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Sustainable Waste Management in Katwa Municipality, West Bengal: An Analysis of Citizens' Perception and Management Strategies

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ABSTRACT

Effective waste management is crucial for maintaining a healthy environment and ensuring sustainable development. This study examines citizens' perceptions and attitudes towards waste management in Katwa Municipality, West Bengal, highlighting the need for effective waste management strategies to address environmental and health impacts. A mixed-methods approach was employed, combining primary and secondary data sources. The findings reveal a significant gap between citizens' attitudes and practices towards waste segregation, with 75% believing it is important but only 40% practicing it. Open dumping is a prevalent waste disposal method, posing environmental and health risks. Citizens' satisfaction with waste collection services is mixed, with 40% satisfied and 30% dissatisfied. The study highlights the importance of increasing public awareness and education on solid waste management, improving waste collection services, and exploring opportunities for waste-to-energy initiatives or recycling programs. Citizens are willing to pay for improved waste management services, with 60% willing to pay ₹50-₹100 per month. The research emphasizes the need for a comprehensive approach to improve waste management practices, including infrastructure upgrades, public awareness campaigns, and community participation.

Keywords: Waste Management, Citizens' Perceptions, Sustainable Practices, Waste Segregation, Public Awareness, Katwa Municipality.

INTRODUCTION

The Proper waste management plays a vital role in protecting the environment, fostering sustainable development, and safeguarding public health, a notion underscored by the World Health Organization (2018). The rapid urbanization and population growth in municipalities across India have led to significant challenges in managing waste sustainably. Katwa

ISSN: 2455-8834

Volume:10, Issue:04 "April 2025"

Municipality in West Bengal is no exception, facing increasing pressures on its waste management systems due to growing population, changing consumption patterns, and inadequate infrastructure (Sharma & Jain, 2019). Sustainable waste management is crucial for maintaining public health, protecting the environment, and promoting sustainable development (UNEP, 2015). In India, municipal solid waste management is a significant concern, with many cities and towns struggling to manage waste effectively (Annepu, 2012). The situation is particularly challenging in smaller municipalities like Katwa, where resources are limited, and infrastructure is often inadequate (Kumar et al., 2017). Citizens' perception and participation play a vital role in determining the effectiveness of waste management strategies (Pokhrel & Viraraghavan, 2005).

Katwa Municipality, located in the Purba Bardhaman district of West Bengal, has a population of approximately 82,000 people (Census of India, 2011). The municipality generates around 20-25 tons of waste per day, which is primarily disposed of in open dumps or landfills (Katwa Municipality, 2020). The existing waste management system in Katwa Municipality faces several challenges, including inadequate infrastructure, lack of segregation at source, and limited citizen participation (West Bengal Pollution Control Board, 2018). This research paper aims to analyze citizens' perceptions and management strategies for sustainable waste management in Katwa Municipality, West Bengal. By understanding citizens' perceptions, this study seeks to identify the strengths and weaknesses of current waste management practices and develop strategies to improve them. The study's findings will contribute to the development of effective waste management policies and practices that are tailored to the specific needs of Katwa Municipality.

STUDY AREA:

Katwa, a thriving semi-urban center, is nestled at the confluence of the Ajay and Bhagirathi rivers in the Katwa sub-division of Purba Bardhaman district. Geographically, it is situated between 23°37' N to 23°39' N latitude and 88°6' E to 88°8' E longitude. The Katwa Municipality was established in the year 1869 with a total area of only 1 sq. km and 5000 population. Today Katwa Municipality consists of 20 wards covering an area of 9.58 sq. kms. As per the 2011 Census, the town is home to a substantial population of 81,615.

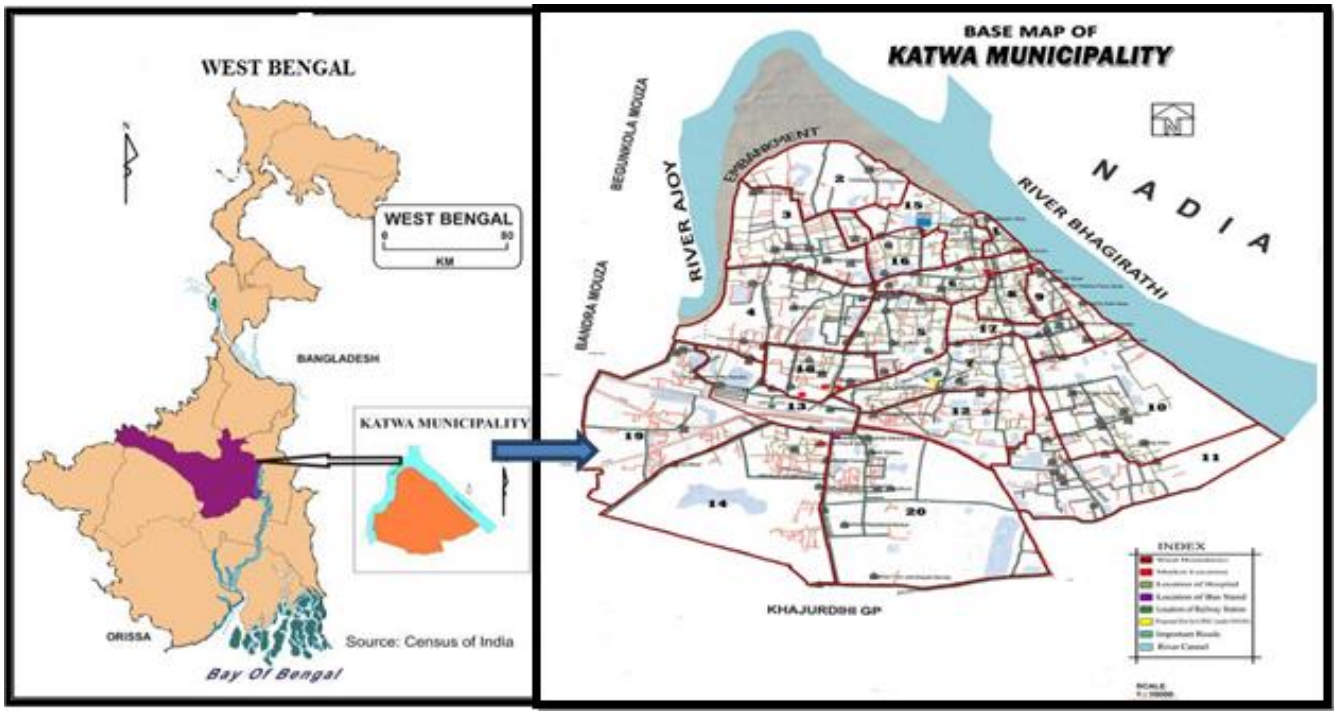
Strategically located, Katwa serves as a crucial administrative hub, boasting a well-developed infrastructure. The town is seamlessly connected to major cities via State Highway 21 and the Eastern Railway network, which extends from Sealdah to Katwa and Howrah to Katwa. The Katwa railway station is a vital transportation hub, linking the town to its hinterland through both main and chord lines. Its proximity to prominent cities, including Burdwan (56 km), Nabawip (52 km), Dainhat (10 km), Beharampur (68 km), Krishnanagar (78 km), Bolpur (60 km), and Kolkata (158 km), underscores Katwa's importance as a regional center. The town's unique blend

ISSN: 2455-8834

Volume:10, Issue:04 "April 2025"

of agricultural heritage and urban amenities makes it an attractive destination for residents, businesses, and administrators alike. As the district Sub-Division of Purba Bardhaman, Katwa continues to play a vital role in the region's development, with its well-established administrative setup and infrastructure supporting the growth of this thriving semi-urban center.

Fig.No.-01



OBJECTIVES:

- To analyze citizens' perceptions of waste management practices in Katwa Municipality.
- To identify the strengths and weaknesses of current waste management practices in the municipality.
- To develop strategies for improving waste management practices and promoting sustainable waste management in Katwa Municipality.

DATABASE:

This study employs a mixed-methods approach, combining primary and secondary data sources to investigate sustainable waste management in Katwa Municipality, West Bengal. The primary data collection involved a multi-faceted approach, comprising a household survey, focus group discussions (FGDs), and key informant interviews (KIIs).

ISSN: 2455-8834

Volume:10, Issue:04 "April 2025"

Primary Data Collection:

1. Household Survey: A structured questionnaire was administered to 300 households, selected through a random sampling technique, to gather information on demographics, waste generation, disposal practices, and perceptions of waste management services (Creswell, 2014).

2. Focus Group Discussions (FGDs): Four FGDs were conducted with 20 participants each, representing different wards of Katwa Municipality, to explore citizens' perceptions, attitudes, and experiences with waste management services (Krueger & Casey, 2015).

3. Key Informant Interviews (KIIs): Ten KIIs were conducted with municipal officials, waste management experts, and local leaders to gather information on existing waste management policies, practices, and challenges (Marshall & Rossman, 2016).

Secondary Data Collection:

1. Municipal Records: Secondary data was collected from Katwa Municipality's records on waste generation, collection, and disposal.

2. Census Data: Data from the 2011 Census of India was used to gather information on demographics and socio-economic characteristics of Katwa Municipality (Office of the Registrar General & Census Commissioner, 2011).

By combining primary and secondary data sources, this study provides a comprehensive understanding of the current state of waste management in Katwa Municipality and informs the development of sustainable waste management strategies.

METHODOLOGY:

This study's methodology was designed to ensure a comprehensive and rigorous investigation of sustainable waste management in Katwa Municipality, West Bengal.

Data Analysis: The study employed a mixed-methods approach to data analysis. Quantitative data from the household survey was analyzed using descriptive statistics, which provided a summary of the demographic characteristics and waste management practices of the respondents (Creswell, 2014). Qualitative data from the focus group discussions (FGDs) and key informant interviews (KIIs) was analyzed using thematic analysis, which involved identifying, coding, and categorizing themes and patterns in the data (Braun & Clarke, 2006).

Data Triangulation: To ensure the validity and reliability of the findings, data from different sources was triangulated. This involved combining data from the household survey, FGDs, KIIs,

ISSN: 2455-8834

Volume:10, Issue:04 "April 2025"

municipal records, and census data to provide a comprehensive understanding of the research problem (Miles & Huberman, 1994).

Sampling Technique: A random sampling technique was used to select households for the survey. The sampling frame consisted of all households in Katwa Municipality, and a sample size of 300 households was determined using the formula for estimating population proportion (Kothari, 2004).

Data Collection Tools: The study used three data collection tools:

1. Structured Questionnaire: A structured questionnaire was used to collect quantitative data from the household survey.

2. FGD Guide: A guide was used to facilitate the FGDs and ensure that the discussions were focused and productive.

3. KII Guide: A guide was used to facilitate the KIIs and ensure that the interviews were focused and productive.

Ethical Considerations: The study ensured the confidentiality and anonymity of respondents. Informed consent was obtained from all participants before data collection, and the study was approved by the Institutional Ethics Committee (World Medical Association, 2013).

RESULTS AND DISCUSSION:

The study's findings indicate that citizens' perceptions of waste management services in Katwa Municipality are shaped by multiple factors, including waste generation patterns, disposal practices, and existing policies. The household survey highlights the types and proportions of waste generated, informing potential areas of focus for sustainable waste management strategies, such as reducing food waste and increasing recycling rates. Furthermore, the Focus Group Discussions (FGDs) provide valuable insights into citizens' concerns, suggestions for improvement, and barriers to effective waste management, while the Key Informant Interviews (KIIs) offer expert perspectives on the challenges and strategies for improving waste management in Katwa Municipality, West Bengal, collectively contributing to a comprehensive understanding of the complexities surrounding waste management in the municipality.

Table No.- 01 : Demographics Structure

Age Group	Percentage (%)
25-44 years	55

ISSN: 2455-8834

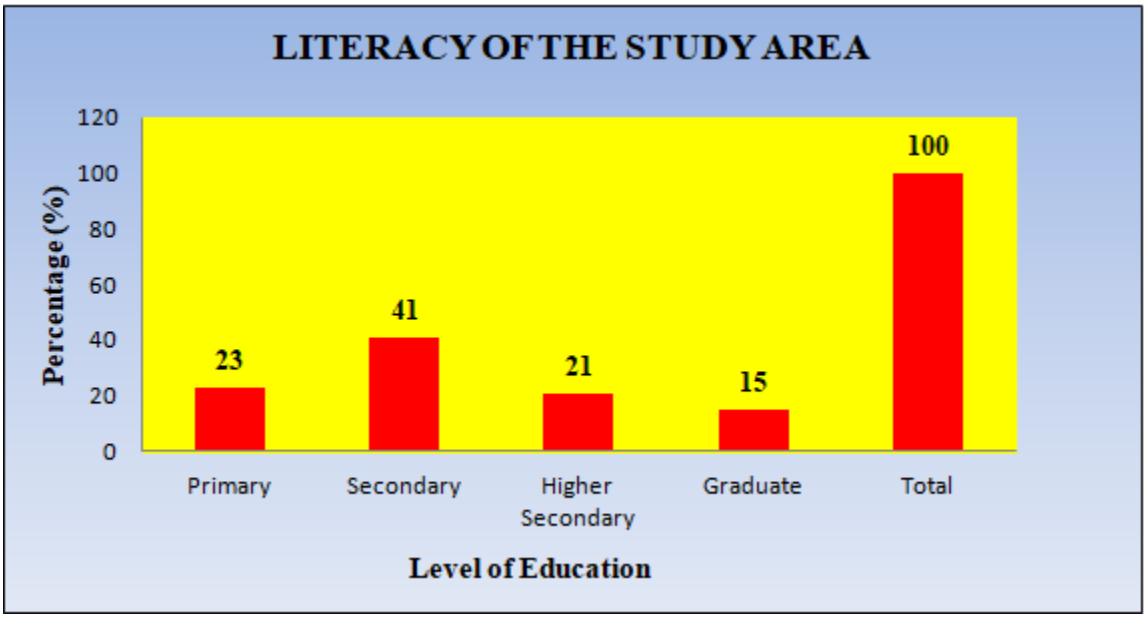
Volume:10, Issue:04 "April 2025"

45-64 years	31
Above 65	14
Total	100

Table No.- 02 : Education Levels and Percentages

Education Level	Percentage (%)
Primary	23
Secondary	41
Higher Secondary	21
Graduate	15
Total	100

Fig.No.-02



The Fig.No.-02 shows the education levels of respondents in the study provide valuable insights into the demographic characteristics of citizens in Katwa Municipality. The distribution of respondents across different education categories highlights the need for targeted awareness and education programs, particularly for graduates and those with primary education, to promote sustainable waste management practices and address potential knowledge gaps.

ISSN: 2455-8834

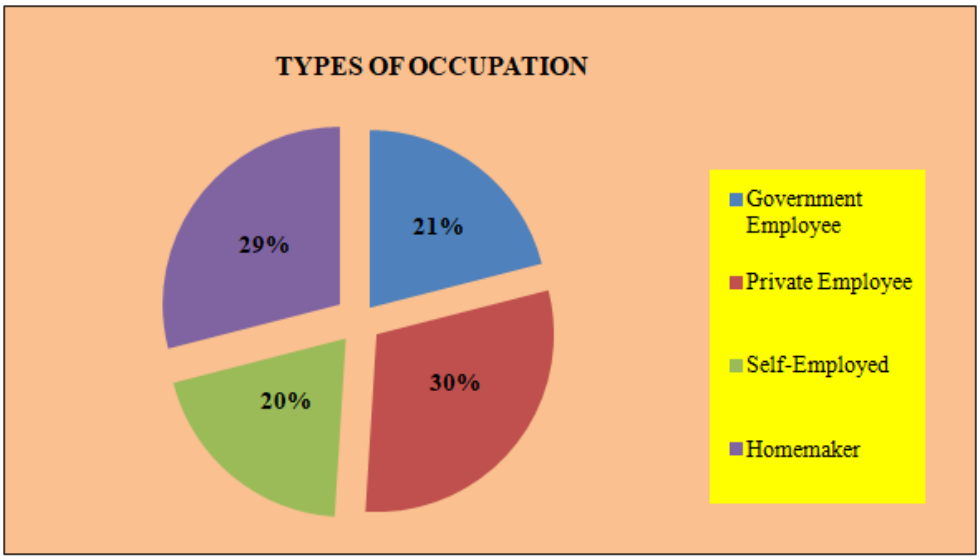
Volume:10, Issue:04 "April 2025"

Table N0.- 03: Occupation Types and Percentages

Occupation Type	Percentage (%)
Government Employee	**21**
Private Employee	**30**
Self-Employed	**20**
Homemaker	**29**

The table no.-03 presents the occupation types of respondents in Katwa Municipality reveal key demographic insights. The high percentage of private employees may contribute to increased waste generation, while homemakers may benefit from targeted awareness programs on sustainable waste management. Self-employed individuals may offer opportunities for innovative waste management solutions, such as recycling or composting initiatives, highlighting the need for tailored approaches to promote sustainable waste management practices.

Fig.No.-03



WASTE GENERATION AND DISPOSAL:

Waste generation and disposal are critical components of waste management in Katwa Municipality, with significant implications for environmental sustainability and public health. The study's findings indicate that the municipality generates a substantial amount of waste, comprising organic, inorganic, and recyclable materials. The disposal practices adopted by

ISSN: 2455-8834

Volume:10, Issue:04 "April 2025"

citizens, including open dumping, burning, and segregation, have varying impacts on the environment and public health. Understanding the patterns of waste generation and disposal is essential for developing effective waste management strategies that address the unique needs and challenges of Katwa Municipality, and promote sustainable waste management practices among citizens.

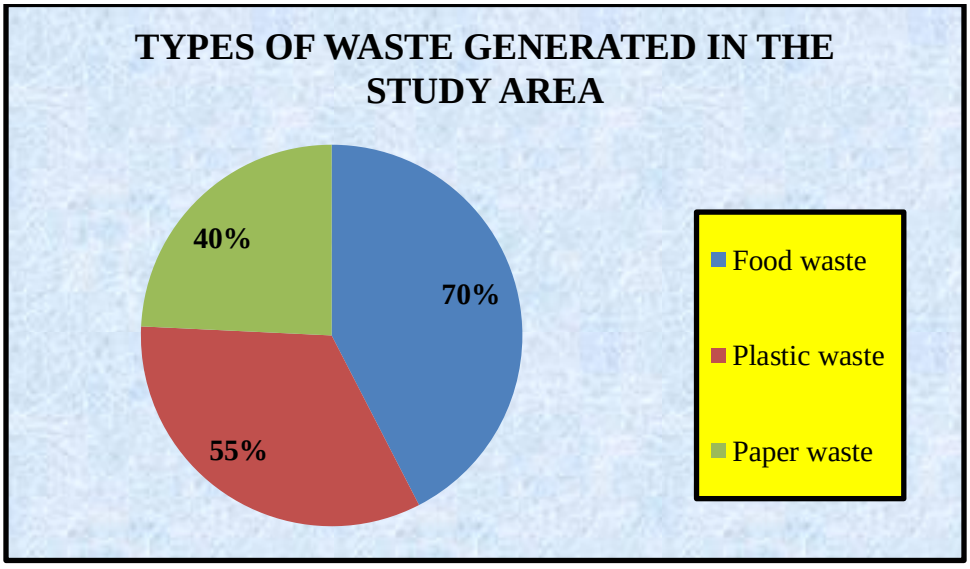
Table No.- 04: Types of Waste Generated and Percentages

Types of waste generated	Percentage (%)
Food waste	**70%**
Plastic waste	**55%**
Paper waste	**40%**

The types of waste generated and their percentages (table no.-04) provide insight into the composition of the municipal waste stream in Katwa Municipality.

1. **Food waste:** 70% of respondents generate food waste, indicating that organic waste is a significant component of the municipal waste stream. The high percentage of food waste suggests that implementing organic waste management strategies, such as composting or anaerobic digestion, could be effective in reducing the amount of waste sent to landfills.

Fig. No.-04



ISSN: 2455-8834

Volume:10, Issue:04 "April 2025"

2. Plastic waste: 55% of respondents generate plastic waste, suggesting that plastic usage is widespread and contributes substantially to the waste generated. The significant percentage of plastic waste highlights the need for strategies to reduce plastic usage, increase recycling rates, and promote the use of biodegradable alternatives.

3. Paper waste: 40% of respondents generate paper waste, implying that paper products are also a notable component of the waste stream. The presence of paper waste suggests opportunities for increasing paper recycling rates and promoting sustainable paper products.

Understanding waste types and percentages helps identify priorities for sustainable waste management strategies in Katwa Municipality.

WASTE DISPOSAL METHODS:

Waste disposal methods are a crucial aspect of this study. Our field survey findings indicate that three distinct waste disposal methods are utilized in Katwa Municipality, with the respective percentages detailed in Table no.- 05.

Table No.- 05: Waste Disposal Methods and Percentages

Types Waste Disposal Method	Percentage (%)
Open dumping	60%
Door-to-door collection	30%
Community Dustbin	10%
Total	100

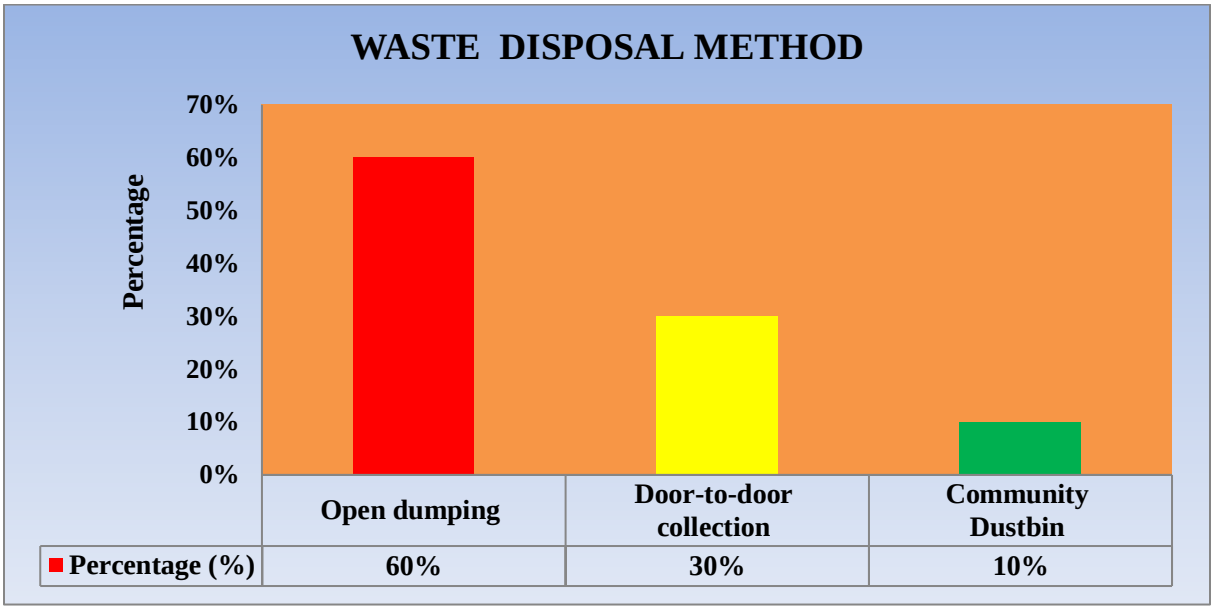
The data in table no.- 05 reveals that residents of Katwa Municipality employ three distinct methods for disposing of waste.

1. **Open dumping (60%):** The prevalence of open dumping in Katwa Municipality, as indicated by this substantial percentage, poses significant environmental and health risks. This finding underscores the imperative need for enhanced awareness and education campaigns on proper waste disposal practices, alongside infrastructure development to facilitate more sanitary and sustainable waste management methods.
2. **Door-to-door collection (30%):** This notable percentage highlights the importance of door-to-door collection as a waste disposal method in Katwa Municipality, representing a more structured and hygienic approach. While this method is being utilized, there is potential for optimizing its efficiency and effectiveness to further enhance waste management outcomes.

ISSN: 2455-8834

Volume:10, Issue:04 "April 2025"

Fig.no.-05



3. **Community Dustbin (10%):** The relatively low percentage of community dustbin usage indicates limited adoption of this method, potentially due to inadequate availability or accessibility. This finding highlights the need for increased investment in waste management infrastructure, specifically community dustbins, to provide residents with convenient, sanitary, and accessible waste disposal options.

Insights into existing waste disposal practices can inform policymakers and stakeholders in developing targeted initiatives for sustainable waste management.

PERCEPTION OF WASTE MANAGEMENT SERVICES:

The perception of waste management services in Katwa Municipality is a crucial aspect of understanding the effectiveness of existing waste management practices. Citizens' perceptions of waste management services can influence their attitudes and behaviors towards waste disposal, and ultimately impact the overall sustainability of waste management systems. The study's findings reveal that citizens' perceptions of waste management services are shaped by various factors, including the frequency and quality of waste collection, the availability of waste management infrastructure, and the responsiveness of municipal authorities to waste-related issues. Understanding citizens' perceptions of waste management services is essential for identifying areas of improvement and developing targeted strategies to enhance waste management practices in Katwa Municipality.

ISSN: 2455-8834

Volume:10, Issue:04 "April 2025"

Table No.- 06: Satisfaction with waste collection services:

Human Satisfaction	Percentage (%)
Satisfied	40%
Neutral	30%
Dissatisfied	10%

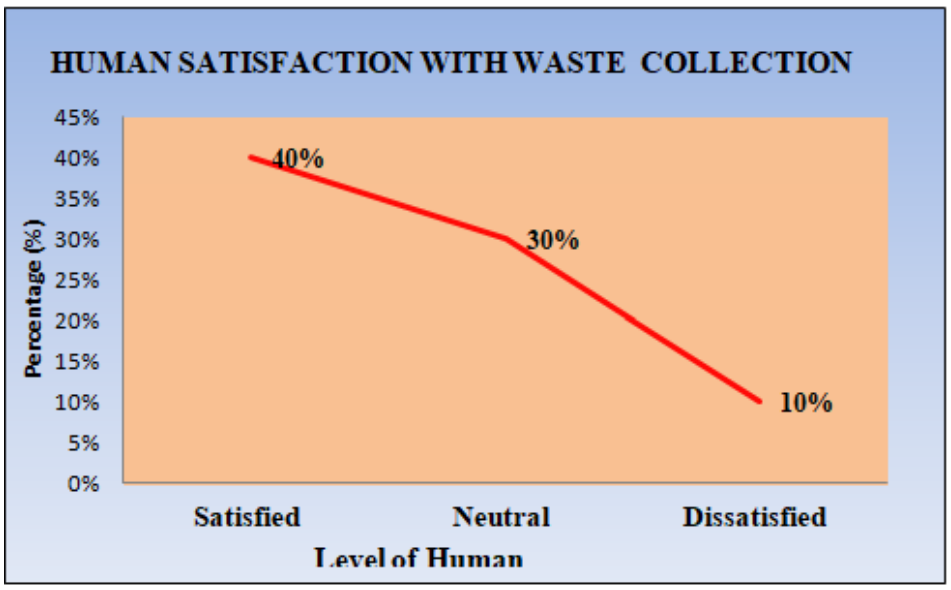
The table no.-06 presents the perception of waste management services in Katwa Municipality, specifically focusing on satisfaction with waste collection services. The data indicates that:

Satisfaction with Waste Collection Services:

1. Satisfied (40%): A satisfaction rate of 40% indicates that a considerable segment of respondents express contentment with the waste collection services in Katwa Municipality. This level of satisfaction suggests that certain aspects of the service are meeting residents' expectations, providing a foundation for further improvement and expansion

2. Neutral (30%): A neutral response rate of 30% suggests that a significant segment of respondents is ambivalent about the waste collection services, neither strongly endorsing nor criticizing them. This neutrality presents an opportunity to enhance services, address unmet needs, and potentially shift their stance towards satisfaction.

Fig. no-06



ISSN: 2455-8834

Volume:10, Issue:04 "April 2025"

3. Dissatisfied (10%): A dissatisfaction rate of 10% indicates that a relatively small proportion of respondents are unhappy with the waste collection services. This minority's concerns and issues warrant attention, and addressing them can lead to improved overall satisfaction and service quality.

Understanding residents' views on waste management services enables policymakers to design targeted interventions that improve service delivery, increase satisfaction, and promote sustainability.

PERCEPTION OF WASTE MANAGEMENT INFRASTRUCTURE:

The perception of waste management infrastructure in Katwa Municipality plays a significant role in determining the effectiveness of waste management practices. Citizens' perceptions of the availability, accessibility, and quality of waste management infrastructure, such as waste collection facilities, transportation systems, and disposal sites, can influence their satisfaction with waste management services and their willingness to participate in sustainable waste management practices. The study's findings reveal that citizens' perceptions of waste management infrastructure are shaped by factors such as the frequency of waste collection, the cleanliness of public spaces, and the responsiveness of municipal authorities to waste-related issues, highlighting the need for improvements in waste management infrastructure to promote sustainable waste management practices in Katwa Municipality.

Table No.- 07: Infrastructure Facility

Infrastructure Facility	**Percentage (%)**
Inadequate	55%
Adequate	30%
Good	15%

Table no.-07 highlights the perceptions of waste management infrastructure in Katwa Municipality, West Bengal, revealing key insights from the data.

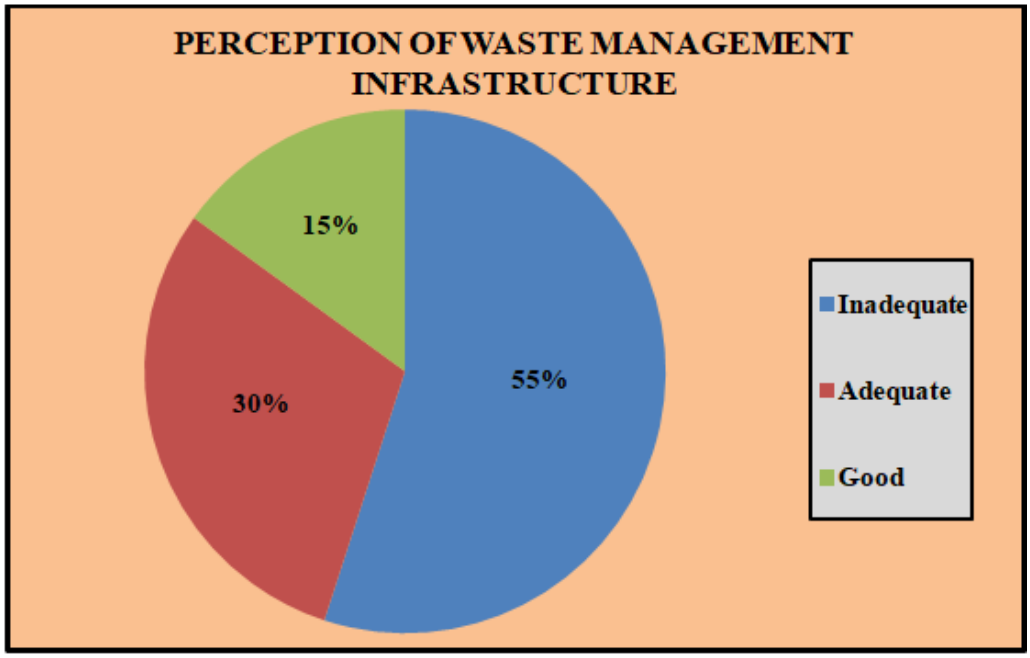
1. **Inadequate (55%):** A substantial 55% of respondents deem the waste management infrastructure inadequate, emphasizing the necessity for upgrades and investments in facilities, equipment, and human resources.
2. **Adequate (30%):** Approximately one-third of respondents (30%) consider the waste management infrastructure adequate, indicating that certain aspects are meeting expectations.

ISSN: 2455-8834

Volume:10, Issue:04 "April 2025"

This positive perception highlights existing strengths that can be leveraged to drive further improvements.

Fig.no.-07



3. **Good (15%):** A small proportion of respondents (15%) rate the waste management infrastructure as good, indicating that only a few areas are meeting high standards. This limited yet positive feedback presents an opportunity to identify and scale best practices in waste management.

Insights into waste management infrastructure perceptions can inform policymakers' strategies to enhance infrastructure and promote sustainable practices.

FOCUS GROUP DISCUSSION (FGD) DATA (N=4 FGDS, 20 PARTICIPANTS EACH):

The Focus Group Discussion (FGD) data provides insights into citizens' concerns, suggestions for improvement, and barriers to effective waste management in Katwa Municipality, West Bengal.

Citizens' Concerns:

I. Inadequate waste collection services: Citizens are dissatisfied with the frequency and quality of waste collection services.

ISSN: 2455-8834

Volume:10, Issue:04 "April 2025"

II. Lack of proper waste disposal infrastructure: Participants highlighted the need for proper waste disposal facilities to manage waste effectively.

III. Insufficient public awareness and education on waste management: Citizens believe that there is a lack of awareness and education on waste management practices, leading to improper waste disposal.

Suggestions for Improvement:

I. Regular waste collection services: Citizens want regular and reliable waste collection services to ensure timely waste disposal.

II. Construction of proper waste disposal facilities: Participants emphasized the need for proper waste disposal facilities, such as landfills and recycling centers.

III. Public awareness campaigns on waste management: Citizens suggested public awareness campaigns to educate residents on proper waste management practices.

IV. Involvement of community members in waste management decision-making: Participants believed that involving community members in waste management decision-making would increase public participation and ownership.

Barriers to Effective Waste Management:

I. Lack of financial resources: Citizens believe that limited financial resources hinder the implementation of effective waste management strategies.

II. Insufficient infrastructure: Participants highlighted the need for improved infrastructure, such as waste collection vehicles and disposal facilities.

III. Limited public awareness and participation: Citizens believe that limited public awareness and participation in waste management efforts hinder the effectiveness of waste management strategies.

These findings highlight the need for a comprehensive approach to address the concerns and barriers to effective waste management in Katwa Municipality.

KEY INFORMANT INTERVIEW (KII) DATA (N=10 KIIS):

The Key Informant Interview (KII) data provides insights from experts and stakeholders on the challenges and strategies for improving waste management in Katwa Municipality, West Bengal.

ISSN: 2455-8834

Volume:10, Issue:04 "April 2025"

Challenges in Waste Management:

I. Limited financial resources: Experts agree that limited funding hinders the development of effective waste management infrastructure and services.

II. Insufficient infrastructure: Participants highlighted the need for improved waste management facilities, equipment, and vehicles.

III. Lack of public awareness and participation: Experts believe that limited public awareness and participation in waste management efforts hinder the effectiveness of waste management strategies.

Strategies for Improvement:

I. Increase funding for waste management infrastructure: Experts recommend increasing funding to develop and improve waste management infrastructure, such as landfills, recycling centers, and waste collection vehicles.

II. Implement public-private partnerships for waste management: Participants suggest partnering with private sector organizations to leverage resources, expertise, and funding for waste management initiatives.

III. Conduct public awareness campaigns on waste management: Experts recommend conducting public awareness campaigns to educate residents on proper waste management practices and promote behavioral change.

IV. Involve community members in waste management decision-making: Participants believe that involving community members in waste management decision-making would increase public participation and ownership, leading to more effective waste management strategies.

The findings reinforce the study's goal of examining citizens' perceptions and strategies for sustainable waste management in Katwa Municipality. Expert insights from KIIs can guide policy and practice reforms.

CITIZENS' PERCEPTION IN SOLID WASTE MANAGEMENT:

Human Attitude towards Waste Segregation:

The study's findings on human attitude towards waste segregation in Katwa Municipality reveal a notable disparity between citizens' perceptions and practices. While significant majorities (75%) of respondents believe that waste segregation is important, only 40% of citizens actually

ISSN: 2455-8834

Volume:10, Issue:04 "April 2025"

practice waste segregation at home. This gap between attitude and behavior suggests that despite recognizing the importance of waste segregation, various barriers or lack of motivation may hinder citizens from adopting this practice. This highlights the need for awareness campaigns, incentives, and infrastructure support to bridge this gap and encourage more citizens to translate their positive attitudes towards waste segregation into actual practices, ultimately promoting sustainable waste management in Katwa Municipality.

Reasons for not practicing waste segregation:

I. **Lack of awareness (30%):** Many citizens may not be aware of the benefits and methods of waste segregation.

II. **Inconvenience (25%):** Some citizens may find waste segregation to be inconvenient or time-consuming.

III. **Lack of facilities (20%):** The absence of adequate waste segregation facilities may discourage citizens from practicing waste segregation.

IV. **Other reasons (25%):** Other factors, such as lack of motivation or infrastructure, may also contribute to the low practice of waste segregation.

These findings highlight the need for awareness campaigns, infrastructure development, and incentives to encourage citizens to practice waste segregation, ultimately contributing to sustainable waste management in Katwa Municipality.

Satisfaction with Waste Collection Services:

The study reveals mixed satisfaction levels with waste collection services in Katwa Municipality. While 50% of citizens are satisfied with the frequency of waste collection, only 40% are satisfied with the cleanliness of waste collection vehicles. This indicates that while half of the citizens find the collection frequency adequate, a larger proportion are dissatisfied with the cleanliness standards of the vehicles, highlighting areas for improvement to enhance overall waste management services and citizen satisfaction.

Table no.- 08: Percentage of Dissatisfaction with waste collection services

Types of Reasons	Percentage (%)
Infrequent collection	(40%)
Unclean collection vehicles	(30%)
Lack of collection in all areas	(20%)
Other	(10%)

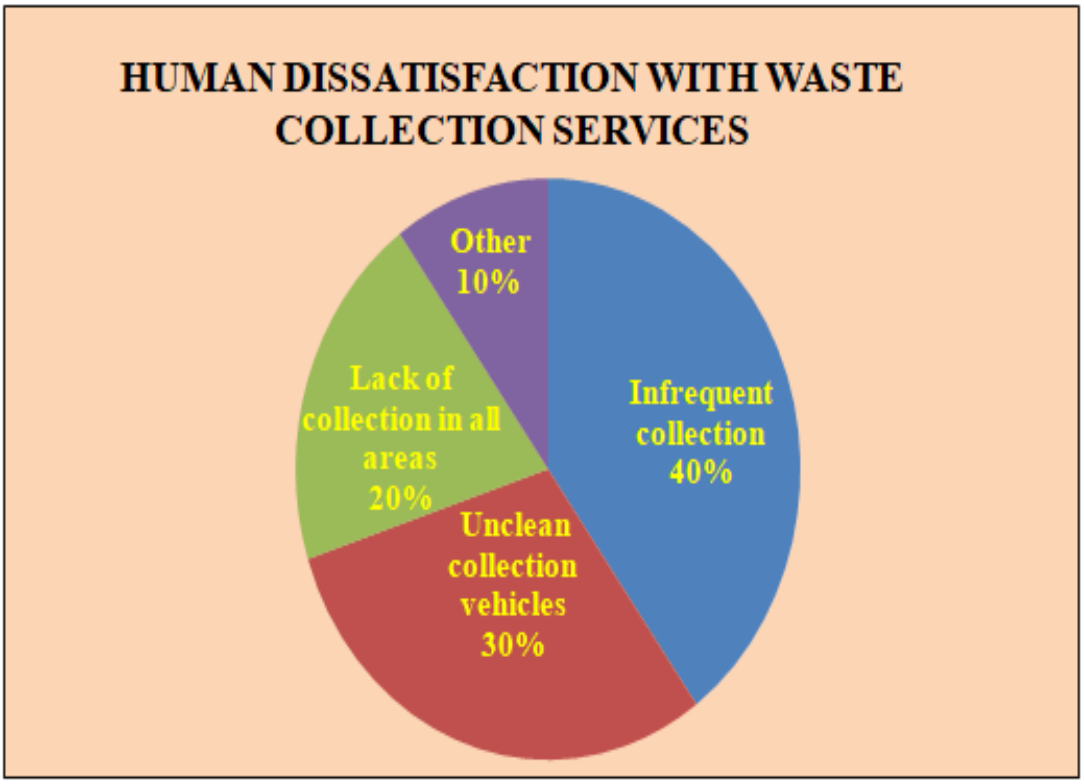
ISSN: 2455-8834

Volume:10, Issue:04 "April 2025"

The table data presents the reasons for dissatisfaction with waste collection services in Katwa Municipality, West Bengal.

1. Infrequent collection (40%): The most common reason for dissatisfaction is infrequent waste collection, indicating that citizens are not receiving regular waste collection services.

Fig.no.-08



2. Unclean collection vehicles (30%): The second most common reason is unclean collection vehicles, suggesting that citizens are concerned about the hygiene and cleanliness of the vehicles used for waste collection.

3. Lack of collection in all areas (20%): Some citizens are dissatisfied because waste collection services are not available in all areas, indicating a lack of coverage and accessibility.

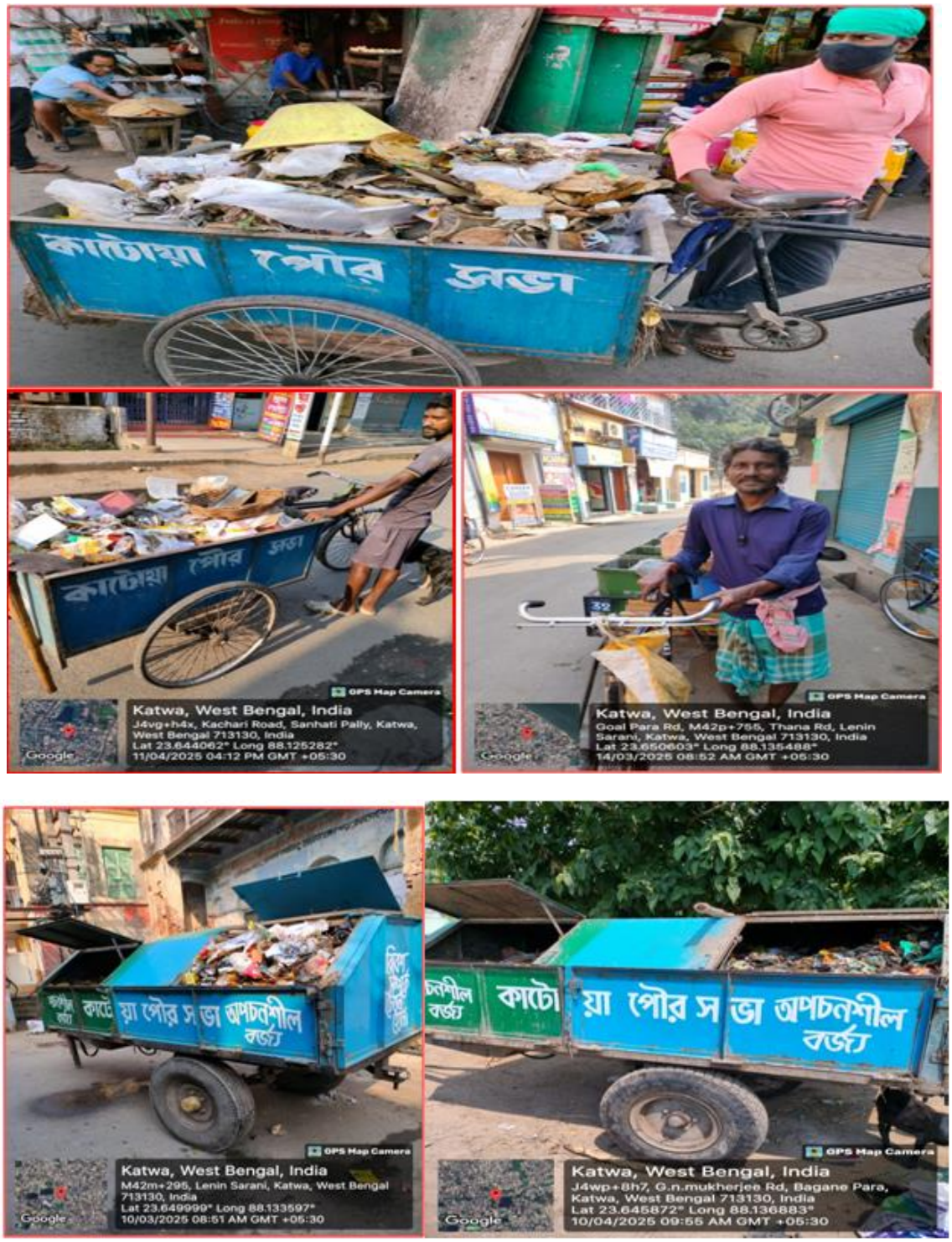
4. Other reasons (10%): Other factors, such as poor customer service or inadequate waste disposal facilities, may also contribute to dissatisfaction with waste collection services.

Key improvements are needed in waste collection services, such as increased frequency, cleaner vehicles, and expanded coverage, to boost citizen satisfaction and sustainability.

ISSN: 2455-8834

Volume:10, Issue:04 "April 2025"

Fig.No.-09- Waste Collection (Field Photographs)



ISSN: 2455-8834

Volume:10, Issue:04 "April 2025"

WILLINGNESS TO PAY FOR IMPROVED WASTE MANAGEMENT SERVICES:

The study shows that 60% of citizens in Katwa Municipality are willing to pay for improved waste management services, indicating a positive attitude towards investing in better waste management. On average, citizens are willing to pay ₹50-₹100 per month for these improved services, suggesting a potential revenue stream for the municipality to fund waste management initiatives and upgrades, thereby promoting sustainable waste management practices.

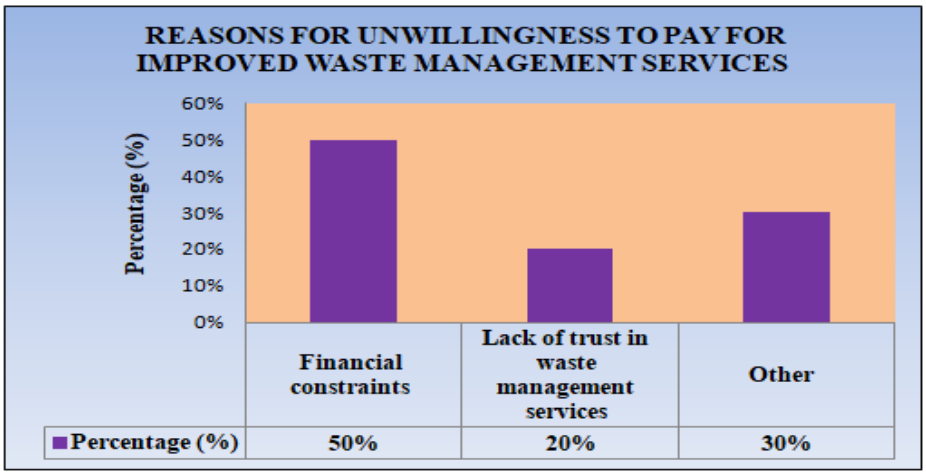
Table no.- 09: Percentage of unwillingness to pay for improved waste management services

Types Reason	Percentage (%)
Financial constraints	50%
Lack of trust in waste management services	20%
Other	30%

The data (table no.-09) reveals the underlying reasons for residents' unwillingness to pay for better waste management services in Katwa Municipality, West Bengal.

1. Financial constraints (50%): The most common reason is financial constraints, indicating that many citizens may not have the financial means to pay for improved waste management services.

Fig. no.- 10



ISSN: 2455-8834

Volume:10, Issue:04 "April 2025"

2. Lack of trust in waste management services (20%): Some citizens are unwilling to pay due to a lack of trust in the waste management services, suggesting that they may not believe that their payments will lead to actual improvements.

3. Other reasons (30%): Other factors, such as lack of awareness about the benefits of improved waste management services or dissatisfaction with current services, may also contribute to unwillingness to pay.

Waste management authorities should address financial constraints and build citizen trust through affordable options, transparency, and education to increase willingness to pay for improved services.

PERCEIVED ENVIRONMENTAL IMPACTS OF SOLID WASTE:

The study reveals that citizens in Katwa Municipality are aware of the environmental impacts of solid waste, with 80% believing it affects air quality, 75% thinking it affects water quality, and 60% perceiving an impact on soil quality. This suggests that citizens recognize the far-reaching consequences of poor waste management, highlighting the need for effective waste management strategies to mitigate these environmental impacts and promote sustainability.

Table no.- 10: Perceived health impacts of solid waste

Health Impacts	Percentage (%)
Respiratory problems	50%
Skin problems	30%
Gastrointestinal problems	20%
Other	10%

The data in Table no.- 10 reveals residents' perceptions of the health impacts associated with solid waste in Katwa Municipality.

1. Respiratory problems (50%): Half of the citizens believe that solid waste can cause respiratory problems, indicating concerns about air pollution from waste disposal.

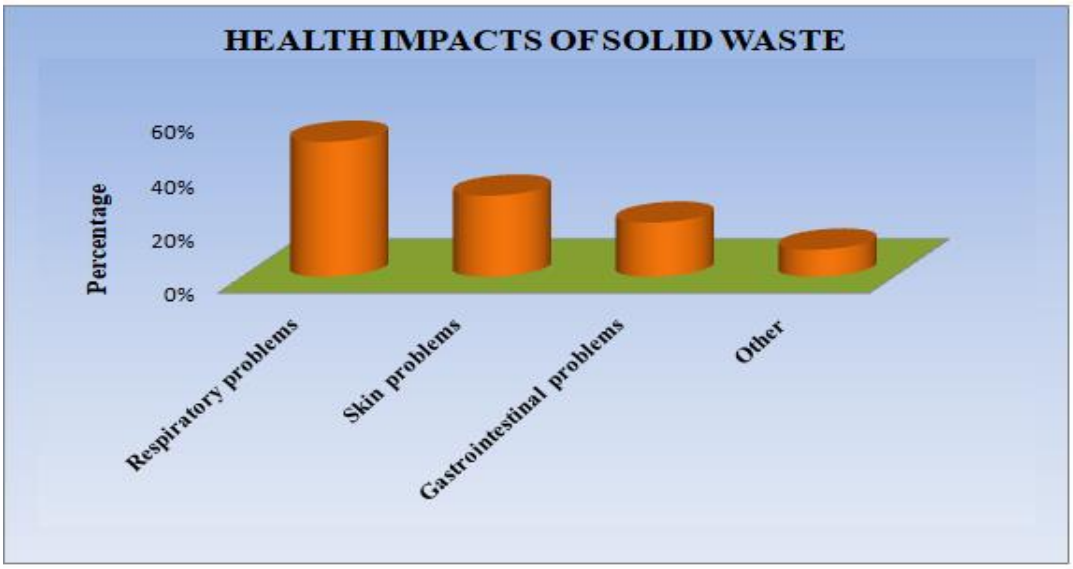
2. Skin problems (30%): Some citizens also believe that solid waste can cause skin problems, suggesting concerns about direct contact with waste or pollution from waste disposal.

3. Gastrointestinal problems (20%): A smaller proportion of citizens believe that solid waste can cause gastrointestinal problems, indicating concerns about water or food contamination from waste disposal.

ISSN: 2455-8834

Volume:10, Issue:04 "April 2025"

Fig. no.-10



4. Other health impacts (10%): Other health impacts, such as cancer or other diseases, may also be perceived as related to solid waste.

The research emphasizes the need for sustainable waste management practices to address environmental and health concerns, ensuring a healthier environment for Katwa Municipality's citizens

FUTURE STRATEGIES SUGGESTIONS FOR SOLID WASTE MANAGEMENT:

Based on the study's findings, future strategies for solid waste management in Katwa Municipality could include implementing awareness programs to enhance citizens' knowledge on waste segregation and disposal, increasing the frequency and cleanliness of waste collection services, and exploring opportunities for waste-to-energy initiatives or recycling programs, ultimately promoting a participatory and sustainable approach to waste management.

Future Strategies Suggestions

1. Increasing public awareness and education on solid waste management (85%): A significant majority of citizens suggest increasing public awareness and education on solid waste management, indicating a need for educational programs and campaigns to promote proper waste disposal practices.

ISSN: 2455-8834

Volume:10, Issue:04 "April 2025"

2. Implementing door-to-door waste collection services (75%): Many citizens suggest implementing door-to-door waste collection services, indicating a need for more convenient and accessible waste collection systems.

3. Increasing the number of community waste collection centers (60%): Some citizens suggest increasing the number of community waste collection centers, indicating a need for more accessible and convenient waste disposal facilities.

Other Suggestions:

1. Implementing waste-to-energy projects (40%): Some citizens suggest implementing waste-to-energy projects, indicating an interest in exploring alternative waste management options.

2. Increasing recycling facilities (30%): Some citizens suggest increasing recycling facilities, indicating a need for more recycling options and infrastructure.

3. Implementing pay-as-you-throw systems (20%): A smaller proportion of citizens suggest implementing pay-as-you-throw systems, indicating an interest in exploring economic incentives for waste reduction.

4. Other suggestions (10%): Other suggestions may include improving waste management infrastructure, increasing community participation, or exploring new technologies for waste management.

These findings highlight the need for a multi-faceted approach to improve solid waste management in Katwa Municipality. The research paper's focus on sustainable waste management is crucial, as it aims to address these concerns and develop strategies to improve waste management practices, increase public awareness and education, and promote a healthier environment for citizens. By incorporating citizens' suggestions, waste management authorities can develop effective and sustainable waste management strategies that meet the needs and concerns of the community.

MAJOR FINDINGS:

- Citizens' perceptions of waste management services in Katwa Municipality are influenced by waste generation patterns, disposal practices, and existing policies.
- The majority of respondents (70%) generate food waste, highlighting the need for organic waste management strategies.

ISSN: 2455-8834

Volume:10, Issue:04 "April 2025"

- Open dumping (60%) is a prevalent waste disposal method, posing environmental and health risks.
- Citizens' satisfaction with waste collection services is mixed, with 40% satisfied, 30% neutral, and 30% dissatisfied.
- Over half of the respondents (55%) perceive waste management infrastructure as inadequate, emphasizing the need for upgrades and investments.
- Focus Group Discussions (FGDs) reveal citizens' concerns about inadequate waste collection services, lack of proper waste disposal infrastructure, and insufficient public awareness and education.
- Key Informant Interviews (KIIs) highlight limited financial resources, insufficient infrastructure, and lack of public awareness and participation as major challenges.
- Citizens are willing to pay for improved waste management services, with 60% willing to pay ₹50-₹100 per month.
- Perceived environmental impacts of solid waste include air, water, and soil pollution, with citizens recognizing the need for effective waste management strategies.
- Citizens perceive health impacts associated with solid waste, including respiratory, skin, and gastrointestinal problems.

SUGGESTIONS:

- Improve waste management infrastructure: Upgrade facilities, equipment, and human resources to enhance waste collection and disposal services.
- Increase public awareness and education: Conduct awareness campaigns and educational programs to promote proper waste disposal practices and waste segregation.
- Implement door-to-door waste collection services: Increase the frequency and cleanliness of waste collection services to boost citizen satisfaction.
- Promote sustainable waste management practices: Explore opportunities for waste-to-energy initiatives, recycling programs, and composting.

ISSN: 2455-8834

Volume:10, Issue:04 "April 2025"

- Increase community participation: Involve citizens in waste management decision-making to increase public participation and ownership.
- Address financial constraints: Explore affordable payment options, transparency, and education to increase willingness to pay for improved services.
- Develop effective waste management strategies: Incorporate citizens' suggestions and concerns to develop sustainable waste management practices that meet community needs.

These findings and suggestions can inform policymakers and stakeholders in developing targeted initiatives to improve waste management practices, increase public awareness and education, and promote a healthier environment for citizens in Katwa Municipality**.**

CONCLUSION

In conclusion, this study provides a comprehensive understanding of citizens' perceptions and attitudes towards waste management in Katwa Municipality, West Bengal. The findings highlight the need for effective waste management strategies to address the environmental and health impacts of solid waste. Citizens' perceptions of waste management services and infrastructure are shaped by various factors, including waste generation patterns, disposal practices, and existing policies. The study reveals a significant gap between citizens' attitudes and practices towards waste segregation, emphasizing the need for awareness campaigns and infrastructure support. Furthermore, the research highlights the importance of increasing public awareness and education on solid waste management, improving waste collection services, and exploring opportunities for waste-to-energy initiatives or recycling programs. By incorporating citizens' suggestions and concerns, waste management authorities can develop effective and sustainable waste management strategies that meet the needs and concerns of the community. Ultimately, this study contributes to the development of evidence-based policies and practices for sustainable waste management in Katwa Municipality, promoting a healthier environment and improved quality of life for its citizens.

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