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Eliminating PET Bottles in Dine-In Restaurants: A Data-Driven Policy Blueprint Toward Sustainability

Jeena John[1], Ishwari Navnath Gaikwad[2], Vismaya Umesh Bhamare[3], Avnish Umesh Bhamare[4], Varad Deepak Bhoj[5]

[1]Principal, Godavari Public School
[2,3,4,5]Student, Godavari Public School,

Abstract
Plastic pollution in India continues to grow rapidly, particularly due to the widespread use of PET bottles in the food and beverage industry. This research examines data collected from 51 dine-in restaurants across three Indian cities—Nashik, Pune, and Hyderabad—to understand the scale of PET bottle usage primarily for aerated drinks that could be avoided without impacting convenience. The study argues for eliminating plastic bottles in dine-in settings where mobility is not a necessity and reusable alternatives like glass bottles are feasible. By combining primary field data with national-level estimates and market trends, the study projects the environmental benefits of this targeted reduction strategy and provides policy recommendations that support India's sustainable development goals.

Keywords: Plastic Waste Reduction, Waste Management India, PET Bottle Elimination, Plastic Waste Management

1. Introduction

Plastic PET bottles are a staple in India's food and beverage service ecosystem. While their usage is justified for takeaway and delivery due to convenience and mobility, their necessity in dine-in restaurants is questionable. Dine-in settings allow for the use of glass bottles or refillable alternatives, which can significantly reduce single-use plastic waste. This paper analyzes real-world data from a sample of restaurants and extrapolates national-scale estimates of avoidable PET waste. The objective is to explore the scope for reduction and identify policy pathways for sustainable practice adoption.

2. Methodology

Primary data was collected from 51 dine-in restaurants across three urban centers: Nashik (Tier-2), Pune (Tier-1), and Hyderabad (Tier-1). These cities were chosen to reflect a mix of urban densities, income demographics, and infrastructure readiness.

Structured field surveys gathered data on:

- Monthly sales of PET and glass bottles.
- The proportion of dine-in versus takeaway/online orders.
- Availability of glass bottle alternatives.
- Restaurant type and sales volume.

By diversifying geographic scope, the study captures a broader view of dine-in consumption patterns and infrastructure challenges. Future work can expand this to additional regions to further validate findings.

3. Key Observations

Based on the data collected from 51 restaurants:

- Total Restaurants Surveyed: 51
- Restaurants Without Glass Bottles (Aerated drinks): 38 (75%)
- Restaurants without glass bottles (Water): 50 (98%)
- Average Dine-in Sales of PET bottles: more than 75% (as per the survey questionnaire)
- Average Combined PET Bottles per Month: ~1,098
- Monthly bottle sales Range varied between different restaurants: 150 to 3,500 per month
- PET Bottle Weight Assumed: 15 grams each
- Monthly Avoidable PET Waste per Restaurant (Dine-in only i.e. 75percent of 1098): ~12.35 kg
- Annual Avoidable Plastic per Restaurant primarily for dine-in: ~148.2 kg
- Total Avoidable PET Waste (51 Restaurants, Dine-in Only): ~7.56 tonnes/year

City-wise Breakdown of Key Observations

A comparative snapshot of PET usage across cities is shown below:

City	Restaurants Surveyed	% Without Glass Bottles	Avg Monthly PET Usage	Est. Monthly Avoidable Waste (75percent)
Nashik	24	75%	1,006	~11.26 kg
Pune	18	78%	1,198	~13.5 kg
Hyderabad	9	70%	1,091	~12.3 kg

This multi-city dataset provides a stronger foundation for extrapolating national trends compared to a single-region survey.

4. Restaurants Without Glass Bottles

Out of 51 surveyed restaurants, 38 did not stock reusable glass bottles for aerated drinks and 50 did not stock reusable glass bottles for water. These establishments rely entirely on single-use plastics even for dine-in customers. Focusing on these venues could immediately curb a significant portion of unnecessary plastic bottle usage. Given that more than half of all beverages are consumed on-site, inventory could shift to sustainable alternatives without impacting service delivery.

5. National Extrapolation

As per NRAI India[1] has an estimated 500,000 organized and 1.5 million unorganized restaurants. Assuming the same PET usage profile nationwide:

Sector	Restaurants	Monthly Avoidable PET (kg)	Annual Avoidable PET (tonnes)
Organized	500,000	6,175,000	74,100
Unorganized	1,500,000	18,525,000	222,300
Total	2,000,000	24,700,000	296,400

Note: Based on an average 200ml PET bottle weighing 15 grams; larger bottles (500ml or 750ml) could yield higher waste per unit.

6. Environmental Implications

Replacing PET bottles with reusable alternatives in dine-in restaurants can eliminate over **296,400 tonnes of plastic waste annually**. This aligns with India's **Plastic Waste Management Rules (2022)**, **SDG 12[2]**, and the **Swachh Bharat Mission[3]**. Beyond waste reduction, it helps lower carbon emissions, landfill burden, and microplastic contamination.

Recent findings highlight the urgency—India is now the **world's largest plastic polluter**, and microplastics are being found in human lungs, placentas, and bloodstreams[4]. This makes source-level interventions like banning PET in dine-in settings essential for public health and sustainability.

7. Recommendations

1. Prohibit PET bottle use in dine-in settings across all food service venues.

2. Subsidize adoption of glass bottle or dispenser systems for beverages.

3. Develop a national sustainability rating for restaurants with green metrics.

4. Educate both vendors and consumers on long-term benefits of plastic reduction.

5. Establish clear signage and incentives for eco-friendly establishments.

8. Conclusion

This study shows that a significant share of PET bottle usage in Indian restaurants is avoidable. With dine-in consumption accounting for over 75% of beverages, alternatives like glass bottles or dispensers are practical and effective. Nationally, the transition could eliminate **over 296,400 tonnes** of PET plastic waste every year. Addressing glass bottle availability and establishing sustainability norms will be essential in scaling this solution.

9. Limitations and Future Scope

- Dataset is region-specific (Nashik, Pune & Hyderabad); broader national studies are needed.
- Some responses included water bottles in the plastic count; clearer categorization can enhance future accuracy.
- Further work should explore the economic cost, supply logistics, and health perceptions of reusable alternatives.

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