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Plastic Use in Kathmandu's Departmental Stores: Environmental Impacts and Alternatives

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Abstract: Plastic is widely used in retail shops and departmental stores in Kathmandu for packing, carrying, and storing goods due to its low cost and durability. However, its excessive use poses a significant environmental threat, causing pollution, harming human health, and damaging ecosystems. The research aims to investigate insights from owners and customers regarding their current plastic usage, the challenges they face in minimising plastic waste, and the potential for adopting eco-friendly alternatives. This study employed a quantitative method, using data collected from department stores across the Kathmandu Valley. A total of 320 respondents, including 160 store employees and 160 customers, were chosen through stratified random sampling. The data were collected through face-to-face interviews and 44 structured questionnaires to examine plastic use, awareness, and alternatives. The findings highlighted the need to reduce reliance on plastics and to identify implementation options for society. The shopkeepers in Kathmandu recommend eco-friendly shopping practices and aim to enhance public awareness about the environmental impacts of plastic usage. The study notes that effective implementation of sustainable solutions requires cooperation among the government, the commercial sector, and NGOs. The shopkeepers proposed that imposing strict penalties on plastic manufacturers and retailers that contravene regulations could significantly reduce plastic waste. Lastly, the findings revealed that consumers are more likely to adopt sustainable practices when offered affordable, convenient, eco-friendly options. This study demonstrates that reducing plastic use in department stores is not only necessary but also feasible when appropriate measures are implemented. If the government, businesses, and NGOs implement regulations, provide alternatives, and raise awareness, this can help reduce plastic waste and make Kathmandu a cleaner and more sustainable city.

Keywords: *Plastics, Environmental, Departmental stores, Eco-Friendly, Public awareness*

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1. Introduction

The use of plastic has become integral to modern life, particularly in retail shops and department stores, where it is affordable and durable for packaging and transporting goods. Department stores contribute significantly to the overall plastic footprint, as they are key nodes in the supply chain and rely heavily on plastics for packaging and distributing a wide range of products (Awasthi et al., 2017). Because of this reliance, plastic waste generation has increased, placing a burden on waste management systems and exacerbating environmental degradation (Hong et al., 2023).

Plastic production increased exponentially from approximately 2 million metric tons in 1950 to 348 million metric tons in 2017, underscoring the gravity of this growing crisis (Bagai & Henam, 2021). The annual global production of plastics is approximately 150 million tons and is projected to range from 155 to 265 million tons by around 2060 (Sharma et al., 2020). The issue is exacerbated by the improper handling of plastic waste, which is characterised by inadequate disposal practices and a lack of recycling infrastructure, resulting in the accumulation of plastics in landfills, the ocean, and natural ecosystems. (Macheca et al., 2024) The buildup of plastic waste in landfills, rivers, and seas causes severe harm to the air, water, and soil, endangering life. (Sharma et al., 2020)

The extensive use of plastic in Kathmandu's department stores has become a serious environmental and health issue. The capital of Nepal, Kathmandu, accounts for a significant share of the country's plastic waste; up to 4.8 million plastic bags are produced there every day. The percentage of plastic waste in Kathmandu's total municipal solid waste has

increased by approximately 50% over the past 10 years, reaching 16–19%. Plastic pollution creates long-term risks to soil, water, and air quality, as well as to public health and urban aesthetics (Ferronato et al., 2024; Maalouf et al., 2025). One bag can take up to 1,000 years to decompose (Piya & Luitel, 2024) (Nepal Plastics Foundation, n.d.).

The Government of Nepal issued an order banning the use of certain plastic bags in 2015, following years of campaigns by environmentalists and non-governmental organisations. Again, there was a debate on how to reduce and recycle plastic bags. As a result, over the past several years, public pressure has led to a reduction in plastic consumption. Nepal has a history of plastic use dating back over four decades. It is essential to reduce and reuse it to address environmental problems. The country also needs to reduce the import of the products, as it imports a vast quantity of plastic every year; the calculation is about 170,000 metric tons of plastic annually. (Poudel, 2017)

The issue of microplastic pollution in Nepal's freshwater systems has become quite serious. According to studies conducted in Phewa Lake, the second-largest lake in Nepal, the microplastic concentration ranges from 55 to 122.5 items/kg dry weight, with the highest concentrations occurring in the eastern, most populated areas. (Malla-Pradhan et al., 2022). The Hanumante River, a significant tributary of the Bagmati River in the Kathmandu Valley, was also found to have 13–23 microplastics per liter of water samples, indicating severe pollution from the discharge of business and residential garbage (Bhatta et al., 2024). The extensive microplastic contamination of Nepal's central drainage systems was further validated by the Narayani River study (Acharya et al., 2025).

Most current research focuses on quantifying plastic and microplastic pollution in the environment, paying little attention to the individual contributions of department stores to the plastic waste problem or to the effectiveness of alternative materials in mitigating environmental impacts. There is a substantial knowledge gap regarding the precise role of department shops in Kathmandu's plastic pollution and the real-world obstacles to shifting to plastic alternatives, despite growing academic and policy attention.

Although some studies address plastic pollution in general, there remains a lack of specific research on how departmental stores in Kathmandu use plastic, the impacts of this use, and potential or existing alternatives. This is an essential gap because these stores play a significant role in everyday life and generate a substantial portion of plastic waste. A closer understanding of their practices is critical for identifying effective and sustainable solutions. This research can help policymakers, store owners, and customers make better decisions and adopt more environmentally friendly practices.

The exploration of alternative materials and practices within departmental stores is crucial for mitigating these adverse effects and promoting a more circular economy (al., 2021; Hohn et al., 2020). Understanding consumer habits can inform policy interventions and public awareness campaigns, driving a shift toward more sustainable retail practices (Lamichhane, 2023).

Statement of the problem

Plastic pollution in Nepal has become a serious concern, as various localised studies highlight the growing intensity of the issue. Currently, the country produces around 988.7 tons of plastic waste each day, a number expected to increase due to rapid urbanization and changing consumption habits. With the population projected to rise from 30.82 million to approximately 33.39 million by 2030, plastic waste generation is projected to increase by approximately 8.34%. Based on this estimate, Nepal could be producing approximately 390,982 tons of plastic waste annually by 2030. (Hoffmann & Adhikari, 2023) Despite growing academic and policy attention, the spread of plastic waste remains a pressing environmental issue that demands immediate and long-term solutions (Oyinlola et al., 2023). Plastic pollution affects both living and non-living components of ecosystems and raises serious concerns about the infiltration of microplastics into food chains and water sources (Iroegbu et al., 2021). The scale of plastic production far exceeds our ability to manage its disposal and recycling, resulting in its accumulation in natural environments (Bagai & Henam, 2021).

Most current research focuses on quantifying plastic and microplastic pollution in the environment, paying little attention to the individual contributions of department stores to the plastic waste problem or to the effectiveness of alternative materials in mitigating environmental impacts. There is a substantial knowledge gap regarding the precise role of department shops in Kathmandu's plastic pollution and the real-world obstacles to shifting to plastic alternatives. Although some studies address plastic pollution in general, there remains a lack of specific research on how departmental stores in Kathmandu use plastic, the impacts of this use, and potential or existing alternatives. This is an important gap because these stores play a significant role in everyday life and generate a large portion of plastic waste.

Rationale of the study

Despite efforts to reduce the excessive use, the easy accessibility of plastic and its improper disposal have significantly contributed to pollution in Kathmandu. It is necessary to understand how local department stores use it and how customers perceive it to develop an effective policy for its proper management. It is inevitable to avoid plastic use, but it is high time to manage it effectively. Hence, this research is conducted not only to collect information but also to urge policymakers to strengthen laws to ensure the proper management of plastic use.

This study uniquely addresses their specific contribution to plastic pollution, an area that has been overlooked in prior research. By exploring plastic usage patterns, the barriers to adopting eco-friendly alternatives, and the practical feasibility of such shifts, it offers targeted insights not captured in previous studies. These findings will be valuable for

informing policies, raising public awareness, and promoting sustainable practices in the retail sector. This research can help policymakers, store owners, and customers make better decisions and move towards eco-friendly solutions.

Objectives of the research

- To assess owners' and customers' views on plastic use, challenges, and eco-friendly alternatives.
- To measure awareness of plastic's impacts and support for sustainable solutions and policies.

2. Relevant literatures

Pollution spreads when plastic garbage is not managed correctly. About 80% of improperly disposed plastic garbage winds up in landfills or the environment. Pollutants like CO_2 and NOx are released into the atmosphere through open dumping and incineration. Plastics release toxic substances, such as chlorinated compounds, into agricultural soils, thereby disrupting soil fertility. These substances have the potential for absorption into groundwater systems. Urban drainage systems are clogged by plastic waste, exacerbating flooding during periods of intense rainfall. (Kibria et al., 2023)

The widespread use of plastic in department stores and its environmental impact have become a growing concern, particularly in developing economies such as Nepal. Plastic has become an integral part of daily life, used extensively for various purposes such as carrying grocery bags, storing water, and packaging household goods. However, the indiscriminate disposal of plastic waste has led to significant environmental degradation, including soil, water, and air contamination. (Awasthi et al., 2017). It is necessary to reduce the use of plastic products in Nepal. The rapid growth of urbanization and economic growth has caused an increase in plastic bags locally and globally. The reason for excessive use is that shopkeepers and vendors give plastic bags free of charge. (Khanal, 2022)

Plastic's extensive use has raised environmental concerns worldwide. Plastic is a versatile material that is now essential in many fields and in daily life. However, there are serious ecological repercussions from the growing manufacture, usage, and inappropriate disposal of plastic. (Shershneva, 2021) Since plastic products have been shown to have a detrimental effect on several species, the pollution directly endangers biodiversity. Plastic waste may build up on land and contaminate soil and groundwater, the detrimental consequences of plastic pollution are not just seen in the coastal environment. (Webb et al., 2012) Plastic's effects on the environment extend beyond its disposal. Significant environmental effects of plastics production include greenhouse gas emissions and the loss of natural resources. Furthermore, because plastic materials can take hundreds of years to decompose, their endurance and durability contribute to their accumulation in the environment. (Khoironi et al., 2019) (Xu et al., 2021)

Since the 1950s, plastic output has increased significantly, rising more than 200-fold from 1.5 million tons to over 300 million tons in 2015. This rapid expansion may be attributed to the wide variety of plastic products on the market, ranging from building materials and packaging to personal and household goods. (Diyana et al., 2021) The widespread use of plastics has led to a substantial accumulation of plastic waste in the environment, posing a global problem. By 2050, there may be more plastic in the oceans than fish if current trends continue, with an estimated 4-12 million tons of plastic entering the oceans each year. (Suaria et al., 2016) (Xu et al., 2021) The use of plastic has increased dramatically since the middle of the 20th century. Approximately 500 million metric tons of plastic were produced worldwide in 2023, but only 9% was recycled. It can take 100–1,000 years for plastics to break down, releasing microplastics and nanoplastics that pollute ecosystems worldwide. (Villarrubia-Gómez et al., 2024)

Plastic bags have a significant impact on human health, the environment, and wildlife. Human health can be affected by harmful chemicals from plastic bags that can drip into food and water sources. "Greenpeace suggests that two such chemicals, called phthalates (thall-eights; DEHP), are suspected as human cancer-causing agents, could damage the liver and kidneys, might damage the development of reproductive organs, and might interfere with development by acting as a mimic of the sex hormone estrogen. Marine bird species are found to ingest and die from consuming plastic particles. Bashir N. H. (2013)

The study analysed data from eight Asian countries between 2011 and 2020, confirming that plastic pollution harms the environment while higher recycling rates improve it. The findings emphasize the need for policies regulating plastic production, promoting sustainable alternatives, and encouraging recycling. (Lin et al., 2024). The global production of plastics has led to significant ecological contamination, posing a major environmental issue. Plastic waste adversely affects marine organisms, human health, and the climate, necessitating urgent action to protect ecosystems. Despite the utility of plastics in daily life, the toxic chemicals used in their production must be carefully monitored to ensure environmental and health safety. Reducing exposure to plastic toxins can lead to a cleaner environment and healthier communities. Therefore, governments should implement robust environmental policies to regulate plastic production, use, and disposal. Reducing plastic consumption is crucial to decreasing waste and mitigating these impacts. (Husain, 2022)

Research has shown that local community behaviour regarding plastic consumption and waste management strongly influences the increasing use of single-use plastic bottles. A study conducted in Kathmandu, Nepal, found that most of the population, particularly in urban areas, relies on plastic bags for daily shopping, contributing to the growing problem of plastic pollution. (Khoironi et al., 2019) Another study emphasizes the negative impact of plastic waste on public well-

being, communities, and the environment, highlighting the need for effective waste management strategies (Khaw-ngern et al., 2021).

The presence of microplastics and nanoplastics in the environment is a major issue associated with plastic use. These tiny plastic particles can cause toxicity, go inside organs, and breakthrough biological barriers, which can result in several health problems. Research indicates that humans are exposed to nanoplastics daily, as they are present in food, drinking water, and air. (Vethaak & Legler, 2021) The ingestion or inhalation of these plastic particles may pose long-term health hazards, including cancer, immune dysfunction, and reproductive problems. (Harsha et al., 2024) In addition to direct exposure to plastic particles, the chemicals used in plastic product manufacturing may have adverse health effects. These chemicals include phthalates and bisphenol A, which are recognized endocrine disruptors and have been connected to reproductive and developmental issues, as well as an elevated risk of several cancers. (Thompson et al., 2009)

Nepal's plastic reduction initiative is hindered by weak enforcement of plastic bans\ prohibitions, which leads most people, especially youth, environmentally conscious consumers, to persevere with plastic because of habit and convenience. (Khanal, 2022) High costs remain a significant barrier to adopting environmentally friendly options, as without government intervention it is difficult to expand plastic-free alternatives. (Barua et al., 2022) Additionally, biodegradable plastics are not a simple solution, as Nepal lacks the necessary composting facilities, and such products end up in landfills and may contribute to environmental pollution. Consumer awareness is also low, with individuals not knowing how to dispose of biodegradable plastics, reducing their efficiency as an eco-friendly alternative. (Moshood et al., 2024)

Government, businesses, and individuals must work together to reduce plastic bag use and implement policies to reduce plastic consumption. Significant reduction in plastic usage can be achieved by opting for alternatives such as reusable cloth bags, paper bags, or biodegradable products. The reduction in the level of plastic-related pollution is directly related to the reduction in the usage of plastic. The practice begins at home where the use of plastic-related items, especially single-use plastic, should be completely avoided. Green chemists seek to propose chemical harvests that are more valuable and also have less toxicity or endocrine activity, if its breakdown into undisruptive substances enters into the environment. (Prasad et al., 2023)

Common plastic products in Nepal include containers, packaging materials, polyethene bags, and thermosets. These can be replaced with degradable polymers and composites containing natural materials. Immediate measures should focus on reducing plastic use, reusing materials, collecting plastics separately, and maximizing recycling. Long-term strategies involve promoting research on degradable polymers and educating the public about sustainable plastic use practices. Adopting degradable polymeric materials as a state policy is recommended to effectively combat plastic waste. (Bhandari et al., 2021)

In order to tackle these challenges, Nepal needs to adopt a multi-dimensional strategy. Intensifying the enforcement of plastic prohibitions with enhanced monitoring and penalties is essential to induce change in behavior. (Khanal, 2022) Subsidization and incentives to local enterprises can make sustainable items more competitive and affordable. (Barua et al., 2022) Developing composting and waste management facilities will ensure proper decomposition of biodegradable plastics, increasing their environmental advantages. (Moshood et al., 2024) Beginning public educational campaigns to educate consumers of greener choices and disposing properly is also equally essential. (Barua et al., 2022) Combining strict regulation, subsidizing, improvement of waste management, and education will result in the capacity to generate a more effective and lasting transformation in Nepal.

The increasing production and consumption of plastics pose significant challenges in waste management, despite efforts to control them. However, effective ecological and economic strategies can mitigate these issues. One of the approaches is converting plastic waste into hydrocarbon fuel, although its economic viability remains uncertain. In the context of Nepal, mechanical recycling appears to be a suitable method for managing plastic waste. The rapid growth of use of plastic in departmental stores, particularly in developing nations like Nepal, raises significant environmental concerns.

3. Materials and methods

This study adopts a quantitative research method to analyze plastic usage and explore strategies to minimize its use in Kathmandu Valley. Data was collected from local departmental stores including local marts, KK Mart, Bigmart, Salesberry, etc., situated in various areas of Kathmandu to ensure relevance in data collection. The majority of these stores reportedly generate approximately less than 5 kgs per day with the majority of their waste consisting of plastic bags, plastic packaging, plastic bottles, etc.

This study employed a stratified random sampling strategy to ensure balanced representation of both store staff and consumers regarding plastic use. The population was divided into two groups: store staff and customers, and 160 respondents were selected from each group, a total of 320 respondents. This approach allowed for the collection of data from both perspectives, those who manage plastic materials and those who consume them, making the findings more comprehensive. The rationale for selecting 320 respondents was based on sample size estimation methods and the need for representativeness across different demographic and consumer groups. There are more than 600 departmental stores,

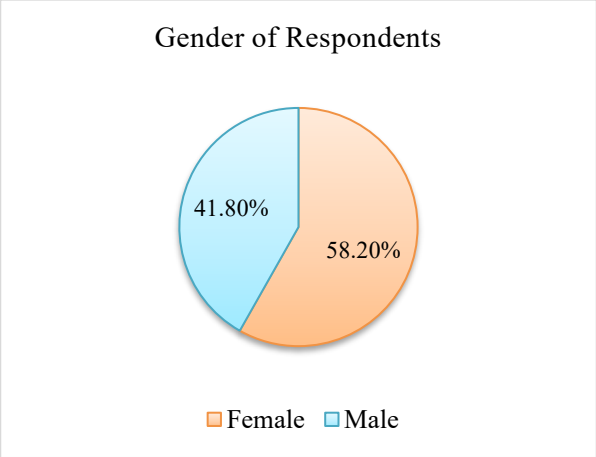
including local stores. To extract reliable data, this paper chose 320 respondents. Each group was allocated a sample of 160 respondents, resulting in a total sample size of 320. This approach increases the reliability of the results and ensures data inclusivity by capturing both the supply-side (store staff) and demand-side (customers) perspectives on plastic use and waste.

The questionnaire's validity and reliability were established through a pilot test conducted before the main data collection. Feedback from the pilot respondents was used to refine the questionnaire for clarity and relevance. Data were collected primarily through face-to-face interviews, which allowed researchers to gain detailed insights into plastic consumption patterns, challenges faced in minimizing usage, and the willingness to adopt eco-friendly alternatives.

4. Results and discussion

4.1. Demographic data

The survey included males and females; 58.2% were female and 41.8% were male. 11.9% were below 20 and 49.03 percent were of age group 21-30, 19.4% were of age group 31-40, 13.4% were of age group 40 to 50, and only 6% of the respondents were above the age of 50.



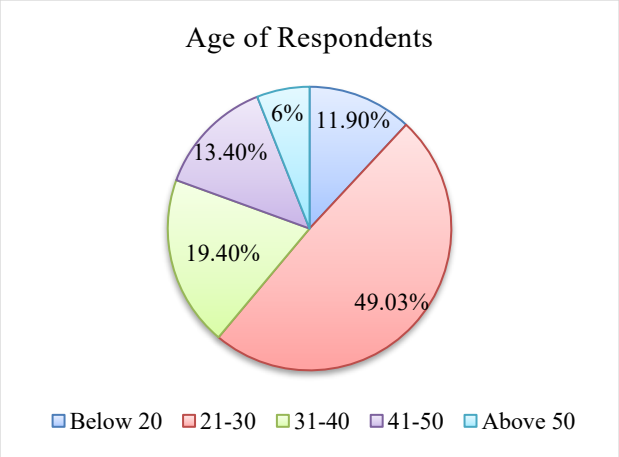


Figure 1: Gender distribution of respondents

Figure 2: Age distribution of respondents

The researchers found the occupations of the respondents. 41.80% were students, 20.90% were professionals in the government and private sectors, 16.40% were business owners, 14.90% were housewives, and 6% were retail workers.

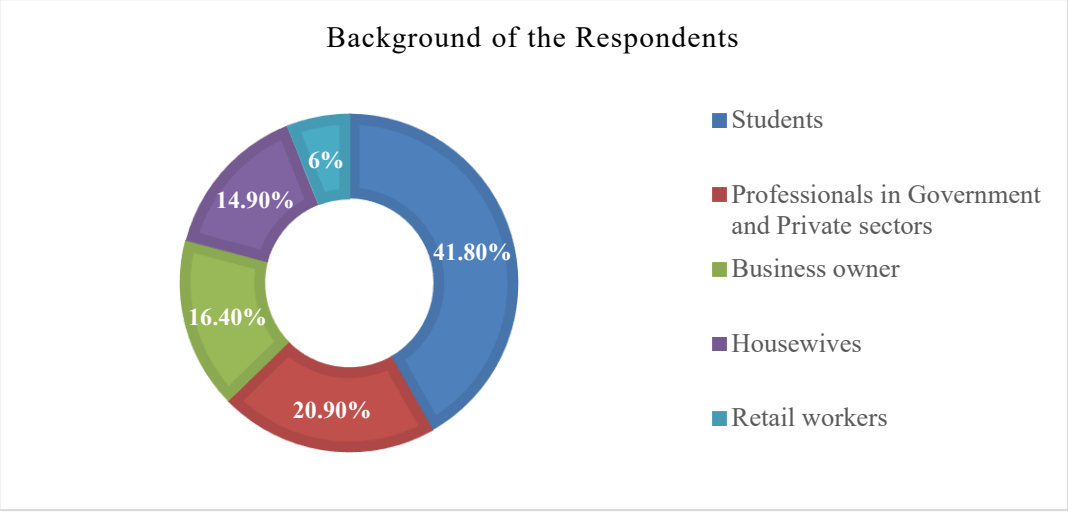


Figure 3: Background of respondents

When asked about their frequency of visiting department stores or grocery markets, 46.3% were regularly visiting

department stores, 23.9% were sometimes, 20.9% were regular, and 9% answered never.

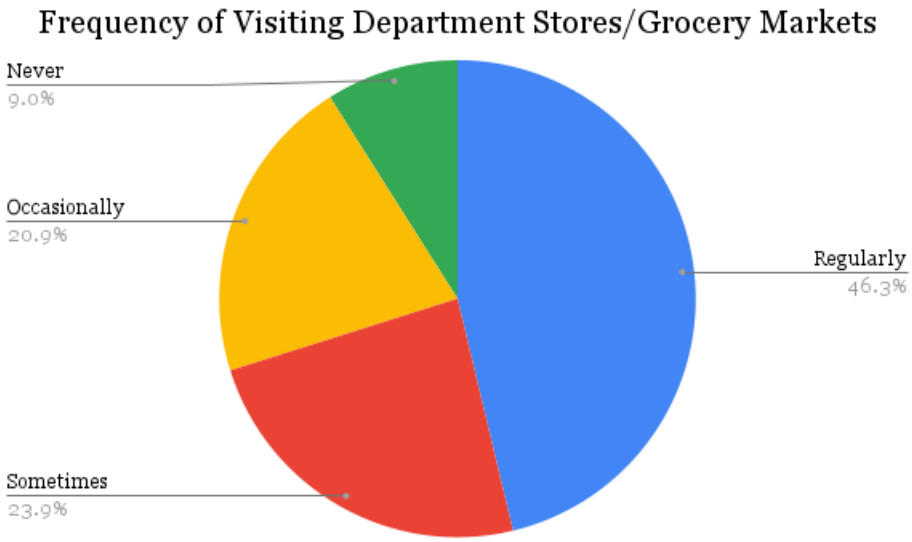


Figure 4: Frequency of Visiting Department Stores/Grocery Markets

The researcher asked questions about their observation on the types of plastic products they commonly observe being used in departmental stores. They reported that 50.7% observed plastic bags, and 37.3% observed plastic packaging for food or other products. Plastic is widely and commonly used, particularly in urban consumer areas, where alternatives like paper or cloth bags are hardly adopted. (Khanal, 2022) Even when 4.8 million plastic bags are used daily, only 28% of stores offer alternatives due to the lack of local production and high costs. (NIDISI, 2024) Consumer attitudes toward plastic use, driven by low costs and convenience, sustain its continued use in Southeast Asia. (Khoironi et al., 2019) It is similar to the results from this study. 3% observed plastic containers, 3% observed plastic bottles, 4.5% observed plastic straws, and 1.5% rarely paper and cloth bags. When shopping at department stores, 41.8% of respondents always receive plastic bags, 35.8% receive them frequently, 14.9% receive them occasionally, 6% receive them rarely, and 1.5% never receive plastic bags. While 94% are aware of the environmental impact of plastic, 6% are not sufficiently aware. Due to a lack of affordability and convenience, such practice is continued.

Regarding the excessive use of plastic in departmental stores in Kathmandu, 70.2% of respondents acknowledged their awareness of the issue, while 17.9% were unsure, and 11.9% disagreed. While public awareness of plastic pollution is increasing due to global campaigns and local media efforts, this does not always translate into reduced use or behavior change. (Husain, 2022) This "knowledge-action gap" reflects a policy and infrastructural inability to provide citizens with convenient, affordable alternatives, a phenomenon that is evident in respondents' continued use of plastic bags despite being informed. (Villarrubia-Gómez et al., 2024) Despite respondents' knowledge and awareness, eco-friendly practices among both store owners and customers are rarely observed.

According to 52.2% of respondents, plastic bags have the most negative impact on the environment, followed by plastic food packaging (32.8%), plastic bottles (7.5%), plastic containers (3%), plastic straws (1.5%), and 3% who believe all of the above contribute equally. Likewise, 73.10% of respondents are aware that plastic waste has a serious impact (e.g., pollution, harm to wildlife), 20.9% believe there is a moderate impact, 3% think there is a minor impact, and the remaining 3% are unsure of the impact. Plastic bags have various environmental hazards in Nepal, such as their contribution to clogged waterways, urban flooding, and also foremost pollutants in marine ecosystems. (Suaria et al., 2016) The majority of respondents are well aware of the negative environmental impacts of plastic use, yet continue to choose non-eco-friendly alternatives.

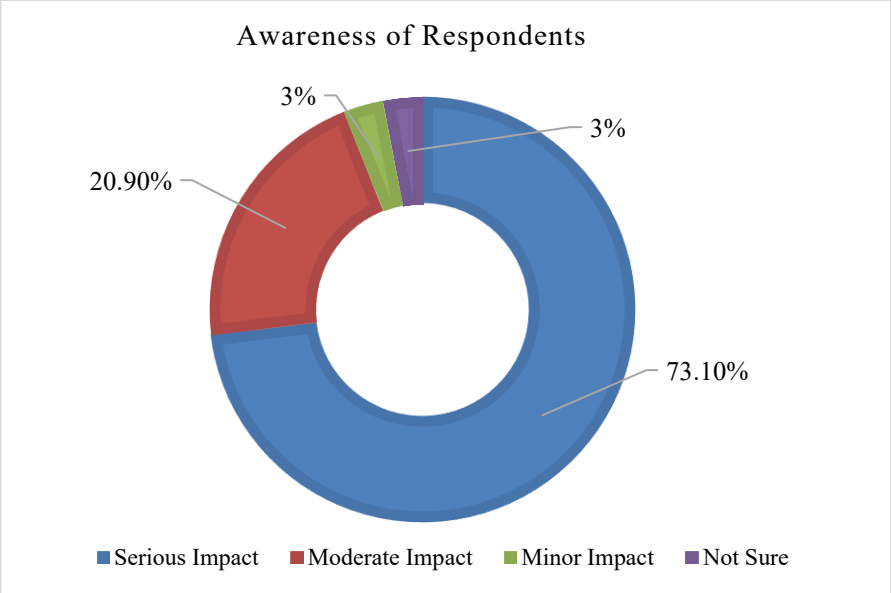


Figure 5: Awareness of respondents regarding the impact of plastic waste

The researchers are interested in understanding people's beliefs about the direct impact of plastic waste. They found that 59.7% of respondents believe plastic waste is a major problem, 29.8% believe it has some impact but not significantly, 6% have not noticed any impact, and 4.5% are unsure. Even though the majority of the respondents have said plastic affects the environment negatively, on a larger environmental spectrum, responses and perspectives on direct impact are differed. Plastic pollution exacerbates multiple planetary boundaries, including chemical pollution, biodiversity loss, and climate change. (Villarrubia-Gómez et al., 2024) Regarding the impact of plastic waste on public health, 85.1% believe it has an effect, 1.5% disagree, and 13.4% are unsure. Nepal lacks infrastructure for the segregation, recycling, and disposal of plastics (Bhandari et al., 2021). When asked about the waste management of plastic products in Kathmandu, 62.7% reported it was poorly managed, 31.3% were unsure how it was managed, 4.5% thought it was well managed, and 1.5% were unsure. Around 20.7 kilotons of plastic is leaked into Nepal's environment due to poor waste management. (Bhandari et al., 2021) A significant contributor to plastic pollution is inadequate waste collection and management by the government, which, at a larger scale, affects ecosystems and public health.

4.2. Alternatives to plastic

According to the findings, consumers are willing to pay for alternatives to plastic bags and packaging. There were 28.4% positive responses to pay for alternatives to plastic. On the other hand, 11.9% were not positive, and 59.7% of the respondents think they may pay depending on the price. Cost-effectiveness remains a key driver of consumer decisions regarding sustainable alternatives in South Asia. Consumers may be concerned with environmentally friendly options, yet price becomes the determining factor when they adopt them. (Barua et al., 2022) To effectively replace plastic packaging in department stores, 49.2% of respondents preferred cloth bags, 29.9% preferred biodegradable plastic alternatives, 19.4% preferred paper bags, and 1.5% had no alternative.

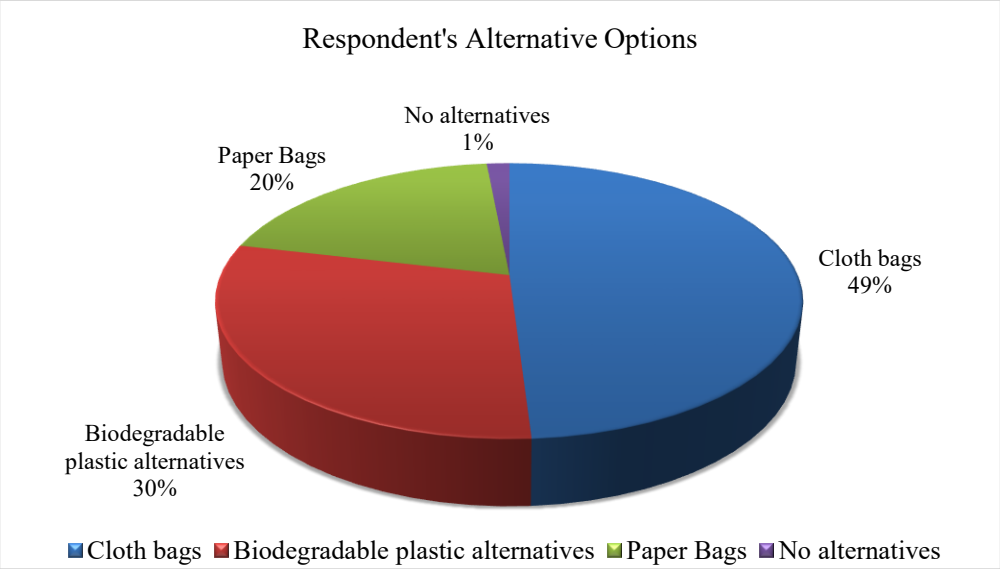


Figure 6: Respondents' preferred alternatives to reduce plastic use

The consumers were willing to bring their reusable bags or containers to reduce plastic usage at stores. There were79.1% who agreed to bring their usable bags. 20.9% replied sometimes, depending on the situation, and none of the respondents chose to disagree with the option. Consumer behavior and convenience are critical in embracing sustainable alternatives. (Villarrubia-Gómez et al., 2024) The willingness of respondents demonstrates that behavioral shifts are possible, especially when alternatives favor convenience and cost-effectiveness.

4.3. Explore the store practices and policies

The research findings regarding the reduction of plastic use in departmental stores in Kathmandu are positive. 52.2% of respondents agreed that these stores are actively reducing their plastic use, 19.4% disagreed, and 28.4% were unsure about the efforts to reduce plastic in the valley. Public perception is key in determining the efficacy of sustainability initiatives. The high positive response rate reflects growing consumer awareness and department stores in Kathmandu's responsiveness to regulatory and consumer pressures (Barua et al., 2022).

According to the survey, 92.5% of respondents believe that departmental stores should be mandated to reduce plastic use through government regulations or incentives, while 3% disagreed, and 4.5% were unsure about the need for such measures. There is a strong need for policy-level measures to encourage biodegradable packaging and reduce single-use plastics (Moshood et al., 2024).

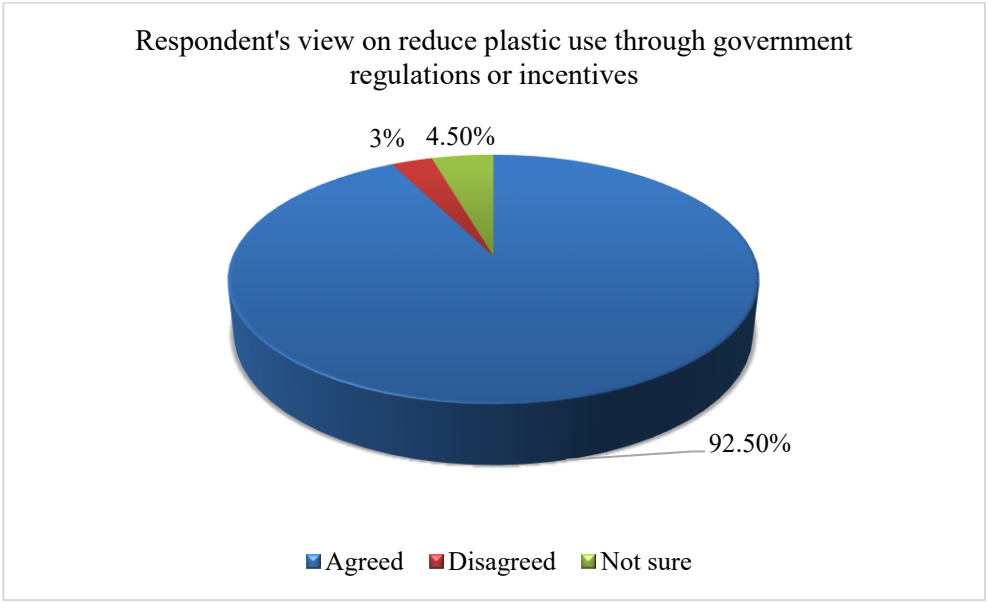


Figure 7: Respondents' views on reducing plastic use through government measures

Departmental stores implement various practices to minimize plastic use, allowing respondents to select multiple options. The most commonly chosen practice was the use of reusable bags, followed by offering discounts to customers

who bring their own bags or containers. Educating customers about plastic waste and alternatives was the third most selected option, followed by banning plastic packaging for products. Lastly, only a few respondents reported seeing no such implementations.

Additional feedback and recommendations for reducing plastic use and waste in Kathmandu emphasize supporting local businesses that provide sustainable alternatives, increasing public awareness, starting changes at the household level, reducing plastic consumption, and establishing a pallet reuse system. Although some respondents recognized that change is difficult, they believe each small step plays a role in the overall transformation.

Regarding the duration of their operations, we found that nearly half of the stores (46.3%) have been operational for 1-5 years, and 25.4% for 6-10 years. Interestingly, 19.4% have been in business for over a decade, and only 9% are newer establishments, operating for less than a year.

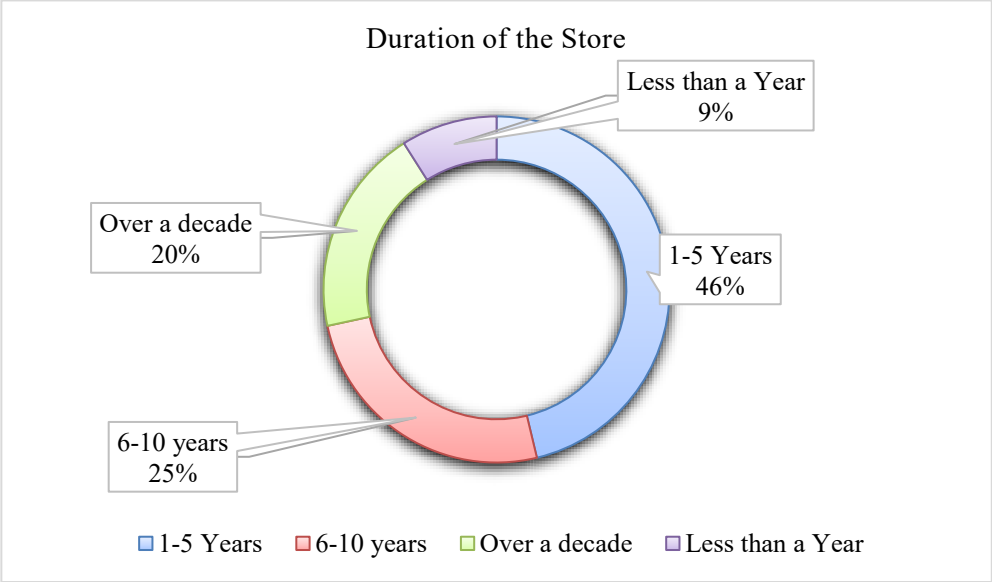


Figure 8: Duration of store operations

The researchers focus on the types of products these stores primarily sell. The majority, 65.7%, reported that they deal in groceries, followed by 26.9% selling household goods. Smaller proportions focus on clothing and accessories, 3% on electronics, and 4.4% sell a mix of all these items.

Regarding customer interaction, the daily footfall varied significantly. About 49.3% of stores receive between 1-50 customers daily, 29.9% see 51-100 visitors, and 20.8% cater to 101-500 customers. This data reflects the diversity in store size and location. Bigger stores with more customer traffic had more scope to drive behavior by providing alternatives and customer education. (Villarrubia-Gómez et al., 2024) Departmental stores have the potential to be key points of intervention for behavior change, particularly when incentives and awareness campaigns are well executed.

4.4. Types and impact of plastic products in these stores

Table 1: Key Challenges in Reducing Plastic Usage in Stores

Item	**Respondent's Number**	**Percentage**
Plastic bags	134	83.6%
Plastic bottles	79	49.3%
Plastic packaging for products	115	71.6%
Plastic containers	67	41.8%
Plastic straws	33	20.9%
Cloth bags	2	1.5%

While asking the question, "What types of plastic products does your store commonly use or provide to customers?" it was allowed respondents to select multiple options. Based on the responses, the most commonly used plastic product is plastic bags, with 134 respondents (83.6%) selecting this option. This indicates that plastic bags are a staple item in many stores. The second most selected item is plastic packaging for products, chosen by 115 respondents (71.6%), suggesting

that many stores rely on plastic packaging to protect or display their products. There is ubiquity of plastic in South Asian shopping spaces (Barua et al., 2022), especially due to its affordability, ubiquity, and efficiency in protecting products, especially in the food and retail sectors. (Moshood et al., 2024) The data of this study affirms the same trend. Plastic bottles were selected by 79 respondents (49.3%), reflecting their moderate usage, likely for beverages or other liquid products. Plastic containers were chosen by 67 respondents (41.8%), indicating their use for storage or takeaway purposes. Plastic straws were less commonly selected, with only 33 respondents (20.9%) reporting their use, possibly due to growing environmental concerns or regulations. Finally, cloth bags were the least selected option, with only 2 respondents (1.5%) indicating their usage, suggesting they are rarely provided as an alternative to plastic products. Economic factors, unavailability of consumer demand, and logistical constraints tend to be obstacles to the wider application of cloth or reusable bags. (Villarrubia-Gómez et al., 2024) These results highlight a significant reliance on single-use plastics and suggest opportunities for stores to transition toward more sustainable alternatives like cloth bags or biodegradable packaging.

When asked about daily plastic waste generation, 56.7% of stores estimated less than 5 kg, while 26.9% generated 5-10 kg. However, 16.4% were unsure about their waste output, indicating a lack of awareness. The lack of data collection and tracking of waste is one major hindrance to plastic reduction at the local level in Nepal. (Khanal, 2022) With proper awareness, tracking, and policy implementation, the plastic waste generation could be significantly minimized.

The question of whether alternatives to plastic bags or packaging are provided revealed that only 28.4% of stores consistently offer options like paper or cloth bags, while 43.3% do not provide any alternatives. The remaining 28.3% offer such options only upon customer request.

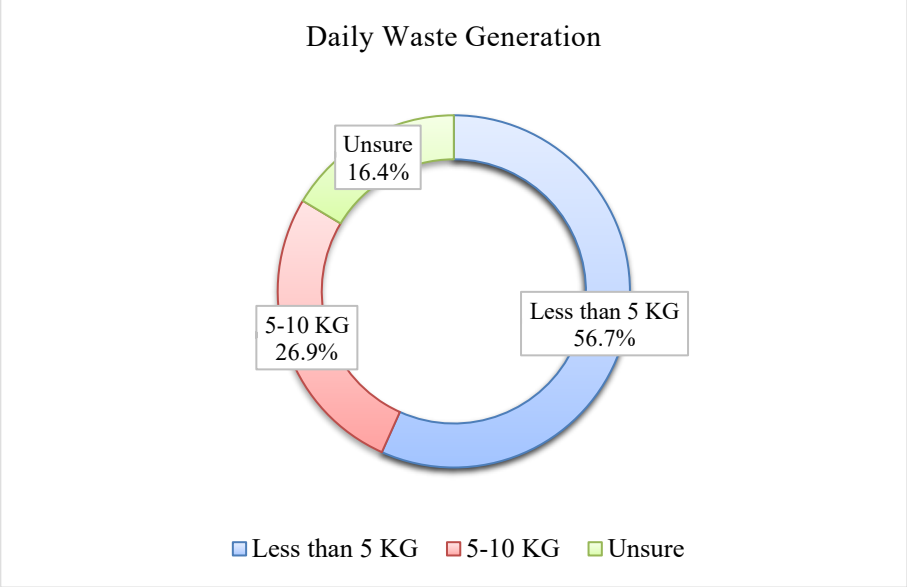


Figure 9: Daily waste generation

Customer concerns about plastic usage are relatively infrequent. Around 41.8% of stores reported never receiving complaints. This outcome can be due to the fact that consumer education and activism about the plastic use is still low in a large part of South Asia, usually because consumers have conventional recourse to convenience products and no apparent substitute. (Barua et al., 2022) 43.3% said concerns were rarely raised. Additionally, 13.4% noted that they occasionally receive complaints, and only 1.5% reported often hearing feedback on this issue.

4.5. Perceived impacts of plastic waste

Regarding environmental harm, 38.8% of respondents believed their plastic waste has a serious impact, while 26.9% saw it as moderate, and 16.4% considered the impact minor. Meanwhile, 14.9% were unsure, and 3% believed it had no impact.

Regarding the impact on the local community, 44.8% of respondents believed plastic waste had a significant effect, while 38.8% saw only minimal impact. Meanwhile, 1.5% felt there was no impact, and 14.9% were uncertain.

The impact of plastic waste on public health was also a concern. While 40.3% of respondents described it as moderate and 29.8% considered it significant, a notable 25.4% were unsure about its connection to health issues, and 4.5% believed it had no impact. There are various public health implications of plastic pollution, particularly via microplastics, that are attributing to health issues like respiratory disease and endocrine disruption. The health risks associated with plastic waste is manifested by the majority of people in both developed and developing nations. (Awasthi et al., 2017) With more

knowledge on the harmful impacts of plastic waste, efforts from the local and individual level can be made to reduce plastic waste.

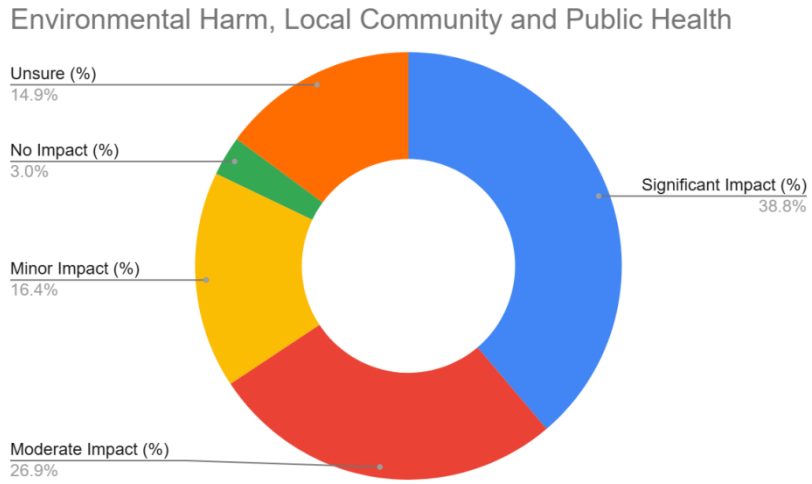


Figure 10: Perceived impacts of plastic waste on environment, community, and health

4.6. The policies and actions of the stores

Unfortunately, only 16.4% of stores had policies to reduce plastic usage, while a staggering 83.6% lacked formal initiatives. When asked about actions to encourage reduced plastic consumption, 20.9% of stores mentioned offering incentives like discounts for reusable bags, 61.2% admitted taking no steps, and 17.9% offered such measures occasionally. Many retail outlets fail to adopt environmental policies unless they are incentivized or mandated, owing to limits on resources and a lack of pressure. (Villarrubia-Gómez et al., 2024) With a support from the government in providing and influencing more eco-friendly alternatives to plastic, stores can also get a boost to make their policies and actions more inclined towards the reduction of plastic usage and waste.

The majority of respondents, 86.5% expressed willingness to support practical government policies to reduce plastic usage, while 7.5% opposed the idea, and 6% were unsure.

Table 2: Key Main Barriers to Reducing Plastic Usage in Stores

Barriers and Solutions to Reducing Plastic Usage	**Percentage**	**Respondent's Number**
High cost of alternatives (e.g., paper, cloth bags)	74.6%	119
Lack of customer demand	53.7%	86
Inconvenience for customers	22.4%	36
Lack of viable alternatives	31.3%	50
Limited government support	32.8%	52
Manufacturers use plastic packaging	1.5%	2
Cloth Bags	80.60%	129
Paper Bags	53.70%	86
Biodegradable Plastics	28.40%	45
Glass/Metal Containers	4.50%	7

To understand the challenge of reducing plastic use in retail shops more efficiently, respondents were allowed to select more than one answer, and multiple challenges were presented. The greatest challenge is seen to be that alternatives like cloth bags are costly (74.6%), which is a serious problem since alternatives are generally imported or not manufactured on a wide scale, therefore being expensive for consumers and retailers as well. (Barua et al., 2022) Nepal lacks the local production capacity for clothes or jute bags making which makes it 3 to 5 times more expensive in comparison to plastic. (NIDISI, 2024) Even though there are conscious customers, they are not very many (Barua et al., 2022), and the lack of

customer demand (53.7%) is also a significant hindrance because most customers do not seek plastic-free products. Along with that, poor government support (32.8%) and lack of alternative choices (31.3%) have also been seen hindering phasing out plastic, while customer hassle (22.4%) also points towards the ongoing use of plastic because it is easy to use. Although only 1.5% of manufacturers using plastic packaging is seen as a barrier, it is still a causative factor. Data suggest cost, customer behavior, and government support are all areas that must receive equal attention to drive sustainable action. Despite these challenges, the table shows that there is a willingness to change. 56.7% have shown interest in sustainable substitutes if costs are affordable, 37.3% would do so on the basis of cost, which implies that resolving the issues of cost and availability can drive important shifts towards sustainability.

The table also reveals strong consumer tendencies for alternatives, with most favouring cloth bags (80.6%), followed by paper bags (53.7%) and biodegradable plastics (28.4%). The lower usage of biodegradable plastics is likely due to Nepal's insufficient infrastructure for their disposal. (Moshood et al., 2024) Glass/ Metal packaging gained minimal support (4.5%), showing that convenience and functionality have significant effects on consumer choices (Villarrubia-Gómez et al., 2024). Despite the already established reliance on plastic due to convenience and poor implementation of bans (Khanal, 2022), it can be seen there are promising chances of alteration in case reusable ones, such as cloth and paper bags, are made easily accessible and properly marketed. (Barua et al., 2022) The strong preference towards reusable alternatives shows a promising path ahead towards reducing plastic dependence in the retail sector of Kathmandu.

Table 3: Types of incentive store owners/staff prefer

Incentive	**Percentage**	**Respondent's Number**
Subsidies for Sustainable Alternatives	62.70%	100
Increased Customer Demand	50.70%	81
Government Regulations	47.80%	77
Public Awareness Campaigns	37.30%	60

Similarly, this table showcases the key incentives, which were also a multiple-choice question, which encourage department stores to adopt green alternatives, based on 160 responses. Subsidies for green alternatives were the most compelling incentive, with 100 respondents (62.7%) supporting it. Consumer behavior is an important driver of the sustainable adoption of biodegradable plastics. (Moshood et al., 2024) Likewise, increased customer demand was the second most powerful factor and was rated as important by 81 respondents (50.7%). Green entrepreneurship in South Asia, like Nepal and Bangladesh, is not scalable without government incentives and financing. (Barua et al., 2022) Similarly, government policy was also a strong option, favored by 77 respondents (47.8%). Implementing the policy alone is useless unless accompanied by public awareness and incentives, as well as validating this function of education campaigns and legislation. (Khanal, 2022) Likewise, Public awareness campaigns, seen as helpful by 60 respondents (37.3%). Economic incentives and consumer choice are the key findings to promoting environmentally friendly practices.

4.7. Strategies for reducing plastic usage effectively

Regarding strategies to reduce plastic usage, respondents recommended promoting reusable bags through discounts and awareness campaigns, making alternatives more affordable, implementing bans on single-use plastics, and introducing refill stations for bulk products. Tackling plastic pollution means requiring a change in systems, combining regulation, market incentives, and consumer education, to actually make it happen i. e., integrating policy, industry responsibility, and public education is necessary to effectuate effective and sustainable change. (Villarrubia-Gómez et al., 2024)

Additional suggestions included collaborating with NGOs, implementing a complete ban on plastics, promoting eco-friendly packaging, penalizing plastic manufacturers, and educating consumers about the environmental impacts of plastic. Affordability and public-private partnership in promoting plastic alternatives are essential (Barua et al., 2022), along with consumer education to increase the effectiveness of enforcement laws and policies. (Khanal, 2022)

Working with local waste management programs is important. Plastic factories should be banned in the country, along with the implementation of restrictions on the importation of plastics. Another alternative would be to establish a reusable bag exchange system in which customers can borrow bags if they forget to bring their own, with the option to return them on a subsequent visit or purchase them at a minimal cost. Alternative plastic bag materials include jute, paper, compostable, and cotton bags. The Government of Nepal can implement a strict policy prohibiting the production, distribution, and use of plastic bags nationwide. Due to the inefficiency of Nepal's current system, prohibition/bans fail. With the revenue gained from recovering and recycling plastic waste, better waste management could be subsidized. (Bharadwaj et al., 2020) Hence, by combining recycling, taxation, segregation, and stakeholder collaboration, the government can reduce plastic waste. Additionally, rigorous oversight mechanisms are essential for regulating the use of plastic bags in Nepal. Since this study was conducted in the urban population of Kathmandu Valley, a region with distinct

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5. Conclusion

The usage of plastic is prevalent in Nepal. It is being widely used in the country because of its easy availability, affordability, and convenience for consumers. While departmental stores in Kathmandu recognize the harmful effects of plastic usage, challenges such as cost, customer behavior, and policy gaps persist. Collaboration among the government, businesses, and the public is crucial for driving meaningful change. The findings inspire actionable steps toward reducing plastic waste and fostering a more sustainable future for the residents of the valley. Every product is packaged in plastic bottles, bags, and containers. The store owners could only have limited options for reducing plastics, as they cannot earn just by putting up eco-friendly products, they can only do so much, as reducing plastics in packaging and wrapping.

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