

Plastic Sachets

Small Packets With Huge Environmental Destruction



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PLASTIC SACHETS: SMALL PACKETS WITH HUGE ENVIRONMENTAL DESTRUCTION



Plastic sachets: Small packets with huge environmental destruction
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Environment and Social Development Organization- ESDO is an action research oriented non-profit and non government organization based in Bangladesh. It is an environmental action research group dedicated to a toxic free, zero-waste planet. This entails fighting pollution and building regenerative solutions in cities through local campaigns, shifts in policy and finance, research and communication initiatives, and movement building. ESDO is working relentlessly to ensure biological diversity since its formation in 1990. It is the pioneer organization that initiated the anti-polythene campaign in 1990 which later resulted in a complete ban of polythene shopping bags throughout Bangladesh in 2002.

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Table of Contents

Acknowledgement	2
Executive Summary	4
Introduction	5
Objectives	6
Methodology	6
Survey Location	6
Data Timeline	7
Data collection	7
Data analysis and presentation	7
Sachets use in Bangladesh	7
Consumer's Sachets Usage as Per Age Group	8
Bangladeshi people's knowledge about sachet products	9
Reasons for purchasing sachets by Bangladeshi	10
Waste generated from single-use plastic sachet products	11
Sachet pollution causes environmental destruction	13
Effect of sachets on terrestrial ecosystems	14
Effect on flooding	14
Effect on the ocean ecosystems	15
Effect on human beings	16
The solution to sachet pollution	17
Recommendation for controlling sachet pollution	19
Conclusion	20
References	21





Executive Summary

People become concerned about the fatal crisis of plastics due to their detrimental effects on the environment as well as human health. Although plastic sachet products are considered one of the fuels for the existing plastic pollution, no previous study is found about the use and impacts of these small sealed packets from the perspective of Bangladesh. In the present study, a pilot field survey was conducted in urban and rural areas of Bangladesh to assess the country's situation of sachet usage. Approximately 1.06 million tons of single-use plastic waste have been produced per year in Bangladesh. This includes higher tourist locations in Cox's Bazar and the Rahinga refuges from the Kutupalong area. While sachet wastes are 192,104 tons per year. Most of the retailer shops are filled with different sachet products such as shampoo and conditioner, saline packs, tomato sauce, and so on. Our results also revealed that almost all of the customers preferred using sachet products, where food sachets were highly preferable (40%), followed by cosmetics (24%), medicine (8%), drinks (7%), cooking ingredients (7%), house cleaning products (7%) and others (7%). Although people prefer small packets for affordability (34%) and availability (29%), they are aware of the sachet-generated plastic pollution and are willing to use alternatives like refillable systems or using value packs. As per the roadmap of the United Nations Sustainable Development Goals (UN SDGs) by 2030, it is necessary to appraise contextual evidence which can inform state, national, and regional policy actions and programs to manage plastic pollution. Among the UN SDGs, plastic pollution is targeted by the

SDGs14 (sustaining life below water) and 15 (life on land). Therefore, we here systematically appraised evidence on the distribution and sources of plastic especially single-use sachets to identify the knowledge gaps and policy needs for plastic pollution management in Bangladesh.

The environmental impacts of sachet wastes are as follows:

- Plastic products are a two-pronged weapon that may contain a variety of dangerous and harmful substances, which ultimately affect agricultural land hurt our ecosystems, and poses a threat to food safety.
- Plastic sachets pollute the soil, land, and water environment by remaining in their original chemical form for a much longer period than microplastics.
- Due to the similarities in size and color between microplastics and natural food sources, several marine biotas mistake those plastic particles for natural prey, which accelerates the bio-magnification of microplastics along with the food web.
- Plastic wastes, as well as sachet pollution, can clog the drains and waterways, and such clogging may increase floodings during the monsoon season in the urban areas.
- Directly disposed plastics in landfills are frequently burned in our country, which are releasing harmful chemicals into the atmosphere and posing major health risks like headache, nausea, heart problems, lung ailments, and reproductive illnesses.

Introduction

Plastics are the most well-known synthetic polymers made from oil or petroleum, used widely for packaging¹. Other than being used in packaging, such petrochemical-based plastics are also used in agriculture, aerospace, automobile, construction, sports, domestic, and house-holds as well. In reality, the increase in population and industrial growth may result in the accelerated production of plastics due to their excellent conveniences such as esthetic quality and cost-effectiveness². Plastic production has been expected to double by 2050 as increased twentyfold in the last few decades³. The remarkable growth of plastic production and its trading already activated severe environmental consequences, revealing the dark side of this material. Indeed, the manufacturing of plastic contributes to climate change accounting for 10-13% of the Earth's remaining climate budget⁴. Among the plastic products, non-recyclable single-use plastics causing serious concern in environmental-related issues are reported to account for 40 percent of the plastic produced every year⁵. Such wasted plastic contaminates our natural terrestrial, and aquatic ecosystems, therefore, the problem should be addressed without any delay.

Among the single-use plastics, the growth of sachets that is referred to as the small sealed packets or mini-packets having single or multi-layered plastics seems to be alarming. A study of sachets in an Asian country stated that 52% of the plastic waste streams were comprised of sachets⁶. Within a short time, most of the sachets become waste as well as considered a threat to the environment. As most plastics are well known for being non-biodegradable⁷, these products have been accumulating in the environment where polluting the natural landscape, clogging up waterways, and most cases exacerbating floodings. Although the initiatives from the private sector and social enterprises put much effort into collecting and recycling sachets, such sachets cannot be recycled easily whether the products are single or multi-layered. Moreover, open-air burning of these products may release harmful chemicals into our natural environment and the air causing public health hazards⁸. Considering such adverse impact on humans and the environment, prevention of using plastics more specifically the use of sachets should be needed to control the plastic wastes.

Furthermore, people become concerned about the emergency crisis of plastics, especially micro-plastics (size, < 5 mm) and nano-plastics (size, 1-1000 nm) in the environment over the last decade⁹. The unavoidable fact is that microplastics not only occupied our environment but are also found in water and our food¹⁰⁻¹². Thus, both the micro-and nano-plastic particles can be transferred to the human food chain as well as in the human body¹³. Microplastics are found in human stool that can enter the human body by the consumption of food wrapped in plastic or by drinking from plastic bottles¹⁴. Another unbelievable finding is the presence of microplastic in the human placenta which was used for man-made coatings, paints, adhesives, plasters, finger paints, polymers and cosmetics, and even in personal care products¹⁵. Similarly, nano-plastics can lead to systemic exposure by transferring from the intestinal barrier into the circulatory system¹³. New evidence has emerged regarding the sources where micro-plastics were linked with the nylon sachets¹⁶. Although more evidence is needed to identify the sources of micro-and nano-plastics, people should reconsider using sachets or small-sealed packages that are likely to be linked with these plastic contaminants.

Recently, an extensive study on the country's situation of sachets in the other countries has been published where they investigated the sachets economy over the waste produced by these single used plastics products⁶. However, no previous study was found about the use of these small sealed packets from the perspective of Bangladesh. In our present study, a pilot field survey was conducted in urban and rural areas of Bangladesh to assess the country's situation of sachet usage. According to the achievement of the United Nations Sustainable Development Goals (UN SDGs) by 2030, it is necessary to appraise contextual evidence which can inform state, national, and regional policy actions and programs to manage plastic pollution. Among the UN SDGs, plastic pollution is targeted by the SDGs14 (sustaining life below water) and 15 (life on land). Therefore, we here aim to systematically appraise scientific evidence on the distribution and sources of plastic especially single-use sachets in Bangladesh. In this research, we also identify the effect of plastic sachets on plastic waste, knowledge gaps, and policy needs for plastic pollution management in Bangladesh.

Objectives

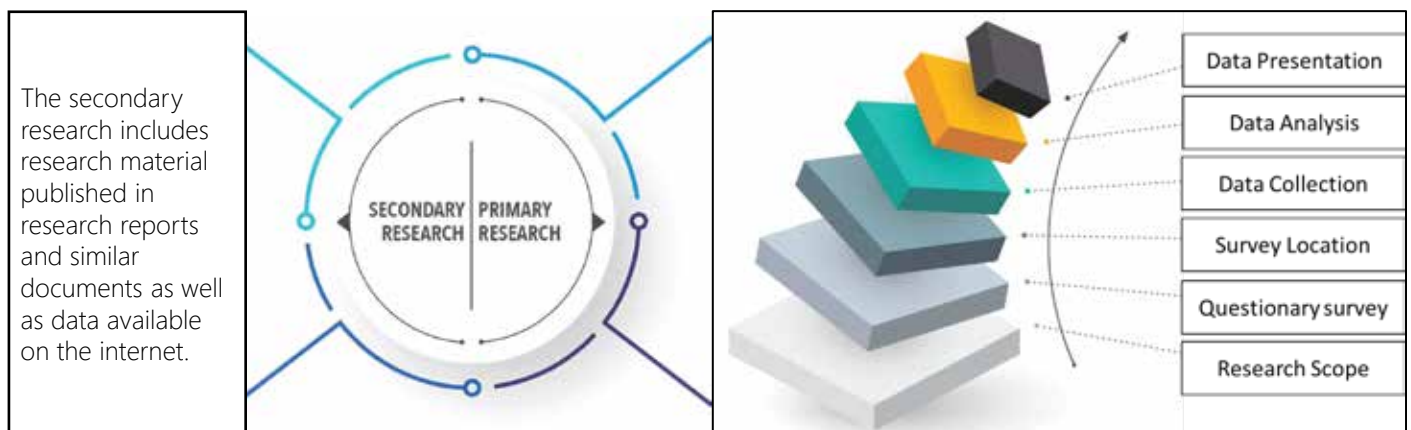
The overall objective of the present study is to assess the country's situation of sachet or mini packet usage and the volume of sachet waste in Bangladesh. Specific objectives are:

1. To assess the market scenario,
2. To categorize sachet products and generate wastes,
3. To identify the sources of sachets and quantity of usage,
4. To assess consumer's views and reasons for purchase,
5. To identify the solution to sachet pollution.



Methodology

Plastic pollution has recently captured the public's attention due to the threats they pose not only to the natural habitats around the globe but also a serious socio-economic implication for various sectors and stakeholders. In Bangladesh, sachets or mini-packets are widely used where both the retailers and consumers have appreciated the benefits of such single-use plastics. We conducted primary research by survey analysis in Dhaka, Chittagong, Khulna, Sylhet, Barisal, Mymensingh, and Rangpur. The survey was also performed in Betgari, Kamrangirchar thana, Cox's Bazar and Kutupalong area. We also conducted secondary research including the research material published in research reports and similar documents as well as data available on the internet.



Survey Location

We wanted to identify the usage of sachets in three different categories of places in the urban areas, towns, and rural areas. For the investigation of the sachet survey in the urban area, we chose several places in Dhaka city of Bangladesh namely Lalmatia, Dhanmondi, Jigatola, Newmarket, Mohammadpur, Shyamoli, Mirpur, and Uttara. We also conducted the survey in Chittagong, Khulna, Sylhet, Barisal, Mymensingh, and Rangpur. The survey was conducted in the rural areas including Betgari, and Kamrangirchar thana. And, other places such as Cox's Bazar and Kutupalong area.

Data Timeline

The study was initialized in June 2021. The survey was conducted from September to December 2022 for collecting the opinions of consumers and retailers. The data analysis was performed from January – March, data presentation from April and finally, the report writing was conducted in May 2022.

Data collection

The most common sachets obtained in Bangladeshi markets are shampoo, conditioner, tomato sauce, coffee, toothpaste, seasoning packs, pickles, instant drinks, saccharine packs, chips, mouth-fresheners, biscuit minipack, mini soap bars, and others. To identify the sources of sachets, market scenario, and categorization of products, we have chosen a detailed questionnaire survey on retailers. The survey was performed for 30 retailers in big cities, and about 20 retailers samples in village areas. Moreover, we also performed a

detailed survey for consumers to identify the quantity of usage and assess the country's situation of sachet usage. To assess consumers' views, another survey was conducted for 250 consumers in each division, 150 in Cox's Bazar, Betgari, and Kamrangirchar Thana, and 175 consumers in Kutupalong. Furthermore, different types of paperwork and networking as well as some qualitative tools for data collection were performed as the research methodology.

Data analysis and presentation

To look into the sources of sachets and quantity of usage are identified using the information collected from the questionnaire survey. The survey data was analyzed

statistically and visualized in Microsoft Excel. The proper documentation was done at the time of data collection and the literature review was performed from online sources.

Sachets use in Bangladesh

According to the survey analysis, a huge amount of plastic waste has been produced by Bangladeshi people every day and most of the products are plastic sachets together with plastic bottles or bags. These sachets are discarded daily that are actually a composite of aluminum, adhesives, and different kinds of plastics. Different types of liquids, such as shampoo, conditioner, tomato sauce, juice, toothpaste, and powdered drinks like milk, orsaline, chips, coffee, or others are stored and sold in single-use plastic sachets. These

sachet products are divided into four categories, such as food sachets (40%), medicine (8%), cosmetics (24%), and stationaries (Figure 1). Here, tomato sauce, juice, and powdered drinks like milk, chips, coffee, etc are food sachets. Saline packs and medicine strips are medicine sachets. Shampoo and conditions, toothpaste, and mouth freshener are categorized as cosmetic sachets. Cooking ingredients (7%) include the masala packs.

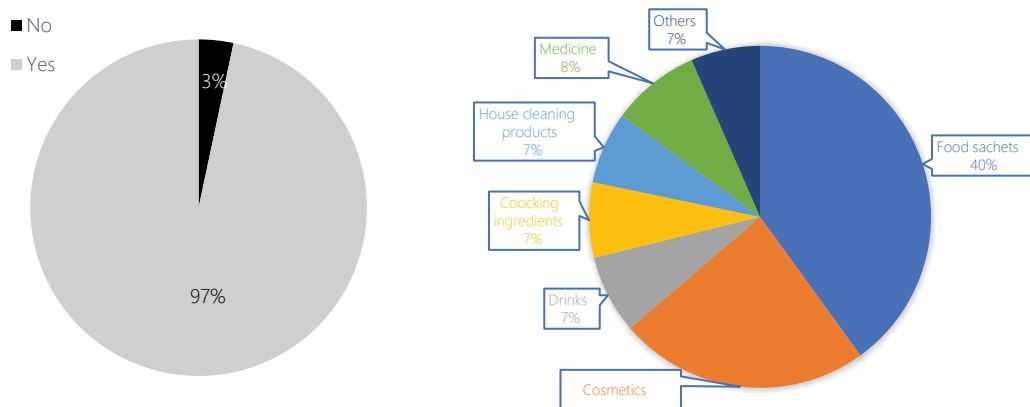


Figure 1: Presence of different sachets and merchandise quantity in the retailer shop of Dhaka and Rangpur.

Among 30 retailer shops, 97% of the respondents confirmed selling sachets in their stores located in various places of Bangladesh. Three percent of them sell either one or two of the sachet products in their shop. Thus, we conclude that no store that doesn't sell one or more sachet products. These retailers stores different types of sachet products such as shampoo/conditioner, saline packs together with toothpaste, instant coffee, tomato sauce, and other products like seasoning packs, instant drinks, chips, etc. We also find out

about the sachet products frequently purchased by Bangladeshi consumers (2375 respondents in different locations of Bangladesh), where the users chose multiple answers during the survey. Shampoo/conditioners (69%) were most frequently purchased, followed by saline packs (50%), tomato sauce (43%), seasoning sachets and many others shown in Figure 2. These results indicated that shampoo and conditioner are most preferable as sachet products for the users.



Figure 2: Popular sachet products purchased by Bangladeshi people.

Consumer's Sachets Usage as Per Age Group

According to our survey, people of the age group 15-19 are the highest consumers of sachets where they mostly use personal care items like shampoo, conditioners, food packaging like sauce, coffee sachets, instant drinks, etc. The age group of 5-9 is the lowest consumers of sachets where they usually use sauce sachets or instant drinks sachets (Figure 3). The people in age group 44-50 mostly use tea bags or coffee sachets. The people of another age group mostly use either personal care items or food packaging or

sometimes both. As per the population of these various age groups, we can conclude the total usage of sachets/day in our country. However, it is unlikely that a person would use sachets regularly. Hence, we considered a person using sachets 15 days a month. The daily usage data was calculated accordingly. Approximately 129 million plastic sachets are used daily by people falling under the age group of 5-50 all over Bangladesh (Figure 3).

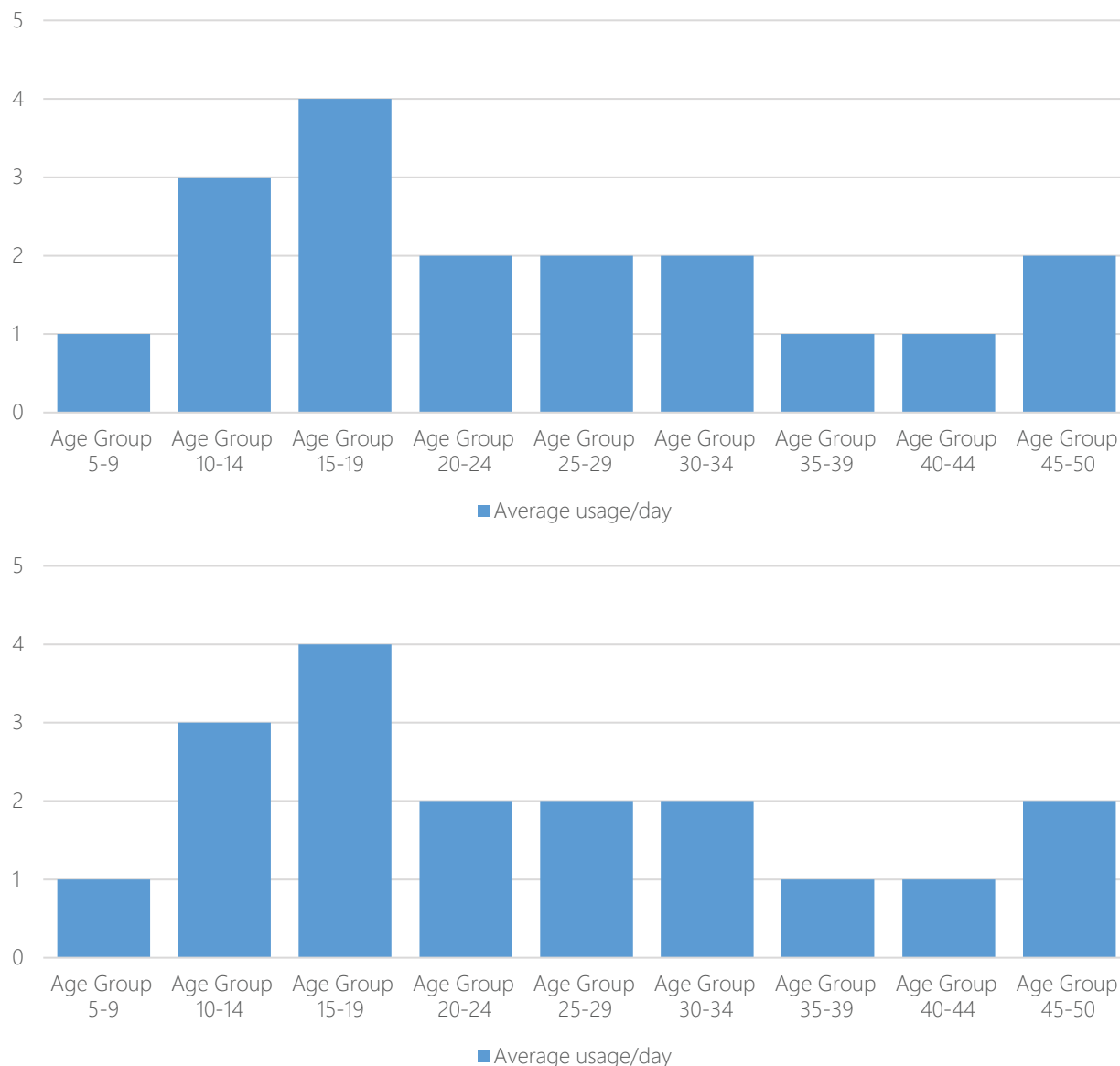


Figure 3: Average and total sachet usage per day according to various age groups.

Bangladeshi people’s knowledge about sachet products

ESDO conducted further survey analysis to understand people’s perspectives on using sachet products in their daily life. We asked the general people about the product quantity presented in the sachets as one previous study observed that the packets often contain lesser amounts of products than what was written on it¹⁷. The majority of Bangladeshi people (61%) have no idea about the product quantity in plastic sachets, while only 39% of them are aware of it (Figure 4). Moreover, people were asked about their knowledge that sachets are non-recyclable. Here, we again observed that most respondents are not known of the non-recyclable sachets (69.6%). On the other hand, 56.6% of

the respondents were aware of the negative impacts of sachets as well as single-use plastics. And, 80% of them think that sachets are harmful to the environment and human health (Figure 4). Although people have knowledge about the harmful effect of sachets, they can resist using the products as such products were once considered sustainable practices as well as for their convenience. One previous study explained the reasons for the success of sachet marketing in an Asian country as improvement of packaging technology, affordability, or portability¹⁸. This might be true for Bangladesh and the rise of sachet products seems to be inevitable for our country like other countries.

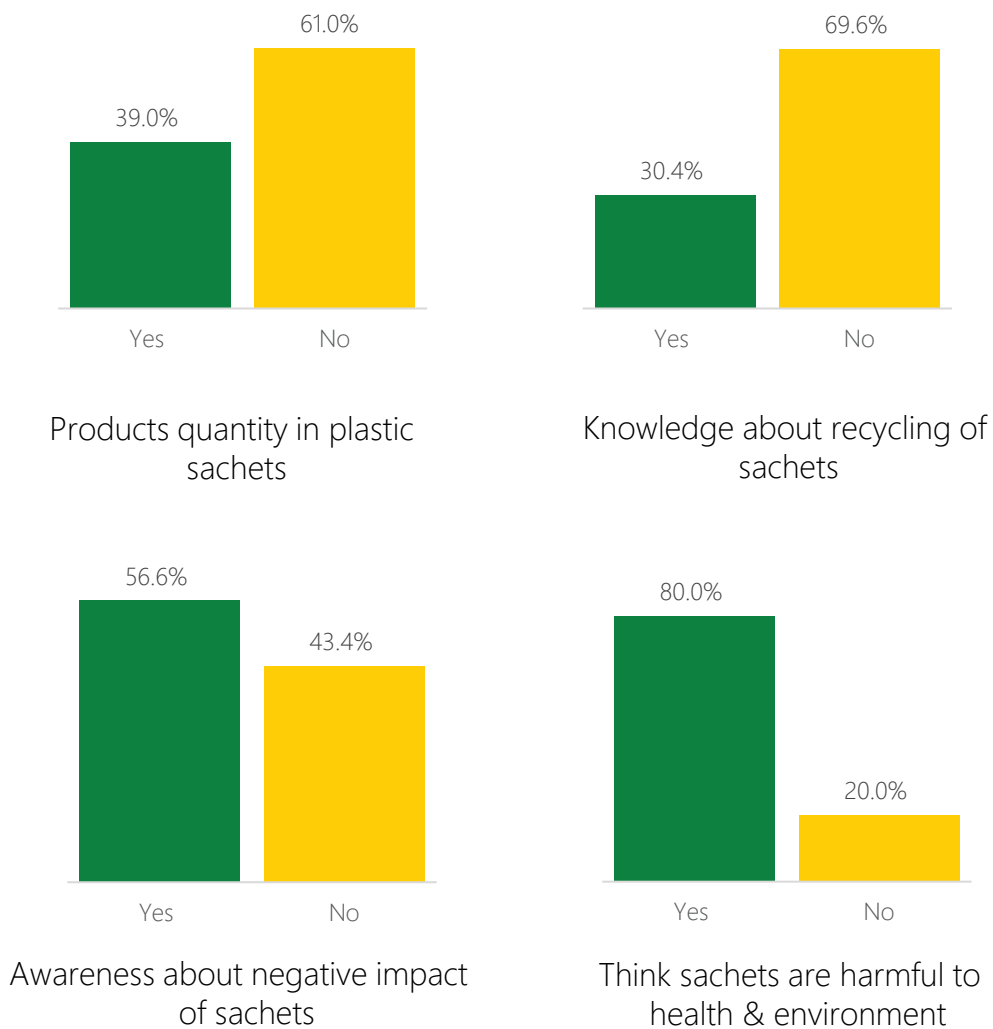
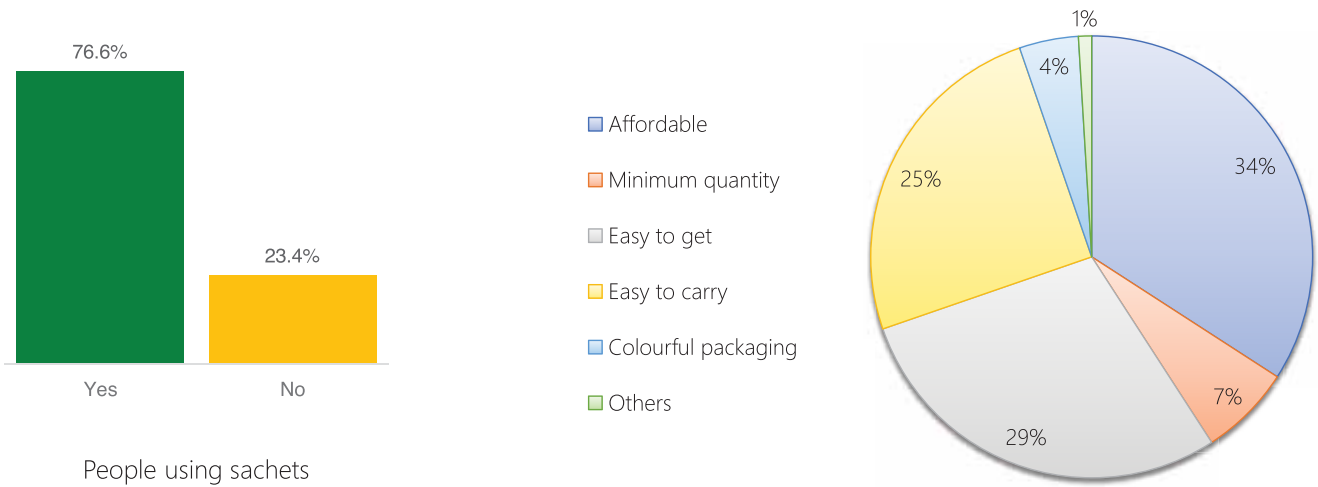


Figure 4: Percentage of respondents about their opinion on plastic sachets

Reasons for purchasing sachets by Bangladeshi

ESDO conducted a survey among 2375 respondents in various locations in Bangladesh, more than 76.6% of people are using sachets in their daily life (Figure 5). Results of the survey analysis concluded that the affordability of sachet products (34%) was the main reason behind the merchandise as well as the purchase of sachet products (Figure 5). This was followed by easy (29%), easy to carry (25%), minimum quality (7%), colorful packaging (4%), and others (1%). The other reason might be these products are easily found in stores. However, we observed people purchase sachet products due to the brand¹⁷. Finally, the factor analysis revealed the motivations behind sachet purchasing into three main factors: affordability, easy to carry, and easy to get them.

Our present study also identified the relationships between the demographic factors (area of residence, gender, age, education, and employment) and the reason for using or purchasing sachet. Although we were unable to find any relationship between reasons for using sachets and variables like the area of residence, gender, profession, and age. However, a negative effect was observed between the frequency of using sachets and education. Such results indicate that the higher the education levels, the lower the frequency of using sachets. Based on these results, we need to educate our people regarding the harmful effect of sachets-generated wastes in our daily life.



Waste generated from single-use plastic sachet products

According to the response on the sell quantity of sachet products by retailers, almost all of the sachets are purchased by the consumers. Therefore, we can assume that the sachets may dominate the residual waste stream in both urban and rural areas of Bangladesh. Moreover, we observed that consumption of sachet products is usually lower in rural areas than in the urban areas of Bangladesh. Our survey analysis observed the total amount of sachets

among the total plastic wastes based on the data provided by the consumers. Although we observed plastic bottles and bags (22.9% and 19.7%) are the top listed wastes, about 18.6% of the total plastic waste was sachets indicating that it covers a high proportion of being cheap and convenient to the consumers (Figure 6). We also observed that the food packaging was listed in fourth place (12.9%), followed by cutleries and medicine strips respectively 9.9% and 7.4%.

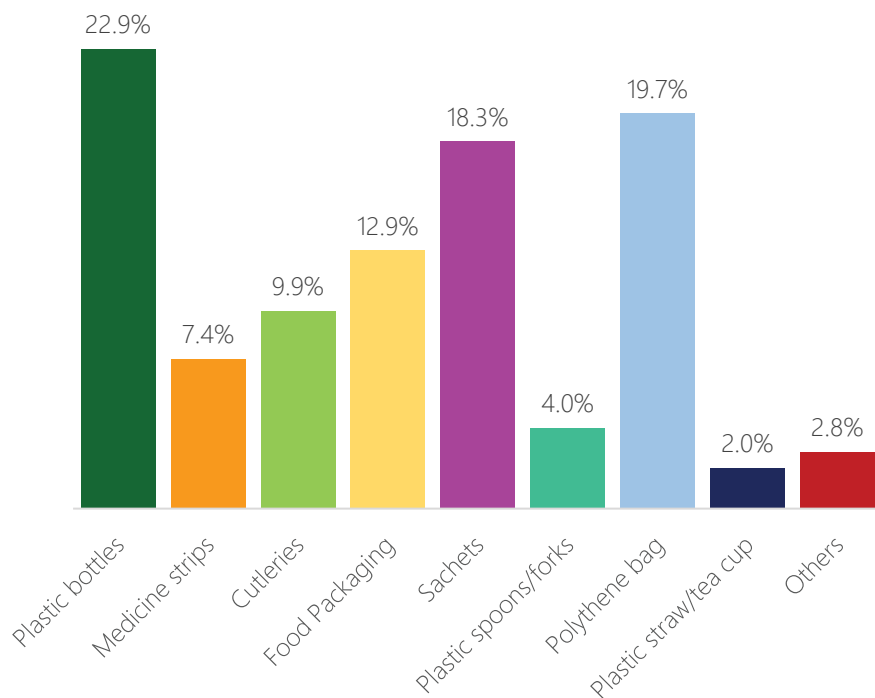


Figure 6: Proportion of average single-use plastic waste generated in Bangladesh.

Previously, ESDO estimates the annual generation of single-use plastic packaging and products such as food wrappers (53,978 tons/year), sachets (28,846 tons/year), and straws (286 tons/year) in Bangladesh¹⁷. Use and purchase of sachet products are popular among general people as well as even in beauty parlors¹⁹, therefore, the products were common in general retailers shop in Bangladesh. We here observed that the shampoo/conditioner (9%), saline (8%) similarly sauce, coffee, instant drinks, mouth fresheners, biscuit mini packs, and toothpaste occupied the top sachet-generated wastes (see Figure 2). These are followed by seasoning packs, pickles, and others. Such small packets

go to the consumers and ultimately go to the environment from the retailer shops. Our survey study revealed almost all of the sachet products finally contribute to countries' total plastic waste. We observed a total of 980,573 tons of single-use plastic waste generated in the fiscal year of 2022, while 176,503 tons of sachet waste in this year. As usual, the higher waste generation in Dhaka is due to its huge population of about 113,795 tons of single-use plastics per year and 20,483 tons of sachets per year (Table 1). While the sachet pollution was lower in the Rangpur division shown in Table 1.

Table 1: Plastic sachet-generated waste in different regions of Bangladesh.

Area	Population*	Household**	Single use plastic Waste (tons/year)	Sachets Waste (tons/year)
Bangladesh	167,942,260	37,787,008	980,573	176,503
Dhaka	22,478,000	4,214,625	113,795	20,483
Chittagong	5,253,000	984,938	26,593	4,787
Khulna	949,659	178,061	4,808	865
Sylhet	928,000	174,000	4,698	846
Barisal	516,000	96,750	2,438	439
Mymensingh	477,000	89,438	2,254	406
Rangpur	425,000	79,688	2,008	361

*<https://worldpopulationreview.com>

**Household consumption rate for Bangladesh is 90% and others is 75%

The plastic waste does not decompose, rather it accumulates in landfills and aquatic environments. In the rural area, we observed about the waste generation was lower than in the urban area. In Betgari, a union of Rangpur districts, single-use plastic waste was about 116 tons/ year

and sachet waste was 21 tons/year (Table 2). In Kamrangirchar Thana, the generation of single-use plastic waste was 697 tons/year, while sachet waste was 125 tons/year as this region is famous to produce sachet products.

Table 2: Plastic sachet-generated waste in rural areas of Bangladesh.

Rural area	Population	Household	Single use plastic Waste (tons/year)	Sachets Waste (tons/year)
Betgari	24,637	4,619	116	21
Kamrangirchar Thana	143,208	26,852	697	125

*Household consumption rate is 75%

The annual single-use plastic waste generation would be higher than expected if we just look at the waste generation in Cox's Bazar and Kutupalong areas where the refugees from Myanmar are sheltering right now. So, the scenario of plastic waste generation in our country differs. We observed more than 69,841 tons of single-use plastics are produced in Cox's

Bazar area and 9,073 tons in Kutupalong, while sachet wastes are respectively 13,968 tons and 1,633 tons (Table 3). This huge amount of waste would be added to the total current waste of Bangladesh increasing our total waste generation in our country.

Area	Population	Household	Single use plastic Waste (tons/year)	Sachets Waste (tons/year)
Bangladesh	167,942,260	37,787,008	980,573	176,503
Cox's Bazar*	10,765,500	2,556,806	69,841	13,968
Kutupalong**	1,398,545	349,636	9,073	1,633
Total (including Cox's Bazar and Kutupalong)			1,059,487	192,104

*Population was calculated including the tourists and officials, where the household consumption rate is 95%

**Population was calculated including refugees from mega camp, where household consumption rate is 100%

Sachet-generated wastes relentlessly survive in our environment as litter tainting the country's landscapes and water bodies. So, sachet pollution occurs on a daily basis in our country. As sachet products are convenient for merchandise, both the retailers and customers can get easy access to single-use plastics over a long time. Moreover, sachets are also presented as cheap while other alternatives like refillable systems are possible. Even though the sachet products help in the economic growth of a country, such growth is not being used for environmental pollution and harmful effects on human health.

On the other hand, management of waste generated by the sachet products may fall on the government which will finally pay the taxpayers, not the manufacturer. Sachets are non-recyclable; therefore, the environment suffers most from sachet pollution. Not only the environment, but public health also pays for the consequences of sachet wastes. Therefore, it is high time to change our behavior towards selling and purchasing sachet products.

Sachet pollution causes environmental destruction

Sachet pollution is the accumulation of plastic sachets on land and water bodies that adversely affects humans as well as aquatic life. Sachet products, like cosmetic and food wrappers, are inexpensive and only have been used for one

time but can linger in the environment for hundreds of years¹⁹. Together, these two factors allow large volumes of plastic wastes from sachets to enter the environment and cause huge environmental destruction.



Effect of sachets on terrestrial ecosystems:

Plants, animals, and people who rely on the land are all threatened by plastic pollution as sachet products that occur on land. There may be four to twenty-three times as much plastic on land as there is in the ocean, according to estimates²⁰. More plastic is piled up on land than in the water, and it's also more concentrated. Plastic is a two-pronged weapon that attracts and leaches hazardous chemicals. It may contain a variety of dangerous and harmful substances, which have the potential to result in a variety of health problems. These sachets are discarded daily that are actually a composite of aluminum, adhesives, and different kinds of plastics. Such plastic ultimately affects agricultural land hurting our ecosystems, and poses a threat to food safety. Moreover, chlorinated plastic sachets can release harmful chemicals into the land, that can cause surface water as well as groundwater sources.

Effect on flooding:

The other main effect of plastic waste or sachet waste is clogging the drains, and such clogging may increase floodings during the monsoon season in the urban areas^{21,22}. Especially for Dhaka and Chittagong, the monsoon is like a nightmare because of the water-logging (Figure 7), which is intimately linked with the irresponsible disposal of popular non-biodegradable polythene bags and sachets that end up clogging the sewers. These stagnant water in drains may help in the breeding of the Aedes mosquito, which claims the lives of thousands every year in Bangladesh, especially in large cities.

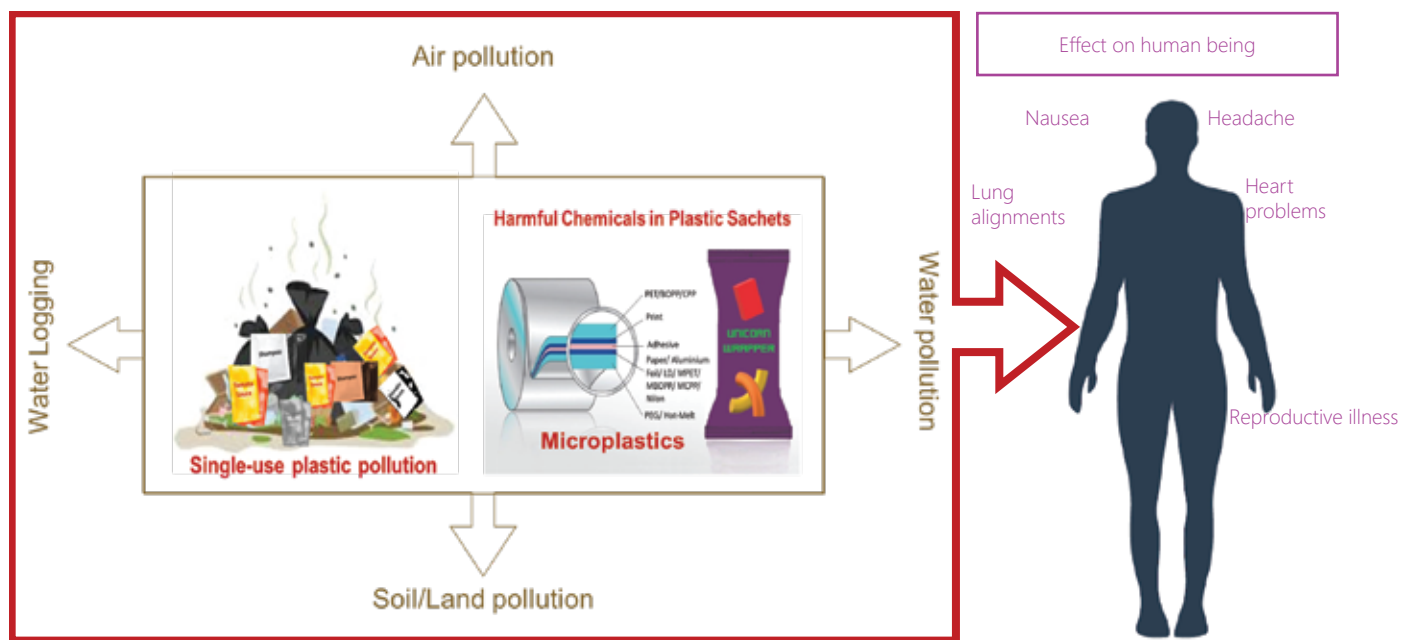


Figure 7: Impact of sachet pollution on the Environment causing air, water, and soil pollution, ultimately effect on human beings.

Effect on the ocean ecosystems:

The majority of the waste plastic eventually makes its way into the ocean from various water bodies such as ponds, lakes, and rivers. According to reports, various types of plastics made up between 50 and 80 percent of the trash found on seashores, ocean surfaces, and seabeds²³. The Bay of Bengal's marine ecosystem is greatly impacted by the accumulation of plastic garbage. About 6,705 pieces of plastic debris were gathered from Cox's Bazar's four sea beaches for a survey, and 63 percent of those were plastic²⁴. These substantial plastic wastes have the potential to harm fish reproductive and kill beneficial microorganisms.

Plastic sachets pollute both the terrestrial and aquatic environment by remaining in their original chemical form for a much longer period than Microplastics. Microplastic concentration in the marine environment has been rising along with the hazard to marine life as a result of the increase in plastic sachets use. Microplastics have been detected on seashores and sea beds while the presence of

plastic fragments is likely to be common in the oceanic water system worldwide²⁴. Whatever their point of origin, microplastics share the same fate in the ocean and have a similar and equal degree of a negative impact on marine life, and ultimately on human life (Figure 8). Therefore, microplastic cycles through both the soil, land, and water ecosystems.

A significant amount of ingested plastic has been found in a variety of marine organisms, including fish, seabirds, decapod crustaceans, amphipods, and lungworms. Microplastics are increasingly available for ingestion by a wide range of marine organisms as the plastics gradually fragment to smaller sizes²⁵. Due to the similarities in size, shape, and color between microplastics and natural food sources, several marine biotas mistake those microplastics for natural prey (Figure 8). Because these marine biotas are preyed upon by higher trophic organisms, lower trophic organisms indiscriminately consume and collect microplastics, which accelerates the bio-magnification of microplastics along with the food web.

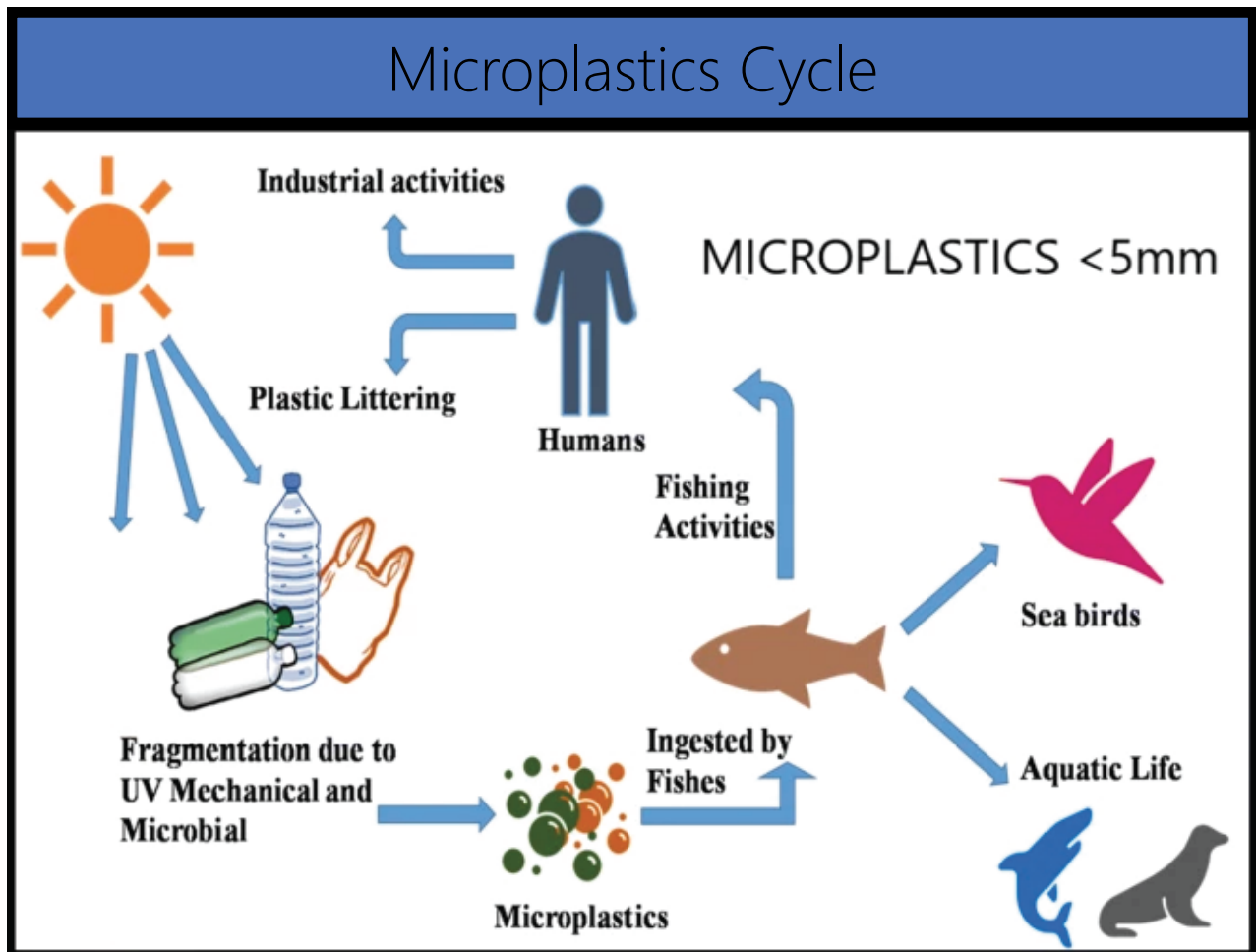


Figure 8: Microplastics cycle in from the environment to human body.

Effect on human beings:

A significant portion of the used plastic sachets is being improperly managed in Bangladesh, endangering both the environment and human health. Plastic debris, particularly microplastics, has a significant negative impact on the marine ecosystem because these particles infiltrate the food chain and cause animal deaths from bloating and indigestion. Microplastics can enter the human food chain and are present in freshwater systems as well²⁶. It is an unavoidable fact that microplastics not only occupied our environment but are also found in water and our food¹⁰⁻¹². Both the micro- and nano-plastic particles can be transferred to the human food chain as well as in the human body¹³. Such microplastics are found in human stool that can enter the human body by the consumption of food wrapped in plastic or by drinking from plastic bottles¹⁴. In major cities, sachet water has become popular due to its portability. However, such packaged water when exposed to the hot sun may release serious chemicals during the process of storage

or transportation²⁷. The leaching of toxic substances such as dioxin and other plastic chemicals into the water may be accelerated due to the ultraviolet rays from the sun or high temperatures.

Another source of microplastics is tea bags that we are using in our daily life. Especially, tea bags are known as silken sachets that can be made from hemp, corn-based plastics, nylon, or PET (polyethylene terephthalate). Such tea bags are made of plastic that can release billions of microplastics into our bodies (Figure 9). A study conducted by the researchers at McGill University in Montreal has found that a single plastic-based tea bag releases approximately, 11.6 billion microplastic particles and 3.1 billion nano plastics into our mug²⁸. When plastic teabags are steeped at 95° C, billions of micro- and nano-plastics (Figure 9). Therefore, people should consider the toxicity before using these fancy tea bags. These plastic materials enter the food chain through teabags, and finally, go into the human body causing several diseases.

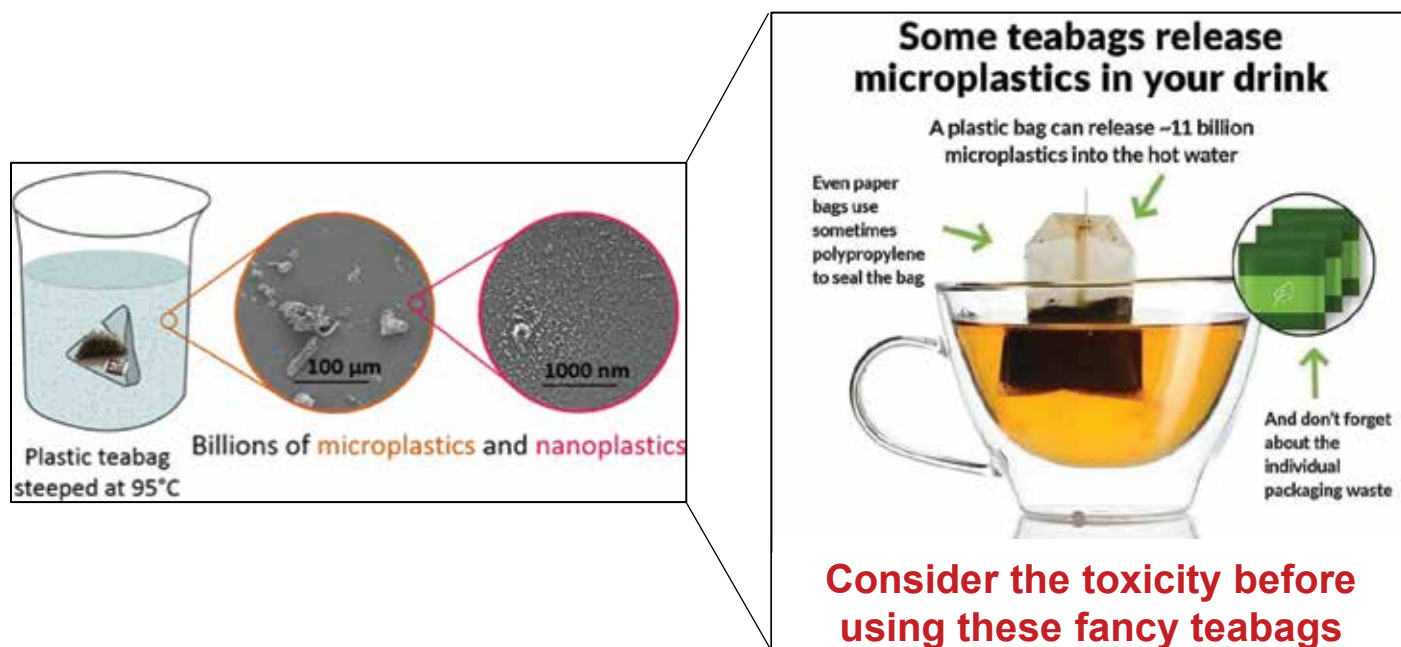


Figure 9: Release of microplastics from teabags that enters the human food chain.

Directly disposed plastics in landfills are frequently burned, releasing dioxins and furans into the atmosphere and posing major health risks like headache, nausea, heart problems, lung ailments, and reproductive illnesses. To increase their physical and chemical qualities, these plastic materials also contain a variety of additives that are added by various polymerization methods. When making plastic, additives of many kinds, including crosslinking agents, antistatic agents,

antioxidants, flame retardants, UV and visible light stability improvers, heat stabilizers, plasticizers, and coloring pigments, are utilized. For instance, diethylhexyl phthalate, which has long been used as a plasticizer and is thought to be a source of human cancer and endocrine disruptor to numerous creatures, is one substance of particular concern²⁶.

The solution to sachet pollution

We also conducted a survey to find out the possible solutions for sachet pollution, and to identify the alternatives to using sachet products. One possible solution will be the use of value packs or refillable systems. When we ask people's opinions on the value packs that are comparatively cheaper than the sachet products, the majority of the respondent (76.5%) are unknown of the fact about value

packs (Figure 10). Therefore, it is necessary to educate our population about the importance of using value packs. Moreover, when asked if refillable containers are established instead of plastic sachets products, 67% of respondents were willing to buy such recyclable containers. This trend was observed beyond the demographic data of age, gender, educational background, or profession of the respondents.

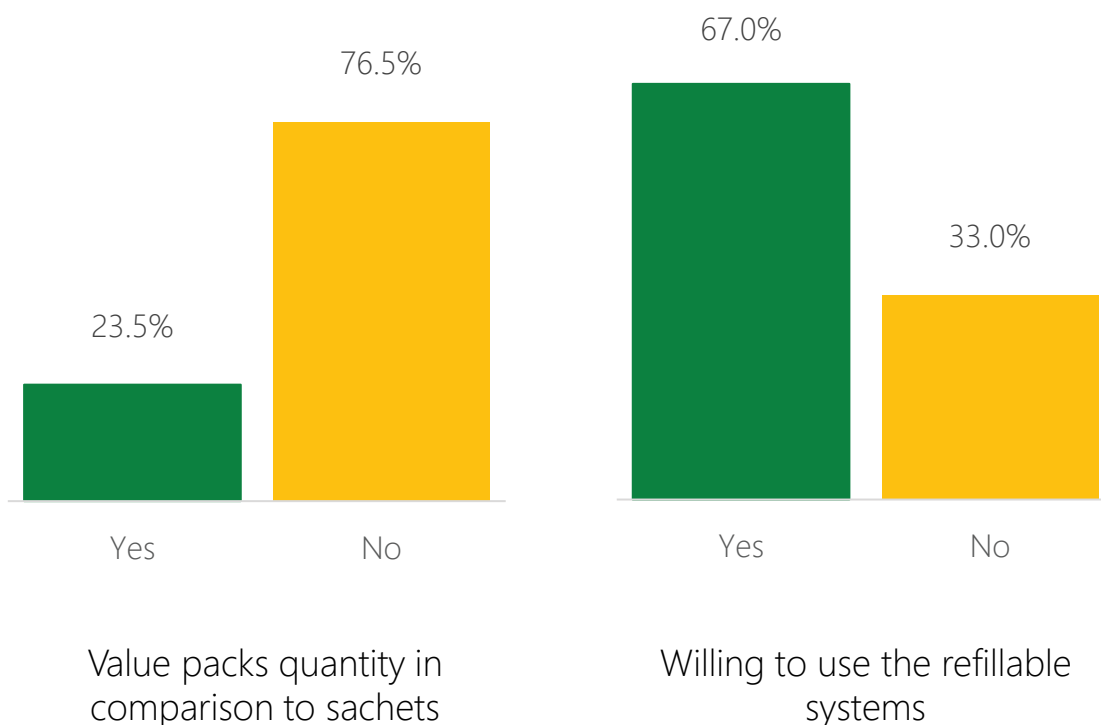


Figure 10: Percentage of respondents gave their opinion on value pack and refillable systems.

In this study, we observed that the most usable sachets are shampoo and conditioner, saline packs, instant drinking powders, seasoning sachets, and many others (Figure 2). The leading types of sachet products purchased by Bangladeshi people are shampoo and conditioner. Support for the regulation of plastic wastes, including sachet pollution, is generally stronger among those with a higher educational level.

Furthermore, we asked the users of single-use plastics about their opinion on whether or not they agree to pay more tax for single-use plastic products if they want to use single-use plastics all the time but do not want to pay more tax on the products, and banning the use of plastic sachets. The result of agreeing to pay high tax revealed that 65% of the respondents were willing to pay high tax for using sachet products (Figure 11). Moreover, only 17% of Bangladeshi want to use sachet products all the time and not pay high taxes,

while 83% of them disagree with the comment indicating that people are aware of the harmful impact of the sachets (Figure 11). Finally, when asked if they agree to ban the use of plastic sachets, 83% of respondents agreed to ban the sachet products.

These survey results suggest that when we let people know that the value packs are comparatively cheaper than the sachet products, there is an incentive among people to ban single-use plastics as well as to reduce plastic packaging (Figure 12). Indeed, plastic waste generation tends to increase day by day and the negative impacts of plastic waste are strongly felt by the people of Bangladesh. The plastic pollution together with the sachet pollution is considered the main cause of flooding due to canals clogged by littered sachets. And, the poor people who suffer most in such natural calamities caused by plastics accumulating in their surroundings.

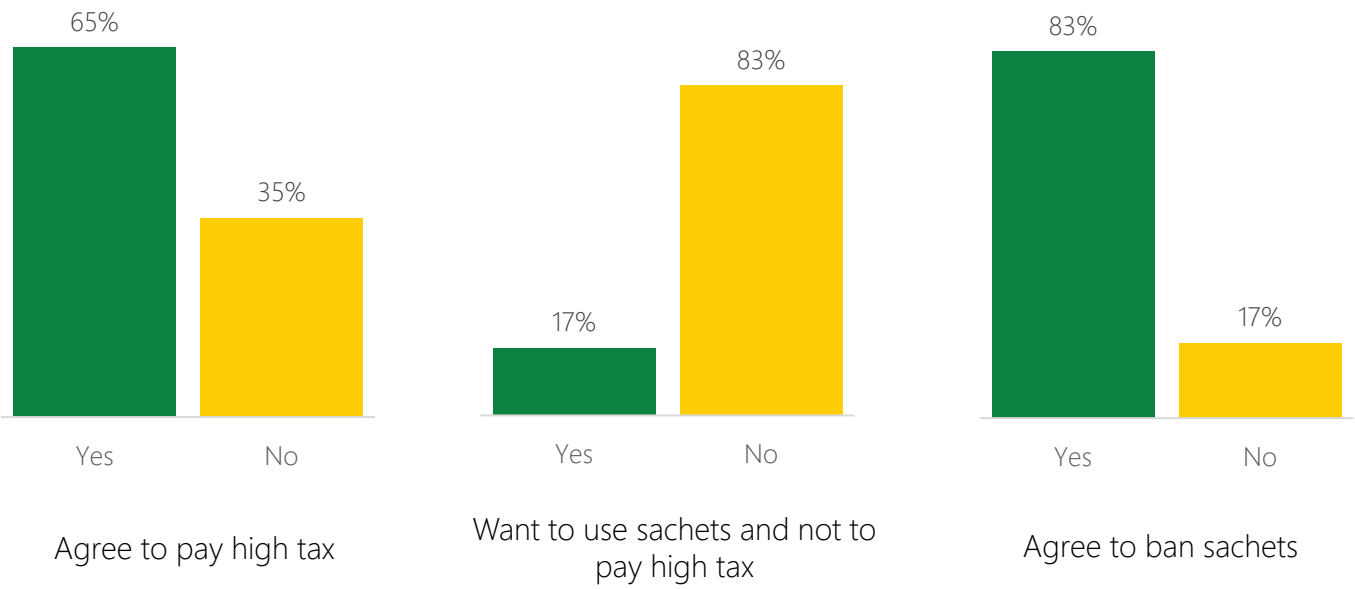


Figure 11: Opinion about the fate of using plastic sachets in Bangladesh.



Recommendation for controlling sachet pollution

1. Government should take the initiative to pass a law to regulate the manufacturing, use, and import of all forms of single-use plastics including sachets on an urgent basis and impose a high tax on these products.
2. The amount of plastic used in manufacturing, shipping, retailing, and disposal streams will be monitored strictly.
3. Guidelines on recycling and safe disposal of plastic products including sachets should be made by the authorities.
4. Environmentally sound and safe waste management mechanism must be developed. Segregation of the waste at the source should be prioritized in this mechanism to ensure separate disposal of plastic waste including sachets.
5. Cost-effective business models to run the businesses of alternative goods should be developed and widely promoted. Accelerate circular economics on the basis of 4R (Refuse, Reduce, Reuse, Recycle).
6. The manufacturers should invest in reuse and refill system and establish zero-waste shops so the customers can bring their own containers for getting liquid products. (Figure 12).
7. Alternative packaging with papers, leaves such as banana leaves, or other environment-friendly packaging systems should be promoted in general stores. For this purpose, certain items can be kept tax-free.
8. Extended Producer Responsibility with polluters' pay should be incorporated.
9. Capacity building of local manufacturers in producing sustainable and environment-friendly alternatives through education and training.
10. Details of the harmful impact of plastic packaging, polythene, sachets, etc. should be included in the primary and high school curriculum.
11. Public awareness, education, and communication (IEC) campaigns should be designed on banning sachet products.
12. Building a zero-waste community and moving towards zero-waste lifestyles.



Figure 12: A solution to plastic packaging (www.lessplastic.co.uk)



Conclusion

Sachet products have short-term benefits and convenience so that it becomes popular. However, this product packaging has become a curse to the environment due to its enormous volume and massive use by large populations, as well as to the governments and communities due to their growing clean-up and disposal costs. Therefore, it's an urgent need to tackle this problem seriously and initiatives to be taken for more sustainable alternatives. Because a sachet is a multilayer packaging item, it can't be recycled. So this problem will not be tackled through recycling. Therefore, we should ban using these plastic products not to produce more plastic waste in the future.

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