



Exploring Knowledge, Attitudes and Practices Regarding Single-Use Plastics in Lahore Workspaces

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Abstract

The plastic industry has grown continuously over the decades to satisfy the needs of a growing population. Single-use plastic and its disposal is a significant hazard to human health and the environment. The current study focuses on the knowledge, attitudes, and practices of people towards plastic usage at different workplaces in Lahore. To investigate behavior and perception of plastic consumption an online survey was conducted from March to August 2021. Results suggested that people have good knowledge about the impacts of plastic on the public as well as environmental health 90% of respondents knew plastic takes thousands of years to degrade, 91.5% of them knew plastic is hazardous for the environment, and 87.8 % agreed that plastic threatens aquatic life, but they usually don't practice it and show negligent attitude towards the use of plastic and its products. 54.8 % of respondents use plastic bags to carry their lunch boxes, and 32.5 % of them take tea/coffee in disposable plastic cups at their workplace. A combination of sound policies and awareness may help to address the major environmental problem and may also help to reduce the environmental pressure posed due to plastic pollution.

Keywords: Worker health, plastic consumption, Occupational safety and health, Behavior and Practice of plastic, Plastic disposal, Plastic Pollution

Introduction

The era we lived in is somehow called Plastic Age. As the population is growing, the plastic industry is growing continuously. Approximately 360 million tons of plastic is produced worldwide 40% of which is single used plastic (Thompson *et al.*, 2009). Plastic takes up a large part of society from being used for electronics, furniture to small household needs like grocery bags and containers (Chen *et al.*, 2021). Packaging is the most dominant field for generating plastic. It is widely used at the workplace for food packaging, snacks and stationery.

Its environmental impacts are starting from its manufacturing to its consumption and its wastes accumulation. In developing countries, plastic bags occupy a large portion of the landfill as they are discarded in landfills. Since there is no life cycle analysis of plastic, it ends up discarded, incinerated, and recycled. So, plastic leakage into the environment is the major concern of the day. Plastic pollution (especially microplastic) in soil, freshwater, and marine ecosystem causes serious detrimental impacts on the health of animals and humans. Several studies report the relationship between plastic bag usage and environmental and health problems. These bags affect

the environment as they take hundreds of years for their complete decomposition (Sutton & Turner, 2012).

In several developing countries, plastic bags are frequently used to carry food items that can cause serious health problems since plastic materials produce some carcinogenic agents by their chemical reactions with food items due to variations in temperature (Narayan, 2001). Plastic also affects human health by direct or indirect microwave heating or cooking of food. Different plasticizers i.e. adipates, sebrates, maleates, etc. migrate when food is packaged and these are very harmful to human health (Nerin *et al.*, 2018). It has been mentioned in recent reports that the reuse of plastic bags can cause contamination of microorganisms in foods (Williams *et al.*, 2011). The magnitude of plastic pollution in the sea has multiplied in past decades. Aquatic animals ingest plastic pieces that hinder their growth, create an intestinal blockage, and reduce stomach capacity (Warner and Flaws, 2018).

Pakistan produces 624,200 tons of plastic each year. After that, these are employed by 6000 industries that produce plastic goods. Because plastic is readily available, affordable, and long-lasting, it is utilized in nearly every industry in developing nations like Pakistan. Every year, approximately 164,332 tons of plastic waste or a portion of the entire amount of plastic end up in the Indus River (Mukheed and Alisha, 2020).

Of the 250 million tons of rubbish produced in Pakistan, 65 percent is made of plastic. In addition, there are numerous risks in cities as a result of mounds of plastic waste and illegal waste dumping. Pakistan has seen an enviable increase in plastic pollution in recent years. The UNDP estimates that Pakistan produces over 3.3 million tons of plastic garbage annually, much of which is dumped untreated in the nation's landfills and waterways. When all of this garbage is disposed of, it will create a pile that is 16,500 meters tall, which is twice as tall as K2 (8611 meters) (Gul, 2020). There are already 55 billion single-use, non-biodegradable plastic bags in circulation nationwide, a 15% increase from the previous year (WWF, 2021). Oklahoma State University estimates that at lunch alone, a single student uses throwaway plastic products to produce around 67 pounds (30.39 kg) of waste per nine months of school (Hart, 2022). These single-use, non-biodegradable bags wind up in municipal systems, open waste dumps, and landfills, where they contaminate the environment for many years. It creates a strong smell, obstructs the drainage or sewer system, and serves as a breeding ground for numerous pathogens, including mosquitoes. Many illnesses, including diarrhea, cholera, typhoid, and malaria, are brought on by these clogged systems. It is a bitter reality that the buy up of plastic products has led in increasing amounts of plastic pollution in Pakistan. It is estimated that food wrappers and containers produce 31.15% of pollution in the environment. Bottles and containers cap produce 15.5% of pollution. Plastic bags cause 11.18% of environmental pollution, straw and stirrers produce 8.13%, beverage bottles cause 7.27% environmental pollution. There is a nine percent share of the plastic in the total solid waste of Pakistan produced each year (Mukheed and Alisha, 2020). A study conducted in Pakistan found that plastic use has severe adverse effects on consumer health, polluting the environment and posing a threat to human life. The findings revealed a statistically significant difference between the pre- and post-intervention data, suggesting that students are sufficiently aware of the health risks associated with plastic use and that educational interventions can help mitigate these negative consequences (Abid et al., 2020). Similarly, it was also determined that participants have an awareness of the harmful impacts of plastic on the environment, but they were not willing to transform their awareness to action (Gundogdu et al., 2018). Mukhtar et al. 2024 conducted a study in Lahore, Pakistan, revealed that 47.3% of students 46.5% in public schools, and 60% in private schools are aware of the problem of plastic pollution. Reducing plastic waste through reuse and recycling was the favored approach, with 20% of public students and 24% of private students supporting environmental efforts. Nonetheless, the way waste was managed in both institutions went against what students had learned. Reducing single-use plastic bag manufacture and usage is one of the difficult tasks for

the government of Pakistan. Plastic has many benefits and is widely used, yet single-use plastic bags do permanent damage to the ecosystem. But in order to lower its production and use, governments must also act now through policy action (Ali et al., 2022).

It has found that water samples of USA have microplastic in them. In 2020, in the Amazon estuary, a fish named *Plagioscion squamosissimus* was found floated over water and was dead by suffocation such that its head was entangled in a plastic bag (Andrades et al., 2019). About 55% of birds collected off the shore of North Carolina have plastic in their gut. These particles enter into human lungs from the gut and also enter to skin and cause different health issues (Lee et al., 2021). Traces of microplastic have been found in Arctic ice samples. This shows the vulnerability of plastic and its contribution to climate change (Mukheed & Alisha, 2020).

In Greece, scientists highlighted plastic pollution in the marine environment and it was seen in results that most people were not aware of plastic pollution. So, there should be initiatives for the awareness of the public so that they may participate in making decisions (Charitou et al., 2021). Detection of contamination is important so that damage can be reduced and policies and laws can be made. For reducing plastic pollution, many policies were introduced in Taiwan with the help of the Government, media interest, and ENGOs that raised awareness among the public and influence other stakeholders (Filho et al., 2021). So, the concentration should be given in the dimension of Practice. Everyone including the government, social workers, NGOs, and also the people should participate in protecting our environment as everyone living on the planet is responsible to protect it (Vigneshwaran and Arunkumar, 2014). This study aims to access the attitudes of the workers towards the usage of plastic, knowledge of them being plastic consumer at workplace and associated environmental and health concern and the practices adopted to handle plastic and its waste

Materials & Methods

Study Population

We conducted a cross-sectional study of 400 randomly selected occupational people working in hospitals, industries, banks, academic institutions in Lahore between March to April 2021. These sectors were chosen because of their substantial impact on waste production and plastic consumption. While banks and academic institutions represent a variety of work settings, hospitals, and other industries are known to utilize a lot of single-use plastics. Inclusion criteria comprised individuals aged 18 and above, actively employed in the mentioned sectors in Lahore, and willing to participate in the study. This strategy ensures a representative sample to evaluate the degree of plastic usage and the awareness of its implications on the environment and health among various Lahore occupational groups. After studying literature to understand past trend of knowledge, attitude and

practice of public towards plastic especially single use plastic consumption. Therefore, departing from the research question, to what extent are occupational people of Lahore using plastic in general and single use plastic in particular, and to what extent they are aware of effects of plastic on their health and environment.

Study Tool and Design

We used a questionnaire to collect participants' responses. For this purpose, we designed an online questionnaire using Google Forms, which was disseminated through social media.

Due to the wide reach of social media platforms, the questionnaire was distributed to a large audience in Lahore across a variety of occupational sectors, including some that may be challenging to contact through conventional in-person approaches. There may be additional expenses for printing, travel, and labor when doing surveys in person. Choosing to use an online questionnaire reduces these costs. Compared to in-person, online surveys enable quick data gathering and analysis, saving time on survey administration and data entry. Because online surveys offer anonymity, participants may feel more comfortable answering delicate questions on environmental issues and plastic consumption, which may lessen social desirability bias. The online questionnaire was disseminated through popular social media platforms such as WhatsApp and Facebook, targeting occupational groups in Lahore. No incentive was provided to the participants yet the participation was completely depended upon the willingness of participants.

The questionnaire summed up total 37 questions having six sections: socio-demographic profile, occupational profile, practice of plastic consumption, environmental concern, health concern and awareness/willingness to reduce plastic pollution. The first section was the Socio-Demographic Profile, having 6 questions. Second section was Occupational Profile consists of 7 questions. Third section was Practice of Plastic Consumption comprising 5 questions. Forth section was about Environmental Concern consists of 6 questions. Fifth section was Health Concern having 3 questions. While sixth section was Awareness or Willingness to reduce plastic pollution comprising 10 questions. The questionnaire seeks to explore those aspects that cover the scope of the plastic consumption, such as patterns of using plastic at the workplace, environmental issues, health consequences, and levels of awareness. Through considering these numerous aspects, the questionnaire gives a comprehensive insight into what people think and do with the issue of plastic usage. The questionnaire includes both closed-ended questions (with predefined response options) and Likert scale questions (measuring agreement levels). This mix allows for quantitative analysis of responses as well as capturing nuanced opinions through Likert scale ratings. All questions are based on the research objectives that concentrate on producing information on how the occupational people in Lahore use plastic,

its impact on the environment and health, and level of awareness on the matter. This helps to focus the results the questionnaire yields on the issue that is being researched. Furthermore, the survey is built to be user- and audience-friendly for participants who operate at varied workplaces. The questionnaire was filled out by only the occupational people and they are usually educated people so questionnaire was made in English language only.

The respondents' demographic data shows that the population is primarily urban and young. The majority of responders (78.5%) are between the ages of 20 and 30, with a somewhat higher percentage of girls (59%) than males (41%). When it comes to education, a sizable percentage (57.8%) has a bachelor's degree. In terms of employment, the majority is in academics (58.5%), with public service coming in second (22.8%). The breakdown of respondents' monthly income reveals that a sizable portion (44.8%) make less than Rs 20,000. Seventy-nine percent of the sample come from metropolitan regions. All things considered, the demographic profile shows a young, educated, and largely urban population as illustrated in Figure 1 (a, b, c, d, e).

Data Analysis

The Excel response sheet containing all participant responses was imported into Statistical Package for the Social Sciences (SPSS) version 24 for analysis. Descriptive statistical analysis was performed to summarize the data, including frequencies and percentages of responses. Additionally, associations between socio-demographic variables and other variables across all sections were examined using the Chi-square test, considering nominal scale variables. This statistical method allowed for the identification of potential relationships or dependencies between different variables. In the results, associations with a significance value (p-value) less than 0.05 were reported, indicating statistically significant relationships between socio-demographic characteristics and other variables. This approach provided valuable insights into how demographic factors may influence attitudes, behaviors, and perceptions regarding plastic consumption, environmental concerns, health implications, and awareness of plastic pollution among the study participants.

Results

The majority of the respondents are females and they heat their plastic lunch boxes at their workplace. They choose different ways to heat it. But most of them directly use the microwave for heating their lunch box. About 41.9% females directly heat their lunch box in microwave and only 8.4% female's use stove to heat their lunch box. Majority of the females are more willing to pay more for biodegradable bags as compared to males. About 79.2% of females are willing to pay more while about 71.3% of males are willing to pay more for biodegradable bags as shown

in Table 1. In terms of gender, significant associations were found between heating methods of plastic lunch boxes ($p = 0.015$) and willingness to pay more for biodegradable bags ($p = 0.069$). This suggests that gender may influence preferences and behaviors related to plastic usage and environmental consciousness as shown in Table 2.

Most of the respondents are of 20-30 years of age and about 72.9% of them did not attend any seminar or session related to plastic pollution in their workplace. Only 2.7% have attended seminars on plastic pollution in their workplace. About 74.5% of respondents aged 20-30 years witnessed plastic waste and this age group people have the highest percentage of witnessing plastic waste in rivers, Lake or sea. The respondents having 20-30 years of age are most aware of plastic pollution and about 38.2% of them have awareness mostly through social media. The respondents of more than 50 years of age are least aware of the plastic pollution as shown in Table 1. Regarding age, significant associations were observed with workplace initiatives on plastic awareness ($p = 0.066$), witnessing plastic waste in natural bodies of water ($p = 0.047$), and sources of awareness about plastic pollution ($p = 0.000$). This implies that different age groups may have varying levels of exposure to and awareness of plastic-related issues as presented in Table 2.

The majority of the respondents have an education equal to a bachelor's and about 93.9% of them are worried about plastic impact on environment. The respondents having education less than or equal to matric are least worried about the plastic impact on environment. Maximum responses are of those people who have education equal to bachelors and about 93.9% of them know that plastic can cause health problems. About 89.1% of respondents having education equal to bachelors know that after heating of plastic lunch box in the microwave not only adds plastic in their food but also increases the chances of cancer. The respondents with having education equal to bachelors are encouraged fully to pay more for the biodegradable bags and about 83.9% of them are encouraged to pay more due to environmental concerns. Only 16% of them are encouraged to pay more because of the enforcement of government as shown in Table 1. Education levels showed significant associations with concerns about plastic's environmental impact ($p = 0.001$), health risks ($p = 0.000$), awareness of the health risks associated with heating plastic lunch boxes ($p = 0.024$), and factors influencing willingness to pay more for biodegradable bags ($p = 0.046$). This suggests that education may play a role in shaping attitudes and behaviors towards plastic usage and environmental responsibility as given in Table 2 (c).

Most of the respondents placed lunch for 3 to 5 hours in the lunchbox and most of them work in academic institutions. About 34.6% of academic occupational people involved in academics placed lunch for three to five hours. About 39% of respondents

having academic backgrounds directly heat plastic lunch boxes in microwave ovens while the same ratio of respondents don't even heat their lunch. In Public service offices about 33% of workers directly microwave lunch boxes. Disposable plastic cup is used by 32.5% of the total participants. Among them, academic workers have the highest percentage of using non-environmentally friendly material cups at their institutions. We asked occupational people whether their workplace has ever organized any session or seminar on plastic pollution and we found surprising results. Almost 75% of participants marked it as "No" while only 25% of workplaces haven't organized it. We also observed that 74% of workers often reuse plastic bottles. Among them 46% belong to academics shows the practice of reusing plastic bottles as shown in Table 1. Workplace types exhibited significant associations with various factors such as lunch box heating methods ($p = 0.002$), tea consumption preferences ($p = 0.000$), organization of plastic-related seminars ($p = 0.000$), and reuse of plastic bottles ($p = 0.007$). This indicates that workplace environments may influence plastic usage patterns and environmental consciousness among employees as presented in Table 2 (d).

We found a significant relationship between monthly income and the material of cups being used by workers in his/her occupational area. Workers having less than Rs 20,000 monthly income approximately 46% use disposable plastic cups at the workplace while for people getting more than Rs 40,000 about 63% of respondents use ceramic/glass cups to take tea at their occupation. Surprisingly, 76% of respondents are willing to pay more for biodegradable bags. From which 73% of people having less than Rs 20,000 salary are willing to pay more. While workers taking more than Rs 40,000 per month are also willing to pay more for biodegradable bags. It has been noted that 58% of people having low income show behavior of preferring neither plastic nor biodegradable bags but their behavior depends on availability of any kind of bag as shown in Table 1. Monthly income levels were associated with tea consumption preferences ($p = 0.000$), willingness to pay more for biodegradable bags ($p = 0.007$), and reasons for preferring plastic bags over biodegradable ones ($p = 0.001$). This suggests that income may influence attitudes towards sustainable consumption practices as given in Table 2.

Despite living in urban areas, 51% of people do not know the triangle symbol i.e., the recycling symbol while 36% of rural people knew about this symbol. The majority of the participants are willing to pay more for biodegradable bags. 81% of respondents belong to urban areas whereas 18% of them belong to rural areas as shown in Table 1. Urban/rural area residency showed associations with awareness of the meaning of the triangle symbol on plastic products ($p = 0.043$) and willingness to pay more for biodegradable bags ($p = 0.024$). This indicates that urban and rural residents

may have different levels of awareness and willingness to adopt eco-friendly practices as provided in Table 2.

Table 1. Showing the frequency and percentages of responses of respondents.

Section 02: Occupational Profile			
Question	Options	Frequency (n=400)	Percentage
Where do you mostly use plastic at your workplace?	Stationery	81	20.3%
	Food packaging	149	37.2%
	Bags/bottles	170	42.5%
Did your office or workplace follow the reduce, reuse or recycle strategy for plastics?	Yes	152	38%
	No	248	62%
For how many hours your lunch is placed in lunch box?	1-2 hours	102	25.5%
	2-3 hours	92	23%
	3-5 hours	151	37.8%
	More than 5 hours	55	13.7%
How do you heat your plastic lunch box at your workplace?	Directly microwave lunch box	147	36.8%
	Use non-plastic material to microwave your lunch	83	20.7%
	Use stove	36	9%
	Don't heat	134	33.5%
What do you use to take tea at your workplace?	Disposable plastic cup	130	32.5%
	Disposable paper cup	79	19.7%
	Ceramic/glass cup	191	47.8%
How many plastic bottles (half liter or 1.5 liter) do you buy per week at your workplace?	0	136	34%
	1-3	196	49%
	4-6	40	10%
	More than 6	28	7%
Have your workplace organized any seminar/session on plastic?	Yes	97	24.3%
	No	303	75.8%
Section 03: Practice of Plastic Consumption			
Question	Options	Frequency (n=400)	Percentage
Do you use refill water bottle?	Yes	350	87.5%
	No	50	12.5%
Which type of lunch box you use?	Disposable	47	11.8%
	Steel box	64	16%
	Glass box	21	5.2%
	Regular plastic box	268	67%
Do you use Plastic (polythene) bag to carry your lunch box?	Yes, I use	219	54.8%
	No, I don't use	109	27.3%
	I don't use any bag	35	8.8%
	I use paper/cloth bag	37	9.3%
From where you get drinking water at your workplace	Buy water bottle	66	16.5%
	Filter/dispenser/cooler	191	47.7%
	Bring from home	143	35.8%
Do you reuse plastic bottle or throw it?	Reuse it	296	74%
	Throw it	104	26%
Section 04: Environmental Concern			
Question	Options	Frequency (n=400)	Percentage
Why do you prefer plastic bag over biodegradable bag?	Cheap	70	17.5%
	Easy to carry and throw	74	18.5%
	Depend on availability	256	64%
Are you worried about plastic impact on environment?	Yes	366	91.5%
	No	34	8.5%
Do you know plastic is causing climate change?	Yes	312	78%
	No	14	3.5%
	No idea	74	18.5%
Do you know plastic is a threat to aquatic life?	Yes	351	87.8%
	No	11	2.7%
	No idea	38	9.5%

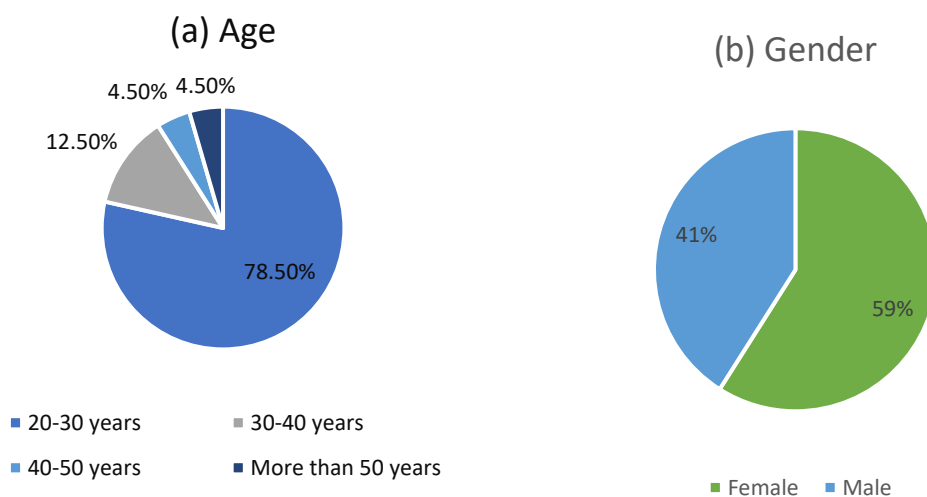
Have you ever witnessed plastic waste in River, Lake or Sea?	Yes No	309 91	77.3% 22.8%
Do you know micro plastic enters to our food?	Yes No No idea	268 56 76	67% 14% 19%
Section 05: Health Concern			
Question	Options	Frequency (n=400)	Percentage
Does plastic causes health problems?	Yes No No idea	356 8 36	89% 2% 9%
Does ingesting micro plastic causes negative impact on your immune system?	Yes No No idea	291 16 93	72.8% 4% 23.3%
Do you know heating plastic lunch box in the microwave oven adds plastic in your food and increases the chance of cancer?	Yes No	345 55	86.3% 13.7%
Section 06: Awareness/Willingness			
Question	Options	Frequency (n=400)	Percentage
Do you know the meaning of a triangle symbol on plastic products?	Yes No	182 218	45.5% 54.5%
Should government completely ban plastic bag?	Yes No	341 59	85.3% 14.7%
Are you willing to pay more for biodegradable bags?	Yes No	304 96	76% 24%
What encourages you to pay more for biodegradable bags?	Due to environmental concern Due to government enforcement	328 72	82% 18%
Would you like to be a part of plastic reduction initiative?	Yes No	363 37	90.8% 9.3%
Would you reduce your own plastic waste	Yes No	355 45	88.8% 11.3%
Do you know plastic take thousands of years to degrade?	Yes No	331 69	82.8% 17.3%
From where did you get awareness of plastic pollution?	Academia Broad cast media Social media	175 101 244	43.8% 25.3% 61%
In your opinion who can play an effective role in banning the use of plastic?	Government Public Both	72 44 284	18% 11% 71%
Do you think that "Avoiding use of one plastic straw can save the planet"?	Yes No	360 40	90% 10%

Table 2. Chi square tables representing association of socio-demographic profile variables with others

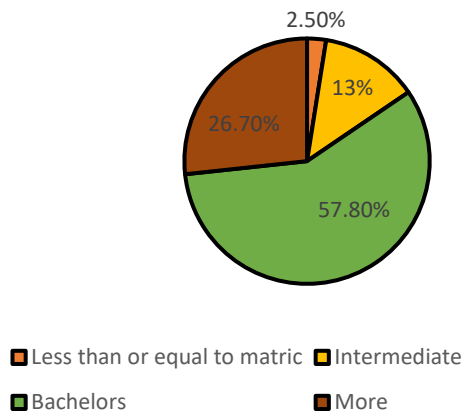
<i>a) w.r.t Gender</i>			
Variables	χ^2	Df	Significance
How do you heat your plastic lunch box at your workplace?	10.404	3	0.015
Are you willing to pay more for biodegradable bags?	3.307	1	0.069
<i>w.r.t Age</i>			
Variables	χ^2	Df	Significance
Have your workplace organized any seminar/session on plastic?	7.176	3	0.066
Have you ever witnessed plastic waste in River, Lake or Sea?	7.941	3	0.047
From where did you get awareness of plastic pollution?	46.252	18	0.000
<i>w.r.t Education</i>			
Variables	χ^2	Df	Significance

Are you worried about plastic impact on environment?	15.937	3	0.001
Does plastic causes health problems?	34.243	6	0.000
Do you know heating plastic lunch box in the microwave oven adds plastic in your food and increases the chance of cancer?	9.403	3	0.024
What encourages you to pay more for biodegradable bags?	8.008	3	0.046
<i>w.r.t. Workplace</i>			
Variables	χ^2	df	Significance
For how many hours your lunch is placed in lunch box?	26.481	12	0.009
How do you heat your plastic lunch box at your workplace?	31.173	12	0.002
What do you use to take tea at your workplace?	43.708	8	0.000
Have your workplace organized any seminar/session on plastic?	34.804	4	0.000
Do you reuse plastic bottle or throw it?	14.183	4	0.007
<i>w.r.t. Monthly income</i>			
Variables	χ^2	df	Significance
What do you use to take tea at your workplace?	36.668	4	0.000
Are you willing to pay more for biodegradable bags?	10.040	2	0.007
Why do you prefer plastic bag over biodegradable bag?	17.908	4	0.001
<i>w.r.t. Area</i>			
Variables	χ^2	df	Significance
Do you know meaning of triangle symbol on plastic products?	4.106	1	0.043
Are you willing to pay more for biodegradable bags?	5.078	1	0.024

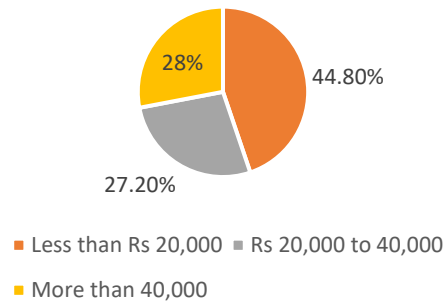
Figure 1: (a, b, c, d, e, f) showing percentage responses of section 1 Sociodemographic Profile



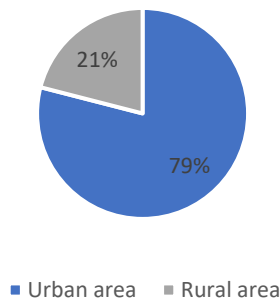
(c) Education



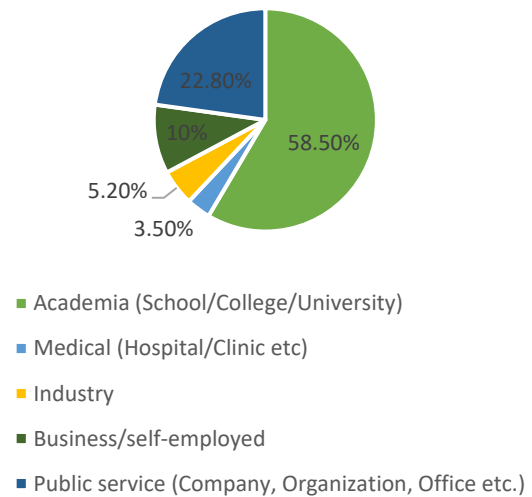
(d) Monthly Income



(e) Residency



(f) Workplace



DISCUSSION

The discussion presents a thorough examination of workplace plastic consumption trends, highlighting the importance of understanding attitudes and actions about plastic use for environmental sustainability. Above-mentioned results give an insight of plastic consumption pattern by analyzing the knowledge, attitude, and practices of plastic consumption at workplace. Most of the people consume plastic in the form of bags and bottles. This demonstrates that the majority of the respondents irrespective of their age, gender, education, workplace, monthly income, and residential areas utilize different products of plastic in their daily life activities, this is corroborated by three studies conducted in South Africa, Australia

and Kenya (Brien and Thondhlana, 2019; Dilkes-Hoffman *et al.*, 2019; Otsyina *et al.*, 2018) respectively. The study conducted in South Africa analyzed patterns of plastic bag consumption regardless of intervention efforts showing that plastic use continues despite perceptions of environmental problems. Similarly, according to the Australian study, people are also very concerned about the environmental effects of plastics and want to see a decrease in the use of plastics, but they are depending on the government and industry to take action.

Moreover, the study conducted in Kenya presented valuable perspectives on the methods employed for disposing of plastic garbage and its adverse impacts on animals, demonstrating the

worldwide reach of the plastic pollution problem. This is due to widespread availability of plastic and its cheapness as compared to other alternatives. The plethoric presence of plastic could be the key attributable reason for its abundant usage in daily life. As we have seen, 67% of respondents use regular plastic lunch box for their lunch that remains in their boxes for 3-5 hours. Moreover, 36.8% of respondents directly microwave their lunch. Hence, the threat of plastic entering their food chain increases. A similar study in India backed up our results (Khanam *et al.*, 2019). The average volume of one plastic bottle is 330-500ml which is insufficient to satisfy the daily needs of hydration of the average individual. Therefore, it can be claimed that single-use plastic bottles are not required to supply the daily needs of water. So, the community should adopt the practice of replacing these single-use plastic bottles with reusable bottles. It is concluded that the patterns of consumer behavior with single-use plastic bottles can be altered with those of environmentally beneficial. This result is consistent with the study by Khoironi states the increasing consumption of single-use plastic bottles (Khoironi and Anggoro, 2019). Seminar on plastic pollution is a good source for dissemination of information about plastic pollution and also changes the attitude of people towards its unsustainable consumption. Furthermore, irrespective of the status of education, gender, and age level people can get awareness from these sessions (Adane and Muleta, 2011). A large population (75% of respondents) highlighted that not even for a single time any seminar or event on plastic pollution has ever held at their workplace. Thus, educating the people through such events at the workplace can help the people to better understand the adverse effect of plastic product consumption (Shahzad *et al.*, 2024b). Around 67% of respondents prefer plastic bags over biodegradable bags because of their availability and results are backed up by a study conducted in Yemen city. More plastic bags added each day in environment that cause pollution and climate change in long run. Plastic debris are not only a hazard to maritime activities including fisheries and tourism but also cause aesthetic problems. Since a large number of populations has witnessed plastic waste in lakes, river, and sea that shows that plastic is a real time problem. About 67% of respondents know that microplastic enters to our food and were also worried about negative impacts of plastic on health. There has been much speculation that ingestion of

microplastic has a potential to transfer toxic substances to food chain (Rhein and Schmid, 2020). The understanding of plastic pollution and its effects on human health by respondents was measured by adding a section on health. Majority of respondents (89%) knows that plastic cause negative health issues. On the other hand, about 9% of people have no idea whether plastic is impacting human health or not. Almost similar results have been found in a survey conducted in Alabama University (Attitude and action regarding single-use plastic bags) and authenticated by Soares (Soares *et al.*, 2021). A study conducted by Sutton and Turner, 2012 demonstrates the use of plastic food containers and their impacts on health showing that plastic increase the risk of cancer. Studies have explained the deteriorating impacts of plastic on human health. Micro and nano plastic can be absorbed by the brain and potentially affect the central nervous system (Cordier *et al.*, 2021). Burden of chemicals used in plastic manufacturing are correlated with reproductive abnormalities in human population. Formaldehyde and styrene -chemicals that are used to form plastic- are potential carcinogens and directly microwaving the food could increase the negative impact many folds. Awareness of the deteriorating impacts of plastic consumption and willingness to substitute plastic are the key indicators that can minimize plastic pollution (Henderson and Green, 2020). Concerning to management of plastic waste, a large percentage of workplaces respondent (62 %) does not follow the 3R (Reduce, Reuse and Recycle) strategy for plastic but majority 74 % of respondent reuse their plastic bottles. This is backed up with a study conducted in Europe (Filho *et al.*, 2021). It also demonstrates that the public, even without much awareness was willing to pay more. A recycling awareness survey in Turkey by Aksan and Celikler, 2019 stands for similar results that desire to save the natural ecosystem. It has been seen that environmental concern is the key indicator that encourages the masses (82%) to pay more for biodegradable bags. The study is endorsed by a similar study conducted in Jimma city of Ethiopia by Legesse (Adane and Muleta, 2011). Most of the participants (90.8%) are willing to become part of the plastic reduction initiative. About 88.8 % of them were ready to reduce their plastic consumption. Various actions to discourage plastic use at the workplace include 1. Ban on plastic use due to government order, 2. Reuse of plastic products and 3. Shift to biodegradable products. About 61 % of

respondents got information about plastic pollution from social media. This corroborates with the study conducted in the Czech Republic by David and Bruno (Walther *et al.*, 2021). Moreover, 71% of them think that both government and public should take part to ban plastic use. Lastly, 90% of participants were aware of the consequences of the use of a single plastic product e.g., straw (Chen *et al.*, 2021). Through long-term collaboration of private enterprises and government, it would be possible to avoid environmental deterioration due to plastic pollution (Shahzad *et al.*, 2024a). Various activities that involve students, teachers, and local people will help in spreading awareness and environmental education. Our study shows the frequency of plastic consumption in different forms (bags, boxes, bottles, cups, and straws) at workplace. The study shows the differences of practices in people of different age, gender, and area for consuming plastic at their working space. Moreover, it highlights the attitude towards plastic consumption, and willingness of people to have a pollution-free environment. It opens the way for conducting researches in future regarding plastic consumption pattern in Pakistan. The findings of the study identify potential areas for further investigation, including how well Pakistani government policies reduce workplace plastic consumption, how educational seminars affect behavior changes related to plastic use, what socioeconomic factors influence people's attitudes toward biodegradable plastics, and whether or not public-private partnerships are feasible for sustainable plastic management. Furthermore, research studies are able to observe how attitudes and behaviors about the use of plastic have changed over time. Future research focused on understanding cultural and regional differences in plastic consumption patterns could be very beneficial and contribute to worldwide efforts to achieve sustainability in the environment.

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Conclusions

This article evaluated the knowledge, attitude and practice of occupational people working in Lahore towards the use of plastic at their workplace, associating them with their profile and characteristics. We found that participants have good knowledge of impacts of plastic on public as well as environmental health, whereby more than half of them are willing to pay more for biodegradable plastics. This feature stands out in respondents with higher education level, who are more worried about environmental problems due to plastic pollution. It is also suggested that people have good knowledge about the impacts of plastic on public as well as environmental health but they usually don't practice it and show negligent attitude towards the use of plastic and its products.

To overcome such attitudes, we need seminars to educate people but more importantly people usually don't follow environmentally friendly practices which means that enforcement through government interventions and policies on particularly to reduce plastic waste are required immediately in Pakistan. Combination of sound policies and education (awareness) may help to address the major environmental problem and may also help to reduce environmental pressure posed due to plastic pollution. It is expected that present findings may offer an effective portrayal of occupational people of Lahore their knowledge, attitude and practice of plastic consumption at workplace.

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Declaration of Interest Statement

The authors declare that there is no conflict of interest with respect to the publication of this article.

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