

SOLID WASTE MANAGEMENT INITIATIVES AND ITS IMPACT ON URBAN COMMUNITY: A STUDY OF KAMRUP METRO, GUWAHATI, ASSAM

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Abstract—Solid waste management has emerged as a major environmental and public health concern due to rapid urbanization, population growth, and changing consumption patterns. In Kamrup Metro, Assam, the increasing generation of municipal solid waste has posed significant challenges in waste collection, segregation, transportation, and disposal (Ao & Ngullie, 2024). This study aimed to examine the impact of solid waste management initiatives on the urban community in Kamrup Metro, Assam. A mixed-methods research approach was adopted using a descriptive and analytical research design. The sample size consisted of 50 respondents, and a purposive sampling technique was adopted for the study. Primary data was collected through structured questionnaires, interviews, and field observations, while secondary data was obtained from books, journals, government reports, and other relevant sources. The findings revealed that although respondents were generally aware of solid waste management initiatives and the importance of waste segregation, the actual practice of waste segregation remained limited due to inadequate infrastructure, irregular municipal waste collection, and insufficient public awareness. The study also highlighted the important role of community participation in improving waste management practices. It concludes that strengthening municipal waste collection services, improving waste segregation infrastructure, enhancing public awareness programmes, and encouraging active community participation are essential for achieving sustainable solid waste management and improving environmental quality in Kamrup Metro, Assam.

Index Terms—Solid Waste Management, Community Participation, Waste Segregation, Sustainable Waste Management, Public Awareness

I. Introduction

Rapid urbanization, population growth, and changing consumption patterns have led to a substantial increase in municipal solid waste generation across urban India. As a result, effective solid waste management has become a major environmental, public health, and governance concern requiring sustainable and integrated management strategies. Inadequate waste collection, improper segregation, and unscientific disposal practices contribute to environmental pollution, public health risks, and degradation of urban ecosystems. Recognizing these challenges, the Government of India introduced the Solid Waste Management Rules, 2016, which emphasize source segregation, scientific waste processing, recycling, and community participation as essential components of sustainable urban waste management (Aryal & Adhikary, 2024). Despite these policy initiatives, many Indian cities continue to face difficulties in implementing effective waste management systems due to infrastructural limitations, rapid urban expansion, and limited public participation. Kamrup Metro, Assam, with Guwahati as its principal urban center, has experienced rapid demographic and economic growth over the last two decades. The expansion of residential areas, commercial establishments, educational institutions, and markets has substantially increased the quantity of municipal solid waste generated every day. The Guwahati Municipal Corporation

(GMC) is responsible for waste collection, transportation, processing, and disposal through municipal services and partnerships with non-governmental organizations. Several initiatives have been introduced, including door-to-door waste collection, public awareness campaigns, segregation of biodegradable and non-biodegradable waste, composting initiatives, and efforts to reduce plastic waste. These initiatives aim to improve environmental sanitation, promote public health, and support sustainable urban development (Kaur & Punera, 2023). Despite these efforts, solid waste management in Kamrup Metro continues to face several operational and behavioral challenges. Irregular waste collection in some localities, inadequate waste segregation at source, insufficient infrastructure, limited recycling facilities, and low levels of community participation reduce the overall effectiveness of existing initiatives. In addition, the increasing volume of waste places considerable pressure on municipal resources and disposal facilities, raising concerns about environmental sustainability and the long-term management of urban waste. These challenges demonstrate that successful solid waste management depends not only on municipal infrastructure and policy implementation but also on active participation and responsible behavior among urban residents. Although previous studies have examined municipal solid waste management in Guwahati and other Indian cities, limited research has specifically assessed the impact of existing solid waste management initiatives on the urban community in Kamrup Metro. Most studies have focused primarily on waste generation, disposal techniques, or municipal service delivery, while comparatively little attention has been given to public awareness, community participation, waste segregation practices, and citizens' perceptions of existing initiatives (Ao & Ngullie, 2024). This gap highlights the need for empirical research that evaluates both institutional efforts and community responses within the local context. Against this background, the present study examines the impact of solid waste management initiatives on the urban community in Kamrup Metro, Assam. The study explores the level of public awareness, waste segregation practices, community participation, and the challenges associated with the implementation of existing waste management initiatives. The findings are expected to contribute to the understanding of urban solid waste management by identifying existing gaps and providing practical recommendations for strengthening municipal services, enhancing public participation, and promoting sustainable waste management practices. The study is expected to be useful for policymakers, municipal authorities, environmental practitioners, researchers, and other stakeholders working towards sustainable urban governance and environmental protection in Assam.

II. LITERATURE REVIEW

Municipal Solid Waste Management (MSWM) has become a significant environmental and public health issue due to rapid urbanization, population growth, and changing consumption patterns. Sustainable waste management requires not only efficient waste collection but also source segregation, recycling, scientific treatment, and active community participation. Several studies have highlighted the challenges and opportunities associated with municipal solid waste management in India and other developing countries.

Aleluia and Ferrao (2016) reported that municipal solid waste in developing Asian countries contains a high proportion of biodegradable waste, making composting and biological treatment more suitable than incineration. The study also emphasized that waste management strategies should be designed according to local environmental and socioeconomic conditions.

Kandpal & Saizen (2021) revealed that municipal solid waste generation in India is increasing rapidly due to urbanization and changing lifestyles. The authors identified poor source segregation, inadequate treatment facilities, and reliance on landfills as major challenges. They recommended integrated waste management practices, including recycling, composting, and resource recovery.

Kaur & Punera (2023) found that although waste collection has improved in many Indian cities, a large proportion of waste is still disposed of through unscientific methods. The study highlighted the need to strengthen municipal infrastructure, improve waste segregation, and increase public awareness for effective waste management.

Ao & Ngullie (2024) examined municipal solid waste management in North-East India and reported that while waste collection has improved, scientific treatment remains limited. Open dumping and burning continue to be common due to inadequate infrastructure and limited municipal capacity. The study stressed the importance of community participation and improved local governance.

Milli (2024) studied household waste management practices in Nepal and found that organic waste constituted the largest share of municipal waste. However, low levels of household segregation and composting resulted in improper disposal practices. They recommended promoting environmental awareness and strengthening municipal waste collection services.

Shaibur (2025) highlighted the potential of converting municipal solid waste into useful products such as compost, biogas, and electricity. The study also highlighted that technological solutions should be supported by public awareness, community participation, and effective policy implementation.

Overall, the reviewed studies indicate that municipal solid waste management in developing countries continues to face challenges such as poor segregation, inadequate treatment facilities, limited financial resources, and weak institutional capacity. Although government initiatives have improved waste collection, sustainable waste management depends on effective implementation, public participation, and scientific disposal methods. Despite extensive research on municipal solid waste management, limited studies have examined the impact of waste management initiatives on urban communities in Assam, particularly in Kamrup Metro. Therefore, the present study seeks to assess the implementation of solid waste management initiatives and their impact on the urban community in Kamrup Metro, Assam, thereby addressing an important regional research gap.

III. RESEARCH OBJECTIVES

- To study how much solid waste is produced in Kamrup Metro and what types of waste are most common?
- To study various initiatives undertaken by the government and municipal authorities to manage solid waste in Guwahati.
- To understand the impacts of these initiatives on the daily life, health and environment of the urban community.
- To find out the major problems and challenges faced in managing solid waste effectively in Kamrup Metro.

IV. RESEARCH METHODOLOGY

The study adopted a mixed-methods research approach using a descriptive and analytical research design to examine the impact of solid waste management initiatives on the urban community in Kamrup Metro, Assam. According to the Census of India (2011), the total population of Kamrup Metro District was 1,253,938 (12.54 lakh), comprising 647,585 males and 606,353 females. The sample size consisted of 50 respondents, and a purposive sampling technique was adopted for the study. Primary data were collected from selected respondents, including residents, shopkeepers, sweepers, and waste pickers, as these groups are directly associated with waste generation, collection, and disposal. Quantitative data were gathered through structured questionnaires, while qualitative information was obtained through semi-structured interviews and field observations to gain a comprehensive understanding of waste management practices and community experiences. Secondary data were collected from books, journals, government reports, Guwahati Municipal Corporation (GMC) publications, and other relevant documents. The collected data were analysed using descriptive statistical techniques, including frequencies and percentages, along with qualitative interpretation to assess the effectiveness of existing solid waste management initiatives, identify implementation challenges, and examine their impact on the urban community in Kamrup Metro, Assam.

V. DATA ANALYSIS AND INTERPRETATION

Table 1: Age Distribution of Respondents (N=50)

AGE GROUP	FREQUENCY	PERCENTAGE
20–29	10	20%
30–39	21	42%
40–49	12	24%
50–59	3	6%
60–69	4	8%
Total	50	100%

Source: Field Work by researchers

The findings indicate that the majority of respondents (42%) belonged to the 30–39 years age group, followed by 24% in the 40–49 years age group. It indicates that the study primarily represents economically active individuals who regularly interact with municipal waste management services. Their responses provide valuable insights into public awareness, waste management practices, and perceptions of existing initiatives in Kamrup Metro.

Table 2: Gender Distribution of Respondents (N=50)

GENDER	FREQUENCY	PERCENTAGE
Male	45	90%
Female	5	10%
Others	0	0%
Total	50	100%

Source: Field Work by researchers

The table shows that male respondents constituted 90% of the sample, while female respondents represented 10%. The majority of male respondents reflects the occupational composition of the selected participants, particularly among sanitation workers and waste pickers. However, the limited participation of women should be considered while interpreting the findings because women play an important role in household waste management.

Table .3: Occupational Distribution of Respondents (N=50)

OCCUPATION	FREQUENCY	PERCENTAGE
Business	17	34%
Ex-serviceman	3	6%
Labor	7	14%
Government job	10	20%
Student	6	12%
Sweepers	5	10%
Waste pickers	2	4%
Total	50	100%

Source: Field Work by researchers

Business owners (34%) formed the largest respondent group, followed by government employees (20%) and labourers (14%). The inclusion of respondents from different occupational backgrounds provided diverse perspectives on waste generation, segregation, collection, and disposal practices. This diversity strengthens the assessment of the impact of solid waste management initiatives on different sections of the urban community.

Table 4: Area-wise Distribution of Respondents (N=50)

AREA	FREQUENCY	PERCENTAGE
Hastinapur Amerigog	11	22%
Kanapara	8	16%
Uzan Bazar	1	2%
Santipur	1	2%
Jayanagar	12	24%
Beltola	3	6%
Panjabari	2	4%
Rukminigaon	4	8%
Ganeshguri	3	6%
Six mile	5	10%
Total	50	100%

Source: Field Work by researchers

Respondents were selected from different localities of Kamrup Metro, with the highest representation from Jayanagar (24%) and Hastinapur Amerigog (22%). The distribution across multiple locations enabled the study to capture variations in municipal waste management services, infrastructure, and community experiences, thereby improving the comprehensiveness of the findings.

Table .5: Awareness of Solid Waste Management Initiatives (N=50)

RESPONSE	FREQUENCY	PERCENTAGE
Yes	50	100%
No	0	0%
Total	50	100%

Source: Field Work by researchers

All respondents reported being aware of solid waste management initiatives implemented by the Guwahati Municipal Corporation. This indicates that awareness programmes have successfully reached the selected respondents. However, awareness alone does not guarantee appropriate waste management practices. Therefore, subsequent findings on waste segregation, disposal behavior, and community participation are necessary to assess the actual effectiveness of these initiatives.

Table 6 Knowledge of Waste Segregation (N=50)

RESPONSE	FREQUENCY	PERCENTAGE
Yes	46	92%
No	4	8%
Total	50	100%

Source: Field Work by researcher

The findings indicate that 92% of the respondents were aware of waste segregation, while only 8% lacked such knowledge. Awareness regarding waste segregation is relatively high among the respondents. However, awareness alone does not ensure proper waste management practices, highlighting the need to strengthen behavioural interventions that encourage regular segregation at the household level.

Table 7 Source of Awareness (N=50)

SOURCE OF AWARENESS	FREQUENCY	PERCENTAGE
Learned by observation	50	100%
Others	0	0%
Total	50	100%

Source: Field Work by researchers

All respondents reported that they learned about waste segregation through observation rather than through formal awareness programmes. This indicates that informal learning plays a major role in shaping public awareness, while organised educational campaigns by municipal authorities appear to have limited visibility. The finding highlights the need for more structured awareness initiatives to improve knowledge and encourage proper waste management practices.

Table 8 Household Waste Segregation Practice (N=50)

PRACTICE	SEGREGATION	PERCENTAGE
Always	2	4%
Sometimes	20	40%
Never	28	56%
Total	50	100%

Source: Field Work by researcher

The response clearly shows that the citizens are aware about segregation practice but the implementation of the same is not at all encouraging, as most of the respondents (56%) never segregates waste, followed by 40% who segregates some time and only 4% who segregates always, this shows a wide disparity between the awareness about segregation practice and actual implementation of the practice at the household level,

this is primarily due to the improper enforcement of rule and lack of adequate number of bins at households, if people are aware then they need to be pushed a bit through proper regulations.

Table 9: Disposal method, N=50

METHOD	FREQUENCY	PERCENTAGE
Municipal collection	48	96%
Private collection	2	4%
Dumping in open areas	0	0%
Others	0	0%
Total	50	100%

Source: Field Work by researcher

Almost all the respondents (96%) rely on the municipal collection as the system of disposal while only a few (4%) people used private services. Nobody admitted to be dumping the waste openly, this implies that almost everyone is relying on the public infrastructure created by the municipal body. This dependence has two sides: first it shows that the citizens trust in the system which GMC has created. Second, it means that if there is any irregularity in the system maintained by GMC then it will directly affect all of them who depend on it for waste disposal.

Table 10: Provision of segregation bins, N=50

RESPONSE	FREQUENCY	PERCENTAGE
Yes	0	0%
No	50	100%
Total	50	100%

Source: Field Work by researcher

No respondent was provided with an alternate segregated bin by GMC to practice segregation; this point highlights an obvious flaw in the infrastructure made available to the citizens for the better management of waste and shows the institutional failure by GMC to come forward to support their citizens in making an effort toward a cleaner and greener environment, the lack of bins is a very simple reason why most of the citizens never bother abouts segregation.

Table11: Effectiveness of municipal waste collection, N=50

RESPONSE	FREQUENCY	PERCENTAGE
Very effective	5	10%
Moderately effective	28	56%
Ineffective	17	34%
Total	50	100%

Source: Field Work by researchers

A large majority of respondents (56%) found the waste collection system to be moderately effective while 34% finds it to be ineffective, only 10% respondents claimed that it is very effective; it is an clear indicator that while it is not absolutely bad in the eyes of the respondents but there is still a considerable amount of space to bring an improvement in its functioning and efficiency so that maximum number of the people believes that the municipal waste collection system is effective enough to manage the garbage effectively from their area and this has also shown a slight sense of reliance.

Table 12. Improvement in cleanliness (past 2-3 years), N=50

RESPONSE	FREQUENCY	PERCENTAGE
Significant	5	10%
Moderate	17	34%
No improvement	28	56%
Total	50	100%

Source: Field Work by researchers

More than half of the respondents (56%) stated that there is no visible improvement in cleanliness while 34% believes that there is moderate improvement whereas only 10% claims significant improvement; this can imply that either the current efforts of GMC in maintaining the cleanliness of the city have not shown substantial results or that most of the population of the city is not much concerned regarding the level of cleanliness that they get, the low perception on cleanliness implies that there is still need to strengthen the operations by the government body in charge of keeping the city clean.

Table 13. Sufficiency of awareness campaigns, N=50

RESPONSE	FREQUENCY	PERCENTAGE
Yes	5	10%
No	45	90%
Total	50	100%

Source: Field Work by researchers

A vast majority (90%) strongly feels that the awareness campaign for waste management and segregation is not enough while only 10% people considers it adequate which means that people know that they are lacking somewhere but the means provided by the concerned bodies are not enough for them to work towards something constructive to improve the situation and hence an overall increased campaign by GMC would create better and lasting awareness in the masses for carrying out a clean disposal practice.

Table 14 Challenges in waste disposal, N=50

CHALLENGE	FREQUENCY	PERCENTAGE
Irregular collection	39	78%
Lack of segregation	9	18%

No awareness	2	4%
Total	50	100%

Source: Field Work by researchers

Irregular municipal waste collection was identified as the major challenge by 78% of respondents, followed by lack of segregation facilities (18%). Only 4% considered lack of awareness to be the main issue. These findings indicate that operational and infrastructural deficiencies, rather than public awareness, are the primary barriers to effective solid waste management in Kamrup Metro.

INTERVIEWS WITH SWEEPERS

Semi-structured interviews were conducted with five sweepers to understand their working conditions, experiences, and perceptions of solid waste management in Kamrup Metro. The respondents reported that they worked from 5:30 a.m. to 12:30 p.m., as waste collection and street cleaning are primarily carried out during the early morning hours. All participants stated that they were provided with basic protective equipment such as gloves and face masks and used tools including brooms, carts for waste collection. Their work experience ranged from 1 year to 20 years, indicating both newly recruited and experienced sanitation workers. None of the participants reported experiencing workplace discrimination. However, they highlighted the need for regular waste collection schedules, adequate protective equipment, and improved working conditions to enhance service efficiency. These findings indicate that sanitation workers play a crucial role in maintaining urban cleanliness, but strengthening occupational safety and municipal support is essential for improving the overall effectiveness of solid waste management initiatives.

INTERVIEWS WITH WASTE PICKERS

Semi-structured interviews were conducted with two waste pickers from Beltola to understand their contribution to solid waste management. The participants had 4–5 years of work experience and reported working 6–8 hours daily collecting recyclable materials such as plastic, paper, and metal. The interviews revealed that waste picking serves as their primary source of livelihood while also contributing to recycling and reducing the quantity of waste disposed of in landfill sites. Despite their important environmental contribution, the participants reported receiving limited institutional recognition and support. The findings highlight the significant role of the informal recycling sector in promoting sustainable waste management. Integrating waste pickers into the formal municipal waste management system through training, social protection, and recognition could improve recycling efficiency and strengthen community-based solid waste management initiatives in Kamrup Metro.

VI. RESULTS AND DISCUSSION

• Understanding the gap between awareness and behaviour

The findings demonstrate that awareness alone does not necessarily lead to positive environmental behavior. Although respondents were familiar with solid waste management initiatives, this awareness was not consistently reflected in day-to-day waste management practices. This indicates that behavioral change is influenced by multiple factors beyond knowledge, including convenience, existing habits, and the surrounding institutional environment. The findings support the view that public awareness is only one component of successful urban waste management and must be complemented by supportive systems that enable citizens to adopt sustainable practices.

• Public Perception of Municipal Waste Management

The study indicates that public perception of municipal waste management is shaped largely by the consistency and reliability of service delivery. Residents evaluate the effectiveness of waste management

initiatives not only by policy announcements but also by their daily experiences with waste collection and urban cleanliness. This suggests that the long-term success of municipal waste management depends on maintaining public confidence through efficient and accountable service delivery.

- **Community Participation as a Key Component of Sustainability**

The findings highlight that sustainable solid waste management cannot be achieved through municipal efforts alone. Community participation remains an essential component of effective urban environmental management. The study suggests that waste management should be viewed as a shared civic responsibility in which households, local communities, educational institutions, and municipal authorities work collaboratively to promote environmentally responsible behavior and improve urban sanitation

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VII. CONCLUSION

The conclusion that can be drawn from the study of solid waste management in Kamrup Metro, Guwahati, is that the city has achieved a commendable level of awareness among its citizens, but this awareness has not yet translated into consistent and effective practices. Every respondent reported being aware of waste management initiatives, and a large majority understood the importance of segregation. Yet, more than half of the households never segregate their waste, and only a very small fraction do so regularly. This gap between knowledge and practice is primarily due to infrastructural shortcomings, such as the absence of segregation bins, and irregular municipal collection services that discourage citizens from taking responsibility for their waste. The perception of municipal waste collection as only moderately effective, coupled with dissatisfaction over the lack of visible improvement in cleanliness in recent years, further highlights the need for stronger operational measures. Awareness campaigns, though successful in reaching the public, remain insufficient in depth and structure, as most people reported learning waste practices only by observation rather than through organized programs. Equally important is the recognition of the vital role played by sweepers and waste pickers in maintaining urban cleanliness and resource recovery. Sweepers demonstrate dedication and long-term service, working tirelessly in the early hours with basic protective gear, while waste pickers spend long hours collecting recyclable materials, thereby reducing the burden on landfills. Despite their essential role, both groups remain under-recognized and inadequately supported, which weakens the overall system. For Guwahati to move toward a cleaner and more sustainable urban environment, there must be a comprehensive approach that combines stronger infrastructure, reliable municipal services, and expanded awareness campaigns with formal recognition of frontline workers. By

providing households with proper bins, ensuring consistent waste collection, and integrating sweepers and waste pickers into the formal system, the city can achieve meaningful progress. With improved facilities, structured awareness, and active community participation, solid waste management initiatives will not only benefit the people but also reflect long-term sustainability and a healthier urban future.

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