Impact of Tannery Relocation on the Local People of Hemayetpur:

A case study on Jhauchor and Horindhara village of Tetuljhora and Bhakurta Union

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We, the undersigned, hereby, declare that we have read this project paper and we have attended the project paper defense and evaluation meeting. Therefore, we certify that, to the best of our knowledge this project paper is satisfactory to the scope and quality as a project paper for the degree of Bachelor in Social Science, field of study: International Relations, Bangladesh University of Professionals.

PROJECT PAPER REVIEW & EVALUATION COMMITTEE MEMBERS

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LIST OF ABBREVIATIONS

BCIC	Bangladesh Chemical Industries Corporation
BFFTW	Bangladesh Freedom Fighters Welfare Trust
BTA	Bangladesh Tanners Association
CETP	Central Effluent Treatment Plant
ETP	Effluent Treatment Plant
HTE	Hazaribagh Tannery Estate
HRW	Human Rights Watch
LFMEAB	The Leather Goods and Footwear Manufacturers & Exports Association of Bangladesh
MEFCC	Ministry of Environment, Forest and Climate Change
MSMEs	Micro, Small, and Medium Enterprises
RMG	Ready Made Garments
STE	Savar Tannery Estate

ABSTRACT

The relocation of the Hazaribagh Tannery to Savar's Hemayetpur seems to have yielded little success, given that the move not only shifted the tanneries, but also took the pollution with them. The main goal behind the relocation was to stop the contamination of the Buriganga River which is still persisting, and the recently established tannery estate in Savar is now playing a key role in pollution the Dhaleshwari River. Despite its contribution to the pollution of the area, it also has created employment opportunities for the local people. This paper aims to disseminate the nuances of the impacts of tannery estates located in Savar, and to analyze the multifaceted ways that the relocation has effected the socioeconomic, environmental and health aspects of the residents in Horindhara and Jhauchor villages of Tetuljhora and Bhakurta Union. The study firstly evaluates the history, state, and pollution caused by the leather industries in Bangladesh, and explains the impacts of Savar tannery estate on the local people residing in neighboring areas through different variables. The results of interviews with residents, and the findings of studies strongly suggest a causal relationship between poor community health, and agricultural decline with the pollution caused by the tanneries. Effectively managing and regulating tanneries is extremely crucial to the well-being of the local people of Savar.

Key words: Relocation, tannery, pollution, socio-economy, environment, health

Chapter 1: INTRODUCTION

The leather industry ranks as the second-largest export earner in Bangladesh, following the Ready-Made Garments (RMG) sector. It plays a crucial role in the country's economy, contributing significantly to employment, growth, and exports. Bangladesh holds a 3% share in the global leather and products market, with 1.8% of the global cattle stock and 3.7% of goat stock (PressXpress, 2023). Presently, Bangladesh produces and exports high-quality leathers from bovine, ovine, caprine (buffalo, cow, sheep, and goat), enjoying a strong international reputation for fine-textured skins. Prime Minister Sheikh Hasina has announced plans to develop area-based tannery industries (industrial estates) in various locations, including Chittagong and Rajshahi, in phases (The Business Standard, 2023).

In addition to positive advancements, there are significant environmental and health hazards associated with the discharge of untreated tannery effluents and solid wastes into nearby low-lying areas. Industrial activities contribute significantly to pollution, with tannery effluents being identified as the most substantial pollutants (Department of Environment, 2018). The detrimental impact of tannery pollution is evident in the state of the Buriganga River and adjacent rivers like Balu and Turag in Dhaka City. None of the tanneries in HTE (Hazaribagh Tannery Estate) had implemented Effluent Treatment Plants (ETPs) to manage the chemical and metal pollutants originating from rawhide and skin processing units and finished leather production. Consequently, Hazaribagh's tannery industries have had severe consequences on the Buriganga Watershed, leading to adverse impacts on human health, aquatic life, river ecology, and the overall environment. Moreover, the unpleasant odor from the leather industry has caused dissatisfaction among residents in the vicinity. In Hazaribagh, the primary shortcomings include lack of development and effective implementation of policies aimed at environmental maintenance and regeneration, inadequate sewerage and infrastructure facilities, unplanned establishment of tannery industries and the absence of proper urban planning. With all these challenges converging, the prospect of restoring the Buriganga River was diminishing day by day. Western companies also showed reluctance in purchasing leather and finished products from countries listed with minimal environmental management activities.

Figure 1: Central Effluent Plant of Savar Tannery Estate (Source: The Daily Star)

As a resolution to the issue, the Ministry of Industries in Bangladesh initiated a project to relocate the tanneries from Hazaribagh to Savar in order to protect the Buriganga river in 2003 (Akhter, 2022). However, the relocation to Hemayetpur was finally completed in 2017 after a prolonged delay. The new site in Horindhara, known as Savar Tannery Estate (STE) incorporates industrial plots, a Central Effluent Treatment Plant (CETP), a disposal yard, an administrative building, drainage facilities, and a substation for electricity supply to the industrial units. Although the reason behind this relocation was to eliminate pollution of the Buriganga River and safeguard the health of the large population residing in Hazaribagh and its environments, it is noteworthy that as the industry migrated, so did its pollution, leading to the transfer of people's hardships. The area adjacent to STE is grappling with significant environmental and health challenges, including water, air, and soil pollution. Health issues such as skin rashes, allergies, and respiratory problems have become prevalent. Despite these challenges, the relocation has brought about positive impacts for local residents, including employment opportunities and economic development. Local residents are generating income by renting accommodations to individuals who have moved with the relocated tannery.

Chapter 2: BACKGROUND OF THE STUDY

2.1. Rationale and Significance

The leather industry of Bangladesh is one of the oldest sectors and currently it's the most promising one. By 2020, it has ascended to become the world's 8th largest footwear producer, contributing 2.1% to the global shoe production (PressXpress, 2023). The Leather Goods and Footwear Manufacturers & Exports Association of Bangladesh (LFMEAB) have reported the presence of 200 tanneries and 3,500 Micro, Small, and Medium Enterprises (MSMEs) in the country (PressXpress, 2023). The industry has provided employment for approximately 0.85 million people, with 60% of the workforce comprising women (PressXpress, 2023). Over the years, Bangladesh has evolved as a reliable source for leather goods and footwear.

Regrettably, the tannery industry stands out as one of the most environmentally harmful sectors. The Hazaribagh area, particularly the Buriganga River, has experienced severe pollution due to the tannery industry. Unfortunately, this relocation to Savar, which was aimed to protect the water bodies by establishing an ecologically sustainable tannery zone, resulted in a broader environmental impact by polluting both the Buriganga and Dhaleshwari rivers (Akther, 2022). The tanneries in Savar are now causing various forms of pollution due to the improper functioning of the Central Effluent Treatment Plant (CETP) in the tannery estate, including water, air, and soil pollution. A significant amount of dissolved salt is being discharged into the Dhaleshwari River from the Savar Tannery Estate, negatively impacting agricultural activities and the river's water (Hossain & Abedin, 2019). This, in turn, affects the health and daily lives of the people residing in the adjacent areas. Some research has been done on environmental pollution caused by the recently established tannery industries in Hemayetpur. However, there is limited work on the impact of tannery relocation on the residents of the surrounding areas of the Dhaleshwari River. Therefore, the paper aims to investigate the multifaceted impact of tannery relocation on the socioeconomic, environmental and health aspects of the residents in Horindhara and Jhauchor villages, considering both the challenges and opportunities brought about by the shifting of the tannery industry.

2.2. Problem statement

Even though the relocation of the Tannery industries might seem effective on the surface level, considering how the people of the present Tannery industries are suffering in their daily lives, it seems pointless to move the almost 50-year-old Hazaribagh Tannery to Savar's Hemayetpur, which is on the outskirts of Dhaka. The decision to move the tannery to the far-off Savar could be considered one of Bangladesh's biggest acts of foolishness, as there is still the presence of continuous pollution of the Buriganga and now, the relatively clean Dhaleshwari has also been polluted with the relocation. The big and long-term objective that led to the relocation of the old tannery to a new location outside of Dhaka has been unfulfilled. The solid waste and effluents are continuously released by the Hemayetpur tannery estate, which is located on the banks of the Dhaleshwari River. These pollutants are combined with river water, which flows into the Buriganga downstream. Thus, it continues to poison the river, which is known as Dhaka's lifeline. The prospects for the tannery sector as a whole are uncertain because an environmentally friendly, well-equipped tannery estate is still unattainable.

The nation has high expectations for the export of completed leather goods as they consider themselves to be a rich supplier of leather given the increasing output of rawhide. There had been a lot of hope following the transfer of the fifty-year-old, broken Hazaribagh facility to an ostensibly cutting-edge tannery estate. Unfortunately, as the days passed, it started to fade. Since the tannery complex was almost entirely relocated in 2017, there have been few production facilities visible during the interim (Financial Express, 2022). The cornerstone of the entire relocation story, a failsafe Central Effluent Treatment Plant (CETP), is still a pipe dream. The results were clear to see. Operating a very ambitious cluster of tanneries proved to be a difficult task due to various reasons including the opposition of the majority of tanners to the move, warnings from the government, deadlines for transferring, threats of license termination for disobedience, and numerous other issues.

Because of these reasons this paper will try to point out how actually the local community in the surrounding areas of relocated Tannery industries is dealing with this shift. Many papers have been written regarding the amount of pollutants released by the industries and ultimately how they are affecting the surrounding environment along with the people living in those. But this paper has tried to apply a human centric approach to highlight the impact of the relocation in

their daily lives, which none other previously written paper did. This is a serious problem as the local community, even though not being directly related to the Tannery industries like the workers there, are being affected negatively. Again, prior papers have discussed focusing on the negative aspects of the relocation mainly, but this paper will try to bring out the positive ones as well so that further steps can be taken by the related authorities to make this relocation an effective one by suggesting necessary recommendations that are needed to be taken.

2.3. Research Questions

Central research question:

To what extent, the local people of Hemayetpur are being impacted due to the relocation of the tannery industries from Hazaribagh?

Secondary research questions:

1. *How has the health condition of the local people of Horindhara and Jhauchor deteriorated due to the Tannery pollution?*
2. *What kind of changes has been noticed by the local community in different elements (soil, air, water) of the environment after the relocation?*
3. *How has the relocation of the Tannery industries impacted the economic condition of the local people?*

2.4. Research objectives

1. The present study aimed to ascertain the community's knowledge regarding the impact of tannery relocation on the environment, specifically with regard to the pollution caused by tanneries in the vicinity.
2. To determine the history and state of the leather industry in Bangladesh at the moment, and the pollution caused by it
3. To evaluate the health issues that local community members are experiencing (if there's any disease that they think are affecting them) after the relocation
4. To assess the socio-economic effects of the local people in the surrounding areas of the tannery industries

2.5. Organization of the paper

The paper has eight chapters and numerous sub-chapters. The following chapter evaluates the established leather industries of Bangladesh along with their history. It also briefly explains the pollution that has been taking place from the extradited wastes of the tanneries. In the next three chapters the literature review, theoretical and conceptual framework, as well as the methods used for conducting the paper has been described. The research is qualitative in nature, conducted through employing in-depth interviews as a primary data collection technique where the participants were chosen through purposive sampling. The second last chapter which is Chapter 7 is the findings of this paper, including the positive and negative effects the tanneries of Hemayetpur has posed on its local people has been examined through various standards. Finally in Chapter 8 the recommendations that we have come up with while conducting this research, for rectifying the situation and also for increasing the condition of livelihood of the people has been shown.

Chapter 3: EVALUATION OF LEATHER INDUSTRY IN BANGLADESH

3.1. History of Tannery Industry in Bangladesh

Businessman Ranada Prasad Saha (RP Saha) initiated the tannery industry in Bangladesh by establishing the first tannery near Narayanganj in 1940 (Hossan, 2022). Subsequently, a new tannery industry was established in Hazaribagh, Dhaka, through a gazette announced by the government in October 1951. Before the partition of Bengal (1947), rawhides and skins from East Bengal were exported to West Bengal, mainly Calcutta, for processing. After the Partition, displaced tanners from India contributed to the development of the tannery industry in East Pakistan. During the Pakistan period, some West Pakistani companies through their subsidiaries set up several new tanneries in East Pakistan. Till 1960, tanneries in East Pakistan processed raw hides and skins using salt and sun-drying, which resisted putrefaction. The non-profit organization 'Pakistan Tanners Association' (PTA) was established in 1964 and was later renamed Bangladesh Tanners Association (BTA) in 1971 after independence (Hossain, 2023). This organization emphasized on promoting the development of the tannery industry in Bangladesh by collaborating with government departments and issuing export certifications. Only Thirty units of non-Bengali tannery workers remained after the conflict in 1971. To transform them into completed leather units, the government gave them up to a brand-new Tannery Corporation. But the attempt failed because of incompetence and corruption. The government subsequently abolished the Tannery Corporation in 1982, transferring most tanneries to the "Bangladesh Chemical Industries Corporation" (BCIC) and allocating three to the Bangladesh Freedom Fighters Welfare Trust (BFFWT). Regrettably, the authorities responsible for overseeing the tanneries were unsuccessful in their management, prompting the government to make the decision to transfer ownership to private entities under

Figure 2: First Tannery Industry of Bangladesh (Source: Business Inspection)

the Disinvestment Policy, which had allowed some enterprising Bengalis with little or no experience in the industry to start wet-blue production.

Recognizing the potential to significantly enhance the value of leather products by processing raw leather into finished goods, the Bangladesh government implemented a ban on the export of wet blue leather in 1990(Hossain, 2023). This decision compelled entrepreneurs to modernize their operations which ultimately gave birth to a new era in the history of the development of the leather sector of the country. Bangladesh started to manufacture and export crust, finished and split leather. The LFMEAB was established in 2003 to connect Bangladeshi indigenous leather manufacturers with global markets. Bangladesh first had trouble luring international brands because of environmental issues with the production of leather. With assistance from BSCIC and a directive from the High Court, tanneries relocated to Hemayetpur, Savar, in 2016. Located at [23°46'29.4"N, 90°14'25.9"E] in Horindhara village, Tetuljhora union of Savar, 3 km from Hemayetpur and 20 km from Dhaka City, the new 200-acre property features a state-of-the-art CETP. The site is bordered downstream by the Buriganga River, the Karnatali and Dhaleshwari River (Banglapedia, 2018). Currently, there are 220 tanneries in Bangladesh exclusively processing raw leather and more than 160 tanneries have been shifted to the Hemayetpur estate, showcasing a commitment to adopting modern and environmentally-friendly practices in the leather industry.

3.2. Background of tannery waste pollution in Bangladesh

In Bangladesh, tannery wastes have been contaminating rivers and farmlands for many years. One well-known environmental tragedy is the severe pollution of the Buriganga River in the capital city of Dhaka caused by the Hazaribagh tannery effluents (Bernhardt and Gysi 2013). According to a 2008 study supported by the European Union, Hazaribagh's top three meters of soil were seriously contaminated (Human Rights Watch 2012). Rahaman et al. (2016) measured the concentrations of heavy metals in the riverbank soil next to the Hazaribagh tannery area at different depths and contrasted the results with samples taken from a clean agricultural area. According to their research, the soil on riverbanks had considerably higher concentrations of Cr, Zn, Pb, and Cd than the soil on. Criticism stemmed from things like inadequate infrastructure, management, administration, and pre-discharge waste treatment. The High Court mandated the

industry's transfer to the Savar Tannery Industrial Estate in response to public and activist opposition. (Khan 2017).

Figure 3: Extreme Height of pollution in Hazaribagh (Source: Business Insider)

Despite expectations for the new location's improved waste facilities and planned development to safeguard public health and the environment, claims of severe pollution from Savar tanneries have arisen. Inadequate planning and inappropriate installation of waste treatment facilities are blamed for the problems (Khan 2017). Bangladesh mandates Effluent Treatment Plants (ETPs) for tanneries to treat waste before release. Only two of the four CETP modules are currently being used by the 111 tanneries that are operational at Savar despite the incomplete Central Effluent Treatment Plant (CETP) (RMGB 2018).

Even though they faced all these problems by the tannery industries in Savar after the relocation, in the recent times, government have taken different kinds of precautionary measures to reduce the problems faced by the local community by implementing action plan to protect the surrounding environment of the tannery industries and ultimately the health condition of the local people. People in the surrounding areas are now mostly satisfied as they are not being directly affected by the pollutants of the tannery industry, as proper care has been taken to manage them. They think the relocation now is not causing them problems like they once faced right after the relocation.

Chapter 4: LITERATURE REVIEW

The relocation of Hazaribagh Tannery to Savar's Hemayetpur has proven counterproductive, causing severe environmental pollution in the Dhaleshwari River and adjacent residential areas. Studies reveal alarming levels of pollutants in water, soil, and plants, rendering the area unsuitable for agriculture, as well as causing various physical afflictions. Similar adverse effects are observed in Kanpur, India, where tannery pollution contaminates the Ganges River, causing health issues, deformities, and economic downturns. The Wolverine Tannery in the United States faces socio-economic implications, with PFAS contamination impacting health, property values, and local businesses. Additionally, Pakistan experiences severe environmental and health repercussions due to tannery pollution, leading to diseases, unhygienic living conditions, and economic challenges for affected communities. These cases, along with this very study, underscore the global crisis of inadequate waste management in the tannery industry, resulting in profound consequences on ecosystems, public health, and socio-economic well-being.

Firstly, In the article "Relocation of Tannery Industry and Its Aftermath" Monirul Haque Rony stated that about 40,000 cubic meters of waste is generated daily from the tanneries located in Savar, but the daily treatment capacity of the Central Effluent Treatment Plant (CETP) is 25,000 cubic meters forcing the remaining fifteen thousand cubic meters of waste to flow into the river without any treatment. Again the evidence that there persists pollution in the tannery area of Hemayetpur can be seen in the paper "Assessment of Environmental Quality of an Area Adjacent to the Relocated Tannery Industries At Hemayetpur, Bangladesh" by Faruque Hosseini, MD Wahiduzzaman, and Zakia Parveen who collected samples of soil, water, and plants from the vicinity of tannery industries and the Dhaleswari river which were subjected to varying levels of environmental pollution. The water samples from the Dhaleshwari River exhibited a slightly acidic to moderately alkaline pH ranging from 6.55 to 10.60. They showed high total dissolved solids (TDS) ranging from 176 to 10,433 mg/l, electrical conductivity (EC) from 305 to 18,206 µS/cm, nitrate from 0.14 to 194 mg/l, sulfate from 10.72 to 8922 mg/l, moderate phosphate from 0.58 to 7.2 mg/l, and low dissolved oxygen (DO) from 1.61 to 5.50 mg/l. Most of these water parameters exceeded the World Health Organization (WHO) guideline values, indicating a gradual decline in the water quality of the Dhaleshwari River. The concentrations of nitrogen,

phosphorus, potassium, and sulfur in the soil varied within the ranges of 12 to 263, 1.19 to 38, 17 to 170, and 251 to 680 mg/kg, respectively. The total concentrations in the soil ranged from 0.03 to 0.14%, 0.090 to 0.14%, and 0.12 to 0.48%, and 0.11 to 0.42% for nitrogen, phosphorus, potassium, and sulfur, respectively. Notably, total phosphorus and potassium concentrations increased, while sulfur decreased in the soil samples. The soils were characterized as acidic in nature, with a high electrical conductivity of 8.17 dS/m, making it gradually unusable for agricultural purposes (Hosseini, 2022).

In another similar research on "Water quality indices to assess the spatiotemporal variations of Dhaleshwari River in central Bangladesh" conducted in the North-East by the Dhalla Bridge and the South-West by Itavora Bridge of the Dhaleshwari River, assessed the pollution status of Dhaleshwari River and the impact of the establishment of Tannery Industrial Park on the river as well. According to the research, the river water quality was found within the 'Poor' range basing on the drinking water quality index (DWQI) using CCME method and it was found at 'Poor' and 'Unsuitable' using W.A. method. According to WQI analyses, the river water should not be used for drinking purposes without treatment. Again, considering heavy metal pollution, HPI values revealed 'Critical' (> 100) condition of the river water. Contamination index (Cd) values emphasized that the contamination of river water was at 'Low' to 'Medium' level with respect to BD standard but was at 'High' level with respect to the WHO standard. Heavy metals are regarded as serious pollution of the aquatic ecosystem because of their environmental persistence and toxicity effects on all forms of living organisms since they cannot be naturally degraded and that leads to bioaccumulation and bio magnification(Goher et al., 2014). The Person's correlation results confirmed that the water quality indices were significantly affected by the discharged effluent from the tannery industrial park.

However in an interview conducted by the Daily Kaler Kantho, BSCIC Chairman Mostaq Hasan stated that Dhaleshwari has been polluted even before the relocation, due to the black water disposition of garment factories, and so the relocation should not be blamed for the pollution entirely.

Reporter Monirul Haque Rony again, on the "Relocation of tannery industry and its aftermath" stated how the water of Dhaleshwari river has acquired an eerie black color, creating an intolerable condition in its surrounding areas making it difficult to live, and the level of

environmental pollution has gone so out of control that the parliamentary committee on the Ministry of Environment, Forest and Climate Change (MEFCC) itself has recommended the temporary closure of the tannery industry city, along with the chairman of the National River Conservation Commission who expressed his anger and dissatisfaction with the waste management of the area after his visit. On "Qualitative Assessment of Environmental and Health Aspects of Relocated Tannery Industries at Hemayetpur" by Alisha Meghna, Mohammad Majibur Rahman, Md. Mostafizur Rahman, Mashura Shammi emphasized that the lack of proper waste treatment facilities results in the release of untreated effluents into nearby rivers, low-lying areas, and municipal sewers, causing severe water, land, and air pollution. This unregulated disposal poses a significant threat to human health and livelihoods.

Another report was carried out by "Kaler Kantha" interviewing the local people living in the adjacent areas regarding the relocation, and they complained that the construction of the tanneries was not done in a planned structure with a good waste management system. Local fishermen of the Jhaochar Baratilbazar Area of Hemayetpur complained how their main source of income, selling fishes was now disturbed since people no longer want to eat fishes from Dhaleshwari due to its pollution.

Before the relocation, the tanneries used to be located in Hazaribagh of the capital city. The tannery workers of Hazaribagh described and displayed a range of health conditions including prematurely aged, discolored, itchy, peeling, acid-burned, and rash-covered skin; fingers corroded to stumps; aches, dizziness, and nausea; and disfigured or amputated limbs. People living in the densely-packed streets and alleys surrounding the tanneries reported an array of health problems to the Human Rights Watch including-fevers, diarrhea, respiratory problems, and skin, stomach, and eye conditions- many of them left undiagnosed due to the cost of medical attention.

A similar incident can be seen in the Kanpur Tannery site of Northern India. "Kanpur: A city being killed by pollution" by Arindam Mukherjee states how the tanneries are a source of hazardous pollution that, environmentalists say, is gradually killing the city. Each day, the tanneries pump out about 30 crore liters of polluted water into the adjacent Ganges river. The city's water treatment unit, however, has a capacity of treating 17 crore liters per day. Kanpur also generates 400 tonnes of solid waste. (Al Jazeera, 2013). The rampant pollution has contaminated groundwater sources. There are reports of increasing deformities among newborn

babies. The contamination of water sources has not only jeopardized public health but has also disrupted the local economy. Traditional livelihoods dependent on agriculture and fisheries have suffered due to polluted water, impacting the income and sustenance of local communities. Farmers complain their fields are turning toxic. In the documentary "The Toxic Price Of Leather" by Sean Gallagher, Sonalal Yadav of the Farmer's Cooperation expressed how the area adjacent to the tannery factories were once filled with roses, but are now left barren due to the extreme height of pollution. He also mentioned how the polluted water filled with chromium from the plants settle in agricultural fields, and destroys their productivity in 3-4 years. He added that there has been a rise of various diseases like Skin Rash and Asthma among the local people. Another study by Shri Kant Singh and Gyan Chandra Kashyap on the "Mental Health Problems among Male Tannery Workers: A Study of Kanpur City, India" reveals a concerning impact of working in tanneries on the mental health of male workers. The tannery workers predominantly engaged in physically demanding and often hazardous tasks, experience a high prevalence of mental health issues. The challenging work conditions, coupled with long working hours and low educational attainment, are associated with a higher likelihood of severe mental health disorders.

Another study on Wolverine Tannery has found profound socio-economic implications on the affected population. The release of contaminants into the air, water, and soil has resulted in escalated healthcare costs due to increased instances of respiratory and skin-related illnesses, thereby reducing overall community well-being. According to Noah Fromson (2018) on the article "Former tannery workers: Wolverine Worldwide isn't there for us" explained how the officials from the Michigan Department of Health and Human Services (MDHHS) indicated the presence of PFAS (per-and polyfluoroalkyl substances) in the blood of most people there but the health effects of exposure to the contaminant were largely unknown still. Dr. Eden Wells, chief medical executive for MDHHS explained the medically studied US areas like Ohio River Valley where due to long term association with the contaminated water, there's high risks of higher cholesterol and also an effect on the liver function. There may be an association with fertility issues and certain cancers such as kidney cancer and testicular cancer due to this. Property values have dwindled as concerns over environmental contamination deter potential buyers or tenants. Local businesses, particularly those dependent on clean resources, face economic downturns, leading to job losses and decreased employment opportunities. Wolverine Tannery, in turn,

incurs substantial legal and regulatory costs for cleanup, impacting its financial viability. Social disparities emerge, disproportionately affecting vulnerable communities, and strained social relations within the affected areas become evident. Additionally, tourism and recreational activities suffer due to environmental degradation, further exacerbating the economic challenges faced by the populace.

One more example of such an event can be seen in Pakistan where tannery pollution has had significant repercussions on both the environment and the health of local residents, particularly in areas with a high concentration of tanneries. Research conducted by Syeda Bushra and Zeeshan Atiq revealed that 85.71% of respondents from industrial estates in Karachi, Lahore, and Multan identified tanneries as the primary source of environmental contamination with harmful effluents. Furthermore, 51.43% of those surveyed pointed to small units, commonly known as “Kachy ka Kaam" as the major contributors to this hazardous effluent discharge.Improper disposal of untreated effluents and solid waste has led to the pollution of air, water, and soil, resulting in severe health challenges for nearby residents. According to 40% and 31.43% of respondents, the primary issues associated with the emission of untreated wastes are the spread of various diseases and the creation of an unhygienic living environment. Different diseases and environmental problems have emerged in these areas due to the release of untreated water. The findings indicate that 68.57%, 62.36%, and 40% of laborers cited the emission of toxic chemicals, polluted water, and a poor drainage system, respectively, as key causes of disease spread. In the course of tannery industry operations,workers frequently face exposure to hazardous chemicals, leading to various health issues such as scabies (reported by 40% of respondents), jaundice (cited by 28.57% of respondents), and respiratory diseases (mentioned by 48.57% of respondents).

There has been ample scientific evidence indicating how the relocation has deteriorated the water of Dhaleshwari River, and has had environmental consequences making it difficult for the people of the adjacent local areas to live a normal life. However there has been a lack of research on the impact of the relocation on the people living in the area, except a few online news reports. Hence this paper will focus on assessing how the local people, their socio-economic condition and health have been affected due to this relocation.

Chapter 5: CONCEPTUAL FRAMEWORK

5.1. Industrial Soil Pollution

One important arrangement of the terrestrial biological system is soil. Contaminations have an instant impact on the microbial community, natural matter, and minerals in the soil (Nagaraju, Sunil Kumar, and Thejaswi, 2014). The physical, chemical, and biological characteristics of soil that are linked to soil fertility may be significantly impacted by the discharge of industrial effluents, especially if the effluents are not treated, which has been noticed in the tannery industries of the research areas. Due to the absence of properly functioning effluents after the relocation in Savar, the soil of the surrounding area got damaged resulting in less agricultural production in that soil. The water of Dhaleshwari River got totally polluted due to the mixing of pollutants into it without proper treatment and so people cannot eat fish from it, uses the water for any kinds of daily chores etc. Soil pollution typically happens when industrial wastes degrade the soil or introduce chemical pollutants into it which is primarily caused by human activity. Similarities can be seen in the soil of the adjacent agricultural lands of the surveyed areas.

5.2.Leather Tanning and Processing

As the research is a study on the impact of tannery in the lives of the local community, a detailed idea regarding the tannery process has been taken by the researchers prior to it.

Leather tanning involves turning putrescible animal hides and skins into a stable, marketable substance known as "leather." When card hides and skins are brought to a tannery, they are trimmed to remove any extra material before leather is made. Subsequently, the processes of soaking, liming, fleshing, de-liming, bating, degreasing, and pickling are executed to establish an ideal atmosphere for the tanning process. Lastly, a variety of products are made using the final leather. Tanning leather is an intricate and time-consuming procedure. (Wahiduzzaman, 2016) There are many variations among the tanning processes, and each has benefits and drawbacks of its own. Automation has reduced the amount of work involved, but the process still involves a complex set of procedures that take a lot of time and effort.

The purpose of the tanning interaction is to modify the skin's protein structure in order to improve the skin's appearance, texture, and durability. All varieties of leather must pass through four basic phases. This covers the following: initial steps; operation of the tan yard; re-tanning; and finishing. Among different kinds of tanning procedures, chrome tanning is a very time-efficient and straightforward process and the majority of tannery industries in Bangladesh use it, same goes by most of the tannery factories at Savar. Almost all of the tanning process is a wet one, requiring large amounts of water and producing effluent from 90% of the used water (Chowdhury et al. 2013). Due to the abundance of highly colored compounds, sodium chloride, ammonia, nitrate, sulfate, various organic and inorganic substances, toxic compounds, various tanning agents, and other sludge that is concerning for the environment, tannery effluents carry a significant amount of contamination (Dargo and Ayalew, 2014). These substances' presence in the effluent has an impact on livestock, agriculture, and people.

Chapter 6: METHODOLOGY

6.1. Overall approach

In the course of conducting the research paper, it has strategically opted for the qualitative research method, a methodology renowned for its emphasis on exploring the intricacies and contextual nuances of the subject. Employing in-depth interviews as a primary data collection technique, it's been sought to elicit comprehensive and detailed responses from participants, allowing for a holistic understanding of their experiences, perceptions, and perspectives related to the research topic.

By delving into the qualitative realm, the research aimed to go beyond surface-level observations, uncovering the underlying complexities that may escape quantitative approaches. This methodological choice has allowed for the exploration of socio economic and health conditions of the local people and environmental aspects of the surrounding tannery industries areas. In essence, the qualitative research approach served as a powerful tool to unravel the depth and richness inherent in the subject matter, fostering a more profound comprehension and appreciation of the research findings.

6.2. Study area

Qualitative research involves the inductive process of gathering data on a specific study area, where researchers construct various concepts and theories based on the collected information. In this particular investigation, the focus was on the impact of tannery effluent on the surrounding area, specifically the relocated tannery industrial site of Jhauchor and Horindhara under Tetuljhora and Bhakurta union.

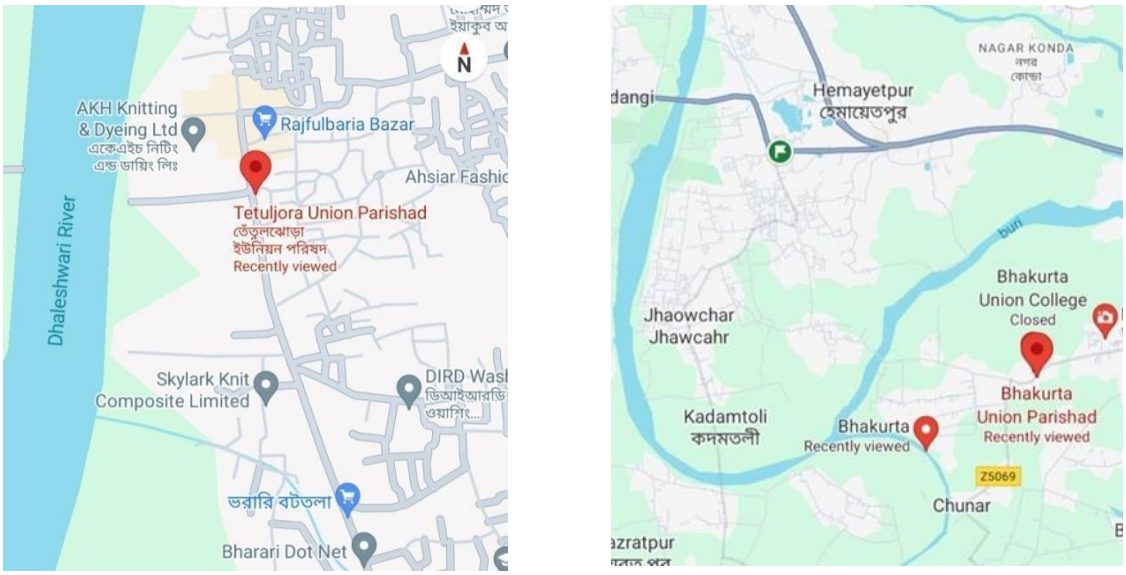

Figure 4: Maps of Tetuljhora and Bhakurta Union (Source: Google Maps)

6.3. Instrument for gathering data

An interview guide that was semi-structured was used to gather the necessary data. The following were the main topics covered in the interview guide: knowledge of the local community regarding the pollution of environmental elements like soil, air, and water after the relocation of Tannery industries from Hazaribagh to Savar, health issues within the community, change in the socio-economic condition of the local people due to the relocation, the impact of relocated Tannery industries on the agricultural production and fisheries sector of the surrounding areas, opinions within the community regarding whether the relocation has positive or negative effects or both in combination in their daily lives.

6.4. Procedure

The researchers physically visited the target area prior to creating the semi-structured interview guide. A local drug store worker, two tannery workers, and a few members of the local community were involved in early talks to gain a basic understanding of the issue being looked into. A literature search was also done on the pertinent topics. After the formulation of the semi-structured interview guide, the researchers followed the mentioned topics in it accordingly in the interview afterwards. A number of 20 local residents who lived close to the Savar (Dhaka) tannery industries participated in the interview. However, prior to data collection, all respondents

were made aware of the study's purpose, their informed consent was obtained, and efforts were made to establish a positive rapport with each of them. The respondents were also guaranteed the confidentiality of their answers and informed that the data would only be used for academic purposes.

6.5. Data collection preparation

The data was gathered using an open-ended, pre-formulated questionnaire. English was used to prepare the questionnaire, which was then directly translated into Bangla. Face-to-face interviews were used by a 5-membered group to gather data. Verbal consent from the local people of the surrounding areas and some tannery workers who also reside there has been taken. Throughout the study, respondents were free to decline the questions and to end the interview at any moment. Socio-demographic information (age, sex, education, marital status, and family background), working information of the local people, health issues faced by them after the relocation, socio-economic impact on them, impact of Tannery industries on various elements of the environment etc. were all included in the questionnaire that was administered by the interviewer.

6.6. Data collection method

The majority of the data used in this research project are primary, with some secondary data used as needed. The secondary data was gathered by reading articles and newspapers about the tannery industry, books and journals, annual reports from various organizations(i.e: HRW), and other published materials that worked to determine the effects of hazardous chemicals on the lives of the locals. The gathering of the primary data took place in November 2023.

To conduct this research study fruitfully, the researchers gave the participants an opportunity to elaborate on the issues they faced after the relocation, which increased their flexibility and range and, as a result, their ability to elicit more information from them. While semi-structured interviews still offer a better framework for comparability than focused interviews, they allow participants to respond to questions more freely than standardized interviews (May, 1997). According to Kumar (2005), interviews are the best method for researching sensitive and complex subjects because they allow the interviewer to personally explain complex concepts to participants and give them preparation time before posing delicate questions.

In addition, three Focus Group Discussions (FGDs) were held to gather data from the locals who live close to Tannery estate of the research area. Participants in Focus Group Discussions (FGDs) primarily come from a group whose voices are seldom heard, including housewives, farmers; poultry farm owners, garment workers, employees of various businesses, and others. For every Focus Group Discussion, three to four participants were present.

6.7. Sampling

The type of sampling method that has been used to select the sample size for this research was purposive sampling among the people of local community, especially because it is qualitative research where detailed knowledge about the effects of tannery on the lives of local people is needed. Here the participants were chosen deliberately from the prime research areas to provide important information, which could not have been obtained otherwise. As an effective purposive sample must have clear criteria and rationale for inclusion, here the inclusion criterion was based on participants who are both male and female, and currently residing in the neighboring locality of the tannery industry.

Serial No.	Name	Sex	Age	Job title
1.	Akhi	Female	30	House wife
2.	Madina	Female	25	Garments worker
3.	Nurun Nahar	Female	33	Tannery Worker
4.	Sumon	Male	24	N/A
5.	Mrs. Soima	Female	N/A	N/A
6.	Shopon	Male	N/A	PoultryFarm Owner
7.	Sophia	Female	20	Housewife
8.	Monowara	Female	60	Housewife
9.	Sarowar	Male	52	Employee at an enterprise
10.	Shiuly	Female	16	Tannery worker

Serial No.	Name	Sex	Age	Job title
11.	Anonymous	Male	N/A	Owner of tea stall
12.	Anonymous	Female	N/A	House wife
13.	Anonymous	Male	N/A	House wife
14.	Anonymous	Male	28/30	Drug store employee
15.	Ratna	Female	40	N/A
16.	Kader	Male	26	Uber Driver
17.	Ayesha	Female	55	Land owner
18.	Samia	Female	32	Teacher
19.	Kabir	Male	24	Unemployed
20.	Masud	Male	45	Carpenter

Table 1: Survey Data of the Participants

Participants were picked purposefully from the prime research zones including Jhauchor and Horindhara, as well as the areas covering and neighboring the BSCIC tannery industrial estate. Overall 20 participants have been interviewed, however four wanted to remain anonymous. As highlighted, the participants covered various age groups and professions, both male and female, which as a result presented different perspectives and feelings on the research topic.

6.8. Data analysis

It was taken into account a number of factors when evaluating the data from the participants, including age, sex, and work experience. In order to present a more comprehensive viewpoint, this paper has purposefully included residents of the community who were impacted by the tannery relocation. Emerging themes showed the many effects of the move. The impacted community members' perspectives demonstrated environmental issues, economic shifts, and health issues. This inclusive approach emphasized the necessity for comprehensive solutions to address the wider effects of industrial transitions on communities by highlighting their experiences. The data is arranged into themes and sub-topics once the interviews have been transcribed. Following their emergence, these themes were interpreted with an emphasis on recurrent themes and discrepancies found in the data. In the end, researchers double-checked the transcripts and modified the initial assumptions to confirm the findings. The majority of participants consistently voiced worries regarding the environmental and health condition.

6.9.Ethical considerations

Dealing with what is right and wrong within a moral framework based on duty and obligation is the discipline of ethics (Nation, 1997, p. 92). It is very important for the researcher to always consider how their work will affect participants and society at large when conducting any kind of research, and they must act appropriately. Kumar (2005) recognizes that gathering data without participants' knowledge, or their expressed consent is unethical. Consequently, the investigators ensured that every participant understood that their involvement in the study was entirely voluntary and that they could withdraw from it at any point. The participants should also be informed that they were not required to respond to any questions, if it made them uncomfortable.

For this research the survey has been conducted by informing the participants that this is a survey performed by university students. Each participant was given word that their confidentiality throughout the interview process will be maintained and anything they say will be used only for the betterment of the paper

6.10. Limitations of the study

The researchers ran into a few obstacles when conducting this investigation. As the research has been conducted just a month prior to the election period, this might have seemed to some of the participants to be a politically motivated research which might refrain some of the participants from speaking freely about their opinions. Most importantly, one must exercise caution when extrapolating large conclusions from the results due to the small sample size. In order to enable a more thorough analysis of the study, it is advantageous to conduct research of any kind on a larger and more detailed scale. Semi-structured interviews, on the other hand, were a very helpful tool for getting detailed and insightful information from the participants. Although conducting interviews takes a lot of time, it has shown to be a very effective way to get people to share their stories honestly and openly about how their lives have been affected. As a result, the researchers were able to learn a great deal about the individual experiences of all the participants due to the impact of relocation of the tannery industries in their lives. But due to time and resource constraints, the number of people who were interviewed was not that much. An additional constraint pertains to researcher bias, which is an inherent risk in all research studies, particularly in cases where data collection is not as structured. The researchers here made an effort to recognize and avoid researcher bias.

Chapter 7: Findings and analysis

7.1 Findings

The researchers have used the Microsoft spreadsheet software in order to point out how the local people of the surveyed areas have been influenced socio-economically, how the different components of the environment are being impacted after the relocation and how the health condition of the community is being affected. This has been done by asking the people about the changes they have been facing from the period of relocation onwards.

Items	Response	No of respondants	Total	Yes(%)	No(%)	No Comment(%)
Do you think the relocation has any positive impact in your lives?	Yes No No comment	5 6 9	20	25	30	45
I lave the relocation positively impacted the economic condition of your family?	Yes No No comment	11 8 1	20	55	40	5
Have you been suffering from more respiratory or skin diseases after Tannery Relocation?	Yes No No comment	14 6 0	20	70	30	0
Have you noticed the elements (Soil, air, water) of the surrounding environment change after relocation?	Yes No No comment	17 3 0	20	85	15	0
Has the relocation played a positive role towards development of the surrounding area?	Yes No No comment	13 0 7	20	65	0	35
Has the relocation impacted the fishes of Dhaleshwari River?	Yes No No comment	11 2 7	20	55	10	35
I lave you noticed a drop in the crop production in the area?	Yes No No comment	7 3 10	20	35	15	50
Is there any change of taste in the fruits and vegetables produced in the area?	Yes No No comment	3 7 10	20	15	35	50
Do you use water from the river?	Yes No No comment	3 17 0	20	15	85	0

Table 2: Excel Spreadsheet of the variables

Among 20 respondents, the researchers have found that 25% of people believe the relocation to be a positive one depending on various factors like employment opportunities, standard of living, infrastructural developments etc. In particular, in the case of economic development, 55% respondents think their family has economically benefited from the relocation as job opportunities have been arranged for more people, but this section of people mainly falls under the middle or owner class of people who are the workers from higher post like managers. In different scenarios the remaining section of people who are residing in the tannery industries area have to suffer as well, as the cost of living increased since they cannot eat fish from their nearby rivers or cannot sell them in the market as people stopped buying them due to the inedible smell

they give off. They also cannot grow plants which once produced good vegetables and fruits, which they could eat and sell in the bazaar as well. The health condition of the people is the factor that has the most negative impact in their lives as they have started experiencing different respiratory diseases and skin diseases including hair fall. The chemicals used in the industries resulted in affecting 70% of the respondents by these diseases.

The other factor which has been impacted even more from this relocation is the environment and its various elements. 85% of the respondents have noticed the changes in the water, soil and air condition as they suffer from the pollution of these elements in different ways in their daily lives. These three being the most important natural components of the surroundings, the negative change in them resulted in the overall negative changes in the corresponding areas and the lives of locals residing in them. That's why 55% of the informants think the relocation has destroyed the fisheries of the nearest Dhaleshwari River, greatly causing the fishes to die altogether and disabling the locals to eat them. Due to the polluted water of the water bodies, 85% complained about the unusable condition of water for any kinds of works, once they used this water for. Similarly 35% highlighted the impact of soil pollution as there is a drop in the agricultural production in the adjacent areas and the taste and productivity of the fruits and vegetables in their yards have also decreased, even more according to 35% of the respondents. But when asked about the development of the overall tannery estate areas, 65% of the interviewee underlined the fact that the areas got more developed along with industrialization as the shifting generated more attention from the government in these places. ETPs have been planted to control the amount of waste produced and more tube wells have been built in almost all the households.

To summarize, with a number of negative impacts, the migration of the tannery estate to Savar area caused few positive changes as well. Still it is paramount to take needful steps so that the number of negative changes can be mitigated and ultimately causing more positive changes in the areas to make the transfer a thriving one.

7.2 Impact on Health

Previously before the relocation, a study was conducted by the Human Rights Watch which showed how the residents of Hazaribagh slums complained about illnesses such as fevers, skin diseases, respiratory problems, and diarrhea, which had been caused by the extreme level of pollution from the tanneries (HRW, 2012). Another scientific research carried out by S.H. Tinni and MD. Azharul Islam stated that 33% of the respondents who were Hazaribagh locals were suffering from skin diseases including rashes and itching, which were caused by the spreading of waste in water and soil. Since the relocation, the condition of Hazaribagh has improved significantly. But every coin has two sides. The relocation moved the pollution along with the tanneries, and are now polluting the localities of Hemayetpur instead.

People living in the nearby localities of the tanneries have reported a wide range of health problems, many of which are yet to be diagnosed due to the cost of medical attention. One of the prime zones of information collection related to health was a drug store located in the Jhauchor area, where one of the employees mentioned that there has been a rise of selling medicine which is used for skin conditions, especially allergy and rashes. This problem has been mentioned by most of the people who were interviewed. Tanneries commonly use substances like chromium salts, formaldehyde, and other potentially hazardous chemicals to treat and preserve animal hides. Prolonged contact with these chemicals through air, water, or direct skin contact can lead to allergic reactions and skin irritations.

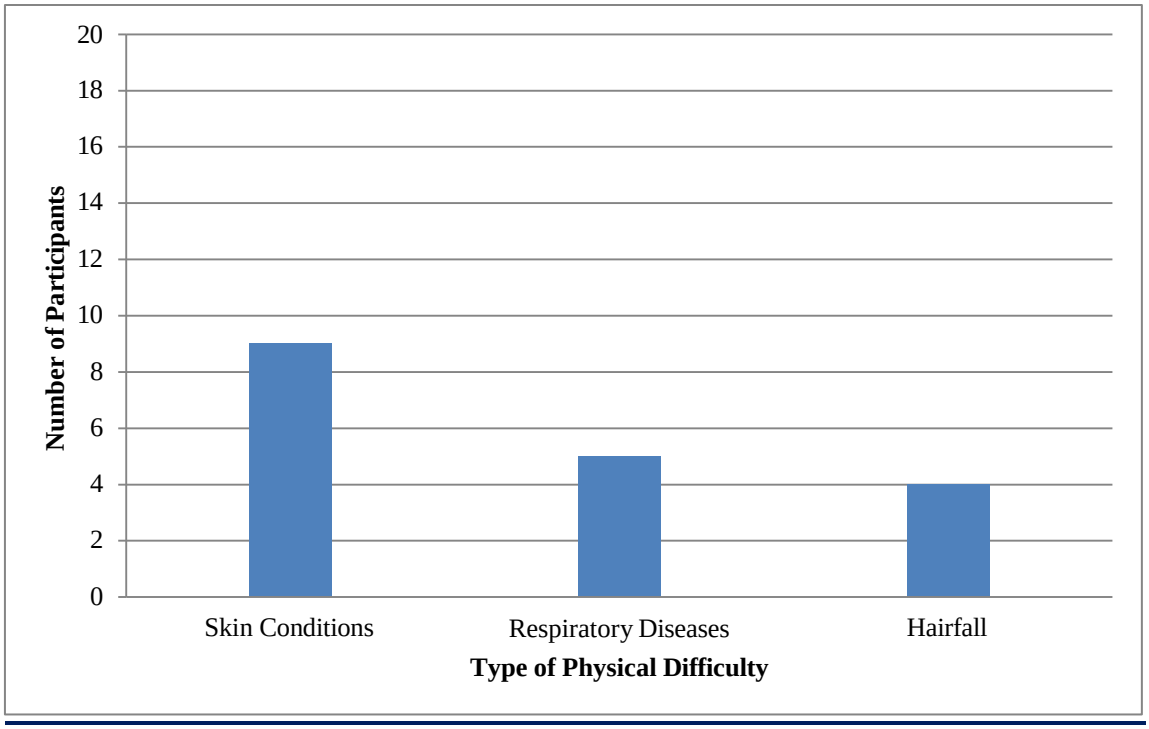

Table 3: Impact of Tannery Relocation of Local People's Health

The drug store employee also added how the local people suffer from respiratory diseases like asthma too. Many of the chemicals used in leather manufacturing can cause respiratory issues such as bronchitis, asthma, and lung cancer. Exposure to these chemicals over a long period of time can lead to chronic respiratory problems. Again hair fall was seen to be an issue among the local residents, who complained that the tanneries have polluted the water they used to use, and to mitigate this problem they are now using water from tap and tube wells instead.

While other factors may play some part in these illnesses, the extent of documented tannery pollution, the results of interviews with residents, and the findings of studies shows a higher prevalence of these illnesses in Hemayetpur, and strongly suggests a causal relationship between tannery pollution and poor community health.

7.3 Environmental Consequences

The survey conducted by the researchers showed numerous ways that the local people have been negatively impacted due to the sudden introduction of tanneries to the area. The various kinds of pollution are explained in depth in the following sections:

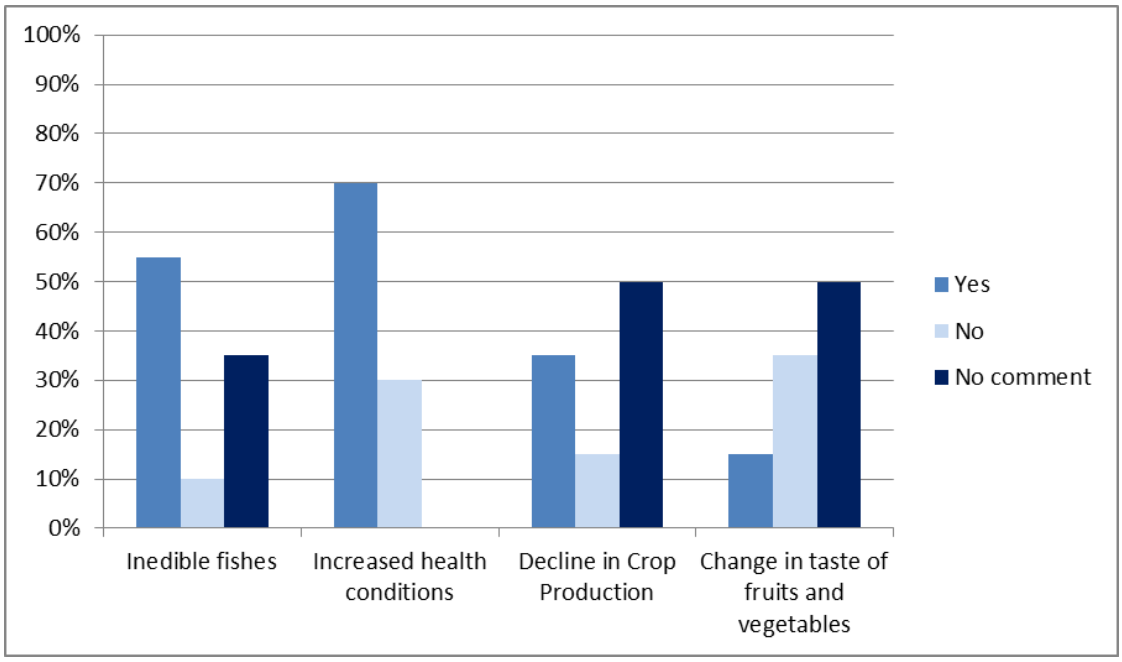

Table 4: Adverse impact on environment

7.3.1 Water condition

Industries such as tanneries put pressure on Bangladesh's water supplies, lakes, rivers, and more, altering their physical, chemical, and biological properties. Water Bodies are negatively impacted by extremely metal-laden industrial effluents. The tannery industry in Bangladesh released loads of garbage into streams like the Dhaleswari River, causing major devastation, especially near Hemayetpur (Hassan, 2023). Following the transfer, factories have opened for business in the new tannery estate in Savar, causing the nearby water bodies to get more polluted with their pollutants. (Hassan, 2023). Its water is nearly ideal for irrigation, affecting the agricultural production in the nearby areas. Thus, significant steps are required to properly treat the released effluents in order to protect the water condition.

Figure 5: Water Pollution arising from tannery waste (Source: bednews24.com)

The water of the rivers turned almost black in color due to the waste disposal of the tannery industries. Every day over 15,000 cubic meters of raw trash are dumped into the Dhaleswari River causing it to pollute more (Rony, 2022). Additionally, according to the local people of Jhauchor and Horindhara village, a major portion of water contamination is caused by wastage from the garments factories. Their effluent is contaminated with chemicals, dyes, and other contaminants that frequently find their way into water bodies and seriously harm the ecosystem. As a result, the legislative committee on the Ministry of Environment, Forests, and Climate Change (MOEFCC) recommended the temporary closure of the tannery industries. (Rony, 2022)

The state of the neighboring river has drastically changed, as reported by the locals near Savar University College. A student named Sujan Hossain said that whereas bathing and fishing in the river were commonplace a few years ago, it's now difficult to even pass by it. The river's once-clear water has taken on an unsettling dark hue, according to the residents. A local named Abul Fazal emphasized the striking change, saying that the river was formerly crystal clear but is now entirely black. Fisherman Binoy Sadhak laments the sporadic sightings of dead fish floating in the river. (Report, 2021)

When the researchers talked to a seller from a drug store in Jhauchor village, he mentioned the rise of selling medicines which are used for skin diseases, including allergy, rashes, etc, and also, respiratory difficulties due to the impact of polluted water from the tannery relocation. He also highlighted how the productivity of the lands has decreased, causing a lesser amount of food production and the inability of consumption of fishes from the Dhaleshwari river which they could in the past. Similarly, Nurun Nahar, a former worker of Hazaribagh tannery, and a resident of Jhauchor village said that the fishes caught from the river have kerosene like smell, making them almost inedible. From the survey that had been conducted by the researchers, it was found that almost 55% of people agreed that the relocation impacted the fishes of Dhaleshwari river, although most of them consume fishes that are brought from the market. Madina (age 25) mentioned how the water they use has an increased level of iron which makes it reddish in color and causes hair fall if used by people for a long time, although it was unclear if it was due to the tanneries located in the area. However, most of the side effects of the water pollution that were caused by the tanneries have been mitigated by the usage of tap waters and the establishment of tube wells, adding that almost 85% of the survey takers agreed on using these instead of the water from the river.

7.3.2 Air condition

Air pollution is also caused due to the chemicals from the tannery industries. According to studies by Haque & Haque (2022), the manufacture of leather also releases some heavy metals and poisons that are bad for the environment. From a similar case study, it was found that 80% of Hazaribagh people found the odor in the air intolerable. Same situation can be seen in the relocated industry of Savar where the stink was so bad in the summer that some travelers even puked. The problem of offensive smells, especially those originating from leather tanneries, has been made worse by population growth, industry, and urbanization. These smells, which include a lot of harmful substances, greatly worsen the environment. It is imperative that necessary steps have to be taken so that the local people of the surrounding areas are relieved from this problem.

Miss Akhi, a thirty-year-old from a nearby community in Hemayetpur, emphasized how harmful gas pollution affects the air and soil. She claimed that because of air pollution, tin roofs corrode quickly and require regular replacement owing to damage. For the inhabitants, the most upsetting problem is still the tannery stink, which can occasionally get intolerable. The only negative

impact Sumon, 24 years old, saw in his area was an offensive smell from a tannery after rain. He emphasized that the people closest to the river are most affected and suffered from different diseases.

7.3.3. Soil condition

A concerning trend has surfaced, with the Dhaleshwari River and its surroundings suffering the most from pollution, even though the tanneries were moved from Hazaribagh to Savar with the intention of shielding the Buriganga from this very contamination. The change affected the socio-economic fabric of the area greatly and changed land values and usage in the vicinity while also creating work possibilities for residents and protecting Dhaka's water bodies by creating an environmentally friendly tannery zone in Savar.

Crop field possessed numerous wild herbs which contributed to enriching the floral diversity of this area. The Hazaribagh Site lacks crop fields for urbanization but the opposite bank of Harindra Site has some crop fields. The activities of the Savar Tannery Estate are especially detrimental to the river's water quality and agriculture. As a result, the estate's neighboring agricultural fields are contaminated, which lowers crop yields and encourages the growth of crops that are hazardous to human health due to their chemical content. Although a Central Effluent Treatment Plant (CETP) is part of the layout design for the tannery estate, its non-operational status allows contamination similar to that of other nearby companies to continue. Consequently, the region's environmental damage is still a result of the current tannery operations. (Hossain & Abedin, 2019)

35% of the interviewees reported on lower crop yields as a result of tannery waste-induced soil sterility. They are able to eat these products via irrigation with tap water, but yields have dramatically declined, particularly for fruits and beans like coconuts and guavas. Insects are now present on guavas, and soil deterioration causes coconut water to dry up. These fruits were valuable formerly, but now the locals mainly depend on the market for goods they used to grow themselves.

When talking with a seller from a drug store, he mentioned how the productivity of the lands decreased, causing a lesser amount of food products and the inability of consumption of fishes

from the Dhaleshwari river which they could do in the past. The Tannery Estate has a limited amount of greenery due to ongoing civil building works that hinder the growth of plants. The only areas with vegetation were the corridors and river levees, which were populated by wild herbs. The Tannery Estate lacked large trees on its grounds.

Tannery relocation to Hemayetpur may cause agricultural land loss due to soil contamination. Tanneries utilize hazardous chemicals that can degrade soil fertility and productivity. Water contamination and land use changes during relocation further reduce farming acreage. Farmers using the impacted land may suffer economically. These concerns require thorough planning, environmental evaluations, and mitigating measures like soil remediation, sustainable agriculture, and farmer support during the transition. Strict laws and monitoring systems are needed to stop environmental degradation and assure regional sustainability.

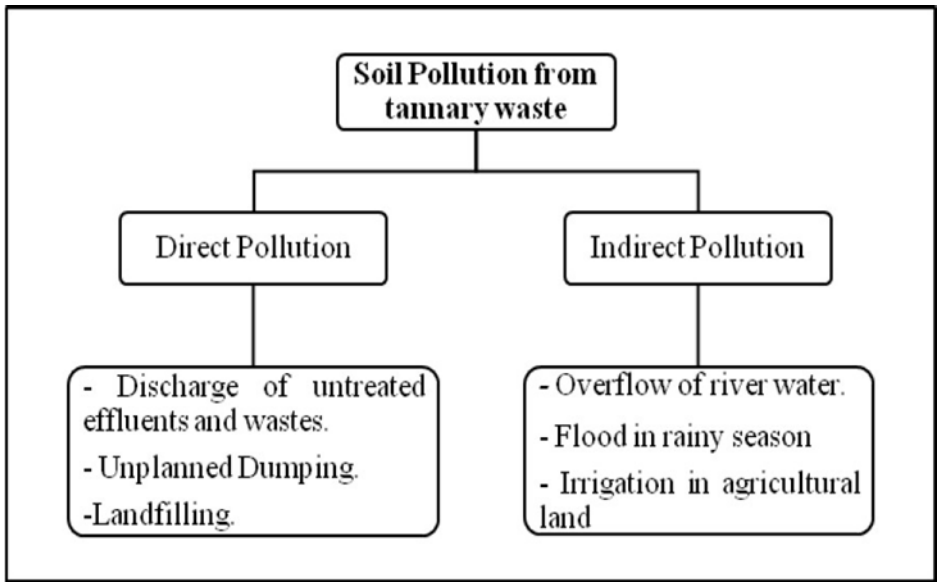

Table 5: Soil Pollution pattern of Tannery Estate; Source: (Hossain & Abedin, 2019)

7.4. Influence on Socio-Economic Conditions

7.4.1. Employment opportunities

The relocation of the tannery estate to Savar has led to the creation of employment opportunities for local residents, both for men and women who are actively working in the tannery. Sumon, a 24-year-old resident of Jhauchor village, emphasized the positive impact of the tannery's relocation on the community, highlighting the increased job opportunities it has provided. He also noted that locals benefit by renting out their houses to tannery workers who have shifted from Hazaribagh. Another participant, Mr. Kader, who works as an Uber driver, acknowledged the economic development in the vicinity of the tannery area. With many people relocating from Hazaribagh, new shops have emerged to meet the growing demand for resources. Typically, the establishment of an industry results in increased economic activities, and in this case, it has led to a rise in land prices and an overall improvement in the quality of life for residents. The enhanced economic activities are expected to further contribute to the well-being of the inhabitants in the area.

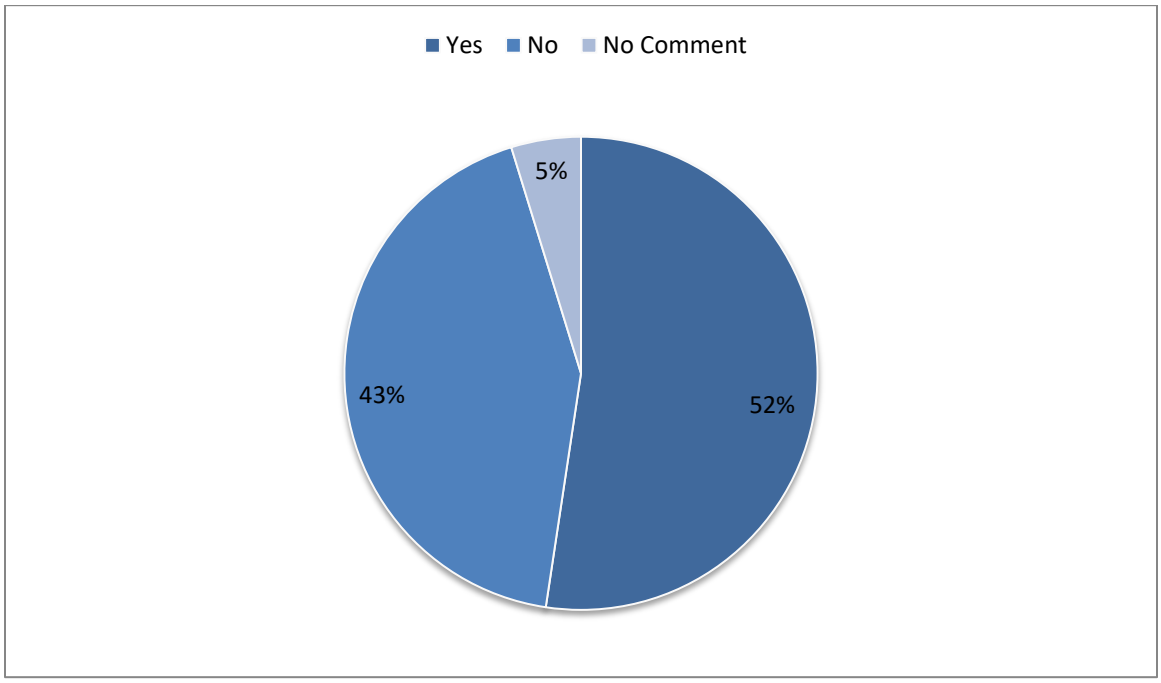

Table 6: Enhanced Employment Opportunities

While residents in Savar are benefiting from new opportunities, those who shift from Hazaribagh are grappling with an economic crisis. After the relocation, many workers from Hazaribagh moved to Savar to join the tannery industry. Unfortunately, the increased workforce, coupled with a decline in leather product exports, led to tannery owners laying off a substantial number of workers each month. NurunNahar, a former employee of HTE, moved to Savar after the relocation and expressed that they now receive lower wages and fewer facilities and the job is not secure enough like before, making their livelihoods more challenging. According to her, the relocation brought along existing employees, creating opportunities for new individuals from the surrounding area. Due to the surplus of workers, tannery owners are cutting off employees who are perceived as less capable.

So, it can be concluded that even though the employment opportunities of the local people have increased in some cases, on the other hand, a small section of people have been facing the insecurity of losing their jobs at the cost of minimal mistakes.

7.4.2. Service and Facilities

The tannery relocation brought the locals some facilities and they also enjoy some services provided by the government along with this industrialization process. According to the residents, the working environment and neighborhood are cleaner here after this process. Their family members working in the tannery industries are also experiencing better facilities there. The installment of tube wells in almost every household is one of the best outcomes of service the locals are facilitated with. With the use of tube wells, people in the study area have been satisfied and they have no complaints regarding the water pollution as now they use tube wells water for all their daily activities which is very healthy. They also think that their areas have become more developed with different kinds of plans and programs by both local and national authorities.

In another scenario, in the name of service, the locals have to spend more on their daily necessary items like they have to buy gas cylinders for cooking activities as pipeline gas has not been provided to the entire household. They are not given any kind of financial support for this and lower class people hugely suffer from this. So if one group of people is enjoying different services and facilities, the other is deprived of the same. Even if there is evidence of economic advancement in the overall area due to the relocation, in the similar way some people are

struggling to even live from hand to mouth.

In addition, building new utilities and roads is frequently a part of the relocation process, which promotes general socio-economic conditions of the area. This can also be witnessed by the locals there as the whole area of the tannery estate has been developed with better roads, ultimately assisting the locals to have better transportation and communication media. The potential for other industries to spring up in lieu of the tannery might lead to job possibilities and support local employment, gradually increasing the facilities of the local people. Notwithstanding, certain obstacles can emerge, such as temporary economic disturbance for enterprises adjusting to the modifications and causing the locals to be deprived of them altogether for some time being as well. Furthermore, depending on how the new industries are seen and how they affect the environment, this migration like many others, have both types of influence in the life of the residing people there.

7.4.3.Livestock Production

Tanneries exert a considerable influence on livestock production, primarily through their operational impact on the environment and animal health. The tanning process, involving the use of various chemicals like chromium and heavy metals, poses a significant threat, since these are improperly disposed of in the surrounding areas leading to water source contamination, which adversely affects the well-being of livestock that depend on these water supplies. Livestock exposed to such contaminated surroundings may suffer from health issues, ultimately impacting their overall productivity and vitality. Shopon, a 37-year-old poultry farm owner, mentioned that his chickens have experienced increased sickness following the tannery relocation, with a primary connection to colder conditions. A huge number of people are dependent upon the poultry farms, including the ones who work directly and indirectly in these places and earn a living from them, as well as people who receive their daily source of nutrition including protein from eggs and meat from these chickens, making the decrease in livestock production adversely impactful. Effectively managing and regulating tanneries in close proximity to livestock farming areas becomes crucial to minimize potential adverse effects on livestock production.

CHAPTER 8: CONCLUDING REMARKS

8.1 Conclusion

The primary motive for relocating the tanneries was to safeguard the Buriganga and its surroundings by establishing an environmentally friendly tannery industrial zone in Savar. This move aimed to enhance leather product exports by addressing international buyers' concerns about environmental management. However, the relocation inadvertently brought pollution to Savar. After the shift, the tannery industry started contaminating the Dhaleshwari river and nearby villages, significantly impacting the residents' livelihoods. The polluted water from this river continues to flow into the Buriganga, worsening its contamination. It's important to note that before the tannery relocation, Savar's garment industries were already contributing to river and environmental pollution, but after it, it's like adding fuel to the fire. Though with the relocation, the local population noticed both positive and negative aspects, as discussed in previous chapters. While residents are grappling with adverse effects like severe health issues and environmental problems, the move has also brought about positive changes by creating job opportunities. The establishment of industries generally leads to increased economic activities, offering new sources of income for local residents, which is seen in this case as well. However, the pollution has resulted in reduced production of vegetables and rendered fish from the Dholeshwari inedible. While some people can afford to purchase fresh fish from other rivers at higher prices, the less affluent residents face difficulties. Due to escalating water pollution caused first by garment industries and now by the tannery sector, local residents have shifted to using tube wells and tap water for their daily needs, which in a way resulted in the upgrading of their living standard. Those still relying on river water are experiencing adverse health effects, some of which are also caused by air contamination, including skin diseases, respiratory problems and hair fall. The government, along with other responsible authorities, need to take proper steps in order to mitigate this problem, and work for the common good.

8.2 Recommendations

Waste from the industrial sectors like tannery industries could bring detrimental impact on the lives of the people residing in the adjoining areas along with damaging their surrounding environmental elements and affecting them both socio-economically. So there is no doubt that precautionary steps are to be taken by the responsible officials as the proper running of these industries will ultimately help in the overall economy of the country. Savar tannery estate being a significant one among many, it is foremost to follow the followings:

- The primary issue with treating tannery effluent is that the Central Effluent Treatment Plant (CETP) lacks a system for refining salt. The capacity of the CETP is 25000 cubic meters, but the amount of pollution that has been produced in the tannery industries of Hemayetpur is 40000 cubic meters (The Business Standard, 2022).

  Therefore, in order to keep the amount of pollution under control, it is significant for the government to plan a new CETP, or allow more private companies to build ETP in the tannery estate

- Higher authorities of the respective departments should monitor tanneries that discharge a comparatively large amount of effluent, or discharge effluent with high concentrations of comparatively hazardous chemicals.

- It is important to make the rule of charging fines to tanneries that are found to have pollution levels that surpass national standards so that people of the surrounding areas do not suffer from the adverse effects of environment pollution.

- The government officials should keep a timely track of the possession of environmental clearance certificate so that the tanneries operating without one cannot operate, and if necessary seeking the cooperation of law enforcement agencies and/or utility service providers

- In order to design a comprehensive environmental strategy to prevent the environmental damage and hazards to health present in Hemayetpur, the researchers of this paper recommend further scientific study for devising new and better clean-up strategy, prioritizing surface ponds, large dumps of tannery waste, and the main drainage canals

- It is important to increase children's knowledge of environmental health issues resulting specially from tannery industries by introducing environmental health programs in the textbooks of primary students
- Local people should be more cautious in using water in their agricultural lands, and must use fresh water instead for increasing the production of their crops. They have been using tap and tube wells for consuming and household chores which mitigate the direct effects of water pollution, and so, a similar stance should be adopted for agricultural purposes
- The residents must be made aware of the level of water pollution in Hemayetpur through campaigns and workshops so that they steer clear from eating the contaminated fishes from the river

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List of Appendices

Appendix 1: Interview schedule

1. How long have you been residing in this area?
2. Are you aware of the presence of a tannery in your vicinity? If yes, how has it impacted your daily life?
3. Have you noticed any changes in the environment, air quality, or water sources since the establishment of the tannery?
4. Do you have any health concerns that you believe might be linked to the activities of the tannery?
5. Have there been any disruptions to your daily routines or lifestyle due to the tannery's operations (noise, odor, etc.)?
6. What changes have you seen in the agricultural production after the relocation?
7. Have you faced any kind of economic advantage or disadvantage due to relocation of the tannery industry here?
8. Do you think the lifestyle of the local community changed after relocation? If yes, how so?
9. Have you noticed any changes in the surrounding environment, for a few years just after the relocation and now after all these years?
10. Do you think the pollutants from the tannery factories are being treated properly now, then they have been just after the relocation?
11. Have you experienced more negative or positive change due to the relocation?
12. Do you think the relocation with time can make any positive changes?
13. Have you observed any efforts by the tannery or the government to mitigate environmental or social impacts in the local community?
14. Are there any specific improvements or changes you would like to see regarding the tannery's operations for the benefit of the local community?
15. Do you believe that local communities should be actively involved in addressing tannery pollution? If yes, how can they do it?

Appendix 2: Example of coded analysis of an interview

(Example of coded analysis of an interview)

Q: Do you have any health concerns that you believe might be linked to the activities of the tannery?

A: Mr. Y, a seller from a drug store, mentioned the rise of selling drugs which are used for allergies. The impact of water from the tannery relocation caused the local people to suffer from diseases like allergy, rush, asthma, respiratory problems etc. The chemicals that are being used in the tannery industry caused the water bodies to get affected causing diseases due to their uses. He too highlighted how the productivity of the lands decreased causing lesser amount of food products and the inability of consumption of fishes from the Dhaleshwari River which they could in the past.

Q: Can you mention how the relocation impacts the fertility of the agricultural land and similarly impacts the economy of your family?

A: Due to the chemical gas, a group of early 30s females said, the crops and vegetables they sow in the lands beside their home, don't give equal amount of product they used to get before the relocation. The production lessened as the soil has become infertile due to the tannery waste but they manage to consume these agricultural products by using water from the tap using an irrigation pump. Particular vegetable like beans that they used to cultivate beside their living areas now give little production due to the polluted soil of these areas. Fruits like Guava, coconut etc were used to grow and have high productivity, due to the damage of the lands suffering from shortage and bad taste. Guavas contain insects inside them and the water inside the coconut gets dried, are the examples mentioned by the woman which they have been facing with the relocation. Once they could use these fruits to earn money as well after meeting their own demand as the productivity was high with good quality, but with time and decreased fertility of the land they can't even eat them properly let alone sell them in the bazaar to get some extra

cash. Rather they became highly dependent on the market for these types of items which they could grow themselves before.

Q: Have you observed any efforts by the tannery or the government to mitigate environmental or social impacts in the local community?

A: Mr.X mentioned that as there is a separate House for the waste product which is located on Gate 3, their life outside this gate is not really hazardously impacted from these pollutants. Because of this initiative by the government to use waste treatment plants at a different place, distant from the local people, according to Mr.X, they haven't been facing any issues related to the tannery wastes in their daily life. They use water from the tap and they are fresh which can be used for all kinds of their daily chores starting from using it for drinking to using it for washing clothes and bath etc. He also mentioned about the dying of fishes due to tannery's impact but at present that problem has been solved. Fisheries sector faced loss due to this crisis which was approximately 2 years ago, but with the government's initiative to protect this sector; fishes are not being affected by this. About the problem of odor from tannery factories, they don't get that outside the factories in their living areas