

Evidence Paper

Plastic Pollution in Bangladesh *Drivers, Impacts and Solutions*

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PLASTIC POLLUTION IN BANGLADESH
DRIVERS, IMPACTS, AND SOLUTIONS

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ABSTRACT

Plastic pollution is quite widespread in Bangladesh, as the country exhibits a pervasive throwaway culture where waste is deliberately discarded on the streets of urban cities. In 2020, the total plastic waste collected in Dhaka alone was 646 tons which accounts for only 10 per cent of the total waste. About 48 per cent of this waste ends up in landfills, while only 37 per cent of the plastic waste is recycled. About 12 per cent of the plastic waste is dumped in small rivers, and the rest 3 per cent is disposed of indiscriminately. Although city corporations are responsible for waste management, most of the waste including plastic waste is collected by the informal sector. Furthermore, there are insufficient information, knowledge and policy considerations which directly address the issue of plastic pollution in Bangladesh. The country currently has limited and ineffective regulations governing plastic pollution. The practice of using alternatives to plastics must be put into effect by further policy initiatives and market-based incentives. This will help limit plastic products from entering the value chain and reduce plastic pollution in urban cities of Bangladesh.

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ACRONYMS

BPA	Bisphenol A
DNCC	Dhaka North City Corporation
DSCC	Dhaka South City Corporation
EPR	Extended Producer Responsibility
EU	European Union
GDP	Gross Domestic Product
HDPE	High-Density Polyethylene
HELCOM	Helsinki Commission
KG	Kilogram
LDPE	Low-Density Polyethylene
MLP	Multilayered Plastic
MoEFCC	Ministry of Environment, Forest, and Climate Change
Mt	Million tons
MW	Megawatt
NCC	Naryanganj City Corporation
OSPAR	Oslo and Paris Conventions
PA	Polyamide
PE	Polyethene
PET	Polyethene Terephthalate
POPs	Persistent Organic pollutants
PP	Polypropylene
PPE	Personal Protective Equipment
PPP	Public-Private Partnership
PS	Polystyrene
PUR	Polyurethane
PVC	Polyvinyl Chloride
RAP	Regional Action Plan
SMI	Survey of Manufacturing Industries
SPS	Sanitary and Phytosanitary
UNDP	United Nations Development Programme
USA	United States of America
YPSA	Young Power in Social Action

1. INTRODUCTION

The global economic paradigm has evolved towards more urbanisation, increased production potential, and advanced technologies. However, as industrialisation progresses and urban infrastructure develops, trade-offs emerge in the form of pollution, environmental deterioration, and waste mismanagement. Plastic waste, regardless of its source, inevitably ends up in the ocean. According to the World Economic Forum, it is hypothesised that by 2050 there will be more plastic than fish in the ocean (WEF, 2016). The intensity of mismanaged waste, particularly plastic waste, has increased as cities and industries have grown. Plastic wastes have been accumulating at a rapid pace all across the world, including in both developed and emerging nations. When it comes to plastic production, China is at the forefront, accounting for around 95 million tons (Mt) of plastic production in 2019 (IPEN, 2022). Nevertheless, plastic pollution is very much prevalent in Bangladesh, considering it was ranked 10th among the top 20 mismanaged plastic waste-generating nations in the world in 2010 (Jambeck, et al., 2015). Bangladesh suffers from a pervasive throwaway culture where waste is deliberately dumped at the edges of the streets. This causes a significant load on the city corporations and municipalities. Furthermore, plastic waste is processed in the same manner as solid organic waste with no segregation. Thus, it is difficult to recycle plastic, without a comprehensive waste management system in Bangladesh.

In this context, the study explores the relationship between plastic pollution and the economy of Bangladesh. Section 1 provides a summary of the facts related to plastic followed by an overview of the global impacts of plastic pollution, and a synopsis of the trends in plastic pollution in Bangladesh including the country's waste management system. Section 2 will then discuss the causes of plastic pollution, while Section 3 examines the effects of plastic pollution in Bangladesh. Finally, Section 4 provides an overview of the current plastic pollution regulations that have been adopted worldwide, followed by a discussion of Bangladesh's policies regarding plastic waste in Section 5, before concluding in Section 6 with some recommendations.

1.1 General facts about plastic

The use of plastic gained momentum after the 1950s when the global production of plastic was estimated

to be at 2 Mt which increased to 460 Mt in 2019, and is expected to reach 590 Mt by 2030 (Geyer, 2020; OECD, 2022). Global plastic waste, on the other hand, has nearly doubled from 156 Mt in 2000 to 342Mt in 2019 (OECD, 2022). Overall, just 9 per cent of plastic gets recycled, while 22 per cent is mistreated (OECD, 2022). Globally, between 2011 and 2019, the usage of plastic for packaging grew from around 112 Mt to roughly 143 Mt (OECD, 2022).

Plastic is most commonly used in packaging, followed by building and construction, electronics, textiles, and consumer items (OECD, 2022). Given the single-use nature of plastic packaging, the approximate lifespan of plastics used in the packaging industry is less than a year. On the contrary, the plastic used in building and construction, such as polyvinyl chloride (PVC), has a shelf life of 35 years. Additionally, the plastic used in industrial machinery, transportation, electronics, textiles, and consumer goods has a lifespan of 20 years, 13 years, 8 years, 5 years, and 3 years, respectively. (Rhodes, 2018). This indicates that there is very little value in terms of usability and longevity for packaging materials and other single-use plastics, especially in the context of a circular economy.

Plastics are essentially artificial synthetic polymers which are a derivative of crude oil or petrochemicals. Plastic is lighter, more malleable, and more durable than many other commonly available natural materials. Because plastic seldom interacts with other substances, its applications are diverse, including the use of plastic to package food and culinary items (Abbing, 2020). Plastics are hydrophobic and do not decay or decompose. Most packaging and single-use plastic bags are made from polyethylene or polythene, which became popular after the 1960s, and is a major source of worldwide plastic waste (Abbing, 2020).

Plastics are fundamentally classified into two types: thermoplastics and thermosets. Thermoplastics are plastic materials that can be remelted and reformed under heat, making them ideal for recycling. Examples of thermoplastics include polyethylene (PE), polypropylene (PP), PVC, polyethylene terephthalate (PET), polystyrene (PS), and polyamide (PA). Because of their malleability, thermoplastics have a wide range of commercial applications. In contrast, thermosets are polymers that form stronger bonds and, as a result, cannot be remodelled or remelted, making it difficult to recycle these materials. The

most used thermoset plastics involve polyurethanes (PUR), unsaturated polyester, silicone, epoxy, melamine, phenolic, and acrylic resins (Geyer, 2020).

1.2 Global impacts of plastic pollution

Since plastic does not naturally disintegrate, it persists in the environment for a long time. Commercially used plastics are non-biodegradable and accrue in landfills (Singh, 2021). Even though packaging materials are essential for storing food products, they contribute to the growing plastic waste which accumulates into rivers and water bodies. On a global scale, 75 per cent of marine litter is mainly comprised of plastic alongside other materials such as glass, paper, and metal (Napper, Pahl, & Thompson, 2021). Plastic in oceans and rivers either exists as large PET bottles that sink or float on the surface or as microplastics that are difficult to observe at first glance. Plastic waste endangers marine life extensively. Marine animals either get caught in plastic nets and suffocate, or ingest microplastic which they mistake for food. With the rise in plastic accumulation, it means that both marine and terrestrial animals will soon not be able to avoid plastic, further threatening the existence of animal species (Abbing, 2020). Plastic waste in the sea has the potential to release several chemicals, harming the natural marine environment. These substances interfere with photosynthesis, making it challenging for planktonic marine plants to efficiently produce oxygen (Tetu, et al., 2019). As a result, marine ecosystem is affected due to reduced levels of oxygen, creating a dead zone in the water, and threatening aquatic biodiversity. The region referred to as a dead zone is devoid of marine life when marine species either die or depart the ecosystem.

Microplastics are also being consumed by humans through drinking water. Every year, people may ingest between 3,000 and 4,000 plastic particles through their water supply (Rhodes, 2018). Although there is still much to learn about how plastic affects human health, there is widespread speculation that plastic may lead to the possible negative consequences for people's wellbeing. Microplastics can also enter the human body through the food chain, which means that eating animals that may have ingested plastic particles may take plastic inside the human body. Microplastics are also floating in the air, thereby making it possible for humans to inhale these pollutants. Such prolonged contact with plastic may

aggravate the human immune system. Plastics have become integrated into the environment to such an extent that they may be found in aquatic ecosystems, terrestrial plains, polar ice caps, (Rhodes, 2018), and even in the human blood stream (Leslie, et al., 2022).

1.3 Overview of plastic pollution in Bangladesh

Plastic pollution is a topic of interest that has recently gained momentum in Bangladesh. Although each municipal government in Bangladesh is ultimately in charge of overseeing waste collection and management, the informal sector collects much of the waste (UN, 2010). Incidentally, attempts made to separate plastic waste for recycling purposes are mostly conducted by the informal sector in Bangladesh. According to Waste Concern, the size of the urban population is correlated to the amount of waste generation. Furthermore, since 2005, the average daily per capita waste generation rate in Bangladesh has grown, surpassing the pace of change in urban population growth (Enayetullah, Sinha, & Lehtonen, 2014). Dhaka, Bangladesh's largest city with a population of more than 10 million, generates most of the country's urban waste, followed by Chittagong (BBS, 2022).

Although Bangladesh produces less plastic waste than China or India, the lack of recycling plastic remains a concern. The amount of plastic pollution in Bangladesh has received little attention in the academic literature and the mainstream news. Additionally, there is a dearth of accurate statistics tracking the amount of overall plastic waste, which makes it difficult to gauge the true intensity of the problem. There are, however, organisations that have conducted studies regarding plastic pollution and waste management in general. But the data represented by these reports are difficult to compare as they vary based on the nature of the study, data collection method, area of study, and the time when the study was conducted. Despite the issues regarding sufficient data, it is evident that plastic pollution in Bangladesh is on the rise as urbanisation escalates, with Dhaka generating most of the waste. Furthermore, the advent of COVID-19 has exacerbated the state of plastic pollution as individuals relied on single-use plastic for fear of infection and the spread of the virus. During COVID-19, there was a massive surge in the use of polythene bags and single-use plastic in Bangladesh.

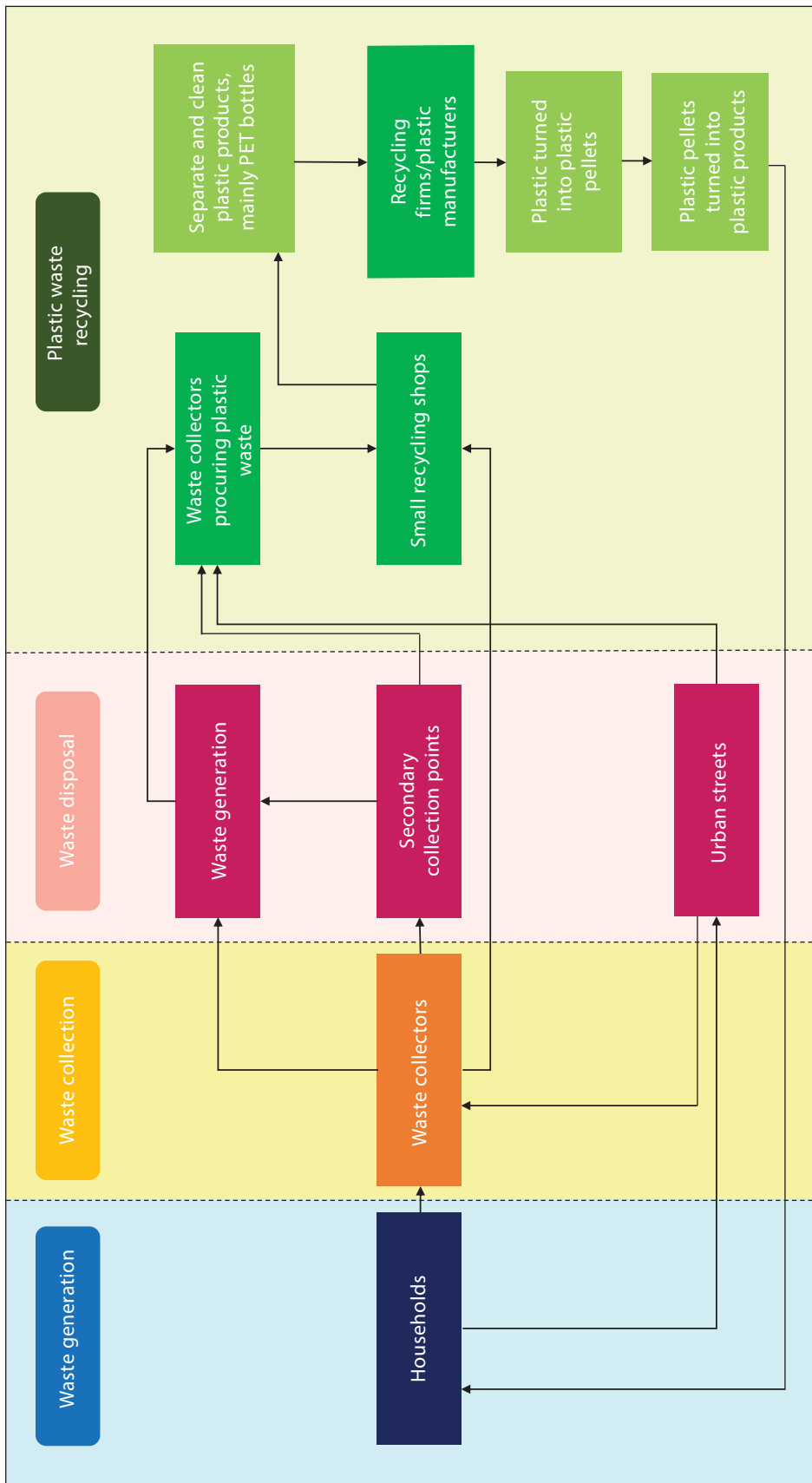
Daily waste production in the Dhaka metropolitan area was 6,646 tons in 2020, 10 per cent of which was plastic (The World Bank, 2021). Less than half of the plastic waste gets recycled while 48 per cent reaches landfills, and the rest is either dumped in rivers or discarded in drains and in other areas of the city (The World Bank, 2021). Additionally, it was reported that high-income households in urban areas generate more plastic waste while lower-income households generate mostly organic waste (ESDO, 2021). Hence, there is a cause for concern relating to plastic pollution in urban cities of Bangladesh.

1.4 Plastic waste management system in Dhaka

In Bangladesh, the informal sector plays a substantial role in the plastic recycling system. More than 1 million informal waste collectors work around the clock to keep the city streets clean.

(ESDO, 2020). Additionally, waste is also collected by individuals employed by the city corporation. The informal sector, however, recycles the majority of plastic waste. During this process, they collect different types of mixed waste from households or urban streets and segregate the plastic waste which can be sold to small recycling shops (Figure 1). At times door-to-door waste collectors also collect wastes from households and dispose of them directly in secondary collection points, after which representatives from the city corporations transport the mixed waste to the designated landfill. Informal waste collectors then procure valuable plastics from the landfill or secondary collection points which they later sell to small local wholesale or recycling shops. These are later sold to other firms from the recycling industry where they convert the plastic into pellets. These pellets are then used as raw materials for manufacturers to produce plastic products to be sold to consumers (The World Bank, 2021).

Figure 1: Waste Management and Plastic Recycling System in Dhaka



Source: Authors' illustration.

2. DRIVERS OF PLASTIC POLLUTION

Many factors contribute to plastic pollution in Bangladesh. Some plastic wastes reach Bangladesh via transboundary river systems, while other causes include excessive plastic product manufacturing, unwarranted use of single-use plastics, a lack of separation of plastic at the source, and irresponsible producer and consumer behaviour.

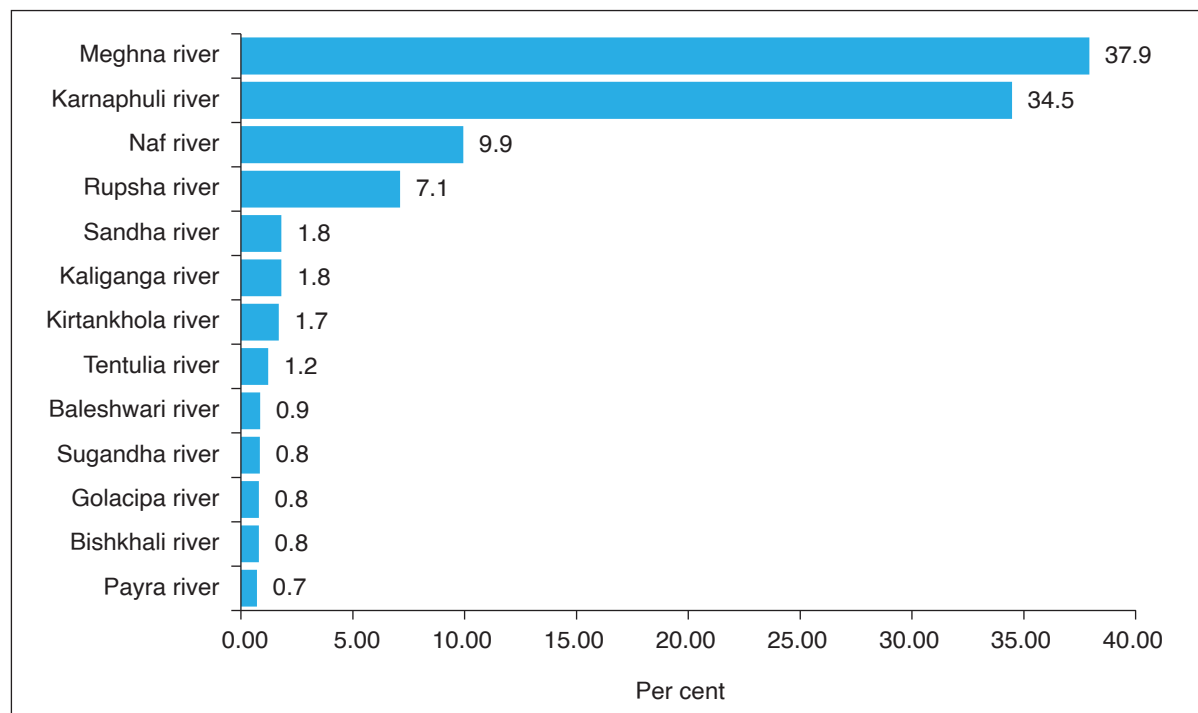
2.1 Water systems acting as a medium of plastic pollution

Rivers play a significant role in being one of the key drivers of plastic pollution by directing mismanaged plastic wastes from one region to another. Mismanaged plastics are wastes that are not adequately managed or properly disposed of and are just discarded in open landfills (Kibria, 2017). Land-based plastic wastes are either transported by rivers and discharged into the oceans or deposited as sediments in coastal regions. The river Ganges is the second largest river source to contribute to

plastic pollution in the world’s oceans (Chowdhury, et al., 2020). Ganges branches out into Padma and Meghna which consequently converges into the Bay of Bengal. According to a study, about 89 per cent of plastic waste is mismanaged in the coastal areas of Bangladesh (Jambeck, et al., 2015). Wastewater is often discharged into the river systems of Bangladesh from urban and industrial areas. Different contaminants, including organic and inorganic pollutants, have polluted both surface water and groundwater sources (Hasan, Shahriar, & Jim, 2019). Amidst different variants of pollutants, mismanaged plastic waste is identified to be a significant source of contamination in the water system (Kibria, 2017).

Near the coastal areas of Bangladesh approximately 25,000 metric tons of plastics are annually dumped into the ocean (Meijer, Emmerik, Ent, Schmidt, & Lebreton, 2021). The Meghna and Karnaphuli rivers account for about 37.9 per cent and 34.5 per cent of the total plastic waste being discharged from major riverine sources in Bangladesh, respectively (Figure 2).

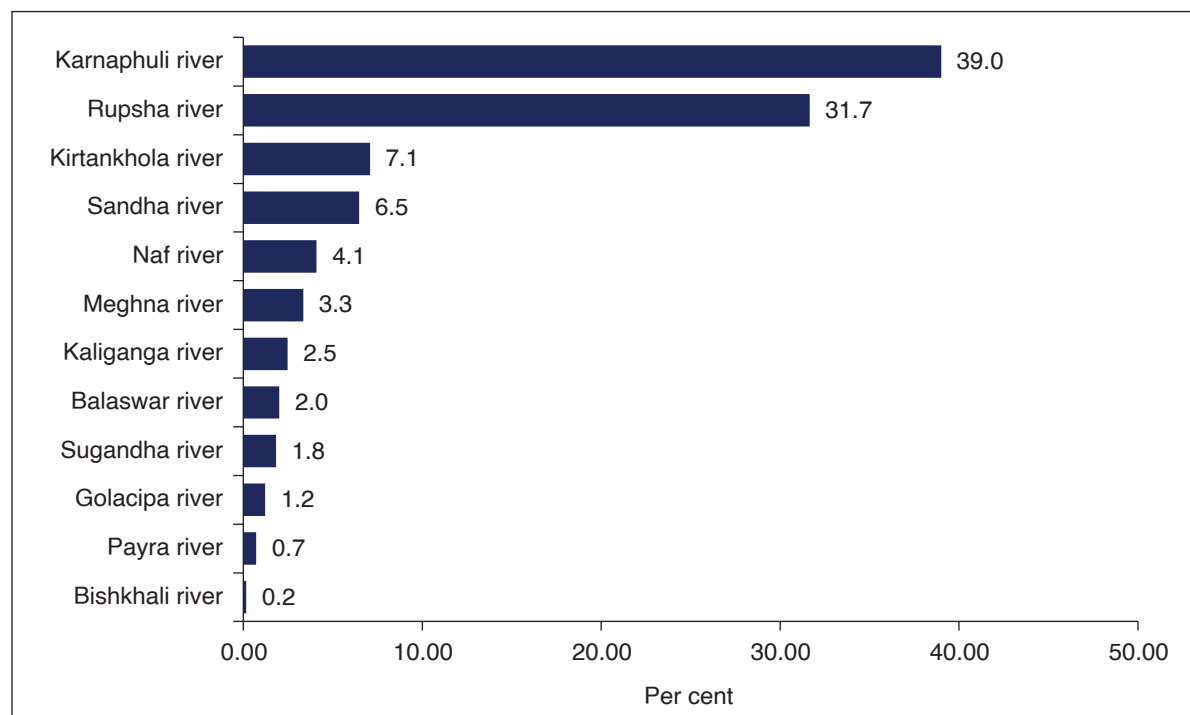
Figure 2: Amount of Discharged Plastic as a Percentage of Total Plastic Discharged from Major Riverine Sources in Bangladesh



Source: Authors’ illustration based on data from The Ocean Clean Up (The Ocean Clean Up, 2022).

Note: The Ocean Clean Up is an interactive database that records the amount of plastic waste entering the ocean from the top 1000 rivers. The figure has been illustrated using the data reported as of 7 August 2022.

Figure 3: Amount of Mismanaged Plastic as a Percentage of Total Mismanaged Plastic from Major Riverine Sources in Bangladesh



Source: Authors' illustration based on data from The Ocean Clean Up (The Ocean Clean Up, 2022).

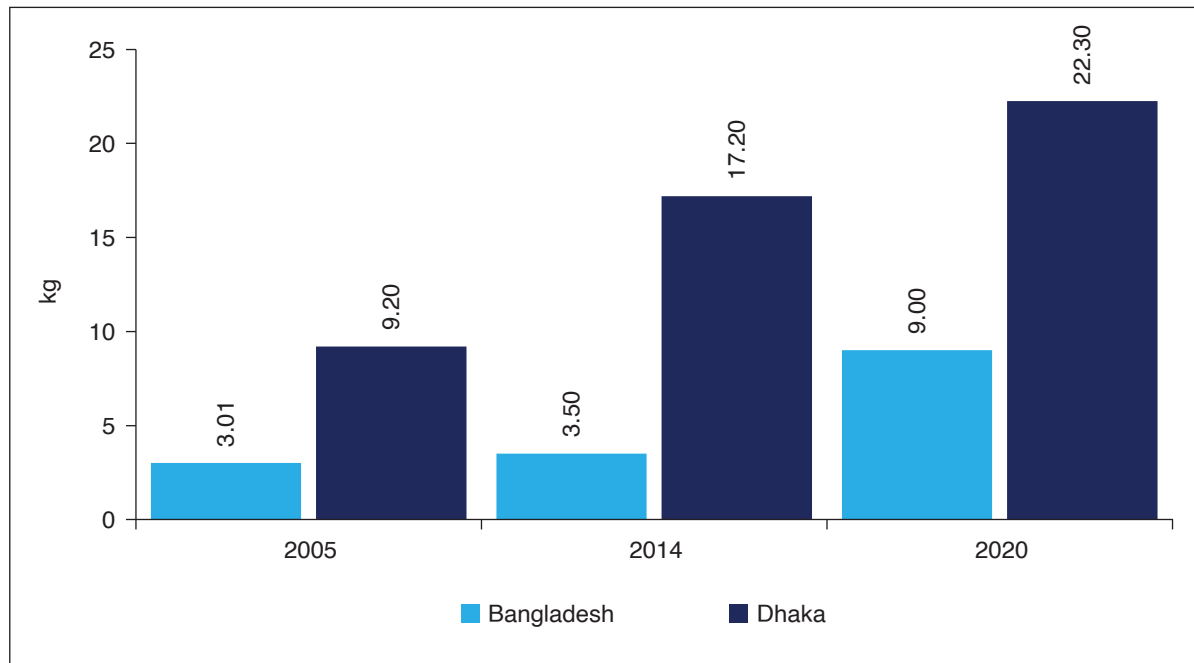
Note: The Ocean Clean Up is an interactive database that records the amount of plastic waste entering the ocean from the top 1000 rivers. The figure has been illustrated using the data reported as of 7 August 2022.

Furthermore, about 1 million metric tons of mismanaged plastic is generated every year around the coastal areas of Bangladesh (Meijer, Emmerik, Ent, Schmidt, & Lebreton, 2021). The Karnaphuli river contributes 39 per cent of the plastic waste that is inadequately disposed of, followed by the Rupsha river, which accounts for roughly 31.7 per cent. (Figure 3). It should be mentioned that most of the rivers in Bangladesh are transboundary rivers, therefore, a significant amount of the plastic waste near coastal areas is not locally produced but is coming from neighbouring countries. Plastic waste reduction in Bangladesh is just as essential as plastic waste reduction in neighbouring nations. Bangladesh has several transboundary rivers, and plastic waste travels through these rivers inadvertently. Having to manage the waste that is entering Bangladesh from other countries upstream is an additional burden for the country. Since India has recently outlawed single-use plastics, Bangladesh might end up becoming the next single-use plastic hotspot. Heaps of mismanaged plastic wastes are also a prominent sight in the urban areas of Bangladesh which

depicts an aggravated scenario of plastic pollution in the country.

2.2 Overproduction of plastic products

Plastic industries also contribute considerably to the growing mismanaged plastic waste in Bangladesh. Over the subsequent years, the plastic industry has become an important sector in the economy of Bangladesh. There are about 5,000 plastic manufacturers that are operating in Bangladesh, employing about 1.2 million individuals (BIDA, 2021). Approximately 98 per cent of these manufacturing units are small and medium enterprises (SMEs) and about 60 per cent operate around Dhaka city (BIDA, 2021). These manufacturing units are producing a great volume of plastic products to meet both domestic and international consumer demand. Since 2005, the average per capita consumption of plastic has increased from 3 kilograms (kg) per year to 9 kg per year in 2020 (Figure 4). In Dhaka alone, the average consumption of plastic has increased from

Figure 4: Annual Per Capita Consumption of Plastic*(in kg)*

Source: Authors' illustration based on data from the World Bank (The World Bank, 2021).

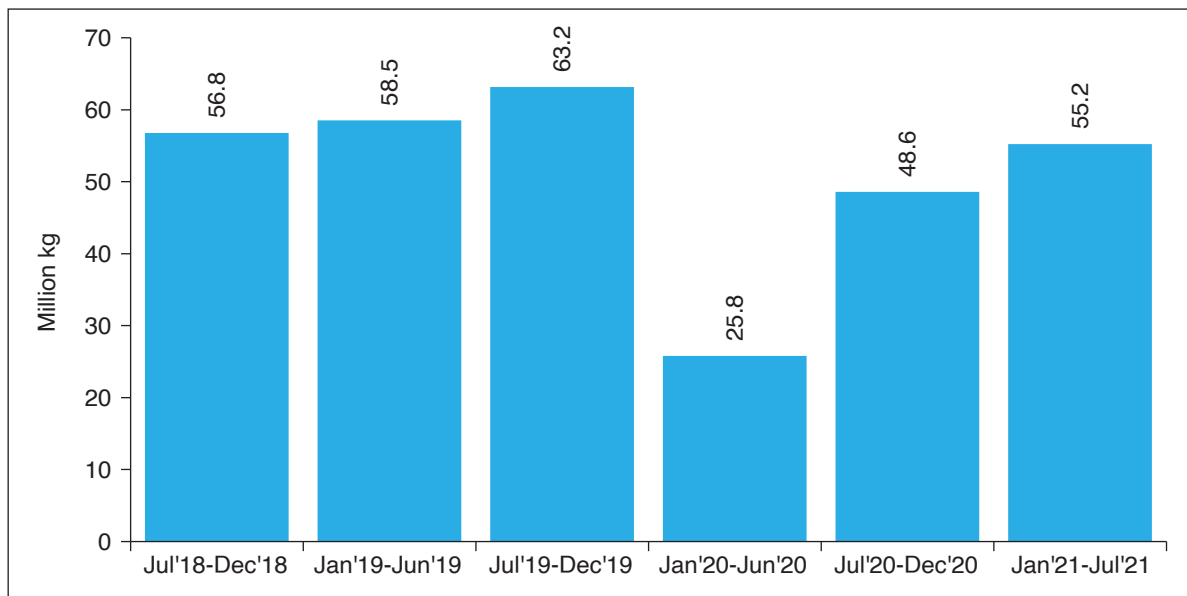
9.2 kg annually in 2005 to 22.25 kg per year in 2020 (The World Bank, 2021).

In Bangladesh, according to the Survey of Manufacturing Industries (SMI), the gross output of manufacturers of plastic products, and plastic furniture and fixtures increased from BDT 34.5 billion in 2012 to BDT 107.5 billion in 2019 (BBS, 2020; BBS, 2013). Plastic manufacturers produce an array of plastic products such as kitchen and tableware, lids, bottles, sanitary products, toys, packaging, and construction materials. Manufacturers also produce accessories such as plastic hangers and clear film, buttons, conveyance materials and other plastic parts for other sectors including textiles, pharmaceuticals, and electronics (BIDA, 2021). Plastic articles include various manufactured plastic products that are produced locally for both the domestic and international markets. From July 2018 to December 2019, total plastic export increased from 56.8 million kg to about 63 kg (Figure 5). The plastic sector grew slowly during the initial wave of COVID-19, like many other sectors, while exports plummeted throughout the first half of 2020. With the easing of constraints, however, the production of plastic has begun to rise dramatically once more. The total weight of plastic goods exported from Bangladesh to foreign nations as of July 2021 was 55 million kg. The growth

in plastic output that is being highlighted by this trend indicates that pre-COVID levels may soon be surpassed. Bangladesh exports plastic goods to 96 nations, with the United States of America (USA), India, China, Germany, and Vietnam among the top five export destinations (EPB, 2021).

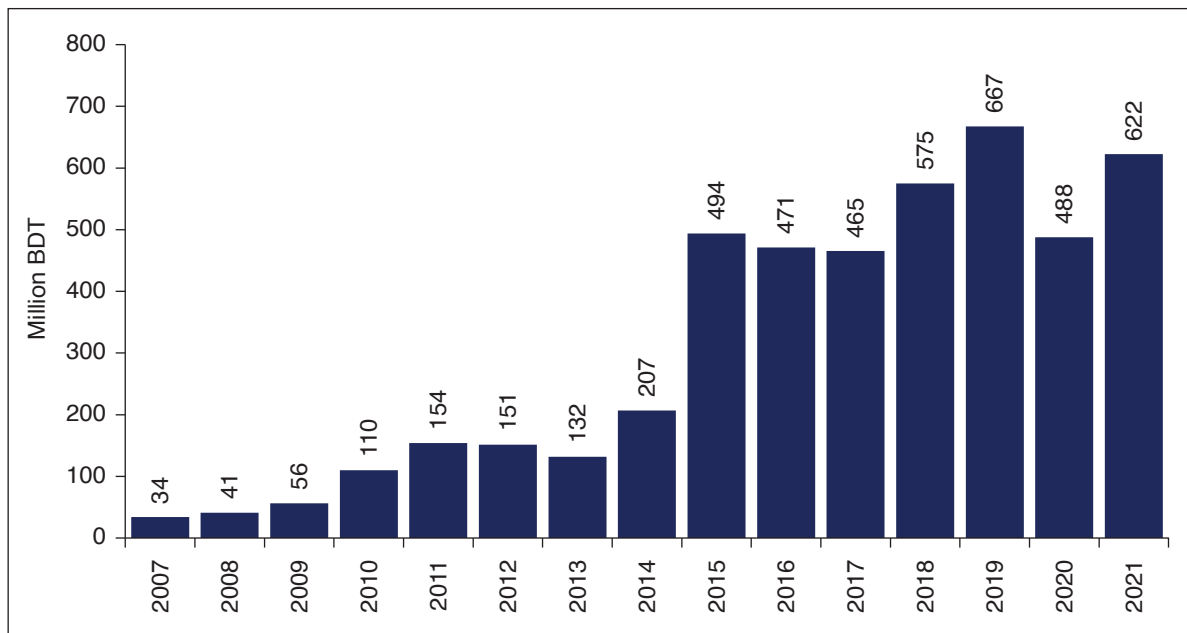
To produce plastic products, manufacturers usually import raw materials and plastic wastes from other countries. Raw materials are also acquired locally from recycled plastic products. However, this only makes up a small fraction as opposed to the number of plastics consumed and disposed of. Furthermore, the customs tariff placed on imported plastic scraps is only 5 per cent which is quite low (NBR, 2023). From 2007 to 2021, imports of scraps of plastics have increased from BDT 34 million to BDT 622 million (Figure 6). However, it is unclear whether the increase in the value of imported plastics was brought about by a growth in the volume or the price. However, a report by The World Bank suggests that Bangladesh imports about 1,409,094 tons of virgin plastic resin every year (The World Bank, 2021). Nevertheless, the rise in exports does allow for a clearer assessment of Bangladesh's level of plastic production. It should also be noted that the manufactured plastics are sold domestically as well. Therefore, the degree of plastic production

Figure 5: Total Exports of Plastic Articles from Bangladesh (in million kg)



Source: Authors' illustration based on data from Foreign Trade Statistics (2018-2021) (BBS, 2022).

Figure 6: Import of Scraps of Plastic to Bangladesh (in million BDT)



Source: Authors' illustration based on data from Statistical Yearbook (2007-2021) (BBS, 2021).

may be much more. The root cause of the growing mismanaged plastic waste pollution in Bangladesh is the rise in plastic production by the plastics industry. Among all the products produced by this

sector, single-use plastics are the most problematic items which add to the increasing plastic pollution in Bangladesh.

2.3 Excessive consumption and indiscriminate disposal of single-use plastics

Single-use plastics are the most frequently used plastic products not only in Bangladesh but also all over the world. Single-use plastics, such as plastic bags, clear plastic thin wraps, coffee cups and lids, utensils, straws, coffee stirrers, caps, and bottles, are generally used once. As of 2019, a survey suggested that individuals throw away about 87,000 tons of single-use plastics every year in Bangladesh (ESDO, 2019). Approximately 96 per cent of this waste comes from consumer items, 33 per cent of which are non-recyclable sachets (ESDO, 2019). A major fraction of single-use plastic is not disposed of properly and therefore ends up as waste in landfills and river systems, further polluting the environment. Food wrappers, straws, lids, sachets, water bottles and caps as well as cigarette filters are the most widely used single-use plastics in Bangladesh. Apart from the plastic packaging industry, the airline industry, residential hotels, supermarkets, restaurants, and major departmental and retail stores are all responsible for a significant share of the single-use plastic waste generation in Bangladesh. Meals provided on domestic and international flights are frequently wrapped in polythene sheets and served with single-use plastic cutleries due to security concerns. These single-use plastics are disposed of indiscriminately, contributing to the creation of plastic pollution. Furthermore, restaurants account for about 2.5 per cent of the total single-use plastic waste which consists of disposable polythene packaging, tableware, sachets, and plastic cups (ESDO, 2019).

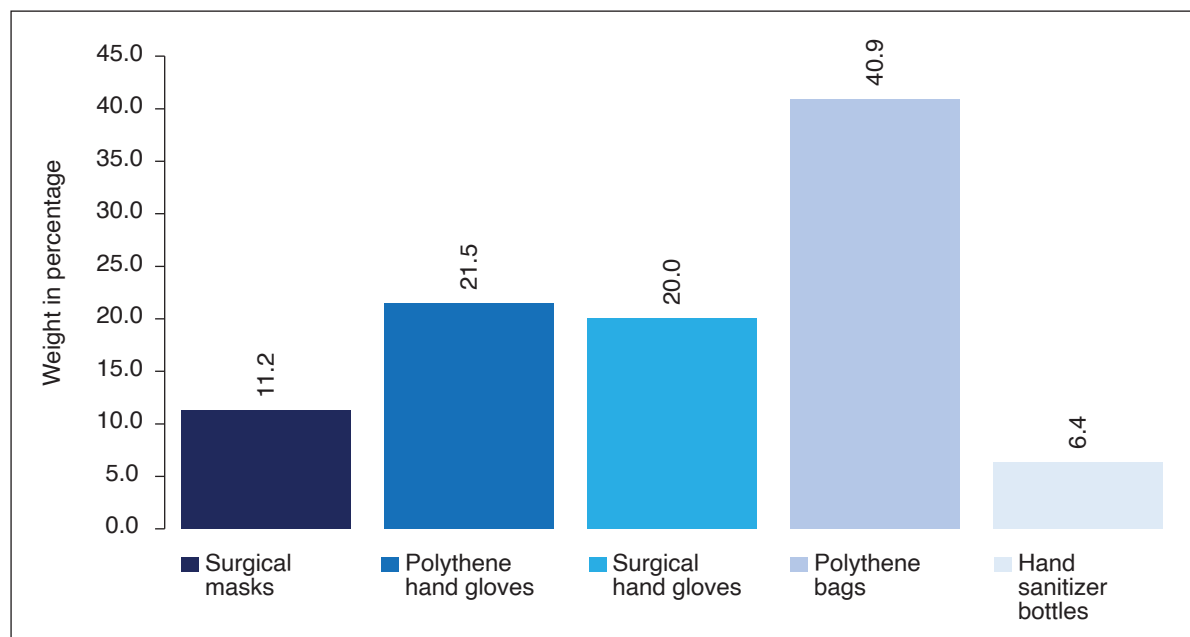
2.4 The surge in the use of single-use plastics driven by COVID-19

The plastic scenario in urban areas of Bangladesh has been a growing concern, which was exacerbated by COVID-19. The informal sector is mostly responsible for the collection of waste from households and landfills in Bangladesh. However, during the pandemic, many of the waste collectors were unable to work owing to the infection and associated lockdown restrictions which made plastic

waste collection less frequent. Due to the fear of infection, individuals changed their lifestyles and began to be more reliant on single-use plastic. Single-use personal protective equipment (PPE), medical masks, plastic gloves, and polythene bags have all become increasingly popular. This change in consumption choices has increased the volume of plastic wastes leading to plastic pollution. Despite the ban on polythene bags in Bangladesh since 2002, the use of these disposable single-use plastic bags has only increased. In Bangladesh, from April 2020 till March 2021, the number of polythene bags used have increased from 1.45 billion to close to 2 billion (ESDO, 2021). The total number of polythene bags used, countrywide accounted for about 21 billion producing about 78,433 tons of wastes under a span of just one year (ESDO, 2021). In Dhaka alone, 1.67 billion polythene bags were used during March 2020 to April 2021 which generated about 5,997 tons of plastic waste (ESDO, 2021). The marginal households have also been contributing to the growing plastic waste accumulating around the urban areas. According to a survey conducted by the Environment and Social Development Organisation (ESDO), on average marginal households dispose of 5 lightweight polythene bags every week and are the main source of single-use plastic waste in Bangladesh (ESDO, 2021). During March of 2020 till April of 2020, polythene bags accounted for 40.9 per cent of the plastic waste followed by polythene hand gloves which accounted for 21.5 per cent, surgical hand gloves which accounted for 20 per cent, surgical masks which accounted for 11.2 per cent, and hand sanitiser bottles which accounted for 6.4 per cent of all plastic waste (Figure 7) (ESDO, 2020).

In the urban areas of Bangladesh, households and street vendors are significant users of single-use plastic hand gloves made of polythene. Around 1,216 million plastic hand gloves were disposed of in just one month near these urban areas (ESDO, 2020). Apart from polythene bags and hand gloves, empty bottles of hand sanitisers have also added to the increasing generation of plastic waste. Containers of hand sanitisers that weighed nearly 900 tons were part of the plastic waste every month during the initial wave of COVID-19 from 26 March 2020 to 25 April 2020 (ESDO, 2020).

Figure 7: Type of Plastic Waste in Bangladesh During COVID-19 (Mar'20-Apr'20)



Source: Authors' illustration based on data from ESDO (ESDO, 2020).

2.5 Inadequate waste management

Another major driver of plastic waste generation is the lack of awareness and initiatives taken at the household level. In Bangladesh, plastic is not segregated at the source. Households compile all their wastes together before disposing it. This also contaminates the plastics that could have been separated and recycled at a later stage of waste treatment. Households with a higher income level tend to generate the most plastic waste as opposed to households with a lower level of income (The World Bank, 2021). Households produce 323 tons of low-density polyethylene (LDPE) plastic waste each day, yet only 174 tons reach landfills (The World Bank, 2021). The informal sector mostly collects PET bottles as they have a high market value and can be cleaned easily even if they are soiled. Materials such as polythene packaging, LDPE items, and multilayer plastic (MLP) products are often not collected by waste collectors as they supposedly have a lower market value, do not melt easily, and require a lot of time to separate and collect. MLP such as packaging for crisps and other food products are difficult to recycle, as the recycling industry does not have the proper technology. As a result, a major proportion of polythene bags, packaging, wrappers, and MLPs accumulate in landfills. Informal waste collectors

work under extremely unhealthy work conditions. Therefore, they collect only the type of plastics which they can sell for recycling purposes and earn a high return. These also include high-density polyethylene (HDPE), PVC, and PP apart from PET bottles. In 2020, the total plastic waste collected in Dhaka alone was 646 tons which accounted for only 10 per cent of the total waste in Dhaka (The World Bank, 2021). About 48 per cent of the waste collected ends up in landfills, while only 37 per cent of plastic waste is recycled (The World Bank, 2021). About 12 per cent of plastic waste is dumped in small rivers, and the rest 3 per cent is disposed of indiscriminately (The World Bank, 2021). The lack of sufficient number of secondary collection stations further lowers the likelihood of collecting plastics from municipal wastes before it is disposed at landfills (The World Bank, 2021).

3. IMPACTS OF PLASTIC POLLUTION

The use of plastic in Bangladesh is pervasive, yet consumers use and throw away plastic without being aware of its associated health, environment, and economic implications. There also exists a free rider problem when it comes to the indiscriminate disposal of plastic waste in Bangladesh. People discard single-use plastic items since they are not entitled

to the expenditures associated with cleaning up the waste, as it is expected that the city corporation and waste collectors will shoulder the majority of the load. A little more than two-thirds of all plastics ever made have been discharged into the environment (Azoulay, et al., 2019). It is still present as micro- or nano-plastics in the air and agricultural soils, microfibers in water sources, or debris in the ocean and the human body (Azoulay, et al., 2019).

3.1 Environmental impacts

Plastic waste mismanagement contributes to water pollution, air pollution, as well as soil pollution to some extent. The most harmful effect of plastic waste on the surrounding air may be ascribed to deliberate or unintentional open fire burning. Burning solid waste is a prevalent practice in Bangladesh to minimise the amount of litter in landfills and urban areas. However, due to a lack of awareness and segregation, these wastes contain plastic items, which are also burned. During winter, the frequency of incineration in local municipalities increases as under-privileged people burn wastes to keep themselves warm. These wastes include a significant amount of plastic waste that are indiscriminately thrown away on the side of streets. Incineration of plastic generates toxic and harmful gasses such as hydrogen chloride, hydrocyanic acid, carbon monoxide, carbon dioxide, and other noxious pollutants (Hossain, Rahman, Chowdhury, & Mohonta, 2021). The type of toxins released, however, depends on the type of plastics burned. For instance, incinerating PVC presents the greatest threat to air pollution. Furthermore, burning plastic wastes leave very fine particles in the air in the form of ash or charred soot (Hossain, Rahman, Chowdhury, & Mohonta, 2021). These ashes and soot deposit on either soil surfaces or on leaves. Additionally, due to rain and floods these toxic particles are washed away into the soil or into water ways. Such chemical contamination has the possibility to alter the pH of rivers and lakes, threatening the natural habitat of aquatic life.

The most apparent effect of plastic waste mismanagement has been observed in water bodies. Plastic waste accounts for much of marine pollution in Bangladesh. Around coastal areas such as Cox's Bazar, tourists and visitors throw away single use plastic items by the beach which ultimately ends up in the sea. In 2020, a survey conducted by Waste Concern in Cox's Bazar revealed that 37 per cent of the plastic wastes disposed in Laboni Beach is

recyclable, among which 52 per cent was made of LDPE (The World Bank, 2021). In Inani Beach, 41 per cent of the plastics discarded were recyclable, among which 70 per cent were made of LDPE (The World Bank, 2021). Due to rainfall, plastic waste from landfills in Bangladesh are also deposited in canals and riverways in surrounding urban cities. Plastic wastes clog canals and sewage systems as well. In the city of Dhaka 22 out of 65 canals have been transformed into dumping zones mostly, due to plastic pollution (Hossain, Rahman, Chowdhury, & Mohonta, 2021). Plastic articles degrade into microplastic, which endangers marine biodiversity significantly. Microplastics or microbeads are just as detrimental to marine life as polyethene bags, if not more. Commercially, a considerable number of personal care items like face creams, toothpaste, scrubs, and exfoliating face wash include microbeads. Through the sewage systems, these microbeads wash into drains and ultimately end up in rivers, canals, and finally the ocean. Microplastics are mistaken for food by marine species, who eventually suffer from indigestion and digestive system damage (ESDO, 2016). Bangladesh still has a very limited knowledge of the negative impacts of microplastics. According to a survey conducted in Bangladesh's three major cities of Dhaka, Chittagong, and Sylhet, larger fish such as Catfish were found to have more microplastic as opposed to the smaller fish (ESDO, 2016). Fish in Dhaka's lakes and ponds were discovered to have a higher concentration of microplastics than Dhaka's river fish. A similar scenario was seen in Chittagong and Sylhet where a considerable amount of microplastics were found in fish from rivers flowing inside these cities. Unlike macro-plastics, microplastics cannot be as easily recycled or filtered through in the sewage systems. These microplastics damage the reproductive systems in fish and can be toxic to their liver which may also cause DNA damage (ESDO, 2016). Ultimately, marine plastic pollution is a sign of a linear plastic economy that is fundamentally wasteful (Forrest, et al., 2019).

3.2 Health impacts

Products made from plastic contain various additives such as Bisphenol A (BPA), phthalates, and other chemicals which can be hazardous to both the environment and to human health (Proshad, et al., 2018). Under heat and pressure, these additives can leak out of the plastic and cause health issues such as eye irritation, blindness, and respiratory problems (Proshad, et al., 2018). These additives may also

damage the liver, cause skin diseases, headache, and dizziness, and may also reduce fertility (Proshad, et al., 2018). More so, toxic plastics may also lead to cardiovascular issues, and genotoxic and gastrointestinal causes (Proshad, et al., 2018). Plastic affects human health at every stage: from extraction to production to utilisation, and to disposal. During extraction and transportation of petrochemicals, individuals are directly exposed to toxic emissions such as benzene and other toxins which affect the immune system, interfere with the sensory organs, damage the kidney, and may also lead to cancer (Azoulay, et al., 2019). During the production stage, individuals are at risk of either inhaling or ingesting toxic chemicals and microplastics which may also be carcinogenic and may cause neuro and reproductive toxicity, low birth weight, as well as eye and skin irritation (Azoulay, et al., 2019). From the consumer end, the impact of plastics is felt either through skin contact or inhalation and ingestion. Plastic pollutants can enter the human body through the food chain as individuals may consume fish contaminated with plastic particles.

In Bangladesh single-use plastics are used to a considerable degree to wrap and store food products. Often, street vendors serve tea and coffee in plastic cups. As aforementioned, under heat, plastic additives such as BPA can leach out and enter the human bloodstream which may cause negative health impacts. In Bangladesh, plastic wastes are often incinerated during disposal. Burning plastic wastes release toxins such as furans and dioxins like persistent organic pollutants (POPs) that may worsen respiratory diseases, and heart ailments, and may damage the nervous system (Verma, Vinoda, Papireddy, & Gowda, 2016). Plastic wastes have collapsed sewage systems by disrupting natural channels and suffocating drainage systems. This causes flooding during the monsoon season in the streets of Dhaka and Chittagong for several days, causing residents to live under unhygienic conditions. Flooded streets lead to mosquito-borne diseases such as dengue and malaria (Hossain, Rahman, Chowdhury, & Mohonta, 2021). Bangladesh witnessed severe and widespread flooding in 1988 and 1998 which partly motivated the ban on polythene bags in 2002.

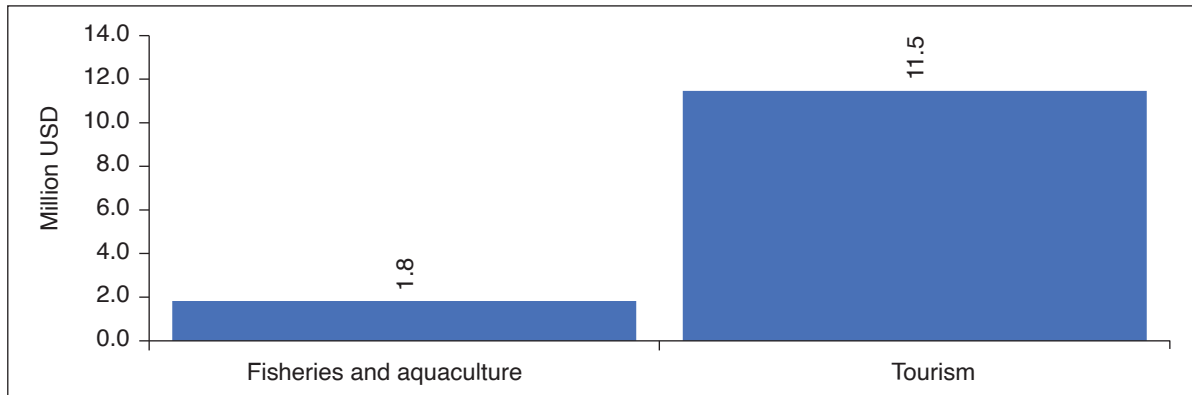
Another current concern is that single-use plastics may contribute to the spread of the SARS-CoV-2 virus. The virus can survive up to 3 days or 72 hours on plastic wastes which can be hazardous

to human health (Prata, Ana L.P. Silva, Walker, Duarte, & Rocha-Santos, 2020). Waste collectors are frequently exposed to such hazardous plastic wastes during waste collection and transportation. The virus can potentially spread through disposed face masks, plastic hand gloves, as well as other discarded personal protective equipment (PPE) which are collected by waste collectors or other representatives from the municipalities without taking any cautionary measures. The workers in the informal sector of Bangladesh come under great risk as they are exposed to the infection and may potentially spread the virus to those, they are encountering (ESDO, 2020).

3.3 Economic Impacts

While the effects of plastic pollution on the environment and human health are visible, the economic effects of plastics are equally significant. Most literature pivot more towards the environmental and health impacts of plastic pollution, yet the economic costs of plastic pollution are seldom debated over. It is estimated that plastic pollution accounts for USD 2.2 trillion annually worldwide in terms of environmental and social impairment (UNEP, 2014; Ricke, Drouet, Caldeira, & Tavoni, 2018; Beaumont, et al., 2019; Zheng & Suh, 2019). The effects of plastic pollution in the oceans account for a sizeable share of the costs that result from it. It is estimated that nearly USD 1.5 trillion per year is lost owing to changes in the oceans' potential to offer fish, biological resources, oxygen, clean water, cultural and recreational significance, and significant climate control (Beaumont, et al., 2019). Furthermore, additional costs occur due to the production and afterwards the incineration, of plastic wastes at the disposal stage. This involves about USD 700 million annually from the release of greenhouse gases during the production of plastic (Ricke, Drouet, Caldeira, & Tavoni, 2018; Zheng & Suh, 2019), USD 25 billion per year due to toxic chemicals released into the soil and water bodies from plastics buried in landfills, USD 4.5 billion each year owing to water usage for plastic production, USD 1.3 billion per year due to the release of pollutants associated with plastics into the air, and USD 875 million annually in value loss for lands caused by excessive littering and waste disposal (UNEP, 2014).

For Bangladesh, the anticipated average annual income loss from tourism, and aquaculture and fisheries due to plastic pollution in 2020 were USD

Figure 8: Average Estimated Annual Loss in Revenue as Per 2020 *(in million USD)*

Source: Authors' illustration based on data from the Ocean Cleanup (The Ocean Cleanup, 2022).

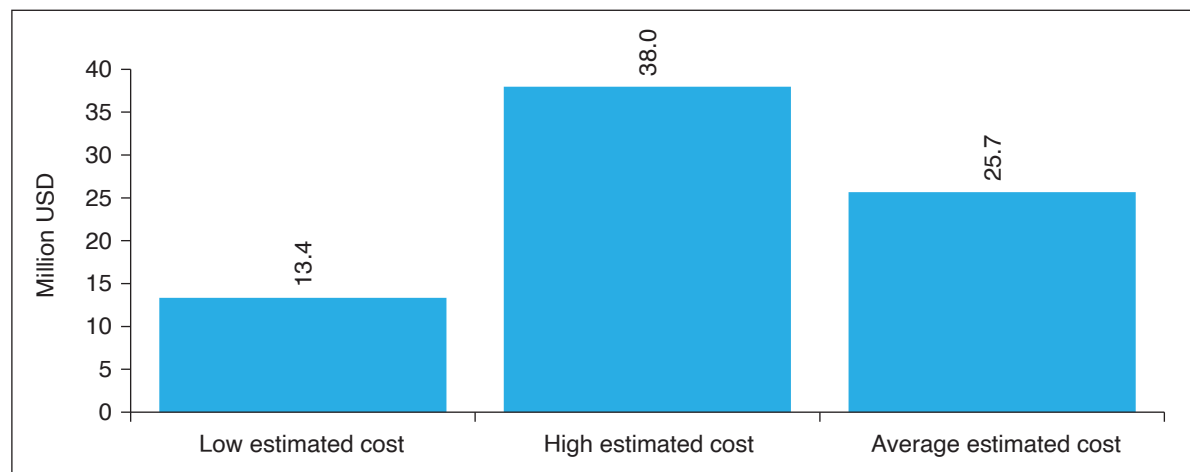
11.5 million and roughly USD 2 million, respectively (Figure 8). In Bangladesh, tourism is a growing industry which was significantly affected due to the initial wave of the pandemic. However, with the progressive improvement of infrastructure, amenities, and more marketing, Bangladesh is gradually developing as an appealing tourism destination. In 2018, the direct contribution of travel and tourism to Bangladesh's Gross Domestic Product (GDP) was 4.4 per cent, and this is projected to ascent to 4.7 per cent in 2027 (Hossain & Wadood, 2020). The tourism business in Bangladesh has huge potential to not only contribute significantly to the country's GDP but also to provide jobs and employment for millions of individuals. On the other hand, aquaculture and fisheries are two of the fastest growing businesses in Bangladesh. They have grown to be substantial contributors to the country's economy and are vital sources of food provision, and income for rural communities, as well as for processing, transportation, and marketing companies (Shamsuzzaman, Mozumder, Mitu, Ahamad, & Bhyuiana, 2020).

However, plastic pollution or improper waste management may have a significant negative impact on the tourist, and aquaculture and fishing industries. The persistent accumulation of plastic debris near coastal areas with the associated putrid odour can make such regions less appealing to tourists. Furthermore, the increasing prevalence of microplastic-contaminated fish may render marine creatures unfit for human consumption. This may also affect the export volume for fishes in the long run as Bangladesh may not be able to meet sanitary and phytosanitary (SPS) measures of partner countries. Furthermore, the expense of clean-up costs can be

a burden on local governments and municipalities. Municipalities in every region are allocated a designated budget. However, it is often seen that most of the budget is used up to cover the expenses of clean-up costs, as waste collectors transport wastes from the streets and secondary dumping stations to landfills. The estimated annual clean-up cost of plastic wastes for the government in 2020 averaged around USD 25.7 million (The Ocean Cleanup, 2022) (Figure 9). Additionally, the highest estimated clean-up cost for the government anticipated in 2020 was as high as 30 per cent of the total revised budget for the Ministry of Environment, Forest, and Climate Change (MoEFCC) in 2020 (The Ocean Cleanup, 2022; MoF, 2021). As a result, in Bangladesh the entire economic impact of plastic pollution is projected to be around USD 39 million per year on average (The Ocean Cleanup, 2022).

Plastic pollution has a large financial impact due to lost revenue and expensive clean-up cost of plastic waste. If such economic costs continue to sustain and increase overtime, it may have negative impacts on the tourist and fishing industry as well as high opportunity costs for the government. A further unevaluated cost of plastic pollution is the cost of treatments for health impairments caused by plastic pollution, especially for the waste collectors in the informal sector. Although further research is required to analyse the direct health costs of plastic particles, clogged drains, and sewage system due to plastic wastes, increase the potential for waterborne diseases in urban areas. Such a heavy health burden will increase out-of-pocket expenditure for ordinary people which will affect the savings for waste collectors further pushing them towards

Figure 9: Average Estimated Annual Loss in Revenue as Per 2020 (in million USD)



Source: Authors' illustration based on data from the Ocean Cleanup (The Ocean Cleanup, 2022).

poverty. Moreover, this will also reduce productivity and output, while also causing a loss in revenue for all individuals in the economy.

4. POLICIES TO REDUCE PLASTIC POLLUTION

The growing attention around plastic pollution has encouraged countries across the world to take initiatives and design policies to mitigate the effects of the plastic economy. Initially the policies regarding plastic waste comprised of a series of either bans or levies. To reduce the effects of plastic pollution global economies legislate directives that only addresses a certain aspect of the plastic value chain, that is, either the product design, production, consumption, disposal or a combination of these aspects. However, a more conducive framework would be to bring attention to the significance of regulating plastics at every stage of the plastic value chain and inclining more towards a circular economy. The discussions over the significance of sustainability and the growing concern of waste mismanagement have brought forth the idea of a more circular economy with a closed loop production system. As a result, several cooperative and statutory measures have been implemented at multiple levels of government worldwide to establish a circular economy. A circular economy framework seeks to reduce plastic waste creation and environmental pollution by addressing all aspects of the value chain, from design, production, use, and disposal (EC, 2018).

4.1 Policies adopted by other countries

Some countries have adopted regulations targeting product design to influence production of sustainable plastics which are easier to recycle. For instance, in 2011, the European Union (EU) Commission Regulation was introduced which incorporated stipulations regarding the composition of plastic articles meant to come into contact with food (Syberg, et al., 2021). In 2019, the EU adopted a revised directive to regulate particular single-use plastic products. The directive addresses the particular product requirements for plastic items and stipulates necessary specifications that must be considered for future product designs. The directive also integrates extended producer responsibility (EPR) to encourage manufacturers to transition to products that are easier to maintain within the circular value chain and eliminate environmental damage (EU, 2019).

Germany enacted a legislation in 1991 requiring retailers who offer plastic bags to pay a fee or levy (Clean Up Australia , 2015; Earth Policy Institute , 2014). Levies and bans are often used as tools to legislate and reduce the production and consumption of either all or particular plastic products. Later in the early 1990s, Denmark also established a regulatory system of charging a fee or a levy on plastic bags (Danish EPA , 2013). Afterwards countries such as Scotland, England, Botswana, Malaysia, Hong Kong, Canada and many more soon followed. In UK, manufacturers and importers have to pay a tax

of GBP 200 per metric tonne of plastic packaging which constitutes 30 per cent less recyclable plastic materials (Government of UK, 2021). The main objective of implementing such a tax regime was to accelerate the use of recycled plastic and thereby increase its demand and reduce the use of virgin plastic to make packaging. In 2002, Ireland passed a levy of 15 Euro cents on the sale of each plastic bag in retail stores which increased to 44 Euro cents in 2009 (Xanthos & Walker, 2017). Bangladesh was the first country to initiate a ban on plastic bags in 2002 followed by Rwanda, Kenya, China, and India. In 2008, China imposed a ban on the production and on the dissemination of ultra-thin plastic bags and afterwards introduced a ban on import of plastic waste into the country. This however, led to other South-Asian countries such as Bangladesh, Thailand, Malaysia, and Vietnam became the new hub of plastic waste imports. Similarly, Canada has also imposed a plastic ban on six single-use plastic products which are most frequently found in the environment and are non-recyclables. These early restrictions were enacted in regard to the huge output of plastic waste and rising environmental contamination in wastewater systems (Syberg, et al., 2021). Such regulations are mostly aimed to reduce the demand for plastic bags which eventually leads to a limitation of production as well as consumption.

Regulatory framework targeted towards the disposal stage of the plastic value chain integrates objectives that increases waste collection while averting the waste away from landfills to encourage reuse and recycle of plastic materials. This requires an efficient infrastructure that includes an adequate waste disposal system. In 1922, Denmark initiated a deposit-refund scheme for glass bottles which also incorporated plastic bottles in the 1990s (Danish EPA , 2013). The majority of stores in Denmark include recycling bins for cans and bottles. The beverage containers are taken from the machines once they have been emptied and afterwards, each item is identified, weighed, and sorted. Following this procedure, the stores and supermarkets are reimbursed, who subsequently give the funds to customers who are recycling their bottles and cans (State of Green , 2018). The EU legislation in 2018 for single-use plastic also incorporated a measure to separate and recycle specific single use plastic products, including fishing equipment and beverage bottles (EC, 2018). Furthermore, the Canadian

government and the Ocean Plastics Charter propose recyclable targets for new plastic items. These guidelines aim to drive new technologies for more recycling capabilities, expand recyclable material markets which will lower prices, and accelerate recycling (Syberg, et al., 2021).

As the environmental impacts of plastic pollution gained more attention, intergovernmental organisations such as Oslo and Paris Conventions (OSPAR) and Helsinki Commission (HELCOM) also designed action plans to tackle marine litter in the North East Atlantic Sea and the Baltic Sea respectively, while integrating the ideology of a circular economy. The Regional Action Plan (RAP) developed by OSPAR addresses the need to decrease the levels of marine litter, specifically microplastics, in the marine ecosystem, to mitigate the negative impacts on the aquatic and coastal environment (OSPAR Commission , 2014). Similarly, HELCOM was established for the conservation of the marine environment in the Baltic Sea with the initiation of the Helsinki Convention, which was signed in 1974 and updated in 1992 by all Baltic Sea coastal countries. The Helsinki Convention includes stipulations regarding transboundary water pollution between contracting parties and associated guidelines to mitigate degradation of the marine environment (HELCOM, 2014).

The EU too made great strides at formulating policy initiatives to curb the challenges presented by the growing plastic pollution and conform to a circular economy. In 2015, the EU published an action plan for a circular economy and adapted an ordinance to reduce plastic bags. Afterwards, in 2018 the EU published a strategy framework on plastics in a circular economy and entered the ocean plastic charter alongside Canada and other countries. In 2020, the European plastic pact was introduced with the goal of reducing 20 per cent virgin plastic products and packaging by 2025 (Syberg, et al., 2021). The Basel protocol was also amended to regulate the transboundary movement of plastic waste (Syberg, et al., 2021). The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal was initiated in 1989 and enacted into force in 1992. It is the most elaborate global environmental agreement regarding harmful wastes as well as other household wastes. The Convention adapted two amendments in 2019

which enacted into force in 2021. This included waste minimisation and restricted the export of hazardous waste including plastics meant for disposal, reuse, recycling, recovery to other countries. This ban aimed to prohibit the import of harmful waste by vulnerable countries and provides provision to keep transboundary waste to a minimum while authorising personnel waste management (UNEP, 2011; Syberg, et al., 2021).

4.2 Existing policies in Bangladesh

In Bangladesh, the regulations pertaining to plastic products are mostly targeted towards the consumption aspect of the value chain. These regulations mostly aim to reduce the pace of consumption of plastic packaging and highlight the interventions needed to manage plastic waste better.

As per the Environment Act 1995, Bangladesh imposed a ban on plastic shopping bags in 2002. However, the ban proved to be ineffective due to a lack of alternatives and enforcement from regulators (MoEFCC, 1995). The High Court issued an order in 2020 to rigorously enforce the prohibition on plastic bags across the nation. Such enforcement may comprise of routine market observation, the closure of firms that make polythene bags, and the forfeiture of equipment. The High Court also issued a ban on carrying, selling and advertising of plastic carrier bags and other single-use plastics such as straws, cotton swabs, cutleries, bottles, food containers and plastic plates in hotels and restaurants in coastal areas (Writ Petition, 2020). To further discourage the use of plastic bags and promote alternatives, The Mandatory Jute Packaging Act was introduced in 2010, which came into force in 2013 in order to promote the Jute industry and reduce dependence on plastic packaging. At the beginning, the government of Bangladesh had stipulated six agricultural products to be packaged in Jute which later increased to seventeen products (The World Bank, 2021).

To promote an efficient waste management system, the National 3R Strategy for Waste Management was adopted in 2010. The National 3R strategy involved reducing, reusing, and recycling which stipulated proper waste management streams to mitigate waste disposal in open fields, waterways, and flood plains by 2015. It also incorporated provisions to encourage recycling and mandatory waste segregation at source, to establish a market

for recyclables, and to incentivise recycling waste (DoE, 2010). However, due to a lack of enforcement and inadequate institutional infrastructure, almost all households do not segregate their waste, which makes recycling a difficult task for waste pickers. Later in 2015, the Plastic Park Project was introduced which relocated old plastic factories from old Dhaka to a new location to improve the environment and promote the sustainable growth of the plastic industry and reduce waste in urban spaces (The World Bank, 2021). Furthermore, the Clean Dhaka Master Plan (2018-2032) was presented which allowed the Dhaka North City Corporation (DNCC) and Dhaka South City Corporation (DSCC) to prepare an integrated approach to address the growing urban population and the associated rising urban waste. The master plan integrates the three aspects of the 3R strategy, ensuring proper collection of waste, proper disposal, and reduction in waste through the establishment of treatment plants and incineration plants (The World Bank, 2021).

In 2020, the Ministry of Industries introduced a policy titled the “National Plastic Industry Development Policy 2021 (Draft)” which generalised the importance of mitigating the impacts of plastic waste on the environment. This policy highlighted the need to achieve zero waste related to plastic and packaging by 2030, to standardise recyclable products, and ensure the quality of recycling (Ministry of Industries, 2021). The policy also emphasised the need to recollect waste from plastic packaging to be recycled. On the other hand, DNCC and Naryanganj City Corporation (NCC) are also in the planning phase of developing a 42.5-megawatt (MW) waste-to-energy power plant in DNCC, and a 5MW power plant in NCC to turn waste into energy through incineration which aims to reduce the volume of landfill wastes.

Apart from these policies and rules, in 2020, Unilever introduced an initiative titled “Create a Circular Economy Model for Plastic Waste” programme in association with United Nations Development Programme (UNDP) to deal with the plastic waste in Bangladesh. The programme focuses on reducing HDPE and LDPE in NCC with activities including increasing awareness, strengthening the informal recycling system, and increasing stakeholder participation for policy advocacy (The World Bank, 2021).

In December 2021, in accordance with the Bangladesh Environment Protection Act 1995, the

government published the Solid Waste Management Regulations. The rules iterated the significance of the 3R approach to reduce waste mismanagement. The regulations also incorporated the importance of EPR, local governments and consumers to practice waste segregation and discouraged the indiscriminate dumping and burning of waste (MoEFCC, 2021). The Eighth Five-Year Plan published by the Bangladesh Planning Commission also incorporates stipulations to improve the management of solid waste in urban regions. This includes provisions to provide incentives to encourage the greater door-to-door waste collection, promote the application of 3R, establish waste-to-energy power plants, and increase the practice of composting. The government has also established recommendations to improve the involvement of private stakeholders, such as enhancing pricing policies to promote effective waste management, instituting a cost for improper domestic waste disposal, establishing co-financing mechanisms under public-private partnerships (PPP), and introducing EPR strategy, particularly for plastic waste management (GED, 2020).

Only a few stakeholders in Bangladesh have spoken out about the relevance of plastic pollution and its effects. As a result, there is a lack of information and understanding, as well as policies that directly relate to plastic pollution. The current rules in place in Bangladesh for regulating plastic pollution are insufficient and ineffective. The early prohibition on plastic bags, for example, was not implemented. Authorities also prohibited the use of polythene bags without including any restrictions on the sources of plastic bags or the technology used to create them. Additionally, despite the current restriction on polythene bags, the government lifted the 5 per cent supplementary duty on all plastic or polythene bags in FY2022 (MoF, 2022). This undermines the argument for a circular economy and makes it more difficult to limit plastic pollution. Furthermore, Bangladesh has placed the National 3R Strategy for Waste Management in light of the growing importance of the circular economy yet does not have a designated action plan to tackle the challenges of plastic waste at all stages of its value chain. The Eighth Five-Year Plan also does not mention any initiatives explicitly for plastic waste but rather includes concerns for solid waste in general. Moreover, electronic wastes also contain a considerable amount of plastic. Therefore, policy initiatives should be designed to safely separate the plastic parts and allow electronic products to be easily recycled as well. Additionally,

in 2019, The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, revised the Ban Amendment which prohibits the export of hazardous waste, including plastic waste, from countries listed in the annex VII of the convention to any other nation (UNEP, 2019). The Ban adopted additional adjustments to annex II, VIII, IX which included provisions of plastic waste and was said to be effective from 2021 (UNEP, 2019). However, Bangladesh has yet to ratify the Ban Amendment to the Basel Convention and update Bangladesh's National Report to the Basel Convention (2017) (InfoMEA, 2018).

5. CONCLUSIONS AND RECOMMENDATIONS

Perhaps the most significant impediment to recycling plastic waste in Bangladesh is an absence of recycling technology, and waste segregation at source. Moreover, the informal sector may not be socially conscious of the significance of appropriate waste management systems. Under this context, some of the possible required interventions are highlighted below.

5.1 Interventions to increase the pace of recycling plastic products

- There is a common notion that the demand for single-use plastic is absent whereas some manufacturers opine that there is, in fact, a lack of supply of single-use plastic. According to Young Power in Social Action (YPSA), the demand for polythene bags to be recycled into new polythene bags is there, but unfortunately there is not enough supply of such single-use polythene bags. In attempts to create a link between the local recycling shops and manufacturers as a pilot project in Chittagong, it was observed that the collection of polythene bags increased and along with the collection of PET bottles. Such a project can be implemented on a national scale, by involving city corporations and incentivising waste collectors to enable more recycling. Bangladesh also requires the appropriate technology to recycle MLP. The usage of virgin plastic resin may potentially decline substantially if firms acquire such technological support to recycle MLP.
- The involvement of the private sector needs to be more prominent. To ensure the possibility of

recycling, plastic wastes must be separated from organic wet wastes prior to disposal. The value of plastic waste depends on how clean they are. Soiled plastic products make it difficult for waste collectors to sell and earn a high return from them.

- Furthermore, municipalities should assist the informal sector by bringing them under an official or institutional framework and providing resources and training to enable the separation of plastic wastes from households and secondary collection places. The city corporation has the resources and the ability to train their waste collectors as well and make them more aware so that plastic waste can be collected in a segregated manner. But more crucially, the government should work with the business sector to create symmetry in information and develop a market for single-use plastic and other LDPE-based plastics. The separation of plastic waste from organic waste is just the first step. It is also essential to establish an appropriate recycling network for all types of plastics. The existence of a market for single-use plastic will motivate waste collectors or local recyclers to try and sort the single-use plastic materials.
- Additionally, the customs tariff for plastic scraps is quite low and should be increased. This will increase the cost of importing plastic scraps and therefore, influence plastic manufacturers to source their raw materials for plastic products locally, increasing the pace of recycling plastic in the domestic market.
- Plastic wastes may also be converted back into petroleum using pyrolysis to be burned as fuel. This is a crucial factor to consider since it will not only increase demand for all sorts of plastics but will also help Bangladesh reduce its reliance on foreign petroleum. However, it is also important to highlight that advance technology is required for such a process and upscaling the process can be quite expensive.
- Another approach for Bangladesh to accelerate recycling is to implement a deposit mechanism like Denmark's. Customers can deposit their old plastic items in recyclable vending machines at wholesalers, retailers, and chain supermarkets and receive a payment in return. Shops may use a refilling system for hygiene-related items including facewash, shampoo, liquid soap, and other liquid detergents. This will encourage reuse and prevent plastic items from ending up in landfills.

- Lastly, even though recycling is not the universal remedy to plastic pollution at least in the short-run, producers need to take responsibilities and design products that are sustainable and easy to recycle.

5.2 Interventions to reduce the use of plastic products

- It is crucial to lessen the quantity of plastic that enters the value chain in the first place. Currently, polythene bags are the most adaptable and cost-effective material available in Bangladesh. Therefore, Bangladesh requires a market-based approach to mitigate the use and production of polythene bags. To discourage further consumption and production of polythene bags, the 5 per cent supplementary duty on polythene bags should be reinstated and they should be made prohibitively expensive. The affordability of polythene bags will be reduced if a tax or fee is imposed on their sale. Customers will be forced to look for alternatives, which will ultimately decrease the demand for polythene bags and hence limit their sales and production.
- To promote for sustainability, it is important to create value for affordable alternatives of plastics to substantially reduce the number of plastics being produced in Bangladesh. Plastic bottles can be replaced with aluminium or glass bottles, and single-use plastic cutlery with bamboo, coconut shell, wood, or banana leaf. However, the use of such alternatives is niche and geographically scattered. It may be conceivable to phase out single-use plastic if these items are employed to carry out capacity building on an entrepreneurial level. The narrative needs to change through a change in attitudes and habits. In terms of product design, polythene may be substituted with jute and paper. Producers may adapt to more sustainable materials like jute bags and paper by changing their production processes. Jute and paper both degrade naturally and have fewer negative effects on the environment and people's health. Manufacturers should also be given incentives, like concessional financing, to promote alternatives to single-use plastic. Corporate commitment is important to initiate a visible change. In this connection, multi-stakeholder dialogues between the government, the private sector, and international development partners may be useful for exploring blended

finance options for funding any circular economy initiative.

There must be a change in culture regarding the improper handling of plastic litter. The government must promote awareness-raising measures not just at the national level but also at the regional level, focusing on small businesses and marketplaces. Consumers must be made aware of the negative effects that plastic pollution has on the environment and human health, as well as the importance of source segregation of plastic waste. The practice of using alternatives to plastics needs to be implemented

through subsequent policy measures adhering to persuasive and regulatory incentives. As in the long run, the use of plastics entering the value chain needs to decrease. This should be aimed at bringing behavioural change among all the stakeholders through the medium of economic incentives, as well as the basic duties suggested by morals and ethics. It is also important to introduce the importance of plastic waste management in educational institutions, as well to facilitate more research regarding this matter. In this way, plastic pollution in Bangladesh may be regulated and Bangladesh may be closer to becoming a circular economy.

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