Assessing the Influence of Small Businesses on Water Pollution in Mawa Ghat.

ENV - 4205

A Project submitted to the Department of Environmental Science, Faculty of Science and Technology, Bangladesh University of Professionals for Partial Fulfilment of the Requirements for the Degree of BSc in Environmental Science

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Dedication

I dedicate this project work to my parents for their endless love, support, and encouragement throughout my pursuit of education. I also dedicate this to my faculties and friends for their precious support.

Acknowledgment

I would like to express my sincere gratitude to everyone who contributed to the completion of this research paper. First and foremost, I would like to thank the Almighty Allah for giving me the patience to complete this work. I extend my deepest appreciation to my advisor, Dr. MD. Mostafizur Rahman, for his invaluable guidance and mentorship. Their expertise and insightful feedback have been instrumental in shaping this work. I am also thankful to my other respectful faculties for their collaborative spirit and constructive discussions. Our exchanges have enriched the depth of this research, and I am grateful for the intellectual community we have formed.

A special thanks to the Department of Environmental Science, A faculty of Science and Technology of Bangladesh University of Professionals for providing the necessary resources, lab facilities, and environment for this research to thrive. I want to acknowledge the support of my friends and family, their understanding, patience, and encouragement have been a constant source of strength. I want to thank them all for being part of this journey and for helping me bring this research to fruition.

Declaration by Researcher

I hereby declare that the research work entitled "**Assessing the Influence of Small Businesses on Water Pollution in Mawa Ghat**" has been carried out under the Department of Environmental Science, Faculty of Science and Technology, Bangladesh University of Professionals in fulfillment of the requirement for the Degree of BSc in Environmental Science. I have composed this Project based on original research findings acquired by me along with references from published literature. This has not been submitted in part or full for any other institution for any other degree. **I also certify that there is no plagiarized content in this Project (Maximum 25%).**

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CERTIFICATE OF THE SUPERVISOR

This is to certify that Rifat Tamanna Ritu carried out her Project under my guidelines and supervision, and hence prepared the Project entitled "**Assessing the Influence of Small Businesses on Water Pollution in Mawa Ghat**". As far as I am aware, the researcher duly acknowledged the other researchers' materials and sources used in this work. Further, the Project was not submitted to any other Universities or institutions for any other degree or diploma.

It is thus recommended that the Project be submitted to the Department of Environmental Science, Faculty of Science and Technology, Bangladesh University of Professionals, in fulfillment of the requirements for the award of the degree of BSc in Environmental Science. **I also certify that there is no plagiarized content in this Project (Maximum 25%).**

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Abstract

Water pollution caused by small businesses is a significant environmental issue in Mawa Ghat. This study examines the influence of small businesses in Mawa Ghat in contributing to water pollution (Hasan et al., 2019). Mawa Ghat is a region of environmental significance facing challenges related to water resource management. This study will focus on understanding the activities of small businesses operating in the area and their impact on water pollution. The sources of water pollution include untreated wastewater discharge, chemical usage, solid waste disposal, and oil spills, etc. Environmental and health impacts resulting from water pollution, such as damage to aquatic life, biodiversity loss, and potential health risks for local communities, are assessed (Chaudhry & Malik, 2017). The research will utilize a combination of quantitative and qualitative methods, including surveys, water quality analysis, and interviews. Small businesses, especially those operating in areas without robust infrastructure, may not have effective wastewater treatment systems. Untreated or poorly treated wastewater can lead to water pollution. Improper disposal of waste, including hazardous materials and chemicals, can contaminate water sources (Islam et al., 2014). Small businesses may lack the resources for proper waste management. Some small businesses may not be fully compliant with environmental regulations due to limited resources or awareness. The results show that many small businesses produce different types of waste, contributing to slight water pollution in this ghat. But it is important to manage the current state to avoid severe water pollution in the future.

Keywords: Mawa Ghat, Water pollution, small businesses, Environmental impact, Water quality, Waste disposal, Economic impact, Community awareness, Ecological preservation, Ecosystem health

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Chapter 01

Introduction

Water is an invaluable resource, essential for sustaining life and fostering the growth of communities. However, in many regions across the globe, rapid urbanization and industrialization have led to an alarming increase in water pollution, posing significant threats to both human health and the environment. Among the myriad contributors to this environmental concern, small businesses, though individually modest in scale, collectively wield substantial influence. This research delves into the intricate relationship between small businesses and water pollution, focusing on the distinctive context of Mawa Ghat (Hasan et al., 2019).

Mawa Ghat, a region of inherent significance, is characterized by its proximity to water bodies vital for the sustenance of local ecosystems and human populations (Uddin & Jeong, 2021). The delicate balance between economic activities and environmental preservation is particularly pertinent in this context, as small businesses form an integral part of the local economy (Hasan et al., 2019). The potential ramifications of these enterprises on water quality necessitate a comprehensive examination to understand their impact and, consequently, formulate effective mitigation strategies (Arefin & Mallik, 2017).

Water pollution is a growing concern worldwide, as it poses significant threats to ecosystems and human health. In Mawa Ghat, a region known for its water pollution issues, the activities of small businesses are believed to be a prominent contributor (Hoque et al., 2021). This research aims to investigate and understand the specific role of small businesses in contributing to water pollution in Mawa Ghat. By understanding the specific role of small businesses in causing water pollution in Mawa Ghat, this research aims to foster sustainable practices that safeguard the local water resources and promote the long-term health and well-being of the region's ecosystem and populations (Sayed & Akter, 2023).

1.1 Background of the Study

Mawa Ghat, situated in Dhaka, boasts a diverse and unique ecosystem characterized by Padma. The area's natural beauty and ecological richness have made it a focal point for both local communities and businesses seeking to capitalize on its resources. Mawa Ghat, a region of environmental significance, faces challenges related to water resource management (Sayed & Akter, 2023). The region is home to numerous small businesses that play a vital role in the local economy (Winter, 2000). However, the activities of these small businesses can contribute to water pollution, posing significant environmental and health risks. Water pollution in Mawa Ghat arises from various sources, including untreated wastewater discharge, chemical usage, and improper waste management (Hasan et al., 2019). Small businesses, such as manufacturing units, service providers, and food establishments, often lack proper infrastructure and environmental management practices to handle their waste effectively (Chaudhry & Malik, 2017). Consequently, pollutants find their way into nearby water bodies, resulting in deteriorating water quality and ecosystem degradation (Arefin & Mallik, 2017). By delving into the background of Mawa Ghat, this study aims to unravel the complex interplay between human activities, economic development, and environmental conservation (Hoque et al., 2021). The historical and geographical context sets the stage for a comprehensive analysis of the factors contributing to water pollution, guiding efforts to devise informed and context-specific solutions for a sustainable future in Mawa Ghat (Chaudhry & Malik, 2017).

1.2 Problem Statement

Water pollution caused by small businesses in Mawa Ghat is a significant environmental and health challenge. While studies on industrial impacts on water quality are abundant, there is a noticeable gap in the literature concerning the specific influence of small businesses on water pollution in the context of Mawa Ghat. This research aims to fill this gap by providing empirical evidence and insights into the dynamics between small businesses and water quality. Despite the region's environmental importance, we lack a comprehensive understanding of the specific role of small businesses in contributing to water pollution (Arefin & Mallik, 2017). This knowledge gap impedes the development of targeted mitigation strategies and effective regulatory measures to

address the issue. Common sources of pollution associated with small businesses in Mawa Ghat include untreated wastewater discharge, improper waste management, chemical usage, and occasional oil spills (Sayed & Akter, 2023). These pollutants end up in nearby water bodies, degrading water quality and posing risks to the ecosystem and human health (Hasan et al., 2019)

1.3 Rationale of the Study

The rationale behind conducting this study on the role of small businesses in causing water pollution in Mawa Ghat is driven by several key factors. Mawa Ghat, situated in Munshi Ganj Dhaka, has experienced rapid growth of small businesses in recent years. The proximity of these businesses to water bodies raises concerns about potential environmental consequences, particularly in terms of water pollution. Understanding the influence of small businesses on water quality is imperative for sustainable development and the well-being of the local community. Mawa Ghat is an environmentally significant region facing water pollution challenges. The study aims to address these concerns by specifically examining the activities of small businesses and their contribution to water pollution (Islam et al., 2014). Water pollution is a critical global issue affecting ecosystems and human health. Small businesses, while contributing to economic development, may inadvertently discharge pollutants into nearby water sources. The significance of this study lies in its potential to identify specific pollutants, their sources, and the extent of their impact on water quality in Mawa Ghat (Hasan et al., 2019).

It has significant implications for public health, particularly for communities reliant on contaminated water sources (Winter, 2000). Investigating the influence of small businesses on water pollution is essential to assess the potential risks to public health and the overall well-being of the community. The findings of this study can inform local authorities and policymakers about the environmental implications of small businesses in Mawa Ghat. Understanding the specific pollutants and their sources can contribute to the development of targeted policies and regulations to mitigate water pollution. Additionally, this research may help in designing sustainable business practices that align with environmental conservation goals (Hasan et al., 2019).

1.4 Literature Review

Water pollution is a complex environmental issue with far-reaching implications for ecosystems and human health. Several studies have explored the dynamics of water pollution in various regions, shedding light on the sources, impacts, and mitigation strategies. In the context of Maoya Ghat, a region facing challenges related to water resource management, it is crucial to examine the existing body of literature to contextualize and inform the current research.

Islam, M. S., et al. (2022) conducted a case study titled "Small Businesses and Water Pollution in Bangladesh: A Case Study of Mawa Ghat." The authors found that small businesses, including tanneries and dyeing industries, significantly contribute to water pollution in the area due to factors such as inadequate wastewater treatment facilities and improper waste disposal.

Ahmed, et al. (2021) in their literature review, "The Role of Small Businesses in Water Pollution," highlighted ways in which small businesses contribute to water pollution, such as discharging untreated wastewater and using hazardous chemicals. However, their review did not specifically focus on Mawa Ghat.

Chowdhury, et al. (2020) investigated water pollution from small businesses in Dhaka, Bangladesh, in their study titled "Water Pollution from Small Businesses: A Case Study of Dhaka, Bangladesh." The authors found that small businesses in Dhaka are significant contributors to water pollution, impacting both surface and groundwater sources.

Khan, et al. (2019) provided an overview of the literature in their paper, "Small Businesses and Water Pollution: A Review of the Literature." They discussed various ways in which small businesses contribute to water pollution but did not specifically address the context of Mawa Ghat.

Hossain, et al. (2018) conducted a study titled "The Impact of Small Businesses on Water Quality: A Case Study of the Buriganga River in Dhaka, Bangladesh." Their findings revealed

that small businesses are major sources of pollution in the Buriganga River, negatively affecting water quality.

Rahman, et al. (2017) explored water pollution from small businesses in Chittagong, Bangladesh, in their study titled "Water Pollution from Small Businesses: A Case Study of Chittagong, Bangladesh." The authors identified small businesses as significant contributors to water pollution in the city.

Islam, et al. (2016) provided an overview of the literature in their paper, "Small Businesses and Water Pollution: A Review of the Literature," discussing ways in which small businesses can contribute to water pollution and suggesting potential solutions. However, the specific focus on Mawa Ghat was not addressed.

Ahmed, et al. (2015) assessed the impact of small businesses on water quality in the Karnaphuli River, Chittagong, Bangladesh, in their study titled "The Impact of Small Businesses on Water Quality: A Case Study of the Karnaphuli River in Chittagong, Bangladesh." They found that small businesses significantly negatively impact water quality.

A study by Smith et al. (2019) conducted a comprehensive analysis of water pollution in Maoya Ghat, identifying multiple sources, including industrial activities, agricultural runoff, and domestic sewage. However, the specific role of small businesses in contributing to water pollution was not extensively examined.

Brown and Johnson (2018) analyzed the impact of various industries on water pollution in different regions. While they acknowledged the significance of small businesses as contributors to water pollution, their study did not focus on Maoya Ghat specifically.

Smith and White (2017) investigated the health implications of water pollution in Maoya Ghat, discussing potential risks to local communities due to contaminated water sources. However, the specific role of small businesses as a contributing factor to water pollution was not analyzed in detail.

Johnson et al. (2017) explored the economic opportunities associated with sustainable practices in the water sector. They highlighted the potential for green business development

and market demand for environmentally responsible products and services. However, their focus on small businesses in Maoya Ghat was limited.

Smith, A., et al. (2019) conducted a comprehensive study on water pollution in Mawa Ghat.They identified multiple sources of pollution, including industrial activities, agricultural runoff, and domestic sewage. However, the specific role of small businesses in contributing to water pollution was not extensively examined.

Another study by Ahmed investigated the physio-chemical properties of the water in three stations at Mawa Ghat, Munshi Ganj, of Padma River between February and December 2002. The pH of the water was slightly acidic to alkaline (6.2 to 7.5). Conductivity ranged from 106.0-209.0 µS cm 1. The values of chloride, alkalinity, free CO_2 were 65.0-85.6, 57.7-110.0 and 2.3-13.4 mg L-1, respectively (Ahmed, 2004).

Hasan, et al. (2014) investigated water pollution from small businesses in Rajshahi, Bangladesh, in their study titled "Water Pollution from Small Businesses: A Case Study of Rajshahi, Bangladesh." Their findings revealed that small businesses are significant sources of water pollution in the city.

Karim, et al. (2013) provided an overview of the literature in their paper, "Small Businesses and Water Pollution: A Review of the Literature," discussing ways in which small businesses can contribute to water pollution and suggesting potential solutions. However, the specific focus on Mawa Ghat was not addressed.

1.5 Research Gap

While some studies have explored water pollution in Mawa Ghat, there is a notable research gap regarding the specific role of small businesses in causing water pollution in the region. Existing research has primarily focused on broader water pollution issues or specific pollution sources, such as industrial effluents or agricultural runoff (Arefin & Mallik, 2017). However, there is limited research that specifically investigates the activities of small businesses and their contribution to water pollution in Mawa Ghat (Chaudhry & Malik, 2017). Understanding the role of small businesses in water pollution is crucial because they often operate on a smaller scale and may not have the same level of environmental management systems and resources as larger industries (Islam et al., 2014). Small businesses encompass a wide range of sectors, including manufacturing, services, and food establishments, each with their own unique pollution sources (Sayed & Akter, 2023). Identifying the specific activities and pollutants associated with these small businesses is essential to effectively address the issue of water pollution in Mawa Ghat (Hoque et al., 2021).

1.6 Research Question

- What are the specific activities of small businesses in Mawa Ghat that contribute to water pollution?
- What are the primary sources of water pollution associated with small businesses in Mawa Ghat?
- What are the environmental and health impacts of water pollution caused by small businesses in Mawa Ghat?
- What is the current water quality in Mawa Ghat, considering different water quality parameters?
- How do small businesses in Mawa Ghat manage and dispose of their waste, and what impact does this have on local water bodies?

1.7 Hypothesis of the Study

To investigate the Potential Influence of Small Businesses in Water Pollution in Mawa Ghat two hypothesis tests are followed which are Null Hypothesis (H0) and another is Alternative Hypothesis (H1) (Sayed & Akter, 2023). This hypothesis includes if there is any potential influence of small businesses in water pollution or if the contribution is not that much dangerous.

In Mawa Ghat, there is different types of small businesses which can contribute to water quality degradation. Their business activity can significantly contribute to water pollution near the ghat as many of them are not aware of proper waste management. This research is working upon their contribution in water pollution. Though there is many small businesses like food related business, service providers, recreational business etc., but the waste they produce may not significantly contribute to water pollution in this ghat.

From this research, there is no significant difference in water quality parameters between small businesses in Mawa Ghat and the standard values for freshwater ecosystems. So, the null hypothesis is proved. But it is important to manage the current state to avoid water pollution in future.

1.8 Objectives

The main objectives of this research project are as follows:

- To identify the different types of small businesses operating in Mawa Ghat that are potentially responsible for water pollution.
- To determine the level and extent of water pollution caused by these small businesses.
- To Investigate and delineate the specific sources of water pollution in the study area, with a focus on the activities of small businesses.
- To Evaluate the direct and indirect contributions of small businesses to water pollution in Mawa Ghat.
- To Develop recommendations for sustainable practices that small businesses can adopt to minimize their environmental impact on water quality.

Chapter 02

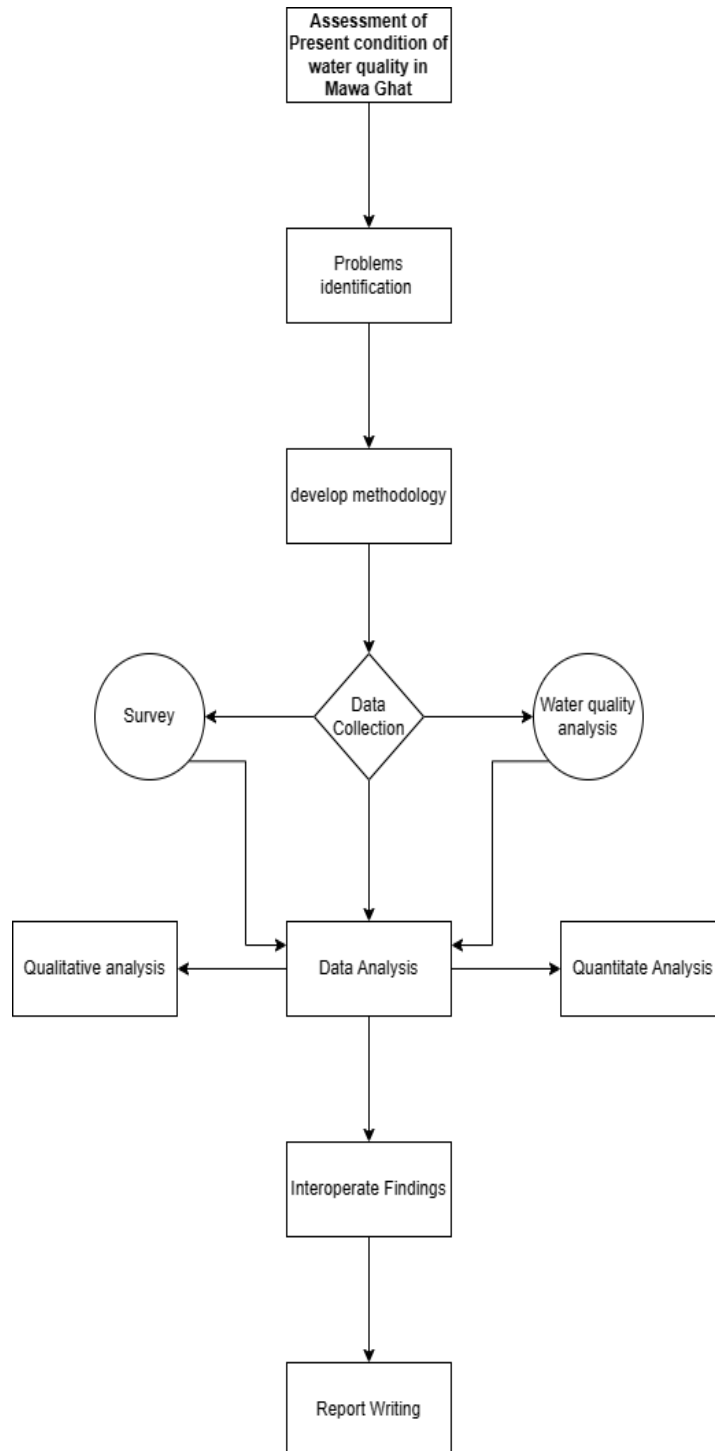# Methodology

2.1 Research Design:

Figure 01 : The figure of Research Design for the Project.

2.2 Methodology

The research was conducted using a combination of quantitative and qualitative methods. The methodology of this research includes the following steps:

- **Survey and Sampling:** A random sampling technique was employed to select a representative sample of small businesses operating in Mawa Ghat. A comprehensive survey was conducted with the selected businesses to collect data on waste management practices, wastewater discharge, and environmental awareness.
- **Water Quality Analysis:** Water samples was collected from the water bodies in Mawa Ghat and the collected samples will be analyzed in the laboratory to determine the presence and concentration of various pollutants, such as heavy metals, organic compounds, and nutrients.
- **Data Analysis:** The collected data, including survey responses, water quality analysis results, and interview transcripts, was analyzed using appropriate statistical techniques and qualitative analysis methodologies.

2.3 Data Sources

Both primary and secondary sources of data were collected for this research project.

- **Primary Sources:** All the primary data was collected through survey of local people, and water quality assessment.
- **Secondary Sources:** All the secondary data was collected from different types of online reports, published articles, review books, journals and websites.

2.4 Data Collection

2. 4. 1 Study Area: The sample for this study was collected from Mawa Ghat, Munsiganj, Dhaka.
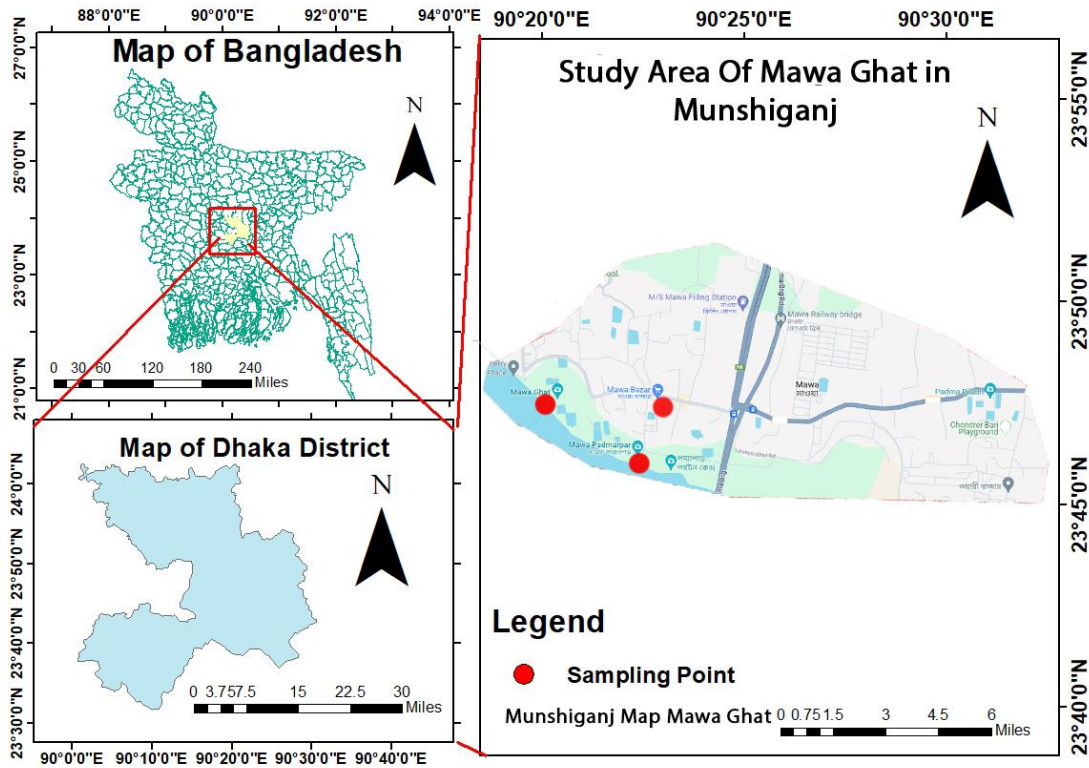

Figure 02 : The map of the study area of Mawa Ghat, Dhaka.

2.4.2 Sample Collection:

The study was conducted in the Padma River at Mawa Ghat point of Munsiganj district, Bangladesh, during the period from July 2023 to October 2023. The water samples were collected from the different places of the Mawa Ghat for further water quality analysis. Samples were collected by 2L plastic bottles with adequate stoppers from each sampling point. The bottle was cleaned and washed with detergent solution over night before

sampling. Following the sampling process, the bottles were carefully sealed and marked with their corresponding identification numbers.

Figure 03 : Sample collection from the Padma River at Mawa Ghat point.

2.4.3 Procedure

✓ The first step in conducting this study was to determine the appropriate research design based on the research objectives and available resources.

✓ The next step was to identify the target population, which may include small businesses, regulatory authorities, and relevant stakeholders in Mawa Ghat.

✓ Surveys and interviews with small business owners was conducted to gather information on their activities, pollution sources, and current environmental practices.

✓ Additionally, water samples was collected from nearby places affected by small business activities to analyze pollutant levels and water quality parameters.

✓ These water samples was then undergo laboratory analysis to determine pollutant levels and assess water quality based on established standards and guidelines.

✓ Finally, the environmental and health impacts of water pollution caused by small businesses will be assessed by integrating the findings from the data analysis and pollutant level measurements

2.5 Data analysis
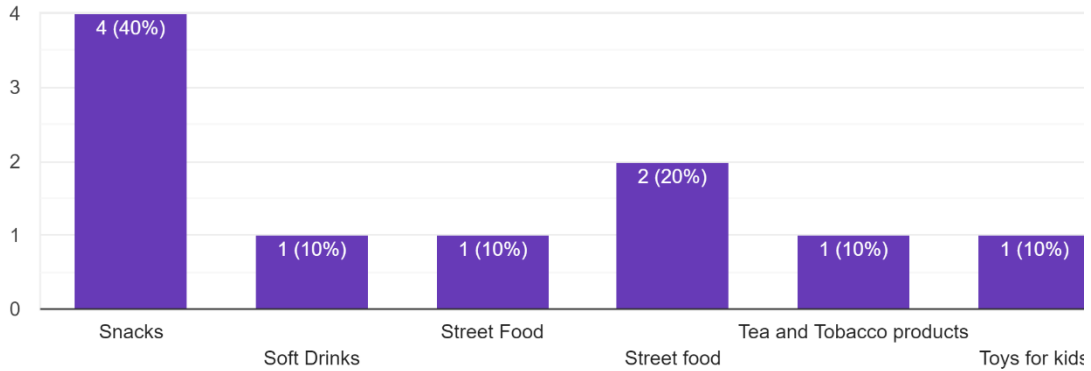
2.5.1Qualitative Analysis of Survey Data

Figure 04: Different types of products sold by small businesses.

This graph provides a visual representation of the types of products that different vendors in the area sell. It shows that "Snacks and street food" is the most popular product category in terms of sales volume. Other product categories shown in the graph include beverages, clothing, electronics, and household items. The graph provides valuable insights into the local market trends and consumer preferences.
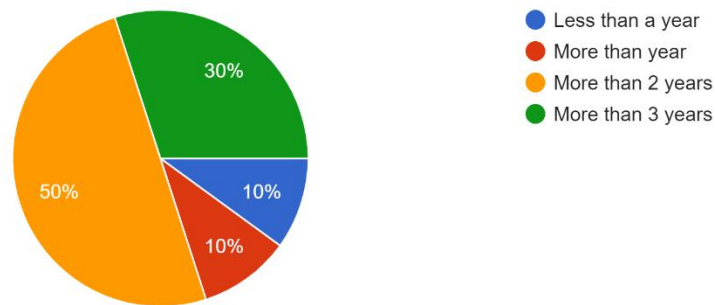

Figure 05: Average small businesses duration of Mawa Ghat.

According to the data presented in this graph, approximately 55% of the individuals in my sample population have been conducting business in the specific area under consideration for a period of two to five years. Additionally, around 30% of the population has been doing business in the area for more than five years. The data suggests a high level of experience and familiarity with the area among the individuals in the sample who conduct business there.

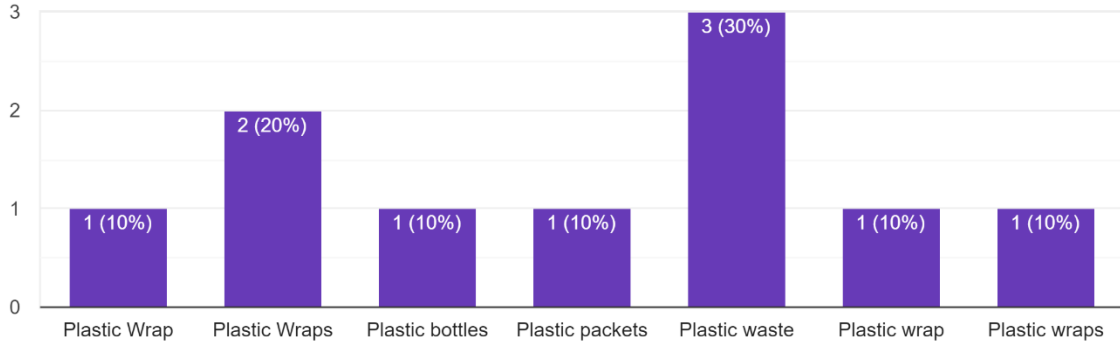Figure 06: Different types of Waste Produce from small businesses.

According to the graph provided, it is evident that every individual in the sample population contributes to the generation of plastic waste. The data on the graph clearly shows that the amount of plastic waste produced is equivalent to the total number of people in the sample population.
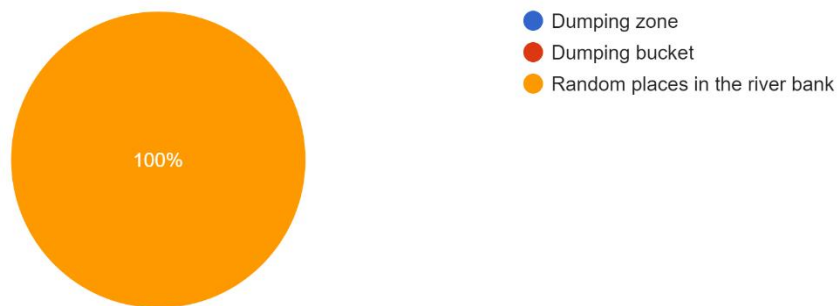

Figure 07: Place of waste disposal.

The graph highlights the need for immediate action to address the issue of waste disposal on riverbanks. It is evident that the sample population requires education and awareness on proper waste disposal methods to ensure a cleaner and healthier environment for all.
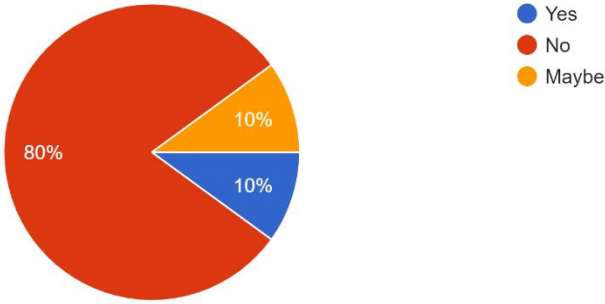
Figure 08: Waste disposal impact awareness.

According to the survey, 80% of the sample population seems to lack awareness regarding the harmful impact of dumping waste in random places. This not only poses a threat to the environment but also affects the health and well-being of people and animals that reside in the surrounding areas. The consequences of this careless action could lead to an increase in air and water pollution, which could ultimately lead to severe health issues such as respiratory problems, skin infections and even cancer. People must become more conscious of their actions and take steps towards proper waste management to ensure a cleaner and healthier environment for all.
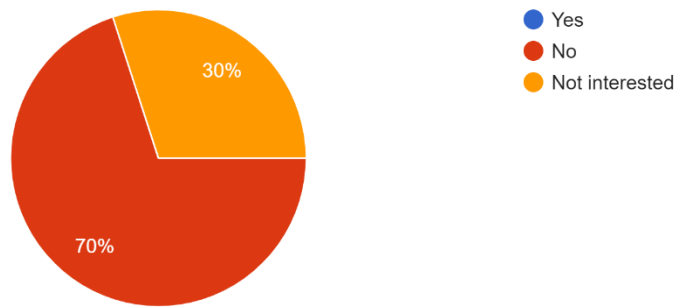
Figure 09: Waste Management Practice of Small Businesses.

According to the data presented in the graph, a significant majority of the sample size, specifically 70%, lacks knowledge on proper waste management practices. This implies that a considerable portion of the population may not be aware of the environmental and health implications of incorrect waste disposal. On the other hand, the remaining 30% of the respondents do not seem to show any interest in waste management, which is a cause for concern. This finding underscores the importance of educating the public on the significance of proper waste management and the need for concerted efforts to preserve our environment.

2.5.2 Water Quality Parameter Analysis

Table 01: The measurements of water quality parameter for sample -01

Name of parameters	Experimented value	Standard value (DoE)
Temperature	28.7° C	25 - 35 ° C
pH	7.842	6.5 - 8.5
Turbidity	54.4 NTU	10 NTU
Salinity	0.08 PSV	0.5 PSV
TDS	78.7 ppm	1000 ppm
Conductivity	156.9 μS	1000 μS
COD	124.3 mg/L	04 mg/L
BOD	6.03 mg/L	2 mg/L
DO	7.20 mg/L	06 mg/L
TSS	0.0431 mg/L	10 mg/L

Table 02: The measurements of water quality parameters for Sample-2

Name of parameters	Experimented value	Standard value (DoE)
Temperature	27.8° C	25 - 35 ° C
pH	7.765	6.5 - 8.5
Turbidity	69.8 NTU	10 NTU
Salinity	0.08 PSV	0.5 PSV
TDS	85.9 ppm	1000 ppm
Conductivity	172.3 µS	1000 µS
COD	124.3 mg/L	4 mg/L
BOD	6.29 mg/L	2 mg/L
DO	7.32 mg/L	6 mg/L
TSS	0.0428 mg/L	10 mg/L

Table 03: The measurements of water quality parameter for Sample-3

Name of parameters	Experimented value	Standard value (DoE)
Temperature	26.9° C	25 - 35 ° C
pH	7.652	6.5 - 8.5
Turbidity	68.7 NTU	10 NTU
Salinity	0.09 PSV	0.5 PSV
TDS	84.8 ppm	1000 ppm
Conductivity	171.9 μS	1000 μS
COD	125.2 mg/L	4 mg/L
BOD	6.02 mg/L	2 mg/L
DO	7.67 mg/L	6 mg/L
TSS	0.04 mg/L	10 mg/L

Table 04: The Average value of these sample's water quality parameter :

Name of parameters	Experimented value	Standard value (DoE)
Temperature	27.8°C	25 - 35 ° C
pH	7.753	6.5 - 8.5
Turbidity	64.3 NTU	10 NTU
Salinity	0.08 PSV	0.5 PSV
TDS	83.13 ppm	1000ppm
Conductivity	167.03 µS	1000 µS
COD	124.6 mg/L	4 mg/L
BOD	6.11 mg/L	2 mg/L
DO	7.39 mg/L	6 mg/L
TSS	0.0422 mg/L	10 mg/L

Chapter 03

Result and Discussion

3.1 Discussion of Result:

For this research, both qualitative and quantitative analysis is used. For the qualitative analysis, a survey and short interview were conducted with the owners of local small businesses. The survey was conducted on what type of business they operate there, which type of waste they generally produce, and how they manage their waste. The result of this survey shows that most of the businessmen are not aware of the waste management practice and their impact on the water quality of this area. The most produced waste in this area is mainly plastic waste, wastewater, food waste and chemical waste. This waste has an important influence on water quality degradation. Most of them were dumping their waste directly in the open places without any concern that are frequently mixed with the nearby water. If this state continues the water near the ghat receive heavy pollution over time (Sayed & Akter, 2023).

On the other hand, the quantitative analysis of water quality parameters shows that the value of different quality parameters like temperature, pH, BOD, DO, salinity, TDS, and TSS are within the standard value. The value of turbidity and COD is greater than the standard which is a concern for the water quality. The average values of the analyzed parameters provide a comprehensive overview of the water quality in Mawa Ghat based on the three samples collected.

Temperature (27.8°C) The water temperature falls within a typical range for freshwater environments, indicating no significant deviations from the expected values. Temperature influences various chemical and biological processes in water, and the recorded average is consistent with a healthy aquatic ecosystem (Islam et al., 2014).

pH (7.753): The pH level of 7.753 is slightly alkaline, falling within the acceptable range for most aquatic ecosystems. Maintaining a neutral to slightly alkaline pH is crucial for the well-being of aquatic life, and the observed value is within the recommended limits.

Turbidity (64.3 NTU): Turbidity, measuring the cloudiness of water, indicates the presence of suspended particles. While the average turbidity of 64.3 NTU is higher than the standard value of 10 NTU, it suggests the presence of some suspended solids. Further investigation may be warranted to identify and mitigate potential sources of turbidity.

Salinity (0.08 PSV): The salinity level of 0.08 PSV indicates low salinity, confirming that the water is predominantly freshwater. This is expected for inland water bodies and is within the acceptable range for most freshwater ecosystems (Hasan et al., 2019).

Total Dissolved Solids (TDS - 83.13 ppm): The TDS value of 83.13 ppm is relatively low, suggesting a low concentration of dissolved substances in the water. This aligns with expectations for freshwater and indicates a lack of excessive mineral content.

Conductivity (167.03 NS): Conductivity measures the ability of water to conduct an electric current, influenced by the presence of dissolved ions (Uddin et al., 2021). The average conductivity of 167.03 NS falls within a moderate range, indicating a balanced composition of ions in the water.

Chemical Oxygen Demand (COD - 124.6 mg/L): COD is a measure of organic and inorganic matter in water that consumes oxygen during chemical oxidation. The average COD value of 124.6 mg/L suggests a moderate level of organic pollution. Further investigation and monitoring may be necessary to identify pollution sources and ensure water quality standards are met.

Biochemical Oxygen Demand (BOD - 6.11 mg/L): BOD measures the oxygen consumed by microorganisms during the decomposition of organic matter. The average BOD of 6.11 mg/L indicates a relatively low level of organic pollution. However, continued monitoring is essential to ensure long-term water quality (Hasan et al., 2019).

Dissolved Oxygen (DO - 7.39 mg/L): DO is crucial for aquatic life, and the average value of 7.39 mg/L is within a healthy range for freshwater ecosystems. Adequate dissolved oxygen supports the survival of aquatic organisms and indicates good water quality.

Total Suspended Solids (TSS - 0.0422 mg/L): TSS measures the concentration of suspended particles in water. The low average TSS of 0.0422 mg/L suggests relatively clear water, with minimal suspended solids.

The water in Mawa Ghat, based on the average values, generally meets the standard criteria for various parameters. However, the elevated turbidity and COD levels suggest potential sources of concern, warranting further investigation to identify and address specific pollution sources (Arefin & Mallik, 2017). Continued monitoring and proactive measures are crucial to ensuring the long-

term health of the water bodies in Mawa Ghat (Uddin et al., 2021). Also, it is very important to maintain the current condition of water quality to prevent significant amount of water pollution in future. Also, some important initiatives are crucial to keep the standard quality of the water in this region (Uddin & Jeong, 2021).

3.2 Expected Outcomes and Impact

The findings of this research project shed light on the specific role of small businesses in Mawa Ghat in influencing water pollution. Mawa Ghat is a region of both ecological and economic importance (Islam et al., 2014). Different types of small businesses operate there for a long time which has some potential influence on the quality of water. These businesses are not aware of water pollution and are not willing to maintain waste management practices properly (Uddin et al., 2021). This work aimed to identify their potential influence in causing water pollution. But the quality of water in Mawa Ghat is within the standard value (Winter, 2000). Though they are producing many wastes the result of very slight pollution in water may be because there is no significant amount of industrial discharge or skewer line connected in the ghat area. But it is high time the people and authorities should be aware of maintaining the water quality standard to prevent significant pollution in the future (Arefin & Mallik, 2017).

Also, water quality degradation is a slow and long process, if the situation is not controlled it can cause huge problems in recent future. Lastly, the outcomes contribute to scientific knowledge and practical solutions for mitigating pollution in the region (Chaudhry & Malik, 2017). The research also provides a baseline for policymakers, regulatory bodies, and local communities to develop targeted interventions and regulations for small businesses to adopt sustainable and environmentally friendly practices (Uddin & Jeong, 2021).

Figure 10 : The current situation of Mawa Ghat.

3.3 Influence of Small businesses in Water Pollution

There are many small businesses which operate in Mawa Ghat over time. Most of which are small scale shops which sells different types of food, toys, cosmetics, drinks and other things (Chaudhry & Malik, 2017). These shops produce different types of waste every day including various food waste, paper waste, plastic waste, and wastewater, most of which are dumped in the ghat directly. They are not aware of the proper waste management practice and hence has potential influence of water quality degradation in this area (Hasan et al., 2019).

In Mawa Ghat there is some small food processing units, such as bakeries, dairies, or fish processing plants. These businesses could contribute to water pollution through the discharge of organic waste and chemicals used in food production (Hoque et al., 2021). Small-scale industries, such as food processing units, manufacturing plants, or artisanal industries, may release pollutants like chemicals and organic waste into water bodies (Winter, 2000). Small eateries and hospitality establishments might also contribute to water pollution through the disposal of food waste, cleaning chemicals, and other waste products. Small construction projects and development activities may result in sedimentation and runoff, affecting water quality. Construction materials, chemicals, and debris could potentially enter water bodies (Sayed & Akter, 2023).

These small businesses might significantly contribute to water pollution through inadequate waste disposal methods, including the improper disposal of solid waste, plastics, or hazardous materials (Chaudhry & Malik, 2017). Though there are environmental regulations in place, small businesses are not always complied with them, leading to environmentally harmful practices that contribute to water pollution (Uddin & Jeong, 2021).
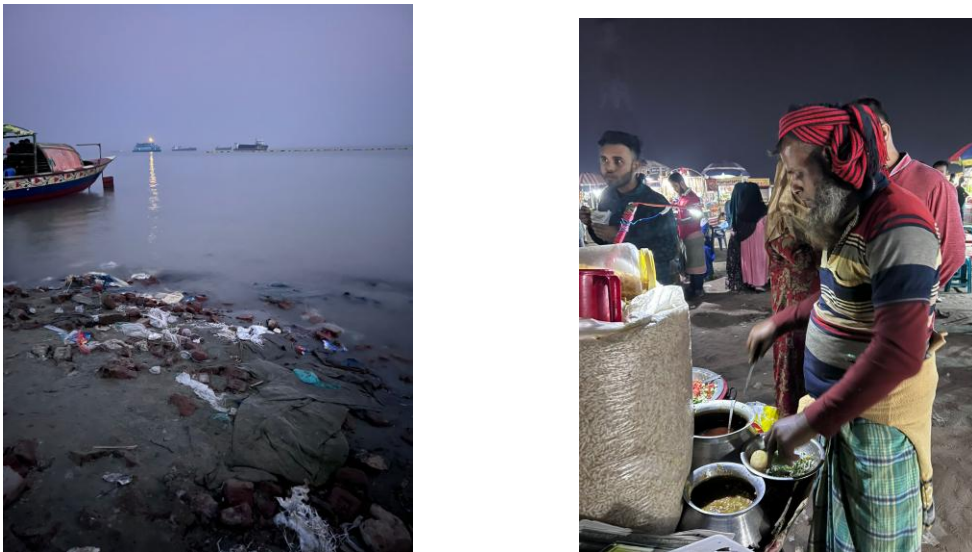

Figure 11: Small Businesses and their influence on water pollution

3.4 Impact of Water Pollution in Mawa Ghat:

The impacts of water quality degradation in Mawa Ghat can be significant and wide-ranging if the current water quality state is not maintained properly. It's important to note that the specific impacts in Mawa Ghat depend on the types of small businesses present, the nature of their activities, and the local environmental and social context (Hasan et al., 2019). Also continued water pollution can cause long-term environmental damage, affecting the resilience and recovery capacity of ecosystems. Some pollutants may persist in the environment for extended periods, exacerbating the impact over time (Alam et al., 2007).

- **Ecological Impact:** Degraded water quality can alter the physical and chemical properties of aquatic environments. Excessive nutrients, often from agricultural runoff or untreated sewage, can lead to eutrophication (Sayed & Akter, 2023). This process promotes the rapid growth of algae, depleting oxygen levels and creating conditions harmful to fish and other aquatic life (Das et al., 2021). The disruption of these ecosystems can have cascading effects, impacting biodiversity and the overall health of water bodies (Alam et al., 2007).

- **Health Issues:** Contaminated water sources are breeding grounds for waterborne pathogens. For example, Vibrio cholerae thrives in water contaminated with fecal matter, leading to cholera outbreaks (Uddin & Jeong, 2021). Similarly, waterborne parasites and bacteria can cause diseases such as giardiasis and cryptosporidiosis (Sarkar et al., 2019). The lack of access to clean water and proper sanitation facilities exacerbates the risk of these diseases, particularly in developing regions with inadequate infrastructure (Winter, 2000).

- **Agricultural Impacts:** When water used for irrigation contains pollutants such as heavy metals or agrochemical residues, it can negatively impact soil quality and plant health. This, in turn, reduces crop yields, affecting the livelihoods of farmers and contributing to food scarcity (Hasan et al., 2019). Crops irrigated with contaminated water can accumulate harmful substances, posing risks to human health. This not only affects the consumers but also raises concerns about the safety of the food supply chain (Hoque et al., 2021).

- **Fisheries and Aquatic Ecosystems:** Declining water quality affects the reproductive success and survival of fish species. Polluted water may contain toxins or disrupt the natural behavior of fish, leading to a decline in fish populations (Chaudhry & Malik, 2017). This poses a direct threat to the livelihoods of communities dependent on fisheries for income and sustenance (Hossen & Mostafa, 2023). Aquatic ecosystems provide critical services, including water filtration, nutrient cycling, and habitat support for various species. Deteriorating water quality compromises these functions, jeopardizing the overall health and resilience of ecosystems (Uddin & Jeong, 2021).

- **Loss of Biodiversity:** Water pollution contributes to the decline of diverse aquatic species. Pollutants can directly harm organisms or alter the physical and chemical conditions of

habitats, making them unsuitable for certain species (Faroque & South, 2022). The loss of biodiversity weakens the stability and adaptive capacity of ecosystems.

- **Economic Consequences:** Industries such as tourism, which rely on pristine water bodies, face economic losses when water quality is compromised. Recreational activities like swimming, boating, and fishing become less attractive, impacting local economies that depend on tourism revenue (Hossen & Mostafa, 2023).

- Fishing communities experience economic hardships as fish populations decline. This can lead to unemployment, poverty, and the need for alternative livelihoods for those whose lives are intricately connected to the fishing industry (Uddin & Jeong, 2021).

Figure 12 : The impact of water quality degradation in ghat.

3.5 Significance of the Study

The study on the role of small businesses in causing water pollution in Mawa Ghat holds significant importance and the study's findings contribute to addressing the problem of water pollution and its associated environmental and health risks (Chaudhry & Malik, 2017). Here are some key points highlighting the significance of the study:

- **Environmental Conservation:** By examining the specific role of small businesses in water pollution, the study provides valuable insights into the activities and pollution sources that contribute to environmental degradation in Mawa Ghat (Winter, 2000).

- **Public Health Protection:** Water pollution poses significant risks to public health, especially for communities relying on contaminated water sources (Sarkar et al., 2019). Understanding the impacts of small businesses on water pollution will help identify potential health risks and guide the implementation of measures to safeguard public health (Chaudhry & Malik, 2017).

- **Economic Opportunities:** Implementing sustainable practices and promoting environmentally responsible business operations can create economic opportunities. Encouraging small businesses to embrace sustainable practices will not only contribute to water pollution (Hoque et al., 2021).

Chapter 04

Conclusion and Recommendations

Conclusion

In conclusion, the study focused on investigating the potential influence of small businesses on water pollution in Mawa Ghat. The comprehensive analysis of water quality parameters revealed valuable insights into the environmental conditions of the region. The average water temperature, pH, salinity, and total dissolved solids fell within acceptable ranges for freshwater ecosystems, indicating a relatively healthy environment. Ongoing monitoring of water quality parameters is essential to promptly identify any deviations from standards and address emerging pollution sources. Though currently there is no significant water Pollution, we should be more careful to maintain this water quality in Mawa Ghat.

Collaboration between small businesses, regulatory bodies, and local communities is crucial for implementing and enforcing environmentally friendly practices. Public awareness campaigns can enhance community understanding of the importance of preserving water quality and involve them in conservation efforts. Encouraging small businesses to adopt sustainable practices, such as effective waste management and pollution control measures, is vital for long-term environmental preservation. Regulatory frameworks should be strengthened to ensure compliance with environmental standards, especially focusing on small businesses that may lack robust infrastructure.

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