

► INTERNATIONAL PERSPECTIVES

Behavioral Approaches of Households to Address Waterborne Diseases in Children in Suburban Bangladesh

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Abstract Behavioral approaches of parents who live in poorer areas of suburban areas regarding waterborne diseases among children have a large effect on the incidence of these diseases. Waterborne diseases remain a persistent and widespread issue among disadvantaged populations who reside in these areas with substandard housing and lack of standard services (areas that have been categorized as suburban slum environments). Our study aimed to explore the implications of parental awareness of waterborne diseases affecting children ages 5–9 years. To conduct the study, 300 household heads (either the father or mother of children ages 5–9 years) were selected using random sampling from the poorer areas of six suburban regions of Khulna District in Bangladesh. Poisson and logistic (also called logit) regression models were applied to examine the relationship between the behavior of household heads and the incidence of waterborne diseases among their children. In addition, the contingent valuation method (CVM) was used to assess willingness to pay (WTP) for improved water services.

Results of the Poisson and logit regressions showed that parental education level, handwashing behavior, household participation in nongovernmental organization (NGO) activities, and the availability of fresh water were significantly associated with a reduction in waterborne diseases among children. Furthermore, the WTP analysis indicated that 65% of the respondents were willing to pay 240 Bangladeshi taka (BDT, which is approximately \$1.98 USD) for improved water services from the Khulna Water Supply and Sewerage Authority. Our study also found that parental education level, household participation in NGO activities, and having older children positively influenced the extent of a respondent's WTP to reduce waterborne diseases among their children. Lastly, we propose several policies based on our study findings that will benefit both consumers and the responsible authorities in improving water supply services in the selected study areas.

Keywords: Bangladesh, Khulna, waterborne diseases, children, household behavior approaches, sanitation, drinking water

Introduction

Globally, the United Nations' Sustainable Development Goal 6 (SDG 6) aims to ensure universal access to clean water and adequate sanitation facilities (Akram et al., 2024). Waterborne diseases, however, continue to place a substantial burden on public health worldwide (Kutwal, 2019). These illnesses are predominantly spread through the fecal–oral route, occurring when contaminated water or food containing human fecal matter is consumed, which happens most often as a result of inadequate sewage systems and poor sanitation practices (Manetu & Karanja, 2021). Each year, diarrheal diseases kill approximately 1.8 million people, including 1.5 million children <5 years. Ensuring access to safe drinking water, improved sanitation, and proper hygiene education could prevent nearly 90% of these deaths, while also contributing to better health outcomes, reduced poverty, and broader socioeconomic progress (Kutwal, 2019).

In Bangladesh, an estimated 103 million people lack access to safely managed sanitation facilities, and approximately 68.3 million people do not have access to safely managed drinking water (Akram & Kittipongvises, 2026). Many developing nations face major water resource challenges stemming from inadequate water management practices (Akram et al., 2024). Groundwater, particularly tube well water, serves as the primary source of drinking water and as the water for cooking, irrigation, and other household needs. When drinking water fails to meet regulatory standards, it can lead to severe health problems, particularly among children who are more susceptible to infections (Rahman et al., 2021).

According to the United Nations Children Fund (UNICEF) and the World Health Organization (WHO), Bangladesh has recorded the highest number of child deaths due to diarrhea, with approximately 50,800 children under the age of 5 years dying from diarrheal illnesses each year. Therefore, access to safe drinking water is essential to good health and is necessary for infant and child survival and development, in particular (Parvez et al., 2019).

Waterborne diseases are common throughout Bangladesh, but these diseases are especially common in suburban areas of cities where poverty and poor living conditions worsen the situation. Whether in big or small cities, these diseases affect almost all of these poorer areas. For example, in the so-called slums of Dhaka, waterborne deaths accounted for 27% of all recorded deaths (Jorgenson & Rice, 2012). The situation is the same in other districts such as Rajshahi, Chittagong, and Khulna. In view of this reality, we selected poor suburban areas of the Khulna District as the study area for our research study.

Mothers play a key role in protecting their children's health, and thus improving mothers' knowledge, attitudes, and practices is crucial to improving their children's health (Workie et al., 2018). A variety of health issues can affect children throughout their early childhood years, and changes in a child's health can manifest through sudden changes in behavior. By increasing parental awareness and attentiveness, a large improvement can be made for children, which will help with these challenges.

Previous research in different countries has explored the linkages between parental awareness and children's physical and mental well-being (Nasrin et al., 2021). Children are vulnerable to infection from many sources such as contaminated food and water, flies, fomites, and polluted environments. The major role played by mothers in urban areas of India, for example, in preventing waterborne diseases is due to the fact that women are mainly responsible for caring for the children (Kutwal, 2019). In Bangladesh, few research studies have specifically addressed parental awareness in relation to reducing waterborne diseases among children ages 5–9 years, particularly in poorer suburban areas.

In light of this knowledge gap, our study aimed to investigate parental behaviors that

contribute to reducing waterborne diseases in children and to quantify each head of household's willingness to pay (WTP) for decreasing such disease incidence using the stated preference approach of the contingent valuation method (CVM). Our study findings can serve as essential baseline information for improving household water security, promoting healthier water-use behaviors, and enhancing child health outcomes within the study area as well as more broadly.

Theoretical Framework

A person's water, sanitation, and hygiene (WASH) practices are shaped by various beliefs and cultural norms. The health belief model (HBM), one of the earliest frameworks for understanding health-related behavior, was created in the 1950s by social psychologists Godfrey M. Hochbaum, Irwin M. Rosenstock, and S. Stephen Kegeles at the U.S. Public Health Service. This model offers a psychological explanation for why people adopt or fail to adopt particular health behaviors under specific circumstances. Over time, HBM has been widely applied in different fields to examine psychosocial influences on adherence to health recommendations and has become one of the most frequently referenced theories in health education (Sajaud-din et al., 2017).

In our study, the concept and factors associated with HBM have been used to interpret the range of water- and sanitation-related practices among residents of poorer areas of six suburban regions of Khulna District in Bangladesh. Our analysis focuses on two broad clusters of behavior within HBM: individuals' perceptions and the factors that modify or trigger their actions. Perception-related elements include how people view the risk and seriousness of illness, as well as the personal value they place on maintaining good health. Modifying factors, on the other hand, cover demographic characteristics, perceived threats, and the cues that prompt individuals to take action (Yamauchi et al., 2022).

Methods

Case Study

We chose Rupsha Upazila of Khulna District, a southwestern coastal region of Bangladesh, as the study area because it is one of Bangladesh's most climate-vulnerable regions.

In Rupsha Upazila, water resources are highly susceptible to environmental stress, which poses major risks to public health. The water supply is primarily provided by a government-owned water supplier, the Khulna Water Supply & Sewerage Authority (KWSA), which distributes treated surface water through a piped network. The water supply, however, remains insufficient to meet the population's needs, and Rupsha Upazila faces major challenges due to high water salinity and industrial contamination.

We selected six villages within Rupsha Upazila (Rajapur, Aichhgati, Jogihati, Diara, Nandanpur, and Milky-Diara). We prepared a list of 500 household heads in six villages whose children had been affected by waterborne diseases more than one time in a year. From this population, a sample of 300 households was selected using a random sampling technique across 6 villages. Our study focuses on two individual segments at the same time. We investigated 1) the probability of waterborne diseases affecting children in these poorer areas and 2) WTP of household heads to reduce the probability of spreading waterborne diseases in these areas.

Model Specification

We estimated the probability of affecting waterborne diseases by using the logit model. Additionally, we estimated the number of affected waterborne diseases as count data using the Poisson regression model, for children ages 5–9 years who had had waterborne diseases during 2024. According to the local government office, most of primary school-age children are negatively affected by waterborne diseases. Alam (2009) considered the cost of waterborne diseases for children living in these poorer areas, whereas we considered a set of independent variables including some engineering variables, behavioral variables, and socioeconomic variables to arrive at our estimation. We considered these types of variables to estimate the exact effect of independent variables on the dependent variable (i.e., the affecting number of waterborne diseases [WDN] in 2024):

$$\begin{aligned} \text{WDN} = & \beta_0 + \beta_1 \text{CAG} + \beta_2 \text{CSX} + \beta_3 \text{PED} + \\ & \beta_4 \text{SLY} + \beta_5 \text{PYI} + \beta_6 \text{HFM} + \beta_7 \text{HNP} + \beta_8 \\ & \text{RNT} + \beta_9 \text{FWA} + \beta_{10} \text{PLF} + \beta_{11} \text{NNC} + \beta_{12} \\ & \text{HWB} + \beta_{13} \text{CCW} + \text{ui} \end{aligned} \quad (1)$$

TABLE 1

List of Independent Variables Used

Variable Abbreviation	Description	Unit of Measure	Expected Sign	Citation
Socioeconomic variables				
CAG	Age of child	Year	+ or -	Alam, 2009; Islam et al., 2019
CSX	Sex of child	1 = male, 0 = female	+ or -	Salifu & Peprah, 2021
PED	Education level of parent	Number of years of schooling	-	Ahsan et al., 2021; Salifu & Peprah, 2021
SLY	Number of years in slum	Year	+	Nabi et al., 2025
PYI	Yearly income of parent	Bangladeshi taka (BDT)	+ or -	Ahsan et al., 2021
HFM	Household family members	Number	+ or -	Ahsan et al., 2021
HNP	Household participation in nongovernmental organization (NGO) activities	1 = household respondent participated in any hygiene-related activities undertaken by an NGO; 0 = other	-	Author's own compilation, 2024
RNT	Owns a radio or TV	1 = household owns a radio and television; 0 = other	-	Nobi, 2023
Engineering variables				
FWA	Fresh water availability for household	1 = water from all sources is available 24 hr/day; 0 = other	-	Alam, 2009
PLF	Pit latrine facility	1 = narrow-necked collection container; 0 = other	-	Alam, 2009
Behavioral variables				
NNC	Narrow-necked collection container	1 = yes; 0 = other	-	Alam, 2009
HWB	Handwashing behavior	1 = children wash hands more than 3 times; 0 = other	-	Alam, 2009; Nobi, 2023
CCW	Clean clothes wearing	1 = wear clean clothes; 0 = other	-	Salifu & Peprah, 2021

We focused on Poisson regression for count data because the WDN is the most important factor for WTP estimation and behavioral aspects of households. Ahsan et al. (2021) established a connection with household WTP to ensure safe drinking water for a coastal area. We used conditional logistic regression (conditional logit, CL). CL was used to estimate the discrete choices or field data collected with grouped structures, where general or standard regression models failed to trace the real scenario. But, in this research article, data were collected through a questionnaire survey on a household basis, where a general logit model was used.

Ahsan et al. (2021) focused on a general logit regression model for econometric analysis. Another study by Alam (2009) on health costs of childhood diarrhea in the Dhaka slum areas of Bangladesh was conducted and included engineering, behavioral, and socio-

economic variables. Engineering variables included availability of a 24-hr pit latrine facility, using a wide container for fresh drinking water collection, handwashing behavior more than 3 times in a day, wearing clean clothes, and keeping the surroundings clean for all. Table 1 lists the independent variables that influence the dependent variable.

Results and Discussion

Head of Household Occupation

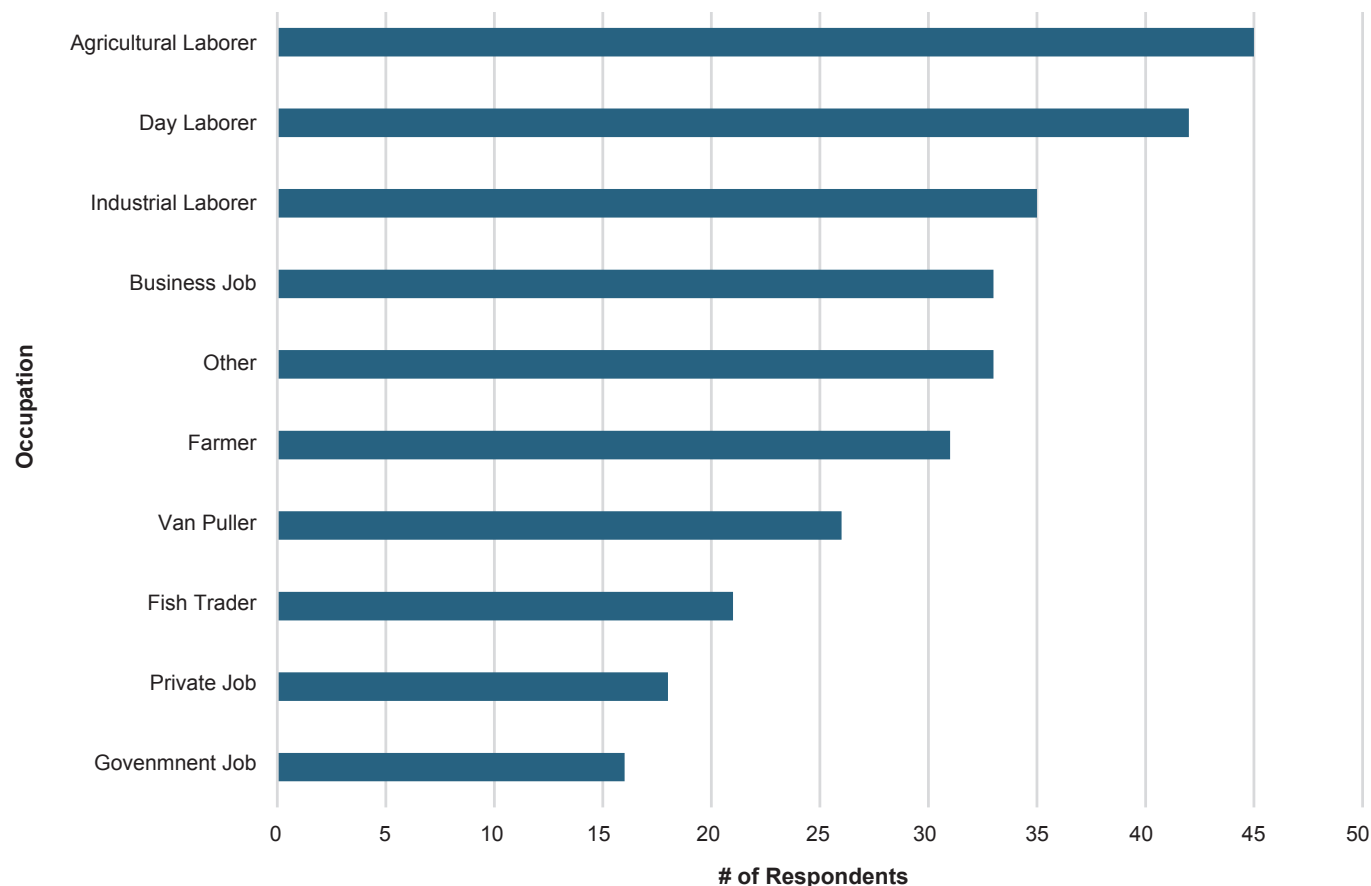
The occupational structure of a community provides insights into residents' sources of income and reflects their socioeconomic status, including income levels and spending patterns. In our study, the majority of households reported being agricultural laborers, a group that generally possesses limited knowledge about the prevention of waterborne diseases (Figure 1). These results are consistent

with findings from Sajauddin et al. (2017), who conducted a study in the city of Khulna and noted that the water and sanitation facilities provided to poor areas there are dependent on different factors. People who live in the slums of Khulna are not formally educated. Their poor socioeconomic profile represents their situation clearly. As such, most of the people in these areas are in low-profile occupations and earn low amounts of money.

Frequency of Waterborne Diseases Occurrence

Figure 2 presents the frequency and duration of waterborne disease episodes among children living in the study areas of Khulna during our 6-month study period. Our results indicate that 42% of children had a waterborne illness with symptoms that lasted 2–4 days, with an additional 25% of children having 5–7 days of symptoms. In addition, 9% of children expe-

FIGURE 1

Occupation of the Head of the Household for Survey Respondents

rienced episodes of 8–10 days, which results in a longer burden of a smaller proportion of the population. Nearly 20% of children were sick for only 1 day, indicating that although some cases are brief and less severe, a substantial proportion of children continue to face extended health challenges due to inadequate water quality and poor sanitation conditions in these communities, and the remaining 4% had a waterborne illness with symptoms that lasted more than 10 days.

Facing Different Waterborne Diseases

Figure 3 shows the likelihood of children in the study area getting various waterborne diseases. As illustrated, 11% of children were infected by amebiasis, 12% were infected by dysentery, 15% were infected with typhoid, and 18% were infected by cholera. Moreover, 19% were affected by different forms of skin

infections, mainly as a result of consuming dirty water or carrying out their daily chores. Our findings also show that the most prevalent disease is diarrhea, which affects 25% of children and is regularly associated with bathing or direct contact with contaminated bodies of water.

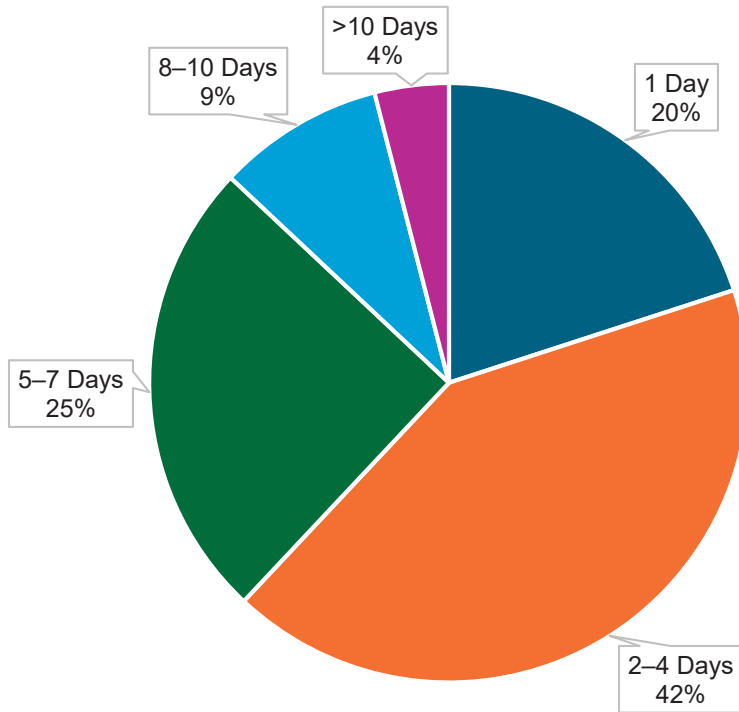
In line with these observations, a review of low- and middle-income countries identified that approximately 60% of deaths due to diarrhea are directly linked to insufficient drinking water, lack of sanitation, and insufficient hygiene (Aydamo et al., 2024). This finding is further supported by other studies (Alemayehu et al., 2021). It should be noted, however, that not all instances of waterborne diseases in children can be blamed directly on water. There are other factors that can influence the waterborne diseases of children in the study areas.

Willingness to Pay for Improved Drinking Water Services

Studies have reported that ranges of 66%–96% indicated WTP for improved water service (Akeju et al., 2018; Akhtar et al., 2018; Eridadi et al., 2021; Tussupova et al., 2015). In our study, >50% of the surveyed households expressed WTP for improved drinking water service. More specifically, 65% of respondents were willing to pay 240 BDT per month for improved drinking water service (Figure 4). To make the finding consistent, Nobi (2021) found that households living in slum areas of Chittagong are willing to pay on average 162 BDT/month. In the research region, a source of reliable drinking water that can support daily life is hard to come by. Therefore, the households want to pay nearly 240 BDT/month to have 24-hr access to an improved water supply as the region is highly climate vulnerable.

FIGURE 2

Frequency of Waterborne Diseases Over the Past 6 Months for Survey Respondents



Interestingly, our survey found that not everyone is willing to pay more for improved drinking water, with 35% of respondents saying that they cannot afford this amount. Many respondents also mentioned that it is the role of the government to improve drinking water quality, and they could not ascertain the quality of the drinking water service even after paying more.

Summary Results of Poisson and Logit Regression Models

Based on the results presented in Table 2, we analyzed the findings using two econometric models. The first model, Poisson regression, shows that as a child's age (CAG) increased by 1 year, the likelihood of being affected by waterborne diseases decreased, which was statistically significant at the 10% level. For parental education (PED), our results indicate that with each additional year of schooling completed by the parents, the probability of their children contracting waterborne diseases declined significantly, with significance at the 5% level.

Furthermore, household participation in nongovernmental organization (HNP) activities exhibit a negative and significant association with the incidence of waterborne diseases, suggesting that community engagement through NGOs enhances awareness and preventive practices. HNP is statistically significant at the 1% level.

The availability of fresh water (FWA) is also important: When households have a 24-hr water supply, the prevalence of diseases is greatly reduced, with the critical threshold at 10%. Expectedly, handwashing behavior (HWB) is strongly and statistically negatively correlated (at a 5% level) with incidences of waterborne diseases, which underscores the significance of good hygiene behavior.

Our findings are further supported by the second logit regression model. This model shows that higher PED has a substantial negative impact on the likelihood of children getting infected with waterborne diseases. Parental yearly income (PYI) can significantly affect the reduction of water-

borne diseases. When PYI increases yearly, households spend more money to purchase protective measures that can reduce the probability of waterborne diseases by 10%. Interestingly, the availability of media, especially radio or TV programs on hygiene and health awareness, do not help to reduce the probability of waterborne diseases, as households are not willing to use their media-related knowledge to protect their children. In our study, however, PYI does not seem to play any major role in reducing waterborne diseases.

Lastly, HWB at the household level is still a major factor in reducing waterborne diseases, and an increase in this behavior results in a visible decrease in the number of children who remain sick. To support the findings of our study, Aydamo et al. (2024) found that mothers who had knowledge of handwashing practices were 4 times more likely to engage in proper handwashing compared with mothers from households with limited knowledge; these results were statistically significant at the 5% level. Additionally, we found that HWB of mothers was positively and significantly linked to their knowledge of handwashing practices, a favorable attitude toward the practice, and the household's water security. Their study further showed that households with secure water access were 1.7 times more likely to demonstrate a positive attitude toward handwashing than households without a reliable water supply ($p = .05$).

Results of the Willingness to Pay Estimation

As described in the methods, KWSA operates a water supply system that sources, treats, and distributes surface water in Rupsha Upazila, an administrative subdivision of Khulna District. The Asian Development Bank supported a project to reduce Khulna's reliance on unsustainable groundwater extraction. According to KWSA, households in Rupsha Upazila face a crisis for access to fresh water. Many tube wells are ineffective in providing safe water, with some marked red due to arsenic contamination.

$$\begin{aligned} \text{WTP for Better Water Service} = & \beta_0 + \beta_1 \text{CAG} + \beta_2 \text{CSX} + \beta_3 \text{PED} + \beta_4 \text{SLY} + \beta_5 \text{PYI} + \\ & \beta_6 \text{HFM} + \beta_7 \text{HNP} + \beta_8 \text{RNT} + \beta_9 \text{PLF} + \beta_{10} \text{NNC} + \beta_{11} \text{HWB} + \beta_{12} \text{CCW} + \text{ui} \quad (2) \end{aligned}$$

FIGURE 3

Percentage of Waterborne Disease Types Reported in Children by Survey Respondents

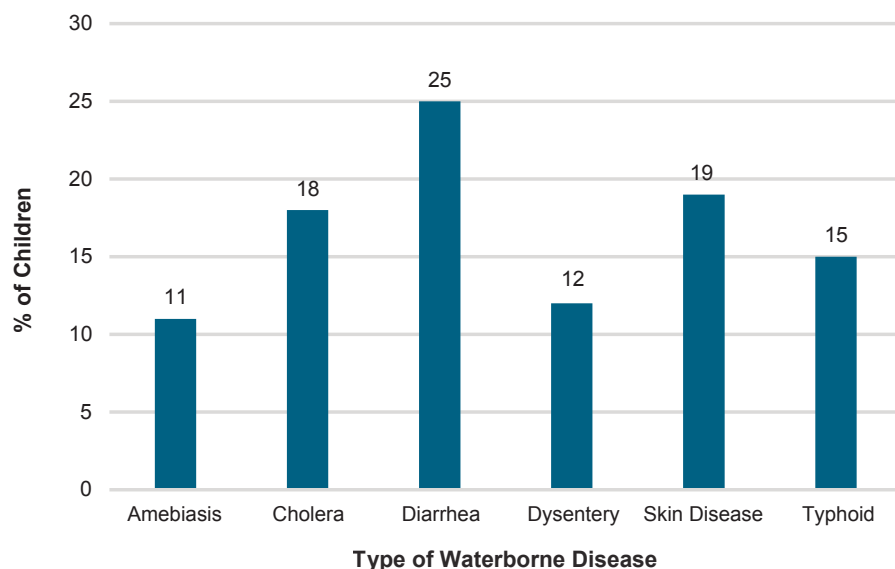
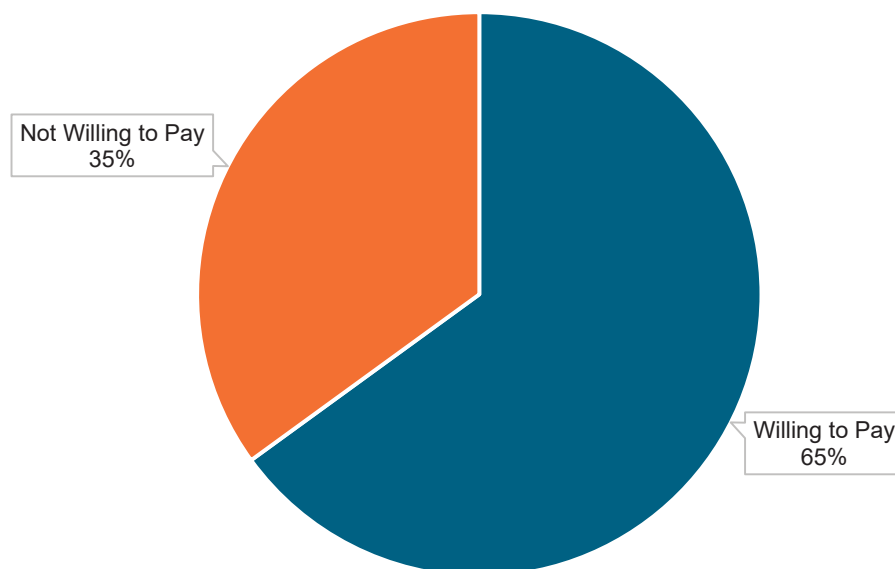


FIGURE 4

Survey Respondent Willingness to Pay for Improved Water Services



We based our WTP estimation on the reference level set by KWASA in 2023, which is an average WTP of 240 BDT (\$1.98 USD) to secure a 24-hr improved water supply. Our

analysis shows that the age of the child is positively and significantly associated with WTP. As children grow older, their parents are more likely to be willing to pay more

to ensure their children's health and safety compared with parents who are less concerned about their children's health as they grow older. (Table 3). According to Alberini & Krupnick (2000), age of the child is an important factor in reducing environmentally related risks, and age variation was statistically significant at the 5% level.

In addition, parental education is positively and significantly associated with WTP. As parental education increases, parental concern for their children's health also increases, making them more likely to pay for better water service than parents with no formal education. Kesztyüs et al. (2014), in their study of parental WTP for preventing childhood overweight and obesity, found that 49% of parents expressed WTP, with a mean WTP of €23.04 (\$31.08 USD) per month. PED is statistically significant at the 10% level in our model.

In addition, the need for having a safe water supply and avoiding waterborne diseases in children will encourage households to spend more money on health insurance as long as they are planning to remain in these poorer areas. In line with this finding, Suyitno et al. (2025) in Thailand showed that the level of PED is a major factor in determining the household treatment of their water. These findings indicate that higher education was highly related to improved water treatment behaviors, perhaps due to higher PED, which enables parents to be more aware of the dangers of untreated drinking water and the important role of hygiene. In addition, slum living years (SLY) has a positive connection with WTP. Households that do not intend to remain in the slum permanently are less likely to pay for better water service than those who intend to remain permanently.

Furthermore, HNP has a positive and significant relationship with WTP. Households that engage more with NGOs through training and daily activities become more health conscious, which increases their WTP to reduce the risk of children's waterborne diseases compared with households that are not engaged in HNP.

Lastly, HWB is also negatively and significantly related to WTP. The findings indicate, however, that households with more frequent handwashing activities are less likely to be willing to pay for improved water services than households with less frequent handwashing practices. According to Nabi et al.

TABLE 2

Results Analysis of Poisson and Logit Regression Models

Variable	Model 1: Poisson Regression	Marginal Effect of Model 1	Model 2: Logit Regression	Marginal Effect of Model 2
CAG	-1.075 *	-0.069 *	-0.095	-0.087
CSX	1.007	0.098	0.008	0.065
PED	-1.877 **	1.072 **	-0.987 *	0.829 *
SLY	-0.897	-0.005	0.012	0.017
PYI	0.001	0.001	-0.010 *	-0.075 *
HFM	-2.690	-1.890	-0.026	-1.850
HNP	-0.215 ***	-0.113 ***	-0.372	-0.269
RNT	-1.065	-0.789	0.143	0.088
FWA	-1.98 *	0.94 *	0.56	0.06
PLF	0.098	0.478	0.036	0.019
NNC	-0.165	-1.890	0.045	-0.069
HWB	-2.265 **	-1.894 **	-0.169 **	-0.132 **
CCW	1.198	1.067	0.158	0.174
Constant	-0.012		0.000	
Observations	300		300	
Log-likelihood ratio	-16.08		-24.56	
Probability > X ²	0.02		0.05	

* $p < .10$. ** $p < .05$. *** $p < .01$.

Note. The dependent variable is the number of waterborne diseases in 2024. See Table 1 for descriptions of the variable abbreviations.

(2025), poor hygiene including inadequate handwashing significantly raises the risk of communicable diseases. In their study, 24.1% of participants had communicable diseases, primarily driven by WASH-related factors. We found that many children in these poorer areas are severely affected by unsafe drinking water.

Policy Recommendations

By improving water quality according to parental preferences, authorities can boost efficiency and profitability, because parents express WTP to protect their children's health. Such improvements support the utility provider and enhance social welfare by reducing childhood illnesses tied to poor water quality. Therefore, prioritizing child health through water quality enhancement is essential. Investment in upgrades is economically sound because it offers substantial benefits for both households and authorities. Policymakers can use WTP estimates to inform

practical policy decisions. The methods we used are broadly applicable across the social sciences and other interdisciplinary fields, regardless of geographic context.

In addition to the benefits of WTP, household behavior plays a vital role in reducing the incidence of waterborne diseases in children by maintaining good hygiene practices. Poor hygiene practices can result in waterborne illnesses. WHO estimates that 94% of waterborne diarrheal cases are preventable through changes to the environment, which includes interventions to increase the availability of clean water for drinking and to improve sanitation and hygiene practices (Manetu & Karanja, 2021).

Moreover, sanitation interventions have been found necessary in preventing the occurrence of waterborne diseases. Sanitation facilities such as latrines (toilets or a simpler facility) with effective drainage are crucial in keeping human feces and other waste prod-

ucts from contaminating drinking water. Hence, the behavioral approaches of households regarding the practice of drinking clean water by purifying or boiling water first and the use of proper sanitation by maintaining hygiene can reduce the incidence of waterborne diseases for both parents and children.

Inadequate water facilities and sanitation facilities account for different socioeconomic and health consequences for residents in these poorer areas. Given the limited access to a safe water supply in the study area, more initiative should be taken by both government agencies and NGOs, which play a crucial role in improving the health and sanitation conditions of children living in poverty. NGOs frequently organize focus group discussions and awareness campaigns on hygiene and sanitation practices, and government agencies provide essential services such as safe drinking water, healthcare, and electricity in these communities.

TABLE 3

Estimation of Willingness to Pay (WTP) to Ensure a Hygienic Water Supply for 24 Hours, at the Household Level

Variable	WTP Logit Model	Marginal Effect of the WTP Logit Model
CAG	1.84 ** (0.89)	1.35 ** (0.66)
CSX	-1.02 (0.06)	-0.97 (0.65)
PED	3.66 * (2.08)	2.86 * (2.01)
SLY	0.79 * (0.27)	0.45 * (0.20)
PYI	0.41 (0.12)	0.38 (0.05)
HFM	2.58 (8.45)	3.98 (6.45)
HNP	1.58 ** (0.45)	1.01 ** (0.29)
RNT	1.67 (0.45)	0.70 (0.55)
PLF	0.89 (0.05)	0.76 (0.39)
NNC	1.58 (0.67)	0.99 (0.46)
HWB	0.78 *** (0.16)	0.61 *** (0.29)
CCW	0.89 (0.05)	0.10 (0.10)
Observations	300	300
Log-likelihood ratio	-109.76	
Probability > X ²	0.0024	

* $p < .10$. ** $p < .05$. *** $p < .01$.

Note. The dependent variable is the willingness of a household to pay 240 BDT (\$1.98 USD) every month to ensure a 24-hr supply of fresh water for drinking and sanitation (1 = agreed to pay and 0 = not agreed to pay; base outcome). Standard errors are in parentheses. See Table 1 for descriptions of the variable abbreviations. BDT = Bangladeshi taka; USD = United States dollar.

Khulna is one of Bangladesh's most climate-vulnerable districts, and its water resources are under major stress. As such, it is vital for both government agencies and NGOs to prioritize safeguarding these stressed natural resources. This action can be achieved by monitoring water quality parameters in line with the Environment Conservation Rules, 1997.

It is essential for the government to prioritize the effects of urbanization, industrialization, migration, environmental degradation, and potential climate change on bodies of water in Khulna District. This safeguarding

can be achieved through the implementation of innovative pollution controls, with a particular focus on groundwater conservation and the reduction of pollution in surface water. Regular monitoring of groundwater quality parameters should be conducted to ensure that they are in compliance with drinking water standards. It is necessary to reevaluate monitoring objectives and identify the most critical parameters (i.e., arsenic, heavy metals such as iron [Fe] and manganese [Mn]) to be monitored based on the most recent information.

Conclusion

Contaminated water sources, insufficient sanitation, and limited hygiene practices are major factors undermining children's health in many low- and middle-income nations. Our study examined how household behaviors influence the incidence of waterborne diseases in children ages 5–9 years living in areas with substandard housing and a lack of standard services (areas that have been categorized as suburban slum environments) of Khulna District, Bangladesh. Our survey findings show that diarrhea and skin infections are the most common waterborne illnesses among children here. Our analysis reveals that factors such as parental education, handwashing habits, participation in NGO programs, and access to fresh water have a significant effect on waterborne disease incidence.

Moreover, our results showed that heads of households expressed a WTP for improved water services specifically to receive safe, hygienic water from KWSA around the clock. But children's experiences with water access, availability, and reliability often are merged into broader household-level data, making it difficult to pinpoint child-specific risks. Because many WASH interventions target entire households rather than children specifically, further research is needed to explore child-centered dimensions of water insecurity that more directly affect child health. To meet Sustainable Development Goal 6 (SDG6), it is crucial for policymakers to focus on child health by ensuring access to clean and safe water. 🌸

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