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**Rural Water Supply, Sanitation and Hygiene in  
Bangladesh: An Investigation of Lohagara Upazila**

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# **Rural Water Supply, Sanitation and Hygiene in Bangladesh: An Investigation of Lohagara Upazila**

**Tawhidul Islam, Ohidul Alam, and Khaled Misbahuzzaman\***

## **Abstract**

In Lohagara Upazila and other rural areas of Chittagong, a few NGOs have been working to resolve water, sanitation and health (WaSH) problems. But it is still an issue of unresolved dearth of education and sufficient lucre. This paper is based on a survey of 72 rural families that were selected randomly in two unions of Lohagara Upazila to explore the current status and adopted measures. It appears that about one quarter of rural people are deprived of safe drinking water. Among other sources, they utilize pond water, which typically is polluted by micro-organisms and other impurities. Access to sanitary latrines is also low. Only 12.5 percent of the 24 lower class families use sanitary latrines (SLs), mostly because they cannot afford to utilize SLs. Even among the 24 middle class families, half do not use proper latrines. Both government and NGOs should come forward to support these rural people and reduce their problems, which have negative implications on the whole country.

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## **I. Introduction**

Bangladesh is one of the most densely populated countries in the world with around 166 million people in an area of 147,570 square kilometer (Bangladesh Bureau of Statistics (BBS), 2011). Administratively, it is divided into 8 divisions, 64 districts, and 11 city corporations, 223 municipalities, 500 upazilas (sub-cities), 509 thanas (sub-areas of districts), and 4451 unions. Amid them more than 76 percent of the population live in rural areas. Around 18 percent of the rural people are classified as hard-core impoverished (they have a daily intake of less than 1,805 kcal/person), while 40 percent are classified as destitute (with a daily intake of less than 2,122 Kcal/person) (BBS, 2007).

Poverty and an agile population growth, combined with traditional drinking water from open ponds and scanty sanitary practices, contributed in the 1960s and 1970s to an apical level of water related morbidity and mortality, especially in rural areas. The country is also vulnerable to natural disasters that wreak havoc on life and livelihood of the citizens and put tremendous pressure on its economy. Nevertheless, Bangladesh has emerged as the leader in experimenting and implementing innovative approaches to rural sanitation in Asia during the last two decades. The vision of the 1998 Bangladesh National Policy for Safe Water Supply and Sanitation (NPSWSS) is to upgrade the standard of public health and to safeguard the environment (Government of Bangladesh (GoB), 1998).

The significance of modernized water supply, sanitation and hygiene (WaSH) is recognized by the inclusion of specific targets for WaSH in the Millennium Development Goals (MDGs). The GoB has adopted the goal of achieving universal sanitation by 2010, five years ahead of the usual 2015 deadline (BBS-UNICEF, 2007). A Sector Development Framework (SDF) was established in May 2004, and a National Sanitation Strategy (NSS) was approved in February 2005. Likewise, grassroots initiatives have been initiated by civil society and non-governmental organizations (NGOs), complementary to Government initiatives.

The NPSWSS provides for ‘safety-nets’ for hard-core poor in conjunction with reducing subsidies over time, which have been translated into operational guidelines for pro-poor strategies for the (WaSH) sector, issued in February 2005 (GoB, 2005). The basic minimum sanitation service level is defined as one hygiene latrine per household. Except for community latrines, which are subsidized with 80 percent, no subsidies exist for household level sanitation. However, local bodies are expected to spend 20 percent of the Annual Development Plan (ADP) allocation in the vicinity of sanitation facilities for hard-core destitute, women and disabled, and can be used for hard as well as soft activities. Furthermore, the Department of Public Health Engineering (DPHE) is still implementing a sanitation program involving subsidies (UN, 2006).

As recognized in the 1998 NPSWSS, water is indispensable to all forms of life but is polluted in various ways which is very risky not only for human beings but also for all living organisms. But, conventional sanitation methods continue to pollute the environment through the improper disposal of waste. Solid wastes management (SWM) is thought-out to be one of the immediate and serious environmental dilemmas in Bangladesh. Yet, environmentally safe SWM is very costly.

The government expected to attain the target of safe water for all by 2011 and the target of sanitation for all by 2010. Bangladesh has been approaching the safe water goal, with 97 percent

of the people having access to pathogen free water. But arsenic contamination presents a second generation challenge which has drastically reduced safe water availability to 80 percent in urban and 70 percent in rural areas. On the other hand, sanitation coverage was 84-97 percent and 86 percent in town and countryside accordingly (GoB and UNICEF, 2004). But progress has been slow with regards to water supply and sanitation in inner-city slums and with regards to providing safe water in arsenic contaminated areas (Ahmed, 1999). Providing an appropriate cost effective and sustainable arsenic mitigation technology poses a big challenge for the sector. Simultaneously, finding and popularizing alternative water sources, rain water harvesting and practicing sustainable surface water are progressing at a slow pace because of organizational shortcomings, inadequacies and dearth of public awareness (GoB and UNICEF, 2004).

The advancement in outland sanitation was rather creeping during the 1980s and 1990s. The sanitation coverage growth quota was merely 1 percent per annum. In 2003, the rural sanitation coverage was only 29 percent (GoB, 1998) though the government was committed to achieve 100 percent sanitation by 2010. Further, in 2003, the government initiated a National Sanitation Campaign in a coordinated way together with DPHE, Local Government Engineering Division (LGED), and the local governments, the government's administrative units in upazilas and districts, and NGOs (Quazi, 2003). Thereto, the government declared the target of providing sanitation to 100 percent of the population by 2010. There has been unprecedented achievement in sanitation coverage over the subsequent years. By June 2008, the provincial sanitation inclusion had accelerated to about 87.5 percent.

This paper examines the access to safe water and sanitation of 72 families in rural areas of Lohagara Upazila. Following this introduction, section II describes the methodology of the study, while section III summarizes some NGO activities and achievements in WaSH in the survey area. Section IV reports the results and provides some discussion, while the last section (section V) provides some conclusions.

## **II. Methodology**

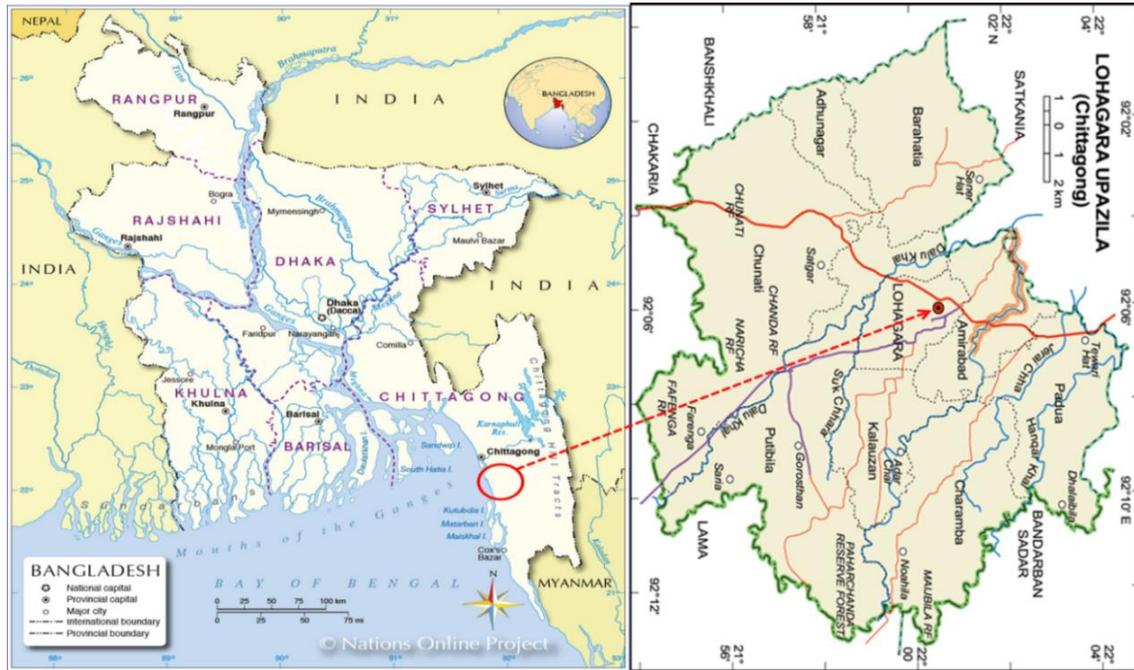
### **II.1. Background of the Survey Area**

Our research area, which are two unions (Adhunagar and Barahatia) in Lohagara Upazila,<sup>1</sup> is close to the Chunati Wildlife Sanctuary (CWS). CWS is a protected area of nearly 7,764 hectares (30 square miles) by the International Union for Conservation of Nature (IUCN). Around 1,500 households from 60 communities are directly or indirectly dependent on the sanctuary. But most of them are destitute and illiterate. Consequently, they have been indiscriminately annihilating their life-guard forest (IPAC, 2010) until various more recent efforts and projects have caused positive changes (Kabir, 2013). Lamentably, progress in the WaSH sector is very creeping compared to demand.

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<sup>1</sup> Lohagara Upazila is situated between Chittagong and Cox's Bazar districts. It lies between 22.0083° N latitude and 92.1056° E longitude (see Figure 1). It has 33,981 units of households and a total area of 259 square km (100 square miles). Noted canals are Tonkaboti, Dolu and Hangor. Lohagara Thana was turned into an upazila in 1983. The upazila consists of 9 union parishads, 40 mouzas and 43 villages.

**Figure 1: Sketch of Survey Area (Marked by Red Colored Circles)**



Source: Created by authors based on maps provided by Banglapedia (2010).<sup>2</sup>

## II.2. Collection of Background Information

Relevant literatures in the form of journals, books, articles, and reports, both published and unpublished, were reviewed to find the key research gaps. Some unimagined issues were also included into the questionnaire after initial surveys. Likewise, a lot of information from NGOs working in survey areas was assembled, including information on obstacles which they face on a daily basis to accomplish their projects. Giving emphasis to their programs and the native people's daily disputes, we report on available drinking water sources of rural people who are deprived of safe drinking water. We also achieved manifold data and guidelines from NGOs how to direct our research to reach the expected goals. Latter, we searched for more studies from other emerging nations and advanced countries to compare and to build a suitable plan including questionnaire design.

## II.3. Design of Questionnaire Structure and Sampling

Taking into account the vision of the study, a semi-structured questionnaire was designed to obtain data and information about different aspects of water and sanitation issues. Among the nine unions within Lohagara Upazila, two were randomly chosen: Adhunagar and Barahatia. Then, following simple random sampling, 3 wards were selected from each of the two unions. From every ward, 12 households were chosen, four for each of the following three income levels:

<sup>2</sup> See [http://en.banglapedia.org/index.php?title=Main\\_Page](http://en.banglapedia.org/index.php?title=Main_Page) for further information.

- lower class families (monthly income between Taka 4,000-6,500/month),
- middle class families (Taka 6,500-12,000/month), and
- upper class families (more than Taka 12,000/month).<sup>3</sup>

Hence, a total of 72 families were chosen, 24 lower class families, 24 middle class families, and 24 upper class families.

#### **II.4. Sorting and Analysis of Data**

Out of the congregated data and facts only the relevant ones were included here to avoid unnecessary bulk of the paper. Intensive care has been taken in respect of applicability, reliability and validity of results. We then put the data into a MS-Excel sheet and analyzed the data statistically as well as created graphical illustrations.

### **III. NGO Activities and Achievements**

Many people in-and-around the CWS are sabotaging the forest inclusion biodiversity at an alarming rate. Consequently, they are fabricating a threat for their own survival. But they have no knowledge about this threat due to poverty and illiteracy. To establish alternate income generation paths amidst CWS dependent people and to restore the CWS, a few NGOs are implementing some projects which include the confirmation of WaSH rights of the CWS's surrounding rural people.

In collaboration with the Bangladesh Forest Department, the Society for Health Extension and Development (SHED) has commenced a project entitled 'Livelihood Development of Forest Dependent Communities in-and-around Chunati Wildlife Sanctuary (LDFC-CWS)' in January 2012, funded by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ, the German Federal Enterprise for International Cooperation). They are attempting to divert 1,500 forest dependent families to alternate income sources. They provide interest free loans, sanitary latrines, improved stoves, tubewells, and some agricultural ingredients for their survival and an improvement of their living status (Kabir, 2013).

With financial support of USAID, Integrated Protected Area Co-management (IPAC) has completed a project on the same issues and has achieved a few successes (IPAC, 2010). Furthermore, at about the same time the IPAC project was running, another NGO, named NISHORGO, conducted their project in the same boundary and brought a few improvements for forest dependent people's living condition. Likewise, BRAC is also working to remove rural people's WaSH and livelihood dilemmas and has made many improvements. Finally, in 2013 an NGO-project named Climate Resilient Ecosystems and Livelihoods (CREL) has begun some projects around the CWS boundary.

### **IV. Results and Discussion**

#### **IV.1. Sources of Daily Water Supply**

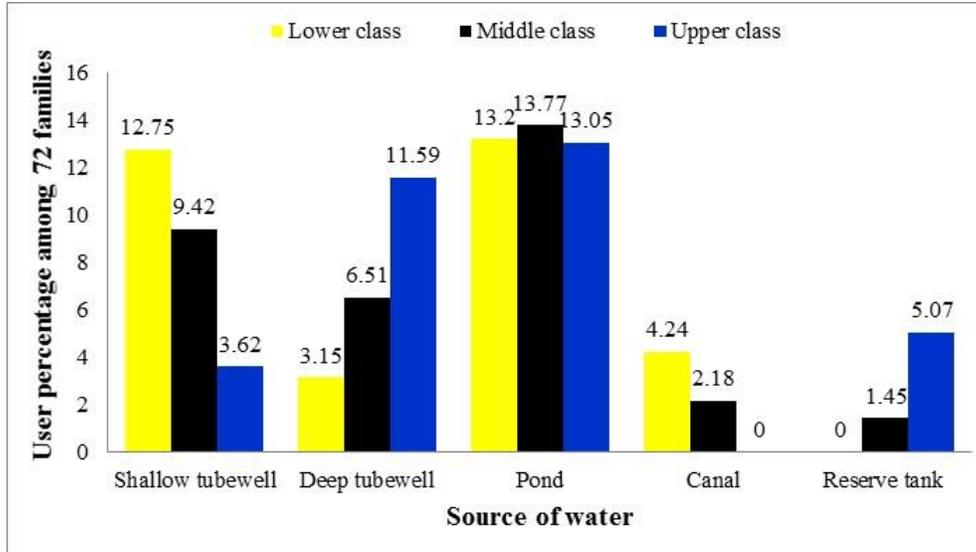
Up-to-date investigation represents that different tiers of water sources had been utilized by the rural people for various purposes other than drinking water, which are shallow tubewell, deep

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<sup>3</sup> At the time of the survey, 1000 taka were about US\$13.

tubewell, pond, canal/river and reserve tank. As Figure 2 shows, while ponds are the predominant source of water supply for all three classes, the second most prominent water source for the lower and middle classes are shallow tubewells, while the safer deep tubewells are the second most prominent water source for the upper class families. None of the lower class families get their water sources from reserve tanks. On the other hand, none of the upper class families get their water sources from canals.

**Figure 2: Different Sources of Water Extraction in Rural Areas of Lohagara Upazila**



Source: Created by the authors based on survey data collection.

Most of the lower income families are day laborers. As the monthly income of lower class families are very low, they cannot set up deep tubewells privately. Most of the middle class families are petty traders and government clerks/staffs/officers. As their monthly salary is moderately eminent, they can setup a tubewell without too much trouble. Moreover, one or two families sometimes adopted a tubewell together. The upper class families can comfortably install a tubewell and nearly ten percent even use reserve tanks.

#### IV.2. Sources of Drinking Water

There were four sources of drinking water among the 72 families included in the survey: shallow tubewell water, deep tubewell water, pond water and reserve tank water. Ponds and shallow tubewells are not considered to be safe drinking water sources. Pond water is adulterated by mixing with various micro-organisms. In the interim flood, pond water is fully contaminated by canal or agricultural water flow accompanying dust, wastes, and pesticides.

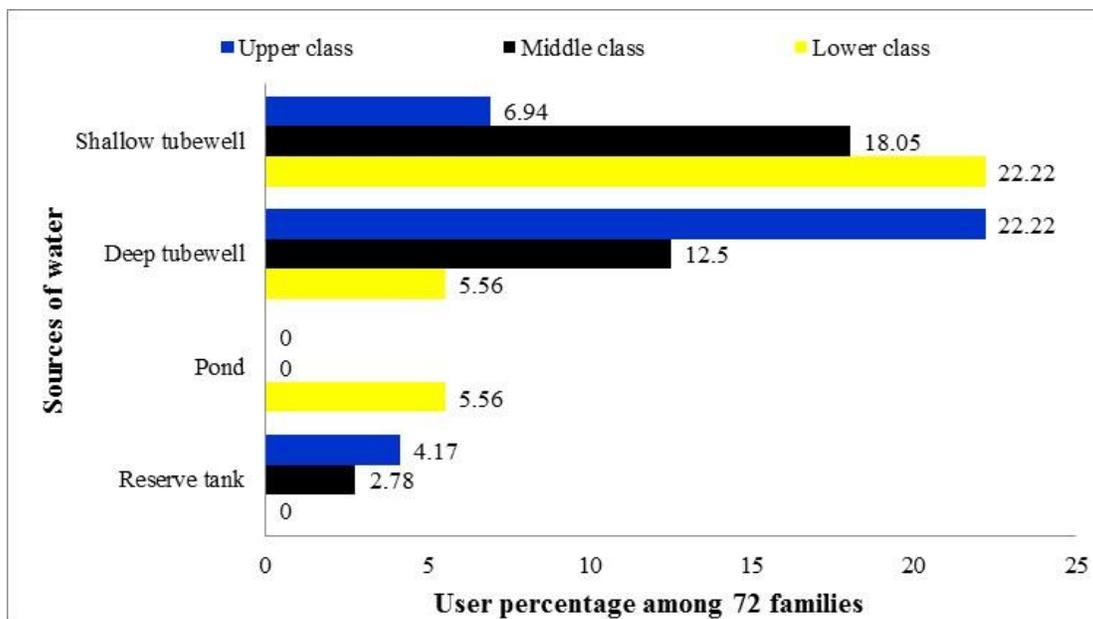
As Figure 3 shows, among the 72 families surveyed, 22 percent are lower class families that get their drinking water from shallow tubewells water, 5.6 percent are lower class families that get their drinking water from deep tubewells water, and another 5.6 percent are lower class families

that get their drinking water from ponds. There are no lower class families that have access to reserve tank drinking water.

Among the 33.3 percent of middle class families, 18 percent get their drinking water from shallow tubewells, 12.5 percent from deep tubewells, and 2.8 percent from reserve tanks. Among the 33.3 percent of upper class families, nearly 7 percent get their drinking water from shallow tubewells, 22 percent from deep tubewells, and 4.2 percent have reserve tanks for their drinking water (figure 3).

To certify pure drinking water to destitute rural people, DPH and some NGOs are providing tubewells in rural areas. Around 10 lower class families typically share one tubewell. With regards to middle class families, as their income levels are better than the lower class, they can more easily establish a tubewell. Sometimes two or three middle income families share one tubewell. In upper class families, every family had a personal tubewell since their earning level was very satisfactory. They also adopted reserve tank water, which was absent in impoverished class family. Most of the higher class family exercises safe drinking water.

**Figure 3: Sources of Drinking Water in Rural Areas of Lohagara Upazila**



Source: Created by the authors based on survey data collection.

### IV.3. Distribution of Different Sorts of Latrines

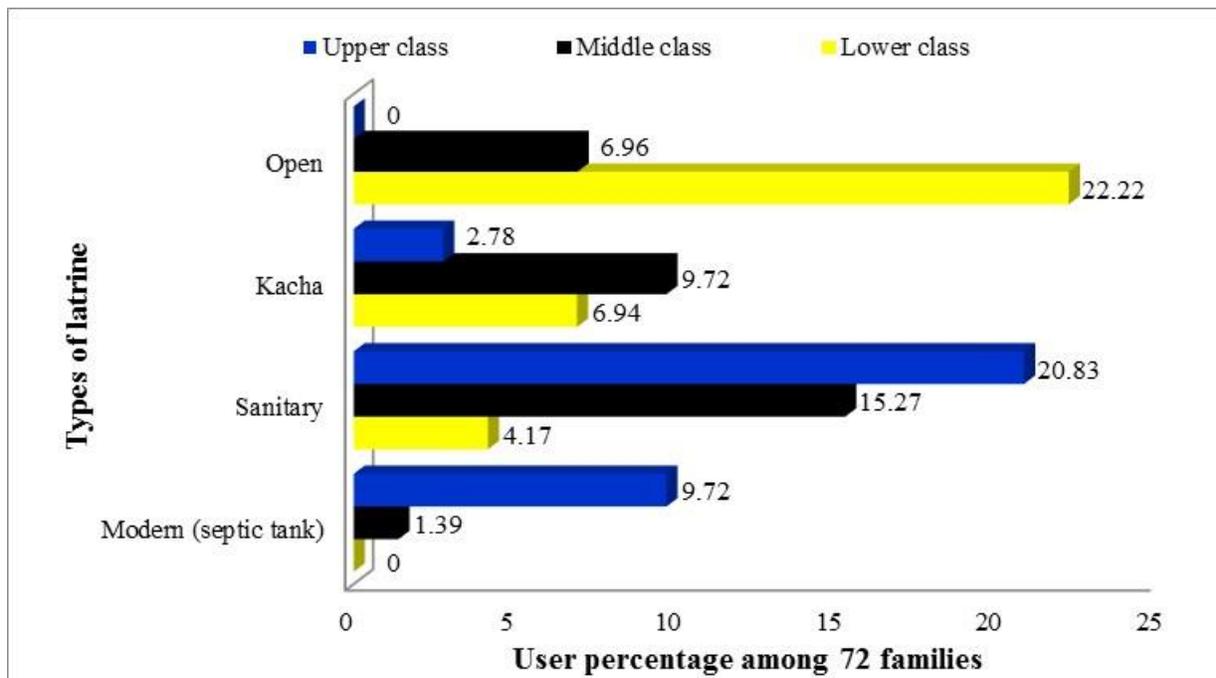
Not only in Bangladesh but also in the entire Indian subcontinent, latrine facilities are quite unsatisfactory, despite that it has been recognized by now that sanitary latrine usages are a precondition for a safe environment and human health. The four types of latrines used in the survey area are modern sanitary latrines (having a septic tank), other sanitary latrine, kacha (a simple latrine made of bamboo, tin and polythene), and open latrines on fallow land or roadsides.

Most of the illiterate people and children use open places as substitute for toilets which is responsible for spreading diseases among surrounding people. Though the situation is gradually changing due to increasing literacy rates and growing awareness, the use of proper latrines is still very low among lower class families.

As detailed in Figure 4, among the 24 lower class families, 16 families (67 percent of lower class families, or 22 percent of the total 72 families) use open latrines, 5 families (21 percent of lower class families, or 7 percent of the total 72 families) use kacha, and only 3 families (12.5 percent of lower class families, or 4.2 percent of the total 72 families) use sanitary latrines. None of the lower class families used modern sanitary latrines with a septic tank. This is largely due to the very low level of wages and that they have no ability to set up a sanitary latrine. The Department of Public Health (DPH) and NGOs are providing some sanitary latrines among the rural destitute people, which is however not sufficient.

The income and education levels of the middle class families is moderately better than those of the lower class families. Therefore, they are more aware than the lower class families about the impact of sanitation on health, and they are trying to use sanitary latrines instead of practicing poor quality kacha latrines or open latrines. Among the 24 middle class families, 5 families (21 percent of middle class families, or 7 percent of the total 72 families) use open latrines, 7 families (29 percent of middle class families, or 9.7 percent of the total 72 families) use kacha, 11 families (46 percent of middle class families, or 15 percent of the total 72 families) use sanitary latrines, and one family (4.2 percent of middle class families, or 1.4 percent of the total 72 families) use modern sanitary latrines with septic tanks.

**Figure 4: Type of Latrines in Rural Areas of Lohagara Upazila**



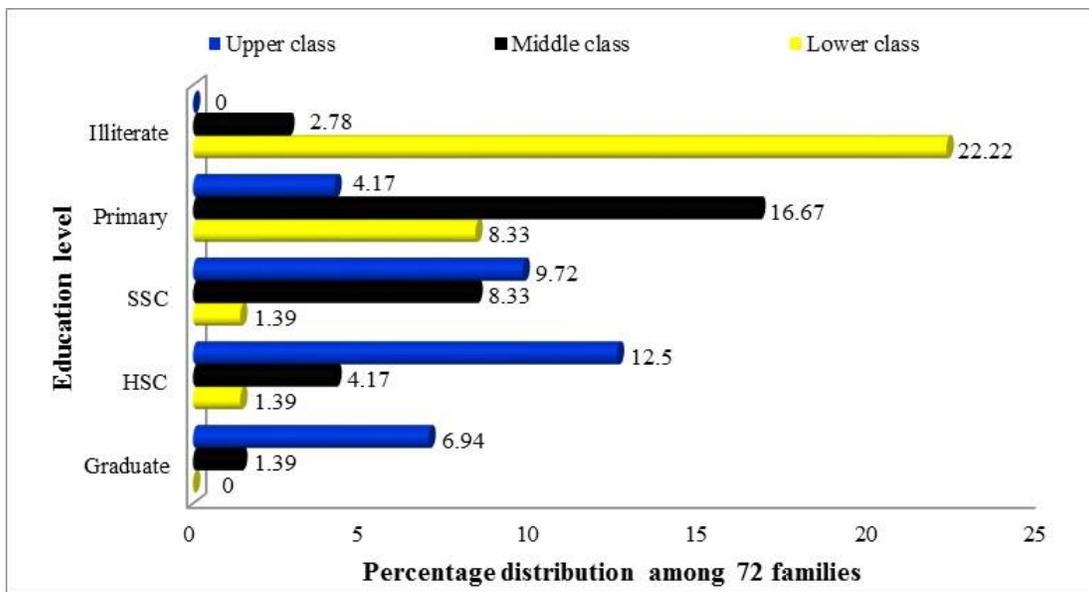
Source: Created by the authors based on survey data collection.

Among the 24 upper class families, 2 families (8 percent of upper class families, or 2.8 percent of the total 72 families) use kacha, 15 families (63 percent of upper class families, or 21 percent of the total 72 families) use sanitary latrines, and 7 families (29 percent of upper class families, or 9.7 percent of the total 72 families) use modern sanitary latrines with septic tanks. There was no use of open latrines among the upper class families, which is due to higher level of literacy and higher income levels that are sufficient for installing sanitary latrines. Furthermore, in many such families, there are some family members working in high or middle income countries, which allows them to send back remittances. With this remittances, they can lead a comfortable life and they are also more alert about the impact of sanitation on health and the environment. Consequently, they are interested to pay more for better sanitation and hygiene, as well as for daily consumption and comforts. In this regard, the upper class families are contributing more than the other families to protecting the environment.

#### IV.4. Education Levels

Education can result in dramatic improvements in life style and health. But education levels are not satisfactory in the whole country, and education levels are worse in rural regions, including coastal areas and hills. As shown in Figure 5, among the 24 lower class families (which represent 33.3 percent of all families), 16 families (22 percent) were illiterate, 6 (8.3 percent) had a primary level education, one family (1.4 percent) had a Secondary School Certificate (SSC), and one family (1.4 percent) had a Higher Secondary School Certificate (HSC) level (1.39 percent) (figure 5). There were no graduate level families in the lower class families. As their livelihood level is minor, they had a pressure to earn income from early childhood. Hence, they could not to go school or if they would have gone, they would have left school within primary levels. Extreme poverty and lack of awareness are the main reasons for their low education level.

**Figure 5: Education Levels in Rural Areas of Lohagara Upazila**



Source: Created by the authors based on survey data collection.

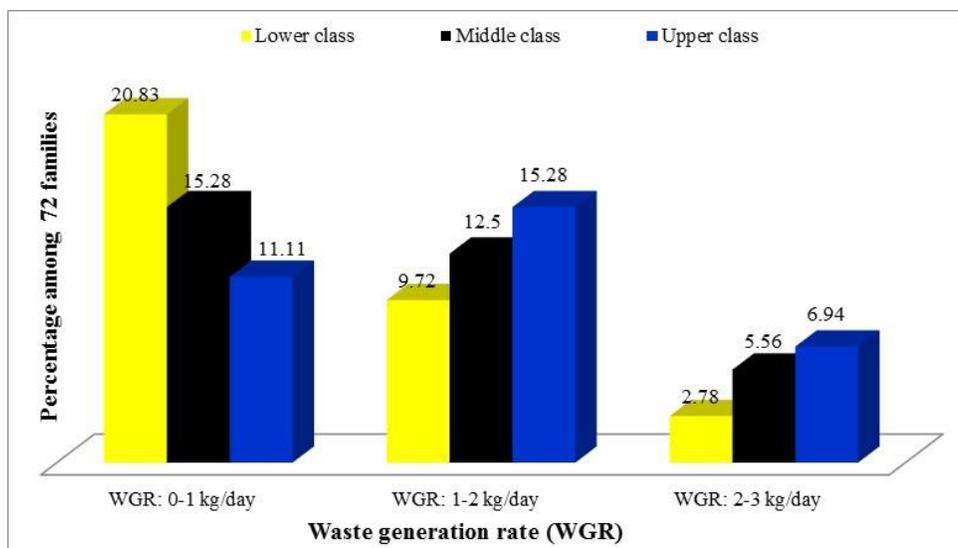
Education levels among the middle class families were considerably higher, with only two families (2.8 percent of the 72 families) illiterate, 12 families (16.7 percent) had primary level education, six families (8.33 percent) had SSCs, three families (4.17 percent) had HSCs, and one family (1.4 percent) had a graduate level education. Many of the middle class families had either continued their study or engaged themselves in enterprise. The education levels of the 24 upper class families consisted of three families (4.17 percent of the 72 families) had only primary level education, seven families (9.7 percent) SSCs, nine families (12.5 percent) HSCs, and five families (7 percent) graduate level education.

We also found that the level of education has an extensive significance on the augmentation of awareness about the importance of safe water and sanitation. There also is a considerable gap between urban and rural populations in terms of awareness about the importance of safe water and sanitation. Aggressive multi-media campaigns, highlighting the linkage between sanitation and health, are needed to raise awareness. The government has recognized this and has commenced multi-media campaigns since 2003.

#### IV.5. Solid Waste Generation

The 72 families were also asked about the quantity of waste they generate. They were given the following three categories: zero to one kg per day, one to two kg per day, or two to three kg per day. Most of this waste is organic, like food waste, including leaves, twigs, and agricultural residues, which fortunately are naturally decomposable. It is also very common that organic waste is used as fertilizer, the production of gas or electricity for the aim of cooking and lighting in the rural areas, though in an inefficient way. The results of the survey (see details in Figure 6) clearly show that the lower class families generate far less waste than the middle class families, which again generate far less waste than the upper class families.

**Figure 6: Waste Generation Rates (WGR) in Rural Areas of Lohagara Upazila**

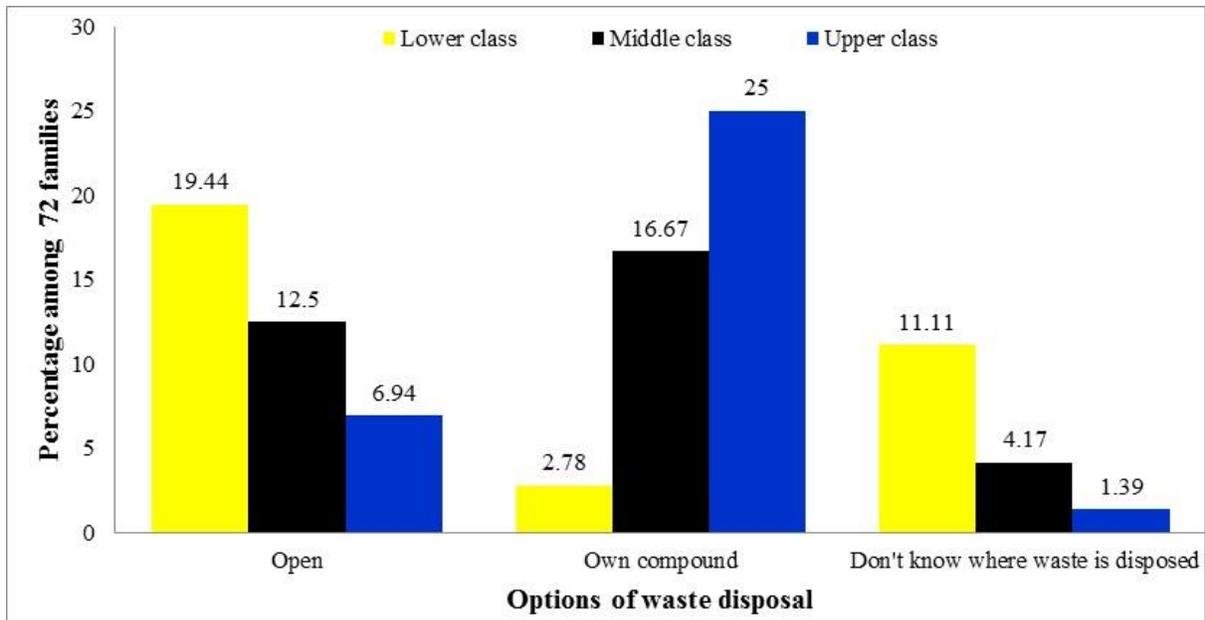


Source: Created by the authors based on survey data collection.

#### IV.6. Current Waste Management Method

Given the impact of different waste management methods have on the environment, we also asked the 72 families on how they dispose of the waste they generate. The disposal of waste is not a tough task in rural regions due to the ample availability of fallow land. However, due to dearth of proper knowledge about solid waste disposal and recycling, much of the waste is disposed illegally. Anyway, based on the survey results (see details in Figure 7), there is a clear correlation between income level and the way families dispose waste. The lower class families use mostly open disposal methods, while the upper level families dispose waste mostly via own compounds. Furthermore, there is a strong correlation between family income levels and knowledge about the family's waste management, as eight lower class families, three middle class families, and only one upper class family did not know where their waste is disposed.

**Figure 7: Forms of Waste Disposal in Rural Areas of Lohagara Upazila**



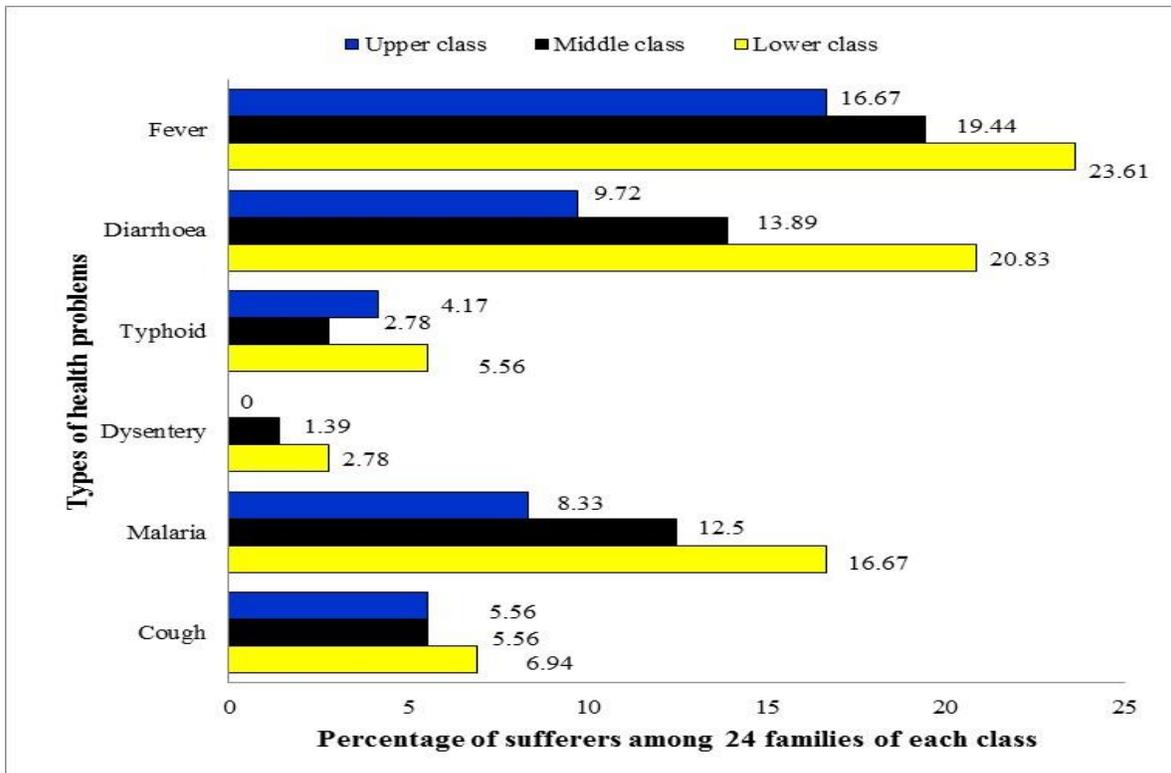
Source: Created by the authors based on survey data collection.

#### IV.7. Resulting Health Problems

The demand of water for sanitation purposes and other utilizations is augmenting day-to-day. People drink water to meet their thirst, but many times, the water they drink is not pure. All kind of impurities are found in drinking water, and as a result, various water borne and vector borne diseases have broken out everywhere in the rural regions. One contributing factor is that people dispose their household wastes in open places, another factor is the lack of sanitation, resulting in illegal and unfair practice of latrines. To determine the degree of implications on health, we asked the families about the presence of a few diseases, typically related to improper waste disposal and improper sanitation, which are fever, diarrhea, cholera, typhoid, dysentery, malaria, cough and arsenicosis. While none of the families reported the presence of any cholera and

arsenicosis, many families had to deal with fever, diarrhea, typhoid, dysentery, malaria, and cough. As is shown in more details in Figure 8, more than three quarters (76 percent) of the lower class families suffered from some health problems, more than half (56 percent) of the middle class families suffered from some health problems, and even 44 percent of the upper class families suffered from some health problems. For all three classes, the three most common health problems are fever, diarrhea, and malaria. Many of these health problems turn out to be fatal, especially for young children of the lower class families.

**Figure 8: Presence of Health Problems in Rural Areas of Lohagara Upazila**



Source: Created by the authors based on survey data collection.

Moreover, a lack of proper knowledge and the insufficient availability of health facilities are helping to spread some of these diseases. While the higher class families have the resources to pay for treatment, they typically do not get proper treatment due to the lack of available facilities and qualified doctors. In any case, the root causes of these problems are illiteracy and poverty. Recently, a few NGOs have been working to improve the health status of rural people by providing training, supplying nutritious foods, creating awareness, and employing health workers. Hence, the overall health situation is improving though is not yet at satisfactory levels. So both government and NGOs should adopt further steps to resolve the health crisis in rural areas like Lohagara Upazila.

## V. Conclusion

Problems in the WaSH sector are a significant environmental dilemma in rural areas of Bangladesh. This study reveals that all classes, but especially the lower and middle class families, suffer considerably from WaSH troubles in Lohagara Upazila. Nearly half (47 percent) of the 72 families included in this study get their drinking water from unsafe shallow tubewells, five percent of the 72 families even get their drinking water from ponds. Mostly due to poverty, half of the 72 families surveyed in this study use either open latrines on fallow land/roadsides or simple latrines made of bamboo, tin and polythene (called kacha).

As a result, they are suffering from various health problems, including water borne diseases. They are deprived of the light of education and entertainment. This scenario is also common in other villages in and around the Chunati Wildlife Sanctuary. Most of the peoples' livelihood is based on agro-economics and the majority of them are farmers. Development activities hardly touch rural life, partly due to the negligible priority given to the development of rural areas.

Despite considerable progress, sanitation advancements cannot be sustained without adopting effective monitoring and evaluation measures. Intensive endeavors require congregation and implementation of national sanitation plans from the grassroots level to the national level. Public funding for sanitation improvement should be increased further, especially in rural areas. The combined efforts of government, NGOs and local people can support to overcome the severe WaSH problems in rural areas.

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