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Solid Waste Issues and Awareness in Gujarat

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Abstract

This research focuses on solid waste management challenges in Gujarat, a state marked by significant economic growth and urbanization. The study investigates 98 towns, categorized as Class-B, Class-C, and Class-D, exploring variations in waste management practices. Gujarat's government plays a crucial role, employing innovative strategies, such as Common Treatment Stabilization and Disposal Facilities (TSDF) and the Xtended Green Node (XGN), to ensure responsible waste management. Despite these efforts, the state faces key challenges, including inadequate infrastructure, informal sector involvement, and a growing issue of e-waste. The research employs a stratified random sampling technique, surveying 680 participants, to assess awareness levels and perceptions regarding solid waste management. The analysis reveals a generally positive awareness of waste management practices and existing policies, with room for improvement in targeted awareness campaigns. The study also highlights diverse opinions on the community's role, emphasizing the need for engagement initiatives. Overall, the findings provide valuable insights for policymakers and

stakeholders, laying the groundwork for informed strategies to address solid waste management challenges and enhance sustainability in Gujarat.

Keywords: Solid Waste, Solid Waste Issues, Awareness of Solid Waste, Gujarat State

1. Introduction

In the dynamic landscape of urbanization and industrial growth, the state of Gujarat has encountered substantial challenges in managing its municipal solid waste effectively. The efficient handling of solid waste is a critical aspect of urban development, with far-reaching implications for public health, environmental sustainability, and overall quality of life. This research paper delves into the intricate web of issues surrounding solid waste management in Gujarat, exploring the nuances of waste generation, collection, and disposal within the state.

The Comptroller and Auditor General (CAG) report, recently tabled in the Gujarat Assembly, sheds light on the alarming statistics regarding municipal solid waste (MSW) in the state. Disturbingly, as much as 74 percent of the MSW generated in Gujarat's cities and towns during the five-year period from 2014 to 2019 was reportedly dumped without any processing. Delays in the approval of detailed project reports (DPRs) for solid waste management (SWM) have contributed to a concerning scenario where only 22 percent of the funds earmarked under the Swachh Bharat Mission for SWM have been utilized so far.

This paper aims to comprehensively investigate the solid waste management challenges faced by Gujarat, a state marked by rapid industrialization and urbanization. The findings presented here are based on an in-depth analysis of the CAG report, which scrutinized records of urban local bodies, state-level committees, and pollution control boards. The delay in the preparation and approval of DPRs, as highlighted in the report, has led to a substantial underutilization of allocated funds, jeopardizing the timely implementation of SWM projects.

The research explores the existing disposal systems in Gujarat, revealing a significant gap between waste generation and treatment capacity. The report indicates that a mere 26 percent of MSW is treated, while a staggering 76 percent finds its way to open dumpsites, exacerbating environmental concerns and posing potential health hazards.

Against this backdrop, the paper seeks to contribute valuable insights into the current state of solid waste management in Gujarat, shedding light on the root causes of inefficiencies and proposing recommendations for sustainable and effective waste disposal practices. By addressing these challenges head-on, this research aims to pave the way for informed policy decisions and strategic interventions that can steer Gujarat towards a more resilient and eco-friendly solid waste management system.

2. Literature Review

- **Karthikeyan et al (2018),** the article discusses hazardous waste management in Gujarat, India, highlighting the role of the Gujarat Pollution Control Board and initiatives such as common treatment facilities, online tracking, waste minimization, clean-up of old dump sites, public-private partnerships, and the shipbreaking industry. The focus is on effective waste management to mitigate environmental and health risks, emphasizing the need for urgent strategies in the face of India's growing industrialization.
- **Patel, V., & Meka, S. (2013),** the study focuses on municipal solid waste (MSW) generation in 98 medium-scale towns in Gujarat, India. Factors such as population growth, urbanization, and lifestyle changes contribute to increased waste. Population projections and an artificial neural network (ANN) model are employed to forecast MSW generation over a 25-year period, with satisfactory performance.
- **Kumar, A., & Agrawal, A. (2020),** the paper highlights persistent challenges in solid waste management (SWM) in Indian cities, emphasizing issues like mixed waste collection and inadequate treatment systems. It discusses waste-to-energy plants, scientific landfill sites, and calls for holistic approaches. Municipalities face hurdles in waste segregation, and the paper suggests decentralized strategies, recycling, and involving informal waste sectors for sustainable MSWM.

3. Background of Area

Gujarat, a state located in western India, has witnessed significant economic growth and urbanization over the years. This development has brought about several challenges, one of which is the management of solid waste. With an area of 75,686 square miles and a

population of 60,383,628 as of the 2011 census, the state faces the complex task of handling solid waste generated by its large and diverse population.

The urbanization and industrialization in Gujarat, particularly in major cities like Ahmedabad, have contributed to an increase in solid waste generation. The state encompasses major sites of the ancient Indus Valley Civilization, such as Lothal and Dholavira, highlighting its rich historical and cultural significance. However, the modern challenges of waste management pose a threat to both the environment and public health.

The disposal of solid waste is a critical issue that demands attention and effective solutions. As of the study's focus in 2024, 98 towns in Gujarat, including Class-B, Class-C, and Class-D towns, are under consideration for a comprehensive investigation into their waste management practices. The towns have been selected based on population criteria, reflecting the diverse urban landscape in the state.

Given the density of population in Gujarat, standing at 308 persons/sq.km (797.6 persons/sq.mi), it becomes imperative to address the solid waste issues systematically. The disposal system in place must align with the scale of urbanization and demographic distribution. The state's geographical location, with a coastline of approximately 1,600 km along the Arabian Sea, adds another dimension to the waste management challenge, necessitating environmentally responsible practices to safeguard the coastal ecosystem.

Gujarat's capital, Gandhinagar, and its largest city, Ahmedabad, play pivotal roles in the state's economic and cultural landscape. As urban centers continue to grow, the demand for an efficient and sustainable waste management system becomes even more pressing.

This research work aims to delve into the solid waste issues faced by Gujarat and assess the existing disposal systems in the selected towns. By focusing on Class-B, Class-C, and Class-D towns, the study seeks to understand the variations in waste management practices across different urban settings. The findings of this research are crucial for policymakers, urban planners, and environmentalists working towards a more sustainable and resilient waste management infrastructure in Gujarat.

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4. Role of Gujarat Government in Solid Waste Management

The Gujarat government plays a pivotal role in solid waste management, implementing a comprehensive and efficient strategy to address the environmental challenges associated with waste. As a pioneering state in waste management, Gujarat has demonstrated leadership through various initiatives and policies.

One notable aspect is the establishment of Common Treatment Stabilization and Disposal Facilities (TSDF), showcasing the state's commitment to responsible waste management. Gujarat took the lead by introducing the concept of TSDF, providing a centralized approach for the safe disposal of hazardous waste generated by industrial clusters. With eight TSDF sites, the state has emerged as a leader in the development of such facilities, contributing significantly to the national landscape, which comprises 27 TSDF sites.

The state government, in collaboration with industry stakeholders and Klynveld Peat Marwick Goerdeler (KPMG), organized a summit and expo focused on the 4R principle of hazardous waste management. This proactive approach demonstrates Gujarat's commitment to raising awareness and promoting best practices in waste management.

The introduction of the Xtended Green Node (XGN) further showcases the state's dedication to transparency and accountability. This online live tracking system monitors the transportation and disposal of hazardous waste, covering over 18,000 industries, treatment plants, and waste handlers. The use of XGN ensures that waste is handled responsibly, with unloading permitted only after the generation of a manifest, contributing to a systematic and regulated waste management process.

Gujarat emphasizes waste minimization through co-processing, aligning with the Hazardous Waste (Movement, Handling & Trans-boundary Movement) Rules of 2008. This approach not only facilitates energy recovery but also promotes the sustainable utilization of hazardous waste, representing a crucial step in reducing environmental impact.

The Gujarat Pollution Control Board has taken proactive measures to clean up old waste dump sites, lifting and shifting substantial amounts of hazardous waste to designated landfill sites. This effort reflects the government's commitment to addressing historical environmental challenges and mitigating the impact of illegal dump sites.

The government has facilitated public-private partnerships in the establishment of Common TSDFs, showcasing a collaborative approach to waste management. With capital investment subsidies, concessional land rates, and financial support from both the state and central governments, Gujarat has fostered the development of effective waste management infrastructure.

The Gujarat government's multifaceted approach to solid waste management, encompassing innovative technologies, public-private partnerships, and environmental cleanup initiatives, underscores its commitment to creating a sustainable and eco-friendly waste management ecosystem in the state.

5. Key Issues and Challenges of Solid Waste in Gujarat

In Gujarat, solid waste management presents a set of key issues and challenges that require strategic interventions. Rapid urbanization and population growth have significantly contributed to the escalating volume of solid waste generated in the state. The inadequate infrastructure for garbage collection and disposal exacerbates the problem, leading to a substantial portion of the waste remaining untreated or finding its way into landfills. The informal sector's involvement in waste management, while valuable in extracting some value from waste, also poses challenges due to the lack of a systematic approach. E-waste is emerging as a growing concern, necessitating specialized handling and disposal methods. Additionally, the state grapples with insufficient recycling infrastructure and practices, resulting in a considerable portion of recyclable materials, such as plastics and aluminum, ending up in landfills. Effective waste management in Gujarat demands a holistic approach, including investments in innovative technologies, improved collection services, integration of formal and informal waste sectors, and the implementation of supportive policies and regulations. Public awareness campaigns and community involvement are vital components to instigate behavioral changes and enhance the efficiency of waste separation and recycling initiatives. By addressing these key challenges, Gujarat can pave the way for a more sustainable and environmentally conscious approach to solid waste management.

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6. Objectives

The primary objective of this research is to conduct a comprehensive investigation into the solid waste management practices and awareness levels in Gujarat, specifically targeting towns categorized as Class-B, Class-C, and Class-D.

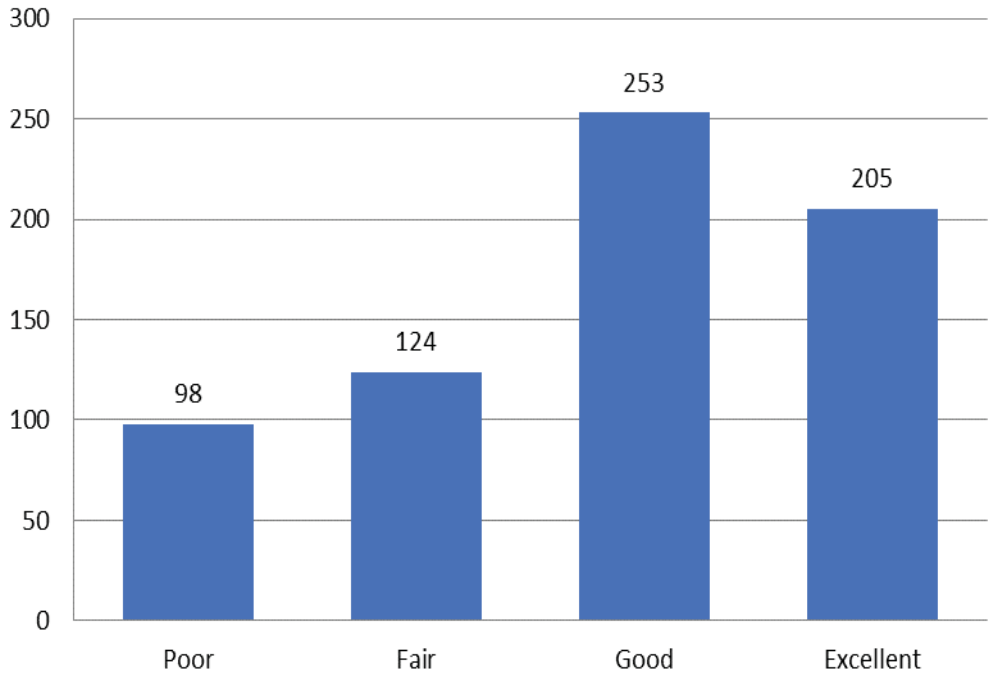
7. Sample Size

A stratified random sampling technique is employed to ensure representation from different town classes. The 680 participants are proportionally distributed among the identified towns in Gujarat. A list of towns categorized as Class-B, Class-C, and Class-D will be obtained from relevant municipal and government records.

8. Analysis and Interpretation

The researcher has disseminated a custom-designed questionnaire in the identified towns of Gujarat to analyze the level of awareness regarding solid waste management practices.

- **Rate Awareness of Solid Waste Management Practices**



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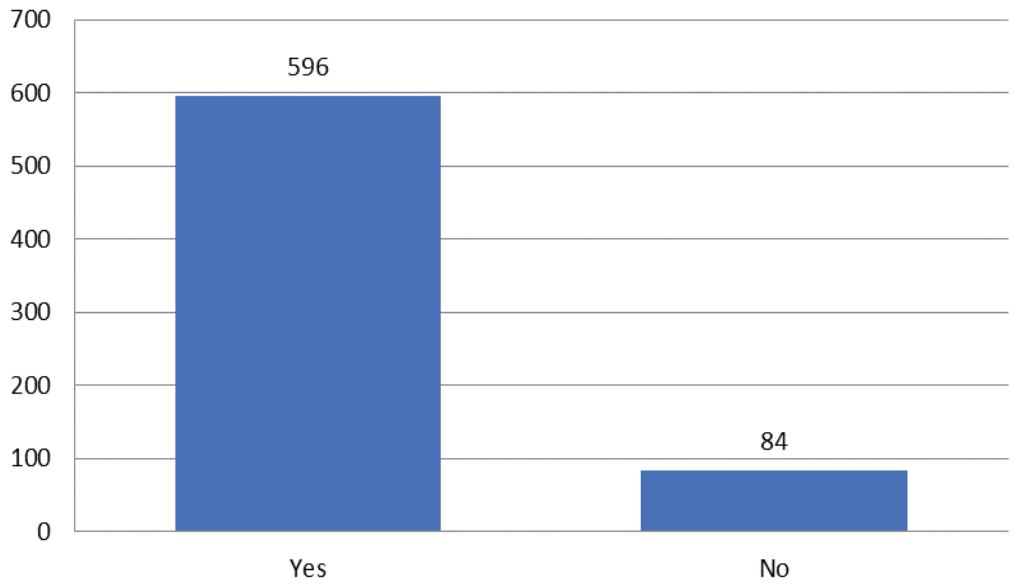
The chart illustrates the respondents' self-reported assessments of their overall awareness of solid waste management practices in Gujarat, categorizing their responses into four levels: Poor, Fair, Good, and Excellent. Most of the surveyed individuals, comprising 253 respondents, rated their awareness as 'Good.' This suggests a considerable portion of the population possesses a satisfactory understanding of solid waste management practices in the state. Furthermore, 205 respondents rated their awareness as 'Excellent,' indicating a significant percentage of the surveyed individuals express a high level of confidence in their knowledge of waste management. On the other hand, 124 respondents reported a 'Fair' level of awareness, signifying a moderate understanding. Notably, 98 respondents perceived their awareness as 'Poor,' indicating a segment of the population with a lower level of knowledge or confidence in their understanding of solid waste management issues. The distribution of responses across these categories provides insights into the varying levels of awareness among the surveyed population, highlighting the need for targeted awareness campaigns or educational initiatives to address any gaps in knowledge and promote a more uniform understanding of solid waste management practices in Gujarat.

- **Waste Management Policies**



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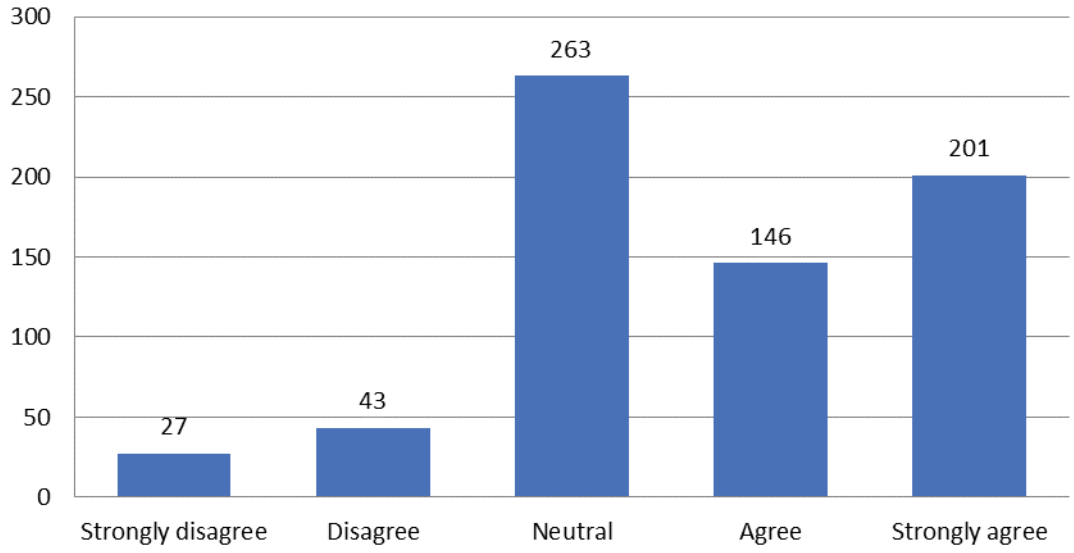
The chart illustrates a significant level of awareness regarding existing waste management policies in the locality among the surveyed individuals in Gujarat. Out of the total 680 respondents, a substantial majority of 596 individuals (approximately 87.6%) indicated that they are cognizant of the waste management policies in their respective areas. This high level of awareness suggests that a significant portion of the population is informed about the guidelines and regulations set by local authorities to govern waste management practices. The relatively low count of 84 respondents (approximately 12.4%) who answered negatively to the question highlights a smaller segment of the population that may lack awareness of the existing policies. This finding underscores the importance of continued efforts in disseminating information and fostering community education initiatives to ensure broader awareness and understanding of waste management policies. Moreover, it provides a valuable insight for local authorities and policymakers to target specific areas or demographic groups that may require additional attention in terms of policy communication and awareness-building campaigns. Overall, the positive response indicates a commendable baseline of awareness, and efforts can be directed towards sustaining and enhancing this awareness for more effective waste management practices in Gujarat.

- **Role In Effective Waste Management**



The responses to the question "Do you believe that the community plays a role in effective waste management?" reveal a diverse range of opinions among the surveyed individuals in Gujarat. The majority of respondents, comprising 263 individuals, expressed a neutral stance, suggesting ambivalence or perhaps a lack of clear conviction regarding the community's role in waste management. On the opposing ends of the spectrum, a combined total of 228 respondents leaned towards a more positive outlook, with 146 individuals agreeing and 201 strongly agreeing that the community does play a significant role in effective waste management. This positive inclination suggests an acknowledgment of the community's potential impact in contributing to better waste management practices. On the contrary, a sum of 70 respondents demonstrated a more sceptical view, with 27 strongly disagreeing and 43 disagreeing with the notion that the community holds a crucial role in waste management. These contrasting perspectives highlight the need for targeted awareness campaigns and community engagement initiatives to foster a shared sense of responsibility and active participation in waste management efforts. Addressing the concerns of those who disagree or are neutral can contribute to building a consensus and mobilizing community-driven solutions for effective waste management in Gujarat.

9. Conclusion

The analysis of the survey responses on solid waste management practices in Gujarat reveals valuable insights into the level of awareness, perceptions, and attitudes among the surveyed population. These findings carry implications for policymakers, community organizations, and other stakeholders involved in waste management initiatives.

Firstly, the majority of respondents, constituting 253 individuals, reported a 'Good' level of awareness regarding solid waste management practices. An additional 205 respondents rated their awareness as 'Excellent.' This suggests that a substantial portion of the surveyed population possesses a satisfactory to high level of understanding of waste management practices in the state. However, the presence of 98 respondents perceiving their awareness as 'Poor' emphasizes the existence of a segment with a lower level of knowledge or confidence. Targeted awareness campaigns and educational initiatives can be designed to bridge these

gaps, ensuring a more uniform understanding of solid waste management practices across the population.

Secondly, the high level of awareness (87.6%) regarding existing waste management policies in the locality is a positive indication. The findings underscore the success of current communication efforts in informing the community about guidelines and regulations set by local authorities. However, the 12.4% who lack awareness of these policies highlight an opportunity for policymakers to refine communication strategies, focusing on specific areas or demographic groups that may require additional attention.

Lastly, the diverse opinions on the community's role in effective waste management, with a significant number expressing neutrality, suggest the need for targeted engagement initiatives. Building a consensus among those who disagree or hold neutral views is crucial for fostering a shared sense of responsibility and active community participation in waste management efforts.

While the survey indicates a commendable baseline of awareness and positive perceptions, it also highlights specific areas where interventions can enhance community engagement and understanding. The findings provide a foundation for informed decision-making and the development of targeted strategies to address solid waste management challenges in Gujarat, ultimately contributing to a more sustainable and effective waste management framework for the state.

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