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ASSESSING THE ROLE OF URBAN-LOCAL GOVERNMENT IN PROVIDING ENVIRONMENTAL SERVICES: A CASE STUDY OF GAZIPUR CITY CORPORATION IN BANGLADESH

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ASSESSING THE ROLE OF URBAN-LOCAL GOVERNMENT IN PROVIDING ENVIRONMENTAL SERVICES: A CASE STUDY OF GAZIPUR CITY CORPORATION IN BANGLADESH

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ABSTRACT

This research paper aims to assess the role of urban-local government in providing environmental services in Gazipur City Corporation (GCC), Bangladesh. The study utilizes a mixed-methods approach, including a survey and qualitative data analysis. The study found that the governance system in GCC is inadequate, resulting in poor service delivery in terms of water supply, waste management, and drainage system. According to the findings of this study, the majority of GCC residents receive inadequate services from the GCC. This study also demonstrates that the GCC does not provide enough safe drinking water or adequate sanitation facilities. Moreover, the GCC does not collect the waste regularly. The study found that the majority of GCC residents think that the region's sewage and drainage systems are deplorable. The necessary steps to lower mosquito populations are not taken by the GCC. The GCC provides poor environmental services. The study recommends that local governments should enhance citizen participation, strengthen decentralization, improve governance mechanisms, increase coordination among government agencies, and conduct further research to explore the challenges and opportunities for urban-local governments in delivering environmental services in Bangladesh. The study's findings can inform policy and practice in Bangladesh and contribute to the existing literature on urban-local governance and service delivery.

1.0 Introduction

The Gazipur City Corporation (GCC) was established in 2013 with the objective of providing efficient and effective services to the citizens of Gazipur (Latif et al., 2014). The GCC is a local government body in Bangladesh that is responsible for providing a range of essential public services to the residents of Gazipur City (Ahmed & Islam, 2020). These services include water supply and sanitation, waste management, transportation, health care, education, and social services (Rahman et al., 2016). The GCC is responsible for planning and implementing policies and programs related to service delivery in the city. These include developing and maintaining infrastructure and facilities, managing resources, and collaborating with other stakeholders to ensure effective and efficient service delivery. In terms of water

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supply and sanitation, the GCC is responsible for managing the city's water supply and sanitation systems, including treatment plants, distribution networks, and sewage systems. The GCC is also responsible for ensuring that water and sanitation services are accessible to all residents of the city, regardless of their socio-economic status. In the area of waste management, the GCC is responsible for collecting and disposing of solid waste and ensuring that the city is kept clean and free from pollution. This includes implementing waste management policies and regulations, conducting awareness-raising campaigns, and partnering with local communities and stakeholders to promote sustainable waste management practices. The GCC has also the duty to provide essential services in the areas of health care, education, and social services which include managing public hospitals and health clinics, providing access to education and training opportunities, and promoting social welfare programs to support vulnerable populations. Despite its mandate, the GCC has faced several challenges in delivering these services effectively, such as lack of financial resources, inadequate human capital, and poor infrastructure. As a result, the quality and accessibility of services provided by the GCC have been suboptimal, affecting the well-being and livelihoods of the citizens of Gazipur (Ahmed & Hossain, 2020). In order to improve service delivery, the GCC has implemented a number of initiatives, such as increasing its budget for infrastructure development and introducing new technologies (Chowdhury, 2021). Additionally, the GCC has also sought to strengthen its human capital by training existing staff and recruiting new personnel. These efforts have been successful in improving the quality of services offered by the GCC and have had a positive impact on the citizens of Gazipur. However, further investment is needed to ensure that these improvements are sustained in the long-term.

This research aims to assess the role of urban-local government in providing environmental services by taking the GCC in Bangladesh as a case study. The findings of this research can inform policy interventions to enhance the GCC's service delivery and contribute to the well-being and prosperity of the citizens of GCC.

2.0 Literature Review

In Bangladesh, the urban-local government system consists of city corporations, municipalities, and union parishes. City corporations are the highest level of urban-local government, followed by municipalities, which cover smaller urban areas, and union parishes, which cover rural areas. City corporations are responsible for providing a range of services, including water supply, sanitation, solid waste management, roads, and transportation (Ahmed and Hossain, 2020). A number of studies have been conducted on governance in urban local government in Bangladesh. Most of these studies have focused on the challenges and issues faced by urban-local governments in providing basic services to citizens. For example, a study by Hossain and Ahmed (2018) found that weak governance, a lack of accountability, and corruption were major obstacles to the effective delivery of basic services in urban areas. Moreover, Hossain and Rahman (2019) examined the role of citizen participation in governance in the urban-local government in Bangladesh. The study found that citizen participation was critical to improving the quality-of-service delivery and promoting accountability in urban-local government. Nonetheless, urban population growth is increasing quickly, which has led to significant demand for a number of basic services (Stren and White, 1989). This demand includes access to clean water, sanitation, and waste management systems. Failure to meet these needs can result in negative health and environmental consequences for urban residents.

Seddiky (2019) cites a number of factors as major barriers to the local government providing healthcare

services for the community, including financial limitations, a lack of coordination and information, a shortage of skilled workers, persistent decentralization issues, political instability, and corruption. According to Bhuiyan 2010, a well-constructed public-private partnership can ensure efficient solid waste management and, as a result, good urban governance in Bangladesh. Moreover, there is little citizen satisfaction with city governments (Mahmud, 2021). In this regard, lack of coordination prevents the provision of necessary services (Panday & Panday, 2008). This highlights the need for effective communication and collaboration between city governments and citizens to improve service delivery and increase satisfaction. Additionally, implementing innovative solutions such as digital platforms can help bridge the gap between citizens and governments. Local urban governments don't have the necessary power, independence, or resources. Additionally, there is insufficient citizen participation (Chowdhury & Aktaruzzaman, 2016). The coordination of agencies working in urban areas is still very difficult (Rahman, 2015; Panday & Jamil, 2011). The central government retains a significant amount of overall control over local and urban areas while granting local governments a limited amount of authority, functions, and sovereignty (Sharmin et al., 2012). Chowdhury and Deb (2012) investigate how the urban local government makes a significant contribution to the delivery of services to the general public.

Rahman and Hassan (2006) examine how solid waste, industrialization, slums, drainage systems, etc. can be detrimental to urban environments. All these, in effect, are caused by poor governance. Keeping the same view, Ahmed (2005) explained how the complex socio-economic environment of urban areas had led to problems in urban services and infrastructure. To solve these problems, governmental policies and the effective roles of local government and NGOs are very important. Like other previous researchers, Jahan (2005) also agreed through her research findings that a lack of appropriate urban policy and planning, problems in financial management, and institutional weakness always lead to poor quality of civic services in urban Bangladesh. As a result, municipal services are not properly delivered to stakeholders, which creates problems in urban areas. Similarly, Ahsan and Rahman (2013) emphasized appropriate legal, institutional, and community action for promoting urban sustainable development, i.e., to defeat the loss of natural resources, improve the living environment, and reduce local pollution. As Gazipur City Corporation (GCC) is the research area, the water and sanitary conditions in this neighborhood are not so good. The majority of individuals in the GCC do not have access to soak pits (79%), and the bulk of them (88%) utilize latrines connected to septic tanks or pits. Tanks are not cleaned on a regular basis. Users, however, rarely empty their pits or tanks on time unless they overflow, and cleaning is urgently required. HHs typically employ sweepers to clean the pit and dispose of the sludge in sewers, rivers, or in other open areas, which pollutes the water sources. According to Abul Hasnat's research, older people who live in ancient homes have better access to water, sanitation, and hygiene practices than those who live in communities. Elderly adults who still lived at home were more knowledgeable about sanitation and hygiene procedures. It was related to age and education. They also advocate for the provision of senior-friendly, easily accessible, clean water facilities, appropriate hygiene education and logistics, and accessible, dependable sanitation in order to improve the lives of the elderly (Hasnat, 2019). As a result, local self-government is critical for ensuring clean water and sanitation. Although historically the public sector has been in charge of delivering water services, private money should now be involved. Public finance may find it challenging to meet everyone's requirements, but business and private citizens can contribute money to build and maintain water infrastructure (Mao, 2022).

According to Haque (2019), services are provided by local government organizations in terms of managing solid waste, drainage, environmental concerns taken into account when developing new projects, and other environmental concerns. He has discovered that it is challenging to locate services related to the mentioned issues. The standard of service rendered contrasts with the topic of Pourashava's status. Not to mention, Bangladesh is falling short in terms of achieving national long-term growth. But there are also some barriers to an LSG for ensuring clean water and sanitation. According to a report published by the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) in 2005, the lack of adequate financial support and inefficient human resources are the main reasons for facing similar governance problems such as air pollution, illegal liquid waste dumping, inadequate drainage, water contamination, and poor solid waste management, among other things by the urban governments. Rapid and uncontrolled development presents environmental risks by affecting health and safety on a local level. Furthermore, local self-governments are financially dependent on the central government, and they are unable to make decisions (UN. ESCAP, 2005). Azad and Fan (2017) argued in their article that improving institutions is essential for ensuring that people have access to clean water and sanitary conditions. The amount of money allocated to the WASH sector in the national budget is insufficient. WASH goals will need to be attained through more funding as well as improved accountability across agencies. Currently, local governments are technically in charge of WASH although central departments continue to carry out a sizeable portion of capital investment projects. More opinions from voters and elected officials would help create much-needed focus (Azad and Fan, 2017). Some steps were suggested by Chowdhury (2019) for guaranteeing clean water and sanitation in metropolitan areas. Increased local income sources and grants from the government must come first. Second, there needs to be enough people, and they need to be well trained. Third, careful planning is necessary to guarantee service quality and prevent financial waste. Fourth, the Pourashava must be protected from political meddling and corruption by appropriate procedures (Chowdhury, 2019). Jahan et al. (2005) considered that rapid urbanization needs effective urban local governance and proper delivery of civic services. In Bangladesh, a lack of appropriate urban planning, and budget management issues always result in poor quality municipal services provided by the Pourashavas. As a result, environmental issues such as solid waste management, land management, pollution control, urban poverty, town planning, public health, and others are not appropriately addressed, which is the main reason for causing problems in towns. To address these issues, an effective urban government is required. According to Fakier et al. (2005), local governments play an important role in environmental management by ensuring service delivery and the execution of the central government's environmental policies, plans, and programs. Rahman et al. (2001) look at how urban services, urban management, solid waste management, and other factors contribute to a healthy and sustainable environment. At the urban level, industries have negative environmental effects such as damaged drainage systems, health issues in slum areas, water contamination, unsanitary conditions, and improper rubbish disposal. All of them are the result of poor urban planning.

Governance is an important factor in the effective delivery of environmental services by urban-local governments in Bangladesh. The study underscores the need for measures to improve governance and accountability in urban-local government, including strengthening citizen participation, improving financial management, and increasing transparency in decision-making processes.

3.0 Methodology of the Study

This study aims to assess the role of urban-local government in providing basic services by taking the Gazipur City Corporation (GCC) in Bangladesh as a case study. To achieve this, a mixed-methods approach has been employed, including both qualitative and quantitative data collection and analysis. Qualitative research method involves gathering data through open-ended questions and observations, while quantitative research method involves gathering data through numerical measurements and statistical analysis. The combination of both methods allows for a more comprehensive understanding of the research topic. Qualitative data has been collected through in-depth interviews with key stakeholders such as government officials, local representatives, and citizens. A semi-structured interview guide has been developed to ensure consistency in the data collected. The interviews have been conducted face-to-face or via telephone, depending on the availability of the participants. The interviews have been audio-recorded with the permission of the participants, and detailed notes have also been taken. The qualitative data collected have been analyzed thematically using the SPSS software.

Quantitative data has been collected through a survey of GCC citizens to assess their satisfaction with basic services provided by the GCC. The sample size of the study is 300 among which 275 are service seekers (households), 15 are FGD respondents, and 10 are service providers including elected representatives and government officials who are responsible for delivering basic services in the corporation area. A structured questionnaire has been developed, pretested, and administered. The questionnaire has been consisted of closed-ended questions with options ranging from strongly agree to strongly disagree. The survey has been conducted through face-to-face interviews or via an online platform, depending on the preference of the participants. The quantitative data collected has been analyzed using descriptive statistics and inferential statistics such as chi-square tests and regression analysis. The qualitative and quantitative data collected have been integrated to provide a more comprehensive understanding of the role of urban-local government in providing basic services. The findings from the qualitative data analysis have been used to contextualize and explain the quantitative data findings.

4.0 Results and Discussion

Environmental protection is one of the major duties of a City Corporation. Environmental protection means caring for our resources and subsequently for ourselves and ensuring a sustainable future for generations to come will have a better environment. Everyone is a stakeholder as we are all inhabitants of this one and only mother earth. Each person has the responsibility something to advance environmental pollution mitigation measures. The Bangladesh Environment Conservation Act (BECA), 1995, provides provisions for the conservation of the environment, improvement of environmental quality, and control and mitigation of the pollution of the environment. Where a person or a group of persons or the public suffers a loss due to violation of a provision of the Act or the rules made there under or a direction issued under section 7, the Director General may file a suit for compensation on behalf of that person, group or the public (The Bangladesh Environment Conservation Act § 15 (a), 2002). The Local Government (City Corporation) Act, 2009 provides several provisions that are relevant to environmental services.

The Corporation shall provide a sufficient number and in the proper situation of latrines and urinals separate for each sex in the city (Local Government Act, Bangladesh Gazette § 1.8 – 41, 2009). It will ensure the cleanliness of public privy and urinals, and ensure the private ones are cleaned and operated

in order (Local Government Act, Bangladesh Gazette § 1.9 – 41, 2009). The Corporation may from time to time set apart suitable places for use by the public for bathing, washing clothes, or drying clothes (Local Government Act, Bangladesh Gazette § 8.12 – 41, 2009). The Corporation will also take steps for the conservation and management of water bodies within the city in accordance with the provisions of the Water Body Act (Local Government Act, Bangladesh Gazette § 8.17 – 41, 2009). The Corporation may establish and maintain public markets, and secure the proper management of such markets (Local Government Act, Bangladesh Gazette § 12.1 – 41, 2009).

The study tried to measure the level of satisfaction of the stakeholders of GCC on environmental services. During the interview, most of the respondents gave the worst rating on the overall environmental services of GCC. 54.9% of the respondents think that the state of environmental pollution control of GCC is too bad whereas it is bad according to 34.5% of respondents. Very few respondents (5.8% and 0.7%) consider this as good or very good (Table 1).

Table 1: Level of Satisfaction with Environmental Services

Variables	Level of Service				
	Too bad (%)	Bad (%)	Neutral (%)	Good (%)	Very good (%)
Waste collection and disposal	164 (59.6)	74 (26.9)	17 (6.2)	20 (7.3)	-
Drainage management	160 (58.2)	64 (23.3)	19 (6.9)	31 (11.3)	1 (.4)
Sewerage system	156 (56.7)	78 (28.4)	10 (3.6)	30 (10.9)	1 (.4)
Mosquito control	145 (52.7)	71 (25.8)	21 (7.6)	36 (13.1)	2 (.7)
City Planning	114 (41.5)	74 (26.9)	40 (14.5)	42 (15.3)	5 (1.8)
City Beautification	120 (43.3)	90 (32.7)	42 (15.3)	19 (6.9)	4 (1.5)
Water supply	179 (65.1)	47 (17.1)	24 (8.7)	25 (9.1)	-
Environment pollution control	151 (54.9)	95 (34.5)	11 (4.0)	16 (5.8)	2 (0.7)
Tree plantation activities	89 (32.4)	90 (32.7)	54 (19.6)	35 (12.7)	7 (2.5)
Public toilet services	154 (56)	100 (36.4)	11 (4.0)	10 (3.6)	-
Graveyard and cremation management	64 (23.3)	66 (24.0)	43 (15.6)	98 (35.6)	4 (1.5)
Hat-bazar management	70 (25.5%)	118 (42.9%)	40 (14.5%)	44 (16%)	3 (1.1%)
Butchery management	55 (20%)	121 (44%)	69 (25.1%)	29 (10.5%)	1 (0.4)

[Source: Field Survey, 2022]

The rapid expansion of cities takes place without any land use planning strategy and the result of human pressure has highly damaging effects on forests, landscapes, as well as green areas in and around cities. The environmental impacts of urbanization are often intensified by climate change and include increased pollution, decreased availability of food and resources, as well as increased poverty, and frequency of extreme climatic events. Urban trees can help mitigate some of the negative impacts and

social consequences of urbanization, and thus make cities more resilient to these changes. Tree plantation activities are too unsatisfactory according to 32.4% of respondents and unsatisfactory by 32.7. Only 19.6% of respondents have taken a neutral position, 12.7% think it is good and 2.5% think it is very good (Table 1).

Proper bazaar management is of utmost importance for well-planned urbanization. It is one of the prime responsibilities of a City Corporation to establish and maintain a public market and secure the proper management and sanitation of such markets (Local Government Act, Bangladesh Gazette § 12.1 – 41, 2009). But hat-bazaar management is too bad according to 25.5% of respondents and 'bad' according to 42.9% of respondents. Only 14.5% of respondents remained neutral, 16% think it is good and only 1.1% think it is very good (Table 1).

Regarding butchery management, the legal framework provides that the City Corporation shall provide and maintain at such sites or sites within or without the limit of the city as the government may approve one or more slaughterhouses for the slaughter of animals or of any specified description of animals (Local Government Act, Bangladesh Gazette § 14, 2009). While interviewed, butchery management services of GCC is rated 'too bad' by 20% of the respondents, 'bad' by (44%), 'neutral' by 25.1%, and 'good' by only 10.5% of the respondents (Table 1).

Public toilets are vital components in creating a sustainable, accessible, and inclusive city. But lack of regulation or compulsory standards results in poor toilet design, inadequate maintenance and management, and unhygienic conditions, resulting in the spread of diseases. In GCC, this service is considered 'too bad' by the majority of respondent (56%) and 'bad' by 36.4% of respondents. Only 3.6% of respondents are happy in this regard and 4% of respondents remained neutral in this regard (Table 1).

Parks and recreation facilities are the places that people go to get healthy and stay fit. Parks are a tangible reflection of the quality of life in a community. They provide identity for citizens and are a major factor in the perception of quality of life in a given community. Parks and recreation services are often cited as one of the most important factors in surveys of how livable communities are. They provide gathering places for families and social groups, as well as for individuals of all ages and economic statuses, regardless of their ability to pay for access. Gazipur has a number of government and non-government entertainment centers. Among them, Bangabandhu Sheikh Mujib Safari Park and Bhaoual National Zoo are worth mentioning.⁴ According to an estimate by the district administration, there are at least 200 parks and recreation centers in the Gazipur district. These centers should be maintained properly. In GCC, recreation centers are not sufficient. Respondents were asked to give their opinion in this regard. Findings reveal that park, playground and entertainment services are too bad according to a huge number of respondents (72.4%). Not only this, 17.5% of respondents thought that it is bad. Only 5.4% and 0.4% of respondents gave ratings on good and very good criteria respectively. 4.4% of respondents remained neutral in this regard (Table 1).

A burial ground, cemetery, or graveyard is an integral part of any urban community. Urban planning must consider where the dead will reside. A City Corporation has the duty to provide suitable places for the burial and burning of the dead and shall take necessary steps for the proper maintenance and administration of such burial and burning places (Local Government Act, Bangladesh Gazette § 23.1

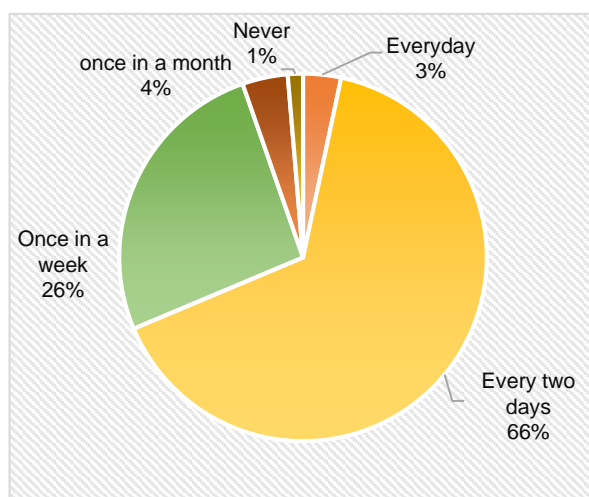
⁴Independent Television. (2019b, January 26). Gazipur Hobe Adhunik Porjoton Nagari (Gazipur will be the modern tourism city) [Video]. YouTube. <https://www.youtube.com/watch?v=RnXSo2gn-aU>

– 41, 2009). In GCC, graveyard and cremation management is very bad according to 23.3% and is considered ‘bad’ by 24% of the respondents. Only 35.6% and 1.5% of respondents think this service is good and very good respectively (Table 1).

4.1 Waste Management Services

Waste management is one of the key responsibilities of the GCC, as it plays a crucial role in maintaining a clean and healthy environment for the residents of the city. The GCC has set up a system for the regular collection and transportation of waste from households, commercial establishments, and public areas. This involves the use of garbage trucks and other equipment to collect waste and transport it to designated dumping sites. The GCC has set up waste management facilities, including landfills and waste transfer stations, to handle the large quantities of waste generated in the city. These facilities are designed to ensure proper disposal of waste and minimize the impact of waste on the environment. Even though the GCC is a far way for ensuring sustainable waste management in this area.

Figure 1: Frequency of Collecting Waste



[Source: Field survey, 2022]

The GCC is did not collect waste from household regularly. From the above Figure 1, we understand that only 3% of respondents say, everyday GCC collects waste. Moreover, 1% of respondents think that GCC never collects waste from their area. 22% of respondents believe that GCC collects waste once a week.

Table 2: Role of GCC in Waste Management

Variables		Frequency	Percentage
Proper initiatives	Yes	89	29.7
	No	211	70.3
Proper supervision	Yes	84	28.0
	No	216	72.0
City corporation plays no role	Yes	102	34.0
	No	198	66.0

[Source: Field survey, 2022]

Table 2 indicates that out of the total respondents surveyed, 89 stakeholders (29.7%) reported that proper initiatives are taken to address the waste management issue, while 211 stakeholders (70.3%) reported that proper initiatives are not taken by the GCC. Table 2 also shows that 84 stakeholders (28.0%) reported that there is proper supervision, while 216 stakeholders (72.0%) reported that there is not. So, the GCC does not take any necessary initiatives as well as any proper supervision regarding waste management.

The data presented in Table 2 indicates that a significant majority of the respondents, approximately 72%, reported that there is no proper supervision regarding waste management. This suggests that the local authorities of GCC responsible for waste management may not fulfill their duties adequately, or that there may be other factors contributing to the lack of proper supervision. The fact that only 28% of the respondents reported that there is proper supervision. They also think that there may be a lack of awareness or information regarding the waste management practices being implemented in the area. It is possible that the respondents who reported that there is proper supervision may be more familiar with the waste management practices, or that they have had more positive experiences with the authorities responsible for waste management.

Table 3: Relationship between Waste Collection and Proper Supervision

Variables			Proper supervision		Total
			yes	no	
Waste collection and disposal system	Very bad	f	64	100	164
		%	76.2%	46.3%	54.7%
	Bad	f	17	57	74
		%	20.2%	26.4%	24.7%
	Neutral	f	3	40	43
		%	3.6%	18.5%	14.3%
	Good	f	0	19	19
		%	0.0%	8.8%	6.3%
Total	f	84	216	300	
	%	100.0%	100.0%	100.0%	

[Source: Field survey, 2022]

Table 3 indicates that 54.7% (n = 164) of respondents think that the overall waste management system in the GCC is very bad. In this regard, the GCC should take immediate action to save our environment by managing waste properly. To understand the lack of proper supervision, a Chi-square test was performed. The chi-square test results are presented in Table 3. The chi-square test was statistically significant, $\chi^2(4, N = 300) = 27.631, P < 0.05$, with Phi and Cramer's V (ϕ) coefficients of 0.303, indicating a strong relationship between proper supervision and the waste management system in the GCC. The results of the chi-square test presented in Table 4.3 reveal that the relationship between proper supervision and waste management systems in the GCC is strong, with a statistically significant chi-square value of $\chi^2(4, N = 300) = 27.631, P < 0.05$, and Phi and Cramer's V (ϕ) coefficients of 0.303. This suggests that effective supervision plays a crucial role in ensuring efficient waste management practices in the GCC region. The findings have important implications for policymakers and waste management authorities in the region, who should prioritize investing in training programs for supervisors to enhance their knowledge and skills in managing waste effectively. Additionally, efforts

should be made to raise awareness among stakeholders about the importance of proper supervision and its impact on waste management outcomes. Overall, this study highlights the need for a collaborative approach among all stakeholders to ensure sustainable waste management practices in the GCC region. During interviews with the residents of the GCC, overall waste management services were given the worst rating. Regarding waste collection and disposal, 59.6% of the respondents rated it as too bad whereas 26.9% and 6.2% rated it as bad and neutral respectively. Only 7.3% of the respondents are satisfied with these services of the GCC (Table 1). Another study on solid waste management also found almost similar findings. This study reveals that the biggest city corporation in Bangladesh, Gazipur City Corporation (GCC), which has a population of over 2.5 million, produces a lot of domestic, commercial, industrial, and medical waste. The majority of the waste is thrown into open spaces like the side of the road, low-lying areas, water reservoirs, nearby canals, and so forth. Trash that is dumped carelessly causes major issues for city residents. To manage these large quantities of municipal solid waste, the City Corporation lacks a sanitary landfill, sufficient vehicles, adequate funding, and sufficient manpower. At the moment, GCC produces a considerable amount of solid waste from the municipality daily, resulting in a gap between supply and demand for the city's waste management (Khandker and Hossain, 2017).

Abu Bakar Siddique Akand also writes in the Daily Star regarding solid waste of Gazipur. He says that to reduce pollution of surface and groundwater, soil, and air, waste must first be discharged into a safe landfill area. These must later be gradually reprocessed, used again, and burned. Unfortunately, in a city like Gazipur, the government ignores all of the necessary procedures. To make the area at Baimail look like a collection of garbage mountains, all they do is pile various types of trash in the open space next to the Dhaka-Tangail highway. Alarmingly, for the past eight years, Gazipur City Corporation has been disposing of waste in this manner. The only justification offered by the authorities during this process—despite being tasked with making arrangements for one—is that they do not have a landfill. They consistently respond, "We are looking for a piece of land," when questioned. The city corporation claims that the city produces up to 2,500 metric tons of waste per day, including hazardous material, and that all of it is dumped there. There are about 90 trucks and 65 vans working on the project. Residents of the area are the worst affected by this unabated waste dumping (Siddique, 2020).

4.2 Drainage Management Services

A healthy and livable city requires a proper drainage system. When it rains, water runs over the ground, picking up faces and contaminating water sources in areas with poor drainage and sanitation systems. This creates an unbalanced environment that contributes significantly to the transmission of illnesses like cholera and typhoid and may raise the risk of developing worm infections from soil contaminated by human faces. One of the new and difficult issues in urban environmental management in our nation is drainage. According to the Local Government Act, Bangladesh Gazette 8.7–41, 2009, the Corporation is responsible for providing a sufficient system of public drains in the city area. All such drains will be built, maintained, kept clear, and emptied with due regard for the health and convenience of the public. One of Bangladesh's largest cities, Gazipur, has a disorganized drainage system. Most of this city's areas lack a planned drainage system, and the majority of homes haphazardly dump their waste into the available drains (Ullah et al., 2013). A city's drainage infrastructure is essential because it largely determines the beauty, health, and convenience of the city. It takes a strong drainage system to maintain a clean, sanitary city. A city's drainage system can guarantee the management of both liquid and solid waste. It can be extremely helpful in reducing the issue of water logging and in providing the city with

suitable sanitation facilities. However, field research revealed that Gazipur City's drainage system is filthy, which causes significant suffering for the local populace. The city's environment and residents' standard of living have declined as a result of drainage system leaks and unforeseen events. It both pollutes the environment and causes a lot of problems for city residents.

Table 4: Role of GCC in Drainage Management System

Variables		Frequency	Percentage
Regular drain cleaning	Yes	1	0.3
	No	299	99.7
Is there enough drain	Yes	25	8.3
	No	275	91.7
Preventing connecting drains and toilet	Yes	1	0.3
	No	299	99.7
Punishing the violators	Yes	2	0.7
	No	298	99.3

[Source: Field survey, 2022]

Table 4 indicates that only one person (0.3%) reported that regular drain cleaning is carried out by the GCC, while 299 stakeholders (99.7%) reported that it is not. Moreover, Table 4 also indicates that 25 stakeholders (8.3%) reported that there is enough drain capacity in the city, while 275 stakeholders (91.7%) reported that there is not.

Table 4 also indicates that only one person (0.3%) reported that the city corporation is preventing connecting drains and toilets, while 299 stakeholders (99.7%) reported that it is not. In this context, the low number of respondents who reported that regular drain cleaning is being carried out, and the high number of respondents who reported that there is not enough drain capacity, suggests that the city corporation does not take adequate measures to manage the drainage system effectively. Similarly, the low number of respondents who reported that the city corporation is preventing connecting drains and toilets, and punishing violators suggest that there is a lack of enforcement of regulations and policies related to drainage management. It is essential for the city corporation to take note of these concerns and take appropriate actions to improve the drainage management in Gazipur City. This may include increasing the frequency of drain cleaning, investing in new drainage infrastructure, enforcing regulations to prevent illegal connections, and imposing penalties on violators to ensure compliance with drainage rules and regulations. By addressing these concerns, the city corporation can help ensure its residents' health, safety, and well-being and promote sustainable urban development.

There is no sewage treatment facility or sewer system in Gazipur. Fecal sludge is either transferred and dumped into the Kodda dumpsite after manual emptying, or it is discharged into the open drain and nearby ditches. All of the city's waste—organic, inorganic, solid, and fecal sludge—from businesses, residences, and public and private institutions is brought to the dumpsite (0.02 square kilometers). There are no barriers or waste management-related design elements; it is merely an open field. Therefore, none of this excrement is treated. The issue of fecal sludge's inappropriate final disposal is one that the municipal government is aware of (Water Aid Bangladesh, 2018).

Respondents were asked if they are satisfied with the drainage and sanitation services of the GCC. 58.2% of the respondents think that drainage management is too bad and 23.3% think that it is bad. Only 11.3%

of respondents gave a good rating of this service. The sewerage system and services of the GCC are also given the worst rating by the respondents. It is rated 'very bad' by 56.7% of respondents, 'bad' by 28.4%, and 'good' by only 10.9% of respondents (Table 1). An online newspaper also reports that.

Despite having a total area of 329 square kilometers, the GCC lacks storm drains, which causes water logging, traffic congestion, and general suffering. The city's drainage system does not even appear on the authorities' to-do list for improvement. Some ground drains only extend across a 10–12 km² portion of the city. Some of the busiest areas of the city are Konabari, Chandana Chourasta, Bason, Gacha, Bhogra, Choydana, and Boardbazar, but they lack an adequate drainage system. These areas always experience flooding problems after heavy rains (Mamun, 2018).

In GCC, improper drainage and sewerage services are the main causes of breeding mosquitoes in the city areas and it is now a prime concern for the city dwellers. Experts say that the number of Culex mosquitoes spreads diseases like avian malaria, filariasis, etc. They think that open drains and water bodies in the city covered with organic matter provide food and a conducive breeding environment for Culex mosquitoes (Khaled, 2020). A study also found that manholes are important breeding sites for Culex mosquitoes in GCC (Rahman, 2018). But authorities concerned do not take proper steps to clean those drains and water bodies regularly and maintain these manholes properly.

A leading newspaper of the country reports that the government's major export, ready-made clothing, is produced in large quantities in Gazipur, which has experienced rapid urbanization over the past two decades. The city of more than two million people currently lacks a centralized sewerage network and a wastewater treatment facility. The decentralized systems used by nearly 70% of the 230,000 households in the Gazipur and Tongi areas typically consist of a traditional septic tank and pit latrines, while the remaining 30% discharge their wastewater directly into drainage systems or bodies of water (IFC to facilitate first wastewater management in Gazipur under PPP, 2020).

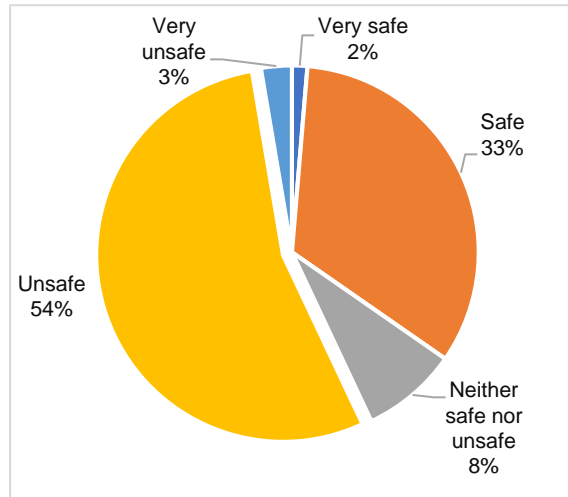
During the interview, it is also found that in GCC, residents are not happy at all with the activities and initiatives of the authority to control mosquitoes. 52.7% of the respondents think that the mosquito control system of the GCC is too bad whereas 25.8% think it is bad. The factors that are basically to be blamed by them for this situation are the absence of effective measures by the city authority and the lack of adequate logistics support. However, very few respondents (7.6%) think that it is neither good nor bad and only 13.1% of respondents are satisfied with these services saying that the mosquito control service of the GCC is good (Table 1).

4.3 Supplying Available Water

The GCC is in charge of managing the water supply system in the city, which includes the treatment, distribution, and supply of water to households, commercial establishments, and public facilities. The GCC has implemented a number of initiatives to ensure a reliable and safe water supply to the residents of the city. Moreover, it has set up a network of pipelines and reservoirs to ensure that water is distributed to all parts of the city. This involves regular maintenance and repair of the pipelines and reservoirs to prevent leaks and ensure an uninterrupted water supply. The GCC provides water through a series of pipes running across the city, this supply system also uses water pumped up from the ground. Moreover, 32% of the respondents stated that they have their own submersible pumps that they use to raise water from the ground. Overall, 99.0% of all respondents utilize groundwater for everyday activities including drinking, washing, and other needs. According to Figure 3, 54% of the total respondents in GCC believe that drinking water is poor quality and unsafe. On the other hand, only 33%

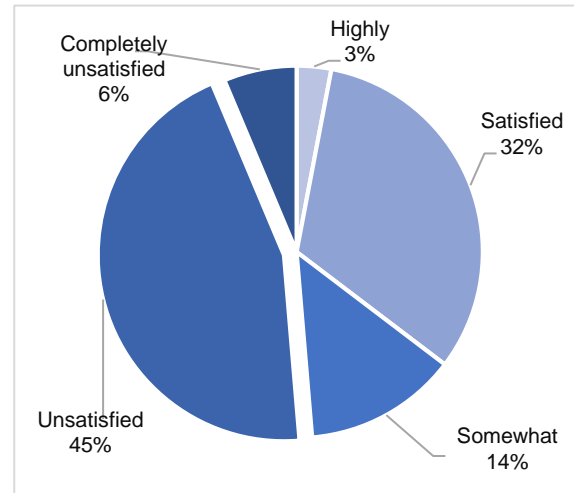
of respondents feel their used water is safe. As most of the residents of GCC mainly rely on government provided water sources. In this context, GCC can't played an important role for providing safe drinking water to its residents.

Figure 2: Safety of Drinking Water



[Source: Field survey, 2022]

Figure 3: Satisfaction in Water Supply



[Source: Field survey, 2022]

The GCC is not capable of providing available water to its citizens. A large number of stakeholders in this area have complained that they do not always have access to water. Moreover, drinking water is not so improved. In this context, it is clear to us that residents of GCC are not satisfied with the water supply. Figure 3 shows that 45% of the respondents are not satisfied with the water supply. On the other side, only 32% of the respondents are totally satisfied with the water supply.

From Table 5, we observe that around 117 respondents were dissatisfied with the water supply. To understand the main reason for their dissatisfaction with the water supply, a chi-square test was performed. Chi-square test results are presented in Table 5 where the underlined reasons are statistically and significantly (at 95% confidence interval, $p < 0.05$) associated with the dissatisfaction of city dwellers with the water supply. From Table 5 it can be identified that negligence of the authority, water supply, and difficulty is establishing their tube well are the major causes of dissatisfaction among city dwellers. Out of 117 respondents (total respondents were 300 and among them, 117 respondents were not satisfied) who claimed negligence of the authority as the cause about 44.5% were dissatisfied and 5.7% were completely dissatisfied with the water supply in the City Corporation area, whereas, who claimed water shortage as a reason among them about 30.8% were dissatisfied and 30.8% were completely dissatisfied. Besides that, 93.3% of respondents were dissatisfied because of establishing their well.

Table 5: Reasons for Dissatisfaction in Water Supply

Reasons for the problem	Satisfaction with water supply			Chi-square Statistics (Observed sample size, df) p-value
	Satisfied	Unsatisfied	Completely Unsatisfied	
Negligence of the authority	f	89	117	15
	%	33.8%	44.5%	5.7%
Unaware local people	f	-	-	-
	%	-	-	-
Water shortage	f	1	4	4
	%	7.7%	30.8%	30.8%
Difficulty establishing own tube-well	f	-	14	-
	%	-	93.3%	-

[Source: Field survey, 2022]

4.4 Climate Change Adaptation Services

A correlation matrix is built using five variables to understand the relationship between various variables related to climate change (Table 6). The correlation matrix shows that there is a significant relationship between food security and factors like health security, income security, economic security, and social security. There is a strong relationship between food security and economic security, income security and economic security, and food security and social security. From this correlation matrix, we understand that climate change can have a very positive impact on the everyday lives of citizens. In this aspect, the Gazipur City Corporation didn't perform its necessary activities to ensure the professional security of the city dwellers. Climate change has become a significant concern for global security, and it is also affecting food security and social security. The correlation matrix shows that climate change can have both positive and negative impacts on citizens' lives. On the one hand, it can lead to increased agricultural productivity in some regions, while on the other hand, it can cause droughts and floods that threaten food security. Social security is also at risk as climate change can exacerbate poverty and inequality, leading to social unrest. Unfortunately, the Gazipur City Corporation has failed to provide adequate professional security for its residents. This lack of action could lead to increased crime rates and endanger the safety of citizens. It is essential for governments to prioritize climate action and ensure that their citizens are protected from its negative impacts. By investing in sustainable development practices, we can build a more secure future for everyone.

Table 6: Relationship between Various Variables Related to Climate Change

	1	2	3	4	5
Food security	1				
Health security	.497**	1			
Income security	.706**	.705**	1		
Economic security	1.000**	.497**	.706**	1	
Social security	1.000**	.497**	.706**	1.000**	1

**Correlation is significant at 0.01 level.

5.0 Conclusion and Recommendations

Delivering necessary services to the GCC is a complex and challenging task. The city faces a range of issues related to limited water resources, water pollution, climate change, poor governance, and financial constraints. These issues impact the quality of life for many residents, and urgent action is needed to address them. To improve service delivery in the GCC, a comprehensive approach is needed that addresses the underlying challenges related to governance, finance, and infrastructure. Moreover, community engagement must be prioritized to ensure that the needs of city residents are included in any long-term plans. Short-term measures, such as increased investment in waste management and drainage maintenance will also help to alleviate some of the most pressing challenges in the short term. The city administration should enhance transparency and accountability, invest in public infrastructure, improve revenue collection, strengthen public-private partnerships, enhance data-driven decision-making, and prioritize equity in resource allocation. It is crucial that GCC should take immediate action to implement these recommendations, as the consequences of inaction could be severe and long-lasting. By working together with residents, businesses, and other stakeholders, the city can overcome these challenges and deliver necessary services that improve the quality of life for all residents. GCC is facing several challenges in providing adequate services to its residents. To address these challenges and improve service delivery in the city, the following recommendations can be implemented:

The GCC should focus on building its institutional capacity by recruiting and training qualified personnel, improving administrative systems and processes, and promoting transparency and accountability in decision-making. This can be achieved through effective human resource management practices, capacity-building programs, and the modernization of administrative systems.

The GCC should establish effective monitoring and evaluation mechanisms to track the performance of service delivery and identify areas that need improvement. This may involve setting up performance indicators, conducting regular evaluations, and using technology for data collection and analysis. Monitoring and evaluation can provide insights into the effectiveness of service delivery efforts and help identify areas that require attention and improvement.

The GCC should prioritize useful financial management practices, including budgeting, accounting, and auditing, to ensure transparent and accountable use of resources. This includes promoting efficient and effective financial planning, revenue collection, and expenditure management to optimize resource utilization and improve service delivery.

The GCC should invest in public infrastructure, such as waste management, water supply and sanitation facilities. This can improve the quality of life for residents and attract private sector investment. The GCC should prioritize equity in the allocation of resources. This can help to ensure that all residents have access to basic amenities such as water supply, sanitation, and health care. Basic services like water supply, sanitation, and health care need to be improved to meet the growing demand of the population. This can be achieved by investing in modern technologies, increasing the availability of skilled personnel, and ensuring that services are accessible to all.

Citizen participation can help ensure that services are responsive to the needs of the community. This can be achieved by increasing the availability of information, engaging citizens in decision-making, and creating platforms for feedback and complaints. The GCC can work with civil society organizations and community groups to develop community-led initiatives to improve service delivery.

The implementation of the recommendations mentioned above can help improve environmental service delivery in the GCC. Moreover, these recommendations can serve as a roadmap for the GCC to

overcome the challenges of governance in environmental service delivery and achieve more effective and efficient service delivery outcomes for its citizens.

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