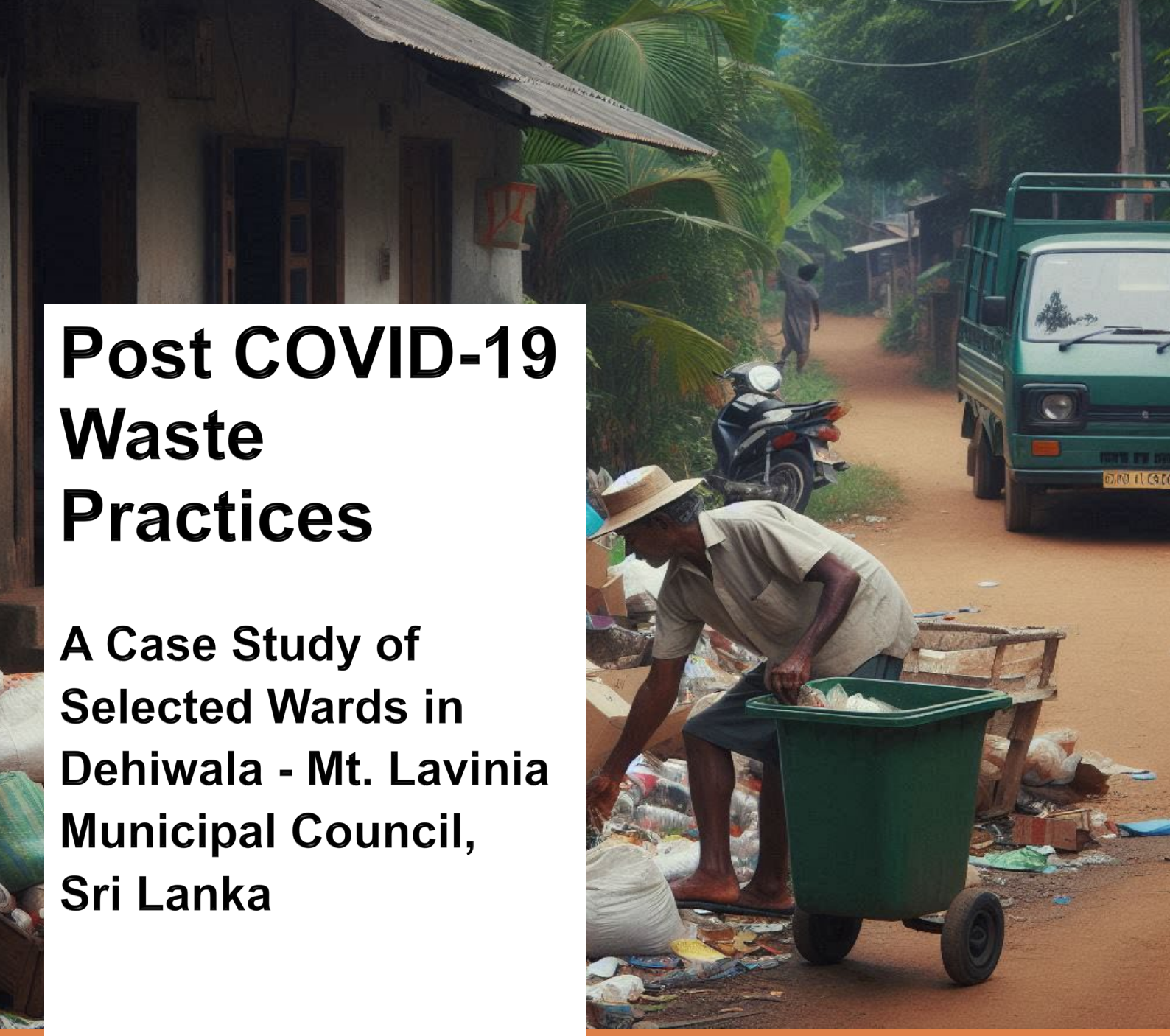

Post COVID-19 Waste Practices

A Case Study of Selected Wards in Dehiwala - Mt. Lavinia Municipal Council, Sri Lanka

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Working Paper 3

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The Working Papers are openly accessible through the repository of the University of Lausanne (https://serval.unil.ch) and the project website (https://lifeofwaste.com), which also contains blogs, research stories, and videos on sustainable waste management, as well as working papers of the research project "Challenges of municipal solid waste management: Learning from post-crisis governance initiatives in South Asia" that preceded the SPIRIT project. The Working Paper Series is edited by René Véron and Swetha Rao Dhananka.

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CHAPTER 1 - INTRODUCTION

1.1. Introduction

The emergence of COVID-19 has generated unparalleled instability in worldwide social and economic structures. No sector has remained unchanged, from the introduction of social distancing initiatives to the reorganization of the public health system (Singh et al., 2022). During this pandemic, the management of municipal solid waste (MSW) has become one of the most challenging environmental problems. The pandemic has changed the dynamics of waste management, causing significant concerns among sanitation staff and policymakers (Mallapur, 2020).

In 2022, the authors of this working paper co-authored a paper titled **"Waste Practices in Dehiwala-Mount Lavinia Municipal Council and Boralesgamuwa Urban Council Areas, Sri Lanka: A Preliminary Study of Selected Urban Wards"** under the R4D Project **"Challenges of Municipal Waste Management: Learning from Post-Crisis Initiatives in South Asia."** In this study, we examined the household waste management activities of the Boralesgamuwa Urban Council (BUC) and the Dehiwala-Mount Lavinia Municipal Council (DMMC) in selected wards of the local councils in the immediate aftermath of the COVID-19 pandemic.

Two years after the publication of the above working paper, the authors wish to study the current state of household waste management practices in DMMC in this paper. The key findings of the 2022 working paper will be utilised as a baseline to comparatively study main waste collection disposal practices, service providers, satisfaction regarding waste management activities, the impact of the pandemic on waste management, etc.

1.1.1 Onset of COVID-19 Pandemic and the MSWM sector in Sri Lanka

The onset of the COVID-19 pandemic began in December 2019 when a cluster of pneumonia cases of unknown origin emerged in Wuhan, China (Wang et al., 2020). Chinese authorities quickly identified the cause as a novel coronavirus, naming it "Severe Acute Respiratory Syndrome Coronavirus 2" (SARS-CoV-2) on 12th January 2020. Within weeks, the virus had spread to 28 countries (Spiteri et al., 2020), prompting the World Health Organization (WHO) to declare it a global pandemic on 11th March 2020. The pandemic had profound effects beyond public health, affecting various sectors worldwide and compelling governments to implement both immediate and long-term responses to mitigate its impact. According to Dr. Mushtaq Ahmed Memon of the United Nations Environment Programme, the pandemic necessitated a disaster management approach, including prevention, preparedness, response, and recovery in waste management strategies (cited in Moyek, 2021).

Sri Lanka reported its first COVID-19 case on 27th January 2020—a Chinese national treated at the National Institute of Infectious Diseases (Amaratunga et al., 2020). Local transmission became evident by 11th March 2020. Despite governmental efforts, the virus continued to spread, exacerbated by factors such as incoming tourists, returning nationals from affected regions, and non-compliance with restrictions. By August 2021, with the spread of the Delta variant, Sri Lanka faced a significant crisis, recording the fourth-highest daily death rate worldwide (Epidemiology Unit of the Ministry of Health, Sri Lanka, 2023). By January 2023, the country had reported over 671,903 cases and 16,817 deaths.

The Sri Lankan government responded with a series of measures to contain the virus, including case detection, contact tracing, quarantine, travel restrictions, isolation of affected villages, and periodic nationwide lockdowns. A Task Force on the Prevention of Coronavirus was established on 26th February 2020 to coordinate efforts (Amaratunga et al., 2020). The government's strategy included imposing curfews, suspending public gatherings, and mobilising the military to set up quarantine centres. As the crisis deepened, the government enforced stricter lockdowns to curb the virus's spread.

The pandemic significantly impacted the Municipal Solid Waste Management (MSWM) sector in Sri Lanka. The Western Province saw a 40% reduction in overall waste during the pandemic, attributed to a decline in single-use plastics in cities and reduced outdoor activities (Hannan, 2020). However, the surge in medical and plastic waste strained the MSWM infrastructure. Sri Lanka faced an estimated daily use of 12 million facemasks, 0.22 million gloves, and 0.29 million face shields, with open burning being the most common disposal method (Kankamage et al., 2022). The existing waste management system, already challenged by mismanaged plastic waste, struggled to safely handle the increased volume of potentially infectious waste.

Despite the challenges, municipal waste collection continued as an essential service during lockdowns, though informal waste workers were banned. The government allocated a budget of $515,000 to train staff in infection prevention and control (IPC) measures and to improve waste management practices in health care facilities (Hannan, 2020).

Adaptive strategies were introduced to manage the increased medical waste. The government implemented guidelines for segregating, collecting, treating, and disposing of immunisation waste within 24 hours. Vaccination centres were tasked with on-site segregation, and waste was transported to secondary health care facilities for treatment, including incineration by companies like Sisili Hanaro Encare (Pvt.) Ltd (Fernando et al., 2023). Additionally, the "Interim Guideline for Management of COVID-19 Infectious Waste (2020)" outlined measures for handling waste

from quarantined households, designating local authorities to oversee waste management operations. Despite these efforts, the guidelines primarily focused on infected households, leaving the general public with questions regarding waste management during the pandemic (Kankamage et al., 2022).

Overall, Sri Lanka's response to the waste management crisis during COVID-19 involved significant adaptive measures. Yet, practical challenges, including the feasibility of protective measures for waste workers and the impact on informal waste workers, highlighted the need for more comprehensive strategies.

1.1.2 COVID-19 Pandemic and Household Waste Management in Sri Lanka

Studies conducted during the COVID-19 pandemic had revealed significant disruptions to household waste management in Sri Lanka. These impacts were multifaceted, encompassing reductions in biodegradable waste production and increases in the generation of plastic waste, particularly among high-income households. Research also highlighted the challenges faced by both formal local council waste management systems and informal waste collectors during this period.

The COVID-19 pandemic had triggered significant changes in the composition of household waste in Sri Lanka, with clear shifts in the proportions of biodegradable and non-biodegradable waste generated. Fernando and De Silva (2023a) noted a marked increase in food waste production during lockdowns, attributed to families cooking at home more frequently. This trend was most pronounced among middle- and high-income households.

At the same time, Jayasinghe et al. (2022) highlighted an unprecedented surge in plastic waste, particularly due to the widespread use of personal protective equipment (PPE), such as masks, gloves, and sanitizer bottles. This increase was further compounded by a rise in consumption of packaged goods, driven by behavioural changes such as stockpiling and reliance on online delivery services (Fernando and De Silva, 2023a). These changes posed significant challenges for local authorities, as traditional waste collection systems were ill-equipped to manage the dual burden of increased household waste and the rise in new waste categories with higher health risks.

Fernando and De Silva (2023b) highlighted that during the pandemic waste collection systems struggled to collect household waste, especially in the initial weeks of the first lock down, until new regulations on waste collection practices and protocols for infectious waste management were introduced by the Ministry of Health and the Western Province Waste Management Authority (Fernando and De Silva, 2023b). Additionally, the restrictions imposed by local councils

on informal waste collectors further exacerbated the situation. These collectors, integral to the recycling ecosystem, were banned from operating as a measure of deter the spread of the virus.

The above discussed changes in the formal and informal waste collection activities further led to significant changes in household waste management activities during the pandemic. Fernando and De Silva (2023b) noted an increase in the reuse and repurposing of waste materials. For instance, residents in DMMC and BUC began to repurpose items like plastic cups and ice cream containers for alternative uses, i.e., home gardening tools and plant pots for growing vegetables and herbs. Coconut shells, once a common source of waste, were retained for use as a cooking fuel. Fernando and De Silva (2023b) also revealed that in the absence or the reduced frequency of waste collection by the local council, households had adopted measures such as making compost using kitchen waste and other biodegradable material, while some had resorted to burn bio-medical waste and other types of waste within the household premises or on the roadside.

1.1.2 Local Council System and Current Status

Sri Lanka operates as a unitary democratic republic with a three-tier government structure: national, provincial, and local (GoSL, 1978). The local government system is grounded in the 13th Amendment to the Constitution, and the second-tier provincial councils are governed under the Provincial Councils Act of 1987. For the third-tier local authorities, the Urban Councils Ordinance (1939), the Municipal Councils Ordinance (1947), and the Pradeshiya Sabhas Act (No. 15 of 1987) are the primary legislative frameworks.

The Ministry of Local Government and Provincial Councils oversees policy and legislative responsibilities at the national level. In contrast, provincial ministers manage the daily administration and supervision of local government functions. Sri Lanka is divided into nine provinces and 341 local government authorities, including 24 municipal councils, 41 urban councils, and 276 Pradeshiya Sabhas (village councils) (Ministry of Local Government and Provincial Councils, n.d).

Local government elections in Sri Lanka follow a mixed electoral system. In this system, 60 percent of members represent single-member or multi-member wards, while the remaining 40 percent come from an 'additional persons' list that does not have any specific ward affiliation. The leading political party in the election nominates mayors, deputy mayors, chairpersons, and vice-chairpersons (Department of Elections, n.d.). By law, municipal councils must have a commissioner who serves as the chief administrative officer, to whom heads of various divisions or departments report. These departments are typically led by professionals such as secretaries,

administrative officers, accountants, engineers, chief medical officers, and sometimes veterinary surgeons. In urban councils and Pradeshiya Sabhas, the chief administrative officer is the secretary, supported by a multidisciplinary team.

The term of the current local government authorities, which began in 2018, was set to expire in March 2022 after a four-year tenure. However, the Minister of Provincial Council and Local Government Affairs extended this term by one year, until 19th March 2023, without providing a reason (Harankaha, 2023). According to statutory provisions, the Election Commission can conduct local authority elections within six months before the new term begins. This period commenced on 20th September 2022, giving the Election Commission the authority to set a date for local elections any time after this date.

In January 2023, it was announced that local government elections would be held on 9th March 2023. However, on 14th February 2023, the postal votes for this election were postponed indefinitely due to a reported shortage of funds (Harankaha, 2023). Since the dissolving of the local councils until the elections are held, the activities of the councils are managed by the aforementioned heads of administration: the commissioners in municipal councils and the secretaries in urban councils and Pradeshiya Sabhas.

1.2. Objectives

This working paper aims,

(a) To comprehend the nature and activities pertaining to household waste management in Dehiwala-Mt. Lavinia Municipal Council post COVID-19 Pandemic

(b) To understand the impacts the COVID-19 pandemic exerted on household waste management practices in Dehiwala-Mt. Lavinia Municipal Council

1.3. Research Methodology

1.3.1. Types of Data

This study examines the current state of household waste management practices in DMMC. Primarily quantitative data was collected, with some qualitative data used to supplement the findings. The quantitative data focused on specifics such as types of waste generated, main service providers, waste segregation, disposal methods, relationships with formal waste collectors, satisfaction with cleanliness, services provided by the local council, and changes in waste management practices post-COVID-19. Qualitative data provided additional insights, capturing respondents' views on the overall services of the local councils, satisfaction with waste

management practices, suggestions for improvement, changes to household waste management practices after the COVID-19 pandemic, and the reasons behind these changes.

In line with the research objectives, the authors developed a semi-structured interview schedule for residents within the DMMC, representing low, middle, and high-income classes. The interview schedule primarily consisted of close-ended questions designed to gather quantitative data on waste generation, service providers, disposal methods, waste segregation, neighbourhood cleanliness, the efficiency of local council waste collection services, and the impact of the COVID-19 pandemic on household waste practices. Additionally, the schedule included open-ended questions to collect qualitative data on residents' opinions regarding neighbourhood cleanliness, local council services, relationships with formal waste workers, and suggestions for improving waste management.

1.3.2 Field Locations

The Dehiwala-Mt. Lavinia Municipal Council (DMMC) is the second-largest municipal council in Sri Lanka, following the Colombo Municipal Council. Located in the Colombo District, the most populous district in the country, DMMC provides residence to over 889,000 citizens. Its ethnic composition is 70% Sinhalese, 15% Sri Lankan Moor, over 11% Tamil, and nearly 4% Burgher and other groups (Dehiwala-Mt. Lavinia Municipal Council, n.d.). DMMC is one of the oldest municipal councils in Sri Lanka, having achieved municipal status in December 1959. The administrative area has changed over time, reaching its current configuration of 29 wards[1] in 1967 (Wijepala, 2003, p. 2).

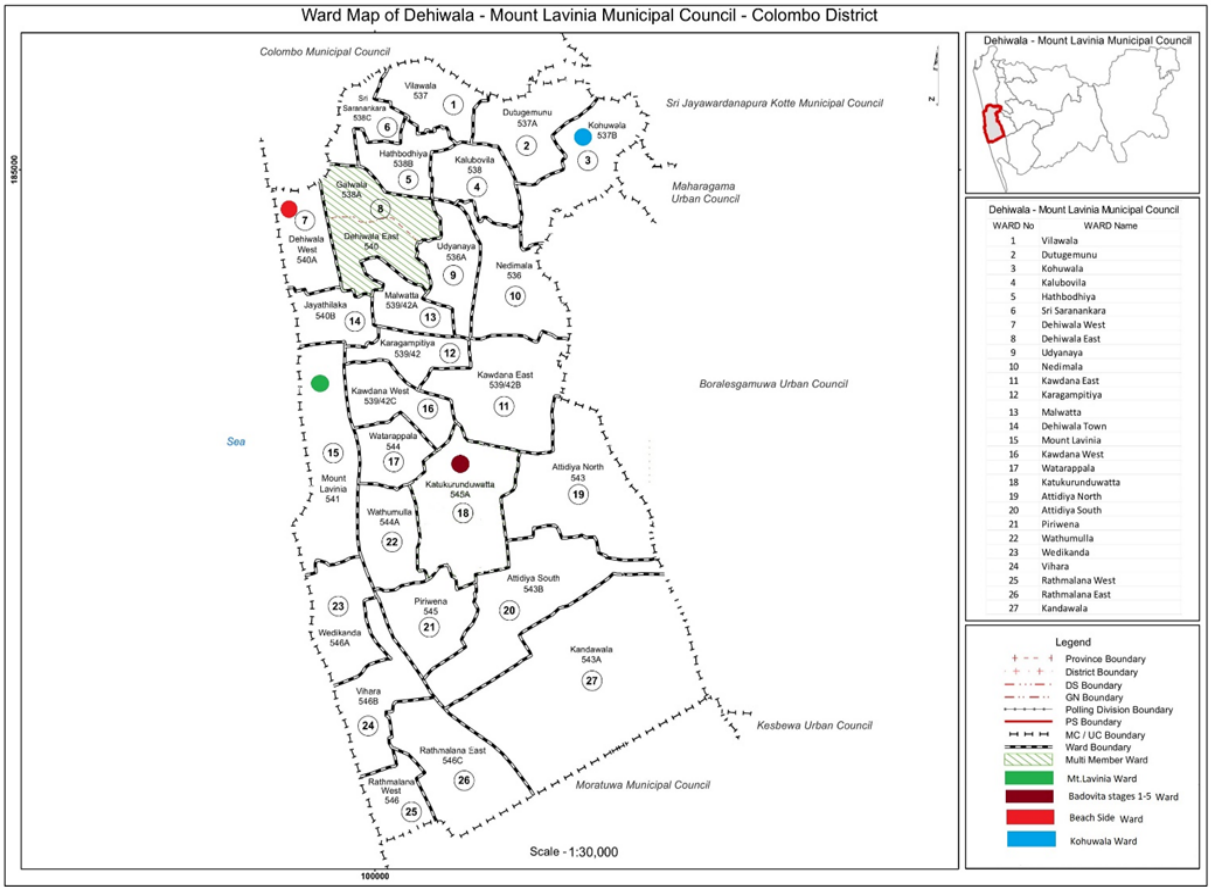
Brief account of selected locations

- Mt. Lavinia City - Positioned as the second most significant urban area within the municipal council, Mt. Lavinia is primarily a residential suburb, akin to Dehiwala City, and is located adjacent to Galle Road. For the study, the researchers selected condominiums situated in the city center.
- Kohuwala - A highly urbanized area in the Colombo district, Kohuwala is characterized by numerous condominiums and high-rise buildings. The study focused on residential areas located in the very heart of the city.
- Station Road - Located within the boundaries of Dehiwala city, Station Road comprises a collection of suburban residential areas, composed of middle-income communities.

[1] A “ward” is an Electoral Area of a given Local Council delineated by the National Delamination Committee established by the Local Council Election Ordinance of 1947

- **Badowita -** Badowita is a low-income settlement established to resettle 1,140 families displaced during the Greater Colombo Flood Control and Canal Development Project in 1990 (SEVANATHA, 2002, p. 1). Initially, the Dehiwala-Mt. Lavinia Municipal Council (DMMC) did not manage waste generated in the settlement due to the absence of Assessment tax payments from its residents (SEVANATHA, 2002, p. 1). This led to a significant decline in cleanliness and hygiene within the community. To address this, the United Nations Development Programme (UNDP), with support from SEVANATHA, a local NGO, initiated a community waste management project in 2000 (Wijepala, 2003). Despite its initial success, the project is currently inactive, and the DMMC has since assumed responsibility for waste management in the area.

Map 01. Ward Map of Dehiwala – Mount Lavinia Municipal Council



(Source: DMMC, 2013)

Justification for Selecting Field Locations

The selection of the Dehiwala-Mt. Lavinia Municipal Council area as the field location for this study is justified by a key reason. The earlier base survey conducted under the project "Challenges of Municipal Solid Waste Management: Learning from Post-Crisis Governance Initiatives in South Asia" was carried out within the DMMC area. This allows for a comparative

analysis of the previous and current household waste management practices, offering valuable insights into changes and developments over time.

1.3.3. Sample Selection

The sample for the study was selected using a purposive stratified sampling method. The same areas of the DMMC that were chosen for the baseline study were used for this study, targeting different income groups. High-income areas included Mt. Lavinia City Limit and Kohuwala, middle-income areas included Station Road – Land Side, and low-income areas included Badovita Stage 1-5 and Beach Side - Station Road. This approach allowed the research team to collect data from various income groups within the municipal council. Since the baseline study did not collect the names and addresses of respondents, the research team selected new respondents for this study.

1.3.4. Sample Size

A total sample of 302 participants was chosen to align with the baseline survey's sample size, which also had 300 respondents (see Table 1.1).

Table 1.1. Sample size of the study

Income Class	Number of Questionnaires
1. Low Income class	124 (41%)
2. Middle income class	115 (38%)
3. High Income class	63 (21%)
Total	**302 (100.00%)**

(Source: Own data, 2024)

1.3.5. Data Collection

The data collection was conducted by a team consisting of three graduate research assistants and the authors. These research assistants, all holding degrees in Sociology from the University of Colombo, were thoroughly trained in a special session on using the semi-structured interview schedule. This training provided them with a comprehensive understanding of the data collection tools and the overarching objectives of the study. Data collection took place from late February to early April 2024. During this period, the research team diligently engaged with the selected participants, conducting interviews to gather the necessary data for the study.

1.3.6. Data Analysis

To achieve a comprehensive understanding of the situation in the field locations, both qualitative and quantitative analysis methods were employed. The data collected from the questionnaires

underwent a thorough process of editing, cleaning, and coding before being entered into the Statistical Package for Social Sciences (SPSS). Within SPSS, both univariate and bi-variate statistical analysis tests were conducted as deemed necessary and appropriate for the study's objectives. The results of these quantitative analyses are presented in tabular form for clarity and ease of interpretation. For the qualitative data, manual coding was performed to categorize and organize the responses. These coded data were then analysed using the thematic analysis method (Braun & Clarke, 2019). This approach allowed for the identification of key themes and patterns within the qualitative responses, providing deeper insights into the participants' perspectives and experiences.

1.4. Challenges

During data collection, the research team encountered several significant challenges that impacted the research process. Two key challenges are outlined below:

1. Difficulty in Conducting Semi-Structured Interviews with High-Income Respondents

The research team initially faced difficulties in contacting and interviewing high-income respondents. This was primarily due to the challenges of gaining approval from the security services and administration of gated communities and high-rise buildings. Additionally, when attempting to speak with household members, research assistants were often met by household workers rather than the respondents themselves. To address these challenges, the authors reached out to officials and members of local welfare societies to obtain the necessary approvals for data collection within these housing schemes. Once the nature and objectives of the research were explained, permission was granted to collect data on the premises. In instances where direct contact with a household member was not possible, the research assistants left an information sheet with the household workers. This sheet briefly outlined the study and its objectives and provided the authors' contact details. This approach allowed respondents to schedule appointments, enabling the research team to gather data from these households effectively.

2. Reluctance of Low-Income Respondents to Participate

In some low-income areas within the DMMC, respondents expressed reluctance to participate in the study. Many mentioned that they had previously participated in numerous studies about their communities but had not seen any tangible changes in their circumstances. To address this concern, research assistants were instructed to explain to respondents that the findings of this study would be shared with local council officials, highlighting the challenges and issues they faced regarding municipal solid waste management (MSWM). However, respondents were

never pressured to participate. They were informed that their involvement was entirely voluntary and that they had the right to decline participation at any point. Research assistants were trained to respect these decisions and to thank respondents for considering participation before moving on to select a different respondent.

1.5. Summary of Chapters

This working paper is organized into four chapters.

Chapter One: Introduction and Methodology

This chapter outlines the primary objectives of the study and details the research methodology. It provides an in-depth discussion of the data collection strategy, sample selection criteria, and data analysis techniques. Additionally, the chapter addresses the challenges encountered by the researchers during the data collection process.

Chapter Two: Demographic and Socio-Economic Profile

Chapter Two presents the demographic and socio-economic data of the selected local councils. This includes information on ethnicity, religion, household composition, education levels, household decision-makers, sources of income, monthly income, and the nature of housing within the study area.

Chapter Three: Status of Waste Management of Households in the DMMC

This chapter examines the current status of waste management in the Dehiwala-Mt. Lavinia Municipal Council. It explores various aspects such as neighbourhood cleanliness, resident satisfaction with waste management activities, and the mechanisms of waste collection, segregation, and disposal. The chapter concludes with a comparative analysis of household municipal solid waste management (MSWM) practices in relation to the findings from the baseline study conducted earlier.

Chapter Four: Conclusion

The final chapter synthesizes the key findings of the study, offering a summary and discussion of the insights gained from the research. This chapter ties together the various elements of the study, providing a cohesive conclusion to the working paper.

CHAPTER 2 - DEMOGRAPHIC AND SOCIO-ECONOMIC PROFILE

2.1. Introduction

This chapter presents the demographic and socio-economic data collected for the study. The data examined includes age, ethnicity, religion, household composition, educational background, and the decision-making dynamics within households. Additionally, the chapter explores economic aspects such as sources of income, monthly income levels, and the nature of housing in the study area. By analysing these demographic factors, the chapter sets the foundation for understanding the socio-economic context within which the study's findings are situated.

Table 2.1. Age of the respondents by income category

Income category	51-60 Years	41- 50 Years	61-70 Years	31-40 Years	71-80 Years	21- 30 Years	81-90 Years	11-20 Years	91-100 years	Total
Low-income class	28	24	26	17	10	12	1	5	1	124
	22.6%	19.4%	21.0%	13.7%	8.1%	9.7%	0.8%	*4.0%	0.8%	100.0 %
Middle-income class	28	20	21	21	15	4	5	0	1	115
	24.3%	17.4%	18.3%	18.3%	13.0%	3.5%	4.3%	0.0%	0.9%	100.0 %
High-income class	14	14	10	10	12	1	1	1	0	63
	22.2%	22.2%	15.9%	15.9%	19.0%	1.6%	1.6%	1.6%	0.0%	100.0 %
Total	**70**	**58**	**57**	**48**	**37**	**17**	**7**	**6**	**2**	**302**
	23.2%	19.2%	18.9%	15.9%	12.3%	5.6%	2.3%	2.0%	0.7%	100.0 %

*Row percentage
(Source: Survey data, 2024)

The age distribution of respondents by income category reveals that the largest groups are aged between 41-60 years. Specifically, over 23% are aged 51-60 years, and over 19% are aged 41-50 years. The age groups of 61-70 years and 31-40 years follow, representing nearly 19% and nearly 16% of the respondents, respectively. Smaller percentages are observed in the 11-20 years (2%), 21-30 years (nearly 6%), 71-80 years (over 12%), 81-90 years (over 2%), and 91-100 years (nearly 1%) categories.

Table 2.2. Ethnicity of the respondents by income category

Income category	Sinhala	Tamil	Moor	Burgher	Total
Low-income class	91	24	7	2	124
	*73.4%	19.4%	5.6%	1.6%	100.0%
Middle-income class	74	27	13	1	115
	64.3%	23.5%	11.3%	0.9%	100.0%

High-income class	40	16	4	3	63
	63.5%	25.4%	6.3%	4.8%	100.0%
Total	**205**	**67**	**24**	**6**	**302**
	67.9%	22.2%	7.9%	2.0%	100.0%

*Row percentage
(Source: Survey data, 2024)

The ethnicity distribution of the respondents shows that the majority are Sinhalese, making up nearly 68% of the total. The Tamil community represents over 22%, while the Moor community accounts for nearly 8%. A smaller portion of 2.0%, identify as Burgher. This data reflects a diverse ethnic composition among the respondents, with Sinhalese being the predominant group followed by Tamil and Moor communities and a small representation of Burghers.

Table 2.3. Religion of the respondents by income category

Income category	Buddhism	Hindu	Roman Catholic	Islam	Christian (non-Roman Catholic)	Total
Low-income class	88	19	10	7	0	124
	*71.0%	15.3%	8.1%	5.6%	0.0%	100.0%
Middle-income class	61	22	16	13	3	115
	53.0%	19.1%	13.9%	11.3%	2.6%	100.0%
High-income class	34	15	5	4	5	63
	54.0%	23.8%	7.9%	6.3%	7.9%	100.0%
Total	**183**	**56**	**31**	**24**	**8**	**302**
	60.6%	18.5%	10.3%	7.9%	2.6%	100.0%

*Row percentage
(Source: Survey data, 2024)

The religious affiliation of respondents shows that the majority practice Buddhism, representing nearly 61% of the total. Hinduism is followed by nearly 19% of the respondents, while over 10% identify as Roman Catholic. Those practicing Islam account for nearly 8%, and non-Roman Catholic Christians make up nearly 3%.

Table 2.4. Family size by income category

Income category	3 members	4 members	5 members	2 members	6 members	1 member	7 members	8 members	10 members	Total
Low-income class	27	22	29	15	13	10	6	1	1	124
	21.8%	17.7%	23.4%	12.1%	10.5%	*8.1%	4.8%	0.8%	0.8%	100.0 %
Middle-income class	27	25	17	21	10	9	4	2	0	115
	23.5%	21.7%	14.8%	18.3%	8.7%	7.8%	3.5%	1.7%	0.0%	100.0 %
High-income class	16	14	12	9	6	2	2	2	0	63
	25.4%	22.2%	19.0%	14.3%	9.5%	3.2%	3.2%	3.2%	0.0%	100.0 %
Total	**70**	**61**	**58**	**45**	**29**	**21**	**12**	**5**	**1**	**302**
	23.2%	20.2%	19.2%	14.9%	9.6%	7.0%	4.0%	1.7%	0.3%	100.0 %

*Row percentage
(Source: Survey data, 2024)

The family size distribution among respondents revealed that households with three members are the most common, making up over 23% of the total. This is followed closely by four-member households at over 20%, and five-member households at over 19%. Households with two members account for nearly 15%, while single-member households represent 7%. Six-member households make up nearly 10%, and households with seven, eight, and ten members collectively account for 6%. This data indicates that most households consist of three to five members.

Table 2.5. Highest educational attainment by income category

Income category	Secondary education	Primary education	Graduate	Post-graduate	Vocational qualification	No formal education	Total
Low-income class	64	56	0	0	0	4	124
	51.6%	45.2%	0.0%	0.0%	0.0%	*3.2%	100.0%
Middle-income class	79	5	16	9	5	1	115
	68.7%	4.3%	13.9%	7.8%	4.3%	0.9%	100.0%
High-income class	32	10	9	6	4	2	63
	50.8%	15.9%	14.3%	9.5%	6.3%	3.2%	100.0%
Total	**175**	**71**	**25**	**15**	**9**	**7**	**302**
	57.9%	23.5%	8.3%	5.0%	3.0%	2.3%	100.0%

*Row percentage
(Source: Survey data, 2024)

The table provides an overview of the highest educational attainment in households categorized by income. Overall, a significant majority, nearly 58%, have completed secondary education, indicating a foundational level of educational achievement across all categories. Graduate and post-graduate qualifications constitute over 8% and 5% of the total, respectively, highlighting a

smaller yet notable proportion with higher academic credentials. Conversely, vocational qualifications are the least represented at 3%. Notably, no respondents from the low-income class have achieved graduate, post-graduate, or vocational qualifications, highlighting a significant disparity in educational attainment between income groups. The data suggest that higher educational achievements are strongly correlated with higher income levels, with secondary education being the most common across all income categories.

Table 2.6. Main income of the households by income category

Income category	Salaried employment	Daily paid labour	Own business	Pension	Self-employed	Total
Low-income class	37	50	12	6	19	124
	29.8%	40.3%	9.7%	4.8%	15.3%	100.0%
Middle-income class	32	14	35	30	4	115
	27.8%	12.2%	30.4%	26.1%	3.5%	100.0%
High-income class	19	6	18	15	5	63
	30.2%	9.5%	28.6%	23.8%	7.9%	100.0%
Total	**88**	**70**	**65**	**51**	**28**	**302**
	29.1%	23.2%	21.5%	16.9%	9.3%	100.0%

*Row percentage
(Source: Survey data, 2024)

Overall, salaried employment (over 29%) and daily paid labour (over 23%) are significant income sources across all categories, followed by owning a business (over 21%) and pensions (nearly 17%).

Table 2.7. Nature of households by income category

Income category	House without a garden	House with Garden	Flats/scheme	Total
Low-income class	121	2	1	124
	97.6%	*1.6%	0.8%	100.0%
Middle-income class	87	27	1	115
	75.7%	23.5%	0.9%	100.0%
High-income class	48	13	2	63
	76.2%	20.6%	3.2%	100.0%
Total	**256**	**42**	**4**	**302**
	84.8%	13.9%	1.3%	100.0%

*Row percentage
(Source: Survey data, 2024)

Overall, the predominant household type across all income categories is houses without a garden (nearly 85%). Houses with a garden make up nearly 14%, while flats/schemes account for only over 1%.

Table 2.8. Key decision maker of the household by income category

Income category	Wife and husband together	Husband	Wife	Father	Total
Low-income class	37	62	23	2	124
	29.8%	*50.0%	18.5%	1.6%	100.0%
Middle-income class	67	28	20	0	115
	58.3%	24.3%	17.4%	0.0%	100.0%
High-income class	42	12	9	0	63
	66.7%	19.0%	14.3%	0.0%	100.0%
Total	**146**	**102**	**52**	**2**	**302**
	48.3%	33.8%	17.2%	0.7%	100.0%

*Row percentage
(Source: Survey data, 2024)

The data shows that across the entire sample, decision-making is most commonly a joint effort between the husband and wife (over 48%). Husbands are the sole decision-makers in nearly 34% of the total, while wives independently make decisions in over 17.2% of the sample. Fathers are rarely the sole decision-makers, with only 2 households (0.7%) reporting this arrangement.

2.2. Discussion

To validate the comparability of the baseline and present study samples, the socio-demographic characteristics of respondents from both studies are presented side by side. The analysis focuses on ethnicity, religion, education, household decision-making, income sources, employment patterns, and additional factors unique to the present study, such as family size and housing types. By examining these dimensions, the discussion underscores the alignment between the two samples and highlight any minor variations.

Socio-Demographic details of the sample -Baseline Study

The majority of respondents of the Baseline Study in the selected local councils were identified to be Sinhalese, followed by minority ethnic groups, including Tamils, Muslims, and Moors. In terms of religious affiliation, Buddhism is the predominant faith among respondents, reflecting the national trend in Sri Lanka. Other religions practiced include Hinduism, Islam, Roman Catholicism, and (non-Roman Catholic) Christianity, indicating the religious diversity within the study population.

A significant proportion of respondents in the study had received formal education. However, educational attainment varies notably across income groups. Respondents from middle- and high-income households had achieved higher levels of education compared to those from low-income settlements, where only a small proportion of individuals have received formal education. The majority of respondents without formal education are concentrated in low-income areas, highlighting the disparities in access to education based on socio-economic status.

The study findings show that in most households, major decisions are taken jointly, particularly by spouses. This reflects broader cultural practices and aligns with existing research on decision-making dynamics in Sri Lankan households. The primary sources of income among respondents are salaried employment and own business activities, with these forms of employment being more prevalent in middle- and high-income households. In contrast, all respondents engaged in daily paid labour belong to low-income households. The baseline study did not collect specific data on age, family size or the nature of housing, which limits comparisons in these areas with subsequent studies.

Socio-Demographic details of the sample - Present Study

The age distribution of the present study reveals that the majority of respondents are middle-aged, with the largest groups falling between 41-60 years. Ethnically, the respondents are diverse, with Sinhalese being the majority, followed by Tamil and Moor communities. This diversity is mirrored in religious affiliations, where Buddhism is the predominant faith, followed by Hinduism, Roman Catholicism, and Islamism. The distribution of family sizes indicates that most households consist of three to five members. Educational attainment among respondents shows that a significant majority have completed secondary education, while higher education levels are less common.

Income sources are diverse, with salaried employment and daily paid labour being the most significant. Business ownership and pensions also contribute notably, indicating a mix of formal and informal economic activities across the income classes. The predominant household type is houses without a garden, with a small percentage living in flats or schemes, reflecting the urbanized nature of the study area. The decision-making within households is most commonly a joint effort between the husband and wife followed by a significant portion of households where husbands are the primary decision-makers.

The socio-demographic profiles of the baseline and present study samples are largely comparable, ensuring the validity of analyses across the two datasets. Minor differences exist between the two samples, such as the inclusion of age distribution, family size, and housing type

in the present study. These new data points enhance the depth of the present study without compromising comparability, as the core socio-demographic variables align closely with those of the baseline study.

CHAPTER 3 - STATUS OF WASTE MANAGEMENT OF HOUSEHOLDS IN THE DMMC

3.1. Introduction

This chapter provides an in-depth examination of waste management practices in households selected within the DMMC including neighbourhood cleanliness, and residents' satisfaction with waste management activities. The chapter also investigates the waste management mechanisms employed, such as collection, segregation, and disposal. The analysis in this chapter treats income class as the independent variable as it has the most significant influence over the dependent variables. The data presented in the following chapter was also tabulated using religion, ethnicity and the highest education level as the independent variable. However, the tabulations revealed that dependent variables relating to household MSWM are not significantly influenced by religion, ethnicity or education level.

3.2. Primary household waste manager

Table 3.1. Primary household waste manager by income class

Income category	Wife	Mother	Wife and husband together	Husband	Male domestic worker	Female Domestic worker	Daughter	Son	Sister	Total
Low-income class	89	12	8	7	0	2	3	2	1	124
	*71.8%	9.7%	6.5%	5.6%	0.0%	1.6%	2.4%	1.6%	0.8%	100.0%
Middle-income class	65	12	8	7	11	8	2	1	1	115
	56.5%	10.4%	7.0%	6.1%	9.6%	7.0%	1.7%	0.9%	0.9%	100.0%
High-income class	40	4	5	5	6	1	1	1	0	63
	63.5%	6.3%	7.9%	7.9%	9.5%	1.6%	1.6%	1.6%	0.0%	100.0%
Total	**194**	**28**	**21**	**19**	**17**	**11**	**6**	**4**	**2**	**302**
	64.2%	9.3%	7.0%	6.3%	5.6%	3.6%	2.0%	1.3%	0.7%	100.0%

*Row percentage
(Source: Survey data, 2024)

The present study shows that the majority of respondents across all income categories indicated that the wife is the primary household waste manager, constituting over 64% of the total. The mother follows as the next most common household waste manager, with over 9% of respondents across all income classes. Combining the wife and husband together as household waste managers accounts for 7% of the total. This aligns closely with the baseline study, which found that 67% of households reported the wife as the primary waste manager. The consistency between these findings suggests a stable pattern in household waste management roles over

time. Overall, both studies underscore the prominent role of women, particularly the wife, in managing household waste.

3.3. Opinion on the cleanliness of the neighbourhood

Table 3.2. Opinion on the cleanliness of the neighbourhood by income category

Income Category	Neighbourhood is unclean	Neighbourhood is clean	Total
Low-income class	105	19	124
	84.7%	*15.3%	100.0%
Middle-income class	28	87	115
	24.3%	75.7%	100.0%
High-income class	20	43	63
	31.7%	68.3%	100.0%
Total	**153**	**149**	**302**
	50.7%	49.3%	100.0%

*Row percentage
(Source: Survey data, 2024)

Table 3.2 presents opinions on the cleanliness of the neighborhood, segmented by income category. In the low-income class, nearly 15% of respondents perceive their neighborhood as clean, while nearly 85% view it as unclean. In the middle-income class, nearly 76% consider their neighborhood clean, whereas over 24% find it unclean. For the high-income class, over 68% believe their neighborhood is clean, and nearly 32% view it as unclean. Overall, over 49% of all respondents view their neighborhood as clean, while nearly 51% consider it unclean. This data reflects a notable variation in perceptions of cleanliness across income categories, with higher-income individuals generally feeling more positive about neighborhood cleanliness compared to lower-income individuals.

In the baseline study, 81% of respondents reported their neighbourhood as clean, with only 19% finding it unclean. This change reflects a significant shift in perceptions of neighbourhood cleanliness. This significant reduction in the satisfaction regarding the cleanliness of the neighbourhood may stem from the disruptions to the Municipal Solid Waste Management activities carried out by the local council caused by the challenges brought on by the economic crisis Sri Lanka is experiencing since late 2021.

Table 3.3. Perceived reasons for the (un-)cleanliness of the neighbourhood by income category (Multiple-response question)

Income Category	Residents cleans the neighbourhood	Waste is dumped on to roadsides	Garbage is thrown into the canals	Municipal council collects waste properly	Drains are blocked and stinks	Lack of frequency in collecting waste by the municipal council	Total
Low-income class	20	66	30	9	13	5	143
	14.0%	46.2%	21.0%	6.3%	9.1%	3.5%	100%
Middle-income class	72	4	25	30	12	11	154
	46.8%	2.6%	16.2%	19.5%	7.8%	7.1%	100%
High- income class	38	2	10	22	15	1	88
	43.2%	2.3%	11.4%	25.0%	17.0%	1.1%	100%
Total	**130**	**72**	**65**	**61**	**40**	**17**	**385**
	33.8%	18.7%	16.9%	15.8%	10.4%	4.4%	100.0%

*Row percentage (Percentages and totals are based on responses.)
(Source: Survey data, 2024)

The reasons for cleanliness and uncleanliness in neighbourhoods across different income categories reflect a mix of resident initiatives, municipal support, and systemic challenges. Regarding cleanliness, low-income respondents predominantly credited efforts by residents, with 14% highlighting community-driven cleaning activities. Additionally, over 6% acknowledged the municipal council's proper waste collection practices, emphasising the dual role of community and institutional contributions in maintaining hygiene. In middle-income areas, nearly 47% attributed cleanliness to resident-driven efforts, including individual and collective cleaning programmes. One middle-income respondent explained:

"In our neighbourhood, residents individually clean their immediate surroundings, including gutters and roadsides. Additionally, we occasionally organize collective cleaning programs, especially before the monsoon season, to prevent the spread of diseases such as Dengue. The local council also encourages residents to keep their surroundings clean and to refrain from disposing of waste on roadsides."

(Semi-structured interviews, 2024)

Similarly, over 43% of high-income respondents highlighted resident-led efforts as the primary factor for cleanliness, while 25% appreciated the municipal council's efficient waste collection services.

Conversely, uncleanliness in neighbourhoods often stemmed from systemic issues, particularly in low-income areas. A significant 21% of low-income respondents identified garbage being thrown into canals as a critical issue, with one respondent elaborating:

"People throwing waste into the canals directly impacts us, as one of the major canals in the DMMC area flows through our neighbourhood. The garbage blocks the canals and gutters, causing our neighbourhood to flood even with a small amount of rain."
(Semi-structured interviews, 2024)

Additionally, over 46% noted waste being dumped on roadsides, while over 9% cited blocked and stinking drains as significant hygiene concerns. High-income respondents reported the fewest issues, with over 11% noting garbage in canals, 17% citing blocked drains, and over 2% identifying roadside waste as a minor concern.

These findings reveal distinct challenges faced by different income groups. While low-income communities grapple with systemic waste management issues, including inadequate infrastructure and improper disposal practices, middle- and high-income neighbourhoods benefit from better resources and proactive community-driven initiatives. However, issues like blocked drains and improper waste disposal in the canal remain concerns across all groups, albeit with varying degrees of severity.

3.4. Household waste management practices

Table 3.4. Segregation of household waste by income class

Income category	Yes	No	Total
Low-income class	124	0	124
	*100.0%	0.0%	100.0%
Middle-income class	114	1	115
	99.1%	0.9%	100.0%
High-income class	63	0	63
	100.0%	0.0%	100.0%
Total	**301**	**1**	**302**
	99.7%	0.3%	100.0%

*Row percentage
(Source: Survey data, 2024)

The data on household waste segregation by income class shows near-universal compliance, with nearly 100% of households over all income classes practicing waste segregation. All respondents in the low- and high-income classes report segregating their waste, representing 100% compliance within those groups. This finding aligns with the baseline study where over 95%

of the respondents stated that they segregate waste. The almost universal adherence to segregation of waste over a long period of time stems from the adaptation of compulsory segregation of municipal waste into dry and wet waste since the collapse of the Meethotamulla Waste dumping site. The DMMC stringently practices this policy and has trained the formal waste workers of the local council to refrain from collecting waste if not properly segregated.

Table 3.5. Type of service provider by income category (Dry Waste)

Income category	Handing over to DMMC	Burning	Disposing to a neighbourhood collection point	Disposing to the waste management point in the flat or the scheme	Total
Low-income class	117	6	1	0	124
	*94.4%	4.8%	0.8%	0.0%	100.0%
Middle-income class	111	3	0	1	115
	96.5%	2.6%	0.0%	0.9%	100.0%
High-income class	61	1	1	0	63
	96.8%	1.6%	1.6%	0.0%	100.0%
Total	**289**	**10**	**2**	**1**	**302**
	95.7%	3.3%	0.7%	0.3%	100.0%

*Row percentage
(Source: Survey data, 2024)

Table 3.5 illustrates the distribution of dry waste disposal methods by income category among the surveyed households. The majority of households across all income categories hand over their dry waste to the Dehiwala-Mt. Lavinia Municipal Council (DMMC), with over 94% of low-income, over 96% of middle-income, and nearly 97% of high-income households using this service. A small percentage of households opt for burning their waste. Disposing of waste at a neighbourhood collection point or at the waste management point in a flat or scheme is minimal across the board, with very few households in these categories.

Furthermore, the findings from the present study closely mirror those from the baseline study regarding the types of service providers for the disposal of dry and wet waste. In both studies, the DMMC emerges as the predominant service provider, with 96% in the baseline study relying on the DMMC for dry waste disposal. Similarly, for wet waste management, the majority of respondents, comprising 98% of the total, reported the municipal council as the main service provider. This consistency highlights the significant role that the municipal council plays in managing waste for the residents.

Table 3.6. Frequency of dry waste collection by income category

Income category	Once every week	Twice every week	Once every two weeks	Is not collected at all	Total
Low-income class	120	2	1	1	124
	96.8%	1.6%	0.8%	*0.8%	100.0%
Middle-income class	101	13	1	0	115
	87.8%	11.3%	0.9%	0.0%	100.0%
High-income class	59	4	0	0	63
	93.7%	6.3%	0.0%	0.0%	100.0%
Total	**280**	**19**	**2**	**1**	**302**
	92.7%	6.3%	0.7%	0.3%	100.0%

*Row percentage
(Source: Survey data, 2024)

Table 3.6 provides an overview of the frequency of waste collection across different income categories. For the low-income class, waste is collected once every week for about 97%, and twice every week for approximately 2%. The middle-income class shows no cases of waste collection being entirely absent, with nearly 88% having waste collected once every week, and over 11% receiving the service twice every week. The high-income class reports no cases of waste collection being absent, with around 94% having it once every week, and about 6% receiving the service twice a week. Overall, the table shows that nearly 93% of the total respondents have a once-a-week waste collection cycle. This data highlights that while weekly waste collection is prevalent across all income groups, there is a notable variance in the frequency of collection, particularly between low-income and higher-income classes.

A respondent from the middle-income class discussed how the reduced frequency impacts the quality of waste management activities of the local council. He stated that he has noticed a trend of waste collection vehicles breaking down.

"One of the main reasons for the reduction in collection days, in my opinion, is the frequent breakdown of the DMMC's waste collection vehicles. This issue has worsened, especially after the economic crisis. I've heard that the council is struggling to fund the necessary repairs due to its financial difficulties."

(Semi-structured interviews, 2024)

Table 3.7. Frequency of wet waste collection by income category

Income category	Twice every week	Once every week	Three times every week	Once every two weeks	Daily	Total
Low-income class	80	42	2	0	0	124
	64.5%	33.9%	1.6%	*0.0%	0.0%	100.0%
Middle-income class	98	15	0	2	0	115
	85.2%	13.0%	0.0%	1.7%	0.0%	100.0%
High-income class	44	12	3	3	1	63
	69.8%	19.0%	4.8%	4.8%	1.6%	100.0%
Total	**222**	**69**	**5**	**5**	**1**	**302**
	73.5%	22.8%	1.7%	1.7%	0.3%	100.0%

*Row percentage
(Source: Survey data, 2024)

In terms of the frequency of wet waste collection across different income categories it was revealed that in the low-income class, nearly 34% have their waste collected once every week, over 64% have it collected twice every week, and nearly 2% have it collected three times every week. In the middle-income class, 13% have their waste collected once every week, and over 85% twice every week, with no respondents having it collected three times a week or daily. For the high-income class, nearly 5% have waste collected once every two weeks, 19% once every week, nearly 70% twice every week, nearly 5% three times a week. Overall, the table shows that the majority of respondents across all income categories have their waste collected twice every week.

In contrast, the baseline study showed that 63% of respondents from the DMMC area reported waste collection occurring four days per week, while 37% reported collection twice a week. Therefore, it is evident that since the baseline survey a significant reduction can be observed in the frequency of waste collection. This reduction in the frequency can be attributed to the disruptions to waste collection activities caused by the onset of the financial crisis in Sri Lanka. As a result of the financial crisis funding from the central government for local councils including for MSWM activities dried up almost completely. Therefore, the local councils have lost a financial lifeline that previously supported its MSWM activities which has led to the reduction of the quality of the services provided by the council.

Table 3.8. Making a payment for dry waste collection by income category

Income category	No	Yes	Total
Low-income class	40	84	124
	32.3%	*67.7%	100.0%
Middle-income class	101	14	115
	87.8%	12.2%	100.0%
High-income class	47	16	63
	74.6%	25.4%	100.0%
Total	**188**	**114**	**302**
	62.3%	37.7%	100.0%

*Row percentage
Source: Survey data, 2024

Table 3.8 illustrates the distribution of households making payments for waste collection by income category. In the baseline study, over 14% of respondents reported making some kind of payment for waste collection. In contrast, the present study reveals that across all income categories, nearly 38% of respondents reported having made a payment for dry waste collection to waste collectors informally, while over 62% did not. The percentages of making payments for wet waste collection is the same.

The data shows that in the low-income class, nearly 68% of households make payments, while over 32% do not. In the middle-income class, only over 12% of households make payments, and nearly 88% do not. In the high-income class, over 25% of households make payments, whereas nearly 75% do not. This table indicates that a higher proportion of low-income households tend to make payments for waste collection compared to middle-income and high-income households. This shift indicates a notable increase in the number of households, that pay for waste collection services.

A respondent representing the low-income class elaborated on a key reason for making a payment for waste collection to waste collectors.

"After the COVID-19 pandemic and the subsequent economic crisis, life has become difficult for everyone, including waste workers. I voluntarily give about 100 LKR each month to the collectors, simply out of appreciation for their hard work and service. However, I've also noticed that waste workers now request payments more frequently than before. As residents, we often feel the need to stay on good terms with them, so we give money when asked. These payments are usually small and are more seen as a gesture of goodwill than an actual payment."

(Semi-structured interviews, 2024)

Table 3.9. Monthly payment amount for dry waste collection by income category

Income category	Rs 50-100	Rs 100-500	Rs 0-50	Rs 500-1000	Rs 1000-5000	Total
Low-income class	59	11	14	0	0	84
	70.2%	13.1%	*16.7%	0.0%	0.0%	100.0%
Middle income class	2	7	0	2	3	14
	14.3%	50.0%	0.0%	14.3%	21.4%	100.0%
High income class	7	7	1	1	0	16
	43.8%	43.8%	6.3%	6.3%	0.0%	100.0%
Total	68	25	15	3	3	114
	59.6%	21.9%	13.2%	2.6%	2.6%	100.0%

*Row percentage
(Source: Survey data, 2024)

The data shows that the majority of low-income households (over 70%) pay between Rs 50-100, with smaller proportions paying Rs 0-50 (nearly 17%) or Rs 100-500 (over 13%). No low-income household pays more than Rs 500. In the middle-income category, 50.0% of households pay between Rs 100-500, while the rest are distributed between Rs 50-100 (over 14%), Rs 500-1000 (over 14%), and Rs 1000-5000 (over 21%). Notably, no middle-income households pay Rs 0-50. High-income households are more evenly spread across different payment ranges, with nearly 44% paying either Rs 50-100 or Rs 100-500, and smaller percentages paying Rs 0-50 (over 6%) and Rs 500-1000 (over 6%). No high-income households pay Rs 1000-5000.Overall, nearly 60% of the households pay Rs 50-100, followed by nearly 22% paying Rs 100-500. Only a small fraction of households pays more than Rs 500. This table indicates that payment amounts for dry waste collection generally increases with income, with higher-income households more likely to pay higher amounts.

For wet waste collection, the majority of payments fall within the Rs 50-100 range, accounting for over 56% of total payments, indicating this as the most common payment bracket. A smaller segment of respondents, over 12%, made payments between Rs 0-50, while over 27% reported paying between Rs 100-500, showcasing a range of financial contributions toward wet waste management services. These findings suggest that while there is a common threshold for waste collection payments, some households are contributing significantly more.

Table 3.10. Earning an income from dry waste by income category

Income category	No	Yes	Total
Low-income class	66	58	124
	53.2%	*46.8%	100.0%
Middle-income class	114	1	115
	99.1%	0.9%	100.0%
High-income class	63	0	63
	100.0%	0.0%	100.0%
Total	**243**	**59**	**302**
	80.5%	19.5%	100.0%

*Row percentage
(Source: Survey data, 2024)

The data reveals that a significant portion of low-income households (nearly 47%) earn an income from dry waste, while the remaining portion of over 53% do not. Among the middle-income households, only nearly 1% earn an income from dry waste, and none of the high-income household's report earning an income from this source. In total, over 19% of the households surveyed earn an income from dry waste, while over 80% do not. When looking at the column percentages, it's clear that the majority of households earning an income from dry waste belong to the low-income category (over 98%). Therefore, the practice of earning an income from dry waste is predominantly observed in low-income households in the sample.

Table 3.11. Gender of the waste collectors by income category

Income Category	Male	Total
Low-income class	124	124
	100.0%	100.0%
Middle-income class	115	115
	100.0%	100.0%
High-income class	63	63
	100.0%	100.0%
Total	**302**	**302**
	100.0%	100.0%

*Row percentage
(Source: Survey data, 2024)

Table 3.11 presents the gender distribution of dry waste collectors across different income categories. According to the survey data, all dry waste collectors in the low-income, middle-income, and high-income categories are male, with each category showing 100% male representation in the present study. This highlights a complete gender homogeneity among the dry waste collectors of DMMC. In the baseline study, the majority of respondents reported that

most waste collectors are male. The total workforce in waste work comprises of over 88% of the total workforce, with only about 11% of females. This suggests a clear gender imbalance in the workforce for dry waste collection, with no female collectors reported in either the baseline or current studies. This imbalance may stem from the fact that female waste workers that were employed in the local council area at the time of the baseline study retiring after completing their service period and the council being unable to recruit new female waste collectors owing to lack of funding.

3.5. Opinions on waste collection activities

Table 3.12. Opinions on waste collection activities by income category

Income Category	Satisfied	Unsatisfied	Total
Low-income class	93	31	124
	*75.0%	25.0%	100.0%
Middle-income class	91	24	115
	79.1%	20.9%	100.0%
High-income class	43	20	63
	68.3%	31.7%	100.0%
Total	**227**	**75**	**302**
	75.2%	24.8%	100.0%

*Row percentage
(Source: Survey data, 2024)

In the low-income class, 75% of respondents express satisfaction with waste collection activities, while 25% are unsatisfied. In the middle-income class, over 79% are satisfied with waste collection, and nearly 21% are unsatisfied. Among the high-income class, over 68% report being satisfied with waste collection activities, and nearly 32% are unsatisfied.

According to the baseline study, 84% of respondents were satisfied with waste collection services in their neighbourhood. In comparison, the present study reveals that over 75% of respondents are satisfied, while nearly 25% express dissatisfaction. Satisfaction is generally evident across income categories, with middle-income individuals showing the highest level of satisfaction and high-income individuals reporting the lowest proportion of satisfaction. The nearly 10% reduction in satisfaction with waste collection services between the baseline and present studies indicates a shift in respondent perceptions over time.

Table 3.13. Reasons for the opinion on waste collection by income category*

(Multiple-response question)

Income Category	Council collects waste duly and on time	Sometimes the local council does not collect waste on due date	Residents throwing waste in to canals	If you give waste workers money, they collect even mixed waste	Total
Low-income class	107	27	5	4	143
	74.8%	*18.9%	3.5%	2.8%	100%
Middle-income class	122	17	8	6	153
	79.7%	11.1%	5.2%	3.9%	100%
High-income class	75	14	0	2	91
	82.4%	15.4%	0.0%	2.2%	100%
Total	**304**	**58**	**13**	**12**	**387**
	78.6%	15.0%	3.4%	3.1%	100.0%

*Row percentage (Percentages and totals are based on responses.)
(Source: Survey data, 2024)

Table 3.13 provides insights into the reasons behind opinions on waste collection by income category. Local council falling short of duly collecting waste, residents throwing waste to canals and waste workers willingness to collect even mixed waste if they are given money, are among the reasons for unsatisfaction on MSWM, while reasons for satisfaction include local council duly collecting waste. The practice of formal waste workers collecting mixed waste in exchange for money may contribute to resident satisfaction due to the convenience it offers, as it eliminates the need for waste segregation. However, individuals who raised this as a concern may represent those who support waste segregation and are worried about the environmental impact of unsegregated waste.

Among low-income respondents, nearly 19%, over 11% and 15% in the middle- and high-income classes respectively, reported that the local council sometimes fails to collect waste on the due date. A smaller percentage (over 3%) noted that waste is thrown into canals, and nearly 3% mentioned that giving money to waste workers ensures the collection of even mixed waste. A higher percentage of this group reported incidences (over 5%) of waste being thrown into canals and a slightly higher percentage (nearly 4%) reported the actions of waste workers as reasons for mixed waste collection.

A respondent from the middle-income class pointed out how the actions of some waste workers can affect the waste segregation efforts of the residents and the local council.

"If you give a little money, around 100 or 200 LKR, you can easily convince waste workers to collect mixed waste. I've seen some waste collectors place mixed waste bags under segregated

waste. Such behaviour, along with residents paying (money) instead of properly segregating, undermines the entire purpose of waste segregation. It discourages residents from segregating their waste since it's much easier to simply pay the collectors."
(Semi-structured interviews, 2024)

Overall, across all income categories, the most common reason for a positive opinion on waste collection is the belief that the council collects waste duly and on time. However, concerns about the council not collecting waste on the due date were most pronounced in the low- and high-income groups, while the middle-income group showed a relatively higher concern about waste being thrown into canals and the necessity of bribes to ensure mixed waste collection.

These issues point to specific areas where waste management services are falling short, particularly affecting lower-income respondents. The findings are consistent with the baseline study, which also highlighted that dissatisfaction was more pronounced among lower-income groups. This alignment indicates that despite overall positive perceptions of waste collection services, significant challenges remain, particularly in addressing the needs and concerns of lower-income residents. In the low income areas there remains challenges such as small roads making it difficult for the waste collection vehicles to carry out door to door waste collection. As a result, residents from certain low-income areas have to hand over waste to the collection vehicles at different locations of their neighbourhood. Overall, these conditions have not changed in the low-income areas that might be a result of their lack of ability to advocate for better services compared to middle- and high-income respondents.

3.6. Opinions on problems with waste collection services and workers

Table 3.14. Problems with waste collection services by income category

Income Category	No problem	Number of collection dates aren't enough	DMMC do not collect waste from narrow roads	Do not collect waste on designated dates	Municipality do not clean the roadsides	Refuse to collect glass waste	Total
Low-income class	87	19	8	3	4	4	125
	*69.6%	15.2%	6.4%	2.4%	3.2%	3.2%	100%
Middle-income class	92	7	6	6	1	4	116
	79.3%	6.0%	5.2%	5.2%	0.9%	3.4%	100%
High-income class	46	1	2	5	7	4	65
	70.8%	1.5%	3.1%	7.7%	10.8%	6.2%	100%
Total	**225**	**27**	**16**	**14**	**12**	**12**	**306**
	73.5%	8.8%	5.2%	4.6%	3.9%	3.9%	100.0%

*Row percentage
(Source: Survey data, 2024)

Table 3.14 outlines problems with waste collection services across different income categories. Among the low-income class, nearly 70% report no problems with waste collection services, while a small percentage note specific issues: over 3% mentioned that the municipality does not clean the roadsides, over 15% find the number of collection dates insufficient, over 6% note that DMMC does not collect waste from narrow roads, over 3% indicate refusal to collect glass waste, and over 2% report waste not being collected on designated dates.

A respondent from a low-income class discussed how the local council fails to collect waste from narrow roads in the municipality.

"You can see that most of the roads in this area are very narrow. It's the people's fault for encroaching on the roadsides when building their houses. However, the local council should have monitored housing construction better. Now, they don't collect waste from such narrow roads, especially in our area. We have to take our waste to the main road to hand it over to the collection vehicle."

(Semi-structured interviews, 2024)

For the middle-income class, over 79% do not perceive any issues, with nearly 1% citing the municipality's failure to clean roadsides, nearly 6% finding collection dates inadequate, over 5% noting non-collection of waste from narrow roads, over 5% mentioning missed collection dates, and over 3% experiencing refusal to collect glass waste. The high-income class shows a similar trend, with nearly 71% reporting no problems, nearly 11% noting roadside cleaning issues, nearly

8% mentioning missed collection dates, over 6% experiencing refusal to collect glass waste, over 3% reporting non-collection from narrow roads, and over 2% finding collection dates insufficient. Overall, the most frequently reported problem is insufficient collection dates, noted by nearly 9% of respondents, while issues such as refusal to collect glass waste and non-collection on designated dates are less commonly reported. These findings align with the baseline study's results.

Table 3.15. Problems with waste collection workers by income category

Income Category	No problem	The collection vehicle workers smell foul	DMMC does not remove litter from the street	If there is more waste than usual, you have to give money to take it	Workers shout at people	DMMC dumps waste on the road while collecting waste	Total
Low-income class	102	12	3	3	5	0	125
	*81.6%	9.6%	2.4%	2.4%	4.0%	0.0%	100%
Middle-income class	58	36	7	6	6	3	116
	50.0%	31.0%	6.0%	5.2%	5.2%	2.6%	100%
High-income class	41	3	7	6	4	2	63
	65.1%	4.8%	11.1%	9.5%	6.3%	3.2%	100%
Total	**201**	**51**	**17**	**15**	**15**	**5**	**304**
	66.1%	16.8%	5.6%	4.9%	4.9%	1.6%	100.0%

*Row percentage
(Source: Survey data, 2024)

Table 3.15 illustrates the problems reported with waste collection workers by income category. In the low-income class, nearly 82% of respondents reported no issues, while nearly 10% complained about the foul smell from collection vehicle workers, 4% reported that workers shout at people, over 2% mentioned that DMMC does not remove litter from the street, and over 2% said they had to pay extra if there was more waste than usual. Among the middle-income class, 50% reported no problems, but a significant 31% complained about the smell from collection vehicle workers. Additionally, 6% noted that DMMC does not remove litter, over 5% indicated extra charges for additional waste, over 5% reported workers shouting, and nearly 3% mentioned that workers spill waste on the road while collecting. In the high-income class, over 65% reported no issues, while over 11% mentioned the non-removal of litter, over 9% noted extra charges, over 6% reported shouting by waste workers, nearly 5% complained about the smell, and over 3% reported workers spilling waste on the road.

Overall, the most common issue across all income categories is the foul smell from collection vehicle workers, reported by nearly 17% of respondents. This may stem from the discourse on

MSWM in general among the middle-income residents who are the majority of the respondents that complained about the smell.

Table 3.16. Opinion on change of the waste management sector in the last three years by income category

Income Category	There is no change	Has improved	Don't know	The situation has worsened	Total
Low-income class	78	37	6	3	124
	62.9%	*29.8%	4.8%	2.4%	100.0%
Middle-income class	48	63	2	2	115
	41.7%	54.8%	1.7%	1.7%	100.0%
High-income class	37	23	2	1	63
	58.7%	36.5%	3.2%	1.6%	100.0%
Total	**163**	**123**	**10**	**6**	**302**
	54.0%	40.7%	3.3%	2.0%	100.0%

*Row percentage
(Source: Survey data, 2024)

Table 3.16 provides opinions on the waste management sector over the past three years, categorized by income level. Among the low-income class, over 30% believe that the waste management sector has improved, while nearly 63% feel there has been no change, and over 2% think the situation has worsened. Nearly 5% of respondents are unsure. In the middle-income class, nearly 55% think the sector has improved, nearly 42% see no change.

A middle-income respondent expounded on the strict enforcement of regulations in the last three years.

"After COVID-19, the practice of not segregating waste continued because the local council collected mixed waste during the immediate post-COVID period. However, local council officials, including Public Health officers and waste collectors, visited every house in our area to inform us that segregation is mandatory. They warned that failing to comply with this regulation could result in hefty fines. Additionally, they checked the waste bins at homes and inspected the surroundings for dengue mosquito breeding sites. A few of my neighbours were even fined for non-compliance."
(Semi-structured interviews, 2024)

With the local council functioning under the commissioner instead of the elected members of the councils, as these were dissolved in late 2023. The middle-income residents seem to have been able to obtain the support from the local council by advocating for themselves. Nevertheless, low-income respondents who are used to obtaining the support of the elected members have failed to obtain the support of the officers that currently manage the council in this period. For the high-

income class, nearly 37% feel that the sector has improved, while nearly 2% think it has worsened. Nearly 59% see no change, and over 3% are unsure. Overall, nearly 41% of all respondents believe that the waste management sector has improved, 2% think it has worsened, 54% see no change, and over 3% are uncertain.

3.7. Opinion on changes in waste collection in the COVID-19 period

Table 3.17. Opinion on changes in waste collection in the COVID-19 period by income category

Income Category	Waste Management did not change	Waste management changed	Don't Know	Total
Low-income class	65	54	5	124
	52.4%	*43.5%	4.0%	100.0%
Middle-income class	97	15	3	115
	84.3%	13.0%	2.6%	100.0%
High-income class	49	12	2	63
	77.8%	19.0%	3.2%	100.0%
Total	**211**	**81**	**10**	**302**
	69.9%	26.8%	3.3%	100.0%

*Row percentage
(Source: Survey data, 2024)

Table 3.17 illustrates the respondents' opinions on whether waste management activities changed during the COVID-19 period, categorized by income level. In the low-income class, over 52% feel that there was no change, while over 43% of respondents believe that waste management activities changed, and 4% are unsure. For the middle-income class, over 84% believe there was no change, while 13% observed changes in waste management, and nearly 3% are unsure. Among the high-income class, nearly 78% feel there was no change in waste management activities while 19% think observed a change, and over 3% are unsure. Overall, nearly 70% of all respondents observed no changes, while nearly 27% of all respondents observed changes in waste management during the COVID-19 period. Overall, more than 3% are uncertain. The perceptions vary by income category, with higher-income respondents more likely to perceive stability in waste management, while a significant proportion of low-income respondents observed changes.

In comparison, the baseline study revealed that 85% of respondents had felt that no changes in waste collection occurred during the COVID-19 period. This discrepancy suggests that while the baseline study showed a strong consensus on the stability of waste management practices during the pandemic, the present study highlights a more varied perception of change, particularly among lower-income groups. This may stem from the compound impacts of the

COVID-19 pandemic and the subsequent economic crisis affecting the quality of the services provided by the local councils.

Table 3.18. Opinion on changes in waste collection activities in the COVID-19 period by income category (Multiple-response question)

Income Category	Waste collection was temporarily disrupted	Municipal Council collected unsegregated waste	Municipal started collecting medical waste separately	The number of waste collectors from the council reduced	Municipal council started no contact waste collection	The frequency of waste collection reduced	Total
Low-income class	11	19	7	14	5	4	60
	18.3%	31.7%	11.7%	23.3%	8.3%	6.7%	100.0%
Middle-income class	3	3	5	1	2	3	17
	17.6%	17.6%	29.4%	5.9%	11.8%	17.6%	100.0%
High-income class	6	0	3	1	1	1	12
	50.0%	0.0%	25.0%	8.3%	8.3%	8.3%	100.0%
Total	**20**	**22**	**15**	**16**	**8**	**8**	**89**
	22.5%	24.7%	16.9%	18.0%	9.0%	9.0%	100.0%

*Row percentage (Percentages and totals are based on responses.)
(Source: Survey data, 2024)

In the low-income group, over 18% reported that waste collection was temporarily disrupted, while nearly 32% noted that the municipal council collected unsegregated waste. Nearly 12% reported that medical waste was collected separately, over 8% of respondents observed the initiation of no-contact waste collection, and nearly 7% noted a reduction in the frequency of waste collection. Additionally, over 23% observed a reduction in the number of waste collectors from the council. This group represented a significant portion of those reporting issues in the MSWM across the various categories, with particularly high percentages for unsegregated waste collection (over 86%) and reduced number of waste collectors (over 87%). For the middle-income group, nearly 18% reported a temporary disruption in waste collection and the collection of unsegregated waste. Nearly 12% observed no-contact waste collection, and over 29% noted separate medical waste collection, which was higher compared to the other income categories. Additionally, nearly 18% mentioned a reduction in waste collection frequency, and nearly 6% reported a decrease in the number of waste collectors.

Among the high-income respondents, 50% reported temporary disruptions in waste collection, with no one noting unsegregated waste collection by the municipal council. 25% noted separate medical waste collection and over 8% observed no-contact waste collection. Furthermore, over 8% reported a reduction in both the frequency of waste collection and the number of waste collectors. Overall, the most commonly reported change was the collection of unsegregated waste by the municipal council, especially among low-income respondents. Temporary

disruptions in waste collection were more frequently noted by the high-income group. The initiation of no-contact waste collection and separate medical waste collection were observed to varying degrees across all income categories, with the middle-income group reporting the highest incidences of segregated medical waste collection.

These findings indicate a shift in waste management practices during the pandemic, with the present study noting a broader range of changes and disruptions compared to the baseline study. The introduction of new practices such as no-contact waste collection and separate medical waste handling in the present study reflects an adaptation to the pandemic's challenges.

Table 3.19. Opinion on making changes to the waste management activities in the household after the COVID-19 pandemic by income category (Multiple response question)

Income Category	Did not made any changes to the household waste management	Made changes to the household waste management	Total
Low-income class	84	40	124
	67.7%	*32.3%	100.0%
Middle-income class	96	19	115
	83.5%	16.5%	100.0%
High-income class	52	11	63
	82.5%	17.5%	100.0%
Total	232	70	302
	76.8%	23.2%	100.0%

*Row percentage
(Source: Survey data, 2024)

Table 3.19 presents the respondents' opinions on whether they made changes to their household waste management activities after the onset of the COVID-19 virus, categorized by income level. In the low-income class, over 32% of respondents reported making changes, while nearly 68% did not. For the middle-income class, about over 16% made changes to their waste management activities, whereas nearly 84% did not. Among the high-income class, over 17% indicated they made changes, while around over 82% did not. Overall, just over 23% of all respondents made changes to their household waste management after the COVID-19 virus, while nearly 77% did not. The likelihood of making changes appears to decrease with higher income categories.

Table 3.20 Changes made to the waste management activities in the household after the COVID-19 virus by income category (Multiple response question)

Income Category	Started composting kitchen waste at home	Started to segregate medical waste separately	Did not hand over waste to local council, but buried at home	Started burning waste	Total
Low-income class	16	14	8	1	39
	41.0%	35.9%	20.5%	2.6%	100.0%
Middle-income class	11	5	0	2	18
	61.1%	27.8%	0.0%	11.1%	100.0%
High-income class	3	3	0	3	9
	33.3%	33.3%	0.0%	33.3%	100.0%
Total	**30**	**22**	**8**	**6**	**66**
	45.5%	33.3%	12.1%	9.1%	100.0%

*Row percentage (Percentages and totals are based on responses.)
(Source: Survey data, 2024)

Table 3.20 presents the changes made to household waste management activities after the COVID-19 pandemic, categorized by income level. It should be noted that 4 respondents who had made changes to the waste management activities had not responded to this particular inquiry. Among the low-income group, the most common change was the initiation of composting kitchen waste at home, reported by 41% of respondents. Segregating medical waste separately was noted by nearly 36%, while over 20% opted to bury waste at home rather than handing it over to the local council. Nearly 3% started burning waste. This group made up the majority of those reporting burning waste at home (100%) and composting kitchen waste (over 53%).

In the middle-income group, over 61% of respondents began composting kitchen waste at home, making it the most frequently reported change in this category. Separating medical waste was undertaken by nearly 28%, and over 11% started burning waste. No respondents in this group reported burying waste at home. This group constituted nearly 37% of all respondents who began composting kitchen waste and 33% of those who started burning waste. The high-income respondents, reported over 33% each in starting to segregate medical waste, composting kitchen waste, and burning waste, with none reporting burning waste at home.

Overall, the most common change across all income groups was the initiation of composting kitchen waste at home, reported by over 45% of respondents. Segregating medical waste was the next most frequent change, noted by over 33%. A smaller percentage opted to bury (over 12%) or burn (over 9%) waste at home. The low-income group showed the highest level of change in waste management activities, particularly in composting and segregating medical waste.

Table 3.21. Propositions to improve waste management by income category*

(Multiple response question)

Income Category	Implementing a community waste bin system	Implementing heavy fines for those that dispose waste to canals	Promoting household-based waste management such as composting	Investing in keeping the canals clean	Increasing the frequency of waste collection	Total
Low-income class	25	24	25	32	27	133
	18.8%	18.0%	18.8%	24.1%	20.3%	100.0 %
Middle income class	33	33	20	19	13	118
	28.0%	28.0%	16.9%	16.1%	11.0%	100.0 %
High income class	22	19	11	4	14	70
	31.4%	27.1%	15.7%	5.7%	20.0%	100.0 %
Total	**80**	**76**	**56**	**55**	**54**	**321**
	24.92%	**23.68%**	**17.45%**	**17.13%**	**16.82%**	100.0 %

*Row percentage (Percentages and totals are based on responses.)
(Source: Survey data, 2024)

Table 3.21 highlights the propositions for improving waste management across different income categories. For the low-income class, the highest support is for investing in keeping the canals clean (over 24%), followed by increasing the frequency of waste collection (over 20%). The middle-income class shows a strong preference for both implementing a community waste bin system and imposing fines for canal waste disposal (both at 28.0%). For the high-income class, the most favored strategy is also implementing a community waste bin system (over 31%), followed by heavy fines for canal waste disposal (over 27%). Interestingly, they show the least interest in investing in keeping the canals clean (nearly 6%).Overall, these responses reflect diverse priorities, heavy fines related to canals are more significant for middle and upper classes, while the poorer population tends to prioritize investments in canal infrastructure or municipal cleaning efforts.

3.8. Discussion

The analysis of the present and baseline studies on waste management practices reveals both significant continuities and notable changes over time. Similarities between the two studies indicate a stable pattern in household roles and waste management practices. For instance, both

studies consistently show that across all income categories, the wife is the primary household waste manager, followed by the mother. This consistency highlights the prominent and enduring role of women in managing household waste.

Both studies also underscore the widespread practice of waste segregation. Nearly 100% of respondents in both studies reported segregating household waste into wet and dry categories, irrespective of income class. This near-universal adherence to waste segregation reflects a well-established and consistent approach to waste management due to the strict practice of regulation by the local council. Additionally, both studies confirm the critical role of the municipal council as the primary service provider for waste disposal, for both dry and wet waste. The

municipal council's dominance in waste management services has remained constant, indicating its central role in the community's waste management infrastructure. Nevertheless, it is important to point out that there is a significant increase of composting practices amongst the respondents showing the increased involvement of residents in MSWM activities specifically during the COVID-19 pandemic due to disruption of waste collection and the reduction in the frequency of collection..

However, there are key changes observed in the findings since the baseline study, reflecting shifts in community perceptions and behaviours over time. One of the most significant changes occur in the perception of neighbourhood cleanliness. While 81% of respondents in the baseline study considered their neighbourhood clean, the present study shows a sharp decline, with only 49% of respondents sharing this view. The remaining 51% now perceive their neighbourhood as unclean. This shift is particularly pronounced among lower-income residents, where a substantial majority now view their neighbourhood as unclean. This change indicates growing concerns about cleanliness due to deteriorating conditions of MSWM and insufficient waste management services in lower-income areas.

Changes in satisfaction with waste collection services further highlight shifts in community perceptions. The baseline study found that 84% of respondents were satisfied with waste collection services. However, the present study shows a decline, with only 75% of respondents expressing satisfaction. This growing dissatisfaction is particularly evident among the low- and middle-income categories, suggesting that these groups are experiencing service-related challenges. Reasons influencing the perception of the respondents on neighbourhood cleanliness and overall satisfaction can be explained in relation to the changes in the administration of the local councils and impacts of COVID-19 pandemic and the consequent financial crisis.

In late 2023, local councils in Sri Lanka were dissolved, and the commissioners and secretaries of the respective councils assumed responsibility for continuing council activities, including waste management. This administrative shift may have influenced the reduced satisfaction levels among the low-income class regarding waste management services. Previous studies by the authors (Fernando et al.2023; Fernando & De Silva, 2023) have revealed that residents traditionally conveyed their complaints and requests directly to elected members of their wards. These elected members, in turn, would direct council officials to allocate resources to address these concerns, maintaining a patron-client relationship with the residents (voters). Elected members often followed up on these issues, supporting voter-friendly measures to ensure their constituents' satisfaction. The absence of elected members since the councils' dissolution in 2023 may have disrupted this key communication channel. Without elected representatives advocating on their behalf, residents' concerns might not receive the same attention or prompt action as before.

Another significant change is the frequency of waste collection. The baseline study reported more frequent waste collection schedules, with a majority of households experiencing collections multiple times per week. In contrast, the present study reveals a shift towards less frequent collections. The data also show a notable increase in the proportion of households making payments for waste collection services. In the baseline study, only 14% of respondents reported making payments for waste collection. However, the present study reveals that nearly 38% of respondents now pay for waste collection, with a particularly high percentage (68%) of low-income respondents reporting payments. This shift suggests an increased monetization of waste collection services, potentially reflecting changes in service delivery and the financial demands placed on households. In terms of workforce dynamics, the present study reveals a complete gender imbalance among dry waste collectors, with 100% of the workforce being male. While the baseline study also reported a male-dominated workforce (88% male, 11% female), the present study indicates a further entrenchment of this gender disparity, with no female waste collectors reported.

The impact of the COVID-19 pandemic on waste management practices is another area of interest. In the present study, nearly 27% of respondents perceived changes in waste management during the pandemic, with low-income respondents being the most affected. Key changes reported include the collection of unsegregated waste (25%), temporary disruptions in waste collection (22%), and a reduction in the number of waste collectors (18%) during the pandemic period. This consistency of findings between the studies suggests that the opinions on

the impacts of the pandemic have remained the same, particularly impacting lower-income communities.

Finally, COVID-19 pandemic brought about positive and negative changes in waste management practices. For instance, it encouraged positive behaviours such as household composting (45%), which alleviated the waste burden on municipalities and less desirable practices, such as waste burning, which poses significant risks to air quality and public health. the present study reveals that a significant proportion of households made changes to their waste management practices in response to the pandemic. These contrasting outcomes highlight the need to promote sustainable practices while addressing the harmful ones.

CHAPTER 4 CONCLUSION

The comparative analysis of waste management practices in the DMMC area, set against the backdrop of Sri Lanka's ongoing economic crisis, underscores how households adapt to systemic challenges. This study reveals not only the constraints imposed by the crisis but also the enduring and emergent practices that characterize household waste management under duress.

The economic crisis, marked by Sri Lanka's bankruptcy declaration and reliance on international financial aid, has profoundly affected municipal solid waste management. Central government budget cuts to local councils, restrictions on new recruitments, lack of council elections and stringent expenditure controls have collectively weakened waste management systems. These constraints are evident in the reduction of waste collection frequency from four times a week in the baseline study to only twice weekly in the present study. This decline has, unsurprisingly, led to a sharp drop in resident satisfaction with neighborhood cleanliness and waste management services. While this may be a temporary dip tied to the financial crisis, confidence in local councils could improve as economic conditions stabilize and government restrictions ease.

Amid these challenges, the findings highlight the potency of strict policies and regulations in embedding good waste management practices. Despite temporary disruptions during the COVID-19 pandemic such as the collection of unsegregated waste residents quickly reverted to nearly universal compliance with waste segregation once services normalized. This resilience reflects the success of the compulsory segregation policy introduced in 2018 after the Meethotamulla dumping site collapse. Households have internalized segregation practices through mechanisms such as separate bins for wet and dry waste.

Residents have further demonstrated self-responsibilization by maintaining neighborhood cleanliness, including managing roadside waste and cleaning gutters and composting. The trend towards composting also emerged as a notable adaptation, potentially driven by reduced waste collection frequency. This practice shortens the waste cycle, reduces strain on municipal systems, and represents an increased form of community engagement. Such adaptations should be viewed as complementary to, rather than substitutes for, systemic solutions.

The study also exposes a persistent gender imbalance in the waste management workforce, with no female waste collectors reported in the present study. This regression may be attributed to the retirement of previously employed female workers and the inability of local councils to recruit due to central government restrictions. This imbalance underscores the need for targeted

interventions to address gender inequities in the formal waste management sector, ensuring inclusivity and diversity in workforce composition.

In conclusion, the findings illustrate both the vulnerabilities and adaptive capacities of waste management practices in the DMMC area. The economic crisis has strained municipal systems, resulting in diminished service delivery and resident dissatisfaction. However, community adaptations, driven by policy frameworks and necessity, demonstrate resilience and engagement. Moving forward, local councils must address systemic weaknesses by restoring service frequency, ensuring equitable access to waste management services, and rectifying gender imbalances.

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