

Environmental Sustainability and Waste Management Practices: A Community-Based Study

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ABSTRACT

Rapid urbanization has intensified waste management challenges in metropolitan cities such as Mumbai. This study examines environmental sustainability and household waste management practices in urban residential communities. A quantitative research approach was adopted using a structured Google Forms questionnaire, collecting 112 valid responses. The study evaluates waste segregation behavior, composting practices, awareness levels, and satisfaction with municipal services.

Findings reveal that although environmental awareness is moderate, consistent waste segregation is practiced by less than half of respondents. Most households rely heavily on municipal waste collection systems, while composting adoption remains partial despite high awareness. The study identifies a significant gap between awareness and implementation. It concludes that effective waste management requires stronger citizen participation, improved infrastructure, and stricter enforcement of segregation practices.

1. INTRODUCTION

Environmental sustainability refers to the responsible use of natural resources to maintain ecological balance for present and future generations. Waste management plays a critical role in achieving sustainability by reducing pollution, conserving resources, and promoting recycling.

Urban areas face increasing waste-related challenges due to population growth, consumption patterns, and limited landfill capacity. Cities like Mumbai generate large volumes of municipal solid waste daily, leading to environmental and health concerns. Effective waste management systems require both institutional support and active community participation.

This study focuses on analyzing household-level waste management practices, awareness, and behavioral patterns in urban communities.

2. LITERATURE REVIEW

Waste management involves the systematic handling of waste through collection, segregation, recycling, and disposal. The **3R principle (Reduce, Reuse, Recycle)** is widely recognized as a sustainable approach to minimize waste.

Government initiatives such as the Swachh Bharat Mission have significantly increased awareness about cleanliness and waste segregation in India. Regulatory guidelines provided by the Central

Pollution Control Board emphasize mandatory segregation of waste into wet, dry, and hazardous categories.

Previous studies highlight that while awareness of sustainability is increasing, actual implementation of proper waste practices remains inconsistent. A major research gap exists in understanding household-level behavior and the gap between awareness and action.

3. RESEARCH METHODOLOGY

This study adopts a **descriptive research design** to analyze waste management practices among urban households.

- **Data Type:**
Primary data (survey responses) and secondary data (reports, journals)
- **Data Collection Tool:**
Structured questionnaire via Google Forms
- **Sample Size:**
112 respondents
- **Sampling Method:**
Convenience sampling
- **Tools Used:**
Microsoft Excel for data analysis and graphical representation
- **Analysis Technique:**
Percentage method and descriptive analysis

The methodology aims to identify patterns in waste segregation, awareness, and sustainability practices.

4. RESULTS AND ANALYSIS

4.1 Waste Segregation Practices

Only about 46% of respondents consistently segregate waste, while a large proportion remain uncertain. This indicates moderate awareness but weak implementation.

4.2 Type of Segregation

- Majority follow basic segregation (wet and dry waste)
- Only a small percentage follow complete segregation including hazardous waste

This reflects limited awareness of advanced waste management practices.

4.3 Waste Disposal Methods

Nearly 80% of households depend on municipal collection systems, showing high reliance on government infrastructure.

4.4 Composting Practices

Although awareness of composting is high, actual implementation is partial. Many respondents are aware but do not actively practice composting.

4.5 Awareness Level

Most respondents rate their awareness as moderate. Awareness of initiatives like the Swachh Bharat Mission is high, but behavioral change is limited.

4.6 Satisfaction with Municipal Services

Satisfaction levels are moderate. Common issues include:

- Irregular waste collection
- Overflowing bins
- Lack of strict segregation enforcement

5. DISCUSSION

The findings reveal a clear gap between awareness and actual waste management behavior. While individuals understand the importance of sustainability, consistent practices such as segregation and composting are not widely followed.

Comparison with successful models like Indore shows that strict enforcement, public participation, and technological integration significantly improve waste management outcomes.

The study highlights that behavioral change, rather than awareness alone, is the key challenge in achieving sustainability.

6. CONCLUSION

The study concludes that waste management is a critical component of environmental sustainability in urban areas. Although awareness among residents is moderate, implementation of proper waste practices remains inconsistent.

High dependency on municipal systems, limited segregation practices, and partial composting adoption indicate the need for improved systems and stronger citizen involvement. Bridging the gap between awareness and action is essential for sustainable urban development.

7. RECOMMENDATIONS

- Conduct regular awareness programs in communities
- Enforce strict waste segregation rules with penalties
- Promote composting at household and society levels
- Improve waste management infrastructure
- Encourage use of technology such as smart waste systems

8. FUTURE SCOPE

Future research can explore:

- AI-based waste management systems
- IoT-enabled smart bins
- Larger and more diverse sample populations
- Comparative studies across cities and rural areas

9. REFERENCES

- Central Pollution Control Board (CPCB), Government of India
- Ministry of Housing and Urban Affairs (Swachh Bharat Mission)
- United Nations Environment Programme (UNEP)
- World Bank – *What a Waste 2.0*
- Tchobanoglous et al., *Integrated Solid Waste Management*
- Research journals on urban waste management