

Beyond Enforcement: Evaluating the Effectiveness of Punjab's 75-Micron Plastic Bag Regulation in Lahore

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ABSTRACT

Plastic pollution is a major environmental problem across Pakistan. Single-use plastic items accumulate as waste, polluting waterways and soil. To reduce overall single-use plastic waste, the Punjab government released the 2023 regulations on the production and consumption of single-use plastic. This regulation required plastic bags across Punjab to have a minimum thickness of 75 microns (micrometers) and prohibited the production and consumption of thinner bags. Due to repeated observed failures in the policy's primary objective despite the Environmental Protection Agency's involvement, this study investigates whether the continued proliferation of plastic bags is caused by implementation gaps by executive authorities or by strategic flaws in the policy design itself. Data were collected through field observations across Lahore, including measurements of plastic bag thickness using a micrometer, and qualitative interviews with retailers regarding their compliance and views on the Plastic Bag Regulation. The study concludes that an economically unattractive middle ground is created by the Punjab government's policy, which makes compliant bags severely uncompetitive in price for informal sellers as compared to bigger retail shops, with thicker bags costing around 1100 to 1200 rupees per kilo, and thinner bags costing between 600 to 800 rupees per kilo. The policy requires both stronger enforcement, which focuses on reducing the production of thin plastic bags, and the need to incorporate strong economic support mechanisms that make the compliant choices more rational for retailers.

INTRODUCTION

Background

Global plastic waste exceeds the global animal biomass, yet it only began being widely used less than a century ago. Plastic pollution is a huge environmental concern in Pakistan, with 3.3 million tonnes of plastic waste generated annually, including 55 to 112 billion single-use plastic bags (*Pakistan Environmental Protection Agency*, n.d.-a; *Pakistan Environmental Protection Agency*, n.d.-a). Plastic pollution is persistent once it is in the environment and may take between 100 and 1,000 years or more to decompose. In marine and land environments, it places species at higher risk of ingesting plastics, suffocating, and becoming entangled in pollution, which can lead to internal and external injuries that reduce the ability to swim and fly (US EPA, 2023). Plastic can also impact human health; it breaks down

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into microplastics due to solar radiation, wind, and currents, etc. These particles can cross cell membrane walls, seeping carcinogenic chemicals that can cause developmental, reproductive, and immune disorders, etc (*Plastic Pollution*, n.d.). In order to protect natural environments and human health, it is essential that plastic usage is reduced, especially single-use plastics, as they are not durable and tear or break in one use, leading to more waste accumulation. One highly used single-use plastic item is plastic bags. Thin plastic bags are often less than 20 micrometers thick; hence, they tear into small pieces of film in 1 or 2 uses. This film is too thin to recycle as it can jam machinery, meaning that it will eventually end up in a landfill or polluting waterways. The pollution then spreads microplastics, which are dangerous for human health. The film itself can block sewage systems, chemicals can leach from it and contaminate groundwater, and it can be consumed by animals. This shows the detrimental effects that thin plastic bags have on the environment. Hence, it is important to move away from the use of plastic bags towards more sustainable alternatives that are better for the environment.

Policy Context

In order to regulate the production and usage of single-use plastics, the province of Punjab released the 2023 Plastic Regulations. In terms of plastic bags, the regulation dictates that all plastic bags must have a minimum thickness of 75 micrometers and be made of a minimum of 20% recycled plastic (*Plastic Regulations 95 of 2023*, n.d.). The intended objective is to shift towards the wide usage of thicker plastic bags that are more durable and can be reused multiple times. This will lead to a reduction in the amount of waste generated from plastic bags. It also serves as a pathway that can be used to slowly transition industry and consumer mindsets towards the complete banning of plastic bags and towards the usage of reusable and sustainable alternatives such as cloth bags. The thorough implementation of this policy would, in theory, lead to the complete eradication of thin plastic bags (*Pakistan Environmental Protection Agency*, n.d.-b).

Problem Statement

Although the Punjab Plastic Regulation was introduced in 2023, thin plastic bags remain common across Lahore, especially in informal sectors such as fruit carts and small corner shops. Bigger retailers (Mega stores such as Alfatah and Imtiaz) have shifted towards reusable cloth alternatives; however, small-sized sellers (local supermarkets, fruit carts, etc) still widely use thin plastic bags. There is an ongoing debate on why repeated attempts at solving the increasing plastic waste material issue through government efforts have failed. While legislators argue it is largely an enforcement issue, on-ground executive authorities have often blamed policy failure. The current debate is whether uneven compliance is due to enforcement failures or policy failures. Most studies investigate the plastic bag ban generally, looking at factors that lead to its low implementation, etc (Muposhi et al., 2022). Not many have investigated thickness-based regulations, and there is an even bigger disparity in a Pakistan- and specifically Lahore-based context. The main aim of this study is to evaluate whether the continued proliferation of thin plastic bags in Lahore results primarily from implementation shortcomings or policy design limitations.

Research Questions

The main research questions that will be investigated in this study cover everything from the environmental friendliness of thicker bags to the effectiveness of the Plastic Bag Policy and its implementation. First, it will be investigated whether thicker plastic bags are better for the environment **than thinner bags**. Secondly, the effectiveness of the regulation will be investigated by seeing the extent of its implementation. Finally, this study will assess whether the proliferation of plastic bags is caused by implementation issues, or if the policy itself has gaps. The factors that affect retailers' decisions to buy thinner or thicker bags will be explored, so that we can see the extent to which socioeconomic positions and buying power affect environment-related decisions. It will also be seen if the abundance of thinner plastic bags adds to their continued usage across Lahore.

Research Objectives

The primary objective of this study is to evaluate whether the continued proliferation of thin plastic bags in Lahore results from implementation shortcomings or policy design limitations. In doing so, the study aims to assess the environmental effects of different plastic bag types, evaluate the effectiveness of Punjab's 75-micron regulation, and examine the influence of cost, availability, and durability on retailer behaviour.

Significance of the Study

This study contributes to the limited body of literature examining thickness-based plastic bag regulations, particularly within the context of Pakistan and Lahore. By investigating the socioeconomic and policy-related factors influencing compliance, the study seeks to provide insights that may assist policymakers in designing more effective environmental regulations and implementation strategies.

LITERATURE REVIEW

The thickness of plastic bags is often measured in microns (1 micron is 0.001 millimeters). Plastic bag thickness measures how thick the film is, in other words, how much film forms the bag's structure. Thicker plastic bags are stronger, more durable, and have higher resistance to puncture; because of this, they have slightly higher cost and weight. Thinner plastic bags are more flexible, making them cheaper, but easier to tear and stretch under heavy load. Since thicker plastic bags are more durable, when used multiple times, they serve as a more sustainable alternative to thinner plastic bags. Thin plastic bags are made of light film; hence, they tear and stretch more easily (Good, 2025). However, they are much cheaper than thicker plastic bags; hence, they are more widely used, showing a trade-off between environmental and economic factors.

Governments around the world have adopted a variety of approaches to reduce plastic bag consumption, including bans, taxation, and minimum thickness requirements. Developing countries are often more likely to adopt strict regulations due to visible environmental degradation, inadequate waste management

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infrastructure, and increasing public concern regarding plastic pollution. Widespread policy adoption remains inconsistent. Some countries have successfully reduced plastic bag usage through taxation and bans, while others have failed to do so. The effectiveness of such policies is influenced by public acceptance and awareness, institutional capacity, etc. This shows that the presence of regulation alone is not enough to ensure compliance (Knoblauch et al., 2018).

Many plastic bag policies assume that environmentally friendly alternatives are financially accessible to all consumers and businesses. In reality, lower-income populations face barriers to compliance because they prioritize affordability and accessibility over environmental consideration (Muposhi et al., 2022). Household income, education levels, and demographic characteristics influence whether consumers rely on disposable plastic bags or reusable alternatives. Environmental awareness alone is not sufficient to drive behavioural change if more sustainable alternatives remain economically unattainable (Zambrano-Monserrate & Alejandra Ruano, 2020).

The effectiveness of plastic bag regulations also appears to vary across different retail environments. Formal supermarkets tend not to use plastic bags and instead use sustainable alternatives like cloth bags. Consumers in these markets are more willing to pay for alternatives, and retailers operate under strict oversight. Informal markets, on the other hand, still tend to use plastic bags due to lower enforcement and greater sensitivity to cost. This shows how the buying power of the consumer, the allowance of the retailer, and the differences in enforcement can lead to big gaps in policy implementation across different market types and socioeconomic groups (Wang & Li, 2021).

METHODOLOGY

Research Design

This study uses a mixed-methods research design to evaluate the effectiveness of Punjab's 2023 plastic bag thickness regulation. By combining quantitative (plastic bag thickness) and qualitative measures (interviews with retailers), the study will assess the influence of enforcement mechanisms and socioeconomic factors on compliance with the 75-microns requirement. A case study approach was adopted, focusing on Lahore as an urban environment with diverse market types, different income levels and a mix of formal and informal retail markets.

Study Area

The research was conducted within Lahore, Pakistan's second largest city and the capital of Punjab. Data collection was carried out across 10 administrative zones to capture variation in compliance patterns. The 10 zones are: (Cantt, Gulberg, Allama Iqbal, Nishtar, Samanabad, Wagha, Data Ganjh Baksh, Ravi, Shalimar, and Aziz Bhatti). The districts encompass a range of socioeconomic contexts, from higher-income commercial areas, dominated by supermarkets and big retailers, to lower-income neighborhoods characterized by small grocery stores, cart vendors, and informal retail markets.

Data Collection Methods

Data collection consisted of three complementary methods: field observations, plastic bag thickness measurements, and interviews. Plastic bags were collected from each surveyed shop; their thickness was measured using a digital micrometer to determine their compliance status, with the minimum thickness requirement of 75 micrometers. Semi-structured (informal, with questions being asked depending on the conversation) interviews were conducted with shop owners (target n= 40-45) to explore their awareness of the regulation, experiences with inspections and fines, supplier relationships and factors influencing bag selection. Interviews were also planned to identify whether cost, availability, durability, or customer preferences played a greater role in determining purchasing decisions than the need to adhere to the law.

Sampling Strategy

A purposive sampling strategy was employed to ensure representation from all types of retail sectors; only shops that used plastic bags were included in the study, as the focus was to check the level of compliance within the plastic bag category. Five shops were selected using simple random sampling from each of the 10 administrative zones, aiming for a sample of 50 shops. However, many retailers refused to be interviewed, reducing the sample size to 44 shops. The sample included supermarkets, convenience stores, corner shops and fruit stalls. This approach allowed comparisons between retail environments with differing economic characteristics.

Data Analysis

Descriptive statistics were used to summarize compliance rates, bag thickness measurements, and price differences between thin plastic bags, compliant thicker bags, and reusable cloth alternatives. Interview responses were transcribed and coded thematically to identify patterns relating to cost sensitivity, product availability, durability, customer demand, and enforcement experiences. These themes were compared across different shop types to see how socioeconomic conditions influence compliance behavior.

Mapping was also incorporated through the development of a digital compliance map of Lahore. Surveyed shops were categorized according to their level of compliance and represented using a color-coded system, allowing for the visualization of implementation trends. The analysis focused on identifying relationships between market structures, socioeconomic conditions, and compliance levels. This approach allows an assessment of whether the use of thin plastic bags is primarily driven by low enforcement or by economic and policy-related barriers.

Ethical Considerations

Participation in interviews was voluntary, and verbal consent was obtained from all respondents before data collection.

Limitations

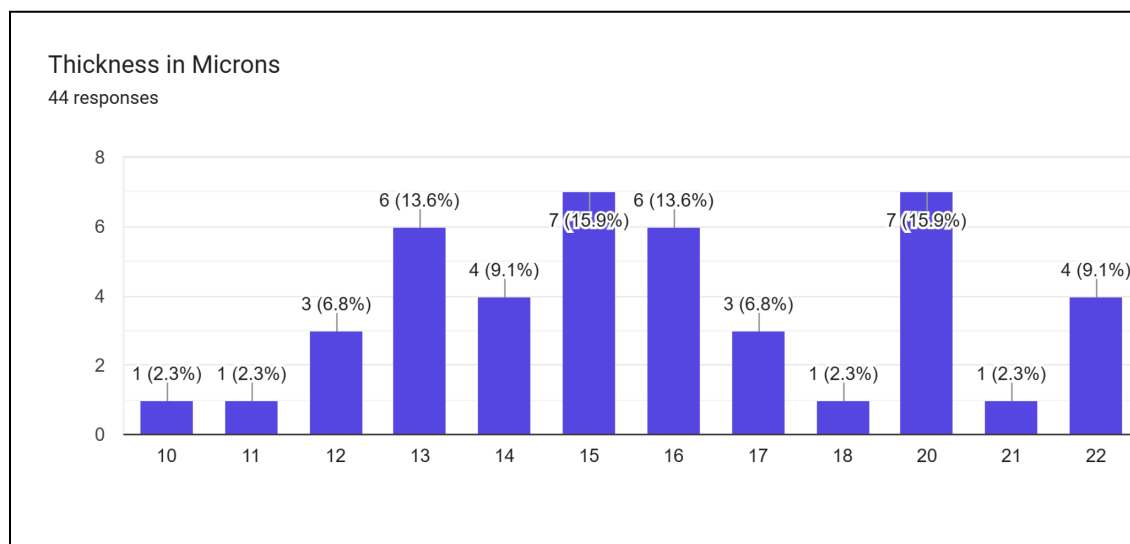
Many retailers refused to give interviews; this reduced the sample size from 50 shops to 44 shops. Even the ones who gave interviews at first were hesitant and needed to be convinced. This hesitance and refusal comes from the fear of the EPA fining them and confiscating their illegal plastic bags. Many of them mentioned they had been previously fined by the EPA and their bags had also been confiscated. Many small fruit cart owners said how they had to shut down for a week when they were last fined. Hence, the reduced sample size is explained by the resistance of the retailers to answer questions due to fear of the EPA finding out and fining them.

RESULTS

Compliance Levels Across Surveyed Shops

Out of the 44 surveyed shops, none were found to be compliant with Punjab's 75-microns plastic bag regulation. All of these shops were smaller neighbourhood stores, fruit vendors, and roadside carts. Bigger supermarkets and retail chains were using cloth bags. The middle option of the compliant thicker plastic bag was used by no one.

Figure 1: Thickness in Microns of Plastic Bags



Plastic Bag Thickness Measurements

As seen in Figure 1, micrometer measurements revealed variation in bag thickness among surveyed bags. All the bags were substantially below the regulation, with the thinnest ones being around 10 micrometers and the thickest being 20 to 22 micrometers. The range of observed thicknesses show that non-compliant products remain readily available within Lahore's supply chains.

Figure 2: Amount of Plastic Bags Bought in a Month

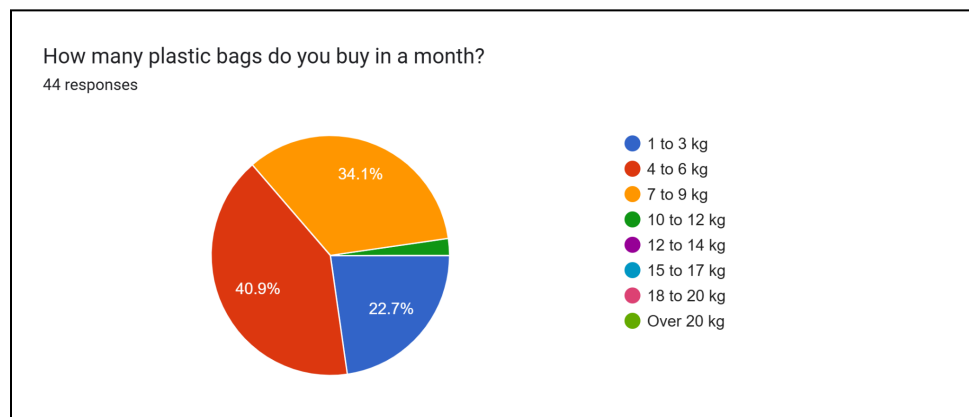


Figure 3: Cost of Monthly Plastic Bag Stock



Pricing Patterns and Plastic Bag Stocks

As seen in Figures 2 and 3, price comparisons show clear connections between the amount of plastic bags bought each month and their **monthly cost**. Thinner plastic bags, with thickness varying from 10 to 22 microns, fell into similar price ranges. The amount of bags bought in a month was dependent on the size

of the shop and the scale of their operation. Fruit carts typically bought less than 3 kgs of plastic bags a month, compared to around 7 to 9 kgs being bought by bigger shops selling everyday items such as dairy products. This shows how smaller businesses already find thin bags to be expensive; hence, switching to thicker bags that are 200 to 300 rupees more expensive than thinner bags is not feasible.

Figure 4: Awareness of the Availability of Thicker Bags and Level of Access



Figure 5: Reasons for Buying Non-compliant Bags

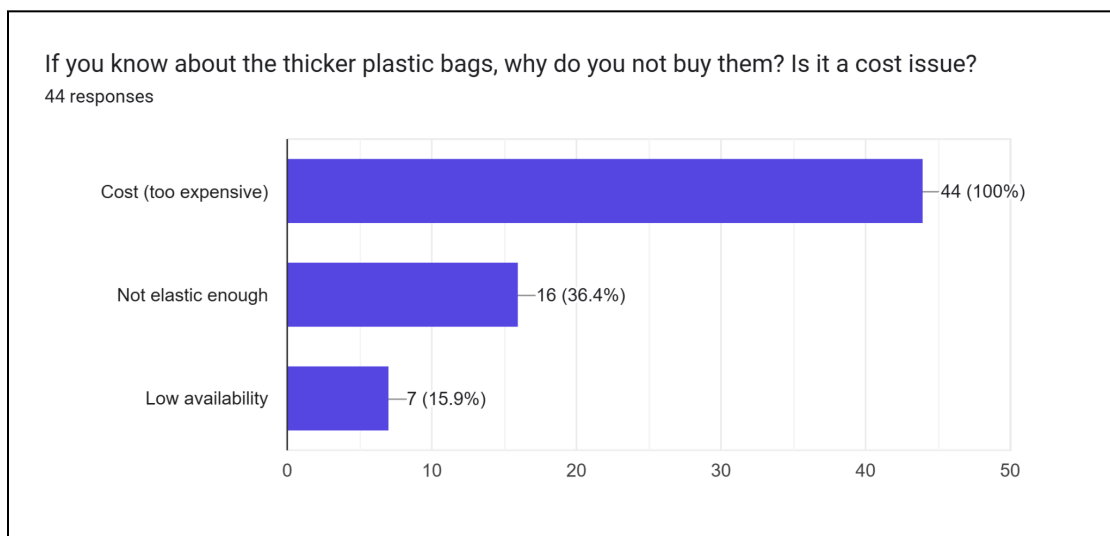
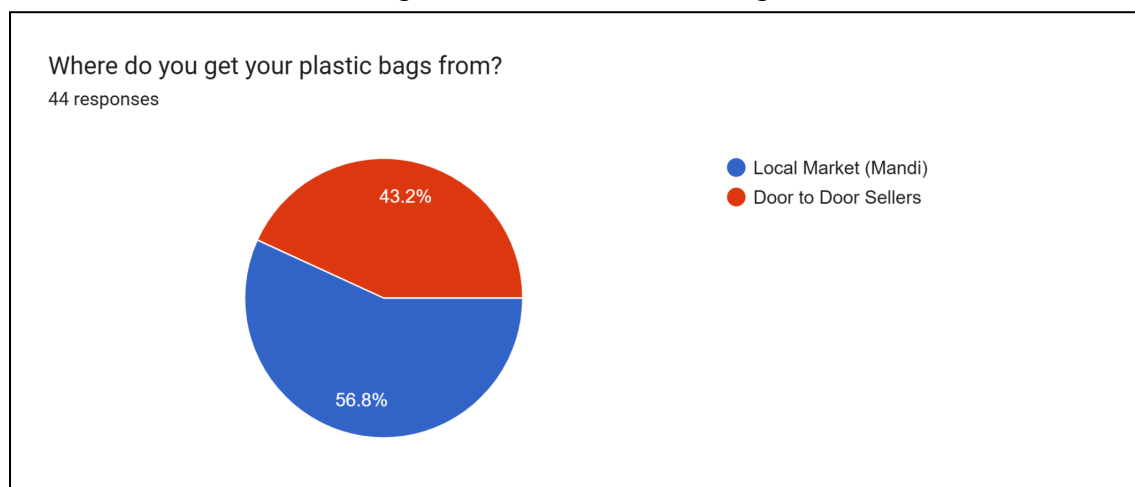


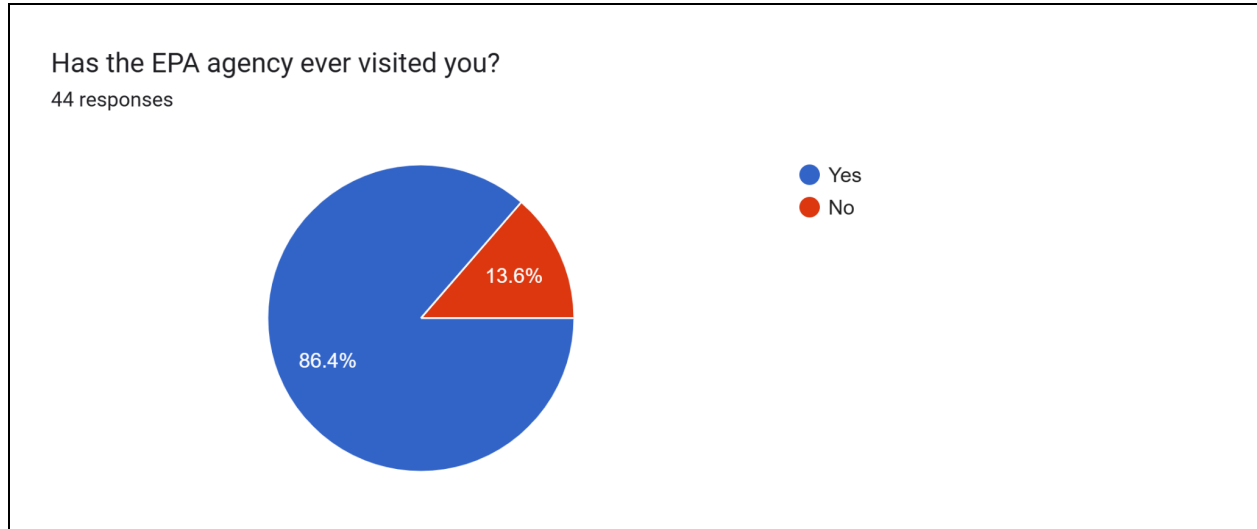
Figure 6: Source of Plastic Bags



Interview Findings

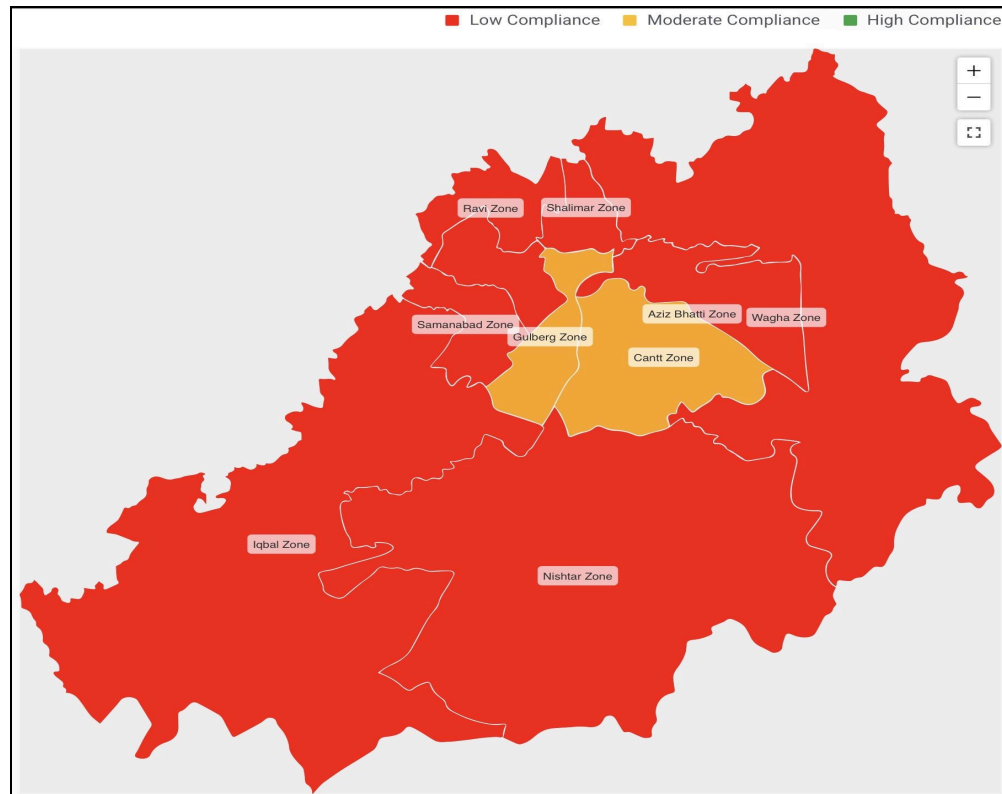
As seen in Figures 4, 5, and 6, semi-structured interviews with retailers highlighted several recurring themes. All retailers were aware of the different thicknesses of plastic bags available and the plastic bag regulation. However, none of them bought the thicker bags, and three main reasons were identified as to why they did so. Cost was the most frequently cited reason for selecting thinner bags. The lack of elasticity of thicker bags was also identified as a factor for preferring thinner bags. Availability of compliant bags within local supply chains was also mentioned by several respondents. The source of all the plastic bags was either local farmer's markets (mandis) or door-to-door sellers. Most retailers weren't aware if their sellers had thicker plastic bags or not; only very few suppliers had thicker bags available.

Figure 7: Inspections by the EPA



As seen in Figure 7, when it comes to awareness of the regulation and interactions with the implementation agency (EPA), all retailers were fully aware of the regulation and knew their bags weren't compliant. The EPA also visited a majority of the shops, and warnings or fines were given. However, some shops were able to hide their bags and avoid consequences.

Figure 8: Compliance Map of Lahore, Administrative Zone-wise



Spatial Distribution of Compliance

As seen in Figure 8, compliance patterns were visualized through a digital mapping exercise incorporating all surveyed locations. Areas with higher concentration of organized retailers generally demonstrated greater adherence to the regulation, while the opposite was true for areas with smaller informal retailers. Even though no plastic bags found were compliant, Cantt and Gulberg are given a moderate compliance status because many shops used cloth bags, and the same shop types in other areas were using plastic bags instead. Hence, showing slightly less use of plastic bags in these 2 areas.

DISCUSSION

Evaluation of Policy Effectiveness

The Punjab government introduced the 75-micron requirement with the intention of reducing plastic waste; the policy assumes that thicker bags will be more durable and hence will be reused multiple times, reducing the amount of waste produced by plastic bags.

Field observations show that overall compliance remains limited. Larger retailers tend to go plastic bag free and switch to cloth bags, as there is less of a price difference between thicker plastic bags and cloth bags than thinner and thicker plastic bags. Because of this, thin plastic bags continue to dominate in

informal retail areas, suggesting that the policy only partially achieved its objective of reducing plastic bag waste.

The regulation appears effective in raising awareness, as all retailers using non-compliant bags have knowledge of it. A large majority of them have been visited by the EPA and faced penal consequences such as warnings and monetary fines, etc. On the implementation side, bigger retailers who can afford cloth bags were using them throughout Lahore. Non-compliant bags remained widespread across all the surveyed locations. While this regulation has succeeded in introducing environmental considerations into retail practices, its impact has been uneven and insufficient to alter consumption patterns across different socioeconomic groups. These findings suggest that the regulation has been effective in raising awareness but less successful in achieving its broader objective of eliminating thin plastic bags from circulation.

Enforcement Challenges

The persistence of thin plastic bags cannot be entirely attributed to a lack of enforcement, as evidence collected during fieldwork suggests that implementation mechanisms are present and active. All retailers showed awareness of the regulation and reported previous encounters with inspection teams from the EPA. Several respondents indicated that enforcement campaigns have recently taken place and that businesses found in possession of non-compliant bags were subjected to fines.

However, enforcement efforts appear to be uneven and constrained by practical limitations. Inspection campaigns are often conducted as periodic sweeps targeting commercially prominent areas. Smaller neighbourhood markets, roadside stalls, etc receive comparatively less attention and consequently lower compliance rates. The implementation mechanism within the policy involves tiered fines and then confiscation; this means that enforcement has to be done in layers. In a sprawling metropolis like Lahore, filled with different market types, it makes thorough and even implementation very difficult.

EPA Shortcomings

While field observations show that enforcement activities are actively conducted by the EPA, implementation remains constrained by institutional and logistical limitations rather than a complete absence of enforcement. Recent reforms have focused on restructuring the Agency, strengthening technical capacity, and expanding environmental monitoring across multiple sectors, including air quality, industrial emissions, climate change, waste management, and plastic pollution (*3.1 Restructuring Report.Pdf*, n.d.). Hence, plastic bag regulation represents only one component of the EPA's broader regulatory responsibilities (*Final Yearly Report EPA 2025*, n.d.). Implementation gaps should be understood not as inaction, but as a reflection of the practical limitations that come with enforcing a wide environmental regulation across a vast and diverse urban landscape.

Economic Barriers to Compliance

Field observations and interviews indicate that economic considerations play a bigger role in shaping compliance behaviour than previously anticipated. Thin plastic bags were typically available at prices ranging between approximately Rs. 600 and Rs. 1000 per kilogram, whereas compliant thicker plastic

bags generally cost between Rs. 1100 and Rs. 1300 per kilogram. Reusable cloth bags were found to cost around Rs. 1400 per kilogram. Although cloth bags are more expensive, the relatively small price difference between cloth bags and compliant plastic bags appears to influence purchasing decisions among retailers and consumers with greater financial flexibility. Since the EPA encourages shops to become plastic bag-free, those who can do so switch quickly. As these larger stores accommodate people with greater purchasing power, they are often able to make up for losses by charging the consumer 50 to 100 rupees for a bag.

Small businesses operating with narrow profit margins, including fruit vendors and neighbourhood grocery stores, frequently reported that they were unable to absorb the additional costs associated with thicker plastic bags. Consequently, these businesses continue to rely on cheaper thin plastic bags despite being aware of their illegality.

This pattern suggests the existence of what may be described as a *Missing Middle Effect*. The regulation implicitly assumes that retailers and consumers will transition from thin plastic bags to thicker compliant ones. However, field observations indicate that this transition rarely occurs in practice. Instead, lower-income retailers remain dependent on thin plastic bags due to their affordability, while higher-income consumers and businesses often skip compliant plastic bags entirely and adopt cloth bags. As a result, thicker plastic bags occupy an economically unattractive middle ground and remain underutilized.

Policy Design Limitations

The findings of this study suggest that shortcomings in policy design may ultimately be more influential than implementation challenges in explaining the persistence of thin plastic bags. Punjab's thickness regulation assumes that consumers and businesses possess the financial capacity and market access needed to adopt compliant alternatives. However, the policy provides few mechanisms to facilitate this transition, particularly for small retailers.

Unlike other environmental policies that incorporate subsidies, phased implementation schedules, or financial incentives, the 75-micron regulation largely relies on punitive measures to encourage behavioural change. No provisions exist to reduce the wholesale cost of compliant bags, support manufacturers, or provide temporary assistance to businesses struggling to adapt. Even if enforcement was strengthened, many retailers would continue to face strong economic incentives to purchase cheaper non-compliant bags. The findings therefore show that the continued proliferation of thin plastic bags reflects not only implementation gaps but also limitations within the design of the regulation itself.

Comparison with Existing Literature

The results of this study align closely with previous research emphasizing the role of socioeconomic factors in determining the effectiveness of environmental regulations. **Muposhi et al. (2022)** argue that policies aimed at reducing plastic consumption frequently assume that environmentally preferable alternatives are financially accessible to all segments of society. The present study supports this argument

by demonstrating that affordability remains a major barrier to compliance within lower-income retail environments.

Similarly, **Wang & Li. (2021)** observed that plastic reduction policies in China achieved greater success within supermarkets than in informal markets, where weaker enforcement and higher sensitivity to cost reduced policy effectiveness. Comparable patterns were seen within Lahore, where larger retailers exhibited substantially higher compliance rates than neighbourhood stores and street vendors. However, this study extends existing literature by identifying the Missing Middle Effect, a phenomenon in which compliant thicker plastic bags remain underutilized because they do not appeal to either low-income retailers or higher-income retailers. This finding highlights the importance of considering economic incentives when designing environmental regulations.

RECOMMENDATIONS AND POLICY IMPLICATIONS

Based on the findings, Punjab's plastic bag regulation will require interventions that address implementation shortcomings and economic barriers. Strengthening enforcement alone is unlikely to eliminate the widespread use of thin plastic bags if compliant alternatives remain too expensive for a large number of retailers.

One potential strategy would involve introducing a six-month transition programme targeted at small businesses operating below a specified revenue threshold. During this period, retailers could receive compliant plastic bags at subsidized rates while gradually adapting their business to accommodate higher costs. Such a programme would reduce the immediate financial burden connected with compliance and provide businesses with a realistic pathway towards adopting environmentally safe alternatives. This is supported by the findings of Amir et al. (2025), which concluded that government subsidies to retailers would help them shift towards sustainable bags. In Pakistan, with varying socioeconomic groups and most abuses of the policy taking place in lower-income areas, transition programmes are essential to ensure that retailers are able to comply with policy while being able to sustain their livelihoods.

Policy efforts should also focus on reducing the price differences between compliant and non-compliant bags. Providing incentives for manufacturers producing compliant bags, lowering taxes on environmentally friendly products, or supporting local production of compliant bags could contribute to decreasing wholesale prices and making thicker bags more competitive within the market. This finding is supported by the study done by (Gupta, 2011) in India, which determined that plastic bag bans alone are not effective, and low-cost alternatives through subsidies need to be made readily available in order to reduce the usage of plastic bags. When there is an incentive to produce compliant bags, more and more will be available in markets, higher availability will also make them cheaper, encouraging their broader

usage. In addition, enforcement efforts should shift away from primarily targeting individual retailers and instead focus on manufacturers, wholesalers, and distributors responsible for supplying non-compliant products. Restricting the production and distribution of thin plastic bags may prove more effective than monitoring thousands of individual businesses across Lahore.

Finally, more awareness needs to spread amongst lower-income communities about the harms of using thin plastic bags, both to the environment and to human health. Since most of the abuses happen in these areas, educating individuals will give awareness beyond just fear of fines and confiscation. This is supported by the study done by (Anwar et al., 2024) which concludes that efficient communication with the consumer about the consequences of their actions is essential to promote more sustainable choices. Together, these measures would help ensure that environmental compliance isn't hindered by affordability issues or a lack of practical alternatives.

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