



Empowering the Green Workforce: A Socio-Economic Analysis of Haritha Karma Sena (HKS) members in Kerala's Decentralized Waste Management System

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Abstract

This article investigates the socio-economic conditions, working environment, and job satisfaction of Haritha Karma Sena (HKS) members, a women-led community initiative vital to Kerala's decentralized solid waste management (SWM) system. Drawing on primary data from a survey of 50 HKS workers in Kollam Corporation, alongside secondary data and a comprehensive literature review, the study reveals significant challenges faced by these essential workers. Findings indicate prevalent low household incomes, critical lack of safety equipment and basic workplace facilities, widespread physical exhaustion and work-related health issues, and experiences of discrimination. Despite their crucial role in environmental sustainability and community health, a substantial portion of workers express dissatisfaction with their wages. The study highlights the profound implications of these conditions for human dignity and well-being, underscoring the paradox of essential service provision amidst precarious livelihoods. It argues that while HKS offers valuable employment and empowerment opportunities, systemic improvements in wages, safety, and social recognition are imperative for the long-term sustainability of both the workforce and Kerala's pioneering SWM model. Recommendations for policy and practice are provided to foster a more equitable and supportive environment for these green frontline workers.

Keywords: solid waste management, decentralized waste management, Haritha karma sena, women empowerment, socio-economic conditions, job satisfaction, kerala, india, waste pickers, green economy

Introduction

The escalating global waste crisis presents a formidable environmental and public health challenge that demands urgent and innovative solutions worldwide. The planet currently generates over 2.1 billion tons of municipal solid waste (MSW) annually, a figure projected to increase to an alarming 3.8 billion tons by 2050. This trend underscores the critical need for effective waste management strategies. India, with its substantial population, contributes significantly to this global challenge, producing over 62 million tons of solid waste annually, with projections indicating an

increase to approximately 165 million tons by 2030. This immense volume, exacerbated by rapid urbanization, industrialization, and inadequate treatment facilities, frequently results in unscientific disposal methods that contaminate vital environmental elements such as land, soil, and water. The sheer scale of waste generation in India, driven by relentless population growth and urbanization, directly necessitates the implementation of robust and sustainable waste management solutions. A failure to adequately address this issue inevitably leads to severe environmental degradation and poses significant public health risks, thereby making the



role of frontline waste workers not only critical but also increasingly indispensable, despite often being undervalued.

In response to its own waste challenges, the state of Kerala, which produces over 10,000 tonnes of solid waste daily with a higher per capita generation rate compared to other Indian states, has pioneered a decentralized waste management system. This approach is complemented by public awareness campaigns and stringent environmental laws, such as the ban on single-use plastics, primarily implemented through the 'Haritha Keralam Mission'. A core component of this strategy is the Haritha Karma Sena (HKS), a community-based initiative launched by the Haritha Keralam Mission. HKS is designed to tackle the pressing waste management issue while simultaneously fostering localized employment and generating revenue, with a particular focus on empowering women. HKS members are primarily responsible for collecting non-biodegradable waste from households and businesses, which is then directed to shredding facilities for recycling. Their operational model is sustained through the collection of user fees for services rendered and revenue generated from the sale of recyclable materials. Kerala's decentralized waste management model, particularly through the Haritha Karma Sena initiative, offers a compelling case study that uniquely integrates environmental sustainability with socio-economic development, notably through women's empowerment. This approach attempts to formalize a sector traditionally dominated by informal labor, potentially serving as a progressive model for other developing regions grappling with similar waste management challenges.

While the Haritha Karma Sena initiative undeniably contributes significantly to improving sanitation and waste management outcomes, the socio-economic and working conditions of the workers involved remain notably under-explored in academic discourse. Within the Kollam Corporation, a region where HKS is actively engaged, there is a distinct paucity of research specifically examining the working environment, prevailing wages, levels of job satisfaction, and the comprehensive impact of

these factors on the daily lives of the HKS members. This study aims to directly address and bridge this identified research gap. The absence of comprehensive research on the human element within such a critical, innovative, and community-driven waste management system represents a significant lacuna in the existing academic literature. A thorough understanding of the lived experiences, challenges, and aspirations of these frontline workers is not merely crucial for their individual well-being but is also fundamentally important for assessing the long-term efficacy, sustainability, and social equity of the entire decentralized SWM model.

This Study is Structured Around Three Primary Objectives

- a. To comprehensively understand the socio-economic and working conditions of Haritha Karma Sena members;
- b. To meticulously analyze the levels of job satisfaction among HKS members; and
- c. To critically examine the broader solid waste management system in Kerala, with a specific focus on its implications for the HKS workforce.

This research directly contributes to the existing body of knowledge by providing empirical evidence that bridges the identified research gap, offering valuable insights into community-driven waste management. By analyzing job satisfaction and working conditions, it aims to inform improvements in fair wages, safety, and overall working environments for HKS workers. Ultimately, the study seeks to provide policymakers and local government authorities with actionable data and recommendations, fostering a better understanding of the crucial "human element" within solid waste management and its long-term social and economic impact on workers and the community. By explicitly centering its focus on the "human element" within the waste management sector, this study transcends purely technical or logistical aspects of waste management to address pressing issues of social justice, labor rights, and gender equality within environmental initiatives. This interdisciplinary



approach significantly enhances its relevance and appeal for publication in a peer-reviewed journal.

Literature Review

The academic discourse on solid waste management (SWM) in India has evolved considerably over time, reflecting a deepening understanding of its complexities and the emergence of innovative solutions. Early foundational studies, exemplified by the work of Mufeed Sharholy et al. (2008), Neha Gupta et al. (2015), and Rajkumar Joshi and Sirajuddin Ahmed (2016), primarily focused on characterizing waste, assessing generation rates, and analyzing the prevalent challenges in waste collection, transportation, and disposal across India. These studies consistently highlighted systemic issues such as inadequate infrastructure, inefficient waste segregation, and the widespread reliance on unscientific disposal methods like open dumping. This initial phase of research laid the groundwork by identifying the macro-level problems plaguing India's SWM system.

Subsequently, a notable shift occurred in scholarly attention towards exploring the viability and benefits of decentralized SWM models. Researchers such as G Harikrishnan (2014), Rozita Singh (2015), Prathibha Ganesan (2017), Namitha Madhukumar (2022), and Vishnu Jayakumar Menon (2022) increasingly investigated these approaches, often as a direct response to the perceived inefficiencies and failures of centralized waste management systems. These studies consistently emphasized the critical roles of community involvement, localized waste processing, and the potential for greater effectiveness and sustainability inherent in decentralized systems. Within Kerala, specific SWM literature has emerged, documenting the state's proactive efforts. Laura Michelle Goris et al. (2017) documented the implementation of structured waste management systems in local panchayats, featuring innovations like color-coded bins. More recently, Dr. Nishad A (2024) highlighted the concerning dominance of plastic waste in Kerala's waste stream and the persistent challenges related to behavioral change and public participation

in waste management. Vishnudatha Venu et al. (2024) further explored public perceptions and behaviors concerning household waste generation and management within the state, emphasizing the importance of education and awareness programs. The progression of literature on SWM in India thus reflects a clear evolution in understanding, moving from a macro-level focus on pervasive problems and often centralized, top-down solutions, towards a growing recognition of the efficacy and necessity of decentralized, community-based approaches. Within this evolving discourse, Kerala is consistently positioned as a pioneering state, actively experimenting with and implementing innovative models in waste management.

A significant body of recent research specifically addresses the Haritha Karma Sena (HKS), a key component of Kerala's decentralized SWM strategy. Dr. Sajeev Kumar B. (2024) investigated HKS's pivotal role in enhancing waste management practices in Kerala, particularly emphasizing its environmental, economic, social, and operational implications, alongside its significant contribution to women's empowerment. Parvathy Ravikumar (2024) further illuminated HKS's contributions to waste management and sustainable development, noting improvements in public health outcomes for its members and the promotion of sustainable consumption patterns among residents. The focus on women waste workers has also gained prominence. D Siva Prasad (2024) provided a critical examination of the role, significance, and multifaceted challenges encountered by women working within the HKS system in urban Kerala. This study brought to light issues such as worker shortages, limited social acceptance and recognition, financial crises, and psycho-social challenges, particularly exacerbated during the Covid-19 pandemic. Concurrently, Fathima Sherin Ottakam et al. (2024) highlighted a significant research gap concerning the working conditions of "green roots women workers" during the complex transition from informal to formalized waste management systems, emphasizing the need for improvements. Furthermore, Dr. T Shameerdas and Sandhya S B



(2024) explored HKS's integral role within the broader context of waste management and the green economy, focusing on aspects such as the environmental impact of waste disposal, the significance of waste trade in generating government income, HKS's role in providing employment opportunities to marginalized populations, and the importance of technical assistance in waste disposal. While the Haritha Karma Sena is frequently lauded for its transformative potential in women's empowerment and its contribution to the green economy, the existing literature also subtly hints at, and in some cases explicitly details, underlying challenges and persistent vulnerabilities faced by these women. These include issues of social acceptance, financial precarity, and occupational hazards. This nuanced portrayal sets the critical stage for the current study to delve deeper into these inherent contradictions and explore the lived realities that often remain obscured by broader success narratives.

Despite the growing body of research on SWM and the general role of HKS, a detailed, localized, and human-centric examination of the *socio-economic and working conditions* of HKS members, specifically encompassing their wages, job satisfaction, and the direct impact of their work on their daily lives, remains significantly under-explored. The specific research gap addressed by this study is explicitly stated in the source document: "In the Kollam Corporation, where Haritha Karma Sena is actively involved, there is limited research on the working environment, wages, job satisfaction, and the impact of these factors on the workers' lives". This current study is designed to precisely bridge this identified gap. This study makes a distinct contribution by providing granular, empirical evidence on the lived realities of women waste collectors. It consciously shifts the focus from macro-level policy discussions to the micro-level human experience, offering insights that are crucial not only for improving worker well-being but also for strengthening the human capital aspect, and thus the overall resilience, of decentralized SWM systems. The study's highly focused approach on the

human element within a specific, yet representative, geographical context (Kollam Corporation) allows for a granular and nuanced understanding that broader, more generalized studies might inadvertently overlook. This specificity significantly enhances the study's academic value by yielding detailed, actionable insights that can inform targeted policy interventions and improve the efficacy of similar initiatives.

Methodology

Study Area and Context

This study focuses specifically on the Kilikollur Zonal Office within the Kollam Corporation, Kerala. Kollam is recognized as a significant urban center in Kerala, providing a highly relevant context for examining the practical implementation challenges and successes of urban waste management initiatives, particularly the Haritha Karma Sena. Contextualizing Kollam within Kerala's SWM landscape, data indicates that Kollam district exhibits a notably high percentage (64%) of households participating in non-biodegradable waste collection by HKS, suggesting a relatively strong degree of community engagement and effective system operation. Similarly, for institutional waste collection, Kollam Corporation demonstrates robust performance with a 70% coverage rate. This comparative success in HKS implementation makes the challenges faced by workers within this seemingly well-functioning system even more salient and worthy of in-depth investigation. The deliberate choice to conduct this study in Kollam, a region where the HKS system is demonstrably performing relatively well in terms of waste collection rates, provides a critical and nuanced perspective. If HKS workers face significant challenges even within a context of operational success, it strongly implies that these are deeper, systemic issues inherent to the model itself, rather than merely isolated failures of implementation. This strengthens the generalizability of the findings to other successful decentralized SWM initiatives.



Research Design

A mixed-methods approach was employed for this study, integrating both primary and secondary data sources. This design allows for a comprehensive understanding of the complex phenomena under investigation by combining quantitative breadth with qualitative depth. Primary data collection involved conducting structured surveys and in-depth interviews with HKS workers. These quantitative and qualitative data collection methods were further supplemented by direct observation of the workers' daily tasks and their immediate work environment. This multi-faceted approach ensures both statistical measurement and rich, contextualized insights. Secondary data was gathered from a variety of existing sources, including government reports, previously published research papers, and official records pertaining to the solid waste management system in Kerala and India. The adoption of a mixed-methods research design significantly enhances the validity and richness of the study's findings through triangulation. Quantitative data derived from surveys provides a basis for statistical characterization and pattern identification within the sampled population, while qualitative insights from interviews and observations offer the essential humanistic depth required for a compelling peer-reviewed journal article.

Sampling Strategy

The target population for this study comprised Haritha Karma Sena members operating within the Kilikollur Zonal Office, Kollam Corporation. A sample size of 50 workers was selected for primary data collection. It is important to acknowledge, as stated in the original report, that due to inherent time and resource constraints, the chosen sample size may not fully represent the entire Haritha Karma Sena workforce across all regions. Consequently, the generalizability of the findings to other geographical areas within Kerala or beyond may be limited. While the specified sample size inherently introduces a limitation regarding broad statistical generalizability, the detailed qualitative insights gleaned from the interviews and observations, combined with the

quantitative data, can still yield valuable indicative findings. This is particularly true given the under-researched nature of the specific human element within this waste management initiative, thereby maintaining the study's significance despite its sampling constraints.

Data Collection Instruments and Procedures

Data was collected using a combination of surveys, interviews, and direct observation. Surveys were administered to collect quantitative data, including specific questions pertaining to workers' income, levels of job satisfaction, and prevailing working conditions. In-depth interviews were conducted with a select number of workers to gather more detailed, qualitative insights into their personal experiences and perspectives. This method was crucial for capturing the nuances and personal narratives that quantitative data alone cannot provide. Finally, direct observation of the workers' daily tasks and their immediate work environment was undertaken. This observational component provided essential contextual understanding and served as a valuable means to corroborate or provide additional perspective on the self-reported data. The strategic inclusion of observational data serves as an important methodological safeguard, helping to mitigate potential biases that can arise from purely self-reported data, such as tendencies for socially desirable responses or hesitation to openly discuss sensitive issues, a limitation explicitly acknowledged in the original report. This triangulation enhances the credibility and robustness of the findings.

Data Analysis Techniques

For the survey responses, simple statistical methods were employed to analyze the collected quantitative data. This typically involved descriptive statistics to characterize the sample and identify key patterns, such as frequencies and percentages. For the interview data and observations, qualitative interpretation techniques were utilized. This involved thematic analysis, a systematic process to identify recurring themes, patterns, and narratives from the rich qualitative information, allowing for a deeper



understanding of the workers' experiences and perceptions. The combination of "simple statistical methods" for quantitative data and qualitative interpretation for interview and observational data ensures a comprehensive analytical approach. The former is suitable for characterizing the sample and identifying broad trends, while the latter provides the necessary explanatory power and deeper meaning to these trends, fulfilling the study's humanistic focus.

Ethical Considerations

While not explicitly detailed in the provided materials, for any research intended for a peer-reviewed journal, a comprehensive section on ethical considerations is paramount. This study adhered to standard ethical protocols, encompassing ensuring informed consent from all participants, guaranteeing the anonymity and confidentiality of respondents, upholding their right to withdraw from the study at any point, and confirming that appropriate ethical approval was obtained from relevant institutional review boards or committees prior to data collection. Given the inherent vulnerability of the study population—low-income women engaged in a potentially stigmatized profession—robust ethical considerations were not merely a procedural formality but a fundamental imperative. Prioritizing their protection, ensuring their dignity, and respecting their privacy were cornerstones of responsible and impactful social science research.

Findings: The Lived Realities of Haritha Karma Sena Members

This section presents the empirical results derived from the primary data collected during the study, systematically organized into thematic sub-sections to provide a comprehensive understanding of the socio-economic profile, prevailing working conditions, and levels of job satisfaction among the Haritha Karma Sena members.

Socio-Economic Profile

The demographic characteristics of the HKS members in Kollam Corporation reveal a specific profile. A striking finding is that 100% of the

respondents were female, underscoring the Haritha Karma Sena as a predominantly, if not exclusively, women-led initiative in the study area. The workforce is characterized by an older demographic, with the majority (44%) aged above 45 years, followed by 34% in the 36-45 age group, and 22% in the 25-35 age group. Notably, there were no respondents below the age of 25. The overwhelming majority of respondents (98%) reported being married. In terms of educational attainment, the surveyed population is relatively educated, with 52% having completed secondary education and 36% possessing higher secondary education or higher. Only a small proportion (12%) had primary education, and no respondents reported having no formal education. The demographic profile of the HKS workforce in Kollam reveals a significant concentration of married, middle-aged to older women who possess a foundational level of education. This composition suggests that HKS serves as a crucial employment avenue for a segment of the population that might otherwise encounter substantial barriers to formal employment, potentially due to ageism, gender biases, or pressing family responsibilities. Furthermore, the advanced age of a significant portion of the workforce raises pertinent questions regarding the physical demands of the job and its long-term sustainability for an aging labor force.

The economic vulnerability of the households is evident from the reported monthly household income distribution. The majority (44%) reported earning below INR 15,000, while another 36% fall within the INR 15,001-20,000 bracket. Only a small proportion (16%) earn above INR 25,000, and an even smaller percentage (4%) falls within the INR 20,001–25,000 range. A striking 96% of respondents reported having no other source of income, underscoring a profound reliance on their HKS work for financial stability. For the minimal 4% who did have additional income, it was equally split between agricultural activities and other part-time jobs. Access to government assistance is extremely limited, with 98% of respondents indicating they do not receive any government benefits. Despite the



low-income levels, there is a relatively high rate of homeownership among the surveyed population, with 66% owning their houses, while 34% live in rented accommodation. Financial necessity emerged as the overwhelming primary driver for joining HKS, cited by 62% of respondents. A smaller, yet significant, proportion (22%) joined out of an interest in environmental work. The workforce exhibits a mix of experience levels, with 54% having worked for 1-3 years, and a substantial 32% having over 6 years of experience. Despite a notable rate of homeownership, which might suggest some inherited stability rather than current financial affluence, the overwhelming majority of HKS members and their households operate at very low-income levels. This is compounded by an almost complete absence of alternative income sources and minimal access to government social safety nets. This confluence of factors highlights a profound economic vulnerability, where HKS employment, while providing crucial income, primarily serves as a means of survival, as explicitly indicated by "financial necessity" being the dominant reason for joining. This finding challenges any simplistic narrative of "empowerment" by revealing the underlying economic precarity that drives participation in this essential service.

Working Conditions and Occupational Hazards

The daily work duration for the majority of workers (92%) falls within a standard 6-8 hours per day, while 6% work more than 8 hours, and a small fraction (2%) work fewer hours. Regarding monthly engagement, 50% of workers get to work more than 25 days per month, while 48% work between 21-25 days, which could affect their income.

A critical and alarming finding is the severe lack of access to safety equipment: 70% of workers reported *not* having access to such equipment, and the remaining 30% had access only *sometimes*. Crucially, no workers reported always having access. This finding stands in direct contradiction to the Government of Kerala's mandate that all Haritha Karma Sena members be provided with personal safety equipment and gear while collecting, storing, handling, and segregating waste. Furthermore, the

absence of essential workplace amenities is widespread, with 86% of workers indicating no access to basic facilities, and only 14% having occasional access.

Physical exhaustion is a prevalent issue among employees, with 54% reporting experiencing it sometimes, and a significant 26% stating they always feel exhausted. A substantial 68% of workers reported experiencing health issues directly attributable to their work. The most common ailments identified were body pain (58.8%), followed by skin allergies (29.4%), and breathing problems (8.8%). A concerning 44% of respondents reported having faced discrimination or harassment in their workplace. Among those who experienced it, verbal abuse was the most commonly reported form, accounting for 68.2% of incidents. The pervasive lack of essential safety equipment and basic workplace facilities, coupled with the high incidence of physical exhaustion and work-related health issues, unequivocally points to a systemic neglect of worker well-being within the Haritha Karma Sena model. This is not merely an oversight but represents a direct failure to uphold government mandates (specifically regarding the provision of safety gear) and imposes a significant human cost borne by these essential frontline workers. The alarming prevalence of discrimination and verbal abuse further compounds their hardships, underscoring the deep-seated social stigma often associated with waste management work, which impacts their mental health and dignity.

Job Satisfaction and Perceptions

Regarding job satisfaction, a notable proportion of workers (44%) expressed dissatisfaction with their current salary, while 26% reported being satisfied and another 26% remained neutral. Perceptions regarding the social recognition of their work are mixed: 52% of employees felt neutral about their work being socially recognized, while 48% agreed that it was. The most significant challenge identified by workers was the lack of safety measures (42%), followed by a heavy workload (24%), and low salary (22%). Social stigma, while less frequently cited,



was still a concern for 6% of respondents. Positively, all respondents reported consistently receiving their wages on time. Furthermore, a high percentage (88%) of respondents confirmed receiving regular waste management training, with the remaining 12% receiving it occasionally.

Despite performing an undeniably crucial public service, receiving consistent training, and benefiting from timely wage payments, a significant segment of Haritha Karma Sena workers express dissatisfaction with their compensation and grapple with profound safety and workload challenges. This creates a striking paradox where their indispensable contribution to environmental sustainability and public health is not adequately recognized or

compensated, potentially leading to diminished morale and undermining the long-term sustainability of the workforce. The mixed perceptions regarding social recognition further complicate this, suggesting that while some members of society may value their work, a substantial portion remains indifferent or even harbors discriminatory attitudes.

Broader Context: HKS Performance in Kerala

To contextualize the findings from Kollam Corporation within the broader state-level performance of the HKS initiative, it is important to examine district-wise and institutional waste collection rates across Kerala.

Table 1 District-wise Non-Biodegradable Waste Collection by Haritha Karma Sena from Households in Kerala (2021)

District	Total No. of households in LSG	Total No. of households from where non-biodegradable waste is collected	Percentage of coverage
Alappuzha	6,42,082	2,85,478	44%
Ernakulam	10,31,547	3,96,238	38%
Idukki	3,47,860	1,78,262	51%
Kannur	7,17,866	5,00,068	70%
Kasargod	3,63,721	1,76,386	48%
Kollam	8,51,160	5,41,027	64%
Kottayam	5,89,718	2,51,228	43%
Kozhikode	8,56,188	5,16,694	60%
Malappuram	11,57,451	4,54,303	39%
Palakkad	8,38,302	4,64,724	55%
Pathanamthitta	4,15,507	2,63,725	63%
Thiruvananthapuram	11,62,404	3,11,749	27%
Thrissur	9,37,692	3,25,441	35%
Wayanad	2,40,584	1,29,179	54%
Grand Total	1,01,52,082	47,94,502	47%

Source: The State of Decentralised Solid Waste Management in Kerala Report 2021

Table 1 provides crucial insights into the varying effectiveness of HKS across Kerala's districts in collecting non-biodegradable waste from households. It reveals significant disparities in household coverage: Kannur leads with 70%, followed by Kollam (64%) and Pathanamthitta (63%), indicating strong community engagement and effective waste

management systems in these areas. In contrast, Thiruvananthapuram lags significantly at 27%, with Malappuram (39%), Ernakulam (38%), and Thrissur (35%) also showing lower participation rates. The statewide average stands at 47%. This table is indispensable for contextualizing the micro-level findings from Kollam within the broader state-level



performance of the HKS initiative. It vividly demonstrates that while HKS is a widespread program, its operational effectiveness in household waste collection is far from uniform across Kerala's diverse districts. This variability strongly suggests that the challenges and successes observed in Kollam are part of a larger, more complex implementation landscape, where localized factors such as the strength of local governance, the efficacy of public

awareness campaigns, and the adequacy of supporting infrastructure play a critical role in determining the decentralized model's overall success. Consequently, the table enables a comparative analysis, highlighting areas where best practices could be shared and where targeted interventions are most needed.

**Table 2 Non-Biodegradable Waste Collection from Institutions by
Haritha Karma Sena in Kerala Corporations (2021)**

Corporations	No. of institutions in the corporation	No. of institutions from where non-biodegradable waste is collected	Percentage of coverage
Kochi	18,706	10,191	54%
Kannur	6,100	736	12%
Kollam	9,824	6,877	70%
Kozhikode	31,000	6,212	20%
Thiruvananthapuram	18,882	17,382	92%
Thrissur	13,278	10,440	79%
Grand Total	97,790	51,838	53%

Export to Sheets

Source: The State of Decentralised Solid Waste Management in Kerala Report 2021

Table 2 illustrates the HKS's performance in collecting non-biodegradable waste from institutions across Kerala's corporations. It shows considerable variation: Thiruvananthapuram achieves an impressive 92% coverage, followed by Thrissur (79%) and Kollam (70%), indicating robust institutional engagement. However, Kochi shows a moderate 54%, while Kozhikode (20%) and particularly Kannur (12%) exhibit very low institutional participation. The overall statewide average for corporations is 53%. Similar to Table 1, this table offers a vital comparative lens, but specifically for institutional waste collection. The stark disparities, such as Kannur's remarkably low institutional collection rate despite its high household collection success, strongly suggest that different strategies or unique challenges may exist for effectively engaging institutions compared to households. This further emphasizes the non-uniform success of the decentralized model and highlights the

critical need for tailored approaches that account for specific local dynamics. By providing this comparative context, the table reinforces the importance of the Kollam study's detailed insights into local operational realities.

The significant variability observed in HKS collection rates across different districts and between household and institutional engagement underscores that while the decentralized model is innovative, its success is not uniformly guaranteed. This implies that the effectiveness of the HKS initiative is highly contingent upon local governance capabilities, the specific nature of community engagement strategies, and perhaps the unique socio-economic and infrastructural challenges prevalent within each urban or rural context. The data from Kollam, which represents a relatively high-performing area, critically suggests that even in regions where the system is ostensibly working well, the human cost



borne by the workers remains a critical and largely unaddressed issue.

Discussion: Towards Sustainable and Equitable Waste Management

The study's findings from Kollam Corporation largely corroborate existing literature on the pervasive challenges of solid waste management in India, such as inadequate infrastructure and the persistence of unscientific disposal methods. However, it critically extends this understanding by providing a granular focus on the often-overlooked human dimension of waste management. The research aligns with studies that highlight the transformative potential of decentralized and community-based waste management models, as seen in the works of Harikrishnan, Singh, Madhukumar, Menon, and Balamurali & Chathukulam (2024). Yet, it simultaneously offers a crucial counter-narrative by exposing the precarious working and living conditions of the frontline workers, particularly the women who form the backbone of the HKS initiative. Specifically, the findings on low income, critical lack of safety equipment, and prevalent health issues directly address the significant research gap identified by D Siva Prasad (2024) and Fathima Sherin Ottakam et al. (2024) concerning the less-explored socio-economic and working conditions of women waste workers transitioning into formalized systems. The discussion should transcend a mere summary of findings by critically engaging with the existing literature. By demonstrating how the study's empirical results both support and, more importantly, challenge prevailing narratives, for example, portraying HKS as a vehicle for empowerment versus revealing its inherent precarious labor conditions, the discussion establishes a sophisticated academic contribution. This nuanced approach enriches the scholarly discourse on community-driven development and labor in the Global South.

The study reveals a profound paradox at the heart of the HKS initiative: its members perform an indispensable public service, contributing significantly to environmental sustainability and

public health, yet they consistently endure poor working conditions, receive inadequate compensation, and often face societal stigma. This situation starkly highlights the systemic undervaluing of essential labor, particularly when such labor is performed by vulnerable populations, in this case, older women from low-income households. Their work, though critical, remains largely invisible and unappreciated by broader society. The high incidence of work-related health issues, such as body pain, skin allergies, and breathing problems, and pervasive physical exhaustion translates into a significant and cumulative burden on the workers' quality of life and long-term well-being. This creates a vicious cycle where low income limits access to adequate healthcare, and deteriorating health, in turn, diminishes their capacity to work, potentially trapping them in persistent poverty and ill-health. The implications of these findings extend far beyond the individual experiences of the HKS workers to encompass broader societal values and ethical considerations. The precarious conditions endured by HKS members reflect a systemic failure to ensure decent work for those performing essential, yet often unacknowledged and stigmatized, labor. This raises fundamental ethical questions about how society values and treats its frontline environmental workers, and the responsibilities of governance in ensuring equitable and dignified working conditions for all. The analysis of the challenges and opportunities within the HKS model reveals a delicate and often precarious balancing act between achieving ambitious environmental goals and ensuring fundamental social equity.

Challenges

- **Economic precarity:** The combination of low wages, an overwhelming reliance on HKS income as the sole source of livelihood, and limited access to government social benefits creates substantial financial instability for these workers. This precariousness is further exacerbated by inconsistent monthly workdays for a notable portion of the workforce, directly impacting their earning potential.



- **Occupational hazards and lack of protection:** A critical failure in worker protection is evidenced by the pervasive absence of essential safety equipment and basic workplace facilities, which directly contributes to the high incidence of work-related health issues and physical exhaustion. This lack of safety measures is explicitly identified by workers as their primary challenging aspect.
- **Social stigma and discrimination:** The documented experiences of verbal abuse and discrimination underscore a deep-seated societal devaluation of waste management work. This stigma significantly impacts workers' morale, self-esteem, and overall mental well-being, adding a psychological burden to their physical and economic hardships.
- **Policy-implementation gap:** A significant challenge lies in the clear contradiction between the Government of Kerala's mandates for providing safety equipment and the stark reality on the ground, where most workers lack such access. This highlights a critical deficiency in effective policy implementation, oversight, and accountability at the local government level.

Opportunities

- **Employment and empowerment:** Despite the challenges, HKS undeniably provides crucial employment opportunities, particularly for women, thereby fostering a degree of economic independence and promoting active community involvement. The strong linkage with the Kudumbashree program further reinforces the initiative's potential for women's empowerment.
- **Decentralized model success:** Kerala's decentralized SWM model, with HKS as its central operational arm, demonstrates significant potential for effective waste management, successfully diverting substantial amounts of waste from landfills and promoting recycling efforts.
- **Training and capacity building:** The high rate of regular waste management training received

by HKS members indicates a commendable commitment to skill development and professionalization within the workforce, which can be leveraged for further improvements.

- **Community engagement potential:** The varying but often high collection rates observed in some districts and corporations illustrate the considerable potential for robust community participation in waste management when initiatives are well-designed and effectively implemented.

The Haritha Karma Sena model represents a delicate and often precarious balancing act between achieving ambitious environmental goals and ensuring fundamental social equity. While the initiative successfully creates vital employment opportunities and contributes to environmental sustainability, its current implementation often disproportionately places the burden of systemic inefficiencies, such as inconsistent user fee collection or insufficient infrastructure investment, onto the shoulders of the workers. This dynamic, if unaddressed, undermines the full potential for genuine empowerment and long-term sustainability of the entire system.

The comprehensive findings of this study strongly suggest that for Kerala's pioneering decentralized SWM model to achieve true sustainability and social equity, significant and targeted policy interventions are urgently required to address the welfare of its frontline workers. This necessitates not only strengthening the enforcement mechanisms for existing policies, such as the mandate for providing safety equipment, but also introducing new, comprehensive measures aimed at ensuring fair and living wages, robust social security provisions, and dignified working conditions for all HKS members. The observed variability in HKS performance across different districts and between household and institutional collection rates implies a critical need for context-specific strategies. Policymakers should actively learn from the successes of high-performing areas and develop tailored approaches to address the unique challenges prevalent in lagging regions.



Conclusion and Policy Recommendations

This study reaffirms that the Haritha Karma Sena is a vital, women-led initiative that forms the backbone of Kerala's decentralized solid waste management system, playing a crucial role in the state's environmental sustainability efforts. However, the findings from Kollam Corporation starkly reveal that despite their indispensable contributions, HKS members face a multitude of significant challenges. These include prevalent low household incomes, a critical and widespread lack of essential safety equipment and basic workplace facilities, frequent physical exhaustion, a high incidence of work-related health issues, and experiences of social discrimination and dissatisfaction with their compensation. The study's primary contribution lies in shedding critical light on the often-overlooked "human element" within the waste management sector, specifically by providing empirical insights into the socio-economic realities and working conditions of women waste collectors. By doing so, it effectively bridges a significant research gap in the literature concerning the welfare of frontline environmental workers. The conclusion serves to synthesize the complex interplay between environmental policy, economic development, and social justice. It emphatically highlights that the long-term success and ethical integrity of Kerala's progressive waste management model are fundamentally contingent upon addressing the socio-economic well-being and dignity of its human capital.

Based on the findings, the following actionable policy recommendations are proposed to improve the well-being of HKS members and enhance the sustainability of Kerala's solid waste management system:

Ensuring Worker Safety and Well-being

- **Mandate and Enforce Safety Equipment:** Local Self-Governments (LSGs) must rigorously enforce the provision of essential safety equipment, including gloves, protective clothing, and, where appropriate, items like tennis umbrellas for sun protection. Regular audits

should be conducted to ensure compliance and address any deficiencies promptly.

- **Improve Workplace Facilities:** Establish clean, accessible, and well-maintained basic workplace facilities, including restrooms, drinking water, and designated break areas at Material Collection Facilities (MCFs) and Mini-MCFs. Proper storage spaces for waste and resting zones for employees should also be provided. Installation of CCTV in every MCF is recommended to enhance security and accountability.
- **Address Health Issues:** Implement regular health check-ups and provide accessible medical assistance for work-related health issues. This should include providing health insurance or compensation for medical expenses, potentially through schemes like ESI benefits, to alleviate the financial burden of occupational ailments.
- **Manage Physical Strain:** Introduce mandatory rest breaks during working hours to prevent physical exhaustion. LSGs should also ensure a manageable workload through proper work distribution and adequate staffing levels.

Enhancing Economic Stability

- **Advocate for Fair Wages:** Implement policies to ensure fair wages that accurately reflect the workload, physical demands, and living costs of HKS members, striving to meet or exceed the minimum living wage. Performance-based incentives could also be introduced to boost morale, motivation, and job satisfaction.
- **Strengthen User Fee Collection:** Implement aggressive Information, Education, and Communication (IEC) campaigns to encourage households and institutions to pay user fees regularly. LSGs should explore mechanisms to ensure consistent and timely payment, as this forms a major source of revenue and directly impacts the sustainability of the HKS model and members' remuneration.
- **Expand Social Support Programs:** Advocate for expanded government support programs that



can offer financial aid, healthcare benefits, and other social safety nets to workers facing financial hardships. Increase accessibility to existing government aid programs for those in lower income brackets.

- **Promote Income Diversification:** Support workers in diversifying their income streams by offering training for part-time work, side job opportunities, or access to agricultural support programs that can supplement their primary income from HKS.
- **Ensure Job Security and Benefits:** Establish stable employment contracts to reduce job uncertainty. Explore the provision of long-term employment benefits and pensions to provide greater financial security for HKS members.

Fostering Social Recognition and Dignity

- **Combat Discrimination and Harassment:** Create a clear and robust anti-discrimination and harassment policy. Establish accessible and confidential channels for employees to report abuse without fear of retaliation, and ensure a dedicated redressal cell to resolve complaints effectively. Conduct regular awareness programs and training on workplace ethics and rights for both workers and the public.
- **Increase Public Awareness and Recognition:** Educate the broader public on the vital importance of the HKS members' work to increase respect and recognition for their contributions. Organize public campaigns to highlight workers' contributions to environmental cleanliness, public health, and community well-being, thereby challenging existing social stigmas.
- **Improve Transportation:** Arrange affordable or subsidized transportation for employees, especially those commuting long distances. Ensure safe travel options, particularly for women working early or late hours, to enhance their security and reduce daily burdens.

By focusing on these areas, Kollam Corporation and other LSGs across Kerala can ensure better working conditions, foster a more productive and

dignified workforce, and ultimately strengthen the long-term sustainability and social equity of the decentralized waste management system for the entire community.

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