HOUSEHOLD WASTE MANAGEMENT IN KERALA: THE ROLE OF LOCAL GOVERNANCE AND HARITHA KARMA SENA

PROJECT SUBMITTED
TO

ST TERESA'S COLLEGE (Autonomous), ERNAKULAM.

Affiliated to

MAHATMA GANDHI UNIVERSITY

IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE

AWARD

OF THE DEGREE OF

BACHELOR OF ARTS IN ECONOMICS

Devika G Raj	**AB23ECO026**
Chandana Sivadasan	**AB23ECO024**
Anna Rose Jose	**AB23ECO048**
Niya Margret Nixen	**AB23ECO013**
Lidiya Michael	**AB23ECO053**

UNDER THE GUIDANCE OF

Dr. SWATHY VARMA P. R

ASSISTANT PROFESSOR, DEPARTMENT OF ECONOMICS,

ST TERESA'S COLLEGE, ERNAKULAM.

MARCH 2026

Evaluated
9/02/2026.

CERTIFICATE

This is to certify that the project titled "Household Waste Management in Kerala: The Role of Local Governance and Haritha Karma Sena " submitted in partial fulfilment of the requirement for the award of the degree of Bachelor of Arts in Economics to St. Teresa's College (Autonomous) (Affiliated to Mahatma Gandhi University, Kottayam) is a Bonafide record of the work done by the project group under my supervision and guidance.

Head of the Department

Dr. Anupa Jacob

Guide and Supervisor

Dr. Swathy Varma P.R

DEPARTMENT OF ECONOMICS
ERNAKULAM
Pin - 682 011
ST. TERESA'S COLLEGE

Name and Signature of External Examiner: Dr. Linda George

DECLARATION

We hereby declare that the project titled "Household Waste Management in Kerala: The Role of Local Governance and Haritha Karma Sena" submitted by us for the Bachelor of Arts Degree in Economics is our original work.

Signature of the supervisor

Dr. Swathy Varma P R

Signature of the candidates

Devika G Raj

Chandana Sivadasan

Anna Rose Jose

Niya Margret Nixen

Lidiya Michael

DEPARTMENT OF ECONOMICS
ST. TERESA'S COLLEGE
ERNAKULAM
Pin - 682 011

HOUSEHOLD WASTE MANAGEMENT IN KERALA: THE ROLE OF LOCAL GOVERNANCE AND HARITHA KARMA SENA

PROJECT SUBMITTED
TO

ST TERESA'S COLLEGE (Autonomous), ERNAKULAM.

Affiliated to

MAHATMA GANDHI UNIVERSITY

IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE

AWARD

OF THE DEGREE OF

BACHELOR OF ARTS IN ECONOMICS

Devika G Raj	**AB23ECO026**
Chandana Sivadasan	**AB23ECO024**
Anna Rose Jose	**AB23ECO048**
Niya Margret Nixen	**AB23ECO013**
Lidiya Michael	**AB23ECO053**

UNDER THE GUIDANCE OF

Dr. SWATHY VARMA P. R

ASSISTANT PROFESSOR, DEPARTMENT OF ECONOMICS,

ST TERESA'S COLLEGE, ERNAKULAM.

MARCH 2026

CERTIFICATE

This is to certify that the project titled “Household Waste Management in Kerala: The Role of Local Governance and Haritha Karma Sena " submitted in partial fulfilment of the requirement for the award of the degree of Bachelor of Arts in Economics to St. Teresa's College (Autonomous) (Affiliated to Mahatma Gandhi University, Kottayam) is a Bonafide record of the work done by the project group under my supervision and guidance.

Head of the Department

Dr. Anupa Jacob

Guide and Supervisor

Dr. Swathy Varma P.R

Name and Signature of External Examiner:

DECLARATION

We hereby declare that the project titled "Household Waste Management in Kerala: The Role of Local Governance and Haritha Karma Sena" submitted by us for the Bachelor of Arts Degree in Economics is our original work.

Signature of the supervisor

Dr. Swathy Varma P R

Signature of the candidates

Devika G Raj

Chandana Sivadasan

Anna Rose Jose

Niya Margret Nixen

Lidiya Michael

ACKNOWLEDGEMENT

We express our sincere gratitude for the guidance and strength that enabled us to successfully complete this project.

We extend our heartfelt gratitude to our guide, Dr. Swathy Varma P. R, for her valuable guidance, constant encouragement, and support throughout the course of this project, without which this work would not have been possible.

We express our sincere gratitude to Dr. Anupa Jacob, Head of the Department of Economics, St. Teresa's College, Ernakulam, for her valuable advice and encouragement.We also extend our gratitude to the faculty members of the Department of Economics for their continuous support and guidance.

We would like to acknowledge the college library for providing access to essential resources and reference materials that greatly aided our study.

We express our sincere gratitude to the Haritha Karma Sena workers of Kalady Grampanchayat and all other respondents for their valuable cooperation and for providing the primary data essential for the successful completion of this project.

Lastly, we take this opportunity to express our deep sense of gratitude and love to our friends and beloved parents for their constant support, encouragement, strength, and help, without which this achievement would not have been possible.

Devika G Raj
Chandana Sivadasan
Anna Rose Jose
Niya Margret Nixen
Lidiya Michael

CONTENTS

CHAPTER NO.	TITLE	PAGE NO.
1	Introduction	1-11
2	Household Waste Management: The Role of Local Governance and Hritha Karma Sena	12-20
3	Analysis of the Effectiveness of Haritha Karma Sena (HKS) in Kalady Grama Panchayat	21-73
4	Findings, Suggestions and Conclusion	74-79
	Bibliography	80-84
	Appendix Questionnaire I Questionnaire II	85-95

LIST OF FIGURES

Figure No	Title	Page No.
3.1	Age Group of HKS Workers	23
3.2	Educational Qualification of HKS Workers	24
3.3	Work Experience of Workers in HKS	25
3.4	Main Source of Income before Joining HKS	26
3.5	Average Monthly Income before Joining HKS	27
3.6	Prior Experience in Sanitation or Cleaning Work before Joining HKS	28
3.7	Financial and Living Situation before Joining HKS	29
3.8	Received Training in Preparation for Working at HKS	30
3.9	Safety Gear for Sanitation Work	31
3.10	Number of Households Served Daily	32
3.11	Duration of Daily Work	33
3.12	Level of Household Compliance with Waste Segregation	34
3.13	Segregation Burden on HKS Workers	35
3.14	Timeliness of Payment Received by HKS Workers	36
3.15	Public Response to the Work of HKS	37
3.16	Recognition and Social Appreciation of HKS Workers	38
3.17	Monthly Income after Joining HKS	39
3.18	Access to Healthcare Services	40
3.19	Opportunities for Skill Development and Training	41

3.20	Control over Income and Economic Decision-Making	42
3.21	Decision-Making Involvement of HKS Workers	43
3.22	Perception of Safety and Respect among HKS Workers	44
3.23	Operational Challenges Faced by HKS Workers	45
3.24	Access to Safety Gear among HKS Workers	46
3.25	Satisfaction with Pay and Compensation	47
3.26	Health Issues Experienced by HKS Workers	48
3.27	Awareness of Government or Institutional Support	49
3.28	Support from Supervisors and Local Authorities	50
3.29	Respect, Safety, and Public Support for HKS Workers	51
3.30	Type of Residence of Respondents	53
3.31	Area of Waste Collection	54
3.32	Place of Residence of Respondents	57
3.33	Methods of Household Waste Management	58
3.34	Frequency of Household Waste Collection	59
3.35	Duration of Waste Management Services	60
3.36	Source of Awareness about Haritha Karma Sena	61
3.37	Punctuality and Consistency of Waste Collection Services	62
3.38	Monthly Payment for Waste Collection Services	63
3.39	Extra Fee for Additional Waste Collection	64
3.40	Amount Paid for Extra Waste Collection	65
3.41	Rating for the Work Done by HKS Workers	66
3.42	Approach of HKS Workers towards Waste Segregation at Source	67

3.43	Public Opinion on Waste Management after the Introduction of HKS	68
3.44	Effectiveness of Waste Management through HKS	69
3.45	Satisfaction of Respondents with Environmental Cleanliness after Implementation of HKS	70
3.46	Segregation of Household Waste at Source	71
3.47	Respondent's Opinion on Public Participation	72
3.48	Overall Rating for Haritha Karma Sena	73

LIST OF TABLES

TABLE NO.	TITLE	PAGE NO.
3.1	Final Weighted Ranking of Monthly Waste Generated	56

CHAPTER I

INTRODUCTION

1.1 INTRODUCTION

The management of household solid waste has emerged as one of the most visible challenges of contemporary environmental governance. Rapid urbanisation, changing consumption patterns, and increasing pressure on natural resources have exposed the limitations of conventional, centralized waste management systems that rely heavily on collection and distant disposal. In response, there has been a growing shift towards decentralized environmental governance, where responsibility for managing waste is placed closer to communities and households, allowing solutions to be more responsive to local needs and conditions.

In India, this transition has gained momentum with the strengthening of local self-government institutions, which has expanded the role of panchayats and municipalities in addressing environmental concerns. Solid waste management has become a key area where decentralization has reshaped governance practices by emphasizing source segregation, community participation, and shared accountability. Kerala stands out in this context due to its long tradition of democratic decentralization and its strong institutional framework that supports community-driven development initiatives.

Within Kerala's decentralised governance structure, the Haritha Karma Sena (HKS) has emerged as a central mechanism for managing household waste at the grassroots level. Operating under the Haritha Keralam Mission with support from Suchitwa Mission and Kudumbashree, HKS functions as a women-led workforce engaged in door-to-door waste collection, segregation of non-biodegradable waste, awareness creation and linkage with recycling systems. By combining environmental service delivery with livelihood generation, HKS represents a practical model of decentralized and inclusive environmental governance.

The functioning of HKS becomes particularly significant in local bodies such as Kalady Grama Panchayat**,** where waste management challenges are shaped by limited infrastructure, financial constraints, and varying levels of public cooperation. While the initiative has contributed to improved waste segregation and cleaner surroundings, HKS workers continue to face challenges

such as irregular income, inadequate facilities, social stigma and gaps in institutional support. At the same time, the programme has created important livelihood opportunities for women who previously had limited access to stable employment, highlighting its role in women's economic empowerment.

Against this backdrop, the present study examines the role of Haritha Karma Sena in Kerala with specific reference to Kalady Grama Panchayat. The study seeks to evaluate the effectiveness of HKS in promoting efficient solid waste collection and segregation at the source, analyse its contribution to women's empowerment and identify the challenges faced by HKS workers. By focusing on local-level implementation, this study aims to provide insights into how decentralized waste management initiatives can be strengthened to ensure environmental sustainability, social inclusion and effective grassroots governance.

1.2 REVIEW OF LITERATURE

The United Nations Environment Programme (2015) provides a global overview of solid waste management systems and emphasises the importance of decentralised and community-based approaches in improving environmental sustainability. The report highlights that effective waste segregation at source and local-level waste collection significantly reduce landfill dependence and environmental pollution. It also stresses that public participation, institutional support and worker safety are critical for the long-term success of decentralised waste governance. The study underscores that integrating social inclusion with environmental policy strengthens both service efficiency and sustainability.

The World Bank (2018) provides a comprehensive global assessment of waste management systems and finds that door-to-door collection combined with household-level segregation significantly improves service efficiency and cost-effectiveness. The report stresses that integrating local workers into formal waste systems strengthens both environmental outcomes and livelihood security. However, it also highlights challenges such as weak institutional capacity and low public cooperation in many developing countries.

The International Labour Organization (2019) focuses on the role of waste workers within the circular economy and highlights the need to recognise them as essential service providers. The study emphasises that decent working conditions, access to social security and institutional recognition are crucial for ensuring inclusive and sustainable waste management systems. It further argues that women workers in waste management often face occupational vulnerability, which can be reduced through policy support and formalisation. The findings reinforce the importance of linking waste governance with labour welfare.

The Local Self Government Department (2021) offers a detailed overview of how decentralized solid waste management functions in Kerala. The report stresses the need for well-designed information, education, and communication (IEC) programmes to ensure that households clearly understand their responsibilities, particularly with respect to user-fee payments. It also highlights the growing role of the HKS in strengthening waste collection at the local level and points to the possibility of expanding income opportunities through activities such as managing waste from public events and linking composting practices with urban farming.

Mohan (2015) discusses the shift in Kerala's waste management system from a highly centralized model to a decentralized, community-oriented approach. The study highlights the growing role of local governments and community organizations in managing waste at the grassroots level. It notes that initiatives such as Haritha Karma Sena have improved efficiency in waste collection and segregation by encouraging community responsibility. However, the study also stresses that the long-term success of decentralized waste management depends on continuous public awareness efforts and adequate allocation of resources.

Rajendran and Nair (2017) focus on the role of community participation in solid waste management under the Kerala Model, with particular emphasis on Haritha Karma Sena. Their study identifies household-level source segregation as a critical factor behind the success of decentralised waste initiatives. The authors stress the importance of public education and strengthening local

institutional capacity, while also acknowledging challenges such as uneven community participation and concerns over financial sustainability.

Menon and Palackal (2022) compare centralised and decentralized approaches to solid waste management, using Kerala as a case study. Their analysis demonstrates that decentralized systems tend to deliver better environmental and public health outcomes when supported by strong institutional frameworks. The study also highlights the importance of overcoming public attitudinal barriers to sustain community-led waste governance.

Siva Prasad (2024) analyses the socio-economic conditions of Haritha Karma Sena workers in urban Kerala, highlighting the persistent social stigma attached to waste-related work and limited acceptance at the household level. The study points out the absence of systematic waste measurement and quantity-based user-fee systems, which contributes to low and unstable incomes among HKS members. It also notes the lack of basic infrastructure, such as restrooms and recycling facilities. While the programme offers livelihood opportunities for women, the study cautions that inadequate institutional support may reinforce occupational vulnerability and gender-based disadvantages.

Nishad (2024) explores how the Haritha Karma Sena has influenced waste management practices in Kerala, with a particular focus on the nature of household waste. The study notes that plastic forms the largest share of the waste stream, creating serious environmental challenges due to its long-lasting nature. It points out that changes in behaviour, effective coordination with local authorities, and the level of community participation play a far greater role in determining waste management outcomes than factors such as age, gender, or education. This suggests that improving institutional support and public engagement is more important than demographic characteristics in strengthening waste management systems.

Shameerdas (2024) focuses on the role of Haritha Karma Sena in the management of non-biodegradable waste in Kerala. The study highlights the contribution of HKS in improving waste segregation and directing recyclable materials into formal recycling channels, thereby reducing pressure on landfills. At the same time, it points out that inadequate infrastructure and logistical support at the local level continue to affect efficiency in some panchayats. The study also emphasises that active community participation and sustained awareness programmes significantly enhance waste segregation outcomes.

1.3 RESEARCH PROBLEM

Waste management in urban areas has become increasingly challenging as cities expand and lifestyles change, leading to higher volumes and more complex composition of household waste. To respond to this challenge, Kerala introduced the Haritha Karma Sena (HKS) as a community-based, decentralized system that collects and segregates waste at the household level while also creating livelihood opportunities for women. Although this model aims to keep the city clean and promote women's empowerment at the same time, there is limited clear evidence on how effectively it ensures proper segregation at source and how far it actually improves the economic and social position of the women involved. In practice, problems such as poor household cooperation, heavy workloads, safety risks, and uneven institutional support may reduce both efficiency and fairness within the system.

The study is therefore to examine how well HKS functions as a local waste management solution in Kochi, to assess its real contribution to women's empowerment and to identify the operational and policy gaps that must be addressed to make the programme more effective, equitable and sustainable.

1.4 OBJECTIVES OF THE STUDY

- To assess the performance of Haritha Karma Sena in local waste management and women's empowerment
- To analyze beneficiaries' perceptions of the effectiveness of Haritha Karma Sena in household waste collection and segregation at source.

1.5 METHODOLOGY

The study adopts a descriptive research design to examine how the HKS functions in everyday solid waste management and how it contributes to women's empowerment at the local level. It focuses on real practices such as door-to-door collection, waste segregation and community cooperation. The analysis is based on the experiences and opinions of HKS workers and local residents who directly participate in the system.

The conceptual framework of the study is grounded in the principles of decentralized environmental governance, wherein Haritha Karma Sena functions as a grassroots institutional mechanism for solid waste management. The framework links governance support and operational practices of HKS - such as door-to-door collection, waste segregation and community engagement to environmental outcomes and women's empowerment. Residents' cooperation and perceptions act as mediating factors, while feedback from both HKS workers and residents contributes to improving service delivery and sustainability.

To analyse the data, simple statistical tools such as graphs, pie charts, and bar diagrams were used to present the findings in a clear and visually interpretable manner. To analyse the priority of different types of waste generated per month, a ranking technique was employed. Respondents were asked to rank various types of waste, where Rank 1 indicated the least priority and Rank 6 indicated the highest priority. Weights corresponding to the rank values were assigned to each response. The weighted scores were calculated by multiplying the frequency of each rank with

the respective weight and summing the scores. Based on the weighted scores, the final ranking of waste types was derived. This method facilitates comparison across waste categories and helps identify the most dominant type of waste generated.

1.5.1 DATA SOURCES

The study is based on both primary and secondary sources of data. Primary data were collected using two separate structured questionnaires and face-to-face interviews. One questionnaire was administered to Haritha Karma Sena (HKS) workers to capture information on their work profile, operational experiences, challenges and aspects of women's empowerment.

The second questionnaire was administered to local residents to understand their experiences, opinions and level of satisfaction with solid waste collection and source-level segregation practices, as well as their interaction with HKS members.

In addition, face-to-face interviews were conducted to obtain qualitative insights into the day-to-day functioning of the waste management system, community cooperation, and challenges faced by HKS workers.

Secondary data were collected from government reports, policy documents, official website, and published research studies related to Haritha Karma Sena and decentralised solid waste management in Kerala. The time period of the study is 2025 – 2026.

1.5.2 POPULATION AND SAMPLE

The population of the study comprises Haritha Karma Sena (HKS) workers and local residents who are directly associated with the household solid waste management system and who actively participate in the processes.

For the study, a sample of 26 Haritha Karma Sena workers from Kalady grama panchayat of Ernakulam district and 36 local residents from across Kerala was selected. The inclusion of both service providers and service beneficiaries enabled the study to capture diverse and balanced perspectives on waste collection and segregation practices, as well as on the programme's role in women's empowerment and community engagement.

The study used purposive sampling technique in the selection of sample . Haritha Karma Sena workers were selected from Kalady Grama Panchayat, based on the review of literature and data availability. The data suggests that decentralized solid waste management has been implemented with relatively greater effectiveness in Ernakukam district of Kerala. In Ernakulam district, Kalady is one of the panchayat which functions relatively well in solid waste management.

Local residents were drawn from different parts of Kerala, as household solid waste management is a general problem across Kerala and widespread environmental issue, affecting communities irrespective of local governance units. This broader selection of beneficiaries enabled the study to capture diverse household experiences and perceptions.

1.6. THEORETICAL FRAMEWORK

The study is grounded in the theories of decentralised environmental governance and community-based environmental management, which emphasise local responsibility and collective action in addressing environmental challenges. Decentralised environmental governance suggests that waste management becomes more effective when responsibilities are entrusted to local institutions, allowing solutions to be tailored to local needs and monitored more closely. In this context, Haritha Karma Sena (HKS) represents a decentralised mechanism that directly engages with households through door-to-door waste collection and source-level segregation, thereby reducing pressure on centralised waste disposal systems. Based on the theories of decentralised environmental governance and community-based environmental management, the study identifies variables that capture both operational efficiency and social impact of Haritha Karma Sena (HKS).

1.7 AREA OF STUDY

The present study is conducted in Kalady Grama Panchayat, located in the Angamali Block of Ernakulam District, Kerala. The primary data related to Haritha Karma Sena (HKS) workers were collected directly from Kalady Grama Panchayat. Kalady Grama Panchayat was selected as the study area because of its effective implementation of the HKS programme and its well-organized system of decentralized solid waste management across all 17 wards, supported by strong institutional mechanisms and active community participation. In addition, the beneficiary side of the study was selected on an all-Kerala basis to obtain a broader and more comprehensive understanding of the impact of the Haritha Karma Sena programme across different local bodies in the state.

1.8 CHAPTER SCHEME

Chapter I introduces the problem of household solid waste management within the framework of decentralised environmental governance and explains the relevance of Haritha Karma Sena as a grassroots initiative in Kerala. It outlines the research problem, objectives, methodology, theoretical framework, area of study and limitations.

Chapter II reviews household waste management practices from global, national and state perspectives, with special reference to Kerala's decentralised governance model. It examines relevant policies, institutional structures and the role of Haritha Karma Sena in linking households with local self-governments.

Chapter III analyses primary data collected from Haritha Karma Sena workers and beneficiaries to assess the effectiveness of the programme at the local level. It examines worker empowerment and challenges along with beneficiaries' perceptions of waste collection and segregation services.

Chapter IV summarises the major findings of the study and identifies key achievements and challenges of Haritha Karma Sena. It presents practical suggestions for strengthening waste

management and worker welfare and concludes with reflections on the sustainability of decentralised waste governance.

1.9 LIMITATIONS OF THE STUDY

- The study is confined to Kochi city and may not fully represent the functioning of Haritha Karma Sena in other regions of Kerala.

- Restricted availability of certain government records and official data has limited the scope for detailed institutional analysis.

- The findings are based on a small and selected sample of HKS workers and residents and may not reflect the views of all beneficiaries in Kochi.

- Limited disclosure of income-related information by respondents has restricted deeper analysis of economic conditions.

CHAPTER II

HOUSEHOLD WASTE MANAGEMENT : THE ROLE OF LOCAL GOVERNANCE AND HARITHA KARMA SENA

Household waste management has emerged as a critical field of inquiry within contemporary environmental governance, particularly in the context of decentralization and increasing emphasis on community participation. As urbanization intensifies and consumption patterns evolve, waste management has emerged as a critical arena in which questions of decentralization, community engagement, and environmental responsibility intersect. Contemporary debates on household solid waste management increasingly recognize that environmental outcomes are shaped not only by technological solutions, but more fundamentally by systems of governance, institutional arrangements, and patterns of social participation. Against this background, the present chapter adopts a layered analytical approach to examine how decentralized environmental governance influences household waste management practices from the global level down to the city scale.

This chapter begins at the international level, where evolving approaches to solid waste management reflect a gradual shift towards decentralized and community-oriented approaches. Global experiences demonstrate that community-based organizations and locally embedded institutions play a critical role in improving accountability, efficiency, and environmental outcomes. Building on this global foundation, the analysis turns to the national framework in India, examining the evolution of household waste management policies and the growing emphasis on decentralisation, local self-governance, and community participation. The focus then shifts to the state of Kerala, where decentralised governance reforms have played a significant role in shaping environmental management practices. The final layers of analysis centre on the urban context of Kochi, where municipal governance structures, waste generation patterns, and community practices are examined in detail. Within this context, Haritha Karma Sena (HKS) is analysed as a decentralised institutional mechanism that links household-level waste practices with municipal governance.

2.1 HOUSEHOLD WASTE MANAGEMENT: A GLOBAL CONTEXT

Household waste management has emerged as one of the most visible and complex challenges of contemporary environmental governance, driven by rapid urbanisation, changing consumption patterns, and increasing environmental vulnerability. As households constitute a major source of municipal solid waste, the way domestic waste is generated, segregated, and managed has significant implications for environmental sustainability, public health, and urban governance. Across countries, the growing volume and changing composition of household waste have exposed the limitations of centralised, landfill-dependent systems. As a result, household waste management is increasingly understood not merely as a technical function of collection and disposal, but as a governance-driven process shaped by policy frameworks, institutional capacity, and community behaviour.

2.1.1 GLOBAL POLICY AND INSTITUTIONAL FRAMEWORK

At the global level, household waste management operates within a multi-layered policy and institutional framework involving national governments, local authorities, and international organisations. National governments play a central role in framing waste management laws and regulations that establish environmental standards and policy priorities such as waste reduction, segregation at source, recycling, composting, and reduced reliance on landfills. These legal frameworks provide the foundation for waste governance, while local governments are responsible for implementing policies through waste collection systems, infrastructure development, regulatory enforcement, and community engagement.

International organisations significantly influence household waste management by providing policy guidance, technical expertise, and financial support.

- The United Nations Environment Programme promotes integrated and sustainable waste management approaches that prioritise waste prevention, source segregation, recycling, and environmentally sound disposal. UNEP emphasises participatory governance structures that actively involve communities alongside government institutions.

- The World Bank focuses on the economic and governance dimensions of waste management, highlighting decentralisation, financial sustainability, and institutional efficiency as key to improving service delivery and accountability.
- The World Health Organization approaches waste management from a public health perspective, drawing attention to health risks associated with improper waste handling, open dumping, and unsafe disposal, and advocating for safe collection and treatment systems, particularly in densely populated urban areas.

Despite these frameworks, global experience shows that strong regulations and infrastructure alone are insufficient if responsibility and decision-making remain highly centralised. This has led to a growing recognition of the need for alternative governance approaches.

2.1.2 DECENTRALISED GOVERNANCE AND COMMUNITY BASED MODELS WORLDWIDE

Decentralised and community-based waste management models have emerged as more adaptive and sustainable alternatives to centralised systems. These models focus on managing waste closer to the point of generation through source-level segregation, neighbourhood-level composting, and local recycling, thereby reducing dependence on landfills and long-distance transportation.

International experience demonstrates the effectiveness of such approaches.

In **Japan**, strict household segregation rules, combined with strong community discipline and close municipal coordination, ensure high-quality recyclable waste streams and minimal landfill dependence. In **Germany**, decentralised recycling systems are supported by extended producer responsibility mechanisms and active citizen participation, enabling high material recovery under strong regulatory oversight. In **Brazil**, community-led recycling cooperatives have successfully integrated informal waste workers into municipal systems, improving recycling rates while also generating livelihoods and promoting social inclusion. Across these cases, the alignment of institutional support with community participation has been central to the success of decentralised waste management systems.

2.2 INDIA'S WASTE MANAGEMENT POLICIES

2.2.1. NATIONAL POLICY FRAMEWORK AND REGULATORY APPROACH

Waste management has emerged as a national priority in India due to rapid urbanization, population growth, industrial expansion, and changing consumption patterns. Poorly managed waste poses serious risks to public health, environmental quality, and governance systems. The Ministry of Environment, Forest and Climate Change (MoEF&CC), under the Environment (Protection) Act, 1986, oversees waste governance in India. A major policy shift has been the transition from landfill-based disposal to a circular economy approach, where waste reduction, reuse, recycling, and safe disposal are prioritized.

The Solid Waste Management (SWM) Rules, 2016 form the backbone of household waste governance. These rules mandate segregation of waste at the source into biodegradable, dry, and domestic hazardous waste, making households directly accountable for waste handling. The rules extend waste management responsibilities beyond statutory towns to include census towns, townships, and certain rural areas. They also emphasize door-to-door collection, decentralized processing of organic waste, scientific landfill management, and integration of informal waste pickers into municipal systems.

In addition to municipal solid waste, India has strengthened regulations for specialized waste streams such as plastics, e-waste, batteries, hazardous waste, and wastewater. Updated regulations introduced during 2024-2025 emphasize Extended Producer Responsibility (EPR), real-time tracking systems, recycling targets, and mandatory treatment and reuse of wastewater by bulk generators.

2.2.2 INSTITUTIONAL ROLES, DECENTRALIZATION AND COMMUNITY PARTICIPATION

Urban Local Bodies (ULBs) are the primary institutions responsible for implementing waste management policies under the 74th Constitutional Amendment. They are tasked with planning, execution, monitoring, and enforcement of waste management services within their jurisdictions. A key strategy promoted by ULBs is decentralized waste management, which reduces dependence on centralized landfills and lowers transportation costs and environmental impacts. Technologies such as composting units, biomethanation plants, and material recovery facilities are increasingly adopted at ward and community levels.

Community participation plays a vital role in improving household waste management. Ward-level committees act as links between residents and municipal authorities, ensuring accountability, grievance redressal, and improved service delivery. Non-governmental organizations (NGOs), resident welfare associations (RWAs), and citizen groups contribute through awareness campaigns, training in composting practices, and support for segregation at source.

Several Indian cities demonstrate the success of citizen-led and decentralized waste initiatives. Panaji's 16-way dry waste segregation model, Ambikapur's ward-level solid and liquid resource management system, Alappuzha's "Clean Home, Clean City" initiative, and Indore's strict enforcement and community participation showcase effective household waste governance and progress toward zero-landfill goals.

2.3 DECENTRALIZED SOLID WASTE MANAGEMENT IN KERALA

Solid waste management in Kerala involves the systematic collection, segregation, processing, recycling, and safe disposal of waste generated by households, institutions, and commercial establishments. The state follows a largely decentraliZed model, focusing on segregation at source and treating waste close to where it is generated. Major initiatives such as the Haritha Keralam Mission and the Malinya Muktham Nava Keralam campaign promote public participation and

scientific waste handling. An important part of this system is the Haritha Karma Sena, a community-based group under local self-government institutions. Haritha Karma Sena workers carry out door-to-door collection of non-biodegradable waste, create awareness about waste segregation and plastic reduction, and ensure that collected waste reaches material collection and resource recovery facilities.

Despite these efforts, Kerala continues to face several challenges in solid waste management. Rapid urbanisation, increasing waste generation, limited land availability for processing facilities, and public resistance to waste treatment plants have slowed progress. Inadequate segregation at source and irregular waste disposal in some areas affect the efficiency of the system. Special categories of waste such as plastic, e-waste, and sanitary waste require better management mechanisms. However, successful local initiatives, the expanding role of Haritha Karma Sena, and growing public awareness show that with stronger implementation and community cooperation, Kerala can move closer to becoming a waste-free and environmentally sustainable state.

2.3.1 HARITHA KARMA SENA OF KALADY GRAMPANCHAYAT

The Kalady Grama Panchayat, situated within the Angamali Block of the Ernakulam District, has transformed the process of solid waste management since they established Haritha Karma Sena (HKS). The HKS unit located in Kalady includes 28 workers who have been trained to oversee decentralized waste management and the collection of waste directly from both homes and institutions. The HKS workers work in teams, so that all wards receive systematic coverage across the 17 wards of Kalady Grama Panchaya**t**, and each worker collects a nominal user charge of ₹50 which contributes a degree of financial self-sufficiency to the overall program. One of the most notable aspects of the Kalady unit is the high degree of citizen participation through frequent awareness programs and community-based classes that have created a strong sense of collective responsibility among residents towards this initiative.

According to the data collected from the Panchayat, the amount of waste collected has consistently increased over time and has improved the segregation process due to improved compliance from community members. Kalady Panchayat has demonstrated a greatly improved, more organized and efficient, and community-driven approach to solid waste management since

establishing the HKS program. As a result, the Haritha Karma Sena process has been successful in promoting sustainable residential behaviours and institutionalizing current practices related to solid waste management in-Kalady Grama panchayat.

Overall, sustainable household waste management requires a combination of strong local governance, community participation, women's leadership, and adequate infrastructure and policy support.

2.4 ROLE OF HOUSEHOLDS AND WOMEN IN DECENTRALIZED SOLID WASTE MANAGEMENT

Households play a central role in decentralised solid waste management as they are the primary generators of waste and the first point of segregation, making their everyday practices crucial to system efficiency. Sustainable household waste management is based on source segregation into biodegradable, recyclable, and hazardous waste, local composting of biodegradable waste, and regular door-to-door collection supported by proper storage facilities.

These practices reflect responsible consumption behaviour and environmental awareness, but household participation becomes effective only when supported by reliable municipal services, continuous awareness programmes, and clear communication such as regular collection schedules and feedback mechanisms.

Within this framework, women and organised social groups play a vital role in decentralised solid waste management due to their close involvement in household and community life. Women lead waste segregation, composting, awareness generation, and community monitoring activities, ensuring sustained participation at the local level. Across different regions of the world, women-led initiatives such as self-help groups in South Asia, recycling cooperatives in Latin America, and community composting projects in Africa and Asia have demonstrated improved environmental outcomes. At the same time, these initiatives promote social inclusion, strengthen community participation, and create livelihood opportunities, making decentralised waste management systems more effective, inclusive, and sustainable.

In conclusion, decentralised solid waste management can be successful and sustainable only when households actively participate at the source, supported by efficient institutional systems and strong municipal services. Empowering women and community groups further strengthens these systems, making waste management more inclusive, environmentally sound, and effective in the long run.

2.5 CHALLENGES IN HOUSEHOLD WASTE MANAGEMENT

- **Institutional and governance challenges:** Poor coordination among agencies, weak monitoring systems, limited technical capacity, and unclear division of responsibilities lead to inefficient service delivery and low accountability.
- **Low community participation:** Lack of awareness, resistance to behavioural change, poor motivation for source segregation, and social stigma associated with sanitation work reduce active household involvement.
- **Infrastructure and resource constraints:** Inadequate collection facilities, insufficient recycling and composting units, and limited financial resources in municipal budgets restrict proper waste handling.
- **Policy and enforcement gaps:** Weak implementation of rules, shortage of trained staff, limited political commitment, and a gap between policy objectives and ground-level practices reduce compliance and long-term sustainability.

CHAPTER: III

ANALYSIS OF THE EFFECTIVENESS OF HARITHA KARMA SENA (HKS) IN KALADY GRAMA PANCHAYAT

This chapter presents an analysis of the data collected to evaluate the functioning and effectiveness of Haritha Karma Sena (HKS) in Kerala, with special reference to Kalady Grama Panchayat.

Haritha Karma Sena plays a crucial role in local-level environmental management through waste collection, segregation, and cleanliness initiatives. The effectiveness of these services depends not only on institutional support and operational efficiency but also on the participation, working conditions, and well-being of HKS workers, most of whom are women.

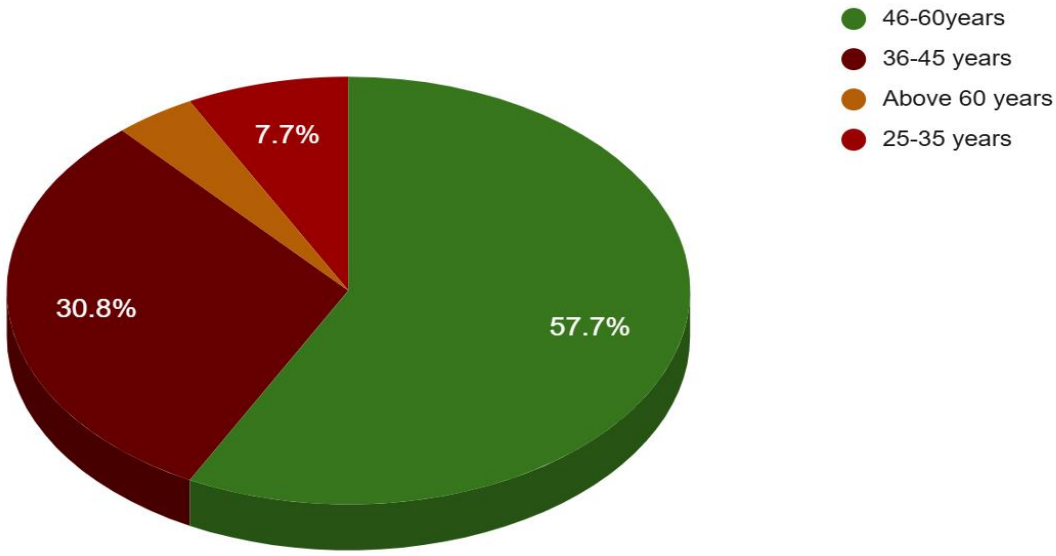
Accordingly, the analysis is divided into two parts: the supply side, which focuses on HKS workers, and the beneficiary side, which examines the perceptions and practices of households receiving HKS services.

3.1 SUPPLY-SIDE : HARITHA KARMA SENA WORKERS

The supply-side analysis examines Haritha Karma Sena workers in Kalady Grama Panchayat, focusing on their socio-economic background, working conditions, income, training, and job satisfaction. Based on a survey of 26 workers, this section evaluates the effectiveness of HKS in waste collection and segregation, its role in women's empowerment, and the key challenges affecting workers' performance.

3.1.1 AGE GROUP OF HKS WORKERS

Figure 3.1 Age Group of HKS Workers



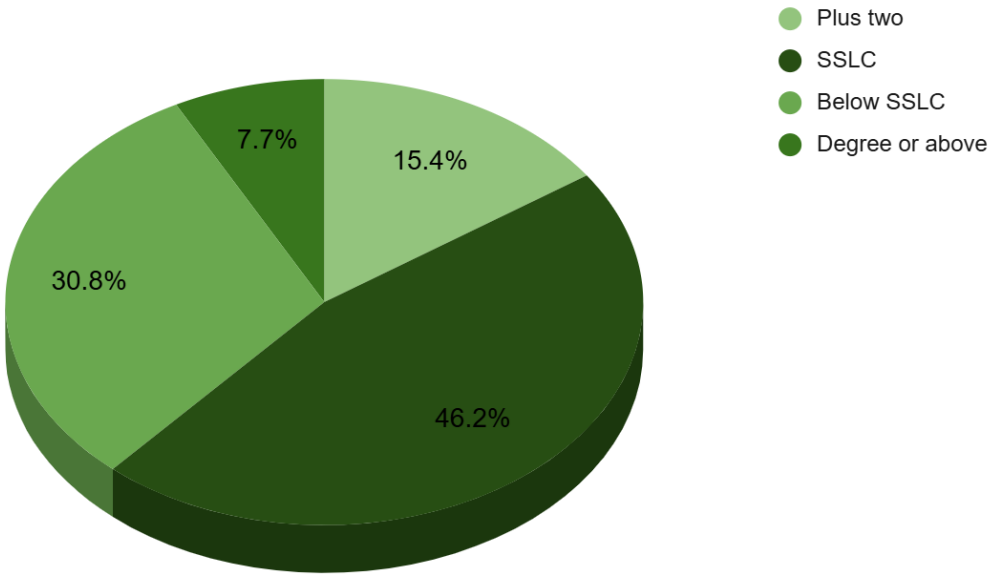
Source – Primary Data

The figure shows the age profile of Haritha Karma Sena (HKS) workers. Most respondents (57.7 percent) belong to the 46-60 age group, followed by 30.8 percent in the 36-45 category, indicating that HKS largely depends on middle-aged women for its day-to-day functioning. Participation from younger age groups is notably low, with only 7.7 percent in the 25-35 range and no representation from those aged 18-24. A small proportion (3.8 percent) of workers are above 60 years of age.

This distribution reflects the role of HKS as a stable livelihood option for middle-aged women, many of whom may have limited access to alternative employment. At the same time, the absence of younger workers points to underlying challenges such as social attitudes toward waste-related work, physical demands of the job, and better employment opportunities available to youth.

3.1.2 EDUCATIONAL QUALIFICATION OF HKS WORKER

Figure 3.2 – Educational Qualification of HKS Workers



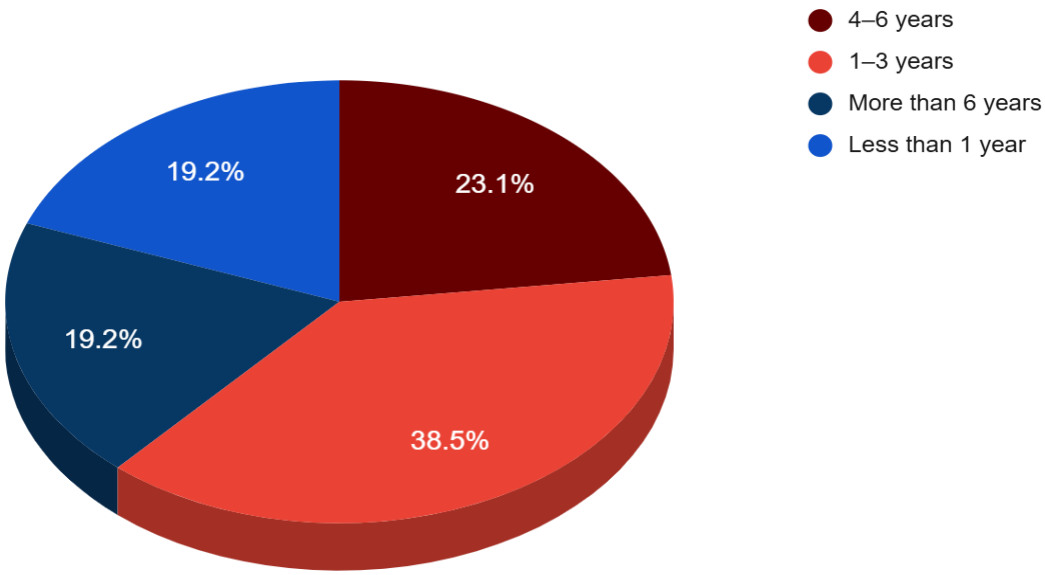
Source – Primary Data

The figure illustrates that 46.2 per cent have completed SSLC, while 30.8 per cent have education below SSLC. About 15.4 per cent have completed Plus Two and only 7.7 per cent holds a degree or higher.

The educational profile indicates that HKS largely provides job opportunities for women with basic to secondary-level education, making it accessible for those with limited formal qualifications. The data also suggests that HKS provides an opportunity for women to engage in meaningful work regardless of their educational background, supporting social inclusion. At the same time, the low presence of highly educated workers points to the need for capacity-building initiatives, skill development, and training programs to enhance efficiency, professional growth, and long-term empowerment within the HKS framework

3.1.3 WORK EXPERIENCE OF WORKERS IN HKS

Figure 3.3 – Work Experience of Workers in HKS



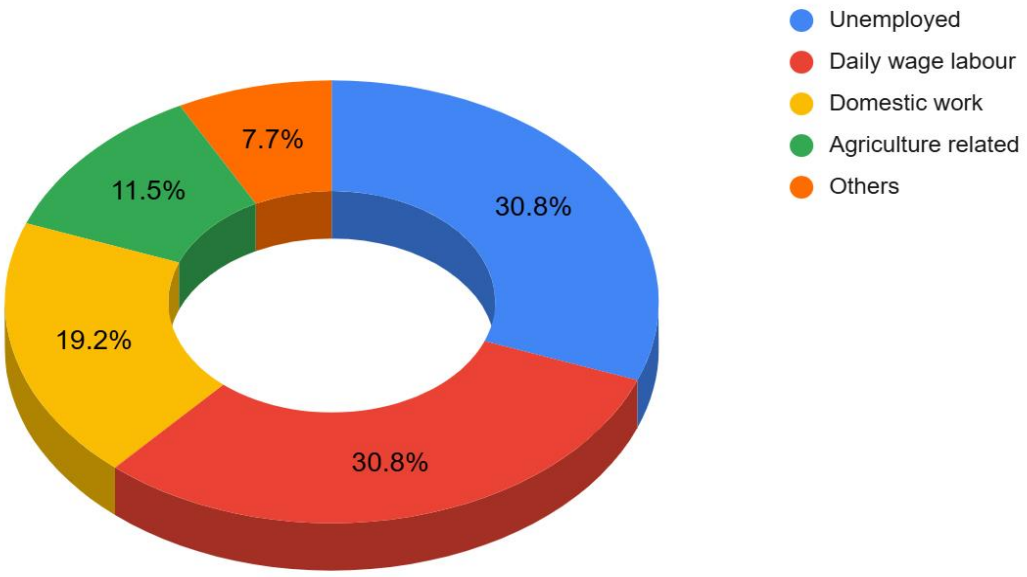
Source – Primary Data

The figure shows the work experience of HKS workers. A majority of respondents (38.5 per cent) have between one and three years of experience. This is followed by workers with four to six years of experience (23.1 per cent). Those with more than six years of experience account for 19.2 per cent, while an equal proportion (19.2 per cent) have less than one year of experience.

Overall, the distribution indicates a workforce with a balanced mix of relatively new and experienced workers. While the large share of workers with one to three years of experience suggests steady recruitment in recent years, the presence of long-serving members points to workforce stability and the development of experience and skills within HKS.

3.1.4 MAIN SOURCE OF INCOME BEFORE JOINING HKS

Figure 3.4 Main Source of Income before Joining HKS



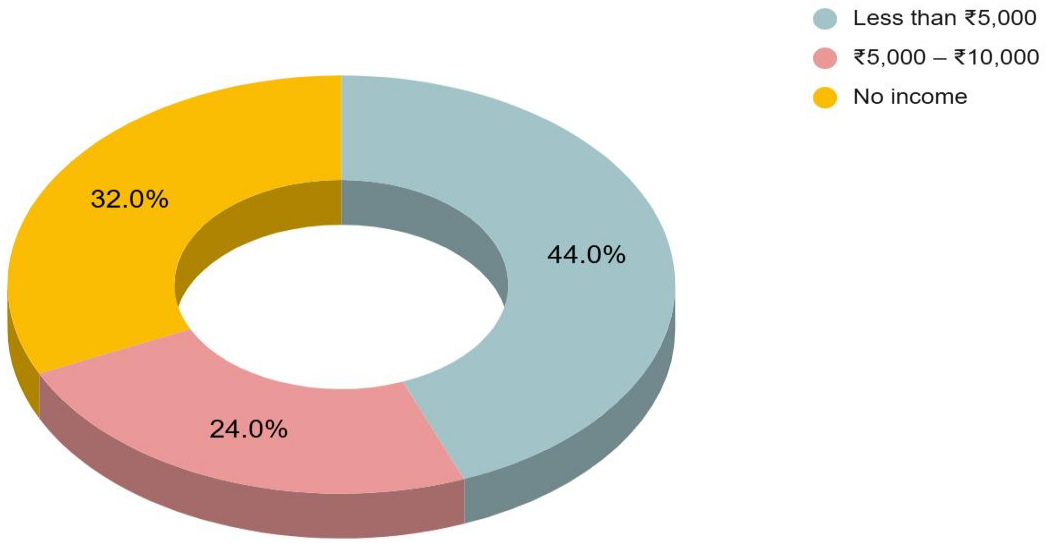
Source – Primary Data

The figure presents the employment status and sources of livelihood of respondents prior to joining Haritha Karma Sena (HKS). The data show that 30.8 per cent of respondents were unemployed, while an equal proportion were engaged in daily wage labour. Domestic work accounted for 19.2 per cent, indicating reliance on informal and household-based employment. A smaller share (11.5 per cent) depended on agriculture-related activities, and only 7.7 per cent reported other livelihood sources.

The pre-HKS livelihood profile reflects a high level of economic insecurity among respondents, with a substantial proportion either unemployed or engaged in unstable and informal forms of work. This highlights the significance of HKS in providing a more reliable and structured livelihood option, particularly for women who previously faced limited and uncertain employment opportunities.

3.1.5 AVERAGE MONTHLY INCOME BEFORE JOINING HKS

Figure – 3.5 Average Monthly Income before Joining HKS



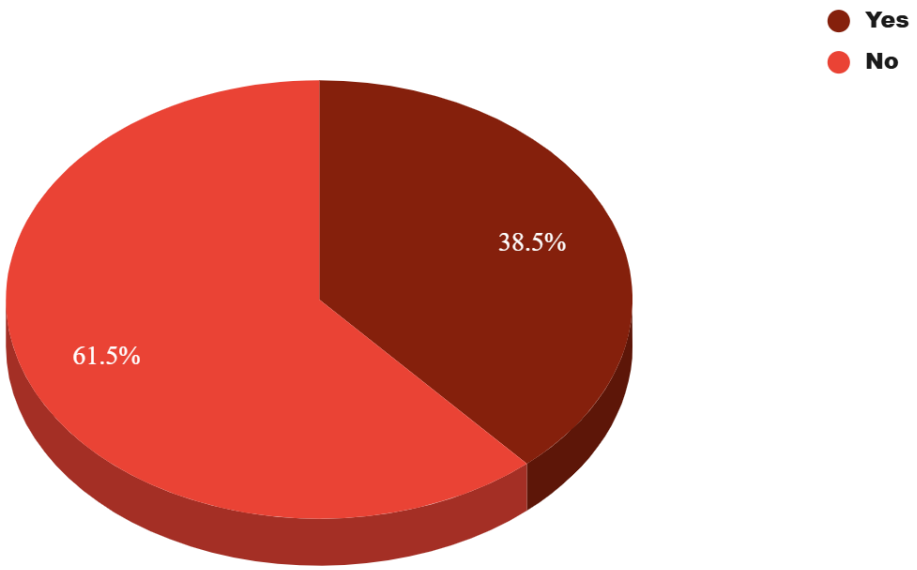
Source - Primary Data

The figure illustrates the average monthly income of respondents before joining Haritha Karma Sena (HKS). The data shows that a majority of the respondents (44 per cent) earned less than ₹5,000 per month prior to joining HKS, indicating low-income levels among most workers. Additionally, 24 per cent reported a monthly income between ₹5,000 and ₹10,000.Notably, none of the respondents earned between ₹10,001 and ₹15,000 or more than ₹15,000 before joining HKS. Furthermore, 32 per cent of respondents reported having no income at all.

This highlights that many HKS workers came from economically vulnerable backgrounds, emphasizing the role of HKS in providing livelihood opportunities, especially for low-income individuals. It also demonstrates the importance of HKS in offering income opportunities to women with limited or no prior earnings, thereby contributing to their economic empowerment and financial independence.

3.1.6 PRIOR EXPERIENCE IN SANITATION OR CLEANING WORK BEFORE JOINING HKS

Figure 3.6 - Prior Experience in Sanitation or Cleaning Work before Joining HKS

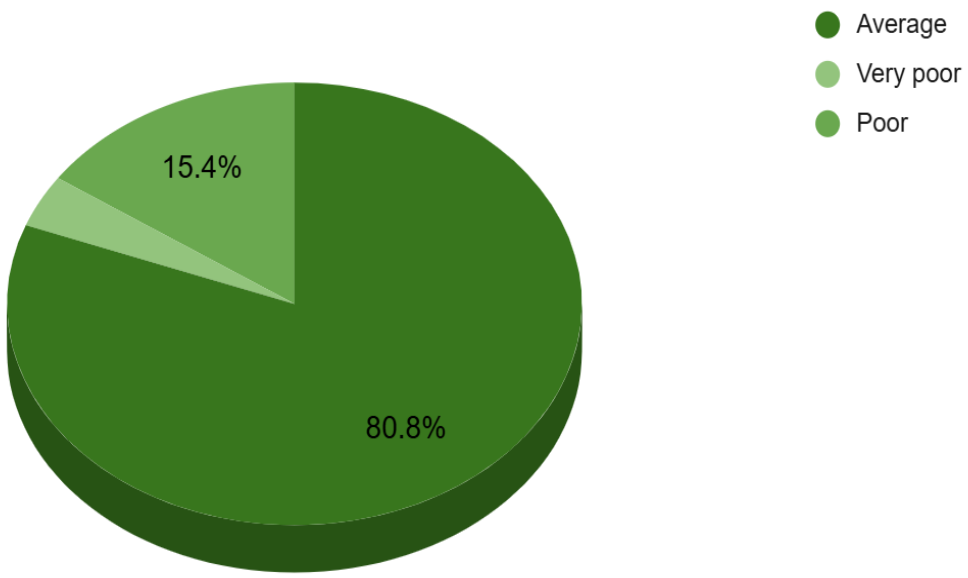


Source – Primary Data

The figure shows that only 38.5 percent of respondents had prior sanitation work experience, while 61.5 percent did not. This indicates that HKS needs to provide training and entry-level opportunities for women without prior exposure, promoting skill development and opening pathways for employment in environmental governance.

3.1.7 FINANCIAL AND LIVING SITUATION BEFORE JOINING HKS

Figure 3.7 - Financial and Living Situation before Joining HKS



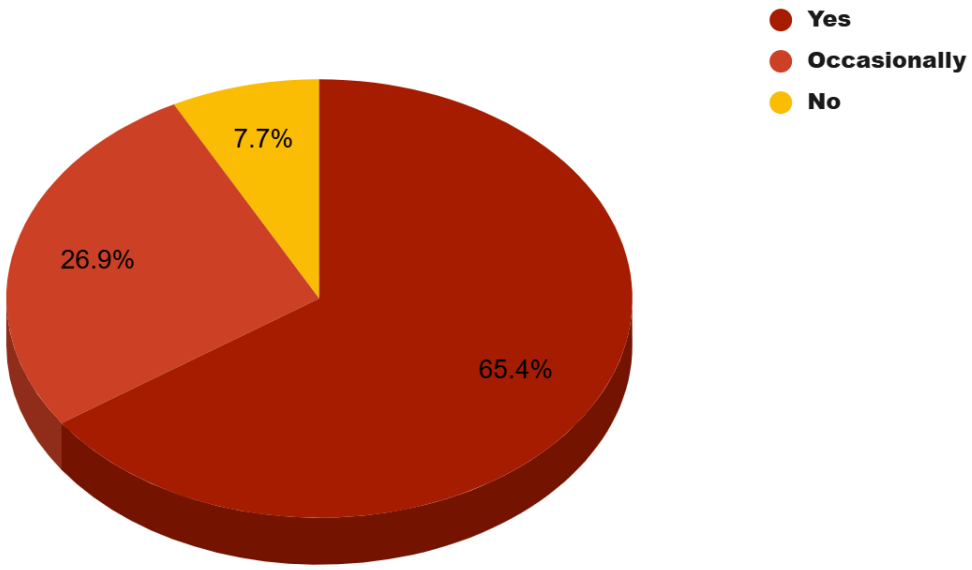
Source – Primary Data

The figure presents the financial and living conditions of respondents before joining HKS. Most respondents (80.8 percent) described their situation as average, 15.4 percent as poor, and 3.8 percent as very poor, with none reporting stability or comfort.

Overall, the figure indicates that respondents largely came from economically constrained backgrounds before joining HKS. The dominance of “average” and poorer living conditions, alongside the absence of stability or comfort, suggests that participants had limited financial security and may have viewed HKS as an opportunity for improved livelihoods and support.

3.1.8 RECEIVED TRAINING IN PREPARATION FOR WORKING AT HKS.

Figure 3.8 - Received training in preparation for working at HKS



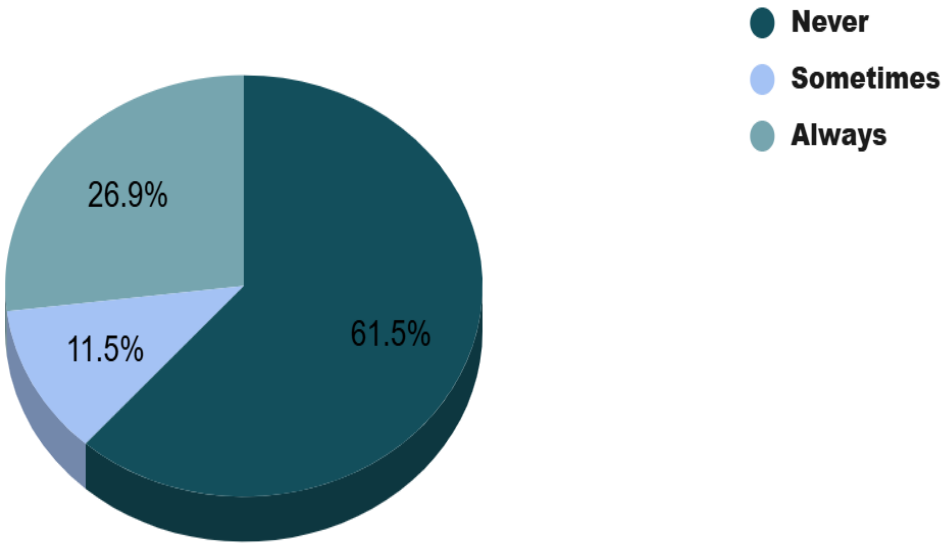
Source - Primary Data

The figure illustrates training received by HKS workers. A majority of 65.4 per cent received training, 26.9 per cent occasionally, and 7.7 per cent did not receive any.

This emphasizes HKS's commitment to preparing women for their responsibilities, building both skill and confidence, and ensuring quality in service delivery.

3.1.9 SAFETY GEAR FOR SANITATION WORK

Figure 3.9 - Safety Gear for Sanitation Work



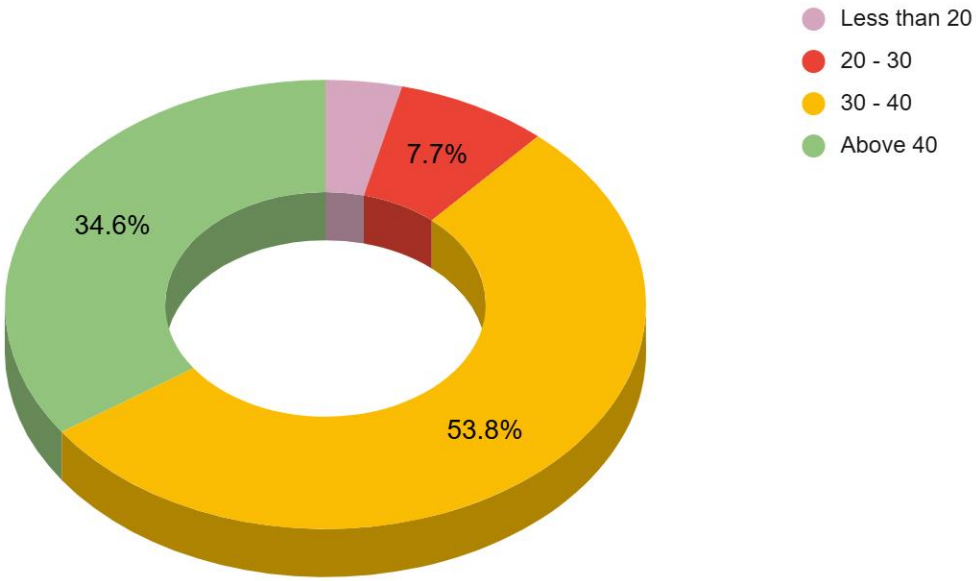
Source - Primary Data

The figure shows the use of safety gearOnly 26.9 per cent always use safety equipment, 11.5 per cent sometimes, and 61.5 per cent never.

This reveals a significant gap in safety measures, pointing to the need for better enforcement and provision of protective gear to safeguard workers health, especially considering the physically demanding nature of sanitation work.

3.1.10 NUMBER OF HOUSEHOLDS SERVED DAILY

Figure 3.10 Number of Households Served Daily



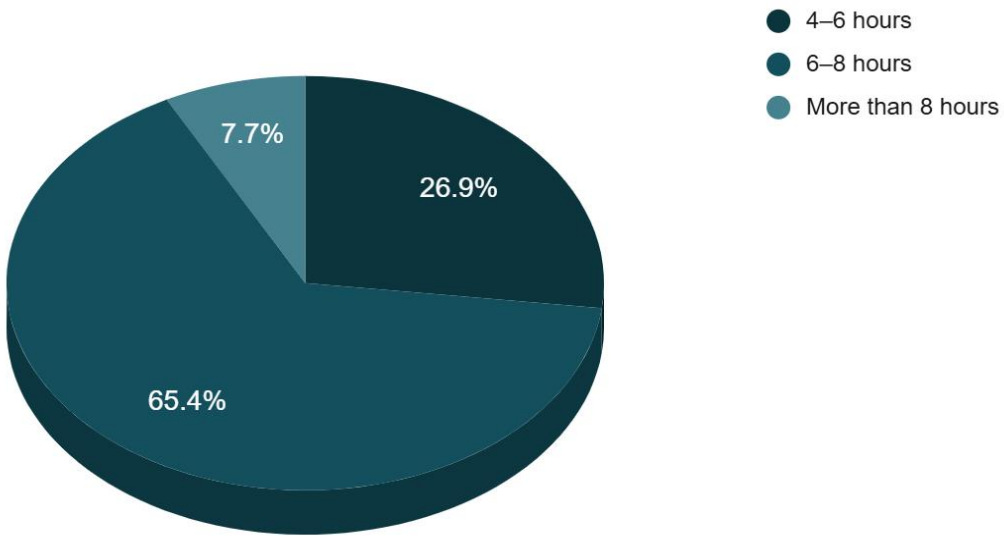
Source– Primary Data

The figure depicts the number of households served by HKS workers daily. Most respondents (53.8 per cent) serve 30 - 40 households, 34.6 per cent serve above 40, 7.7 per cent serve 20 -30, and 3.9 per cent serve less than 20 households.

This reflects the extensive coverage of HKS activities and the significant workload handled by women workers, demonstrating their vital role in community-level environmental governance.

3.1.11 DURATION OF DAILY WORK

Figure 3.11 Duration of Daily Work



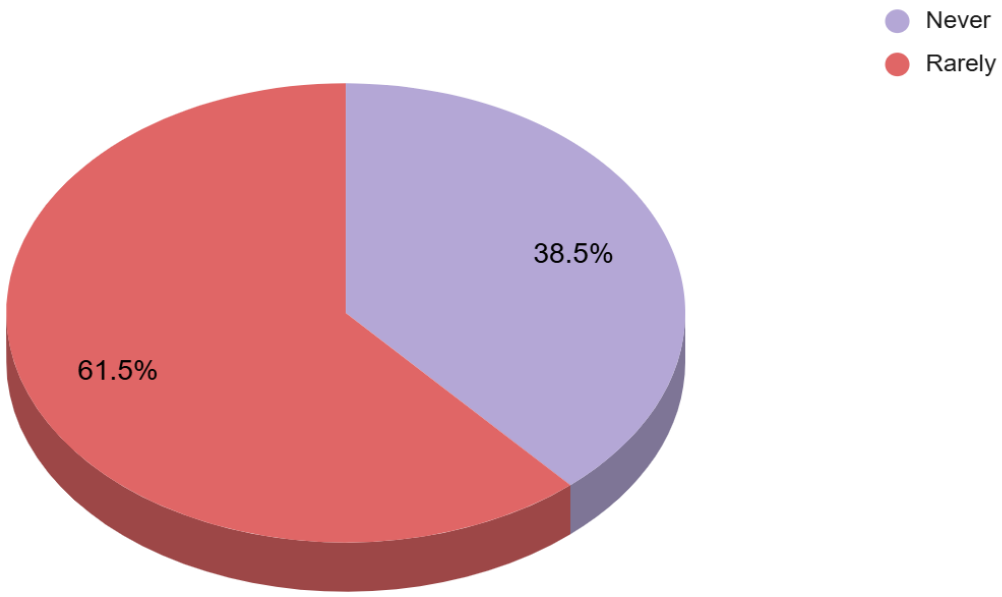
Source – Primary Data

The figure shows that a majority of HKS members work long hours, that is, about 65.4 per cent of respondents work between 6 and 8 hours per day, while 26.9 per cent work for 4-6 hours, and 7.7 per cent work for more than 8 hours. Notably, none of the respondents reported working for less than four hours.

This indicates that HKS work is not casual or part-time in nature but rather involves a substantial daily time commitment. Such working hours reflect the heavy workload borne by HKS members in managing door-to-door waste collection, segregation, and transport, highlighting their crucial role in maintaining Kochi's decentralized waste management system.

3.1.12 LEVEL OF HOUSEHOLD COMPLIANCE WITH WASTE SEGREGATION

Figure - 3.12 Level of Household Compliance with Waste Segregation



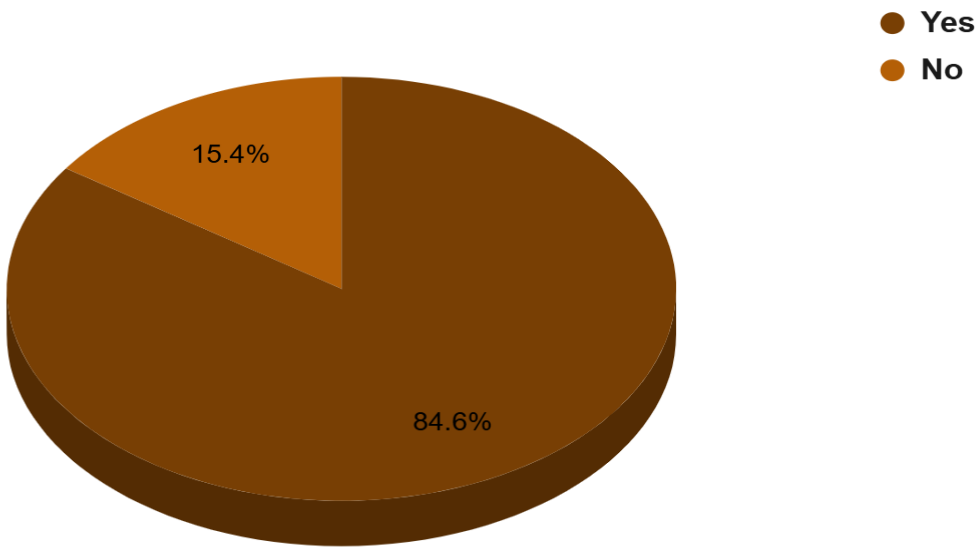
Source – Primary Data

The figure shows that household compliance with waste segregation is very low. According to the respondents, 38.5 per cent reported that households never provide segregated waste, while 61.5% per cent stated that segregation occurs rarely. This indicates that waste is not regularly segregated at the household level. None of the respondents reported that households always provide segregated waste.

The findings clearly show that household waste segregation is largely absent, which poses challenges for effective waste collection and management. The absence of regular segregation affects the efficiency of waste handling and processing and points to the need for stronger awareness and guidance at the household level.

3.1.13 SEGREGATION BURDEN ON HKS WORKERS

Figure 3.13 - Segregation Burden on HKS Workers



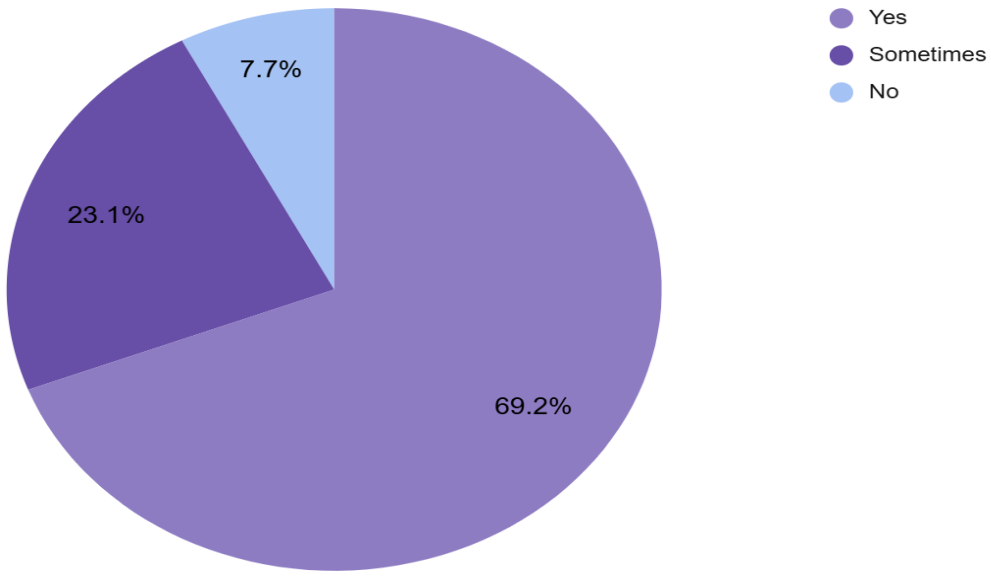
Source – Primary Data

The figure shows the responses to whether HKS workers have to segregate waste themselves to provide further insight into operational realities. A very large majority (84.6per cent) stated that they must segregate the waste themselves when households fail to do so, while only 15.4 per cent reported that they do not.

This shows that segregation, which should ideally occur at the household level, is being transferred to HKS workers. Economically, this represents an increase in labour intensity without a corresponding increase in compensation. It also exposes workers to greater health and safety risks due to direct handling of mixed waste.

3.1.14 TIMELINESS OF PAYMENT RECEIVED BY HKS WORKERS

Figure 3.14 - Timeliness of Payment Received by HKS Workers



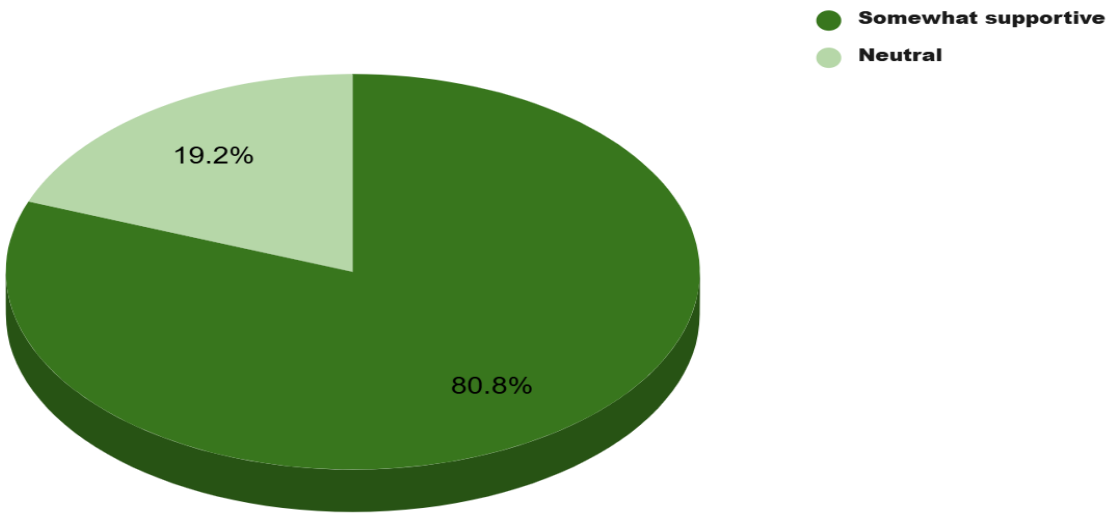
Source – Primary Data

The figure shows whether HKS workers receive their payments on time. Most of the respondents (69.2 per cent) reported that they receive payments on time. However, 23.1 per cent stated that payments are received only sometimes on time, while 7.7 per cent reported that they do not receive payments on time.

Although most HKS workers receive timely payments, the presence of delayed or irregular payments for nearly one-third of the respondents indicates issues in payment regularity.

3.1.15 PUBLIC RESPONSE TO THE WORK OF HKS

Figure 3.15 - Public Response to the Work of HKS



Source - Primary Data

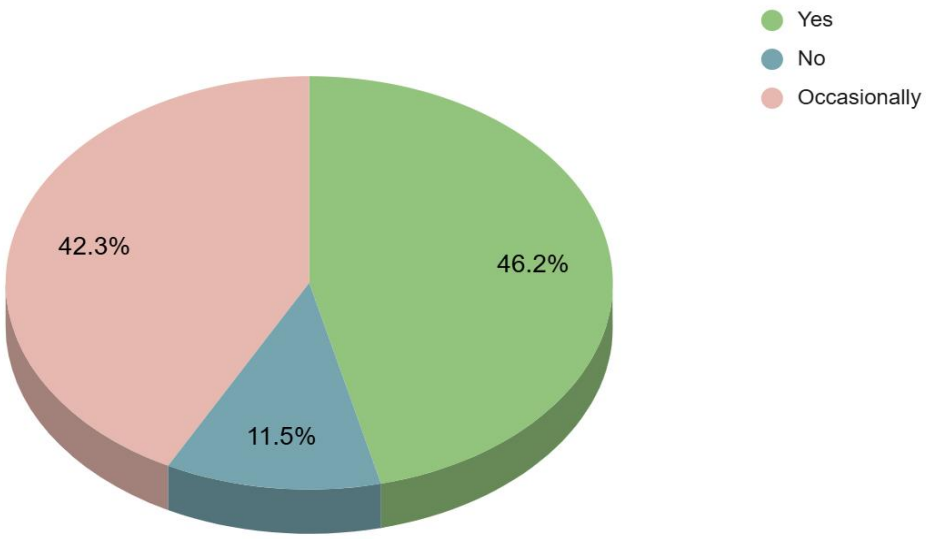
The figure shows that 80.8 per cent of respondents described the public as somewhat supportive, while 19.2 per cent viewed the response as neutral. No respondents reported either very supportive or not supportive attitudes.

This indicates that although the public generally accepts the work of HKS, strong active support is limited. The absence of high enthusiasm may affect cooperation with waste segregation and collection, highlighting the need for greater community engagement.

From the perspective of decentralised environmental governance, this is a critical finding. Effective decentralisation depends not only on institutional arrangements but also on active citizen participation. While the data shows that outright resistance is not a major problem, the lack of strong public support may contribute to problems such as poor waste segregation and limited cooperation with HKS workers.

3.1.16 RECOGNITION AND SOCIAL APPRECIATION OF HKS WORKERS

Figure – 3.16 Recognition and Social Appreciation of HKS Workers

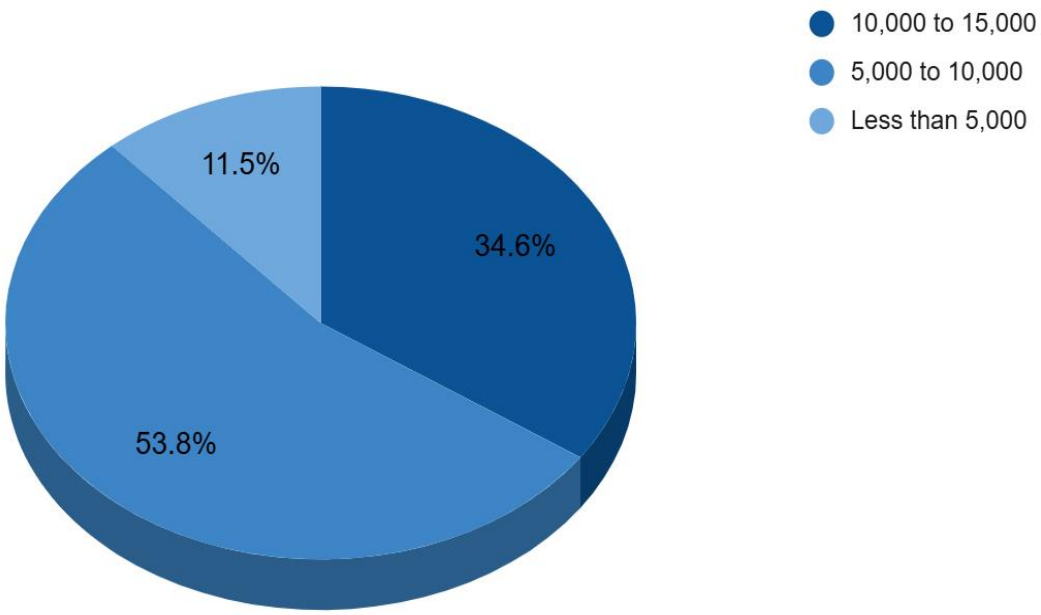


Source – Primary Data

A decentralized governance system is sustainable only when frontline workers receive social recognition for their contributions. The data shows that 46.2 per cent of HKS members reported receiving regular recognition, while 42.3 per cent received appreciation occasionally. Only 11.5 per cent stated that they do not receive any recognition. This distribution indicates that nearly nine out of ten workers receive some form of appreciation, either formally or informally. Recognition is important not only for motivation but also for social dignity, especially in waste-related occupations that often face stigma.

3.1.17 MONTHLY INCOME AFTER JOINING HARITHA KARMA SENA

Figure 3.17 - Monthly Income after Joining HKS



Source - Primary Data

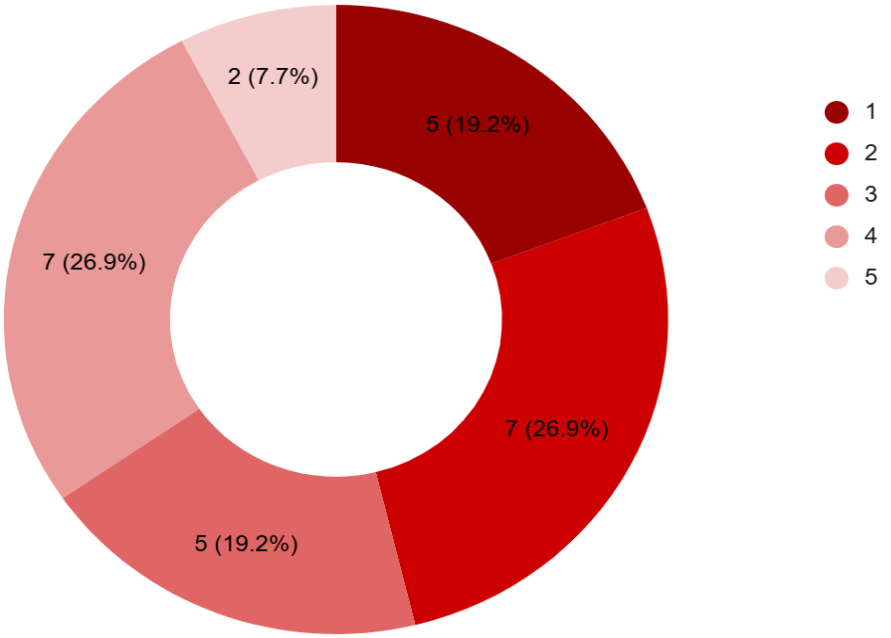
The data shows that 53.8 per cent of respondents earn between ₹5,000 and ₹10,000, while 34.6 per cent earn between ₹10,000 and ₹15,000. Only 11.5 per cent earn less than ₹5,000, and none reported earning above ₹15,000.

This suggests that the majority of HKS workers fall within the lower-middle income category, which is significant for women who previously may have had little or no stable earnings. Regular income from HKS improves household financial security and reduces dependence on informal or

unpaid labour. However, the absence of higher income brackets also highlights the limited upward income mobility within the system.

3.1.18 ACCESS TO HEALTHCARE SERVICES

Figure 3.18 – Access to Healthcare Services



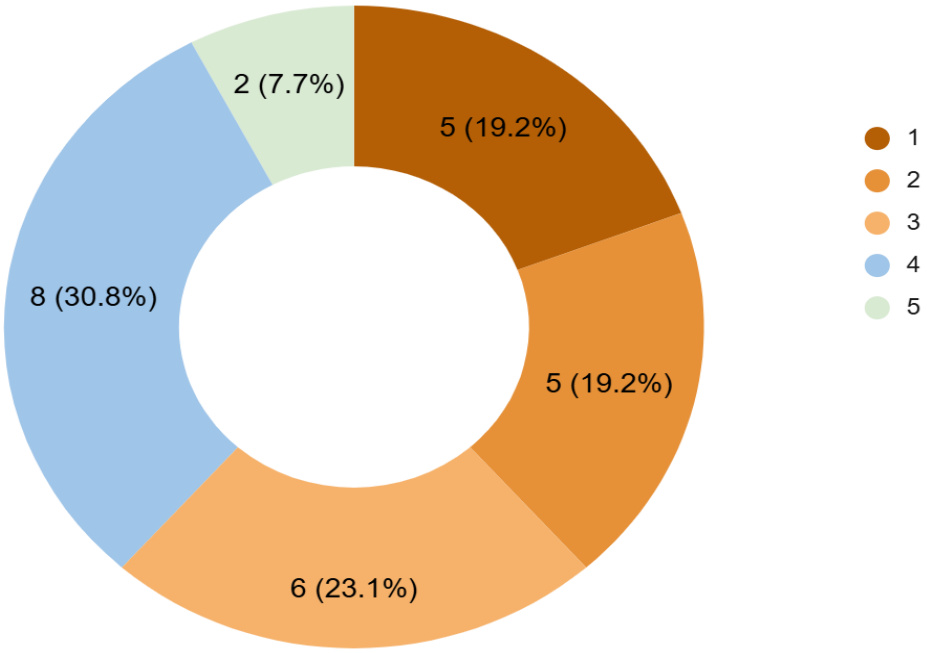
Source - Primary Data

The responses to this question were spread across the five-point scale. About 34.6 per cent of respondents selected ratings 4 and 5, indicating good access to healthcare, while 65.3 per cent selected ratings 1, 2 or 3, reflecting moderate to poor access.

This mixed pattern suggests that while many HKS workers can access healthcare when needed, a significant section still faces difficulties. Given the physically demanding and hazardous nature of waste work, limited healthcare access can negatively affect productivity and worker well-being. Although healthcare access exists for many HKS workers, gaps remain, pointing to the need for stronger institutional welfare support.

3.1.19 OPPORTUNITIES FOR SKILL DEVELOPMENT AND TRAINING

Figure 3.19 – Opportunities for Skill Development and Training



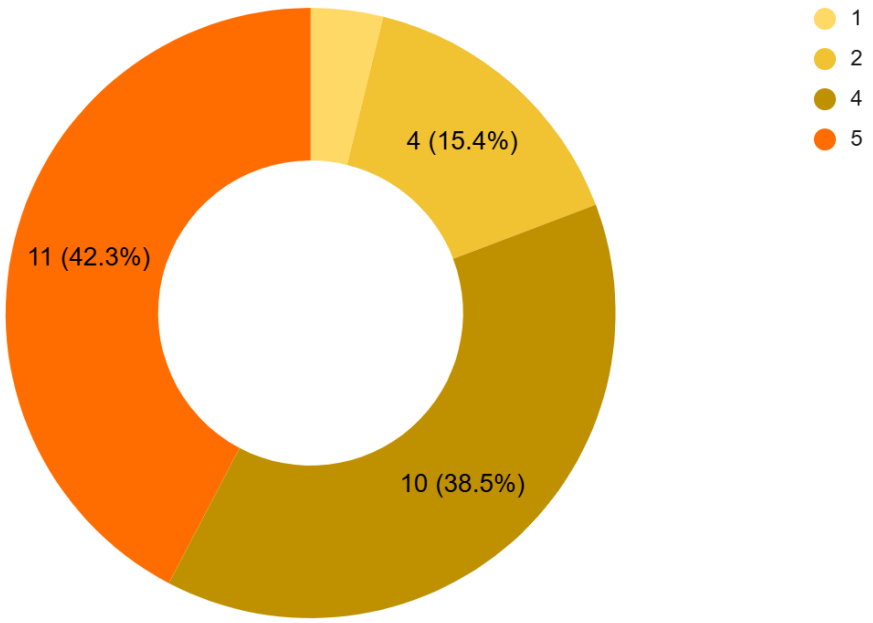
Source – Primary Data

The responses to this question were spread across the five-point scale. The data shows that 30.8 per cent rated their opportunities at level 4, and 23.1 per cent at level 3, while 19.2 per cent rated them at both levels 1 and 2. Only 7.7 per cent rated it at the highest level (5).

This indicates that training opportunities exist but are unevenly distributed. While some workers benefit from capacity-building initiatives, others remain stuck with limited learning or career advancement opportunities. HKS offers some scope for skill development, but training remains insufficient to ensure long-term professional growth for all workers

3.1.20 CONTROL OVER INCOME AND ECONOMIC DECISION-MAKING

Figure 3.20 Control over Income and Economic Decision - Making



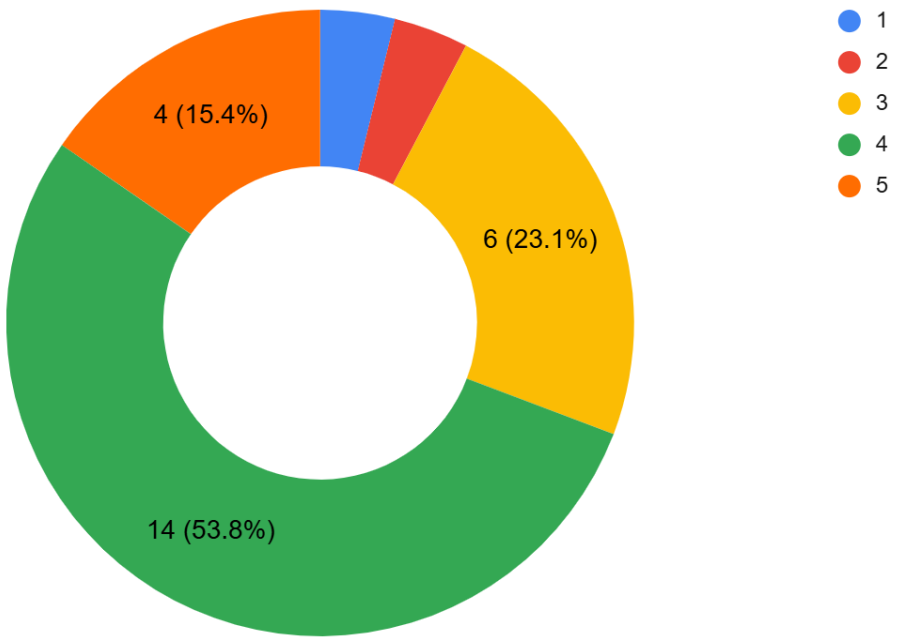
Source - Primary Data

The responses to this question were spread across the five-point scale. This figure measures economic participation by examining the extent to which HKS members control how they use the money they earn. The responses show that 3.8 per cent selected level 1, 15.4 per cent selected level 2, 0 per cent selected level 3, 38.5 percent selected level 4, and 42.3 per cent selected level 5.Thus, a strong majority (80.8 per cent) of respondents reported high control over their earnings (levels 4 and 5), while 19.2 per cent indicated low control (levels 1 and 2).

The absence of responses at level 3 suggests a clear division between workers who enjoy financial autonomy and those who do not. Most HKS members have significant control over their income, indicating a high degree of financial independence and empowerment.

3.1.21 DECISION MAKING INVOLVEMENT OF HKS WORKERS

Figure 3.21 Decision-Making Involvement of HKS Workers



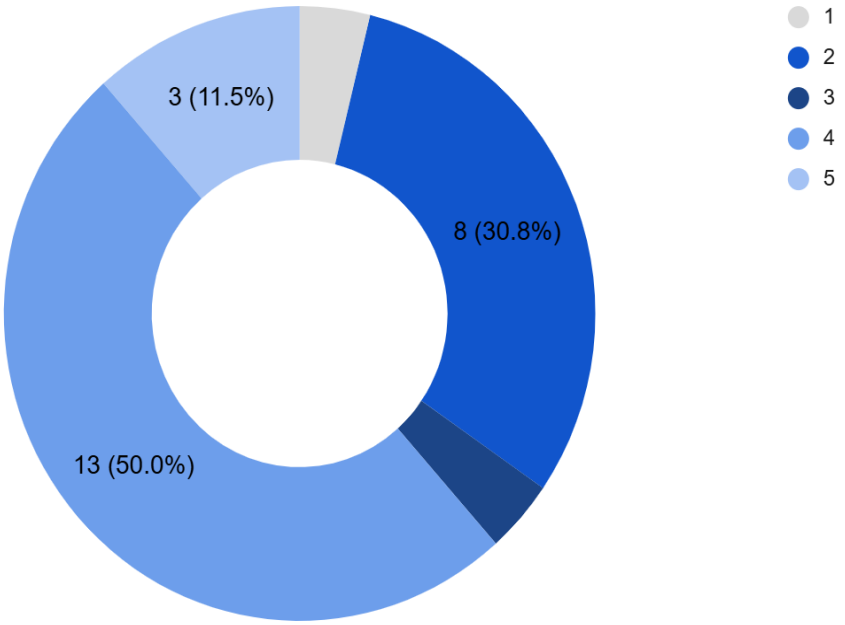
Source - Primary Data

The figure shows the level of involvement of HKS members in important decision-making at home or work, measured on a five-point scale. Most respondents reported high involvement, with 53.8 per cent selecting scale point 4 and 15.4 per cent selecting scale point 5. This indicates that most respondents actively participate in decision-making processes.About 23.1 per cent of respondents reported a moderate level of involvement (scale point 3), while only a small proportion (3.8 per cent each) reported low involvement (scale points 1 and 2).

The findings suggest that participation in HKS has positively influenced women's decision-making capacity, reflecting its role in promoting women empowerment under decentralized environmental governance in Kochi city.

3.1.22 PERCEPTION OF SAFETY AND RESPECT AMONG HKS MEMBERS

Figure 3.22 Perception of Safety and Respect among HKS Workers



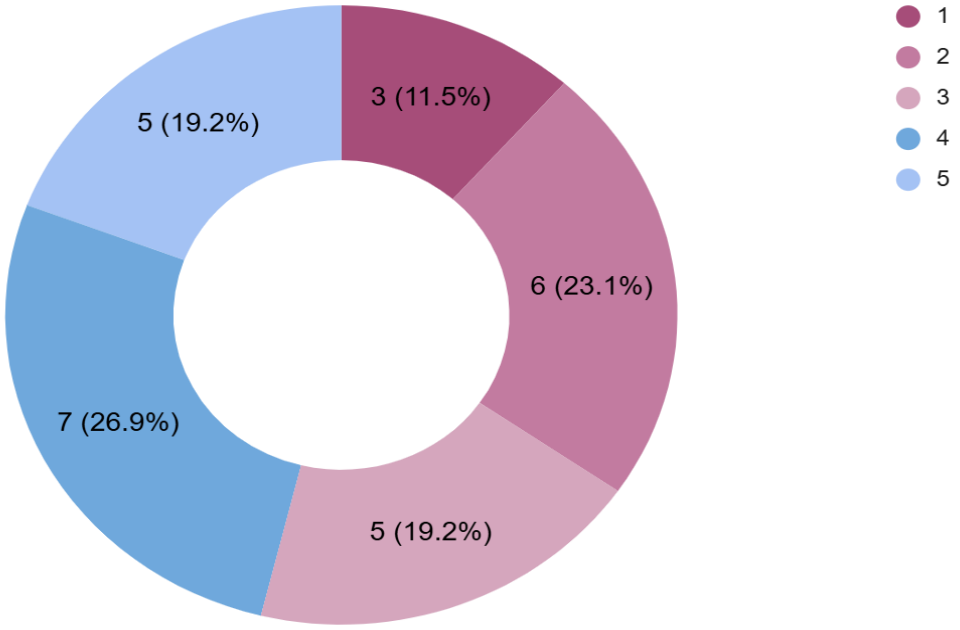
Source – Primary Data

The responses to this question were spread across the five-point scale. The figure shows that 61.5 per cent of HKS (ratings 4 and 5) feels safe and respected at work, indicating a generally positive and supportive work environment under decentralized environmental governance in Kochi. However, 30.8 per cent rated 2 and 7.6 per cent rated 1 and 3, showing that some members still face safety and respect-related challenges.

Overall, while HKS contributes positively to women empowerment and effective governance, the findings highlight the need for improved protection and support mechanisms for all workers.

3.1.23 OPERATIONAL CHALLENGES FACED BY HKS MEMBERS

Figure 3.23 Operational Challenges Faced by HKS Workers



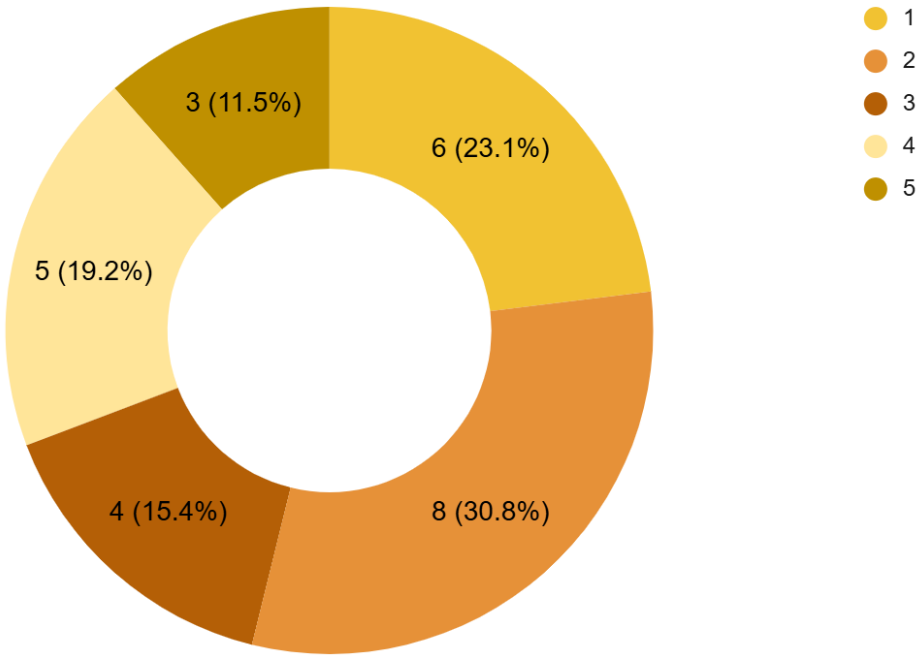
Source – Primary Data

The responses to this question were spread across the five-point scale. Figure 3.1.27 indicates that most HKS members face notable operational challenges such as poor waste segregation, lack of tools, and long working hours. The highest responses are at rating 4 (26.9 per cent) and rating 5 (19.2 per cent), showing high to very high challenges. Moderate challenges are also common (ratings 2 and 3).

Overall, the findings show that operational difficulties significantly affect HKS members, influencing their effectiveness and work conditions under decentralized environmental governance in Kochi city.

3.1.24 ACCESS TO SAFETY GEAR AMONG HKS MEMBERS

Figure 3.24 Access to Safety Gear among HKS Workers



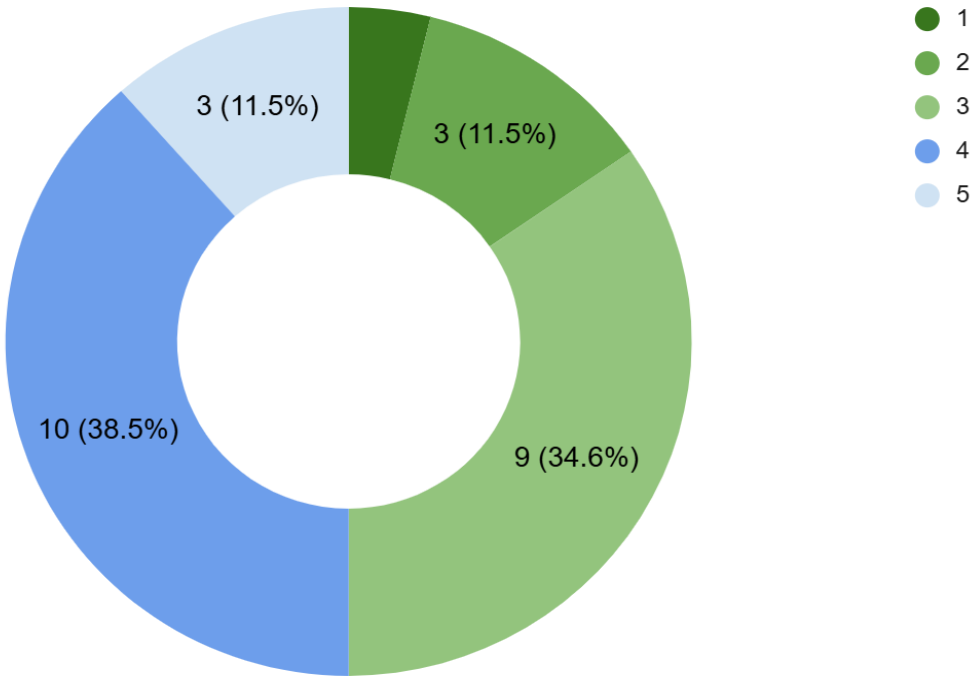
Source – Primary Data

The responses to this question were spread across the five-point scale. The figure shows that access to safety gear among HKS members is uneven. A large share of respondents rated 2 (30.8 per cent) and 1 (23.1 per cent), indicating inadequate access to gloves, masks, and boots. Moderate access is reported by 15.4 per cent (rating 3), while fewer members rated 4 (19.2 per cent) and 5 (11.5 per cent), suggesting adequate to very good access.

Overall, the figure suggests that access to essential safety gear among HKS members is uneven and generally concentrated toward the lower end of the scale. This pattern indicates significant gaps in occupational protection, potentially exposing many members to health and safety risks, while only a smaller group reports adequate or very good access.

3.1.25 SATISFACTION WITH PAY AND COMPENSATION

Figure 3.25 Satisfaction with Pay and Compensation



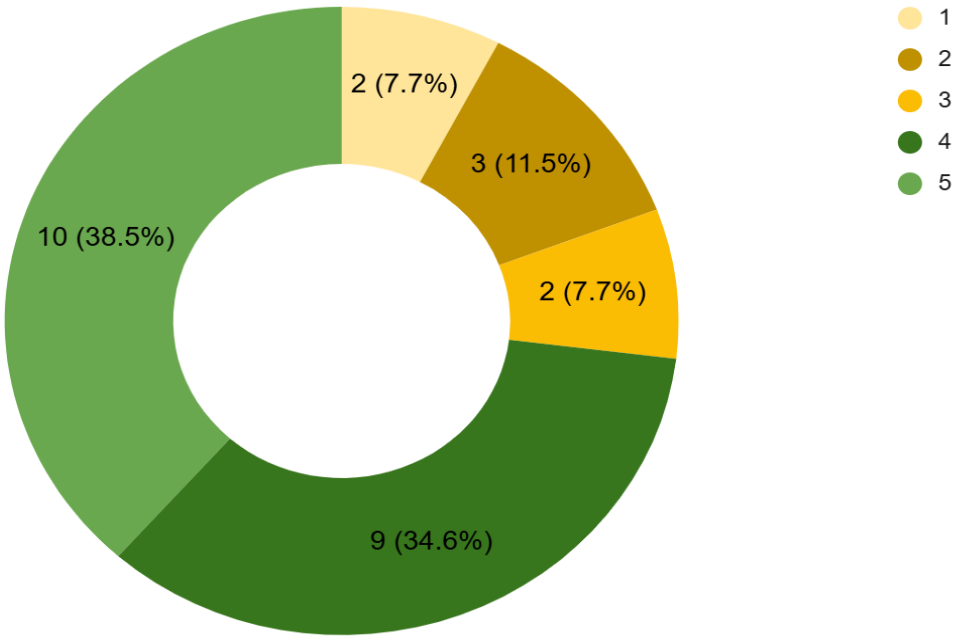
Source - Primary Data

The responses to this question were spread across the five-point scale. The figure shows that 50 per cent of HKS workers are satisfied with their pay, payment regularity, and overtime compensation (ratings 4 and 5), while 34.6 per cent reported moderate satisfaction (rating 3). However, 15.3 per cent expressed dissatisfaction (ratings 1 and 2).

This indicates that although the payment system is fairly effective, issues of adequacy and regularity remain challenges. Addressing these concerns is important for improving women's economic empowerment and the overall effectiveness of Haritha Karma Sena under decentralized environmental governance in Kochi city.

3.1.26 HEALTH ISSUES EXPERIENCED BY HKS WORKERS

Figure 3.26 Health issues Experienced by HKS Workers



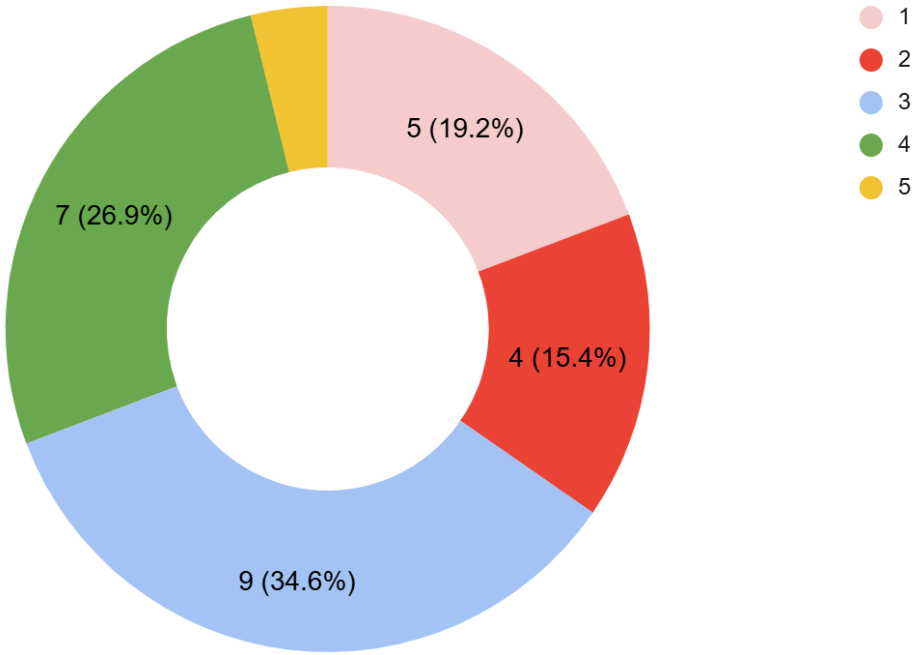
Source - Primary Data

The responses to this question were spread across the five-point scale. The figure shows the extent of health problems faced by Haritha Karma Sena (HKS) workers: 38.5 per cent reported frequent issues (rating 5), 34.6 per cent often (rating 4), 7.7 per cent sometimes (rating 3), 11.5 per cent rarely (rating 2), and 7.7 per cent never (rating 1).

Overall, the figure indicates that health problems are common among HKS workers, with a majority reporting frequent or frequent occurrences. This suggests that the nature of their work may pose significant health risks, while only a small proportion experience such problems rarely or not at all.

3.1.27 AWARENESS OF GOVERNMENT OR INSTITUTIONAL SUPPORT

Figure 3.27 Awareness of Government or Institutional Support



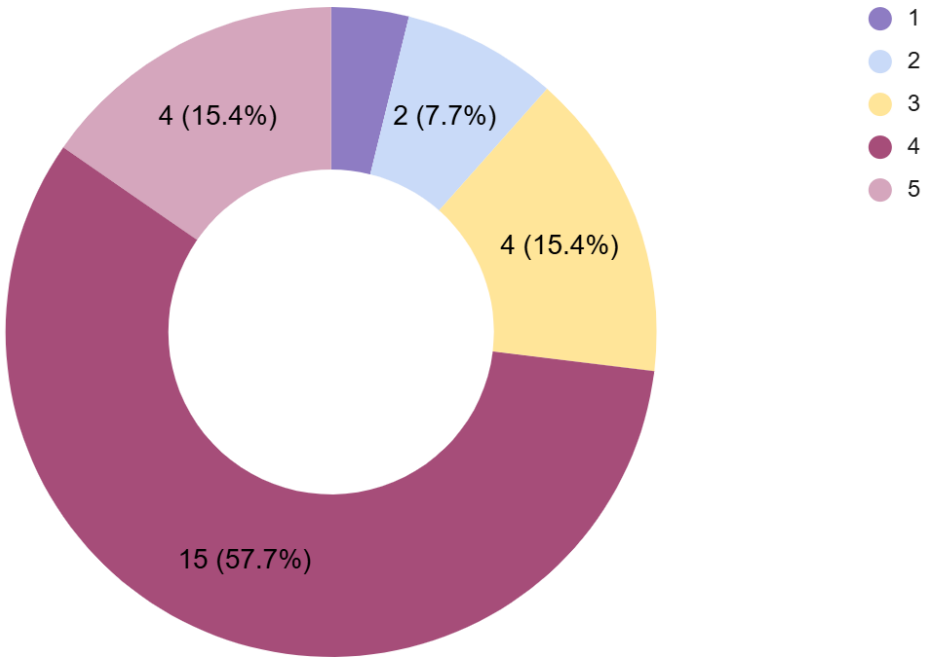
Source - Primary Data

The figure shows HKS workers' awareness of government or institutional support, such as health insurance or financial assistance, rated on a scale of 1 to 5. The results indicate: 34.6 per cent of respondents are moderately aware (rating 3), 26.9 per cent fairly aware (rating 4), 19.2 per cent have low awareness (rating 1), 15.4 per cent slightly aware (rating 2), and only 3.8 per cent are fully aware (rating 5).

This suggests that a significant portion of HKS workers lack sufficient knowledge about available support programs, which can limit their access to benefits. Enhancing information dissemination and awareness campaigns is essential to improve worker welfare, strengthen women's empowerment, and increase the overall effectiveness of HKS under decentralized environmental governance in Kochi city.

3.1.28 SUPPORT FROM SUPERVISORS AND LOCAL AUTHORITIES

Figure 3.28 Support from Supervisors and Local Authorities



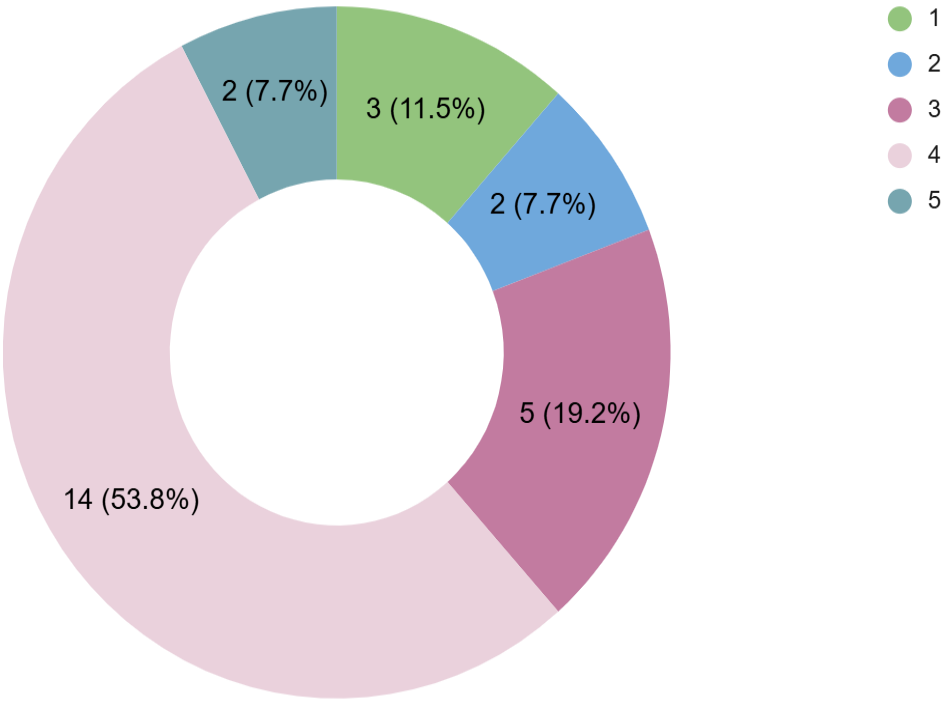
Source – Primary Data

The figure shows HKS workers' perception of support from supervisors and local authorities in their daily work, rated on a scale of 1 to 5. The results indicate that the majority, 57.7per cent, feel fairly supported (rating 4), while 15.4 per cent feel fully supported (rating 5). 15.4 per cent reported moderate support (rating 3), and smaller percentages felt little or no support (7.7 per cent rating 2, 3.8 per cent rating 1).

Overall, the figure suggests that most HKS workers perceive a generally positive level of support from supervisors and local authorities. While strong support is reported by a large share of respondents, the presence of some workers experiencing limited or no support indicates room for improvement in ensuring consistent support across all members.

3.1.29 RESPECT, SAFETY AND PUBLIC SUPPORT FOR HKS WORKERS

Figure 3.29 Respect, Safety and Public Support for HKS Workers



Source – Primary Data

The figure shows how HKS workers perceive respect, safety, and support from the public while performing their duties, rated on a scale of 1 to 5. The results indicate that the majority, 53.8 per cent, feel respected and supported (rating 4), while 7.7 per cent feel fully supported (rating 5). 19.2 per cent reported moderate support (rating 3), and smaller percentages felt little or no support (11.5 per cent rating 1, 7.7 per cent rating 2). Overall, the figure suggests that most HKS workers experience a reasonably positive level of respect, safety, and support from the public.

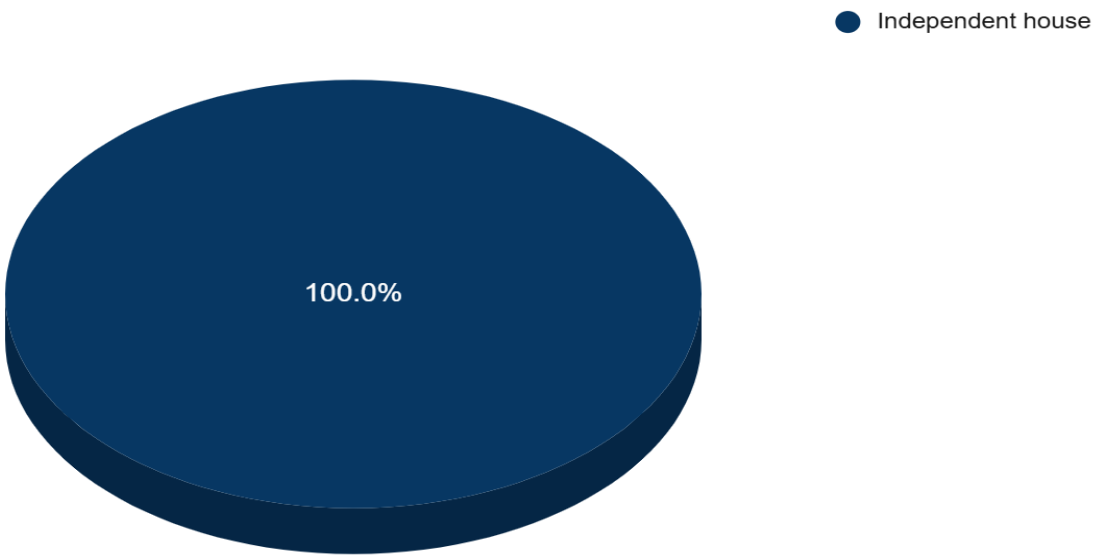
However, the presence of respondents reporting low or no support indicates that negative public interactions persist for some workers, highlighting the need for greater public awareness and sensitivity toward their role.

3.2 DEMAND SIDE : BENEFICIARIES

The beneficiary-side analysis examines the role of households in the success of HKS initiatives, focusing on their awareness, participation, and waste management practices. Primary data were collected from 36 respondents from across Kerala through a Google Form survey to assess awareness of HKS, utilization of its services, satisfaction levels, and challenges faced in following recommended waste management practices. The data were collected on an all-Kerala basis to capture diverse household experiences and to gain a broader understanding of how HKS initiatives function across different local contexts. The analysis highlights beneficiary acceptance, expectations, and areas where service delivery and community engagement can be improved.

3.2.1 TYPE OF RESIDENCE OF RESPONDENTS

Figure 3.30 - Type of Residence of Respondents



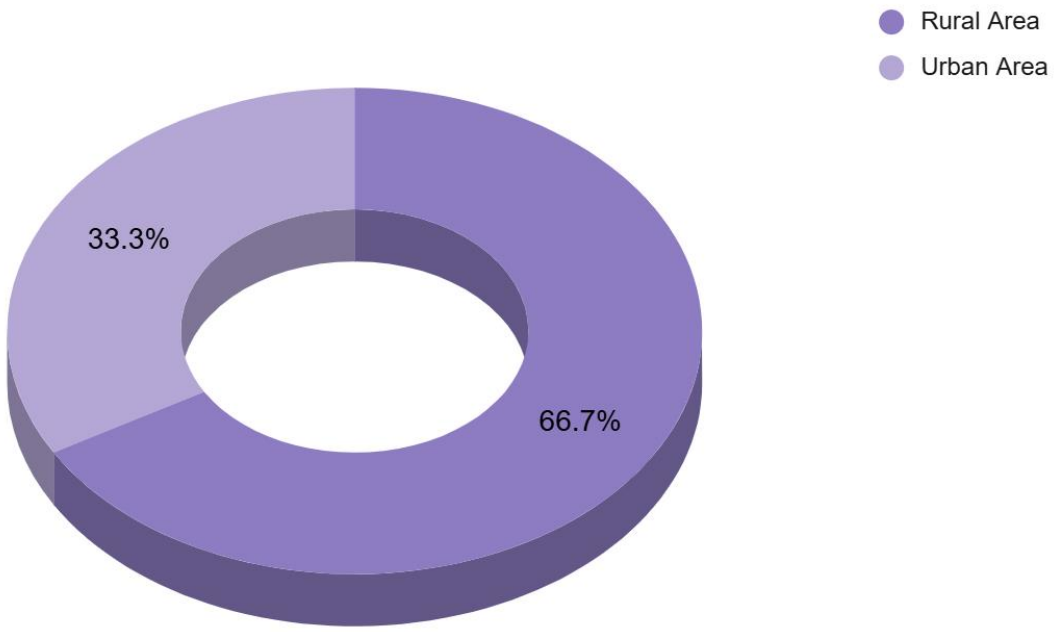
Source - Primary Data

The data reveal that 100 per cent of the respondents lived in independent houses. There were no respondents from apartments or commercial establishments or other institutions..

The high share of independent houses is mainly because most of the respondents who participated in the survey were from independent households.

3.2.2 AREA OF WASTE COLLECTION

Figure 3.31 - Area of Waste Collection



Source – Primary Data

The figure shows that 66.7 per cent of waste collection under HKS is from rural areas, while 33.3 per cent is from urban areas. This indicates a higher representation of rural areas in the study.

3.2.3 - TYPE OF WASTE GENERATED PER MONTH - WEIGHTED AVERAGE RANK METHOD

To analyse the type of waste generated by households on a monthly basis, the Weighted Average Rank Method was used. This method helps in identifying the relative frequency and importance of different categories of household waste by assigning numerical weights to ranks provided by respondents. A higher weighted score indicates a higher level of waste generation.

METHOD OF CALCULATION

Respondents ranked different types of household waste from least priority (R1) to highest priority (R6) based on their monthly generation. Each rank was assigned a specific weight, and the weighted score for each waste category was calculated to determine its final rank.

FORMULA USED

Weighted Score = $\sum (f_i \times w_i)$

Where:

f_i = frequency of responses under each rank

w_i = weight assigned to each rank

Table 3.1- Final Weighted Ranking of Monthly Waste Generation

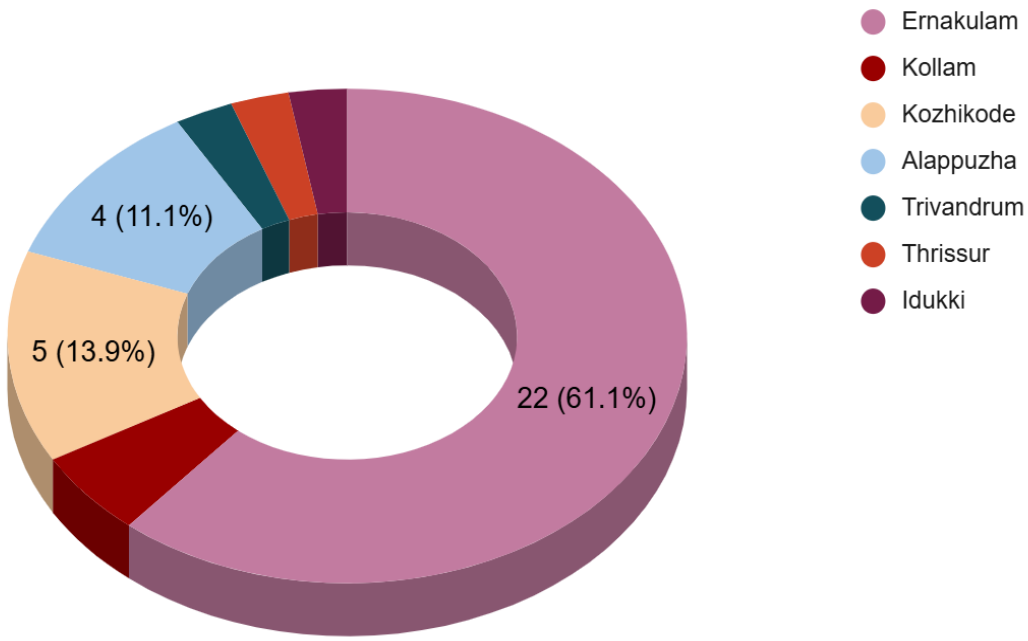
TYPE OF WASTE	WEIGHTED SCORE	RANK
Dry Recyclable Waste	123	1
Food Waste	112	2
Sanitary Waste	82	3
E Waste	69	4
Bulky Waste (Furniture etc	61	5
Hazardous Waste	58	6

The weighted ranking analysis reveals that dry recyclable waste is the most frequently generated type of waste on a monthly basis, followed by food waste, indicating the dominance of recyclable and biodegradable waste streams in households. Sanitary waste ranks third, reflecting moderate generation levels. E-waste, bulky waste, and hazardous waste occupy the lower ranks, suggesting that they are generated less frequently and mainly on an occasional basis. However, despite their lower frequency, hazardous and bulky wastes require specialised handling due to their potential environmental and health impacts.

The analysis shows that household waste generation is largely composed of recyclable and biodegradable materials, supporting the relevance of decentralised waste management systems. Effective segregation and focused management of high-priority waste categories can further improve the efficiency and sustainability of household waste management practices

3.2.4 -PLACE OF RESIDENCE OF RESPONDENTS

Figure 3.32 - Place of Residence of Respondents



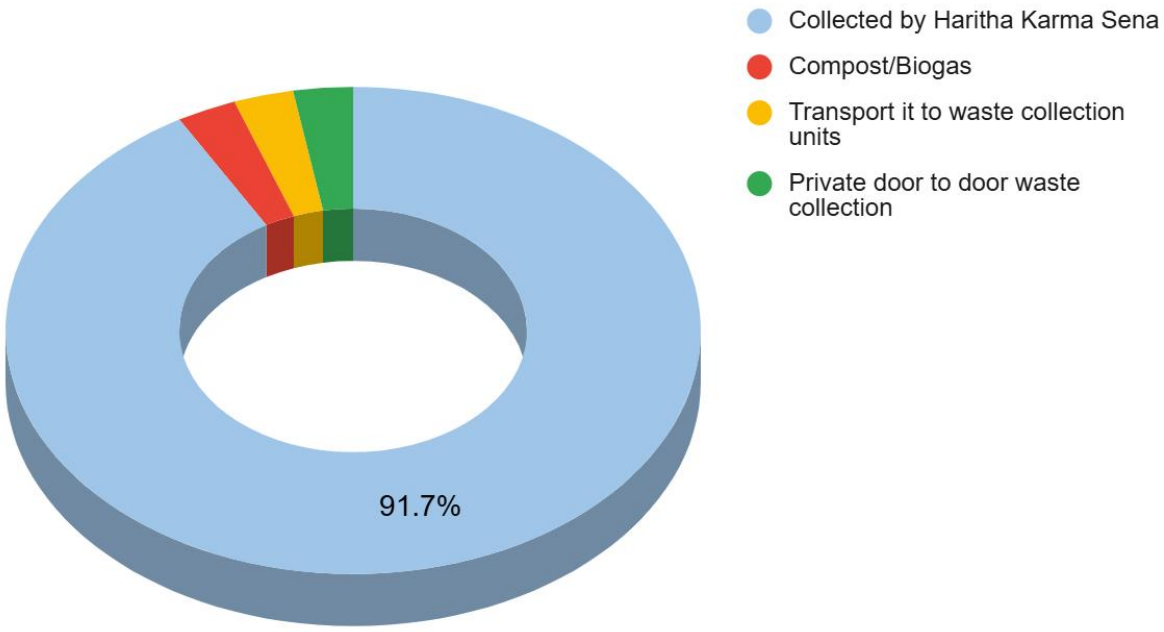
Source – Primary Data

The figure illustrates the place of residence of the respondents included in the study. Among the respondents, the majority (22) are from Ernakulam, while 5 are from Kozhikode, 4 from Alappuzha, and a few from Kollam, Idukki, Thrissur, and Trivandrum.

It shows that the respondents come from various locations within the study area, reflecting a diverse geographical distribution.

3.2.5 -METHODS OF HOUSEHOLD WASTE MANAGEMENT

Figure 3.33 - Methods of Household Waste Management

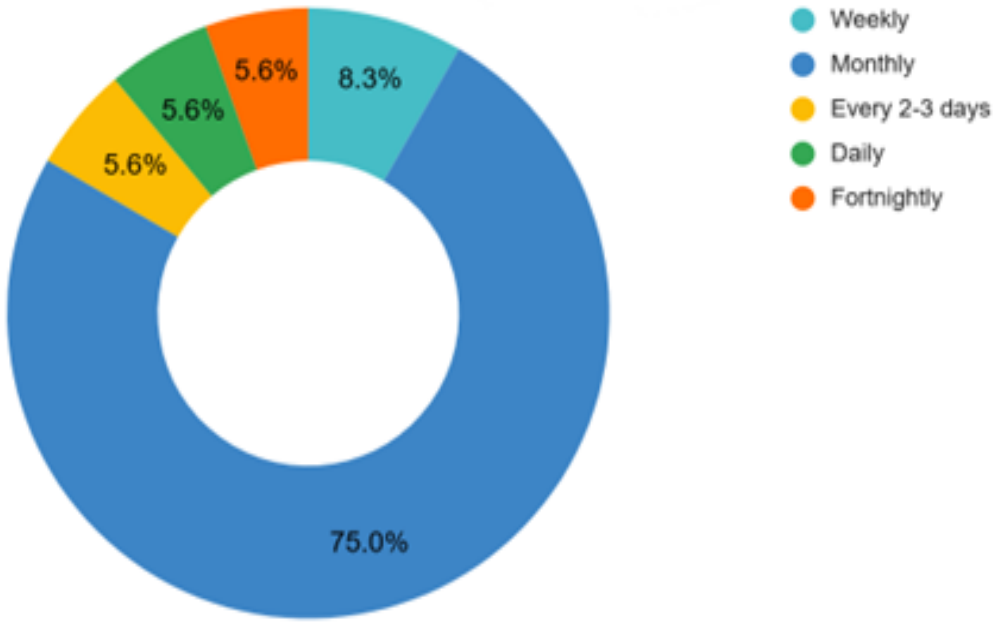


Source – Primary data

The figure shows that the vast majority of households (91.7%) rely on HKS for waste collection, highlighting its critical importance in household waste management. HKS serves as the primary and most accessible system for regular waste removal, ensuring cleanliness, convenience, and proper disposal at the household level. In contrast, only a small proportion of respondents use alternative methods such as composting or biogas, transporting waste to collection units, or private door-to-door services, indicating limited adoption of these practices compared to HKS.

3.2.6 -FREQUENCY OF HOUSEHOLD WASTE COLLECTION

Figure 3.34 - Frequency of Household Waste Collection



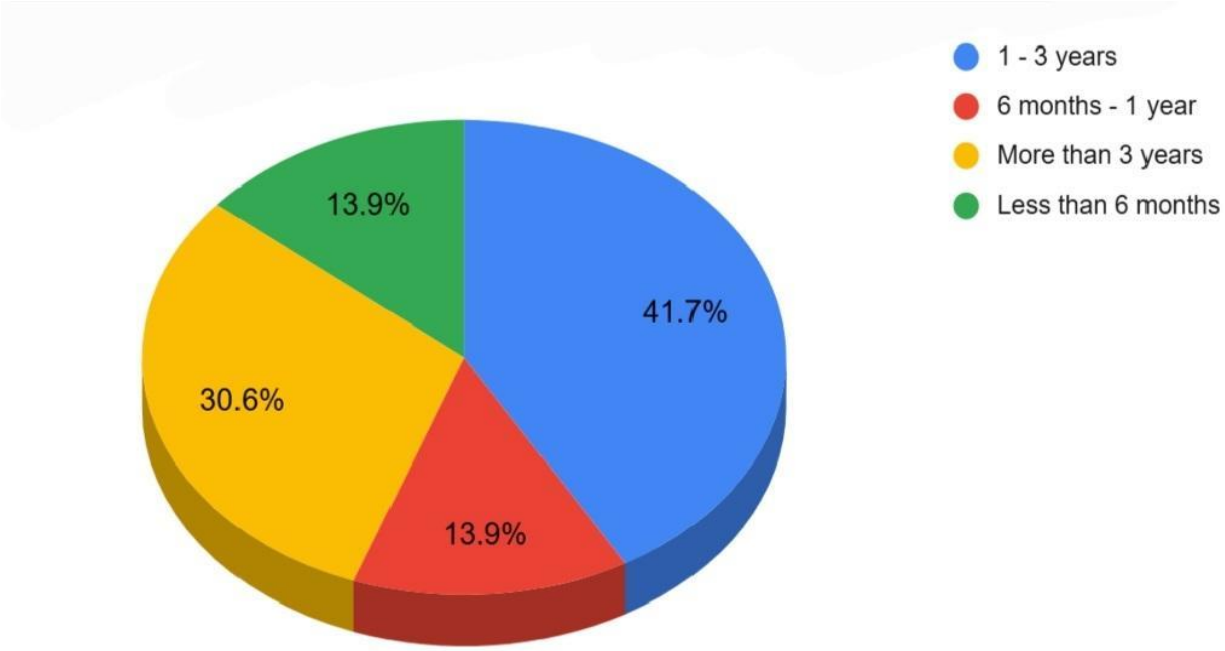
Source – Primary Data

The figure shows the frequency of household waste collection under the HKS waste management system. It indicates that 75 per cent of households receive waste collection monthly, representing the majority of respondents in the study area.

Only a small proportion of households reported more frequent waste collection such as daily, every 2-3 days, weekly, or fortnightly. Overall, this pattern indicates that the HKS system operates mainly on a monthly basis.

3.2.7 -DURATION OF WASTE MANAGEMENT SERVICES

Figure 3.35 - Duration of Waste Management Services

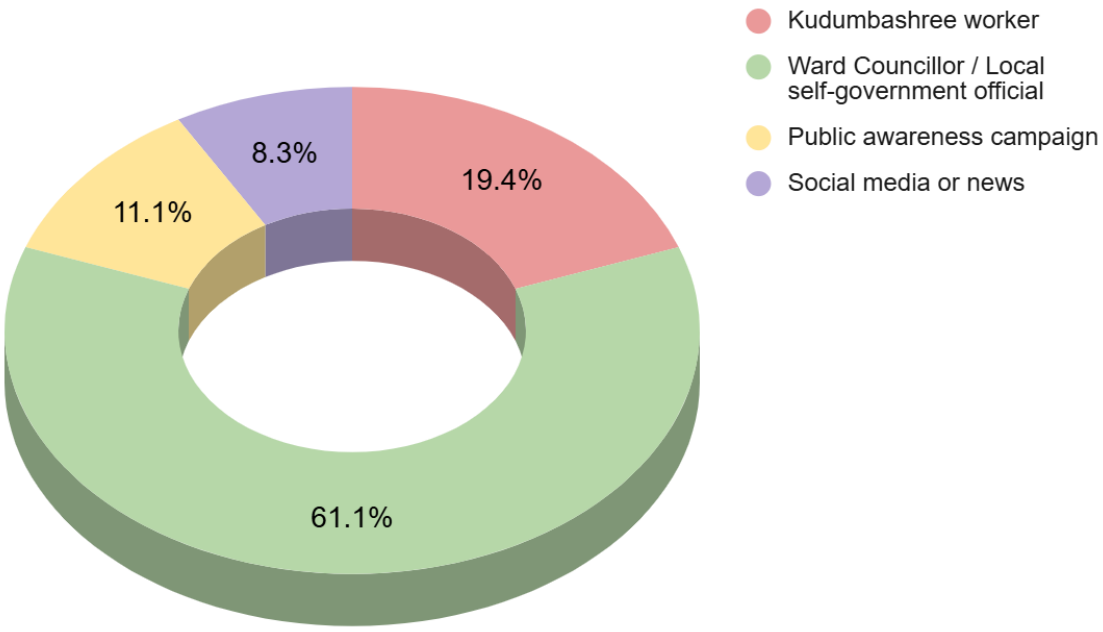


Source-Primary Data

The figure presents the duration for which households have been receiving waste management services from HKS. It shows that the largest proportion of respondents (41.7 per cent) have been receiving services for 1-3 years, indicating sustained engagement with the HKS system. About 30.6 per cent of households reported receiving services for more than 3 years, while smaller proportions (13.9 per cent each) have been availing services for less than 6 months and 6 months to 1 year.

3.2.8 - SOURCE OF AWARENESS ABOUT HARITHA KARMA SENA

Figure 3.36 - Source of Awareness about Haritha Karma Sena



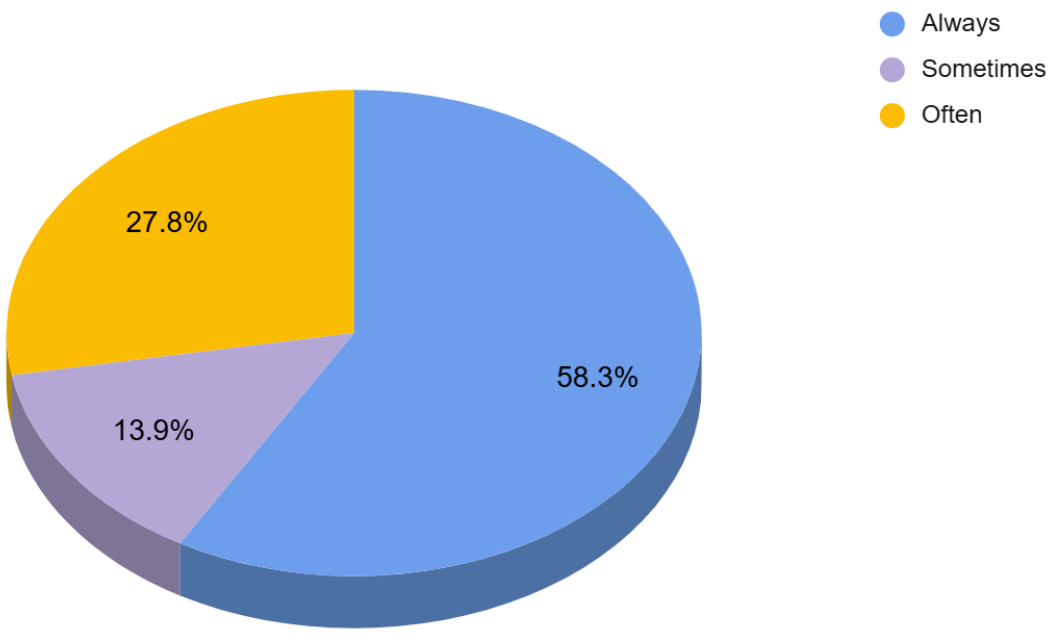
Source-Primary Data

The figure shows how respondents came to know about HKS. It indicates that the majority of respondents (61.1 per cent) became aware of HKS through Ward Councillors or local self-government officials, highlighting the important role of local institutions in spreading awareness. About 19.4 per cent of respondents learned about HKS through Kudumbashree workers, while 11.1 per cent cited public awareness campaigns and only 8.3 per cent mentioned social media or news.

This pattern suggests that direct communication through local governance and community workers is the primary method of outreach, reflecting the effectiveness of personal and institutional networks in disseminating information about HKS.

3.2.9 -PUNCTUALITY AND CONSISTENCY OF WASTE COLLECTION SERVICES

Figure 3.37 - Punctuality and Consistency of Waste Collection Services



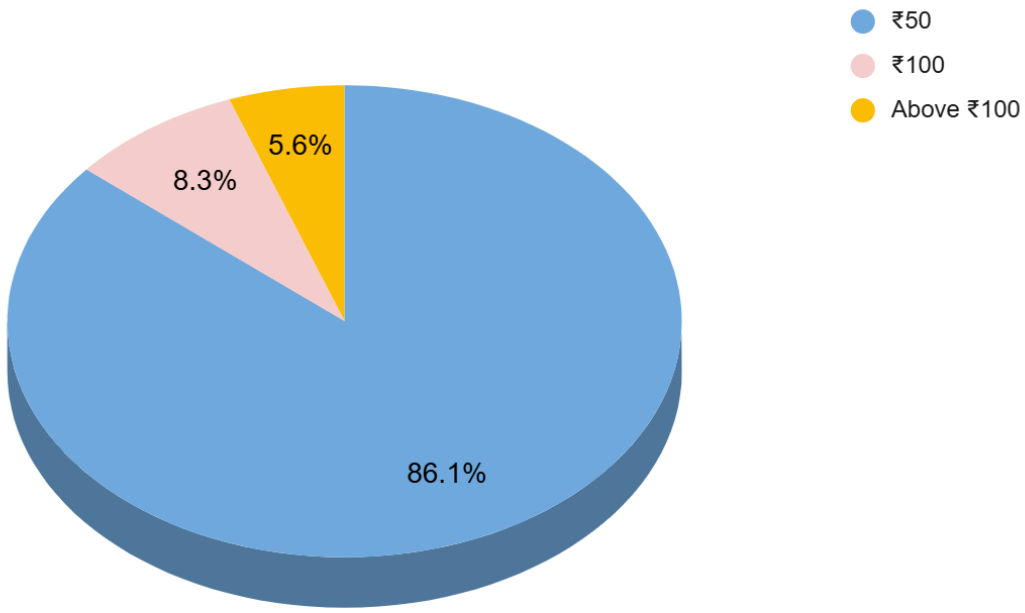
Source-Primary Data

The figure shows the responses regarding the punctuality and consistency of waste collection services provided by HKS. This indicates that a majority of respondents (58.3 per cent) stated that waste collectors are always punctual and consistent in their service. About 27.8 per cent reported that the service is often punctual, while 13.9 per cent stated that it is sometimes punctual. None of the respondents reported that the service is rarely punctual.

This distribution suggests that most households are generally satisfied with the punctuality and regularity of HKS waste collection services, reflecting the reliability and efficiency of the system in meeting local waste management needs. The results also indicate a high level of trust in the operational performance of HKS among the surveyed households.

3.2.10 -MONTHLY PAYMENT FOR WASTE COLLECTION SERVICES

Figure 3.38 - Monthly Payment for Waste Collection Services

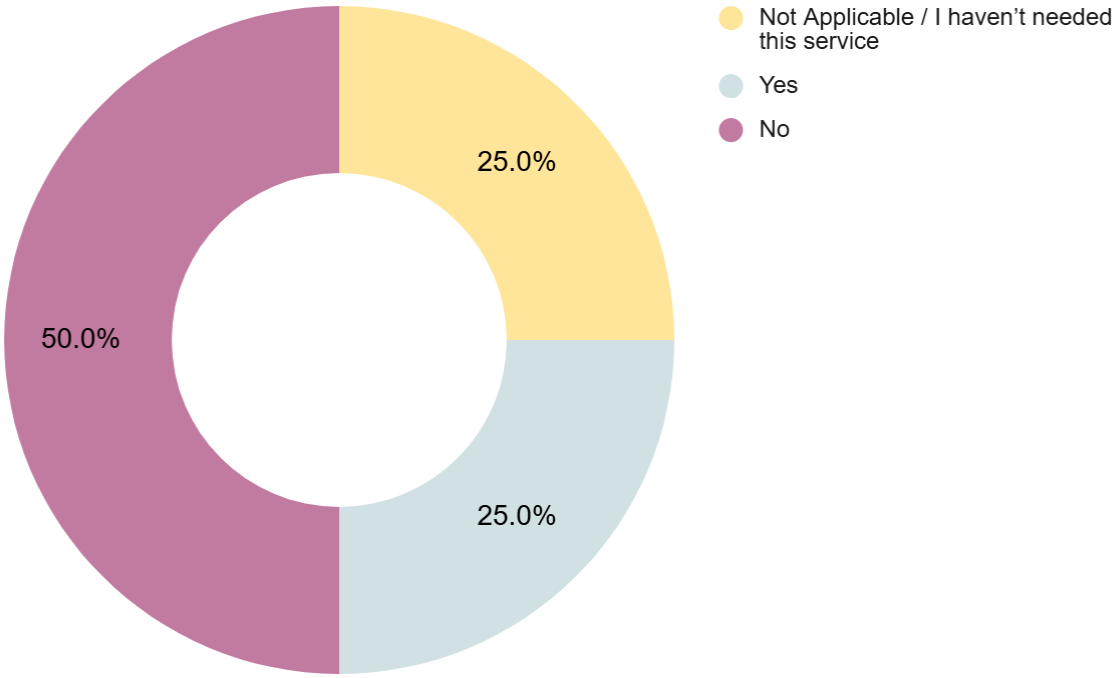


Source-Primary Data

The figure presents the amount paid by households for waste collection services provided by HKS. It shows that a large majority of respondents (86.1 per cent) pay ₹50 per month for the service. A small proportion of households reported paying below ₹50, ₹100, or above ₹100 per month. This indicates that the service charges are generally affordable and standardized for most households. The data suggest that the cost of waste collection services under HKS is reasonable, which may encourage wider participation and continued use of the service.

3.2.11 EXTRA FEE FOR ADDITIONAL WASTE COLLECTION

Figure 3.39 - Extra Fee for Additional Waste Collection



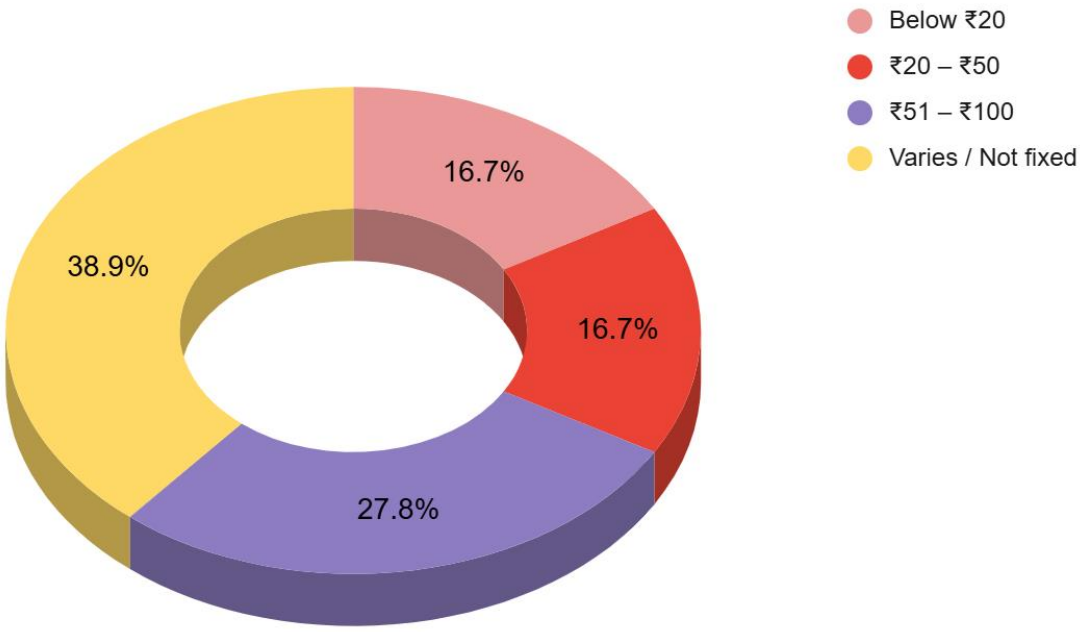
Source-Primary Data

The figure shows whether households pay an extra fee when HKS collects waste beyond the regular amount. It indicates that 50 per cent of respondents stated that they do not pay any extra fee for additional waste collection. About 25 per cent of respondents reported that they pay an extra fee, while another 25 per cent stated that this situation is not applicable, as they have not required additional waste collection services.

Overall, the figure suggests that extra charges are not commonly imposed on households, and additional waste collection is either free or not frequently needed by most respondents

3.2.12 -AMOUNT PAID FOR EXTRA WASTE COLLECTION

Figure 3.40 - Amount Paid for Extra Waste Collection



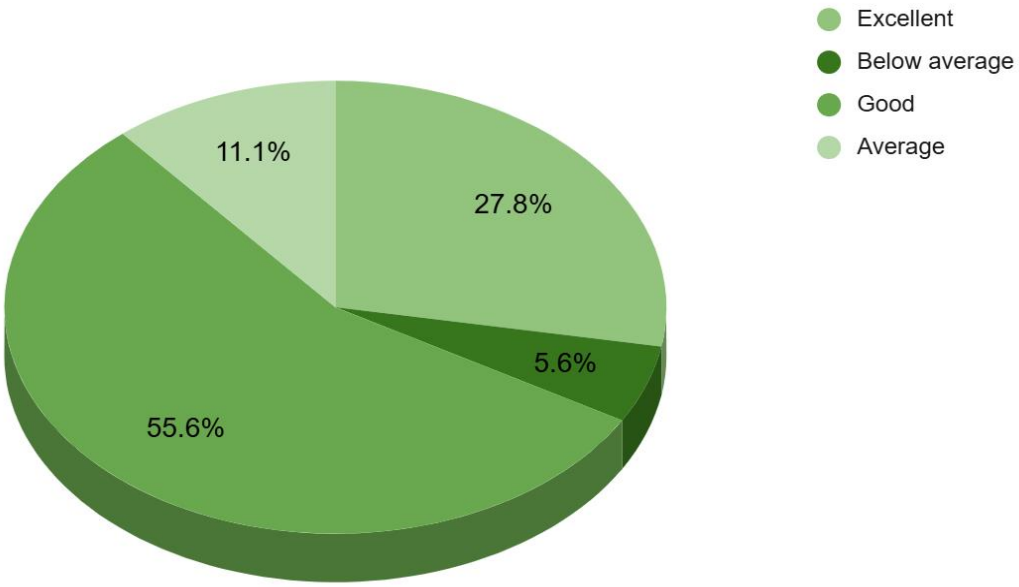
Source – Primary Data

The figure presents the amount usually paid by households for extra waste collection services. It shows that the largest proportion of respondents (38.9 per cent) reported that the extra fee varies and is not fixed. About 27.8 per cent of respondents pay between ₹51 and ₹100, while 16.7 per cent each pay below ₹20 or ₹20-₹50. None of the respondents reported paying more than ₹100 for extra collection.

This indicates that the extra charges for waste collection are generally moderate and flexible, depending on the quantity of waste generated. The variable fee structure may encourage households to continue using additional services when needed.

3.2.13 - RATING FOR THE WORK DONE BY HKS WORKERS

Figure 3.41 - Rating for the Work Done by HKS Workers



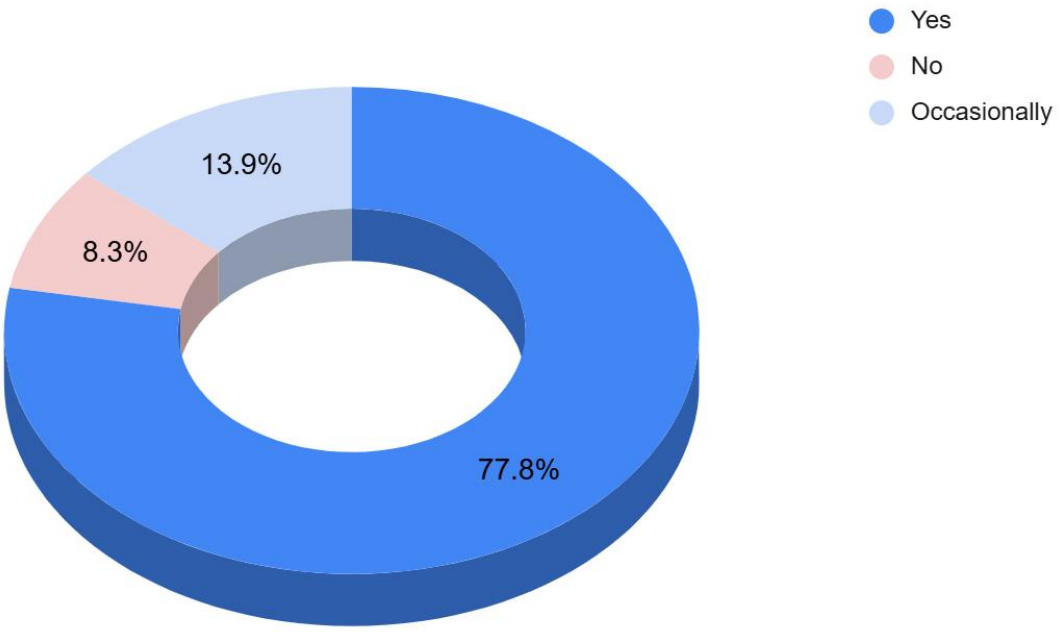
Source - Primary data

The figure shows a rating for the work done by HKS workers. About 27.8 per cent of respondents rated the work as excellent, 55.6 per cent as good, 11.1 per cent as average, and 5.5 per cent as below average. None of the respondents rated the work poor.

The ratings suggest that the majority of respondents perceive the work of HKS workers as efficient and satisfactory, reflecting the growing effectiveness and professionalism of the workforce. It also indicates increased public confidence and participation in the waste management system.

3.2.14 - APPROACH OF HKS WORKERS TOWARDS SEGREGATION WASTE AT THE SOURCE

Figure 3.42 - Approach of HKS Workers towards Segregation of Waste at Source



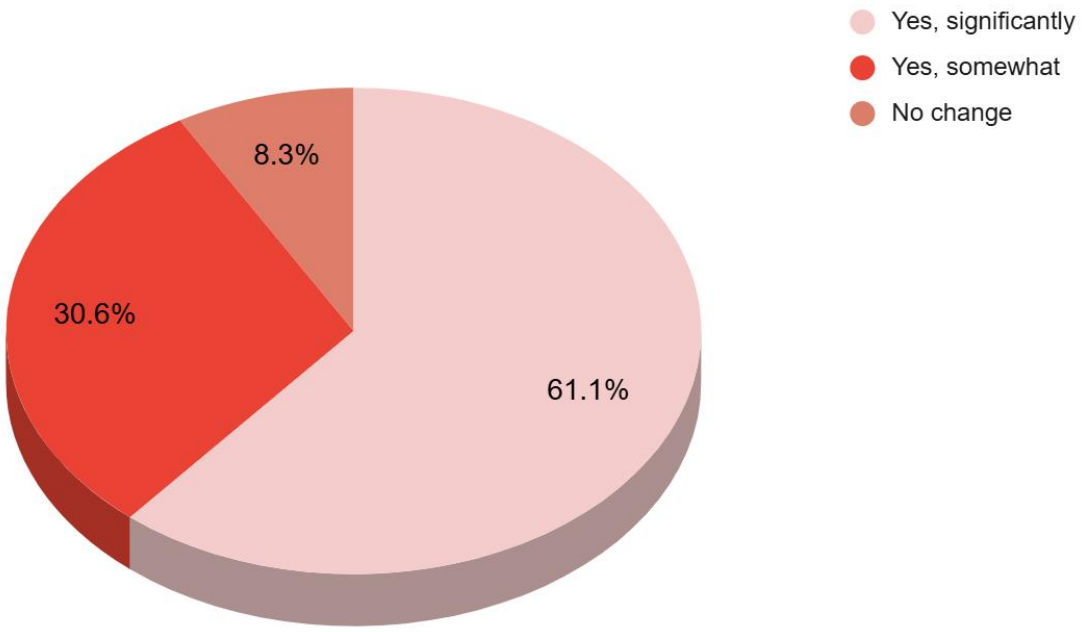
Source - Primary data

The figure depicts responses about how HKS workers encourage waste segregation at the source. About 77.8 per cent of respondents stated that workers consistently encourage segregation, 13.9 per cent reported occasional encouragement, and 8.3 per cent said workers did not encourage segregation.

This shows that HKS workers take an active role in promoting waste segregation, which has led to greater public participation and compliance with proper waste management practices at the household level.

3.2.15 - PUBLIC OPINION ABOUT WASTE MANAGEMENT AFTER THE INTRODUCTION OF HKS

Figure 3.43 - Public Opinion about Waste Management after the Introduction of HKS



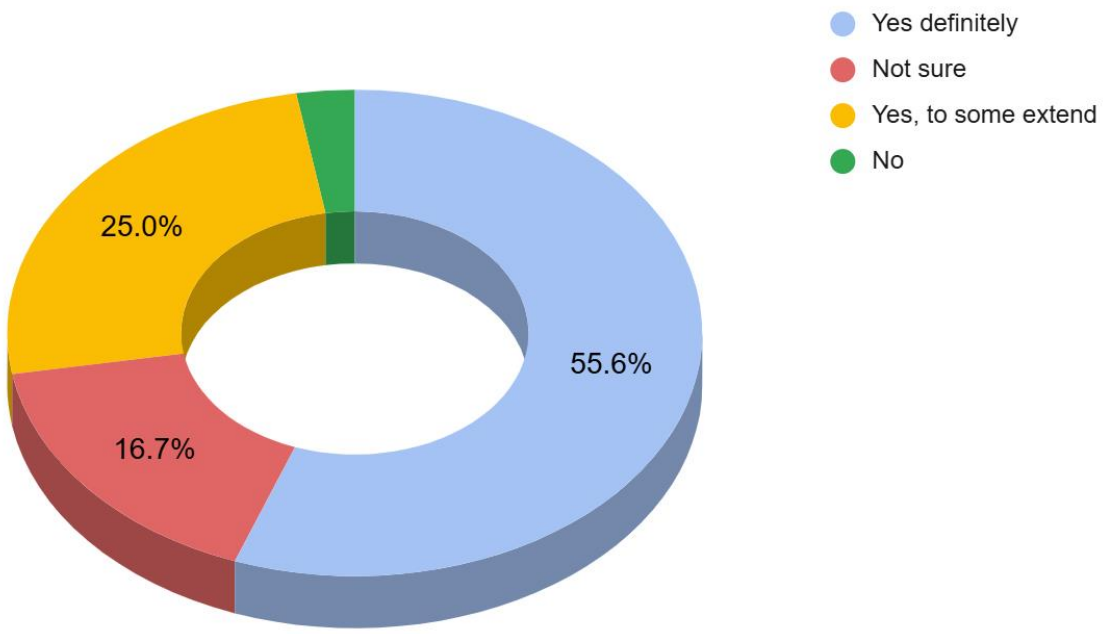
Source - Primary data

The figure shows that 61.1 per cent of respondents perceived a significant improvement in waste management; 30.6 per cent observed a slight improvement, and 8.3 per cent saw no change after HKS was introduced. None reported any deterioration.

The responses indicate clear evidence of improved waste management following HKS implementation, reflecting the efficiency of HKS workers and the positive impact of community-based waste management in local areas.

3.2.16 - EFFECTIVENESS OF WASTE MANAGEMENT THROUGH HKS

Figure 3.44 - Effectiveness of Waste Management through HKS



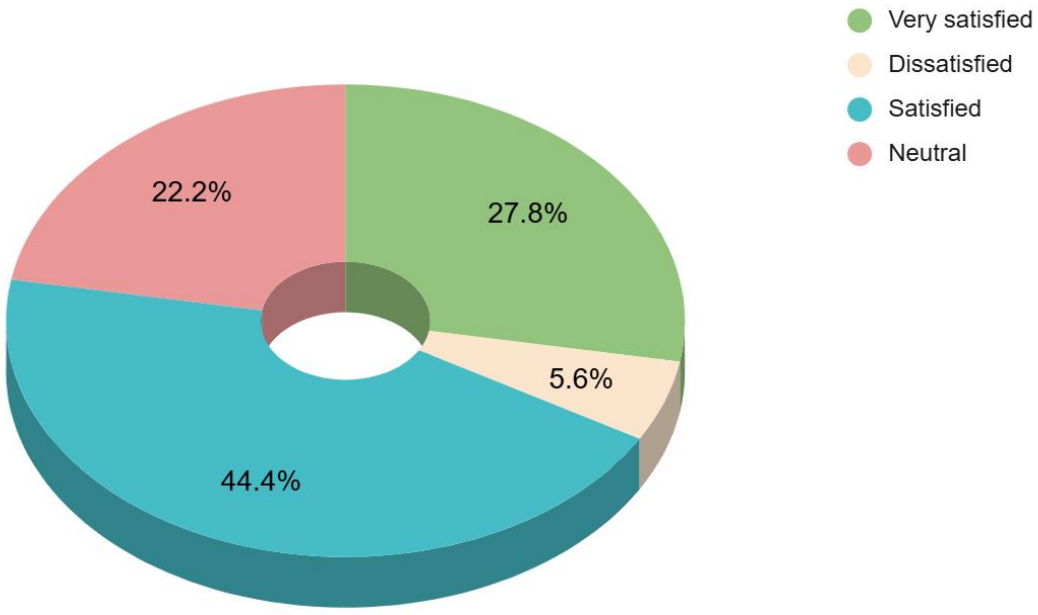
Source: Primary data

The figure shows consumer opinions on decentralized vs centralized waste management. About 55.6 per cent strongly agreed that decentralized systems like HKS are more effective, 25 per cent agreed to some extent, 16.7 per cent were unsure, and 2.7 per cent disagreed.

The results suggest that the majority of respondents prefer decentralized waste management, indicating high public acceptance and trust in local bodies like HKS to manage household waste effectively.

3.2.17 - SATISFACTION OF RESPONDENTS ABOUT THE ENVIRONMENT CLEANLINESS AFTER IMPLEMENTATION OF HKS

Figure 3.45 - Satisfaction of Respondents with Environmental Cleanliness after Implementation of HKS



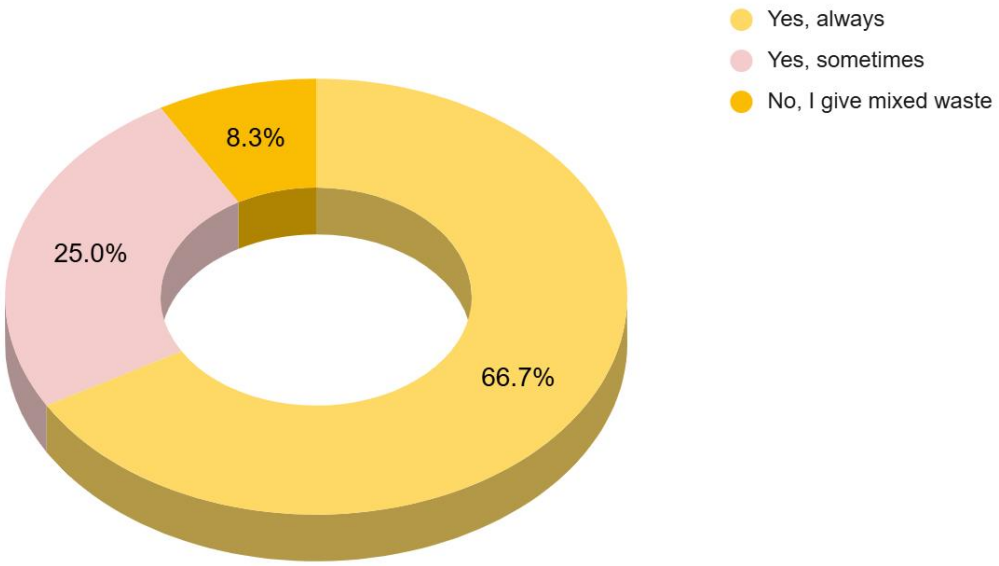
Source - Primary Data

The figure illustrates respondents' satisfaction regarding environmental cleanliness after HKS implementation. About 27.8 per cent were very satisfied, 44.4 per cent were satisfied, 22.2 per cent were neutral, and 5.6 per cent were not satisfied.

This shows that most respondents are satisfied with the cleanliness and hygiene improvements resulting from HKS, while a small proportion indicates areas that may require further improvement to enhance service quality.

3.2.18 - SEGREGATION OF HOUSEHOLD WASTE AT THE SOURCE

Figure 3.46 - Segregation of Household Waste at Source



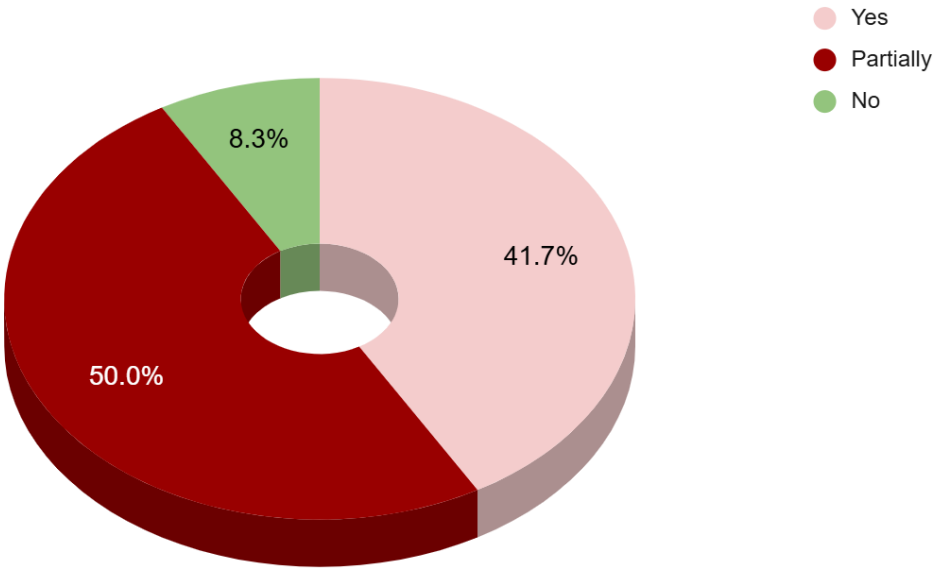
Source - Primary data

The figure shows that 66.7 per cent of respondents segregate waste before handing it to HKS workers, 25 per cent do so occasionally, and 8.3 per cent provide mixed waste.

This suggests that most households follow proper segregation practices, which can enhance the productivity and efficiency of HKS operations. However, the presence of mixed waste from some households highlights the need for continued awareness and guidance.

3.2.19 - RESPONDENT'S OPINION ABOUT PUBLIC PARTICIPATION

Figure 3.47 - Respondent's Opinion on Public Participation



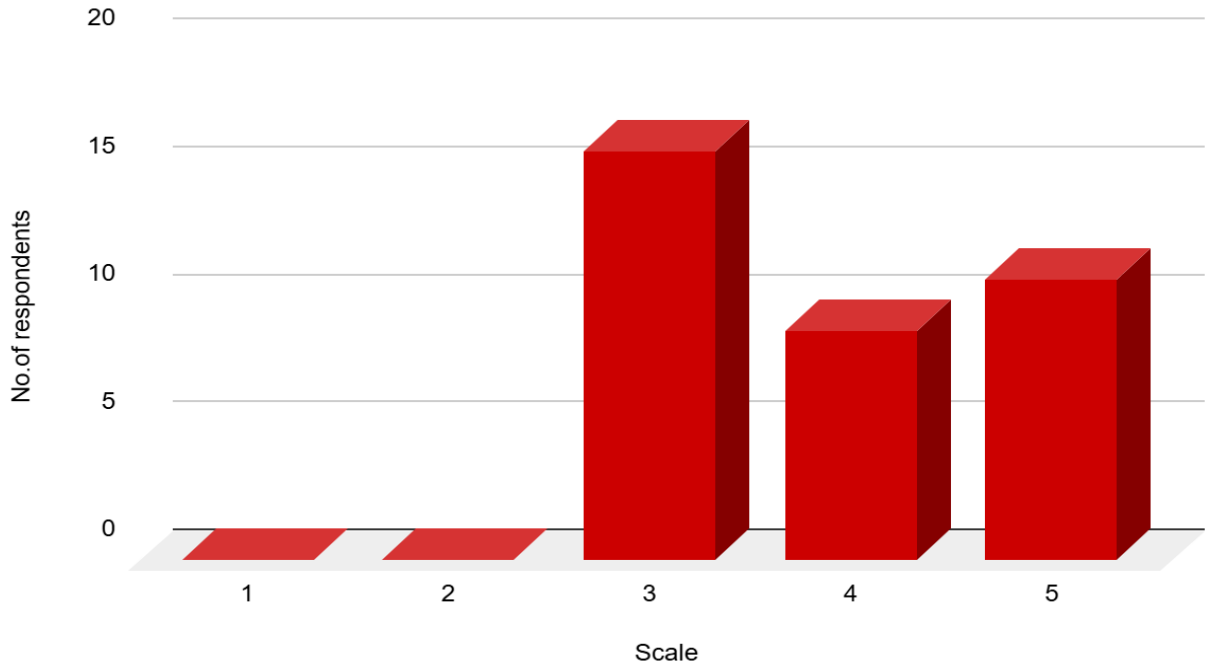
Source - Primary data

The figure shows respondents' opinions on public participation in waste segregation and support for HKS workers. About 41.7 per cent of respondents stated that the public is very cooperative, 50 per cent partially agreed, and 8.3 per cent felt the public is not cooperative.

The responses suggest that public participation is moderate, with room for improvement. Increasing awareness and encouraging cooperation at the household level can enhance the efficiency of HKS operations and promote better community involvement.

3.2.20 - OVERALL RATING FOR HARITHA KARMA SENA

Figure 3.48 - Overall Rating for Haritha Karma Sena



Source - Primary data

The figure shows the overall rating of HKS on a scale of 1 to 5 based on 36 responses. Most respondents rated it 3, while a considerable number rated it 4, and a slightly smaller group rated it 5. No respondents gave HKS a rating below 3.

The responses suggest that HKS is generally perceived as effective and reliable, with ratings ranging from good to excellent. While overall feedback is positive, it also highlights that some challenges remain, which can be addressed through policy improvements and operational refinements.

CHAPTER 4

FINDINGS, SUGGESTIONS AND CONCLUSION

4.1 FINDINGS

The findings of this study bring out the everyday realities of the functions of the Haritha Karma Sena at the ground level. They reflect not only the improvements made in cleanliness and waste management, but also the challenges faced by the women who carry out this work and the communities that depend on them. By drawing on the experiences of workers and residents, the findings offer a balanced picture of the environmental impact of HKS, its role in women's empowerment, and the areas where stronger support and cooperation are still needed.

- **Effectiveness of Haritha Karma Sena in Waste Management**

  The study finds that Haritha Karma Sena plays a key role in decentralised waste management through door-to-door collection, waste segregation and awareness activities. Most respondents reported visible improvements in neighbourhood cleanliness after the introduction of HKS services, indicating that the programme has been effective in improving local environmental conditions.

- **Increase in Public Awareness on Waste Management**

  Data reveal that public awareness regarding proper waste disposal and segregation has increased due to the regular interaction of HKS workers with households. Awareness activities conducted by workers have encouraged responsible waste practices at the community level.

- **Inadequate Segregation at Source**

  Despite improvements in cleanliness, proper segregation at the household level remains weak. Many households continue to hand over mixed waste, which increases the workload of HKS workers and reduces operational efficiency.

- **Increased Workload and Occupational Health Risks**

  Due to poor source-level segregation, HKS workers are often required to segregate waste themselves. This leads to physical strain and exposure to health problems such as fatigue,

skin allergies and respiratory issues, highlighting the occupational risks associated with the work.

- **Insufficient Safety Equipment and Training**

  The findings show inconsistent access to protective equipment such as gloves, masks and boots. Although basic training is provided at the time of joining, opportunities for continuous training and skill development are limited, restricting improvements in efficiency and income potential.

- **Positive Impact on Women's Economic Empowerment**

  The study finds that HKS has provided women workers with regular and stable income compared to their previous employment. Most workers reported greater control over their earnings and increased participation in household decision-making.

- **Improvement in Social Recognition and Dignity**

  Women workers experienced improved social recognition within the community, which enhanced their confidence and sense of dignity. This indicates that HKS has contributed to women's social empowerment in addition to economic benefits.

- **Limited Income Growth**

  Despite income stability, earnings remain within lower income brackets. This limits broader economic advancement and indicates the need for better wage structures and income-enhancing opportunities.

- **Inadequate Workplace Facilities and Welfare Support**

  The analysis reveals serious gaps in basic workplace facilities such as toilets, rest areas and sanitation infrastructure. These shortcomings reflect insufficient welfare support and the need for stronger administrative intervention.

- **Workers' Perceived Needs and Suggestions**

  HKS workers emphasised the need for regular health check-ups, insurance coverage, timely incentives, improved safety equipment, uniforms or identity cards, increased team size and

expanded public awareness programmes. These suggestions reflect practical challenges faced on the ground.

- **Strong Environmental Commitment among Workers**

  All HKS workers expressed a strong sense of environmental responsibility and pride in contributing to sustainable waste management, indicating high commitment to their role.

- **Beneficiaries' Satisfaction with Services**

  Most beneficiaries reported overall satisfaction with HKS services and acknowledged improvements in waste management practices and cleanliness in their surroundings after programme implementation. A majority of respondents also indicated that they faced no major issues with service delivery.

- **Beneficiaries' Expectations and Concerns**

  Beneficiaries highlighted the need for regular and timely collection, better segregation practices, adequate safety equipment for workers and an effective complaint and feedback mechanism. Minor issues such as irregular service and communication gaps were also reported.

- **Role of HKS as Community Educators**

  The study finds that HKS workers function not only as waste collectors but also as community educators. Their active participation in awareness and education programmes has contributed to behavioural change in waste management practices.

4.2 SUGGESTIONS

The experience of Haritha Karma Sena in Kochi demonstrates that waste management is not merely a technical activity, but a social process rooted in dignity, cooperation, and shared responsibility. When households actively participate and institutions adequately support workers, decentralized waste management systems can create cleaner environments and empowered communities. Strengthening HKS is therefore not only an environmental necessity but a vital social investment in women's empowerment and sustainable urban governance.

Strengthening Household Segregation and Public Participation: Household-level waste segregation should be strengthened through continuous awareness campaigns at the ward and neighborhood levels. Educational programs must clearly explain segregation methods and their importance. In addition to awareness, local bodies should introduce incentives for compliance and penalties for repeated non-compliance. Proper segregation at source will reduce worker workload, health risks, and improve operational efficiency.

Improve Worker Safety, Health and Basic Facilities: Ensuring safety and well-being of HKS workers must be a priority. Local self-government institutions should guarantee the continuous supply and proper use of safety equipment such as gloves, masks, boots, and uniforms. In addition, regular health check-ups, health insurance coverage, and the provision of basic facilities like toilets, drinking water, and rest areas are essential to protect workers' dignity and health.

Capacity Building and Skill Development: Continuous training programmes should be introduced to enhance skills in advanced waste segregation, recycling, composting and other waste-based activities. Skill development will improve work efficiency and create opportunities for income diversification and upward mobility.

Strengthening Feedback Mechanisms: Establishing clear and regular feedback channels for beneficiaries, such as periodic meetings, surveys, and complaint registers, can help identify gaps and challenges in service delivery. Timely review and action on this feedback will improve responsiveness, accountability, and the overall effectiveness of HKS.

4.3 CONCLUSION

The study was undertaken to evaluate the effectiveness of Haritha Karma Sena (HKS), analyse its role in women's empowerment, and assess its impact from the beneficiary perspective within a decentralised waste management system in Kochi. The findings clearly indicate that the door-to-door waste collection system implemented by HKS has brought visible improvements in neighbourhood cleanliness and has increased public awareness regarding responsible waste disposal practices. Beneficiaries, largely independent households from rural and semi-urban areas, depend primarily on HKS for waste collection and generate mainly biodegradable and dry recyclable waste, which aligns well with the decentralised model. Awareness created through ward councillors, local self-government institutions, and Kudumbashree workers highlights the importance of community-level governance in ensuring participation and acceptance.

From the beneficiary side, the system is widely perceived as effective, affordable, and reliable. High levels of satisfaction were reported with regard to punctuality, consistency, service quality, and worker performance. The standard monthly fee is considered reasonable, and extra charges for additional waste collection are generally flexible. Beneficiaries also acknowledged the active role of HKS workers in encouraging waste segregation at source, resulting in improved household practices and enhanced environmental cleanliness. However, partial public cooperation, occasional mixed waste disposal, and limited collection frequency indicate the need for continued awareness programmes and behavioural change initiatives to strengthen household-level participation.

The study also highlights the significant role of HKS in promoting women's empowerment. Regular income, improved financial independence, greater involvement in household decision-making, and increased social recognition have positively impacted the lives of women workers. At the same time, challenges such as moderate income levels, health risks, inadequate safety equipment, limited workplace facilities, and additional workload due to poor segregation practices constrain the full realisation of empowerment. Overall, the findings present a mixed but hopeful picture: Haritha Karma Sena has demonstrated strong potential in improving environmental conditions, supporting women's livelihoods, and strengthening decentralised waste management.

BIBLIOGRAPHY

Central Pollution Control Board. (2015). Action plan for municipal solid waste management. Government of India. https://cpcb.nic.in/uploads/MSW/Action_plan.pdf

Earth5R. (2015). 5 examples where waste segregation became a local economic engine: Earth5R case summary. https://earth5r.org/5-examples-where-waste-segregation-became-a-local-economic-engine-earth5r-case-summary/

Haritha Keralam Mission. (2024). Haritha Karmasena. Government of Kerala. https://haritham.kerala.gov.in/stories_view.php?nid=WFJjMnl2eVdSdXl0L3N3VGM1aXRJQT09&url=Haritha-Karmasena

Indian Express. (2017). *Solid Waste Management Rules 2016: How well they have been implemented on the ground.* https://indianexpress.com/article/what-is/solid-waste-management-rules-2016-how-well-they-have-been-implemented-on-ground/

International Institute of SDGs and Public Policy Research. (2024). *Waste management in India: An analysis of government policies and outcomes.* https://iisppr.org.in/waste-management-in-india-an-analysis-of-government-policies-and-outcomes/

International Labour Organization. (2019). *Decent work and the role of waste pickers in the circular economy.* ILO. https://www.ilo.org/global/publications/books/WCMS_697673/lang--en/index.htm

Kerala Calling. (2025). *Waste-free New Kerala: Haritha Karma Sena. Government of Kerala.* https://keralacalling.kerala.gov.in/seamless-services-and-a-waste-free-new-kerala/

Local Self Government Department, Government of Kerala. (2021). *The state of decentralised solid waste management in Kerala: Report 2021*. https://lsgkerala.gov.in

Local Self Government Department, Government of Kerala. (2025). *Kudumbashree Haritha Karma Sena: Kerala model of cleanliness.* https://lsgd.kerala.gov.in/en/waste-management/solid-waste-management/introduction/

Manorama Online. (2025). *Initiative of Haritha Karma Sena in e-waste management.* https://www.onmanorama.com/news/kerala/2025/07/19/kerala-e-waste-collection-haritha-karma-sena-dispose-fridge-tv-computers.amp.html

Menon, A., & Palackal, A. (2022). *Centralized and decentralized approaches to solid waste management: A case study. The Holistic Approach to the Environment.* https://www.environmentaljournal.in

Ministry of Statistics and Programme Implementation. (2023). *Official statistics portal.* Government of India. https://share.google/CcPsdNa3KaGdTin3N

Mohan. (2015). *Changing waste management practices in Kerala: Role of local governments and community organisations.* Journal of Environmental Governance. https://www.researchgate.net

M. S. Chadha Center for Global India. (2025). *The Ambikapur model: How one officer's leadership pioneered India's zero-waste movement.* Princeton University. https://cgi.princeton.edu/news/ambikapur-model-how-one-officers-leadership-pioneered-india%E2%80%99s-zero-waste-movement

National Health Systems Resource Centre. (2025). *Solid waste management guidebook.* https://nhsrcindia.org/sites/default/files/Solid%20Waste%20Management%20Guidebook.pdf

New Indian Express. (2025). *Kerala plans a hybrid model for 100% source-level biowaste management.* https://www.newindianexpress.com/states/kerala/2025/oct/21/kerala-plans-hybrid-model-for-100-source-level-biowaste-management

Nishad, A. (2024). *Haritha Karma Sena: Transforming waste management.* https://www.researchgate.net

Prasad, D. S. (2024). *Role of Haritha Karma Sena (HKS) workers as women informal sector waste management workers in urban local bodies of Kerala: A socio-economic and livelihood study.* https://www.researchgate.net

Praveen, M. P. (2024). *Improved plastic waste sorting helps HKS volunteers in Amballur Panchayat earn additional income.* The Hindu. https://www.thehindu.com

Praveen, S. R. (2024). *Foot soldiers of Kerala's silent revolution against waste.* The Hindu. https://www.thehindu.com

Press Trust of India. (2025). *Women in Kannapuram village transform waste into income.* The Week.
https://www.theweek.in

Rajendran, R., & Nair, S. (2017). *Community engagement in solid waste management: The Kerala model.* Indian Journal of Public Administration.
https://journals.sagepub.com

Shameerdas, T. (2024). *Haritha Karma Sena and non-biodegradable waste management.*
https://www.researchgate.net

Shameerdas, T., & Sandhya, S. B. (2024). *Role of Haritha Karma Sena in waste management and the green economy.*
https://www.researchgate.net

Sustainability Directory. (2025). *Decentralized waste management: Definitions and principles.*
https://pollution.sustainability-directory.com/term/decentralized-waste-management/

The Hindu. (2024). *Training for Haritha Karma Sena members begins across Kerala.* The Hindu.
https://www.thehindu.com

Times of India. (2025). *Kochi municipality lags; e-waste collection consortiums advance.* The Times of India.
https://timesofindia.indiatimes.com

UNDP India. (2023). *16 ways segregating waste: Panaji's innovative model for solid waste management.* https://www.undp.org/india/stories/16-ways-segregating-waste-panajis-innovative-model-solid-waste-management

UN-Habitat. (2010). *Solid waste management in the world's cities: Water and sanitation in the world's cities 2010.* Earthscan. https://unhabitat.org/solid-waste-management-in-the-worlds-cities

United Nations Environment Programme. (2015). *Global waste management outlook.* UNEP. https://www.unep.org/resources/report/global-waste-management-outlook

United Nations Environment Programme. (2024). *Global waste management outlook 2024.* UNEP. https://www.unep.org/resources/global-waste-management-outlook-2024

World Bank. (2018). *What a waste 2.0: A global snapshot of solid waste management to 2050.* World Bank. https://openknowledge.worldbank.org/handle/10986/30317

World Bank. (2022). *Solid waste management. World Bank Urban Development Overview.* https://www.worldbank.org/en/topic/urbandevelopment/brief/solid-waste-management

World Health Organization. (2017). *Safe management of wastes from health-care activities (2nd ed.).* WHO. https://www.who.int/publications/i/item/9789241549950

APPENDIX

QUESTIONNAIRE - 1

Survey on Haritha Karma Sena (HKS) Workers: Effectiveness, Empowerment, and Challenges

Purpose: The questionnaire aims to evaluate the experiences, empowerment, and challenges of Haritha Karma Sena (HKS) workers to improve their effectiveness.

Your responses will remain confidential and will be used only for academic research.

Instruction: Please tick the appropriate box for each question

Section A – Basic Information

1. What is your age group?

- 18–24
- 25–35
- 36–45
- 46–60
- Above 60

2. What is your educational qualification?

- Below SSLC
- SSLC
- Plus Two
- Degree or above

3. How many years of work experience do you have in Haritha Karma Sena?

- Less than 1 year
- 1–3 years
- 4–6 years
- More than 6 years

4. What are your main responsibilities in Haritha Karma Sena?

- Door-to-door waste collection
- Waste segregation
- Transporting waste
- Awareness and education activities
- Reporting to local bodies
- Others (specify)

Section B - Pre-HKS Background Assessment (Before Joining HKS)

5. What was your main source of income before joining HKS?

- Unemployed
- Daily wage labour
- Domestic work
- Agriculture
- Other (specify)

6. What was your average monthly income before joining HKS?

- No income
- Less than ₹5,000
- ₹5,000 – ₹10,000
- ₹10,001 – ₹15,000
- Above ₹15,000

7. What motivated you to join Haritha Karma Sena? (Multiple responses)

- Regular income
- Government schemes/benefits
- Job security
- Lack of other opportunities
- Other reasons

8. Did you have prior experience in sanitation or cleaning work before joining HKS?

- Yes
- No

9. How would you describe your financial and living situation before joining HKS?

- Very poor
- Poor

- Average
- Stable
- Comfortable

Section C – Evaluating Effectiveness of Haritha Karma Sena

10. Did you receive proper training for your work?

- Yes, regularly
- Occasionally
- No

11. Are you given proper tools and safety gear (gloves, masks, boots) ?

- Always
- Sometimes
- Never

12. How many households do you serve daily?

- Less than 50
- 50–100
- 101–150
- More than 150

13. How many hours do you work daily?

- Less than 4 hours
- 4–6 hours
- 6–8 hours
- More than 8 hours

14.Do you receive the waste already segregated by households?

- Yes, always
- Sometimes
- Rarely
- Never

15. If not segregated, do you have to segregate it yourself?

- Yes
- No

16. Public response to your work:

- Very supportive
- Somewhat supportive
- Neutral
- Not supportive

17. What improvements have you seen in your area? (Tick all that apply)

- Better segregation of waste
- Cleaner surroundings
- Increased public awareness
- No noticeable change
- Other: _____

18. Do you think your work benefits the environment?

- Yes
- No
- Not sure

19. Are you involved in awareness or education programmes?

- Yes
- No

20. Do you receive any form of recognition or appreciation for your work?

- Yes
- No
- Occasionally

Section D – Evaluating Women Empowerment

21. What is your monthly income after joining HKS?

- Less than 5,000
- 5,000 to 10,000
- 10,000 to 15,000
- Above 15,000

Instruction: (Please choose one number for each statement)

Scale Guide:

1 = Strongly Disagree
2 = Disagree
3 = Neutral
4 = Agree
5 = Strongly Agree

22. **Health** – I can access healthcare services (including women's health needs) when needed.

○ 1 ○ 2 ○ 3 ○ 4 ○ 5

23. **Education** – I have opportunities to learn new skills or attend training related to work.

○ 1 ○ 2 ○ 3 ○ 4 ○ 5

24. **Economic Participation** – I have control over how I use the money I earn.

○ 1 ○ 2 ○ 3 ○ 4 ○ 5

25. **Decision-Making** – I am involved in important decisions at home or work.

○ 1 ○ 2 ○ 3 ○ 4 ○ 5

26. **Freedom from Violence** – I feel safe and respected while working as a Haritha Karma Sena member.

○ 1 ○ 2 ○ 3 ○ 4 ○ 5

Section E – Identifying Challenges Faced by HKS Workers

Instruction:(Please choose one number for each statement)

Scale Guide:
1 – Strongly Disagree
2 – Disagree
3 – Neutral
4 – Agree
5 – Strongly Agree

27.Do you face operational challenges like poor waste segregation, lack of tools, or long working hours?

○ 1 ○ 2 ○ 3 ○ 4 ○ 5

28.Do you have adequate access to safety gear such as gloves, masks, and boots while working?

○ 1 ○ 2 ○ 3 ○ 4 ○ 5

29. Are you satisfied with your pay, payment, regularity, and overtime compensation?

○ 1 ○ 2 ○ 3 ○ 4 ○ 5

30.Do you experience health issues like respiratory problems, skin allergies, fatigue, or injuries due to your work?

○ 1 ○ 2 ○ 3 ○ 4 ○ 5

31. Are you aware of any government or institutional support (e.g., health insurance, financial help) for workers like you?

○ 1 ○ 2 ○ 3 ○ 4 ○ 5

32.Do you feel supported by your supervisors or local authorities in your daily work?

○ 1 ○ 2 ○ 3 ○ 4 ○ 5

33.Do you feel respected, safe, and supported by the public while performing your duties?

○ 1 ○ 2 ○ 3 ○ 4 ○ 5

34. Suggestions to Improve HKS Operations (Tick all that apply)

- Conduct more public awareness campaigns
- Provide better working tools and gear
- Ensure timely incentives and bonuses
- Increase team size to reduce workload
- Regular health check-ups and insurance
- Provide uniforms or ID cards for recognition
- Other: _____

35. Any other comments?

Thank you for your valuable time and responses!

QUESTIONNAIRE II

Survey on Haritha Karma Sena (HKS) Workers: Effectiveness, Empowerment and Challenges

Household Survey on Haritha Karma Sena (HKS) Services in Kerala

Purpose: This questionnaire aims to evaluate the effectiveness of Haritha Karma Sena (HKS) and identify the challenges faced by HKS workers from the consumers' perspective.

Your responses will remain confidential and will be used only for academic research.

Instruction: Please tick the appropriate box for each question.

Section A: Basic Information

1. What type of residence do you live in?

- Independent house
- Apartment / Flat
- Institution
- Hostel
- Commercial establishment

2.Area of residence

- Rural
- Urban

3. What types of waste are generated in your household?
(Rank according to frequency; 1 = least generated)

- Food waste
- Dry recyclable waste
- Sanitary waste
- E-waste
- Hazardous waste
- Bulky waste

4.Place of residence : _____

5.How do you manage household waste?

- Collected by Haritha Karma Sena
- Private door-to-door collection
- Composting at home
- Burning / combustion
- Given to nearby farms
- Taken to waste collection point

Section B: Evaluating the Effectiveness of HKS

6.How frequently is your household waste collected or processed?

- Daily
- Every 2–3 days
- Weekly
- Fortnightly
- Monthly

7. How long have you been receiving waste management services from HKS?

- Less than 6 months
- 6 months – 1 year
- 1–3 years
- More than 3 years

8.How did you come to know about Haritha Karma Sena?

- Ward councillor / local government
- Kudumbashree workers
- Public awareness campaigns
- Social media / news

9.How punctual and consistent is waste collection by HKS?

- Always punctual
- Often punctual
- Sometimes punctual
- Rarely punctual

10.How much do you pay for HKS waste collection services?

- Below ₹50
- ₹50
- ₹100
- Above ₹100

11.Do you pay extra fees for additional waste collection?

- Yes
- No
- Not applicable

12. If yes, how much do you usually pay as an extra fee?

- Below ₹20
- ₹20–₹50
- ₹51–₹100
- Amount varies

13.How would you rate the quality of waste segregation and collection done by HKS workers?

- Excellent
- Good
- Average
- Below average
- Poor

14.Do HKS workers encourage segregation of waste at the source?

- Always
- Occasionally
- Never

15.How has waste management changed in your locality after HKS introduction?

- Improved significantly
- Improved slightly
- No change
- Worsened

16.Do you think decentralized waste management (through HKS) is more effective than centralized systems?

- Strongly agree
- Agree to some extent
- Not sure
- Disagree

17. How satisfied are you with environmental cleanliness after HKS implementation?

- Very satisfied
- Satisfied
- Neutral
- Dissatisfied

Section C: Challenges and Suggestions

18.Do you segregate household waste before handing it over to HKS?

- Yes,Always
- Yes,Sometimes
- No, I provide mixed waste
- I was not aware that segregation was required

19. Have you faced any issues with HKS services?

- Irregular service
- Inadequate segregation
- Poor Behaviour
- Lack of communication
- No issues
- Other

20.Do you think HKS workers receive adequate support from the local government / Kudumbashree?

- Yes
- No
- Not sure

21. What challenges do you think HKS workers face?

- Low wages and job insecurity
- Health hazards and infections
- Lack of safety equipment
- Long working hours

- Poor working conditions
- Not aware

22.Do you think public is cooperative in source segregation and supporting HKS workers

- Yes
- No
- Partially

23. What suggestions do you have to improve HKS services?

- More regular waste collection
- Better segregation and handling
- Proper uniforms and safety equipment
- Proper system for complaint and feedback
- Improved behaviour and communication from workers
- Other suggestions

24. How would you rate Haritha Karma Sena?
(1 – Very Poor, 2 – Poor, 3 – Average, 4 – Good, 5 – Excellent)

- 1
- 2
- 3
- 4
- 5

25. Any other comments?

Thank you for your valuable time and responses!