RESEARCH PAPER

Household Waste Segregation Behaviour And Environmental Responsibility In Kodaikanal Municipality: A Qualitative Study

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Abstract

Solid waste management has become a significant environmental challenge in tourism-based hill towns due to increasing population, urbanisation, and seasonal tourist inflows. This study investigates household waste segregation behaviour and environmental responsibility among the residents of kodaikanal municipality, a significant hill station in tamil nadu, india. This study aims to understand the level of awareness among the residents of kodaikanal municipality on wet and dry waste segregation, assess their participation in the segregation process and identify social and institutional barriers influencing solid waste management behaviours of kodaikanal residents. A qualitative research methodology was adopted, and data were collected through in-depth interviews with residents, municipality sanitary workers, shop owners and ngo representatives in kodaikanal municipality. Field observations and municipal document analysis were also used. Using purposive sampling, 50 participants were selected for the study. The research indicates that despite the high level of awareness regarding wet and dry waste segregation, with 80% of residents acknowledging it due to frequent municipal awareness initiatives, the actual practice of segregation is not consistent with this awareness, thereby highlighting a disparity between knowledge and action. A considerable proportion of households still dispose of wet and dry waste together in a single dustbin, necessitating that municipal sanitary workers segregate the waste during their daily door-to-door collection routes. Furthermore, the study demonstrates a limited sense of environmental responsibility among the residents, as many view waste management primarily as a municipal obligation rather than a collective responsibility. The solid waste produced by the tourism sector intensifies the burden on the municipal solid waste management infrastructure. Consequently, this study posits that enhancing community engagement, environmental awareness, and cooperative efforts between kodaikanal's populace and municipal authorities is crucial for the advancement of sustainable solid waste management practices in this tamil nadu hill station, which is significantly dependent on tourism.

Keywords: Solid Waste, Household Waste, Environmental Responsibility, Waste Segregation.

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Introduction:

The escalating production of solid waste has emerged as a critical global environmental concern, driven by swift urban expansion, population increases, industrial development, and evolving consumption habits. According to the World Bank's *What a Waste 2.0* report, the world produced roughly 2.01 billion tonnes of municipal solid waste in 2016. If current patterns persist, that number is projected to swell to 3.40 billion tonnes by 2050. The report also highlights a troubling reality: more than a third of the globe's waste is not being handled in an environmentally responsible manner. This situation leads to significant environmental and public health problems, including soil degradation, water contamination, the release of greenhouse gases, and the decline of biodiversity. Developing nations, especially those in Asia and Africa, encounter heightened difficulties stemming from inadequate waste management systems and insufficient regulatory oversight. Correspondingly, the United Nations Environment Programme emphasizes that ineffective waste management substantially exacerbates environmental deterioration and climate change, as landfills and open dumping sites generate considerable methane emissions, a highly impactful greenhouse gas. Consequently, the enhancement of

waste reduction, recycling initiatives, and sustainable waste management strategies has emerged as a critical global imperative for realizing the objectives of sustainable development and environmental safeguarding (Kaza et al., 2018; UNEP, 2021).

Municipal solid waste in India:

Municipal solid waste (MSW) management in India presents a significant environmental and governance challenge, especially considering the swift urbanization, population expansion, and evolving consumption habits. The Central Pollution Control Board (CPCB) reported that India produced approximately 1,70,338 tonnes of municipal solid waste daily during the 2021–22 period. This figure represents a significant rise compared to earlier decades. Of the total waste produced, about 91,512 tonnes are processed using scientific methods each day. The rest is either consigned to landfills, dumped openly, or poorly managed. Furthermore, research indicates that India produces about 62 million tonnes of municipal waste each year. The prediction points to significant growth, driven by both increasing urban populations and economic expansion. Despite the progress made by government programs like the Swachh Bharat Mission, significant challenges remain. These include poor source separation, a lack of comprehensive recycling systems, open dumping, and inefficient waste collection. These deficiencies exacerbate environmental deterioration, contaminate groundwater, and contribute to the emission of greenhouse gases, consequently posing considerable public health hazards across numerous Indian urban centres. Consequently, enhancing waste segregation practices, refining recycling processes, and bolstering municipal infrastructure have emerged as essential objectives for fostering sustainable urban development within India.

Importance of household segregation:

Household waste segregation at its origin is a fundamental component of efficient municipal solid waste management, facilitating effective recycling, composting, and environmentally sound waste disposal practices. By categorizing waste at the household level into biodegradable, recyclable, and hazardous components, the strain on municipal collection systems is substantially diminished, concurrently preventing the contamination of recyclable materials. Research suggests that approximately 50–60% of municipal solid waste produced in Indian cities is biodegradable; this fraction can be effectively processed through composting or bio-methanation if segregated at the source (CPCB, 2022). Furthermore, separating waste at the source improves recycling efficiency. As a result, the presence of mixed waste often makes it unsuitable for material recovery, which then increases the use of landfills. Globally, the World Bank reports that recycling initiatives manage approximately 13.5% of waste, with composting representing roughly 5.5%; this situation is primarily attributable to inadequate source segregation (Kaza et al., 2018). Furthermore, the Central Pollution Control Board emphasizes the critical role of household-level segregation in the successful execution of the Solid Waste Management Rules, 2016. These regulations mandate the classification of waste into biodegradable, dry, and domestic hazardous categories to facilitate the development of sustainable waste management approaches in urban environments (CPCB, 2022). Consequently, household waste segregation is crucial for diminishing landfill waste, enhancing recycling rates, preserving natural resources, and mitigating environmental pollution (Kaza et al., 2018).

Environmental sensitivity of hill stations:

Hill stations are environmentally sensitive regions where improper solid waste management can lead to severe ecological consequences due to fragile mountain ecosystems, steep terrain, and limited waste processing infrastructure. These areas often experience a sharp increase in waste generation because of seasonal tourism, which places additional pressure on local waste management systems. Research suggests that mountain tourist destinations often produce two to three times the waste of their resident populations during peak tourist seasons, thereby presenting a considerable challenge for local municipalities regarding waste management (UNEP & UNWTO, 2005). Consequently, the inappropriate management of municipal solid waste in mountainous areas poses a risk of soil, groundwater, and water body contamination, considering that waste disposal sites are often located on inclines, thereby enabling leachate to migrate into nearby streams and lakes (World Bank, 2021). Furthermore, the limited land availability and transportation constraints in mountainous terrain make landfill development and waste collection more difficult, resulting in open dumping and burning practices that threaten biodiversity and public health (CPCB, 2022). Hill ecosystems are particularly susceptible to the detrimental effects of plastic pollution, which poses a threat to wildlife and disrupts the integrity of natural habitats. Therefore, hill stations located in ecologically vulnerable zones require the adoption of sustainable waste management strategies. These strategies should include efforts to reduce waste,

methods for separating waste at the source, decentralized composting systems, and strict enforcement of waste management rules related to tourism. The main goal is to protect the vulnerable ecosystems (UNEP, 2015).

Waste challenges in Kodaikanal:

Kodaikanal, a popular tourist spot, grapples with the considerable task of handling solid waste. This stems from a surge in visitors, the seasonal ebb and flow of its population, and the constraints of existing municipal systems. Tourist hotspots typically produce waste volumes that far exceed those of their resident populations; this is largely attributable to the substantial waste generated by hotels, restaurants, and recreational pursuits, encompassing food waste, plastic packaging, and other single-use items. Research indicates that tourism-dependent businesses, including hotels and restaurants, can account for as much as 50–70% of the total waste produced in popular tourist towns, thereby exerting significant strain on local waste management systems (United Nations Environment Programme & World Tourism Organization, 2005). In Kodaikanal, the rapid expansion of tourism and hospitality ventures has demonstrably amplified municipal solid waste generation; studies suggest that a considerable portion of the town's waste is derived from hospitality establishments and tourist-related activities, especially during peak seasons characterized by a sharp increase in visitor numbers (Rajamanickam, 2017).

The geographical characteristics of hill towns further complicate waste management, as narrow roads, steep slopes, and limited land availability restrict efficient waste collection, transportation, and landfill development (World Bank, 2021). Consequently, improper waste disposal methods, including open dumping and incineration, can precipitate environmental issues such as soil contamination, water pollution, and the deterioration of the sensitive hill ecosystem that characterizes tourist destinations (UNEP, 2015). Therefore, municipalities like Kodaikanal, which depend on tourism, necessitate comprehensive waste management strategies. To effectively address the growing waste management challenge, these strategies should include separating waste at its source, promoting responsible tourism practices, and improving municipal infrastructure.

Research Gap:

Although the academic discourse on municipal solid waste management in India has expanded considerably, the majority of extant research predominantly addresses urban waste generation, technological interventions, and municipal infrastructure. Consequently, the household-level behavioural dimensions of waste segregation, especially within environmentally sensitive hill stations, have received comparatively little scholarly attention. Research has shown that source segregation at the household level is one of the most critical factors determining the success of waste management systems, yet behavioural practices and environmental responsibility among residents remain insufficiently explored in many local contexts (Kaza et al., 2018). Furthermore, studies on tourism towns highlight the increasing pressure of waste generation due to tourist inflow, but there is a lack of qualitative research examining how local households perceive and practice waste segregation in hill tourism destinations such as Kodaikanal (World Bank, 2021). Therefore, this study aims to address a clear gap in research by using qualitative methods to explore how people in tourism-driven hill towns separate their waste and how they view their environmental responsibilities.

Research objectives:

- To analyse the household waste segregation practices among residents of Kodaikanal.
- To examine the level of environmental responsibility and awareness related to waste management among local households.
- To identify the social and institutional factors influencing household waste segregation in the study area.

Review of Literature

Moeini et al. (2023) argue that the efficacy of waste separation is predominantly determined by a triad of factors: motivation, knowledge, and access. Their findings suggest that even when individuals possess the desire to act sustainably, a lack of technical knowledge regarding material categorisation can stifle effective participation. This aligns with the broader consensus that environmental awareness serves as the primary catalyst for transitioning from passive concern to active waste sorting.

Xia et al. (2021) emphasise that analysing individual behavioural patterns is essential for reducing "contamination"—the mixing of non-recyclables with recyclables—which often renders entire batches of waste unprocessable. Their study highlights that improving recycling efficiency is contingent upon the precision of the sorting behaviour at the point of origin, rather than relying solely on downstream technological interventions.

Akmal et al. (2023) demonstrate that variables such as education levels, household income, and prior

environmental exposure significantly dictate the consistency of segregation practices. High-income or more highly educated cohorts often exhibit more disciplined sorting habits, though this is frequently mediated by the availability of municipal support. Conversely, improper segregation in less-informed communities can inadvertently undermine entire municipal recycling systems, as mixed waste streams increase processing costs and lower the quality of recovered materials.

Jampala (2024) emphasises that behavioural intention is the most critical predictor of whether an individual will engage in waste separation. His research suggests that while external infrastructure is necessary, the internal "readiness to act" determines the consistency and long-term viability of household participation in municipal programs.

Yuriev et al. (2020) demonstrate that household waste management is rarely an isolated decision; rather, it is significantly swayed by Subjective Norms—the perceived social pressure from family and the immediate community. Furthermore, their work highlights that Perceived Behavioural Control (the individual's belief in their own ability to segregate waste effectively) is a major determinant in whether a resident feel empowered to participate or overwhelmed by the complexity of the task.

Pan et al. (2024) explore "Extended TPB" frameworks, arguing that Environmental Knowledge and Awareness act as significant moderators. Their findings indicate that when residents are well-informed about the ecological consequences of their waste, their behavioural intentions are strengthened, leading to a marked improvement in the accuracy of waste segregation practices.

Afroz et al. (2011) argue that personal environmental concerns and a sense of moral responsibility are among the strongest predictors of household waste reduction. Their research suggests that when waste segregation is viewed through a moral lens rather than a purely regulatory one, residents are more likely to maintain consistent sorting habits, even in the absence of external incentives.

Wilson (2025) demonstrates that individuals possessing robust "biospheric" or environmental values are significantly more likely to participate in recycling activities. This research emphasises that environmental attitudes and specialised knowledge act as precursors to sustainable household practices. Without a foundational understanding of *why* certain actions matter, the drive to engage in complex behaviours like source segregation remains low.

Moeini et al. (2023) argue that household segregation behavior is a product of both internal variables (socioeconomic status and environmental attitudes) and external variables (policy regulations and infrastructure). Their research highlights that high environmental concern (internal) can be rendered ineffective if the external institutional support—such as reliable collection schedules—is absent.

Xu et al. (2017) demonstrate that specific policy interventions, such as door-to-door collection services, mandatory segregation rules, and recycling incentives, serve as powerful catalysts for sustainable practices. By lowering the "transaction cost" for the resident (e.g., making it easier to dispose of waste correctly than incorrectly), institutional frameworks can normalize high-effort behaviors like source separation.

Debnath et al. (2020) observe that during peak tourist seasons, waste accumulation frequently outpaces collection frequency. This "seasonal overflow" leads to visible littering and illegal dumping, as the local infrastructure—optimised for a smaller permanent population—reaches its breaking point under the weight of tourism-driven consumption.

Kuniyal (2003), focusing on Himalayan trekking and tourism regions, notes that poorly managed solid waste directly threatens biodiversity, water quality, and landscape aesthetics. Because these regions often serve as water catchment areas, waste contamination at high altitudes has a "downstream" effect, polluting water sources for communities situated lower in the valleys.

Conceptual Framework:

This study examines household waste segregation behaviour and environmental responsibility by integrating three major theoretical perspectives: the Theory of Planned Behaviour, Environmental Citizenship Theory, and the Motivation–Opportunity–Ability Model. These frameworks provide a comprehensive understanding of how individual attitudes, social influences, and institutional factors shape environmental behaviour at the household level.

The Theory of Planned Behaviour (TPB) explains that human behaviour is primarily influenced by behavioural intentions, which are shaped by three factors: attitudes toward the behaviour, subjective norms, and perceived behavioural control (Ajzen, 1991). In the context of waste management, household waste segregation practices are significantly influenced by positive attitudes towards environmental protection, social expectations from family or community, and individuals' perceived ability to separate waste (Ajzen, 1991). Studies applying TPB to waste management behaviour have shown that attitudes toward recycling,

social pressure to behave responsibly, and the availability of waste segregation facilities are key determinants of household waste separation behaviour (Yuriev et al., 2020). Building on this framework, Environmental Citizenship Theory emphasises the importance of environmental awareness, ethical responsibility, and civic engagement in promoting sustainable environmental practices.

Environmental citizenship encourages individuals to take responsibility for protecting natural resources and reducing environmental impacts through responsible actions such as recycling and waste segregation (Dobson, 2010). Research suggests that individuals who possess stronger environmental values and ecological awareness are more likely to adopt pro-environmental behaviours, including waste reduction and segregation at the household level (Stern, 2000). In addition, the Motivation–Opportunity–Ability (MOA) Model provides a behavioural perspective that explains how environmental practices are shaped by motivational factors, access to opportunities, and individuals' abilities to perform specific behaviours. According to the MOA framework, environmental behaviour occurs when individuals are motivated to act, have the opportunity through supportive infrastructure and institutional arrangements, and possess the knowledge or ability required to perform the behaviour (MacInnis et al., 1991). Studies on waste management behaviour indicate that the availability of municipal waste collection systems, access to segregated bins, and environmental awareness campaigns can significantly enhance household participation in waste segregation practices (Moeini et al., 2023).

Based on these theoretical perspectives, this study proposes a conceptual framework in which environmental awareness, social norms, municipal support, and perceived behavioural control influence household waste segregation behaviour. Environmental awareness increases individuals' understanding of ecological impacts and motivates responsible waste practices (Stern, 2000). Social norms encourage households to adopt environmentally responsible behaviour due to expectations from community members and social networks (Yuriev et al., 2020). Municipal backing, encompassing waste collection provisions and segregation facilities, furnishes the institutional framework essential for the adoption of sustainable waste management strategies (World Bank, 2021). Furthermore, residents' assurance in their capacity to segregate waste efficiently, a reflection of perceived behavioural control, bolsters their environmental intentions and subsequent actions (Ajzen, 1991). Ultimately, how we separate household waste can help us be more environmentally responsible. This is because it encourages us to consume sustainably, reduces the amount of waste sent to landfills, and supports the recovery of resources. In environmentally sensitive tourism towns such as Kodaikanal, strengthening these behavioural and institutional factors is essential for improving municipal solid waste management and protecting fragile ecosystems.

Research Methodology:

Research Design:

The present study utilises a qualitative research design to explore the waste segregation practices and environmental accountability exhibited by the residents of Kodaikanal. Qualitative research is particularly appropriate for investigating social behaviours, perceptions, and attitudes, thereby facilitating a deeper comprehension of individuals' experiences and interpretations of environmental practices. Previous research has shown that qualitative methods are useful for studying how people behave toward the environment. These methods are good at capturing personal viewpoints, local knowledge, and community dynamics, which are all important for understanding sustainable practices (Creswell, 2014). Qualitative research is useful in waste management because it helps identify behavioural patterns, social norms, and institutional challenges that affect how households separate waste and their environmental responsibility.

Study Area:

The study was undertaken within Kodaikanal Municipality, which is situated in the Dindigul District of Tamil Nadu, India. Kodaikanal, a prominent hill station, is positioned within the Palani Hills of the Western Ghats, distinguished by its delicate mountain ecosystem and abundant biodiversity. The municipality draws a substantial influx of tourists each year, owing to its picturesque landscapes, agreeable climate, and various recreational offerings. Nevertheless, the escalating number of visitors has exerted considerable strain on local infrastructure and environmental assets, especially concerning the management of municipal solid waste. The activities associated with tourism, the presence of hospitality establishments, and seasonal population variations all contribute to the heightened generation of waste within the town. In addition, the geographical features of hill regions, including steep terrain, narrow roads, and limited land availability, create logistical challenges for waste collection,

transportation, and disposal. These conditions make Kodaikanal an important case study for examining household waste segregation behaviour and environmental responsibility in a tourism-driven hill ecosystem.

Sampling:

Employing purposive sampling, a non-probability technique frequently utilized in qualitative research, this study selects participants based on their pertinent knowledge and experience concerning the research subject. This sampling strategy enables the researcher to acquire comprehensive and nuanced data from individuals directly engaged in or impacted by waste management practices within the designated study area. The study's participants encompass residents from thirty-five households within the municipality, municipal sanitation workers responsible for waste collection and management, representatives from local non-governmental organisations (NGOs) focused on environmental or waste management endeavours, and shop owners and small business operators generating commercial waste. The study involved approximately fifty participants. This sample size is generally considered sufficient for qualitative research. It allows for gathering a variety of viewpoints and supports a thorough investigation of the topic.

Data Collection:

To thoroughly investigate household waste segregation and environmental consciousness in Kodaikanal, this research utilizes a triangulated qualitative methodology. This approach integrates in-depth semi-structured interviews, participant observation, and the analysis of municipal documents. Interviews with key stakeholders, encompassing residents, waste management personnel, and representatives from non-governmental organizations, yield essential perspectives on individual motivations and institutional obstacles. Simultaneously, participant observation provides firsthand, empirical evidence concerning the practicalities of sorting behaviours and neighbourhood waste management. Moreover, the approach is augmented by an examination of official municipal records and policy documents. This comprehensive methodology, therefore, enables the collection of both residents' subjective experiences and the objective characteristics of local waste management systems. Consequently, this strengthens the validation of observed behaviours and the assessment of the effectiveness of the implemented policies.

Data Analysis:

Thematic analysis, a common method for finding and understanding patterns in qualitative research, will be used to analyse the qualitative data. The analysis will proceed in several steps. First, the interview responses will be transcribed. Then, the relevant parts of the data will be coded. Finally, these codes are combined to form larger themes. Thematic analysis helps identify recurring patterns and connections in participants' responses about waste segregation practices and environmental responsibility. Based on preliminary observations and existing literature, several central themes are anticipated to surface throughout the analysis. These themes are likely to encompass environmental consciousness concerning waste segregation, the behavioural and institutional obstacles that impede segregation efforts, the degree of environmental responsibility exhibited by residents, the accessibility of waste management infrastructure and municipal assistance, and the influence of tourism-generated waste. Employing thematic analysis, this study seeks to cultivate a more profound comprehension of the social, behavioural, and institutional determinants shaping household waste segregation practices within the designated study area. The research findings are anticipated to inform the development of enhanced waste management policies and the promotion of sustainable environmental practices in tourism-dependent hill towns, exemplified by Kodaikanal.

Results and Discussion

This section presents the findings derived from interviews, observations, and document analysis conducted among residents and stakeholders in Kodaikanal Municipality. The results are organized into key thematic areas including awareness of waste segregation, household practices, environmental responsibility, social influences, municipal support, barriers to segregation, and tourism-related waste challenges.

Awareness of Waste Segregation:

The study's results indicate a considerable degree of awareness concerning waste segregation within Kodaikanal households. Most residents show a good understanding of separating wet and dry waste, especially when the municipal door-to-door waste collection service is in place. This heightened awareness among residents is primarily ascribed to the municipality's ongoing awareness initiatives and the dedicated efforts of sanitation personnel. Residents noted that sanitation personnel, including field workers, sanitary inspectors, and Swachh Bharat Mission animators, repeatedly stressed the importance

of separating waste at the point of collection. Moreover, long-time residents and shopkeepers show a better understanding of how to separate waste than migrant workers, whose knowledge in this area is less developed.

The observed difference could be due to variations in how much people have been exposed to municipal awareness campaigns and how involved they are in their communities. Similar findings have been reported in other studies on waste management. These studies indicate that public awareness efforts, along with active participation from local government, significantly improve residents' understanding of waste segregation practices (Moeini et al., 2023). Notwithstanding this increased awareness, the data imply that knowledge, in and of itself, does not invariably lead to sustained behavioural modification, thereby underscoring the disparity between environmental cognisance and the practical application of waste management strategies.

Household Waste Segregation Practices:

Even though most residents understand the significance of waste separation, the reality often falls short. Many households continue to dump everything into one container, rather than diligently sorting their refuse into wet and dry categories from the outset. Consequently, when municipal workers pick up the refuse, they're frequently stuck with the task of separating the jumbled mess. For those who do separate their waste, the most common method is using two separate bins: one for biodegradable (wet) waste and another for non-biodegradable (dry) waste. That said, the approach isn't universally applied across every neighbourhood. Observations show that how well people separate waste varies across the city, with some neighbourhoods following the rules more closely than others. These observations are consistent with a common trend in waste management research; specifically, that while the principles of waste segregation are broadly understood, their practical application often faces challenges related to convenience and established behaviours (Yuriev et al., 2020). The disparity between theoretical comprehension and practical execution underscores the necessity for more impactful behavioural interventions and the establishment of reliable monitoring mechanisms.

Environmental Responsibility and Pro-Environmental Behaviour:

The study indicates that a strong sense of environmental responsibility is generally lacking among many residents. Although people understand the importance of waste segregation in theory, many do not perceive waste management as a personal environmental responsibility. Instead, several participants consider waste collection primarily as a municipal service intended to remove household waste rather than as a shared environmental responsibility. Only a small number of households reported adopting environmentally friendly practices, such as composting food waste, using less plastic, and reusing materials. The city's waste collection services and public trash cans are the primary means of waste disposal for most residents.

This suggests that environmental stewardship at the household level is comparatively underdeveloped. Nevertheless, a subset of residents does connect appropriate waste management with the preservation of Kodaikanal's natural aesthetics and its tourism potential. These individuals understand that improper waste disposal could jeopardize the town's delicate hill ecosystem and adversely impact tourism. Furthermore, prior studies on pro-environmental conduct indicate that individuals with more robust environmental values are more inclined to engage in sustainable practices such as waste segregation and recycling (Stern, 2000).

Social Influences and Community Norms:

Social dynamics play an important role in shaping household waste management behaviour in Kodaikanal. Residents often observe and respond to the behaviour of their neighbours, indicating that community norms influence individual waste practices. However, the study reveals that negative behavioural patterns often spread more quickly than positive ones. For example, when some residents hand over mixed waste to collection workers without segregation, others may become discouraged from segregating their waste as well. In some areas, this behaviour leads to a general failure to separate waste properly. Simultaneously, local non-governmental organisations (NGOs) and community-led endeavours have contributed to the reinforcement of segregation practices within both residential and commercial settings. Furthermore, certain neighbourhoods exert a degree of social pressure on residents to uphold cleanliness standards. Conversely, in areas marked by a lack of community engagement, residents may collectively fail to fulfil their waste management responsibilities, consequently facilitating the proliferation of Garbage Vulnerable Points (GVPs), which are locations where waste is persistently disposed of in public spaces.

These observations align with research emphasising the significance of social norms in influencing pro-environmental conduct; individuals frequently modify their behaviours in response to the actions of their peers within the community (Yuriev et al., 2020).

Municipal Support and Infrastructure:

Current research suggests that Kodaikanal's municipal waste management system is functioning fairly well. The city government is responsible for waste collection, providing these services directly to its residents. Furthermore, the waste management system emphasises the segregation of refuse, classifying it into wet and dry components. This service is consistently accessible throughout all residential zones. Nevertheless, the town's topography, characterised by its hilly terrain, presents operational challenges, thereby impeding the efficient use of pull carts by collection personnel in certain locations. Frequently, employees collect assorted refuse in bags, subsequently sorting it manually. This is because households don't separate their waste at the source. Participants generally concurred that the municipality adequately supports waste segregation through awareness initiatives, collection services, and waste management facilities. Conversely, some residents voiced dissatisfaction when municipal officials persistently emphasised segregation practices that residents themselves were reluctant to adopt.

Barriers to Household Waste Segregation:

Several behavioural and practical issues were identified as barriers to effective waste segregation in households. A frequently cited obstacle is the constraint of time. Numerous residents express a preference for consolidating all household waste within a single receptacle, subsequently attempting to segregate it immediately prior to collection, a practice they consider both inconvenient and time-intensive. Furthermore, a significant impediment stems from the established practice of waste mixing. Many households continue to use a single dustbin for all types of waste, making segregation difficult at later stages. Habitual behaviour and convenience, therefore, play a major role in shaping waste disposal practices. A surprising finding is that some residents believe waste segregation is primarily the responsibility of municipal workers rather than households. Some participants stated that since they pay municipal taxes, waste segregation should be performed by the collection workers. This perception significantly undermines household participation in waste management initiatives.

Tourism-Related Waste Challenges:

Kodaikanal residents often associate tourism with a large amount of waste. People interviewed said that tourists often create a lot of disposable waste, such as plastic packaging and food containers. Kodaikanal Lake, the local market, and the evening street food areas were identified as key sites for waste accumulation. Waste from these locations often spreads into nearby residential areas, which makes it harder for the local waste management systems to function effectively. Residents often feel that tourism complicates waste management in the town. The influx of visitors generates a significant amount of waste, and these visitors don't always adhere to the established local practices for dealing with it.

Observational Findings:

Field studies show that food waste, plastic packaging, and snack wrappers are the most common types of household waste in Kodaikanal. These waste materials reflect how households consume goods and the environmental effects of food consumption related to tourism. Conversely, certain positive waste management practices were also observed. In particular wards, residents demonstrated enhanced cooperation with municipal collection staff and actively participated in waste segregation. Moreover, a small proportion of households have adopted home composting techniques, implying the possibility of wider adoption of decentralised waste management approaches.

Suggested Improvements for Waste Management:

The local residents had a few suggestions for improving how waste was handled. They suggested boosting awareness campaigns, getting more people involved in waste initiatives, offering more rewards for sorting waste, and keeping a closer eye on how waste is disposed of. Expanding composting at home and improving waste systems in tourist spots were also seen as key to cutting down on waste. To make this work, we'll need a mix of changing how people act, getting the community more involved, and making sure residents and the local government work together better. This is all to ensure Kodaikanal, a town sensitive to its environment, manages its waste in a sustainable way.

Conclusion:

This study examined the waste segregation practices and environmental responsibility of Kodaikanal residents. This hill town, which relies heavily on tourism, faces increasing waste management challenges due to its fragile environment. Using a qualitative approach, the research explored residents' understanding, practices, and views, as well as the

institutional factors affecting their waste segregation behaviors. The findings show that, although most households are aware of waste segregation, consistent source segregation is not being practised. The study found that the majority of residents are aware of the concept of separating wet and dry waste due to continuous awareness efforts by the local municipality and sanitation workers. Municipal campaigns, along with the door-to-door efforts of waste collection personnel and the participation of Swachh Bharat Mission field staff, have been key in getting the word out to the public. Despite this awareness, many households still dispose of waste in a single container, rather than separating it at the source. As a result, municipal employees often have to separate mixed waste during collection. This observation highlights a distinct disparity between public knowledge and practical behaviour, implying that mere awareness does not suffice to promote effective household waste segregation. The research further indicates that residents' environmental consciousness is somewhat constrained. While a segment of the population acknowledges the significance of waste segregation for environmental preservation and the upkeep of Kodaikanal's natural landscape, a considerable number of households perceive waste management primarily as a municipal obligation, rather than a collective civic responsibility. A limited percentage of residents engage in environmentally sound practices, including household composting, plastic reduction, or waste reuse. This limited sense of environmental responsibility indicates the need for stronger environmental education and behavioural change initiatives. Social dynamics within neighbourhoods also influence waste management practices. The behaviour of neighbours often affects the willingness of residents to follow waste segregation practices. In some areas, negative behavioural patterns—such as handing over mixed waste to collection workers—discourage others from segregating their waste. Conversely, the involvement of local non-governmental organizations and community-based groups within specific wards has fostered heightened environmental consciousness and the adoption of sustainable practices. These observations underscore the significant influence of community involvement and existing social norms in determining how households manage their waste. The investigation revealed significant backing for waste management initiatives from Kodaikanal's municipal officials. The local government, specifically, offers consistent door-to-door waste collection, aiming to separate recyclable materials.

Nevertheless, the region's challenging topography poses considerable obstacles, thereby complicating the logistics of waste collection and transportation. Moreover, insufficient waste segregation at the household level intensifies the challenges encountered by sanitation workers, who often must manually sort the collected waste. A further significant finding from this study concerns the influence of tourism on waste generation. Kodaikanal, a favoured hill station, draws a considerable crowd annually. Consequently, this influx of people leads to a rise in waste at popular tourist spots. Kodaikanal Lake, the local markets, and the street food vendors all bear the brunt of this. Residents often see tourism as a major cause of increased waste, which often ends up in nearby areas. This makes it harder to manage city waste effectively. Essentially, the research shows that how well people in Kodaikanal separate their household waste is at a moderate level. Despite awareness campaigns and support from local governments, effective waste segregation is hindered by behavioural factors. Common problems include mixing different types of waste, time constraints, and a lack of personal responsibility.

To address this issue, it's crucial to strengthen community involvement, encourage environmental responsibility among the public, and implement behavioural change programs designed to promote consistent waste sorting in homes. Consequently, the successful implementation of sustainable waste management practices in Kodaikanal necessitates a concerted effort, encompassing the active participation of local inhabitants, municipal governing bodies, and community-based organisations. The augmentation of environmental awareness, the promotion of decentralised waste management techniques such as household composting, and the refinement of waste management protocols within tourist areas are all crucial steps. These actions can significantly improve the effectiveness of solid waste management systems in this environmentally sensitive hill station. Tackling these concerns will be essential for safeguarding Kodaikanal's ecological integrity while simultaneously fostering sustainable urban development moving forward.

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