

Original Research Article

Solid waste management: a case study of a slum area within the UHTC field practice area

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ABSTRACT

Background: Rapid urbanization and population growth have led to a substantial increase in municipal solid waste (MSW) generation, posing significant environmental and public health challenges, particularly in developing countries. Evaluating community awareness and practices related to household waste management is crucial for devising effective interventions.

Methods: A community-based cross-sectional study was performed in a slum area. Data were gathered via a door-to-door survey employing a standardized questionnaire amongst 482 households. We got information about socio-demographic characteristics, household waste generated, segregation practices, disposal methods, municipal waste collection.

Results: Most households generated common domestic waste, including kitchen waste, vegetable waste, paper, and plastic. (99.4%) people knew that throwing away trash in the wrong way hurts the environment. About 54.4% of families threw away their trash in trash cans, and 5.4% in open areas near their homes. 37.6% of homes said that municipal services picked up their trash every day, while 20.5% said that it was picked up at random times. Only 36.3% of those who answered were happy with the current system for picking up trash in the city.

Conclusions: To improve sustainable household waste management in urban slum areas, it is important to strengthen the infrastructure for municipal trash management, make sure that waste is picked up on a regular basis, encourage source-level segregation, and get more people involved.

Keywords: Solid waste management, Household garbage, Urban slums, Waste segregation, Community awareness, Municipal waste services

INTRODUCTION

The amount of MSW being made around the world is growing quickly, and managing it is getting harder and harder, especially in developing nations. Rapid population increase, urban expansion, changing living standards, and changing consumer habits are the main reasons why solid waste production has gone up so much.¹ The United States, China, and India are the three biggest producers of municipal solid trash in the world.² The World Bank says that solid waste creation would rise by 73% each year from 2020 levels, reaching 3.88 billion

tons by 2050, or around 0.79 kg per person per day. This is because cities are growing and people are moving there.³ As of the 2011 census, India had an estimated population of 1.21 billion people, or 17.66% of the world's population. It produces about 0.1 million tonnes of MSW every day.⁴

Solid waste is defined internationally as waste that is not liquid and comes from public services, households, businesses, industries, farms, and mining activities. The resource conservation and recovery act of 1976 (RCRA) says that solid waste comprises trash, garbage, sludge from municipal sewage treatment plants, ash from solid

waste incinerators, mining waste, building and demolition debris, and some hazardous wastes. You can group solid waste by where it came from (home, business, factory, or farm), what it was used for (like packaging), what materials it is made of (glass, paper, or plastics), what physical properties it has (biodegradable or combustible), and how safe it is (hazardous or radioactive).⁵ In many low- and middle-income countries, household garbage can become dangerous if it is not collected, sorted, and processed correctly. This can have long-lasting repercussions on the environment and people's health.

Not only may poorly run waste facilities like open dumps, landfills, and incinerators put the health of people in low-income neighborhoods at risk, but they can also cause a lot of waste to pile up. People who handle garbage are at a high risk of getting sick if they don't have the right safety gear and knowledge.⁶ Poor solid waste disposal also hurts the quality of air, land, and water. When solid waste is thrown away in the open, it pollutes the air, makes the soil less fertile, and poisons the water. Also, decaying trash makes places where germs, flies, and mosquitoes can thrive, which leads to several infectious diseases.⁷

Aurangabad (now Chhatrapati Sambhajanagar), which is known as one of the fastest-growing industrial cities in central Maharashtra, was chosen as the study location. The Aurangabad Municipal Corporation (AMC) was set up in 1982 and serves more than 1.55 lakh people who live in the city. Ajanta and Ellora Caves, which are UNESCO World Heritage Sites, are in the city. It is also Maharashtra's fifth-largest city by population.⁸ This study seeks to document the current state of solid waste management techniques, community awareness, and service satisfaction in a representative slum region within the city.

METHODS

Study design

A community-based cross-sectional study was undertaken. Data were obtained by a house-to-house survey utilizing a pre-tested, structured questionnaire presented via personal interview. The study was conducted from 1.2.2025 to 31.1.2026. A total of 482 houses were surveyed. The target sample consisted of 20% (about 550 households) of all enlisted households within the field practice region. All houses that agreed to participate were included. There were no clear criteria for excluding people.

Study setting

The study was conducted in a slum neighbourhood under the field practice area of the Urban Health Training Centre (UHTC) of MGM Medical College, Chhatrapati Sambhajanagar.

Parameters assessed

Socio-demographic data collected included age, educational status, marital status, family income, type of family, family size, and occupation. trash management parameters including the individual accountable for trash disposal, the disposal technique, the types of waste segregation employed, the disposal frequency, and occurrences of indiscriminate dumping. The study was conducted after approval from Institution Ethics Committee. (MGM-ECRHS/2024/20. Dated: 23.8.2024).

Statistical methods

Data were analyzed using descriptive statistics. Categorical variables concerning household waste disposal practices, awareness, and perceptions of municipal waste management were summarized as frequencies and percentages. Percentages were calculated using the number of valid responses to each question as the denominator. For multiple-response questions, each response option was summarized separately as a frequency and percentage of respondents; therefore, percentages could exceed 100% when summed.

RESULTS

A total 482 of households were surveyed to assess perceptions and practices related to household waste disposal and municipal waste management. When inquire about whether they know about the final disposal site of household waste after collection by municipal corporation, majority of respondents 85.1% were not aware regarding the final destination of household waste. Remaining 14.8 % answered yes but it was not the correct answer. Only 5 people could answer correctly. Most participants answered that the waste generated at home is found to be predominantly of common domestic nature, with vegetable waste, kitchen waste, paper waste, plastic waste being reported as the most common type.

The most reported problem was irregular collection of waste, reported by 58.1% of respondents. Lack of nearby dustbins leading to indiscriminate disposal was reported by 36.9%, while 26% stated that waste being thrown on roads was a major concern.

With respect to municipal waste collection, 37.6% (n=181) of respondents reported that waste was collected daily. Collection once every two days was reported by 29.5% (n=142) of households. Irregular waste collection was reported by 20.5% (n=99), while 12.2% (n=59) stated that waste was collected once every three days.

In terms of satisfaction with the existing municipal waste removal system, only 36.3% (n=175) of households were satisfied and very few i.e. 7.5% (n=36) were very satisfied. The remaining respondents reported being either neutral about the system or dissatisfied. Regarding why they should do the segregation of household waste into

wet and dry components, majority of respondents 58.9% (n=284) felt that segregation was their responsibility, while 40.5% chose that it is mandatory.

The majority of respondents recognized the environmental impact of improper waste disposal. Nearly all participants (99.4%, n=479) agreed that improper disposal of waste leads to environmental pollution, while only 0.6% (n=3) did not agree with this statement

Regarding the frequency of waste disposal at the household level, 44.2% (n=213) of households reported disposing of waste daily. A similar proportion, 44.0% (n=212), disposed of waste once every two days, while 11.8% (n=57) disposed of waste once every three days. More than half of the households (54.4%, n=262) reported disposing of waste in dustbins. However, 5.4% (n=26) disposed of waste in open spaces near their houses.

When inquired about their preferred method of waste disposal, door-to-door waste collection was the most preferred, with 65.8% (n=317) of participants reporting that a collector collects waste directly from their house. Approximately 33.4% (n=161) of respondents preferred a system in which the waste collector comes to a fixed place at a specified time, and households' hand over their waste at that location. A much smaller proportion, 8.9% (n=43), reported keeping their waste container by the roadside at a specified time for collection. Only 6% (n=29) of respondents stated that they personally dispose of their waste in dustbins. An overwhelming majority of respondents, 99% (n≈477), expressed a positive willingness to dispose of household waste daily.

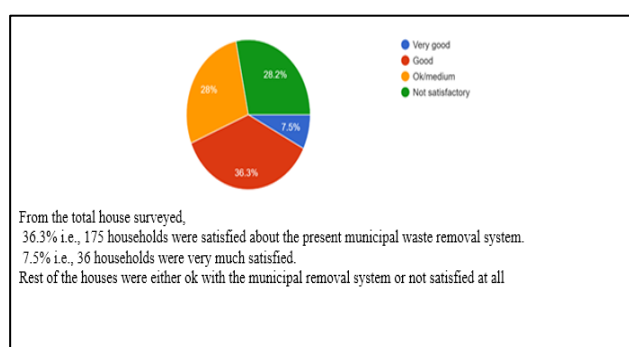


Figure 1: Distribution of participants as per segregation of your household waste into wet and dry.

Table 1: Segregation of wet and dry.

Segregation of wet and dry because	No. of families	%
It's your responsibility	284	58.9
It's mandatory	195	40.5
It can generate some income	23	0.6

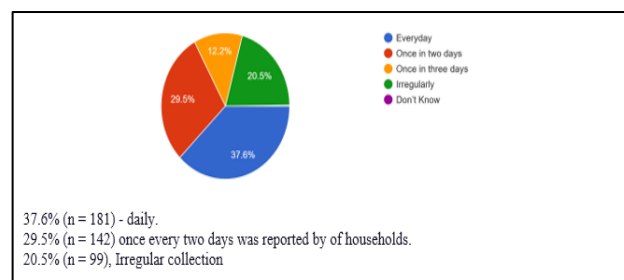


Figure 2: Distribution of participants as per the frequency of waste collection by municipal corporation.

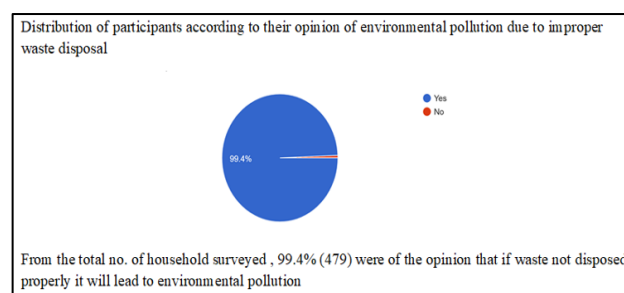


Figure 3: Distribution of participants according to their opinion.

DISCUSSION

Agarwal et al examined waste management practices in India and their effects on public health and the environment, concluding that effective strategic planning and community education are vital for enhancing waste management results.⁹ Sivaraman et al determined that incineration was the most suitable method for solid waste disposal in the Puducherry context, where land limitations hindered the widespread implementation of landfilling and composting.¹⁰ These studies laid the foundation of conduction present study.

The present study revealed that the bulk of home garbage originated from typical residential sources, with kitchen waste, vegetable waste, paper, and plastic being the primary constituents. These results align with the observations of Kallawar et al who noted that the majority of household garbage consists of biodegradable materials indicating the significance of source-level composting and segregation.¹¹ Research from Kolkata (Shaoli Dea) further validates this composition trend, indicating that organic waste represents the predominant portion of municipal refuse.¹² Almost all participants (99%) in the present study recognized the detrimental impacts of improper waste disposal on environmental and human health. This aligns with the findings of Rani et al where more than three-quarters of respondents exhibited awareness of these implications.¹

However, Kaithery et al reported contrary findings, indicating that only 66.5% of participants were aware of

waste management implications a discrepancy potentially arising from variations in local sensitization efforts and educational interventions.⁵ A persistent knowledge-practice gap was evident in the current study. More over half of the families threw their trash away in dustbins, yet a large number of them still threw their trash out in open areas near their homes. This is in line with what Rani et al found, which showed that people still burned and dumped trash in public places even if they knew a lot about it.¹ Indira et al reported superior practices, noting that households utilized color-coded bins and segregated waste prior to disposal. Regarding waste segregation, more than half of the participants regarded it as their personal responsibility, and a substantial proportion deemed it obligatory.¹⁴ Kaithery et al obtained similar results.⁵ However, Rani et al, Kallawar et al both said that segregation wasn't always put into practice, even when people understood the idea.^{1,11}

This led to mixed waste that made treatment harder. The current study found that the most common complaint about waste collection was that it wasn't done regularly (58.1%), which led to people throwing things away without thinking. Benjongkumba et al and Parhi et al likewise ascribed suboptimal solid waste management results in India to limited municipal budgets, a deficit of competent workers, and insufficient collection infrastructure.¹³ Research conducted in Kolkata indicated community dissatisfaction and open dumping as repercussions of inadequate source-level collection services.¹²

Contentment with municipal waste management services was minimal, with hardly about one-third of households expressing satisfaction. Indira et al found that most people were happy with municipal sanitation services, which is different from this.¹⁴ The operational difficulties noted in this study—irregular collection, lack of local dustbins, and waste accumulation on roads align with extensive national documentation of systemic inefficiencies in urban solid waste management.

Limitations

The present study is limited by its cross-sectional design and single-site setting. The data is self-reported, so there is possibility of selection and social-desirability biases, and absence of direct observation or objective measurement of waste generation. Therefore, the findings should be interpreted cautiously and may not be generalizable to all urban slum populations.

CONCLUSION

This study shows that the people who were studied know a lot about the health and environmental effects of throwing away solid waste the wrong way, but this knowledge doesn't always lead to good waste management. Biodegradable kitchen garbage made up the most of the household waste, followed by plastic and

paper. This shows that there is a lot of room for composting and separating waste at the source. Still, bad behaviors like open dumping, burning trash, and not separating trash properly are still common. There was a clear gap between what people know and what they do, especially when it comes to scientific storage at the source, consistent disposal of dry waste, and separating wet and dry fractions.

Irregular municipal garbage collection, a lack of local dustbin infrastructure, and poor service coverage were all seen as major operational problems that lead to indiscriminate dumping and community unhappiness. Overall, just being aware of these issues is not enough to achieve sustainable solid waste management. It is important to improve city infrastructure, make sure that waste is picked up on time and consistently, encourage segregation at the source, and get people involved in their communities. To fill in the gaps and make solid waste management methods in urban slums more environmentally friendly and health-protective, local governments and communities need to work together on integrated projects.

Recommendations

Increase the number of times that municipal waste collection services pick up trash to ensure that slum areas are covered every day or almost every day. Encourage and make sure that garbage is separated at the source into wet (biodegradable) and dry (non-biodegradable) streams. To lessen the amount of trash that goes to landfills, choose eco-friendly ways to get rid of trash, such as composting organic garbage.

Run programs to teach people about the benefits of composting, recycling, and properly disposing of trash. To cut down on people throwing things away without thinking, make sure there are enough trash cans in easy-to-reach places. Set up community-based recycling programs, especially for plastic garbage, that are connected to formal recycling routes.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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