Labor, Garments worker, Service holder, small traders etc.	Service holder, Auto drivers, daily workers, maid, small traders etc.	Service holder, auto driver, bus drivers, daily workers, employee, garment worker etc.	Service holder, government employee, garment workers, daily labours, maid, small traders etc.
Income Monthly BDT Range	20000 - 40000	15000-30000	15000-30000	15000-30000	18000-30000
House Rent BDT Range	5000-10000	4000-8000	2000-6000	2000-5000	5000-8000
Latrine Type	Septic Tank, Pit Latrine, Sewage System	Septic tank Pit latrine Sewage system	Septic tank Pit latrine Sewage system	Septic tank, Pit latrine Sewage system	Septic tank, Pit latrine Sewage system
Drainage system	Poor	Poor	Poor	Poor	Poor
Road Condition	Concrete Road	Pavement	Concrete Road	Pavement	Pavement
Waste Disposal	Drain	Drain, Scattered everywhere	Drain	Drain	Drain and waste bin

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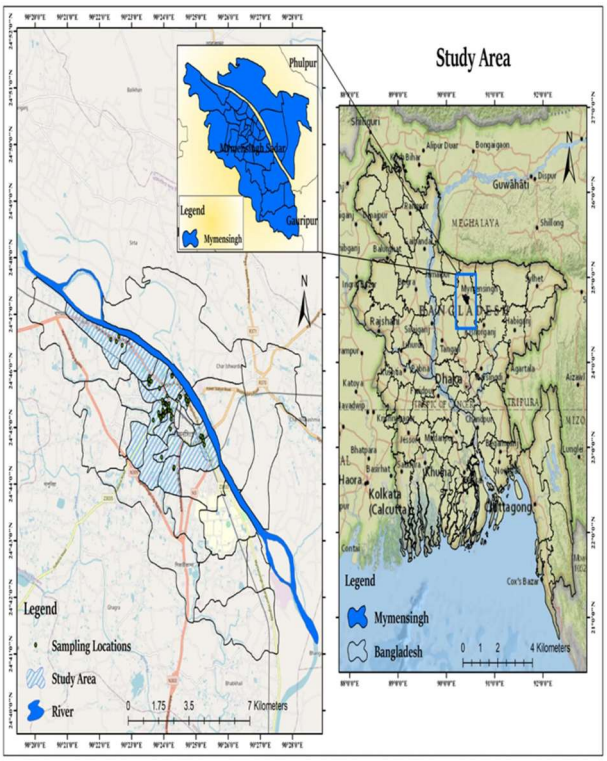

Fig-1: Map of Mymensingh City and plotting the coordinates by GIS.

Direct Data Collection Method

In this direct method, we create a questionnaire survey list for counting the opinion of local area people of selected survey areas. We are visiting the area and talking to the slum people to know their present condition of water sources, drinking water condition, sanitary type, sanitary facilities, drainage system, waste management system, hygiene, and knowledge about healthy sanitation. After collecting the data, we analyzed the data for results and try to find out a difference between those area facilities and the problem.

Indirect Data Collection Method

Before doing the direct data collection method we visit the slum area to know their condition and how many facilities are present in those slum areas. We collected some informal data from the local people of the slum area. We looked out at the drainage system, drainage facilities, sanitary condition, and overall, briefly the slum area. Then we created the questionnaire survey list based on this observation.

IV. RESULT & DISCUSSION

Mymensingh City Corporation is a fast-expanding metropolitan area that faces major difficulties in providing adequate water sanitation and hygiene practices. For the maintenance of public health and the prevention of waterborne infections, access to clean drinking water, appropriate sanitation systems, and hygiene behaviors are essential. However, these fundamental services are frequently jeopardized in many metropolitan contexts, including Mymensingh, which has a negative impact on health.

Water Sources Result

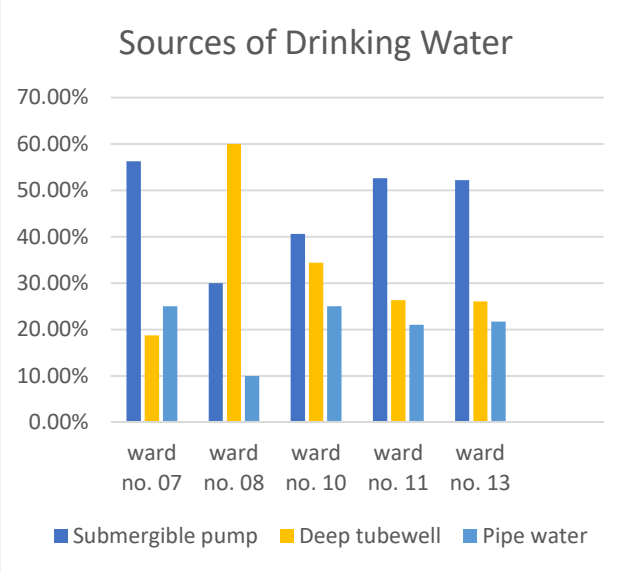

Fig - 2: Sources of Drinking Water.

The highest proportion of homes (56.25%) are using submersible pumps as a source of drinking water in Ward No. 7 whereas Ward No. 11 has the second-highest percentage (52.63%), which is slightly higher than ward no.7. However, in Ward no. 13 submersible pumps are also the primary source of water for a sizeable majority (52.17%) of the residents in this ward. On the other hand, ward no.8 has the lowest number of submersible users which is (30%) but 40% of homes depend on the submersible pump in ward no. 10.

Ward No. 08 only (10%) of the homes here have access to a water source that is piped. In Ward No. 10, like Ward No. 8, 25% of the houses in this ward

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have access to piped water. Wards 7, 11, and 13 all contain some homes (21.05% to 25%) that depend on piped water.

Overview of Sanitation Infrastructure

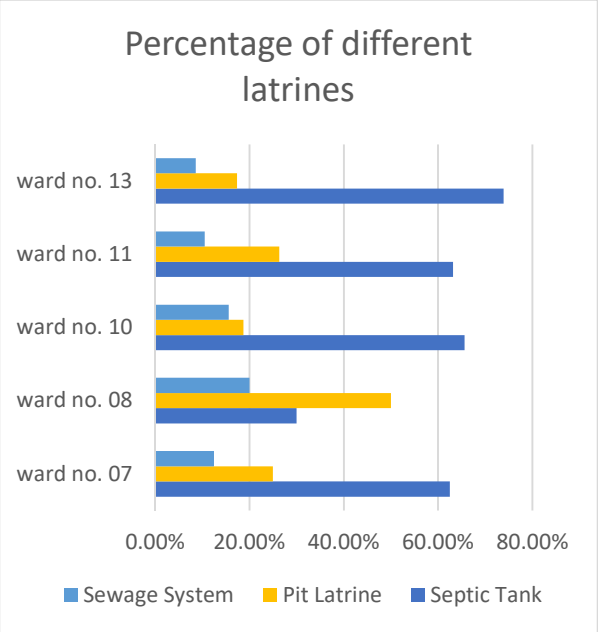

Fig - 3: User Percentage of Different Latrines.

The information shows how various sanitation infrastructure alternatives are distributed throughout the various Mymensingh City Corporation wards.

Most homes (62.50%) in ward no. 7 rely on septic tanks for their sanitation system. This suggests that this ward has a substantial reliance on septic tanks for the disposal of garbage. In ward no. 10 septic tanks are used by the majority (65.62%) of homes in this ward, indicating a comparable reliance on this sanitation choice. A significant majority (63.15%) of homes in ward no. 11 also use septic tanks to dispose of their garbage.

Overall, the data shows diverse sanitary infrastructure distribution patterns among Mymensingh City Corporation wards. Another area with many septic tank-using families is Ward No. 13 (73.91%). In Wards No. 08 and 11, pit latrines are often used, and a sizeable fraction of households rely on them.

Distance from water source to sanitation facilities

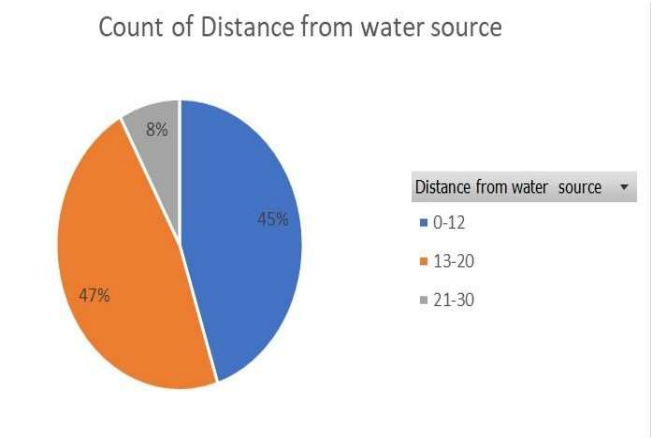

Fig - 4: Distance from Water Source to Sanitation Facilities.

Most cases (47%) occur between 13-20 feet from the water source. This implies that a sizeable number of people or places are situated within a reasonable distance of the water source. There are 45% in the 0–12 feet range from the water source. This suggests that a significant portion of people or places are located within a short distance of the water source. The lowest count is 8% when the distance from the water source is between 21 and 30 feet. This analysis suggests that most people or places are concentrated within a moderate distance of the water source, with fewer instances found at shorter or farther distances.

Overview of Hygiene Result

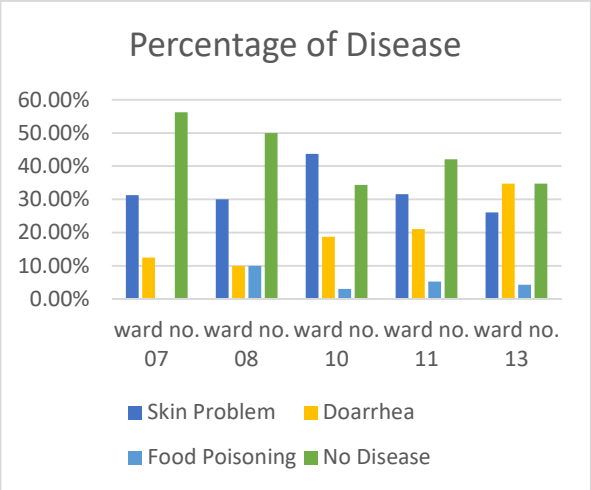

Fig - 5: Percentage of Diseases in Study Area.

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The bar chart represents the data analysis of health problems in the Mymensingh City Corporation's different wards.

Most cases of "No Disease" (56.25%) are reported in Ward No. 07 as a health condition. This shows that most people in this ward do not have any specific illnesses. "Skin Problem" is the second most common condition, with a prevalence rate of 31.25%. This can be a sign of a nearby problem with skin health. It's important to note that no cases of "food poisoning" and only a tiny fraction of cases (12.50%) reported "diarrhea".

Overall, the data analysis reveals variances in the distribution of health issues among various wards. The frequency of "No Disease" is shown in most wards, however, there are variations in the incidence of "Skin Problems," "Diarrhea," and "Food Poisoning" among them. These results may be helpful in identifying possible health problems in certain regions and in allocating necessary healthcare resources to successfully address them.

Impact of Public Health

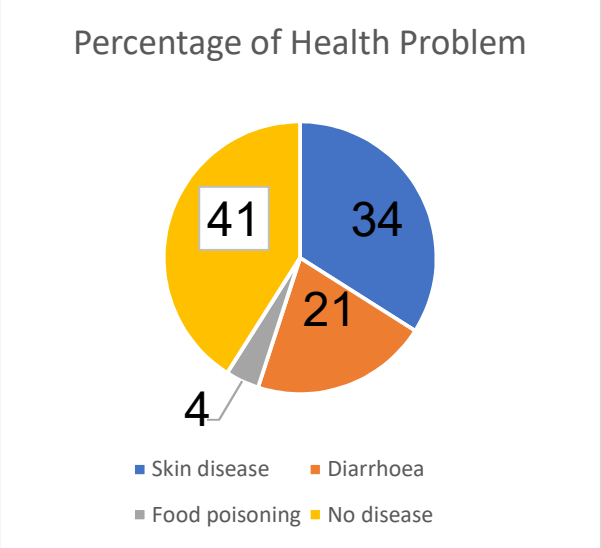

Fig - 6: Percentage of Health Problems in Mymensingh City.

Mymensingh City Corporation reported 34% of cases of skin diseases. Dermatitis, eczema, fungal infections, rashes, and other conditions that are related to skin diseases are just a few examples. These illnesses could be brought on by several things, including allergies, infections, environmental factors, or poor hygiene. 21% of diarrhea was reported in the Mymensingh City Corporation region. There have been four cases of food poisoning that have been reported. Consuming contaminated food, frequently because of improper handling, storage, or preparation, results in food poisoning. Gastrointestinal distress, vomiting, and diarrhea may result. The dataset shows that 41% of people reported having no disease. This group of people is made up of people who do not currently have any of the health problems mentioned in the dataset.

Analysis of Hygiene Message Data

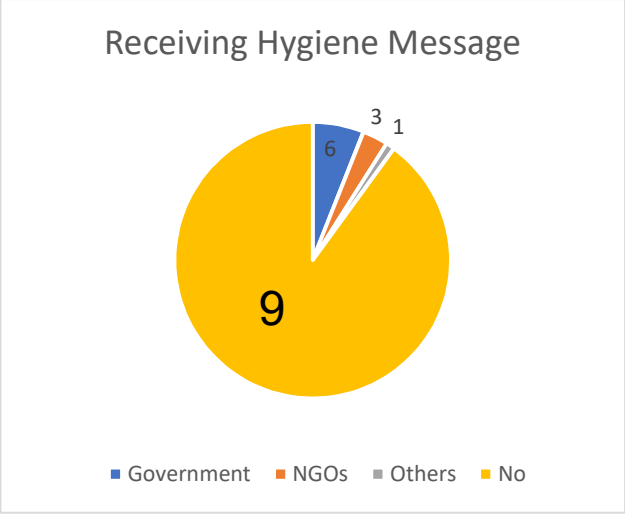

Fig - 7: Receiving Message about Hygiene Concern.

The fact that 90% of respondents said they had never seen a message about hygiene shows that there is a big gap in the public's knowledge and education about how to stay clean. To close this gap, government agencies, NGOs, private organizations, community leaders, and other stakeholders need to work together to make hygiene campaigns that cover a lot of ground. These campaigns should focus on making hygiene messages reach and affect more people, getting people to change their habits, and improving public health.

V. CONCLUSION & RECOMMENDATIONS

Recommendations

Despite the progress made, there is still a lack of coverage of households with Water, sanitation, and hygiene (WASH) interconnected and crucial for

promoting public health and preventing the spread of diseases. Here's an overview of each component:

Water

Key considerations include:

- **Availability of reliable water sources:** Assess the availability and accessibility of water sources, such as piped water, wells, boreholes, or water trucking. The source of water for the people of the Dhopakhola area is coming from the City Corporation supply, which is very close to the supply of water pipes and drainage system.
- **Water quality:** Evaluate the safety of the water supply, ensuring it is free from microbial, chemical, and physical contaminants that can pose health risks.
- **Education and Awareness:** Stay informed about local water quality issues, regulations, and recommendations provided by your local health department or water authority.

Sanitation

Sanitation refers to the safe disposal of human waste and the provision of hygienic toilet facilities. Key aspects to consider include:

- **Toilet facilities:** Evaluate the availability, accessibility, and condition of toilets or latrines. Assess if they are appropriate for different age groups, genders, and people with disabilities.
- **Sewerage systems:** Assess the presence and functionality of sewerage systems, including sewage networks, treatment plants, and safe disposal of wastewater.
- **Open defecation:** Determine the prevalence of open defecation and its associated health risks. Encourage the adoption of safe and hygienic toilet practices.

Hygiene

Hygiene practices play a crucial role in preventing the spread of diseases. Key areas of focus include:

- **Handwashing:** Evaluate the availability and accessibility of handwashing facilities with soap and water. Assess the knowledge and practice of proper handwashing techniques among the population.
- **Personal hygiene:** Assess practices related to bathing, dental hygiene, menstrual hygiene management, and general cleanliness.
- **Hygiene awareness and behavior change**: Evaluate the level of awareness and understanding of hygiene practices within the community. Identify opportunities for promoting behavior change through education and awareness campaigns.

Conclusion

The result showed that most of the residents of Mymensingh City had access to surface and underground water supply. About half of the people used submergible pump water and one-third of people used deep tube well water and others used supply piped water etc. for their daily uses. Some owners of apartment buildings in Mymensingh have their own submersible pumps. Access to clean and safe drinking water, proper sanitation facilities, and the promotion of good hygiene practices are crucial in preventing the spread of diseases, reducing mortality rates, and enhancing the overall standard of living in the residential areas of Mymensingh.

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