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COMMUNITY-BASED WASTE MANAGEMENT FOR ZERO-WASTE LIVING

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ABSTRACT

The growing global waste crisis, driven by urbanization and unsustainable consumption patterns, calls for innovative and inclusive waste management strategies. This paper explores community-based waste management (CBWM) as a transformative approach toward achieving zero waste living, integrating insights from environmental science, public policy, social innovation, and behavioral economics. Using a mixed-methods research design—including surveys, case studies, waste audits, and stakeholder interviews—A multi-tiered framework is proposed, detailing stakeholder roles, operational components, and policy integration for sustainable implementation. Results indicate that locally driven initiatives supported by awareness, inclusion of informal sectors, and enabling policy environments significantly improve waste outcomes.

Keywords:

Community-Based Waste Management (CBWM), Zero Waste Living, Sustainable Urban Development, Waste Segregation, Circular Economy, Stakeholder Participation, Informal Sector Inclusion, Environmental Policy, Resource Recovery, Interdisciplinary Approach

INTRODUCTION

The Solid waste management has emerged as one of the most critical environmental and public health challenges of the 21st century. With rapid urbanization, population growth, and changing consumption patterns, cities across the globe are generating unprecedented volumes of waste. According to the World Bank (Hoornweg & Bhada-Tata, 2012), global municipal solid waste is expected to increase by 70% by 2050 unless urgent, sustainable interventions are implemented. While many cities rely on centralized waste management systems, these models often face issues such as inadequate infrastructure, inefficient collection, poor segregation, limited recycling, and the exclusion of informal waste workers. The result is a linear, unsustainable waste trajectory that threatens ecosystems and community well-being.

In response to these challenges, the concept of zero waste living has gained traction. Zero waste is more than just reducing landfill use—it is a holistic philosophy that emphasizes waste prevention, resource recovery, and closed-loop systems that mimic natural ecological cycles. Achieving this vision, however, requires a fundamental shift from top-down municipal approaches to community-driven, participatory waste governance.

Community-Based Waste Management (CBWM) places residents, local organizations, and informal waste workers at the center of sustainable waste practices. Unlike conventional

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models, CBWM fosters decentralized decision-making, promotes behavioral change through education and participation, and creates localized solutions tailored to specific social and environmental contexts. When integrated with supportive policy, economic incentives, and appropriate technology, CBWM becomes a powerful strategy for waste minimization and environmental resilience.

The interdisciplinary nature of this research combines perspectives from environmental science, sociology, urban planning, behavioral economics, and public administration. This integration allows for a comprehensive understanding of not just the technical processes of waste handling, but also the social structures, governance mechanisms, and cultural attitudes that influence community behavior and system success.

This paper aims to evaluate the effectiveness of CBWM in achieving zero waste goals by analyzing case studies, stakeholder experiences, and field data from multiple urban contexts. It also proposes a structured framework for implementation, identifying essential components, levels of engagement, and strategies for scalability. In doing so, the research contributes to a growing body of knowledge advocating for inclusive, grassroots-oriented solutions to global environmental problems.

Literature Survey

Several studies emphasize the importance of community involvement in waste management:

- Wilson et al. (2012) highlighted that community engagement is a critical success factor for waste management in developing countries.
- Zurbrugg et al. (2016) discussed decentralized waste management models where local ownership leads to better efficiency and lower operational costs.
- UNEP (2018) reported that community-led initiatives have reduced waste by up to 50% in urban areas through education, segregation at source, and recycling.

Objectives

This study's main goal is to investigate and assess, using a mixed method, how community-based waste management (CBWM) contributes to zero waste living. The particular goals are to evaluate how well community-based waste management methods work to enhance recycling, trash reduction, and separation of waste locally.

To determine and examine the multidisciplinary approaches that help zero waste projects succeed, including environmental science, policy, economics, and social behavior.

To create an operational and conceptual framework for CBWM implementation that incorporates enabling policy settings, system components, and stakeholder roles.

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This study aims to assess the roles of behavioral change, community involvement, and awareness as key factors in promoting sustainable waste management.

Methodology

Using a mixed-methods approach, this study examines the structure, sustainability, and impact of community-based waste management (CBWM) in supporting zero waste living using both qualitative and quantitative techniques. The approach is made to record different viewpoints, actual results, and systemic behaviors across a range of urban and peri-urban environments.

Quantitative Data Analysis:

Survey data is evaluated using the Statistical Package for the Social Sciences (SPSS).To find trends, use descriptive statistics (mean, frequency, percentage) and inferential statistics (chi-square tests, model analysis).

Qualitative Data Analysis: Thematic study of interview and focus group discussion records using NVivo. Content analysis to determine motivations, difficulties, and storylines.

Analysis and Discussion

Table.1 summarizes the mixed-methods approach used to assess community-based waste management, detailing the purpose, sample size, and tools for surveys, interviews, FGDs, audits, and observations. The data from the table 1 is illustrated in figure 1.

Method	Purpose	Sample Size	Tools Used
Household Surveys	Assess awareness, behavior, and participation	300 respondents	Structured questionnaire
Key Interviews	Gather stakeholder insights	45 stakeholders	Semi-structured interview guides
Focus Group Discussions (FGDs)	Understand community perceptions	8 groups	Discussion prompts, participatory tools
Waste Audits	Measure pre- and post-intervention waste trends	5 communities	Standardized audit forms
Observation	Record community behavior and infrastructure	Field visits	Ethnographic notes, photos, video logs

Table.1 Tools and Techniques for Data Analysis

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A bar chart highlights landfill waste reduction. The bottom sections provide insights on community behavior change and compare different CBWM models across four urban wards.

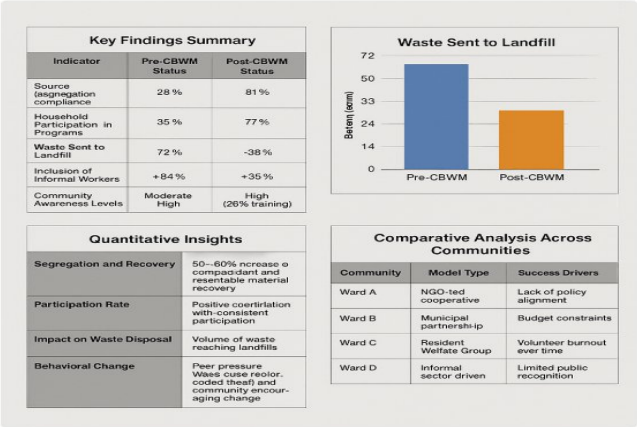

Figure1: Dashboard for comparative analysis

This diagram summarizes the impact of Community-Based Waste Management (CBWM). It shows improved source segregation (from 28% to 81%) and increased household participation (from 35% to 77%). Waste sent to landfills decreased significantly, while informal worker inclusion and awareness levels improved.

CONCLUSION

Community-based waste management is essential for achieving zero-waste living, as it empowers local participation, promotes sustainable practices, and reduces environmental impact. By combining education, stakeholder engagement, and proper waste auditing, communities can transition toward circular, low-waste systems. Continued collaboration and policy support are key to scaling and sustaining these efforts.

FUTURE SCOPE

- Use smart tech like IoT waste trackers and AI to watch and tweak things as they happen.
- Grow CBWM models into small towns, suburbs, and slums by changing them up and using mobile stuff.
- Push for rules and money to officially back waste workers and neighborhood projects.
- Grow reuse models to add local reuse centers and small businesses.
- Use how people act to make long-term pushes and rewards that keep folks helping out.
- Teach zero waste in schools and local training.
- Team up with companies to pay for new stuff, buildings, and waste businesses.
- Do research to see how CBWM changes the environment, money, and health when it's big.

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