

# ENVIRONMENTAL FOOTPRINT OF SINGLE-USE PLASTIC BOTTLES

## The Pollution and Health Hazards Across the Full Lifecycle



## Environmental Footprint of Single-Use Plastic Bottles: The Pollution and Health Hazards Across the Full Lifecycle



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### About ESDO

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, shifting 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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# EXECUTIVE SUMMARY

The Environment and Social Development Organization-ESDO conducted an extensive study on the usage and management of single-use plastic (SUP) bottles across Bangladesh. This research evaluated consumer, retailer, and waste picker perspectives from both urban and rural areas, from February 2024 to October 2024 across all eight divisions of the country. It investigated the patterns of SUP bottle usage, disposal methods, recycling practices, and their environmental and health impacts. By analyzing consumer preferences and waste management challenges, the study provides critical insights into the lifecycle of SUP bottles in Bangladesh, emphasizing the urgent need for sustainable solutions to address this growing environmental issue.

According to the study, Bangladesh's annual consumption of single-use plastic (SUP) bottles is estimated to range between 3.15 and 3.84 billion. A survey of 3,416 consumers across the eight divisions, encompassing both urban and rural areas, revealed significant differences in consumption patterns and disposal methods. In both urban and rural areas, almost 83% of consumers frequently used SUP bottles. Awareness of environmental impacts was very low among both urban respondents (38.2%) and rural respondents (19.8%). **Additionally, 51% of urban consumers reported discarding their bottles after one use, while only 42% of rural consumers did.** These findings illustrate the disparities in awareness, usage, and waste management practices between urban and rural regions, offering critical insights for targeted interventions.

Among 288 surveyed retailers, 67.8% of those in urban areas were unaware of the environmental impacts of SUP bottles, compared to 94.6% in rural areas. However, informal disposal practices were common, with 55% of urban retailers and 70% of rural retailers disposing of SUP bottles improperly. While 35% of urban retailers offered alternatives to SUP bottles, only 15% of rural retailers did. These results highlight the need for stronger regulations, awareness campaigns, and support to encourage sustainable retail practices and improve waste disposal systems.

The study also included 180 waste pickers from urban areas, revealing that 75% were young men and the rest were female, with 93% lacking formal education. Most waste pickers (80%) collected SUP bottles for resale, but only 25% accessed formal recycling facilities. Environmental awareness among waste pickers was notably low, with only 3.4% understanding the full impact of SUP bottles. These findings underscore the importance of providing better training, resources, and working conditions to empower waste pickers and enhance their contributions to effective waste management systems.

This study provides valuable insights into the roles of retailers and waste pickers in managing plastic waste in Bangladesh. The findings highlight significant gaps in awareness, waste management practices, and access to sustainable alternatives. Strengthened regulations, educational initiatives, and targeted support are crucial to reducing plastic waste and promoting responsible practices across urban and rural areas.





## Key Findings

- Annual consumption of single-use plastic (SUP) bottles in Bangladesh is estimated to be between 3.15 billion and 3.84 billion, accounting for 0.82% of global consumption, with approximately only 21.4% being recycled.
- 83.6% of respondents across the country purchase products in SUP bottles, while 16.4% do not.
- Urban consumers prefer water bottles, while Rural consumers prefer soft drinks.
- In cities, 47% of respondents buy SUP bottles weekly, and 18% purchase daily; in rural areas, 39.3% purchase weekly.
- 250 mL bottles are the most preferred size in both regions, with 34% of consumers in urban and 56.7% in rural favoring them. Retailers also supported this trend, with 70% reporting that 250 mL bottles are their best-sellers.
- In urban, 51% of consumers discard SUP bottles after a single use, and 34% reuse and then discard them, while in rural, 42% directly discard and 28% reuse and then discard bottles.
- Awareness of health and environmental risks is notably low, with 18.4% of urban respondents and 5.5% of rural respondents recognizing these risks.
- In Urban areas, 25% of retailers sell over 21-30 SUP bottles daily, while most retailers in rural areas sell 10–20 bottles daily.
- Urban retailers predominantly sell water bottles (36.1%), while Rural retailers primarily sell soft drinks (83.3%).
- Retailers in urban areas exhibit little more awareness of SUP bottles' environmental and health impacts than rural retailers.
- Most waste pickers in urban areas are young males with low educational attainment, with 93% being uneducated.
- 81.7% of waste pickers collect SUP bottles for resell, but only 7.2% engage in recycling.
- Only 3.4% of waste pickers understand the environmental impact of SUP bottles
- Improper disposal and chemical leaching of SUP bottles contribute significantly to soil, air, and water pollution, with long-lasting environmental degradation due to their non-biodegradable nature.
- Prolonged exposure to chemicals leaching from SUP bottles, such as Bisphenol A (BPA), poses health risks, including endocrine disruption and potential long-term health consequences, especially to those working in the bottle manufacturing industry.

# Table of Contents

Executive Summary .....	3
Key Findings .....	4
Table of Contents.....	5
Introduction .....	8
Purpose and Objectives .....	9
A Journey Through Time: The Evolution of Plastic Bottles .....	10
Understanding the Composition of Plastic Bottles .....	11
Global Overview of Single-Use Plastic Bottles: A Crisis in Numbers .....	12
The National Context of Plastic Pollution.....	13
Single-Use Plastic Bottles in Bangladesh: Calculating the Impact.....	14
Estimating Bangladesh’s Consumption of SUP Bottles.....	14
Economic and Environmental Benefits of Reusable Bottles.....	15
Methodology .....	16
Study Design .....	16
Study Area .....	17
Target Groups .....	17
Data Collection .....	17
Questionnaires.....	17
Direct Observations .....	18
Sampling Strategy .....	18
Consumers .....	18
Retailers .....	18
Waste Pickers.....	18
Data Analysis .....	18
Results and Discussion.....	19
Unmasking the Plastic Crisis: Insights from Urban and Rural Consumers .....	19
Consumption by Age-Group.....	19
Gender Dynamics .....	19
Education and Awareness Levels .....	19
Consumer Engagement with Single-Use Plastic Bottles.....	20
Product Preference .....	21
Purchase Frequency.....	21

Weekly Consumption of SUP Bottles (Water and Soft Drinks) .....	22
Bottle Size Preferences.....	22
Points of Purchase.....	23
Disposal Practices .....	23
Openness to Alternatives .....	24
Health and Environmental Awareness .....	24
Tackling Plastic Waste at the Source: Insights from Retailers in Bangladesh .....	25
Age Distribution.....	25
Gender Representation.....	25
Education Levels: A Foundation for Awareness .....	25
Geographic Distribution.....	26
Recognition of SUP Bottles.....	26
Daily Sales of SUP Bottles.....	26
Types of SUP Bottles Sold.....	27
Size Preferences for Water Bottles .....	27
Environmental Impact of Single-use Plastic Bottles.....	27
Health Risks of SUP Bottles.....	28
A Critical Analysis of Waste Picker Demographics and Practices .....	28
Age Distribution of Waste Pickers .....	28
Gender Representation.....	29
Education Levels.....	29
Sources of Single-Use Plastic Bottles .....	29
Post-Collection Actions .....	30
Frequency of Sales.....	30
Where Waste Pickers Sell SUP Bottles.....	30
Sorting Practices Before Selling.....	31
Daily Collection Volumes .....	31
Types of Bottles Collected .....	31
Awareness of Environmental Impact.....	32
Perceptions of Changes in SUP Waste.....	32
Environmental Impacts of Single-Use Plastic Bottles .....	33
Pollution of Waterways and Oceans.....	33
Harm to Wildlife and Marine Ecosystems .....	34
Land and Soil Pollution .....	34

Exacerbating Climate Change.....	34
Depleting Natural Resources .....	34
Accumulation in Landfills.....	34
Environmental Impacts in the Context of Bangladesh.....	35
Health Impacts of Single-Use Plastic Bottles.....	36
Chemical Leaching in Bottled Water and Soft Drinks .....	42
Occupational Health Risks for Industry Workers .....	43
Broader Public Health Implications.....	43
Conclusion .....	43
Recommendations.....	44
Annexure .....	47
Pictorials.....	47
Survey Questionnaires .....	50
Online Survey Form.....	52



# Introduction

Plastic bottles made from polyethylene terephthalate (PET) have become ubiquitous since their widespread adoption in the 1950s, transforming the way beverages are packaged and consumed.<sup>1</sup> PET plastic is valued for its light weight, durability, and chemical stability, but these same characteristics also make it a persistent pollutant with long-lasting environmental consequences. PET is derived primarily from petroleum and natural gas, meaning that each bottle begins its life as part of an energy-intensive supply chain dependent on fossil fuels. Studies show that the production of virgin PET emits significant greenhouse gases, contributing to approximately 13.4 million metric tons of CO<sub>2</sub> annually from plastic bottle production alone, accelerating climate change and further depleting finite fossil fuel resources<sup>2</sup>.

The challenges of managing PET waste are stark: the World Wildlife Fund (WWF) reports that only about 25% of plastic bottles are recycled globally, while 75% end up in landfills or natural environments, including rivers, oceans, and forests.<sup>3</sup> When plastic bottles are discarded improperly, they can persist in the environment for up to 450 years, gradually fragmenting into smaller particles known as microplastics, but never fully breaking down<sup>4</sup>. If single-use plastic bottles had existed at the time of Shakespeare or the construction of the Taj Mahal, those discarded then would still be intact today, a testament to the long-lasting nature of this material.

This extensive longevity has profound implications. As PET bottles degrade, they release microplastics and potentially hazardous chemicals, which pollute the ecosystem and can enter the food chain. These microplastics have been detected in fish, birds, and even human tissue, raising serious health concerns.<sup>5</sup> The United Nations Environment Programme (UNEP) estimates that up to 12 million metric tons of plastic enter the oceans each year, where it accumulates in massive gyres and is ingested by marine life, leading to bioaccumulation of plastic particles up the food chain.<sup>6</sup> Alarmingly, studies have found microplastic particles in over 90% of tested bottled and tap water samples worldwide, underscoring the global pervasiveness of plastic contamination (Mason et al., 2018).<sup>7</sup>

While recycling is often promoted as a solution, it is not without its limitations. The recycling process for PET is energy-intensive and not always effective, as contamination often limits the

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<sup>1</sup> Nayanathara Thathsarani Pilapitiya, P., & Ratnayake, A. S. (2024). The world of plastic waste: A review. *Cleaner Materials*, 11, 100220. <https://doi.org/10.1016/j.clema.2024.100220>

<sup>2</sup> World Health Organization. (n.d.). Ambient (outdoor) air quality and health. Retrieved November 13, 2024, from [https://www.who.int/news-room/fact-sheets/detail/ambient-\(outdoor\)-air-quality-and-health](https://www.who.int/news-room/fact-sheets/detail/ambient-(outdoor)-air-quality-and-health)

<sup>3</sup> Sadan, Z. and De Kock, L. Plastics: Facts and Futures: Moving beyond pollution management towards a circular plastics economy in South Africa. WWF South Africa, Cape Town, South Africa

<sup>4</sup> Kibria, M. G., Masuk, N. I., Safayet, R., Nguyen, H. Q., & Mourshed, M. (2023). Plastic waste: Challenges and opportunities to mitigate pollution and effective management. *Journal of Environmental Management*, 327, Article 116690. <https://doi.org/10.1016/j.jenvman.2022.116690>

<sup>5</sup> Ali, N., Khan, M. H., Ali, M., Ahmad, S., Khan, A., Nabi, G., Ali, F., Bououdina, M., & Kyzas, G. Z. (2024). Insight into microplastics in the aquatic ecosystem: Properties, sources, threats and mitigation strategies. *Science of The Total Environment*, 913, 169489. <https://doi.org/10.1016/j.scitotenv.2023.169489>

<sup>6</sup> United Nations Environment Programme. (n.d.). Beat plastic pollution. Retrieved November 13, 2024, from <https://www.unep.org/interactives/beat-plastic-pollution/>

<sup>7</sup> Tong, Huiyan & Jiang, Qianyi & Hu, Xingshuai & Zhong, Xiacong. (2020). Occurrence and identification of microplastics in tap water from China. *Chemosphere*. 252. 126493. [10.1016/j.chemosphere.2020.126493](https://doi.org/10.1016/j.chemosphere.2020.126493)



recyclability of materials. Even when PET is recycled, it can typically only be reprocessed a finite number of times before it becomes unusable, meaning that recycling alone cannot close the loop on plastic waste.<sup>8</sup> As a result, most recycled PET is "downcycled" into products of lower quality, which ultimately also enter the waste stream, perpetuating the problem.<sup>9</sup>

Considering the inefficiency of recycling and the environmental risks associated with plastic waste, the most sustainable approach may be to reduce reliance on single-use plastic bottles altogether. Transitioning to reusable bottles could significantly decrease plastic waste generation and reduce pressure on ecosystems already overwhelmed by pollution. Reducing our use of single-use plastic not only addresses the issue at its source but also offers a proactive solution to minimize our carbon footprint and protect our environment.

## Purpose and Objectives

The primary purpose of this report is to thoroughly investigate the environmental footprint of single-use plastic (SUP) bottles, focusing on the patterns of consumption, disposal, and their broader impact on both the environment and human health. This study takes a comparative approach, examining the stark differences in plastic bottle usage and waste management practices between the bustling urban setting and the more rural, agriculturally centered regions of eight divisions of Bangladesh. By analyzing these two contrasting contexts, the report aims to highlight not only the scale of plastic pollution but also the unique challenges different communities face in managing SUP waste.

The specific objectives are:

1. To assess consumption and disposal patterns of SUP water and drinks bottles among consumers and retailers.
2. To evaluate the role of waste pickers in the collection, recycling, and resale of SUP bottles and the challenges they face in waste management.
3. To analyze the environmental and health impacts of SUP bottles and provide actionable recommendations for reducing their use and promoting sustainable alternatives.



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<sup>8</sup> Muringayil Joseph, T., Azat, S., Ahmadi, Z., Moini Jazani, O., Esmaeili, A., Kianfar, E., Haponiuk, J., & Thomas, S. (2024). Polyethylene terephthalate (PET) recycling: A review. *Case Studies in Chemical and Environmental Engineering*, 9, 100673. <https://doi.org/10.1016/j.cscee.2024.100673>

<sup>9</sup> Allen, D., Spoelman, N., Matthews, M., Dell, J., Linsley, C., Johl, A., & Marcil, C. (2024). The fraud of plastic recycling. Center for Climate Integrity. Retrieved November 13, 2024, from <https://climateintegrity.org/plastics-fraud>

# A Journey Through Time: The Evolution of Plastic Bottles

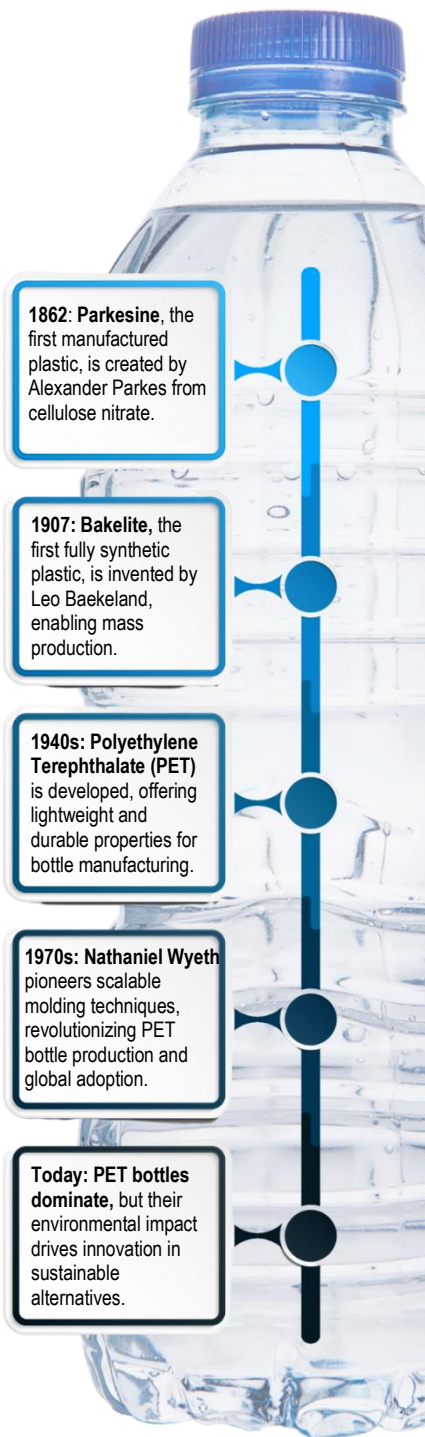
The history of plastic bottles is a fascinating tale that begins with ancient uses of natural plastics like horn and tortoiseshell. These materials were common in everyday items, but as industrialization surged in the 19th century, demand for sustainable alternatives grew. Alexander Parkes responded to this need by creating Parkesine in 1862, the first manufactured plastic, derived from cellulose nitrate.<sup>10</sup>

The 20th century marked a significant turning point in plastic production with Belgian chemist Leo Baekeland's invention of Bakelite in 1907. This was the first fully synthetic plastic, paving the way for mass production and a consumer boom. Bakelite's versatility allowed it to be molded into various forms, making it ideal for a wide range of products, from radios to kitchenware.<sup>11</sup>

However, the quest for practical water containers remained unfulfilled until the development of polyethylene terephthalate (PET) in the 1940s. This lightweight, strong plastic, formed by combining ethylene glycol and terephthalic acid, exhibited desirable properties for bottle manufacturing, such as waterproofing and chemical resistance.<sup>7</sup>

In the 1970s, Nathaniel Wyeth's scalable molding techniques revolutionized the beverage industry by enabling the efficient production of PET bottles. These bottles quickly became popular for their durability, versatility, and cost-effectiveness, leading to their widespread adoption across the globe.<sup>7</sup>

Today, while PET is the predominant material used for plastic water bottles, alternatives like polycarbonate and high-density polyethylene (HDPE) are also common. Despite their convenience and widespread use, the environmental impact of plastic bottles poses significant challenges, prompting ongoing efforts to reduce plastic waste and explore sustainable alternatives.<sup>6</sup>



**1862: Parkesine**, the first manufactured plastic, is created by Alexander Parkes from cellulose nitrate.

**1907: Bakelite**, the first fully synthetic plastic, is invented by Leo Baekeland, enabling mass production.

**1940s: Polyethylene Terephthalate (PET)** is developed, offering lightweight and durable properties for bottle manufacturing.

**1970s: Nathaniel Wyeth** pioneers scalable molding techniques, revolutionizing PET bottle production and global adoption.

**Today: PET bottles dominate**, but their environmental impact drives innovation in sustainable alternatives.

<sup>10</sup> Science Museum. (n.d.). *The age of plastic: Parkesine and pollution*. Retrieved October 27, 2024, from <https://www.sciencemuseum.org.uk/objects-and-stories/chemistry/age-plastic-parkesine-pollution>

<sup>11</sup> SMF GmbH. (n.d.). *History of plastic water bottles: How did they become so ubiquitous?* Retrieved October 27, 2024, from <https://smfgmbh.com/history-of-plastic-water/>

# Understanding the Composition of Plastic Bottles

Plastic bottles are crafted from various materials, each tailored to specific properties and applications. Here are the primary types of plastics used in bottle manufacturing:<sup>12</sup>

- **HDPE (High-Density Polyethylene):** Durable and moisture-resistant, commonly used for milk and cleaning product bottles, but unsuitable for high heat.
- **LDPE (Low-Density Polyethylene):** Softer and flexible, often used for squeeze bottles.
- **PET (Polyethylene Terephthalate):** Lightweight and transparent, ideal for single-use beverage bottles, rigorously tested for safety.
- **PP (Polypropylene):** Versatile for pharmaceuticals, with good chemical resistance.
- **PC (Polycarbonate):** Strong and reusable, but raises BPA health concerns.
- **PS (Polystyrene):** Used in foam packaging, with significant environmental impacts.
- **PVC (Polyvinyl Chloride):** Durable for long-term products but poses health risks when burned.



Source: *Plastics for Change*. (n.d.). *Different Types of Plastic*.

The variety of plastics used in bottle manufacturing not only meets diverse consumer needs but also highlights ongoing challenges related to environmental sustainability and health concerns. Understanding these materials is crucial for developing better recycling practices and alternatives to plastic bottles in the future.

Plastic Bottles	Uses
<b>PET (Polyethylene Terephthalate)</b>	Commonly used for carrying water and beverages.
<b>PE (Polyethylene)</b>	A stiff plastic often used for squeeze bottles
<b>PP (Polypropylene)</b>	Typically used for pharmaceutical bottles (pills).
<b>PC (Polycarbonate)</b>	Used for refillable and reusable containers.
<b>PVC (Polyvinyl Chloride)</b>	A durable material ideal for products requiring long-term storage

<sup>12</sup> IQS Directory. (n.d.). *Plastic bottles: What are they?* Retrieved October 27, 2024, from <https://www.iqsdirectory.com/articles/blow-molding/plastic-bottles.html>

# Global Overview of Single-Use Plastic Bottles: A Crisis in Numbers

Single-use plastic bottles have become a defining symbol of our consumer-driven, throwaway culture. Today, a staggering **one million plastic bottles are purchased worldwide every minute**, adding up to more than **583 billion bottles annually** as of 2021.<sup>13</sup> If historical growth trends continue, global production of primary plastic is forecasted to reach 1,100 million tons by 2050.<sup>14</sup> Despite the convenience they offer, fewer than **one-third of these bottles are recycled**, leaving billions to accumulate in our oceans, landfills, and natural ecosystems, where they can persist for centuries.<sup>6</sup>

This surge in plastic bottle use is fueled by modern lifestyles, urbanization, and the growing popularity of bottled beverages. Demand remains particularly high in North America and Europe, **while Asia has seen rapid growth due to urban expansion and a shift toward convenience products.**<sup>15</sup> These production levels have vast environmental consequences: single-use plastic bottles are primarily made from fossil fuel-based materials, contributing around **3% of global greenhouse gas emissions**, a number that continues to rise as recycling rates stagnate and demand for virgin plastic remains high.<sup>16</sup>

Plastic's resilience, once its selling point, is now its greatest liability. Once discarded, plastic bottles break down into **microplastics**, tiny fragments that enter the food chain, pollute our drinking water, and have even been found in human blood. Studies reveal that **93% of globally sourced bottled water contains microplastics**, at levels twice as high as those found in tap water.<sup>6</sup> These plastics are more than just waste; they're leaving an indelible mark on our planet, becoming embedded in geological layers as a marker of the Anthropocene and creating new oceanic micro-ecosystems known as the "plastisphere".<sup>7</sup>

Plastics, particularly in single-use packaging, dominate global waste streams, accounting for approximately **36% of all plastic production**. Of this, around **85% end up in landfills or unregulated waste sites.**<sup>8</sup> These vast quantities of plastic waste stress already burdened waste management systems worldwide, pushing for urgent, sustainable solutions to mitigate the impact of single-use plastic bottles on our environment and health. Reducing plastic consumption, especially through reusable alternatives, could drastically cut down on waste, pollution, and greenhouse gas emissions, fostering a cleaner, healthier future for all.

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<sup>13</sup> Beyond Plastics. (n.d.). *Plastic water bottles*. Retrieved October 27, 2024, from <https://www.beyondplastics.org/factsheets/plastic-water-bottles>

<sup>14</sup> United Nations Environment Programme. (n.d.). *Beat plastic pollution*. Retrieved October 27, 2024, from <https://www.unep.org/interactives/beat-plastic-pollution/>

<sup>15</sup> Padilla-Vasquez, D. (2024, May 1). *Protect our planet from plastic pollution: 5 things to know*. Climate, Energy, and Environment.

<sup>16</sup> Hannah Ritchie (2023) - "How much of global greenhouse gas emissions come from plastics?" Published online at OurWorldInData.org. Retrieved from: '<https://ourworldindata.org/ghg-emissions-plastics>'

# The National Context of Plastic Pollution

Plastic pollution has long been a critical issue in Bangladesh, particularly in its urban areas and along its extensive coastline. The country's rivers and waterways are frequently clogged with plastic waste, leading to flooding and environmental degradation. Despite these challenges, plastic consumption has continued to rise, with single-use plastics such as bottles contributing significantly to the problem.

In response to this growing crisis, the Bangladesh government has expanded the ban on single-use plastic bottles beyond the Chief Adviser's office to include a nationwide initiative. This move aligns with global trends, where countries are increasingly recognizing the need to reduce reliance on disposable plastics to protect the environment and public health. The ban is a significant step forward in the country's broader strategy to combat environmental degradation, with the potential to bring substantial long-term benefits.



Source: SMF GmbH. (n.d.). *History of plastic water bottles: How did they become so ubiquitous?*

We are heavily exposed to microplastics and nano-plastics through drinking, eating, and breathing. Scientists have found tiny plastic particles throughout the human body, including in the heart, bloodstream, lungs, placenta, brain, and more, with further research raising concerns. In wildlife, nano-plastics are especially dangerous, as they can travel from the bloodstream to the brain, organs, and cells. Children and pregnant individuals are particularly vulnerable to these effects. The full impact of microplastics and nano-plastics on health is still unclear. Plastics contain over 16,000 chemicals, none classified as safe, with at least 25% considered hazardous. Harmful substances like phthalates, PFAS, bisphenols, asbestos, and toxic heavy metals are common, and microplastics can absorb environmental toxins that then contaminate living organisms and ecosystems. Most plastic water bottles are made from PET plastic, which can leach chemicals like antimony, lead, and BPA into the liquid. This risk increases if the bottles are reused, exposed

to heat or sunlight, or recycled. Single-use plastic bottles also contain PFAS, a chemical group dangerous to both human and environmental health.<sup>17</sup>

Research by Orb Media found that 93% of the 11 bottled water brands tested contained traces of microplastics. The study included well-known brands like Aquafina and Evian, with Nestlé Pure Life showing some of the highest contamination levels. The findings also revealed that bottled water had approximately 50% more microplastics than tap water.<sup>18</sup> Out of the mentioned brands, Aqua and Aquafina are available in Bangladesh.

## Single-Use Plastic Bottles in Bangladesh: Calculating the Impact

The consumption of single-use plastic (SUP) bottles in Bangladesh mirrors a global trend of increasing reliance on disposable plastics, which significantly contributes to environmental degradation. Globally, **approximately 525 billion** plastic bottles are purchased each year, equating to nearly **1 million bottles per minute**. Bangladesh, with its rapidly urbanizing population, is a notable participant in this consumption cycle.

### Estimating Bangladesh's Consumption of SUP Bottles

With a population of 180 million, roughly 70.2 million people live in urban areas, representing 39% of the population. Between 75% and 85% of these urban residents regularly purchase bottled water, a necessity often driven by inadequate access to safe drinking water. At a 75% purchase rate, 17.55 million urban dwellers in Bangladesh would consume around **3.15 billion** bottles per year. At a higher estimate of 84%, 28.08 million people would purchase **3.84 billion** bottles annually.<sup>19</sup> This range indicates that Bangladesh's SUP bottle consumption likely falls between 1.15 billion to 1.84 billion bottles per year, which contributes to **about 0.82%** of global consumption. According to our baseline survey, approximately **21.4%** of the bottles are **recycled**. The study found that during the recycling process, the labels of the bottles are removed and thrown out indiscriminately, which causes serious pollution threats to waterbodies, soil, and air as well.

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<sup>17</sup> <https://www.plasticpollutioncoalition.org/blog/2024/1/10/study-finds-hundreds-of-thousands-of-plastic-particles-in-bottled-water>

<sup>18</sup> <https://cleanwater.org/2020/07/29/bottled-water-human-health-consequences-drinking-plastic>

<sup>19</sup> <https://www.bpcl.com.bd/sustainability/>

In Bangladesh  
**3.15-3.84 BILLION**  
**SINGLE-USE PLASTIC**  
**BOTTLES**  
are Used Every Year



Let's  
**BRING OUR OWN**  
**REUSABLE BOTTLE**  
For a Healthier Future

## Economic and Environmental Benefits of Reusable Bottles

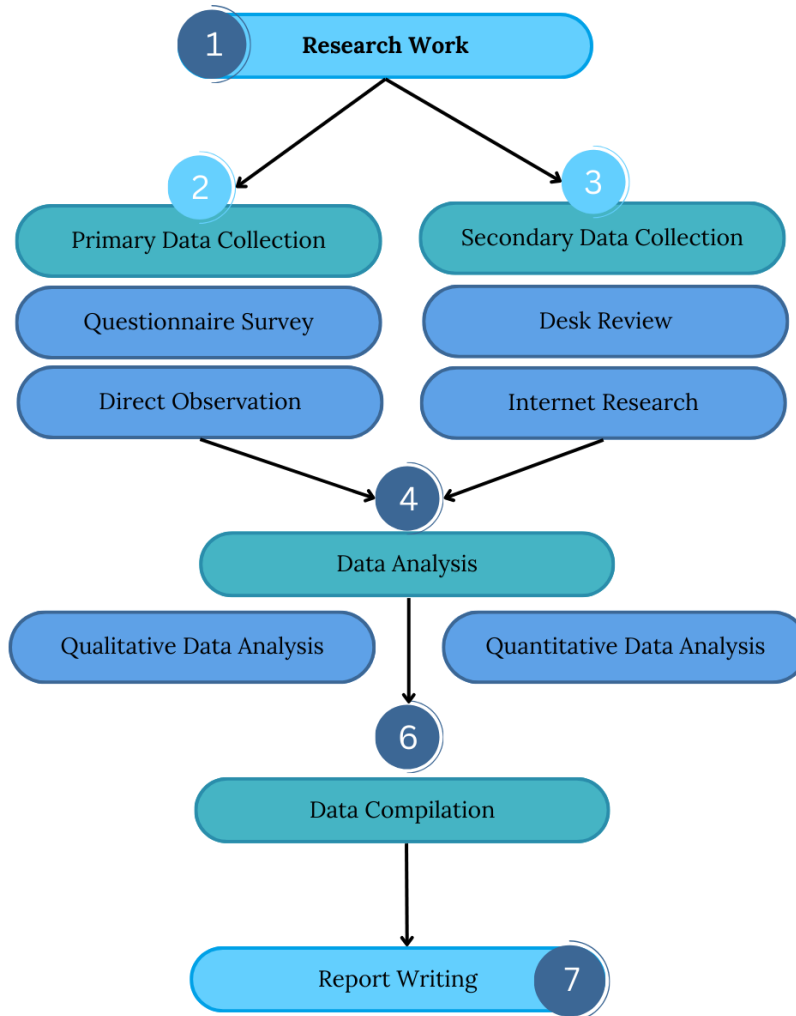
Switching to reusable bottles presents a compelling case for both economic savings and environmental benefits. A single-use plastic bottle costs about 15 BDT, while a durable, reusable bottle costs approximately 150 BDT.

Given that the average person uses about 66 plastic bottles annually, adopting reusable bottles could save consumers a considerable amount of money in the long term. This shift would also reduce plastic waste significantly, advancing Bangladesh's goals for sustainability and plastic reduction.

By addressing the SUP bottle issue and promoting reusable alternatives, Bangladesh can make meaningful strides toward reducing its plastic footprint. Embracing sustainable practices is not only an environmental necessity but also a practical, cost-effective choice for consumers.

# Methodology

The methodology of this report was carefully structured to provide a comprehensive understanding of the environmental footprint of single-use plastic (SUP) bottles. The approach integrates quantitative data collected through detailed questionnaires to assess consumption, disposal patterns, and waste management practices. By focusing on two distinctly different study areas, Dhaka and Rangpur, the study captures the varying dynamics of SUP bottle usage and management in urban and rural contexts.



## Study Design

The study adopted a survey-based approach, employing structured questionnaires tailored for specific stakeholder groups, including consumers, retailers, and waste pickers. This method enabled the collection of quantitative data while maintaining consistency and comparability between the two regions.



## Study Area

To comprehensively analyze the regional variations in single-use plastic (SUP) bottle consumption and waste management practices, the study encompassed both urban and rural settlements from February 2024 to October 2024 across all eight divisions, surveyed in Bangladesh. The diverse geographic coverage ensured a more holistic understanding of SUP bottle usage and disposal behaviors across the country.

### Urban and Rural Areas Across Divisions:

- The survey included respondents from both urban and rural settings in Dhaka, Chattogram, Sylhet, Mymensingh, Rajshahi, Khulna, Barishal, and Rangpur.
- This approach allowed for capturing the dynamics of SUP bottle usage in high-consumption, densely populated urban centers as well as agriculturally driven rural areas.
- Dhaka Metropolitan, the largest urban hub, was a focal point, representing significant beverage consumption and informal waste management activities. Rangpur, primarily rural, provided insights into waste disposal challenges in areas with limited infrastructure.



## Target Groups

The study engaged three main groups of stakeholders to gather diverse perspectives:

- **Consumers:** Individuals and households who purchase and use SUP bottles, providing insights into usage frequency, preferences, and disposal habits.
- **Retailers:** Shop owners and vendors who sell bottled water and beverages, offering information on market trends, consumer demand, and any recycling-related practices.
- **Waste Pickers:** Individuals engaged in informal recycling activities, primarily in Dhaka, providing data on collection practices, the economic value of plastic bottles, and challenges in waste management.

## Data Collection

### 1. Questionnaires

The primary data collection tool was a series of structured questionnaires designed to address the study's specific objectives. Separate questionnaires were developed for each stakeholder group. These were also administered through an online survey platform to maximize outreach and participation.

- **Consumer Questionnaires:** Focused on purchasing habits, consumption frequency, disposal practices, and awareness of environmental impacts associated with SUP bottles.
- **Retailer Questionnaires:** Covered sales patterns, customer preferences, knowledge of waste management practices, and attitudes toward SUP bottle recycling.

- **Waste Picker Questionnaires:** Explored the volume and value of collected bottles, challenges in collection and resale, and perspectives on recycling infrastructure and policies.

The questionnaires were pre-tested to ensure clarity, relevance, and ease of understanding before full-scale deployment.

## 2. Direct Observations

Complementing the survey data, direct observations were conducted in retail outlets, waste collection points, and informal recycling areas across the divisions. These observations provided contextual insights into SUP bottle consumption, disposal, and management practices, validating and enriching the survey findings.

## Sampling Strategy

A purposive sampling approach was employed to ensure diverse representation from the target groups.

### Consumers

A total of 3,416 respondents participated, with representation from the following divisions:

- Dhaka Metropolitan: 655 respondents
- Chattogram: 375 respondents
- Sylhet: 410 respondents
- Mymensingh: 300 respondents
- Rajshahi: 360 respondents
- Khulna: 400 respondents
- Barishal: 400 respondents
- Rangpur: 516 respondents

### Retailers

Surveys were conducted with 288 retailers, proportionally representing urban and rural contexts across the divisions.

### Waste Pickers

Data were collected from 180 waste pickers in Dhaka Metropolitan, emphasizing their critical role in urban waste management and informal recycling networks.

## Data Analysis

The collected data were analyzed using statistical software to identify patterns, trends, and regional variations in SUP bottle consumption and disposal behaviors.

- **Descriptive Statistics:** Summarized the findings to provide an overall understanding of the data.
- **Comparative Analysis:** Highlighted differences between urban and rural settlements across the eight divisions.
- **Visualizations:** Graphs and tables were utilized to present the findings effectively, facilitating a clear understanding of trends and insights.

# Results and Discussion

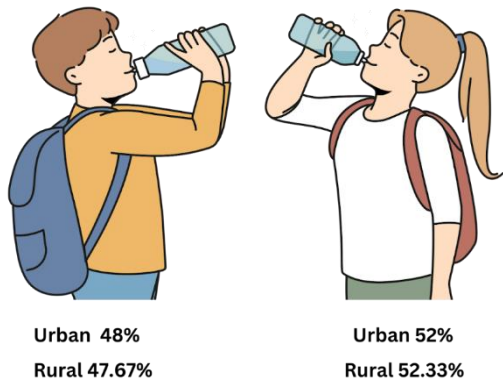
## Unmasking the Plastic Crisis: Insights from Urban and Rural Consumers

In a world grappling with the escalating challenge of plastic pollution, comprehending the consumption patterns of single-use plastic (SUP) bottles is of paramount importance. This study surveyed **3,416 consumers across Bangladesh's eight divisions**, encompassing both urban and rural settlements. Notably, 655 respondents were from Dhaka Metropolitan, representing a densely populated urban environment with high plastic consumption, while 516 respondents were from Rangpur, reflecting rural consumption dynamics and waste management practices. The findings illuminate significant regional disparities in awareness, usage, and disposal habits, underscoring the pressing need for tailored interventions to combat the plastic pollution crisis.

### Consumption by Age-Group

In both urban and rural scenarios, younger age groups dominate single-use plastic (SUP) bottle consumption, albeit with regional variations. In urban areas, **46.08%** of consumers are in the **21-35 age group**, a reflection of an urban lifestyle where convenience drives purchasing decisions. In contrast, in rural areas, SUP consumption is led by the **11-20 age group**, with **65.1%** frequently purchasing bottled drinks. These trends emphasize the demand for convenience among youth, whether in urban or rural contexts, and reveal how both urban professionals and rural students gravitate toward easily accessible, portable beverages.

### GENDER CHART



### Gender Dynamics

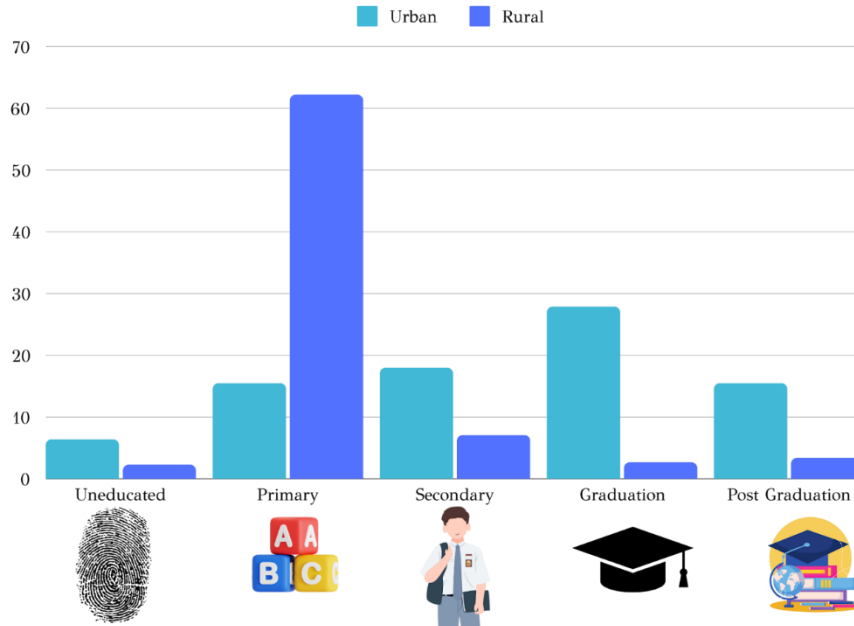
Gender dynamics show interesting regional differences. In cities, **52%** of SUP bottle consumers are female, compared to **48%** of males, suggesting that lifestyle factors in urban areas may drive higher SUP bottle use among women. In rural areas, however, the distribution is more balanced, with **52.2%** female and **47.8%** male. This balance in rural areas highlights a shared responsibility in consumption practices, offering an opportunity for gender-inclusive awareness campaigns focused on reducing SUP dependency.

### Education and Awareness Levels

Education significantly influences SUP awareness, especially in urban. Here, **33.6%** of respondents hold graduate degrees, while **18.6%** have postgraduate qualifications. This educated urban demographic exhibits high awareness levels, with **55.4%** recognizing SUP bottles and **69.8%** acknowledging their health risks. In contrast, the rural population, where **79.9%** have only primary education, shows a lower awareness level, with **27.8%** identifying SUP bottles accurately.

These contrasting knowledge levels point to an urgent need for educational programs in rural regions, where consumption is high but awareness remains limited.

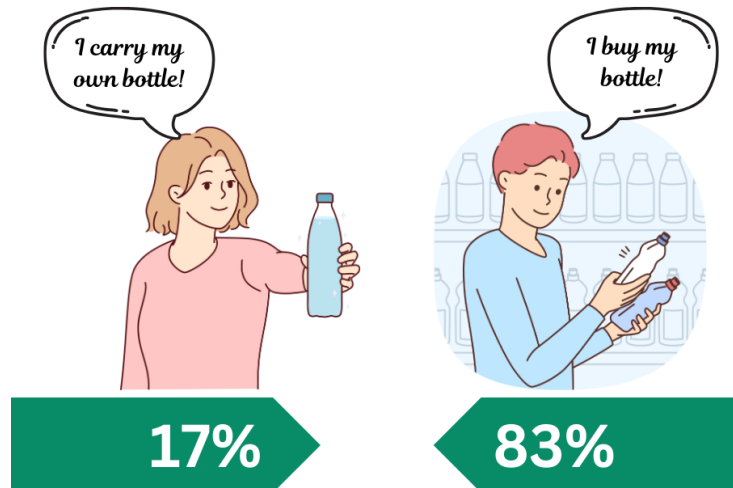
## LEVEL OF EDUCATION



## Consumer Engagement with Single-Use Plastic Bottles

The consumer preference for single-use plastic (SUP) bottles is evident in both Urban and Rural areas, with a significant number of consumers purchasing products contained in SUP bottles. In urban settlements, 83.5% of respondents buy products in SUP bottles, while 16.5% do not. The rural areas show a similarly high percentage, with 83% of respondents purchasing items in SUP bottles, and 17% not. In total, 83.6% of respondents across both regions buy products in SUP bottles, while 16.4% do not. This high level of consumer engagement with SUP bottles in both regions underscores the prevalent use of single-use plastic in everyday purchases.

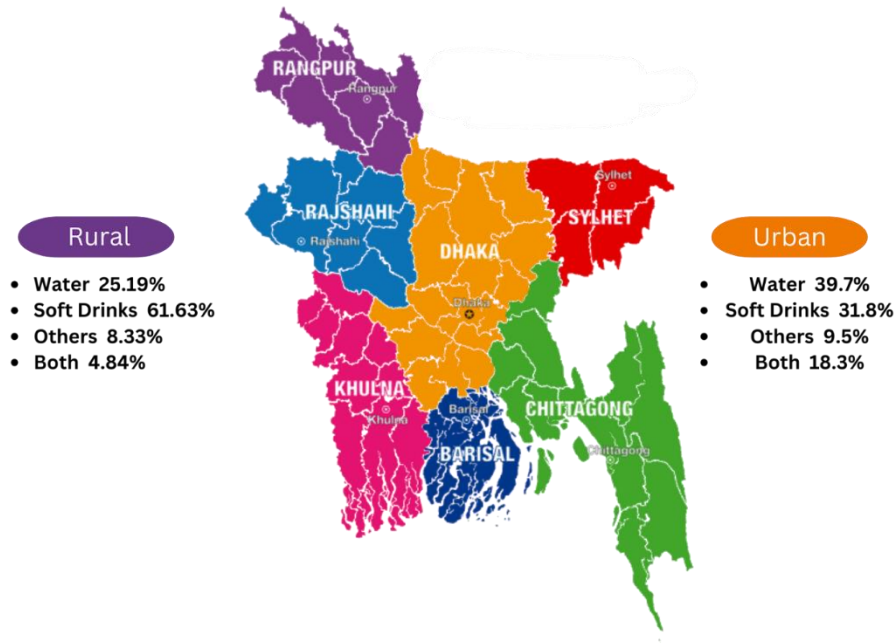
## RATIO OF SINGLE-USE PLASTIC BOTTLE USERS



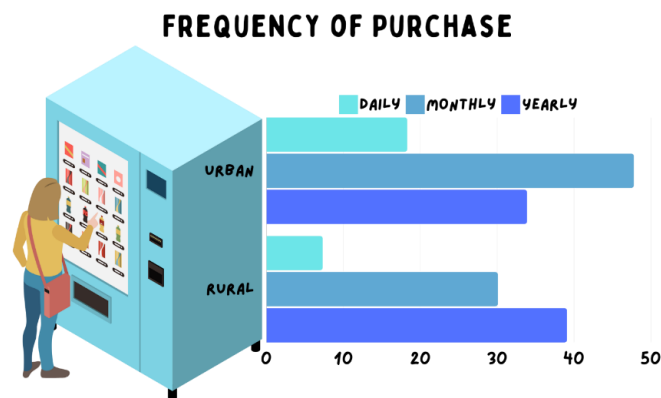
## Product Preference

Product preference varies significantly across the country. In cities, **40%** of respondents prefer water in SUP bottles, while **32%** opt for soft drinks. Conversely, in rural-centered areas, soft drinks are more popular, with **61.63%** choosing them over water (25.19%). This difference may stem from lifestyle and cultural factors, with metropolitan's on-the-go consumers balancing between water and soft drinks, while rural's younger demographic predominantly favors soft drinks. This split in preferences underscores the importance of targeted messaging that aligns with each region's consumption habits.

### PREFERRED TYPE OF SINGLE-USE PLASTIC (SUP) BOTTLES



## Purchase Frequency

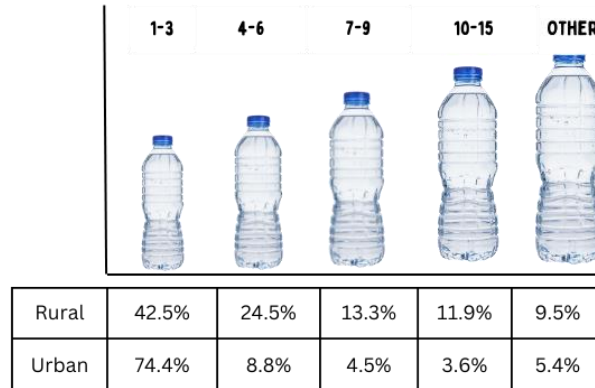


In cities, 47% purchase SUP bottles every week, with 18% buying them daily. This trend reflects the fast-paced urban lifestyle, where convenience is paramount. In contrast, 39.3% in suburban and rural areas engage in weekly purchases. It indicates a less frequent usage pattern. The discrepancy in purchasing behavior can be attributed to the metropolitan environment that emphasizes quick access to products, while village-based traditional lifestyles and slower pace may lead to more considered consumption choices.

## Weekly Consumption of SUP Bottles (Water and Soft Drinks)

Weekly single-use plastic (SUP) bottle consumption shows notable regional variation. In rural areas, the majority 42.5%, consume only 1-3 bottles per week, indicating a lower dependency on bottled products, likely influenced by cost considerations and the availability of alternatives. Urban shows a broader distribution, with 74.4% consuming 1-3 bottles, but a significant proportion, 8.8%, and 4.5% using 4-6 and 7-9 bottles weekly, respectively. This suggests that urban factors, such as lifestyle and greater access to bottled beverages, drive higher consumption. These patterns underscore the need for targeted awareness efforts to reduce SUP usage, especially in urban areas with markedly higher demand.

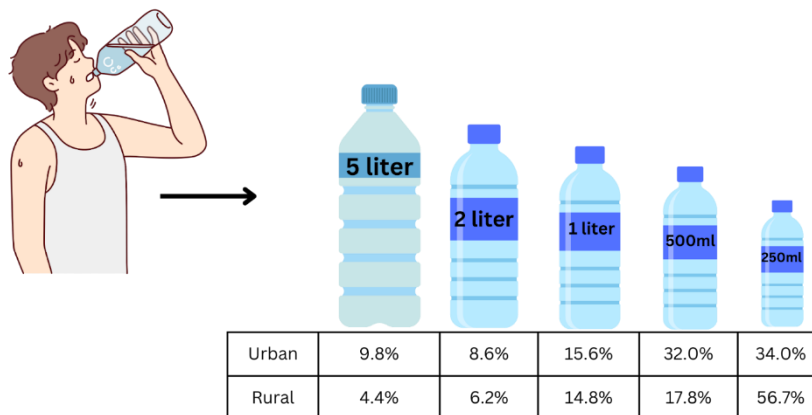
### CONSUMPTION IN A WEEK



### Bottle Size Preferences

The 250 ml bottle emerges as the most popular choice in both urban and rural, with 34% in cities and 56.7% in rural preferring this size. In cities, the preference for smaller, portable bottles aligns with the need for mobility in a bustling city, catering to consumers on the go. Conversely, in rural areas, the choice may be influenced by economic factors, as smaller bottles are often more affordable. This shared preference highlights a cultural shift towards convenience-driven consumption across both regions, albeit shaped by different socio-economic realities.

### PREFERRED SIZE OF BOTTLES



## Points of Purchase

Local convenience stores are the primary retail outlet for SUP bottles in both regions, with **54.8%** in urban and **75.64%** in rural regions purchasing from these stores. In cities, consumers also frequently buy from restaurants and shopping malls, showcasing a more diverse retail landscape that caters to urban lifestyles. In contrast, villages rely heavily on local shops, reflecting traditional rural shopping patterns influenced by limited access to larger retail facilities. This reliance on smaller local outlets in rural areas may foster community ties and support local economies, while cities' varied retail options indicate a bustling consumer culture.

## PURCHASE POINTS OF SINGLE-USE PLASTIC (SUP) BOTTLES

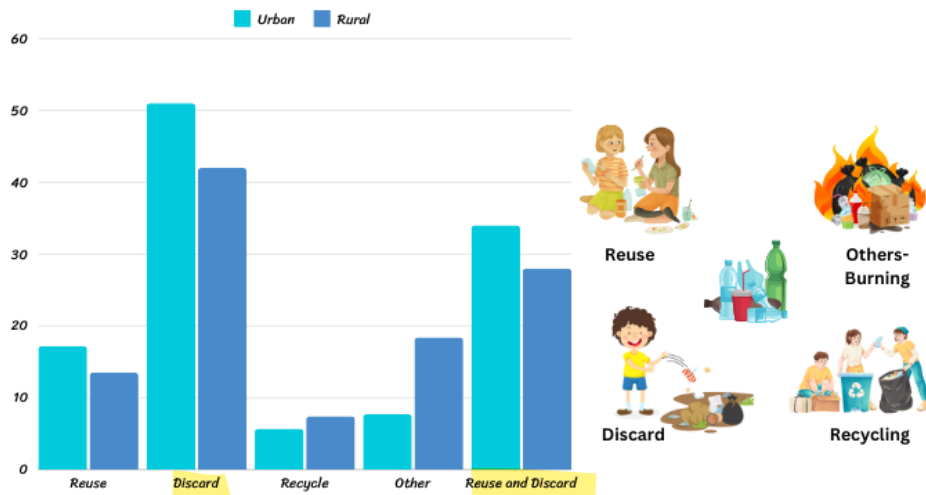


Location	Local Convenience store	Shopping mall	Supershops	Restaurant	Other
Urban	54.8%	11.4%	11.4%	13.2%	9.2%
Rural	75.64%	5.62%	8.27%	6.59%	4.07%

## Disposal Practices

Disposal methods reveal notable differences between the two regions. In cities, 51% of consumers report discarding SUP bottles after only one use, while 34% reuse and discard them. Recycling practices remain low, with only 8% participating. In Rural areas, 42% discard bottles after one use, but there is a higher reuse and then discard rate of 28%, which may be influenced by economic considerations and the culture of reusing materials.

## DISPOSAL OF SINGLE-USE PLASTIC (SUP) BOTTLES



The higher rate of disposal in cities raises concerns about waste management and emphasizes the need for improved disposal infrastructure and education on recycling, especially given the city's larger volume of SUP consumption.

## Openness to Alternatives

Encouragingly, 46.2% of express cities are open to exploring alternatives to SUP bottles, indicating a willingness to consider more sustainable options. In the countryside, this figure is slightly higher at 48.4%, suggesting a growing awareness of the environmental impact of single-use plastics. This shared inclination towards seeking alternatives signifies an opportunity for both regions to implement policies and initiatives promoting sustainable practices, potentially leading to a significant reduction in SUP consumption.

## Health and Environmental Awareness

Awareness of the health and environmental risks associated with SUP bottles is notably low in both regions. In urban areas, 18.4% recognize health hazards, while 38.2% acknowledge environmental impacts. Similarly, in rural areas, 5.5% are aware of health risks, and 19.8% recognize environmental consequences. The low awareness of health and environmental risks associated with SUP bottles underscores the need for targeted behavior change campaigns. These variations likely stem from differences in educational backgrounds and socio-economic conditions, highlighting the importance of tailored educational initiatives. By addressing these gaps, such campaigns could significantly enhance understanding and encourage responsible consumption and disposal practices across both urban and rural communities.

This analysis reveals a pervasive use of SUP bottles across both urban and rural settings, driven by convenience and lifestyle factors, with young consumers leading the trend. The city's lower awareness levels and higher educational attainment highlight an informed but convenience-driven urban population, while the non-urban areas show a growing rural consciousness about environmental and health impacts. Despite the recognized risks, discard practices remain high, indicating a critical need for infrastructure improvements and behavior-change initiatives. Increasing awareness and promoting viable alternatives could help shift both regions towards more sustainable practices, reducing SUP dependency and environmental impact.



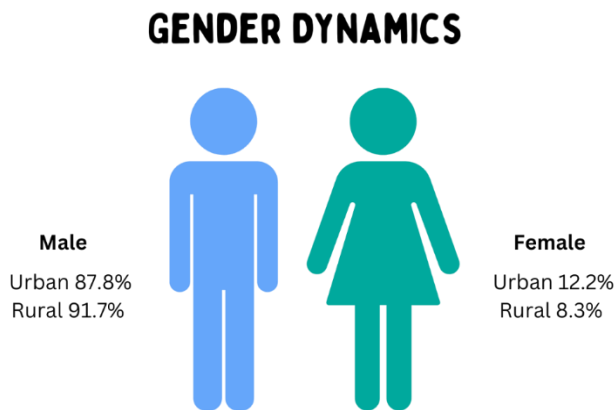
## Tackling Plastic Waste at the Source: Insights from Retailers in Bangladesh

This analysis explores responses from 288 retailers in urban and rural areas of the country, examining their demographic profiles, awareness levels, and sales and disposal practices of single-use plastic (SUP) bottles. Insights gathered reveal key differences between urban and rural retailers, highlighting potential strategies to address the plastic crisis at its origin.

### Age Distribution

The age profile of retailers reveals a vibrant and predominantly youthful workforce across both urban and rural settings of the country. In cities, the majority of retailers fall within the 21-35 age range, comprising 43.9%, followed closely by those aged 36-50 at 32.2%. This trend indicates a dynamic environment where younger entrepreneurs are actively engaging in the retail sector. Conversely, rural retailers show a similar trend, with 45.4% in the 21-35 age group, alongside 40.7% aged 36-50. The absence of retailers under 10 years of age in both regions suggests a focused concentration of experience among those actively involved in the market.

### Gender Representation



A significant gender disparity is evident among retailers, with males comprising the vast majority. In cities, out of 180 retailers, 87.8% are male, while only 12.2% are female. Similarly, rural areas display a comparable pattern, with 91.7% male retailers and just 8.3% females. This male dominance raises important questions about gender inclusivity and the potential need for targeted initiatives to support female participation in the retail sector.

### Education Levels: A Foundation for Awareness

Education plays a critical role in shaping the awareness and practices of retailers regarding SUP bottles. In urban cities, the educational background reveals a mix of levels: 18.9% (34) are uneducated, 38.3% at the primary level, 31.7% with secondary education, and 11.1% (20) have graduated. Notably, no retailers have attained post-graduate education. Rural areas present a similar picture, with 5.6% (6) uneducated, 34.3% (37) at the primary level, 51.0% (55) at the secondary, and a handful (6.5%) with higher education. This educational diversity suggests that while many retailers possess foundational knowledge, there remains an opportunity for increased training and awareness programs to enhance understanding of sustainable practices.

## Geographic Distribution

The geographic distribution of retailers provides insights into their operational environments. The Dhaka and Chittagong metropolitan area's retail scene is entirely urban, with 100% of retailers located within the city limits. In contrast, other areas showcase a blend of urban and rural settings, with 53.7% retailers in urban areas and 46.3%. This dichotomy highlights the varying challenges and consumer behaviors that retailers encounter based on their location, necessitating tailored strategies for each environment.

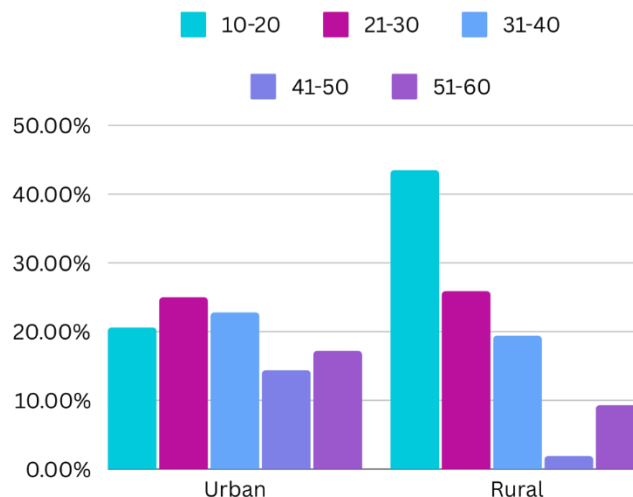
## Recognition of SUP Bottles

Awareness of single-use plastic bottles is vital for responsible retailing. In cities, 53.3% of retailers confirm their knowledge of SUP bottles, while 46.7% remain unaware. Rural areas show a lower level of awareness, with 33.1% of retailers recognizing SUP bottles, and 16.9% uncertain. This disparity in knowledge underscores the importance of continued education and outreach to enhance understanding of SUP and its implications.

## Daily Sales of SUP Bottles

When examining daily sales, city retailers report a robust average, with 25% selling between 21-30 bottles daily and 22.8% selling between 31-40. A notable number also report sales exceeding 50 bottles 17.2%. In contrast, village retailers indicate lower sales volumes, with the majority 43.5% selling between 10 and 20 bottles daily and far fewer in the higher ranges. This data points to a vibrant market for SUP bottles in urban areas, where consumer demand appears to be significantly higher than in rural.

### DAILY SELLS OF SINGLE-USE PLASTIC (SUP) BOTTLES



## Types of SUP Bottles Sold

Retailers' responses reveal intriguing patterns in consumer preferences for SUP bottles. In city centers, a significant majority of 36.1% sell water bottles, followed by soft drinks 22.8%, and a combination of both 35.0%. In rural areas, however, the landscape shifts dramatically, with 83.3% of retailers predominantly selling soft drinks, while only 7.4% focus on water. This divergence indicates differing consumer behaviors, possibly influenced by regional tastes and preferences.

## TYPE SINGLE-USE PLASTIC (SUP) BOTTLES

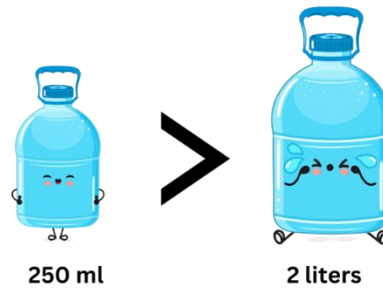


SUPB choices	Water	Soft Drinks	Others	Both
Urban	36.1%	22.8%	6.1%	35.0%
Rural	7.4%	83.3%	5.6%	3.7%

## Size Preferences for Water Bottles

The size of water bottles sold also highlights regional differences. City retailers favor the 500 ml size, comprising 41.1%, followed by the 250 ml size at 28.3%, and larger sizes, up to 1 liter, at 13.3%. On the other hand, rural retailers predominantly sell the 250 ml size, making up 77.8% of the total sales, with very minimal sales of larger sizes, such as 500 ml 10.4%, and 5 liters 8.7%. This stark preference for smaller bottles in rural areas could reflect a more price-sensitive consumer base, potentially influenced by regional economic factors and purchasing power.

## MOST SOLD SIZES



Sizes	250 ml	500 ml	1 liter	2 liters	5 liters
Urban	28.3%	41.1%	13.3%	6.1%	11.1%
Rural	77.8%	11.1%	0.9%	0.9%	9.3%

## Environmental Impact of Single-use Plastic Bottles

A crucial aspect of retailers' awareness pertains to the environmental impact of SUP bottles. In urban areas, 32.2% of retailers acknowledge the environmental harm caused by these products, while 67.8% do not. Rural areas reflect a poorer consensus, with 5.4% of retailers aware of the environmental issues associated with SUP bottles, leaving 94.6% unaware. This heightened awareness suggests an opportunity for retailers to educate them to become advocates for sustainable practices and to educate their customers on reducing plastic waste.

## Health Risks of SUP Bottles

Retailers' perceptions of health risks linked to SUP bottles are equally important. In cities, 35.4% of retailers recognize potential health hazards, while 27.1% do not. Rural areas show a non-impressive level of awareness, with 7.2% of retailers acknowledging health risks and only 92.8% unaware. This lack of awareness shows the need to promote healthier alternatives and encourage responsible consumer choices.

The comparison of urban and rural retailer behaviors reveals critical insights into the role of retailers in addressing the SUP crisis. Urban retailers, with higher sales volumes, demonstrate a lower awareness of health and environmental risks, suggesting a need for city-focused education campaigns that emphasize the urgent impacts of plastic pollution. In contrast, rural retailers, despite lower sales, show high awareness levels and a strong preference for smaller bottle sizes, making them ideal candidates for targeted interventions to reduce plastic waste in rural settings.

Addressing these urban-rural disparities in awareness, education, and product preferences can pave the way for effective strategies tailored to each context. Retailers, as key distributors of SUP bottles, have a unique role in driving consumer behavior change. By fostering awareness, offering sustainable alternatives, and implementing region-specific waste management practices, both urban and rural retailers can contribute significantly to mitigating Bangladesh's plastic pollution problem.

## A Critical Analysis of Waste Picker Demographics and Practices

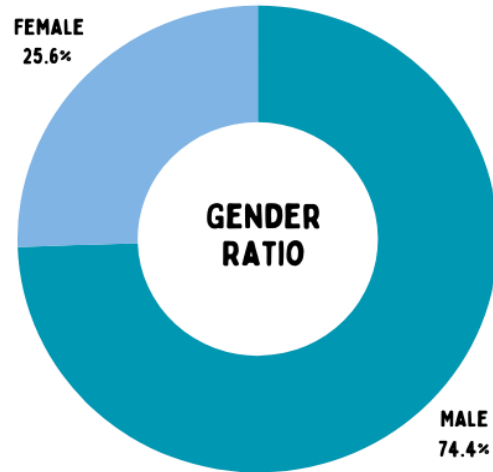
This analysis examines the responses from 180 waste pickers in Dhaka, exploring their demographic profiles, awareness levels, and collection and disposal practices related to single-use plastic (SUP) bottles. The insights gathered reveal significant patterns among waste pickers that can inform strategies to address plastic waste at its source.

### Age Distribution of Waste Pickers

The age distribution of waste pickers in Dhaka highlights a predominance of younger individuals, with **27.8%** falling into the **11-20 years** category. The **21-35 years** group represents **35%**, while **23.3%** are aged **36-50 years**, and **3.3%** are over **50 years**. This age profile suggests that many young people are engaged in waste picking, possibly due to economic necessity and limited employment opportunities in urban settings.

## Gender Representation

The gender composition of waste pickers reveals a significant male majority, with **74.4%** identifying as male, compared to **25.6%** who identify as female. This gender imbalance may influence the strategies and practices of waste collection and sale, as male waste pickers may prioritize different types of bottles or methods of engagement with buyers compared to their female counterparts.

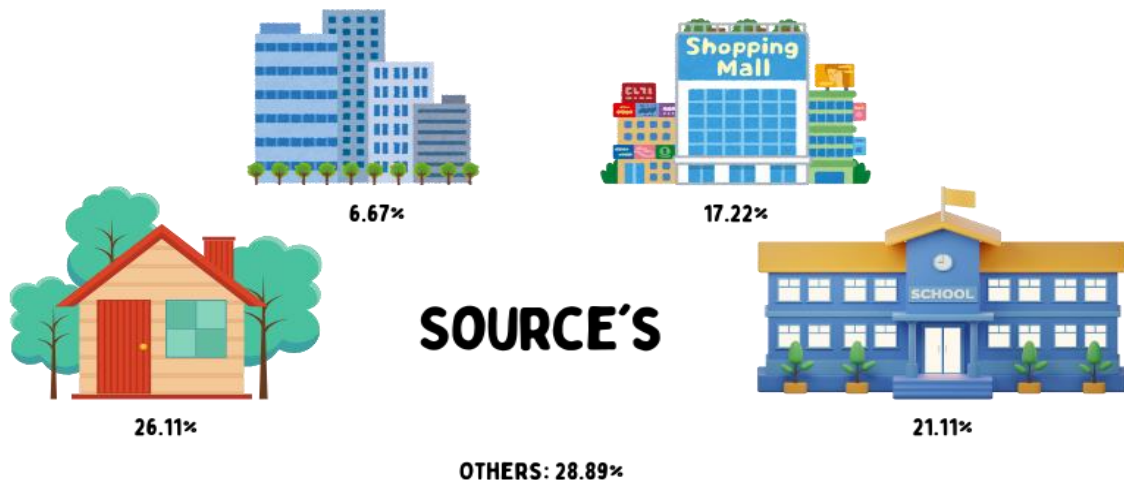


## Education Levels

The educational background of waste pickers in Dhaka is concerning, with **93%** classified as uneducated. Only **3.6%** have completed primary education, and a mere **0.2%** hold a higher degree. This limited educational attainment emphasizes the need for targeted educational initiatives that can provide waste pickers with knowledge about sustainable practices and environmental impacts.

## Sources of Single-Use Plastic Bottles

Waste pickers indicated various sources for collecting SUP bottles, with **26.11%** obtaining them primarily from **home**, followed by **21.1%** from **school areas**, and **17.2%** from **markets**. The remaining **28.89%** reported collecting from **other sources**. This suggests that SUP bottles are prevalent across multiple environments, reinforcing the need for holistic strategies to tackle plastic waste.



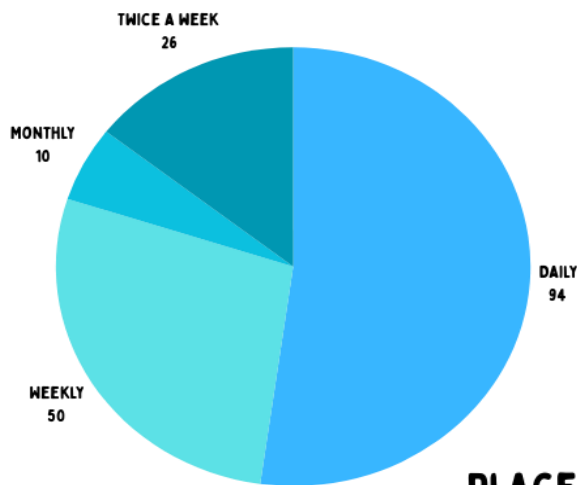
## Post-Collection Actions

When asked about their actions with collected SUP bottles, **81.7%** reported selling them, while only **7.2%** recycled, and **6.11%** reused them. This reliance on selling underscores the economic motivations driving waste pickers' activities and highlights the urgent need for viable recycling solutions.

## FATE OF COLLECTED SUP BOTTLES



## FREQUENCY OF SELLING



## Frequency of Sales

A substantial **52.2%** of waste pickers sell SUP bottles **daily**, while **27.8%** do so **weekly**. Smaller fractions sell bottles **monthly 5.6%** or **twice a week 14.4%**. The high frequency of sales illustrates the pressing economic needs that waste pickers face in their daily lives.

## Where Waste Pickers Sell SUP Bottles

The primary selling venues for SUP bottles highlight the informal nature of waste picking in Dhaka. **Scrap dealers** are the leading buyers,

## PLACE OF SELLING



Selling Point	Recycling center	Scrap dealers	Community Market	Waste picker Cooperatives	Local waste dealers	Middle man	Others
Seller count	22	65	63	20	8	1	1
Percentage	12.22%	36.11%	35.00%	11.11%	4.44%	0.56%	0.56%

with **36.7%** selling there, followed by **community markets** at **35%**. The significant interaction with scrap dealers suggests that strengthening these connections could enhance the livelihoods of waste pickers while promoting better waste management practices.

### Sorting Practices Before Selling

Most respondents, **51.1%** reported sorting SUP bottles before selling them, while **41.1%** did not engage in this practice. This indicates a varying level of awareness and potential for improving sorting practices to increase the value of the bottles collected.

### Daily Collection Volumes

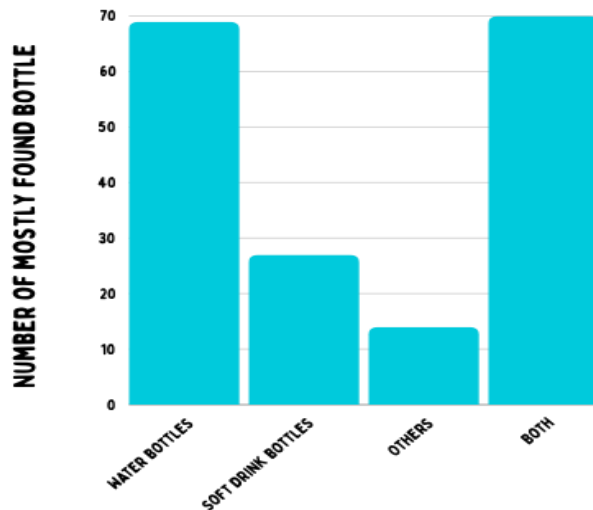
Regarding daily collection volumes, **28.3%** reported picking up over **100** bottles, while **30%** collected **25-50** bottles, and **15%** gathered between **1-25** bottles. The capacity to collect large volumes indicates the active role waste pickers play in managing urban waste.

### NUMBER OF SUP BOTTLE PICKUP



Range	1-25	25-50	50-75	75-100	100+
Number	27	54	16	32	51

### TYPE OF MOSTLY FOUND BOTTLE



### Types of Bottles Collected

When identifying the types of bottles predominantly found, **57.7%** reported water bottles as the most common, with **22.5%** noting soft drink bottles and **58.3%** mentioning both. This preference for water bottles highlights the high demand for bottled water in urban settings, contributing significantly to the plastic waste problem.

## Awareness of Environmental Impact

On environmental awareness, **3.4%** acknowledged that SUP bottles are harmful to the environment, while **96.6%** did not express this understanding. This split illustrates a crucial opportunity for educational interventions aimed at increasing awareness of the environmental consequences of plastic waste.

### AWARENESS ABOUT HARM TO ENVIRONMENT



**YES: 3.4%**



**NO: 96.6%**

## Perceptions of Changes in SUP Waste

When asked about changes in SUP waste over the years, **46.7%** noted an increase, while **53.3%** observed no significant changes. This disparity in perception emphasizes the need for comprehensive data and community engagement to inform waste pickers about trends in plastic pollution.

The findings from this survey provide critical insights into the lives and practices of waste pickers in Dhaka. The predominance of younger, male pickers with low educational attainment reflects the socio-economic challenges they face. The high frequency of bottle collection and selling, combined with a significant reliance on informal markets, underscores the economic necessity behind their activities. Moreover, the levels of environmental awareness among waste pickers suggest a pressing need for educational initiatives to improve understanding of the environmental impacts associated with plastic waste. By addressing these challenges and enhancing awareness, strategies can be developed to improve the livelihoods of waste pickers while contributing to broader environmental sustainability goals in urban settings.



# Environmental Impacts of Single-Use Plastic Bottles

Globally, more than **60 million water bottles** are discarded every day, and a single plastic bottle can take up to **700 years to biodegrade**. These bottles contribute to landfill congestion, occupying valuable space meant for non-recyclable waste. Plastic waste has harmful effects on the ecosystem, releasing toxins into the air and water during degradation, which can be detrimental to humans, plants, and animals. To address these issues, efforts are being made to develop recycling processes that convert plastic bottles into useful products, such as clothing, furniture, fences, and new plastic bottles, bags, and containers<sup>2</sup>.

The widespread use and improper disposal of single-use plastics have significant negative effects on the environment.

## Pollution of Waterways and Oceans

Each year, up to **13 million metric tons** of plastic largely made up of single-use plastic bottles enter the oceans, making plastics **account for 80% of marine debris**. The Great Pacific Garbage Patch contains over **87,000 tons of plastic waste**. Plastic debris can be found not only on the ocean surface but also on the seabed and along coastlines worldwide, with even microplastics detected in Arctic Sea ice<sup>20</sup>. There will be 1 lb. of plastic in the oceans for every 3 lbs. of fish by 2025<sup>21</sup>.



**80% of marine debris is plastic, mostly made up of plastic bottles**



## Harm to Wildlife and Marine Ecosystems

More than **260 species**, including invertebrates, turtles, fish, seabirds, and mammals, are affected by plastic waste through ingestion or entanglement. Additionally, plastic debris can damage coral reefs and facilitate the spread of invasive species. Toxins from plastics accumulate in the food chain, impacting larger predators like tuna and swordfish.



Source: Natural Resources Defense Council (NRDC)

## Land and Soil Pollution



Plastic bottle waste

is a significant part of terrestrial litter, affecting landscapes, roadways, and public spaces. Agricultural soils can become contaminated with microplastics from sewage sludge used as fertilizer. Toxic chemicals from plastic waste can leach into the soil, furthering contamination.



## Exacerbating Climate Change

Ninety-nine percent of plastics are derived from fossil fuels, and plastic production and transportation **account for 6% of global oil consumption**. Burning plastic waste emits carbon emissions, contributing to climate change, while the slow decomposition of plastics releases methane, another potent greenhouse gas<sup>3</sup>.

## Depleting Natural Resources

The energy needed to produce bottled water can be up to **2,000 times higher** than that required for tap water. Producing just one liter of bottled water in PET plastic consumes three liters of water, resulting in a considerable waste of natural resources and contributing to climate change<sup>4</sup>. The production of single-use plastics relies on finite resources such as petroleum, natural gas, and other fossil fuels. Moreover, the processes of recovering and recycling plastic consume considerable amounts of water, energy, and other resources.

## Accumulation in Landfills

A large share of plastic waste ends up in landfills or open dumps. In 2016, approximately **242 million tons of plastic** waste were produced worldwide. It can take up to **1,000 years** for plastic to decompose in landfills, during which it may leach toxic chemicals into the soil and groundwater<sup>3</sup>.

## Environmental Impacts in the Context of Bangladesh

In Bangladesh, the amount of plastic used per person in cities has increased from **3.0 kg in 2005 to 9.0 kg in 2020**. In Dhaka, the usage is three times higher than the national average. This increase in plastic is causing serious problems for the environment, affecting soil and water quality. Poor waste management and excessive use of plastic is making the situation worse. The Bay of Bengal has been documented to have various types of plastic debris in its coastal and ocean waters. This plastic pollution poses toxic risks to marine animals, affecting their health and disrupting marine ecosystems.

Microplastics from single-use plastic bottles have also entered surface waters. In the surface waters of the **Bay of Bengal**, the abundance of MP ranges from **500 to 20,000 pieces** per kilometer, with even higher levels of over **100,000 items** per kilometer near **Nicobar Island**. Recent studies have found **443 microplastic** items in the intestines of **marine fish** in the Bay, indicating that microplastics in fish could pose a public health risk. In shrimp from the same area, researchers documented **3.40 to 3.87 microplastic items per gram** in their **gastrointestinal tracts**, with black fibers and filaments being the most common types. If these shrimps are consumed without removing their intestines, microplastics could be transferred to humans<sup>22</sup>.

In coastal areas like Cox's Bazar, tourists often discard single-use plastic items on the beaches, which eventually end up in the sea. A 2020 survey by Waste Concern found that 37% of the plastic waste on Laboni Beach was recyclable, with 52% of it made from LDPE. At Inani Beach, 41% of discarded plastics were recyclable, and 70% of those were also LDPE. Additionally, rainfall causes plastic waste from landfills in Bangladesh to wash into canals and rivers in nearby urban areas. This waste clogs canals and sewage systems. In Dhaka, 22 out of 65 canals have become dumping zones largely due to plastic pollution<sup>23</sup>.

In a year, urban areas produce about 821,250 tons of plastic waste, with 207,685 tons ending up in the marine environment. While **36%** of the plastic waste was **recycled** in noncommercial sectors, **39%** was **sent to landfills**, and **25%** of that waste eventually **leaked into the environment** and **reached waterways**. This situation raises concerns about the significant loss of soil organic matter in Bangladesh, especially regarding the impact of microplastics on soil and terrestrial ecosystems<sup>5</sup>.



<sup>22</sup> Rahman, M. (2024). *The single-use plastic waste problem in Bangladesh: Finding sustainable alternatives in local and global context*.

<sup>23</sup> Centre for Policy Dialogue (CPD). (2023). *Plastic pollution in Bangladesh: Drivers, impacts, and solutions*.

# Health Impacts of Single-Use Plastic Bottles

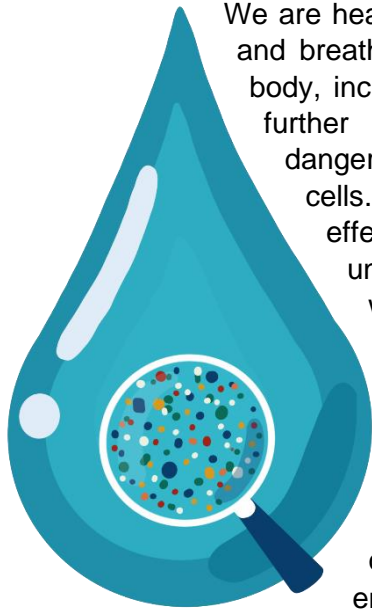


Plastic is defined as any synthetic or semi-synthetic polymer with thermo-plastic or thermo-set properties, which can be produced from hydrocarbons or biomass raw materials<sup>24</sup>. Since entering the consumer market, plastic production has experienced exponential growth, increasing from one million tons in 1945 to over 300 million tons by 2014. While plastic can break into progressively smaller particles through photo-oxidative processes, its molecular structure undergoes minimal change during this breakdown. Plastics fragment into microplastics and nanoplastics, yet they remain plastics—just smaller in size—making them easier to ingest and potentially able to cross the gastrointestinal tract, spreading throughout an organism. According to experts, nanoplastics are so tiny—about 1,000 times smaller than the average width of a human hair—that they can pass through tissues in the digestive tract or lungs and enter the bloodstream, potentially distributing harmful synthetic chemicals throughout the body and into cells. A study found that one liter of water, equivalent to two standard-sized bottled waters, contained an average of 240,000 plastic particles from seven different types of plastic, with 90% of them identified as nanoplastics and the remainder as microplastics<sup>25</sup>.

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<sup>24</sup> United Nations Environment Programme (UNEP). (2017). *Research on plastic pollution*.

<sup>25</sup> LaMotte, S. (2024, January 8). *Nanoplastics found in bottled water, study reveals*. CNN.



We are heavily exposed to microplastics and nanoplastics through drinking, eating, and breathing. Scientists have found tiny plastic particles throughout the human body, including in the heart, bloodstream, lungs, placenta, brain, and more, with further research raising concerns. In wildlife, nanoplastics are especially dangerous, as they can travel from the bloodstream to the brain, organs, and cells. Children and pregnant individuals are particularly vulnerable to these effects. The full impact of microplastics and nanoplastics on health is still unclear. Plastics contain over 16,000 chemicals, none classified as safe, with at least 25% considered hazardous. Harmful substances like phthalates, PFAS, bisphenols, asbestos, and toxic heavy metals are common, and microplastics can absorb environmental toxins that then contaminate living organisms and ecosystems. Most plastic water bottles are made from PET plastic, which can leach chemicals like antimony, lead, and BPA into the liquid. This risk increases if the bottles are reused, exposed to heat or sunlight, or recycled. Single-use plastic bottles also contain PFAS, a chemical group dangerous to both human and environmental health<sup>26</sup>.

Research by Orb Media found that 93% of the 11 bottled water brands tested contained traces of microplastics. The study included well-known brands like Aquafina and Evian, with Nestlé Pure Life showing some of the highest contamination levels. The findings also revealed that bottled water had approximately 50% more microplastics than tap water<sup>27</sup>. Out of the mentioned brands, Aqua and Aquafina are available in Bangladesh.



Source: Clean Water Action, 2020

<sup>26</sup> Plastic Pollution Coalition. (2024, January 10). *Study finds hundreds of thousands of plastic particles in bottled water.*

<sup>27</sup> Clean Water Action. (2020, July 29). *Bottled water: The human health consequences of drinking plastic.*

## Is Your Plastic Safe?

What to look for on the bottle

### SAFE

Plastics marked number 1, 2, 4, or 5.








### AVOID



Plastics marked number 7 are usually polycarbonate, but may be other types of nonrecyclable plastic. Check the packaging, or call the manufacturer to see if a bottle is made of polycarbonate plastic.



Plastics marked #3 are PVC plastic, a dangerous chemical sometimes used in plastic squeeze bottles and peanut butter jars.



Plastics marked #6 are made with polystyrene, a chemical used in Styrofoam food trays that can damage the brain and nervous system.

Source: Institute for Agriculture and Trade Policy, "Smart Plastics Guide," available at [www.iatp.org](http://www.iatp.org).

Source: Natural Resources Defense Council, 2008.

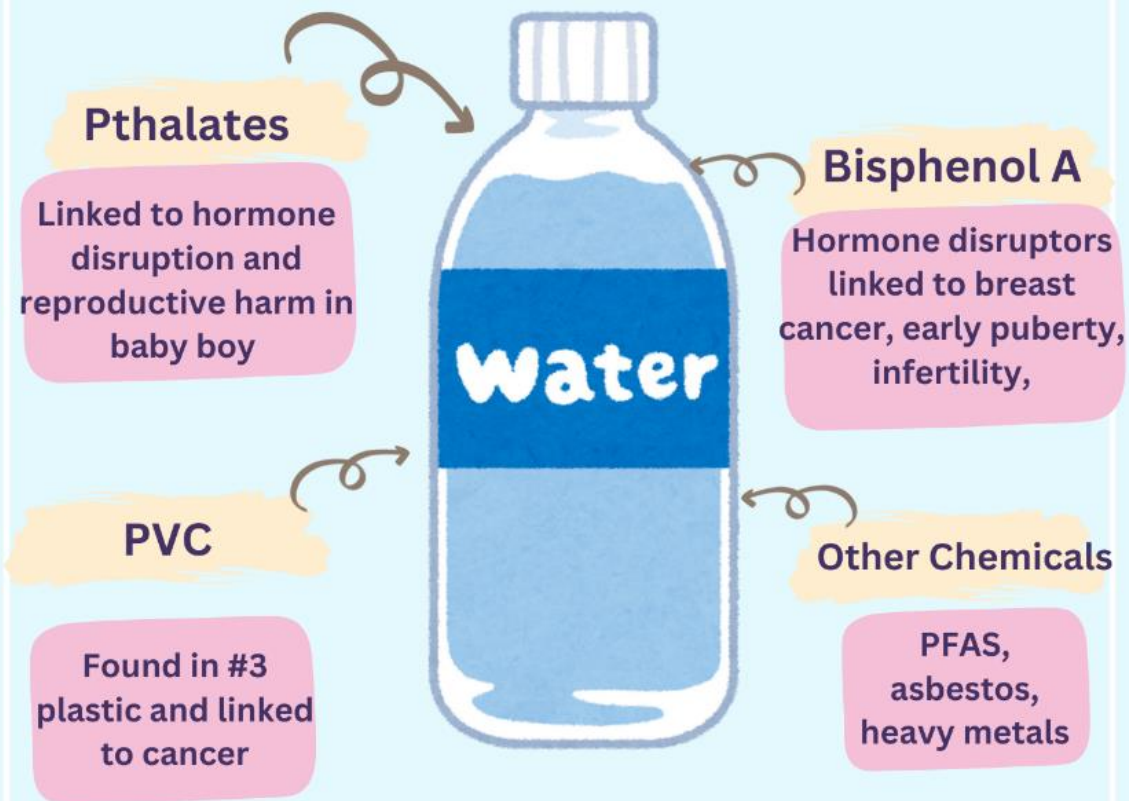
Bacteria growth is a major concern, potentially even more serious than chemical leaching. Reusing single-use plastic bottles can lead to harmful bacteria developing within just one day, especially if the bottle is opened, used, and then left unattended. While single-use bottles pose the highest risk, damaged or poorly cleaned reusable bottles can also harbor bacteria.

The plastic materials used to make water bottles contain chemicals that may disrupt the endocrine system, such as bisphenol A and phthalates. Bisphenol A is used in the production of various plastic products like bottles, toys, containers, and medical/dental items, while phthalates are used to make plastics more flexible. These chemicals can leach into the water we drink, especially when the bottles are exposed to extreme temperatures or when water has been stored in them for extended periods. Bisphenol A and phthalates have been detected in drinking water worldwide<sup>28</sup>.



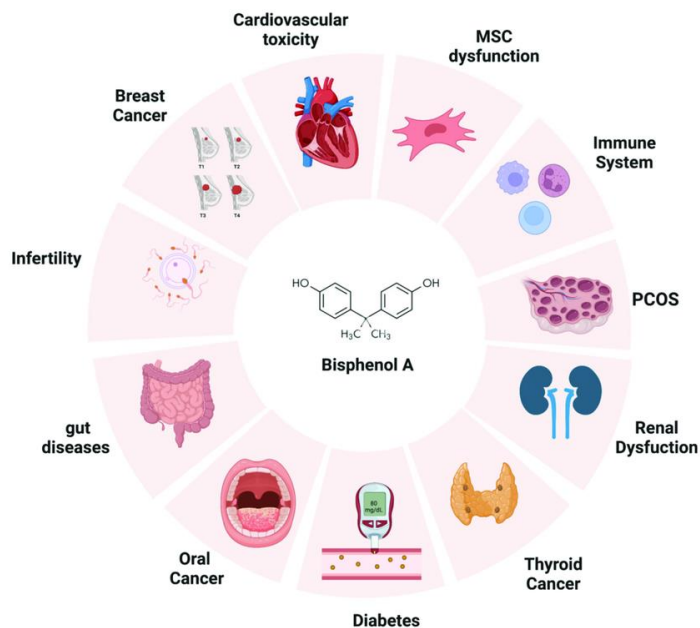
<sup>28</sup> Frontiers for Young Minds. (2021). *Plastic pollution: How does it affect the environment?*

# TOXIC CHEMICALS PLASTIC

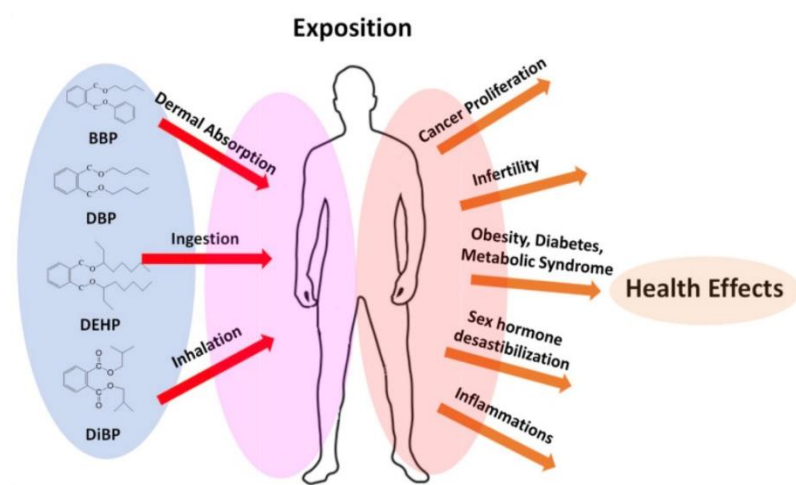


## Bisphenol A

BPA is a hormone-disrupting chemical that, in animal studies, has been linked to reproductive issues such as reduced sperm counts, hormonal imbalances, enlarged prostate glands, chromosomal abnormalities in eggs, and pre-cancerous changes in the breast and prostate. It has also been associated with obesity and insulin resistance, a condition often preceding diabetes. Research shows that over 93% of the general population carries traces of BPA in their bodies<sup>29</sup>.



## Phthalates



- Antimony, a compound used in the production of PET (Polyethylene terephthalate) plastic (which is BPA-free), is a suspected carcinogen that may be toxic in high doses. Phthalates, which are endocrine disruptors, can interfere with hormone function, particularly estrogen, though their effects are still debated. This trio of harmful chemicals commonly found in plastic bottles can leach into your water under certain conditions<sup>30</sup>.

- Studies have shown that low molecular weight phthalates, like DEP, can cause acute irritation to the skin, eyes, and mucous membranes. Phthalates affect humans from gene expression to physiological changes. High molecular weight phthalates have been linked to altered gene methylation, affecting androgen and estrogen responses, protein secretion, and spermatogenesis. Epidemiological studies indicate a strong association between phthalate exposure and adverse reproductive outcomes in both men and women, as well as conditions like type II diabetes, insulin resistance, obesity, allergies, and asthma<sup>31</sup>.

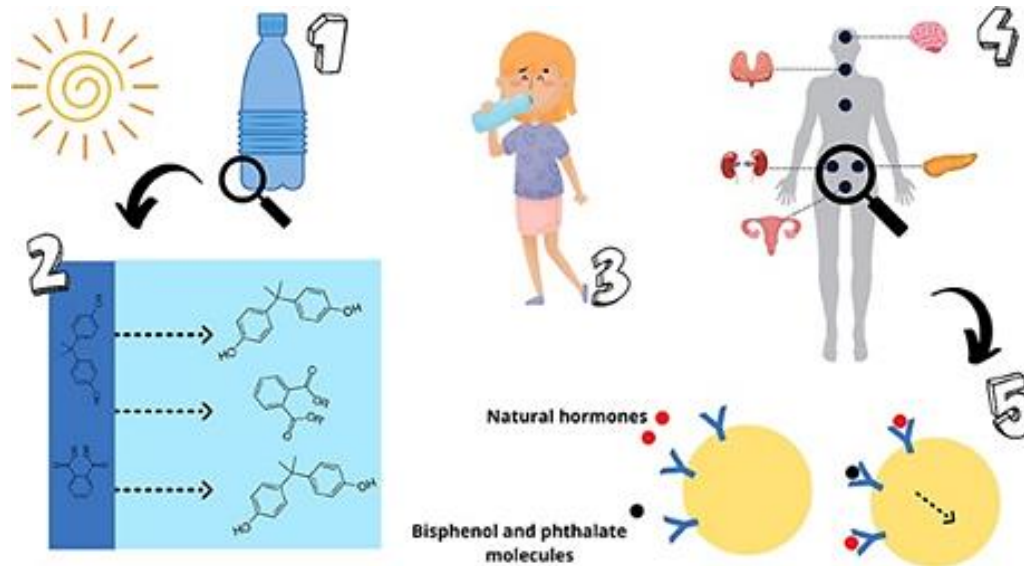
<sup>29</sup> Natural Resources Defense Council (NRDC). (n.d.). *Bisphenol A (BPA): Toxic effects on human health and the environment*.

<sup>30</sup> Clearly Filtered. (n.d.). *The known health risks of plastic water bottles*.

<sup>31</sup> Pivnenko, K., et al. (2020). *Microplastics and their potential health effects*. *Environmental Science and Pollution Research*, 27(23), 28549-28565



- Epidemiological studies on the toxicity of phthalates in children have primarily focused on pregnancy outcomes, genital development, semen quality, early puberty, thyroid function, respiratory issues, and neurodevelopment.



Source: Schirinzi et al., 2021

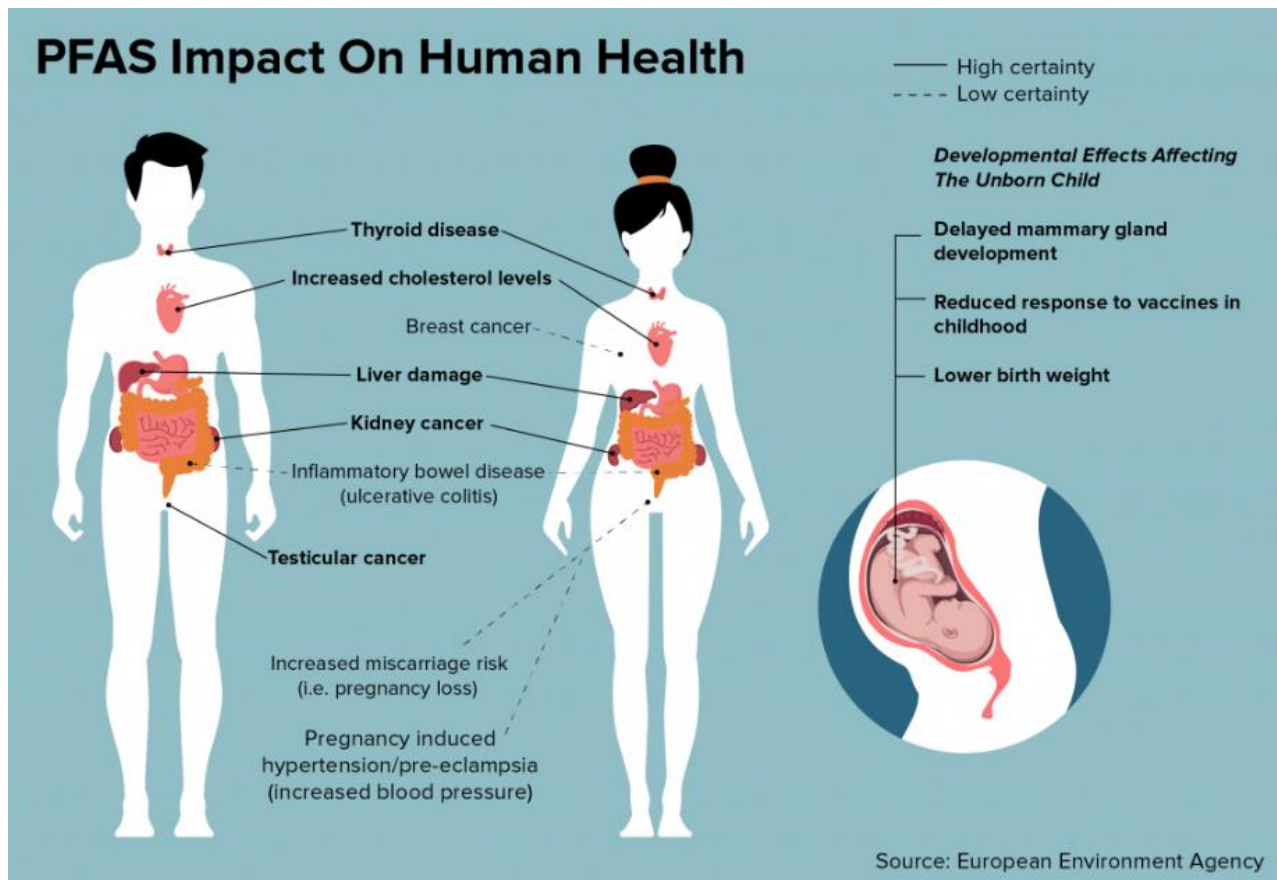
## PVC (Polyvinyl chloride)

PVC is naturally rigid and performs poorly when exposed to heat or light. To overcome these limitations, toxic additives such as plasticizers are often added to make it more flexible. However, plasticizers can interfere with the body's signaling system, negatively impact reproductive health, and contribute to asthma and developmental issues<sup>32</sup>.

## PFAS (Perfluoroalkyl and polyfluoroalkyl)

PFAS, particularly PFOS, has been linked to reduced fertility, impaired fetal development, and disrupted thyroid hormone function. PFOS has been shown to interfere with hormone signaling pathways, raising concerns about its effects on reproductive health and other hormone-regulated processes. Additionally, PFOS exposure may suppress the immune system, increasing susceptibility to infections and immune-related disorders.

<sup>32</sup> EcoCenter. (n.d.). *Poison plastic: The toxic life cycle of PVC.*



## Overall health impact of Single-Use Plastic Bottles

The consumption of bottled water and soft drinks in single-use plastic (SUP) bottles poses significant health risks due to the potential leaching of toxic chemicals, as well as broader occupational health concerns within the manufacturing sector. These health risks affect both consumers and the workers involved in the production of plastic bottles.

### Chemical Leaching in Bottled Water and Soft Drinks

The plastic materials used for manufacturing SUP bottles, predominantly PET (Polyethylene Terephthalate), can leach harmful chemicals into beverages, particularly under certain conditions such as heat exposure, prolonged storage, or reuse of the bottles. Chemicals like **antimony**, **Bisphenol A (BPA)**, **phthalates**, and **PFAS** (Per- and Polyfluoroalkyl substances) are known to disrupt endocrine function and pose carcinogenic risks. These chemicals can migrate into the beverages consumed, with research showing that bottled water contains up to 50% more microplastics and associated contaminants compared to tap water<sup>33</sup>.

<sup>33</sup> Orb Media (2018). Microplastic Contamination in Bottled Water.

## Occupational Health Risks for Industry Workers

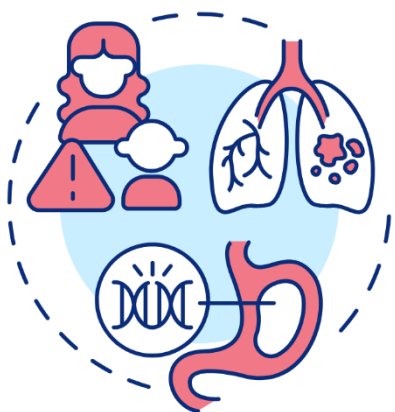
The production of SUP bottles exposes workers to hazardous chemicals and fine particulate matter. **Phthalates, vinyl chloride**, and other volatile organic compounds used in the manufacturing process have been associated with respiratory diseases, hormonal imbalances, and increased risks of cancer. Globally, the plastic bottle production industry employs approximately 1.5 million workers, many of whom operate in poorly regulated environments, particularly in developing countries like Bangladesh. However, there is no available data about the workers associated with the plastic bottle industry in Bangladesh, showing their negligence about them. These workers are disproportionately exposed to high concentrations of industrial chemicals and are at heightened risk for occupational diseases<sup>34</sup>.



## Broader Public Health Implications

Beyond direct exposure through consumption, the environmental persistence of SUP bottle waste contributes to the microplastic contamination of food chains and water systems. The ingestion of microplastics has been linked to inflammatory responses, gastrointestinal damage, and systemic toxicity, affecting vulnerable populations like children and pregnant individuals more severely<sup>35</sup>.

Efforts to address the health impacts of bottled water and soft drinks must include stricter regulation of chemical use in plastic production, improved occupational safety standards for workers, and public awareness campaigns to promote safer alternatives.



## Conclusion

The findings of this report reveal the immense environmental and health challenges posed by single-use plastic (SUP) bottles, particularly in a country like Bangladesh, where rapid urbanization, inadequate waste management, and limited awareness exacerbate the problem. SUP bottles, with their pervasive use and low recycling rates, have left a lasting imprint on ecosystems, public health, and the socio-economic landscape. Addressing this issue requires immediate and comprehensive action to mitigate the damage caused by these persistent pollutants.

Environmentally, SUP bottles contribute significantly to the degradation of marine and terrestrial ecosystems. Their persistence in the environment, spanning centuries, leads to the accumulation

<sup>34</sup> International Labor Organization (2023). Occupational Hazards in Plastic Manufacturing.

<sup>35</sup> World Health Organization (2022). Health Risks of Microplastics in Drinking Water.

of microplastics that infiltrate food chains, contaminate water bodies, and degrade soil quality. The Bay of Bengal's documented microplastic levels highlight the alarming extent of marine pollution, while clogged urban drainage systems illustrate the detrimental impact on cities like Dhaka. The environmental burden of SUP bottles is further compounded by their contribution to climate change, as their production and improper disposal release significant greenhouse gases.

The health implications of SUP bottles are equally concerning. Hazardous chemicals such as BPA, PFAS, and phthalates leach into beverages, especially when bottles are reused or exposed to heat. These substances have been linked to severe health risks, including endocrine disruption, organ toxicity, and carcinogenic effects. Furthermore, microplastics originating from these bottles have been detected in marine organisms and human tissues, raising critical concerns about their long-term impact on both wildlife and public health.

The socio-economic dynamics surrounding SUP bottles underscore the complexity of addressing this issue. Consumers in urban areas, despite higher awareness of health risks, remain reliant on SUP bottles for convenience. Retailers play a central role in the distribution of these products, yet their awareness of environmental impacts varies significantly between urban and rural areas. Waste pickers, who form a crucial part of the informal recycling economy, are economically dependent on collecting SUP bottles but lack the necessary education and infrastructure to maximize their contribution to sustainable waste management.

## Recommendations

To mitigate the adverse environmental, health, and socio-economic impacts of single-use plastic bottles, the following actions are recommended:

### **Transition to Environmentally Safe, Sustainable, and Affordable Alternatives:**

Considering the significant health and environmental impacts, it is essential to shift away from single-use plastic bottles toward eco-friendly and cost-effective alternatives such as glass, metal, or biodegradable materials.

### **Promote Reusable Bottles:**

Encourage the adoption of reusable bottles among consumers, supported by incentives, awareness campaigns, and easy access to affordable reusable options.

### **Reduce Production and Consumption of SUP Bottles:**

Implement targeted measures to reduce the production and consumption of SUP bottles, including stricter monitoring of manufacturing processes and public campaigns to reduce dependency.

### **Establish Comprehensive Policy and Regulatory Guidelines:**

Develop and enforce robust policies to phase out SUP bottles gradually. A comprehensive regulatory framework should include clear targets for reduction, guidelines for sustainable alternatives, and mechanisms for monitoring compliance.

### **Promote Alternatives and Support Production Transition:**

Provide incentives for manufacturers to shift from SUP bottle production to environmentally friendly alternatives, facilitating technological and financial support for the transition.

### Regulate Recycling Facilities:

Introduce strict recycling guidelines for existing plastic bottle recycling facilities to control and minimize environmental and health impacts. This includes ensuring safe working conditions for recycling industry workers and adopting best practices for waste management.

### Prevent and Ban Chemical Recycling and Hazardous Plastic Waste Trade:

Ban chemical recycling, which releases toxic emissions and exacerbates environmental harm. Additionally, enforce a strict ban on the import and export of hazardous plastic waste to align with global environmental standards.

Ensure full compliance with the **Basel Convention** on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal to prevent the illegal dumping of plastic waste in Bangladesh.

### Enhance Recycling Systems:

Improve the efficiency of recycling infrastructure by integrating informal waste pickers into formal systems, providing education, safety training, and economic incentives to optimize collection and recycling processes.



### **Public Awareness and Behavioral Change:**

Conduct targeted awareness campaigns to educate consumers, retailers, and waste workers about the harmful impacts of SUP bottles and the benefits of sustainable alternatives. These campaigns should address both urban and rural populations with tailored messaging.

By implementing these recommendations, Bangladesh can take significant steps toward reducing the adverse impacts of single-use plastic bottles, fostering a transition to sustainable alternatives, and protecting public health and the environment. This collective effort will not only improve environmental integrity but also contribute to socio-economic equity, paving the way for a cleaner, healthier, and more sustainable future.

In conclusion, the pervasive issue of single-use plastic bottles demands urgent and coordinated efforts at all levels. Addressing this crisis presents an opportunity for Bangladesh to lead in innovative and sustainable waste management practices. By fostering collaboration among governments, businesses, civil society, and communities, the nation can pave the way for a future that prioritizes environmental integrity, public health, and socio-economic equity. Through collective action, it is possible to combat the far-reaching impacts of SUP bottles and create a cleaner, healthier, and more sustainable world.



# Annexure

## Pictorials











# Survey Questionnaires

## Survey Questionnaires for Consumers The Ban on Single-Use Plastic Bottles in Bangladesh: A Step Toward Environmental and Economic Sustainability

This survey is conducted by the Environmental and Social Development Organization - ESDO. It aims to analyze the consumption of single-use plastic bottles in Bangladesh, examining the extent of their use to provide insights into the total amount of plastic waste generated in the country. Your response will be strictly confidential.

(এই জরিপটি পরিবেশবান্ধবতা এবং সামাজিক উন্নয়ন সংক্রমে পরিবেশবান্ধবতা - এসডো দ্বারা পরিচালিত হচ্ছে। এর উদ্দেশ্য হচ্ছে বাংলাদেশে একক ব্যবহারযোগ্য প্লাস্টিক বোতলের ব্যবহার বিশ্লেষণ, যা ব্যবহারের মাত্রা পরিমাপ করে, দেশের মোট প্লাস্টিক বর্জ্যের পরিমাণ সম্পর্কে ধারণা প্রদান করা। এখানে আপনার মতামতের গোপনীয়তা সম্পূর্ণরূপে রক্ষা করা হবে।)

**Single-Use Plastic Bottles:** Single-use plastics (SUP) such as plastic bottles are bottles that are generally used once and then disposed of.

(একক ব্যবহারযোগ্য প্লাস্টিক বোতল: একক ব্যবহারযোগ্য বোতল হল সেসব বোতল যা একবার ব্যবহারের পর ফেলে দেওয়া হয়।)

### Respondent Profile:

- Name of Respondent (উত্তরদাতার নাম):
- Age (Years) বয়স (বছর):  
 5-10 (৫-১০)  11-20 (১১-২০)  21-35 (২১-৩৫)  36-50 (৩৬-৫০)  50+ (৫০+)
- Gender (লিঙ্গ):  
 Male (পুরুষ)  Female (মহিলা)  Other (অন্যান্য)
- Education level (শিক্ষার স্তর):  
 Uneducated (শিক্ষিত শিক্ষা নেই)  Primary (প্রাথমিক)  Secondary (মাধ্যমিক)  
 Graduation (স্নাতক)  Post-graduation (স্নাতকোত্তর)
- Profession (পেশা):  
 Student (ছাত্র/ছাত্রী)  Government (সরকারি)  Private (ব্যক্তিগত)  Unemployed (বেকর)  
 Businessman (ব্যবসায়ী)  Housewife (ঘরোয়া)
- Where do you live in? (আপনি কোথায় বাস করেন?):  
 Urban (শহরকেন্দ্র)  Rural (গ্রাম)  Suburb (মহকলা)

### Single-use Plastic Consumption:

- Do you know which plastic bottles are known as single-use plastic (SUP) bottles? (আপনি কি জানেন কোন প্লাস্টিক বোতলগুলো একক ব্যবহারযোগ্য বোতল হিসেবে পরিচিত?)  
 Yes (হ্যাঁ)  No (না)
- Do you buy soft drinks/soda/ water / any product contained in single-use plastic (SUP) bottles? (আপনি কি টাঙ্গা কেমস পানীয়/ সোডা /একক ব্যবহারযোগ্য প্লাস্টিক (SUP) বোতলে তৈরি কোনো পণ্য কিনেন?)  
 Yes (হ্যাঁ)  No (না)

### (If yes) (হ্যাঁ হলে)

- Mostly what do you consume in single-use plastic (SUP) bottles? (আপনি সাধারণত একক ব্যবহারযোগ্য প্লাস্টিক বোতলে কোন ধরনের পণ্য ব্যবহার করেন?)  
 Water (পানি)  Soft drinks (কেমস পানীয়)  Other (Specify) (অন্যান্য): .....
- How frequently do you purchase single-use plastic (SUP) bottles? (আপনি কতটা ঘন ঘন একক ব্যবহারযোগ্য প্লাস্টিক বোতল কিনে থাকেন?)  
 Daily (দৈনিক)  Weekly (সাপ্তাহিক)  Monthly (মাসিক)
- How many single-use plastic (SUP) bottles do you consume in a week? (আপনি এক সপ্তাহে কতটা একক ব্যবহারযোগ্য প্লাস্টিক বোতল ব্যবহার করেন?)  
 1-3 (১-৩)  4-6 (৪-৬)  7-9 (৭-৯)  10-15 (১০-১৫)  
 Other(specify) (অন্যান্য): .....
- Which size of bottles do you buy most? (আপনি কোন মাপের বোতলসমূহ পণ্য সবচেয়ে বেশি কিনে থাকেন?)  
 250 ml (২৫০ মিলি.)  500 ml (৫০০ মিলি.)  1 liter (১ লিটার)  
 2 liters (২ লিটার)  5 liters (৫ লিটার)
- Where do you usually purchase single-use plastic (SUP) bottles? (আপনি সাধারণত একক ব্যবহারযোগ্য প্লাস্টিক বোতল কোথাকোথাক কিনে থাকেন?)  
 Local Convenience store (স্থানীয় কেমস)  Shopping mall (শপিং মল)  Supershops (সুপারশপ)  
 Restaurant (রেস্তোরাঁ)  Other (Specify) (অন্যান্য): .....
- How do you typically dispose of single-use plastic (SUP) bottles? (আপনি সাধারণত একক ব্যবহারযোগ্য প্লাস্টিক (SUP) বোতল কীভাবে নিষ্কাশন করেন?)  
 Reuse (দুবার ব্যবহার করা)  Discard (ফেলে দেওয়া)  
 Recycle (রিসাইক্লিং)  Other (Specify) (অন্যান্য): .....
- Do you consider alternatives to single-use plastic (SUP) bottles? (আপনি কি একক ব্যবহারযোগ্য প্লাস্টিক বোতলের বিকল্প পণ্য ব্যবহার করেন?)  
 Yes (হ্যাঁ)  No (না)
- Do you know that single-use plastic (SUP) bottles are harmful to health? (আপনি কি জানেন একক ব্যবহারযোগ্য প্লাস্টিক বোতল স্বাস্থ্যের জন্য ক্ষতিকারক?)  
 Yes (হ্যাঁ)  No (না)
- Do you know that single-use plastic (SUP) bottles are harmful to the environment? (আপনি কি জানেন একক ব্যবহারযোগ্য প্লাস্টিক বোতল পরিবেশের জন্য ক্ষতিকারক?)  
 Yes (হ্যাঁ)  No (না)

## Survey Questionnaires for Retailers The Ban on Single-Use Plastic Bottles in Bangladesh: A Step Toward Environmental and Economic Sustainability

This survey is conducted by the Environmental and Social Development Organization - ESDO. It aims to analyze the consumption of single-use plastic bottles in Bangladesh, examining the extent of their use to provide insights into the total amount of plastic waste generated in the country. Your response will be strictly confidential.

(এই জরিপটি পরিবেশবান্ধবতা এবং সামাজিক উন্নয়ন সংক্রমে পরিবেশবান্ধবতা - এসডো দ্বারা পরিচালিত হচ্ছে। এর উদ্দেশ্য হচ্ছে বাংলাদেশে একক ব্যবহারযোগ্য প্লাস্টিক বোতলের ব্যবহার বিশ্লেষণ, যা ব্যবহারের মাত্রা পরিমাপ করে, দেশের মোট প্লাস্টিক বর্জ্যের পরিমাণ সম্পর্কে ধারণা প্রদান করা। এখানে আপনার মতামতের গোপনীয়তা সম্পূর্ণরূপে রক্ষা করা হবে।)

**Single-Use Plastic Bottles:** Single-use plastics (SUP) such as plastic bottles are bottles that are generally used once and then disposed of.

(একক ব্যবহারযোগ্য প্লাস্টিক বোতল: একক ব্যবহারযোগ্য বোতল হল সেসব বোতল যা একবার ব্যবহারের পর ফেলে দেওয়া হয়।)

### Respondent Profile:

- Name of Respondent (উত্তরদাতার নাম):
- Age (Years) বয়স (বছর):  
 5-10 (৫-১০)  11-20 (১১-২০)  21-35 (২১-৩৫)  36-50 (৩৬-৫০)  50+ (৫০+)
- Gender (লিঙ্গ):  
 Male (পুরুষ)  Female (মহিলা)  Other (অন্যান্য)
- Education level (শিক্ষার স্তর):  
 Uneducated (শিক্ষিত শিক্ষা নেই)  Primary (প্রাথমিক)  Secondary (মাধ্যমিক)  
 Graduation (স্নাতক)  Post-graduation (স্নাতকোত্তর)
- Profession (পেশা):  
 Student (ছাত্র/ছাত্রী)  Government (সরকারি)  Private (ব্যক্তিগত)  Unemployed (বেকর)  
 Businessman (ব্যবসায়ী)  Housewife (ঘরোয়া)
- Where do you live in? (আপনি কোথায় বাস করেন?):  
 Urban (শহরকেন্দ্র)  Rural (গ্রাম)  Suburb (মহকলা)

### Single-use Plastic Retail:

- Do you know which plastic bottles are known as single-use plastic (SUP) bottles? (আপনি কি জানেন কোন প্লাস্টিক বোতলগুলো একক ব্যবহারযোগ্য বোতল হিসেবে পরিচিত?)  
 Yes (হ্যাঁ)  No (না)

- How many single-use plastic (SUP) water bottles are sold daily? (আপনি প্রতিদিন কতগুলো একক ব্যবহারযোগ্য প্লাস্টিকের বোতলসমূহ পানি বিক্রি করেন?)  
 10-20 (১০-২০টি)  21-30 (২১-৩০টি)  31-40 (৩১-৪০টি)  41-50 (৪১-৫০টি)  
 51-60 (৫১-৬০টি)  Other(Specify) (অন্যান্য): .....
- Which type of single-use plastic (SUP) bottles are mostly used? (সাধারণত একক ব্যবহারযোগ্য প্লাস্টিক বোতল কোন ধরনের পণ্য বেশি বিক্রি হয়?)  
 Water (পানি)  Soft drinks (কেমস পানীয়)  Other (Specify) (অন্যান্য): .....
- How many water bottles are sold daily compared to other soft drinks bottles? (অন্যান্য কেমস পানীয়ের বোতলের তুলনায় প্রতিদিন কতগুলো পানির বোতল বিক্রি হয়?)  
Please describe your answer (বিজ্ঞপিত লিখুন): .....
- Which size of water bottles are mostly sold? (কোন মাপের বোতলসমূহ পণ্য সবচেয়ে বেশি বিক্রি হয়ে থাকে?)  
 250 ml (২৫০ মিলি.)  500 ml (৫০০ মিলি.)  1 liter (১ লিটার)  
 2 liters (২ লিটার)  5 liters (৫ লিটার)
- Do you know that single-use plastic (SUP) bottles are harmful to the environment? (আপনি কি জানেন একক ব্যবহারযোগ্য প্লাস্টিক বোতল পরিবেশের জন্য ক্ষতিকারক?)  
 Yes (হ্যাঁ)  No (না)
- Do you know that single-use plastic (SUP) bottles are harmful to the health? (আপনি কি জানেন একক ব্যবহারযোগ্য প্লাস্টিক বোতল পরিবেশের জন্য ক্ষতিকারক?)  
 Yes (হ্যাঁ)  No (না)

**Survey Questionnaires for Waste Pickers**  
**The Ban on Single-Use Plastic Bottles in Bangladesh: A Step Toward Environmental and Economic Sustainability**

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(এই জরিপটি এনসোডরনমেন্ট এন্ড সোশ্যাল ডেভেলপমেন্ট অর্গানাইজেশন - এসডো দ্বারা পরিচালিত হচ্ছে। এর উদ্দেশ্য হচ্ছে বাংলাদেশে একবার ব্যবহারযোগ্য প্লাস্টিকের বোতলের ব্যবহার বিশ্লেষণ, তা ব্যবহারের মাত্রা পরিমাপ করে, দেশের মোট প্লাস্টিক বর্জ্যের পরিমাণ সম্পর্কে ধারণা প্রদান করা। এখানে আপনার মতামতের গোপনীয়তা সম্পূর্ণরূপে রক্ষা করা হবে।)

**Single-Use Plastic Bottles:** Single-use plastics (SUP) such as plastic bottles are bottles that are generally used once and then disposed of.

(**একবার ব্যবহারযোগ্য প্লাস্টিক বোতলঃ** একবার ব্যবহারযোগ্য বোতল হল সেসব বোতল যা একবার ব্যবহারের পর ফেলে দেওয়া হয়।)

**Respondent Profile:**

- Name of Respondent (উত্তরদাতার নাম):
- Age (Years) বয়স (বছর)
  - 5-10 (৫-১০)
  - 11-20 (১১-২০)
  - 21-35 (২১-৩৫)
  - 36-50 (৩৬-৫০)
  - 50+ (৫০+)
- Gender (সিল)
  - Male (পুরুষ)
  - Female (মহিলা)
  - Other (অন্যান্য)
- Education level (শিক্ষণত বোধ্যতা)
  - Uneducated (প্রাথমিকিক শিক্ষা নেই)
  - Primary (প্রাথমিক)
  - Secondary (মাধ্যমিক)
  - Graduation (স্নাতক)
  - Post-graduation (স্নাতকোত্তর)
- Profession (পেশা)
  - Student (ছাত্র/ছাত্রী)
  - Government (সরকারি)
  - Private (বেসরকারি)
  - Unemployed (বেকর)
  - Businessman (কর্মসারী)
  - Housewife (গৃহিণী)
- Where do you live in? (আপনি কোথায় বাস করেন?)
  - Urban (শহর/শহর)
  - Rural (গ্রাম)
  - Suburb (দেহল)

**Single-use Plastic Management:**

- From where do you collect most of the single-use plastic (SUP) bottles? (আপনি অধিকাংশ একবার ব্যবহারযোগ্য প্লাস্টিক বোতল কোথা থেকে সংগ্রহ করে থাকেন?)
  - Home (বাসা)
  - Office (অফিস)
  - Markets (বাজার)
  - School areas (স্কুল এলাকার আশেপাশে)
  - Other (Specify) (বিস্তারিত উল্লেখ করুন): .....

- What do you usually do with the single-use plastic (SUP) bottles? (আপনি সাধারণত একবার ব্যবহারযোগ্য প্লাস্টিক বোতলগুলির কী করেন)
  - Recycle (কিলাইকরণ)
  - Sell (বিক্রি)
  - Reuse (পুনরায় ব্যবহার)
  - Other (Specify) (অন্যান্য): .....

- How often do you sell single-use plastic (SUP) bottles? (আপনি কত ঘনতম একবার ব্যবহারযোগ্য প্লাস্টিক বোতল বিক্রি করে থাকেন?)
  - Daily (দৈনিক)
  - Weekly (সাপ্তাহিক)
  - Twice a week (সাপ্তাহে দু'বার)
  - Monthly (মাসিক)
  - Don't sell (বিক্রি করিনা)

- Where do you usually sell the single-use plastic (SUP) bottles you collect? (আপনি সাধারণত যে একবার ব্যবহারযোগ্য প্লাস্টিক বোতলগুলি সংগ্রহ করেন, সেগুলি কোথায় বিক্রি করেন?)
  - Recycling center (কিলাইকরণ কেন্দ্র/সেতা)
  - Scrap dealers (কাগজ/প্লাস্টিক ব্যবসারী)
  - Community markets (এলাকার বাজার)
  - Waste picker cooperatives (বর্জ্য সংগ্রহকারী সমন্বয়)
  - Local waste dealers (বর্জ্য ব্যবসারী)
  - Middle man (মধ্যস্থকারী)
  - Don't sell (বিক্রি করিনা)
  - Other (Specify) (অন্যান্য/বিস্তারিত উল্লেখ করুন): .....

- Do you sort the single-use plastic (SUP) bottles before selling them? (আপনি কি বিক্রি করার আগে একবার ব্যবহারযোগ্য প্লাস্টিক (SUP) বোতলগুলি পৃথক করেন?)
  - Yes (হ্যাঁ)
  - No (না)
  - Don't sell (বিক্রি করিনা)

- How many single-use plastic (SUP) bottles do you usually pick up daily? (আপনি সাধারণত দৈনিক কতগুলো একবার ব্যবহারযোগ্য প্লাস্টিক বোতল সংগ্রহ করে থাকেন?)
  - Around 1-25 (প্রায় ১-২৫ টি)
  - Around 25-50 (প্রায় ২৫-৫০ টি)
  - 50-75 (প্রায় ৫০-৭৫ টি)
  - 75-100 (প্রায় ৭৫-১০০ টি)
  - 100+ ( ৪০টির বেশি) Please specify (উল্লেখ করুন): .....

- Which type of bottles are being found mostly? (কোন ধরনের বোতলগুলি সবচেয়ে বেশি পাওয়া যায়?)
  - Water bottles (পানির বোতল)
  - Soft drink bottles (কোলা পানীয় বোতল)
  - Other (Specify) (বিস্তারিত উল্লেখ করুন): .....

- Do you know that single-use plastic (SUP) bottles are harmful to the environment? (আপনি কি জানেন একবার ব্যবহারযোগ্য প্লাস্টিক বোতল পরিবেশের জন্য ক্ষতিকারক?)
  - Yes (হ্যাঁ)
  - No (না)

- Have you noticed any changes in the amount of single-use plastic (SUP) waste over the years? (আপনি কি বিগত বছরগুলিতে একবার ব্যবহারযোগ্য প্লাস্টিক বর্জ্যের পরিমাণ কোনো পরিবর্তন লক্ষ্য করেছেন?)
  - Yes (হ্যাঁ)
  - No (না)

**Online Survey Form**

Link: <https://docs.google.com/forms/d/e/1FAIpQLScbYFqdI1rbf4PRqtPxXOHpYEQQkQDjzmTHT>

**Environmental Footprint of Single-Use Plastic Bottles: A Comprehensive Survey of Consumption, Retail, and Waste Management**

**B I U**

This survey is conducted by the Environmental and Social Development Organization - ESDO. It aims to analyze the consumption of single-use plastic bottles in Bangladesh, examining the extent of their use to provide insights into the total amount of plastic waste generated in the country. This survey will take 3-4 minutes, and your responses will be strictly confidential.

(এই জরিপটি এনসোডরনমেন্ট এন্ড সোশ্যাল ডেভেলপমেন্ট অর্গানাইজেশন - এসডো দ্বারা পরিচালিত হচ্ছে। এর উদ্দেশ্য হচ্ছে বাংলাদেশে একবার ব্যবহারযোগ্য প্লাস্টিকের বোতলের ব্যবহার বিশ্লেষণ, তা ব্যবহারের মাত্রা পরিমাপ করে, দেশের মোট প্লাস্টিক বর্জ্যের পরিমাণ সম্পর্কে ধারণা প্রদান করা। এই জরিপে ৩-৪ মিনিট সময় লাগবে এবং আপনার মতামতের গোপনীয়তা সম্পূর্ণরূপে রক্ষা করা হবে।)

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**Respondent Profile**

Description (optional)

[LcDJkvkwZ3jMA/viewform?usp=sf\\_link](https://docs.google.com/forms/d/e/1FAIpQLScbYFqdI1rbf4PRqtPxXOHpYEQQkQDjzmTHT)

# Planet or Plastic?

*Stop plastic pollution!*



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