អង្គការសហគមន៍តាំងត្នោត
Sahmakum Teang Tnaut Organization · a Cambodian Urban NGO

PHNOM PENH SOLID WASTE MANAGEMENT 2024

A comparison between urban poor settlement locations and general residental areas

SUMMARY

Picture 1: A pile of garbage in target urban poor settlements where interviews were given

This research focused on the challenges of solid waste management in Phnom Penh, highlighting differences between urban poor settlements and general residential areas. Urban waste management is not only a sanitation issue but also impacts public health, quality of life, and sustainable urban development. The study aims to identify specific issues and provides applicable recommendations to relevant parties, especially local authorities, waste collection companies, residents and urban poor settlements to increase the effectiveness of the solid waste management system in the city.

This study is based on a survey of 203 families across 14 target urban poor settlements and general residential areas in Phnom Penh. The research results showed the inefficiencies in key waste collection operations, the gap in public awareness, and the challenges in waste management governance. This study aims to enhance solid waste management effectively and equally within the city and provide policymakers and stakeholders with a clear roadmap to address the problems.

The study reveals that 26 percent of people face a shortage of waste dumping sites such as bins. The shortage of such locations can lead to littering in public spaces, posing health risks and harming the environment. Immediate interventions should prioritise establishing dump sites within or near the urban poor settlements and use small waste collection trucks to access to narrow roads.

Public awareness and compliance with solid waste separation remain limited, with only 30 percent of respondents regularly sorting their wet and dry waste. To address this issue, a public education campaign should prioritize the importance of waste segregation. More than this, waste collection companies have to ensure proper waste segregation and collection practices to build trust and encourage the participation of the public.

The study also showed a significant mismatch of waste collection services. More than 70 percent of respondents mentioned the irregularity of timetables of collecting and discharge of garbage. The survey identified two main waste management issues: narrow roads that prevent truck access, and the lack of clear, regular collection schedules. Strengthening cooperation between waste collection companies and local authorities is crucial in establishing a regular, transparent, and reliable waste collection timetable. To boost urban poor settlementsparticipation, the city could implement smartphone apps and establish regional waste collection centers. These solutions would provide timely updates to residents and gather user feedback to improve waste collection services.

More than this, public participation in a solid waste management programme remains limited, with only 33 percent of respondents aware of the waste collection timetables in their areas. In addition, the information of key networks or institutions broke off the relationship between service providers and users, which prevents people from reporting the challenges of waste management. A new governance model could improve solid waste management by creating a community forum where residents can regularly participate, share concerns, and collaborate on strategic improvements.

The legal framework and policy, including the 1999 sub-decree on solid waste management and the urban solid waste management strategy 2020-2030, provides a guideline for effective management. However, implementation remains unequal, especially in urban poor settlements that lack infrastructure and resources. The National Solid Waste Management Strategy must examine priority curban poor settlements needs. The structures of localised city

governance must ensure a revision policy to resolve the challenges faced by the residents and urban poor settlements.

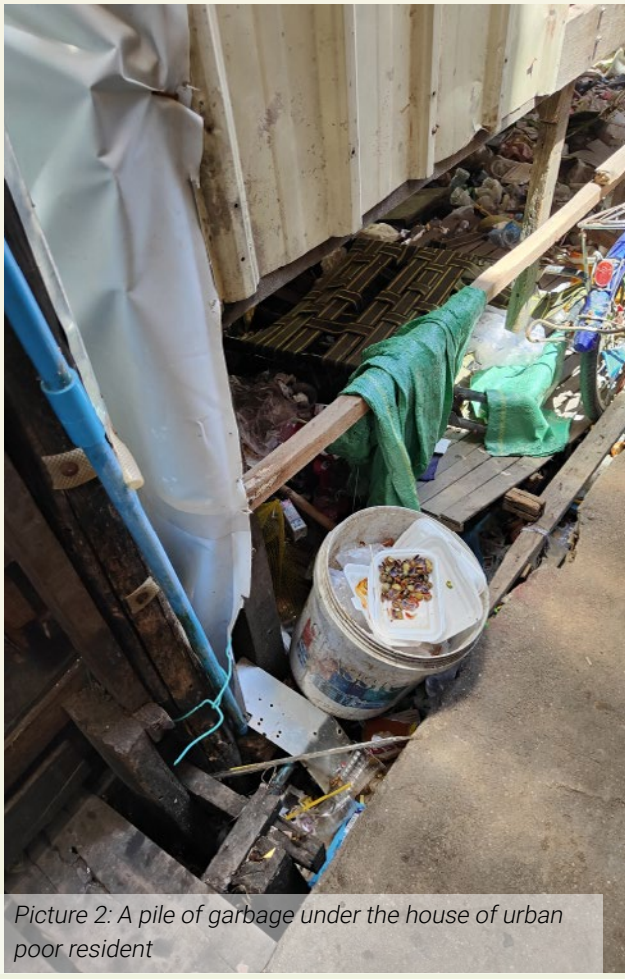
Key recommendations to enhance solid waste management include urgent infrastructure construction, particularly in areas with narrow roads and areas lacking dump sites, to expand the capacity for waste collection. There should be initiatives or projects encouraging urban poor settlements participation, such as rewarding individuals who sort solid waste properly. This factor could also increase the participation of the people to another level. The use of digital technology provides updates on a clear timetable for collecting garbage. Monitoring the GPS of waste collection trucks could also increase accountability and effectiveness of collecting garbage. Effective waste management requires excellent coordination and a timely response. Therefore, public-private partnership and local leadership training should be strengthened to coordinate the work and address various issues faced by the people.

Overall, the study highlights an urgent need for an inclusive response from the Phnom Penh Urban Solid Waste management system, which serves as a connection between national and international framework policies and the livelihoods of the people. Improved infrastructure in the target areas must promote public participation and innovative technology must be embraced. The capital city of Phnom Penh has the capacity to address key challenges of solid waste management. A clean, healthy, and sustainable city could be achieved with the continued coordination and participation of the urban poor settlements, the government, and private solid waste management services. The research aims to seek interventions that prioritise vulnerable urban poor settlements and strengthen governance infrastructure to ensure equitable and sustainable solid waste management for all people in Phnom Penh.

CONTENT

1. INTRODUCTION

Ineffective solid waste management in urban areas threatens both environmental sustainability and public health. In Phnom Penh, the capital of Cambodia, several critical challenges persist: improper waste disposal methods, poor waste handling practices, lack of waste sorting, incorrect disposal timing, and irregular collection schedules. These issues significantly impact local urban poor settlements. Our study surveyed 203 respondents to assess the current state of solid waste management in the city. The findings align with both international frameworks and UNDP research, providing valuable context for improving waste management practices in Phnom Penh. Additionally, the UNDP's research on solid waste management, combined with international climate change frameworks, offers practical guidance for implementing effective waste management strategies worldwide.



Picture 2: A pile of garbage under the house of urban poor resident

2. NATIONAL LAW LANDSCAPES, POLICIES AND REGULATIONS

National laws, policies and regulations relating to solid waste management have been formulated to protect and improve environmental quality and public health through the prevention, mitigation and management of pollution. These legal standards also ensure the sustainable conservation, development, management, and utilization of natural resources in Cambodia. The following is a summary of national laws, policies, and regulations relating to solid waste management in Cambodia:

2.1 The Law on Environmental Protection and Natural Resource Management

The Law on Environmental Protection and Natural Resource Management[1] consists of some articles pertaining to solid waste management:

Article 12, Point 1: The sources, types, quantities of pollutants and toxic wastes being imported. Generated, transported, recycled, treated, stored, disposed, or released into the airspace, water, land or on land.

Article 16: The Ministry of Environment, following a request from the public, shall provide information on its activities, and shall encourage public participation in environmental protection and natural resource management.

2.2 Urban Solid Waste Management Policy 2020-2030

The Urban Solid Waste Management Policy 2020-2030[2] consists of three main points pertaining to solid waste management:

- ❒ Prepare mechanisms to provide urban solid waste management services within the jurisdiction.
- ❒ Prepare and execute the urban solid waste segregation programme from the beginning to the end of the month, ensuring separate transportation.
- ❒ Implement measures to reduce and eliminate litter in public and private places.

First: The strategy for implementing urban solid waste management by the capital, municipal, and district administrations. These relate to short-term measures (1-2 years), focusing on the following:

Second: The action plan and the process of enforcing policies, the preparation of situational mechanisms, and the establishment of the sub-national legal framework introduce the following action:

1. Ministry of Environment, Law on Environmental Protection and Natural Resource Management, Access thought link: https://shorturl.at/uJ977
2. Ministry of Environment, Urban Solid Waste Management Policy 2020-2030, Access thought link: https://www.moe.gov.kh/wp-content/uploads/2021/02/160221.pdf

- ❒ Establish units or offices under the capital, municipal, and district administrations responsible for implementing the transfer of management of action plans and operations.
- ❒ Establish mechanisms to provide clean services, collect, transport, and dispose of solid waste in designated landfills within their jurisdictions.
- ❒ Encourage greater participation from companies offering clean services, and collect and transport solid waste, to ensure a competitive mechanism for Phnom Penh
- ❒ (According to high population density and quantity).

Third: Institutions responsible for the implementation of this solid waste management policy, especially sub-national administrations, must organise training programmes to educate and spread knowledge of sanitary and eco-friendly solid waste management to the public.

2.3 Regulations:

- ❒ Sub-Degree No. 36 S.E., on Solid Waste Management (1999)[3]
- ❒ Notification on the change in urban solid waste management from Phnom Penh Waste Management and Solid Waste Authority to Enterprise for Managing Urban Solid Waste in Phnom Penh .[4]
- ❒ Sub-Degree No. 03 S.E., dated January 5, 2022, on the Establishment of Enterprise for Managing Urban Solid Waste in Phnom Penh .[5]
- ❒ Invitation for Bid on the provision of Solid Waste Services and Transportation in Phnom Penh .[6]
- ❒ Guidelines on Urban Solid Waste management in Phnom Penh (2021) [7]
- ❒ Notification on the change in urban solid waste management .[8]

3. Sub-Degree No. 36 S.E., on Solid Waste Management 1999, Access thought link: https://shorturl.at/7batr
4. Phnom Penh Capital Hall No. 002, 2024 SorChorNor.Sor., on the notification on the change in urban solid waste management from Phnom Penh Waste Management and Solid Waste Authority to Enterprise for Managing Urban Solid Waste in Phnom Penh, Access thought link: https://shorturl.at/t8sCI
5. Sub-Degree No. 3 03 S.E., date January 5, 2022, on the Establishment of Enterprise for Managing Urban Solid Waste in Phnom Penh, Access thought link: https://epa.moe.gov.kh/posts/view/document-dswm/16590039915
6. Phnom Penh Capital Hall, Invitation for Bid on the provision of Solid Waste Services and Transportation in Phnom Penh, Access thought link: https://phnompenh.gov.kh/en/news-press-releases/post/ann250220/
7. Phnom Penh Capital Hall, Guidelines on Urban Solid Waste management in Phnom Penh (2021), Access thought link: https://phnompenh.gov.kh/en/news-press-releases/post/ann16921e/
8. Development Data Organization, Notification on the change in urban solid waste management from Phnom Penh Waste Management and Solid Waste Authority to Enterprise for Managing Urban Solid Waste in Phnom Penh, Access thought link: https://shorturl.at/EAT1D

3. INTERNATIONAL FRAMEWORK RELATING TO SOLID WASTE MANAGMENT

Urban solid waste management has emerged as a critical component of modern environmental governance, intertwined with pressing global challenges like climate change, public health, and sustainable development. Growing urbanization and population expansion have intensified the pressure on cities to manage increasingly large volumes of waste. In response, international laws, treaties, and frameworks have been established to guide environmentally responsible waste management practices. These international instruments serve multiple purposes: they harmonize waste management practices across borders, establish standards for waste reduction, and ensure environmental protection compliance. As a result, they have become instrumental in shaping national solid waste management policies worldwide.

The following the international frameworks are the most relevant to the issue of urban solid waste management, especially in the context of Phnom Penh, Cambodia, highlighting their impacts on city governance, sustainability, and public health.

3.1) The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (19) [9]:

The Basel Convention stands as the cornerstone of international environmental law governing hazardous waste management. Adopted to address the growing problem of developed nations shipping hazardous waste to developing countries, the Convention regulates cross-border waste movement and enforces environmentally sound disposal practices. It specifically targets the deceptive practices of mislabeling hazardous waste as recyclable materials or dumping them at artificially low prices in developing nations. Under the Convention, waste-exporting countries must ensure their hazardous waste is treated and disposed of according to strict environmental standards, placing legal responsibility firmly on the nations generating the waste.

Although the Basel Convention focuses especially on hazardous solid waste, the broader guidelines of environmental management are applicable to urban solid waste management. With an emphasis on solid waste reduction and the precautionary principle, the Convention encouraged national governments to

9. The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (19), Access thought link: https://www.basel.int/theconvention/overview/tabid/1271/default.aspx

approve various polices to minimise waste generation, including urban solid waste. As for Phnom Penh, adhering to the Basel Convention can provide the legal framework for mitigating environmental risks due to improper waste disposal, especially in urban housing areas.

3.2) Paris Agreement (2015)

The Paris Agreement[10] under the United Nations Framework Convention on Climate Change (UNFCCC) represents a global commitment to limiting temperature increases and reducing the impacts of climate change. While the agreement focuses primarily on reducing greenhouse gas emissions, it also has important implications for solid waste management. Methane emission from landfills, which is a common method of solid waste disposal in developing countries, are a major source of greenhouse gases and contribute to global warming.

The Paris Agreement advocates for sustainable development practices, including promoting a circular economy that reduces solid waste and reduces emissions. Countries that ratify the agreement are encouraged to adopt the solid waste management policies that support the transformation to a low-carbon economy. According to this agreement, Phnom Penh is required to reduce the use of landfills by encouraging recycling, and managing organic solid waste more effectively to reduce methane emissions. Aligning with the goals of this agreement will not only contribute to Cambodia's climate commitments, but also address regional public health concerns related to solid waste accumulation and pollution.

3.3) Sustainable Development Goals (SDGs) (2015)

The 2030 Agenda for Sustainable Development, adopted by all UN Member States, includes 17 Sustainable Development Goals (SDGs)[11] that address a number of global challenges, including environmental sustainability, poverty eradication, and health. A number of SDGs are directly related to solid waste management, particularly SDG 11 (Sustainable cities and urban poor settlements) and SDG 12 (Responsible consumption and production) (UN, 2015).

SDG 11 highlights the need to lessen cities' negative environmental effects, with a particular focus on improving urban solid waste management. It calls for lowering air and water pollution caused by solid waste, connecting solid waste management practices to broader concerns about municipal livability and sustainability.

10. UNFCCC, The Paris Agreement on Climate Change, Access thought link: //unfccc.int/sites/default/files/resource/parisagreement_publication.pdf
11. United Nations Sustainable Development Goals (2015), Access thought link: https://sdgs.un.org/goals

SDG 12 aims to reduce the generation of solid wastes through its prevention, reduction, recycling and reuse. These goals advocate for a shift towards a more sustainable use pattern, reducing solid waste and further reorganizing materials to establish a circular economy.

Based on the SDGs, policymakers are encouraged to include solid waste management in comprehensive development strategies. By aligning Phnom Penh's solid waste management with Sustainable Development Goals, SDGs 11 and SDGs 12, cities can improve environmental performance, promote public health, and promote sustainable urban development. Furthermore, the SDGs involve communities in the solid waste management, which is important for addressing the challenges faced by urban populations.

3.4) United Nations Development Programme (UNDP), Guidelines on Solid Waste Management[12]

The United Nations Development Programme (UNDP) has developed a comprehensive solid waste management guideline as a part of its broader mandate to promote sustainable development and environmental protection. The guidelines advocate for an integrated solid waste management system that considers social, environmental and economic dimensions. They stress the importance of inclusion, particularly in addressing the needs of marginalized urban populations, frequently bear the brunt of insufficient solid waste management services.

The UNDP Guidelines are extremely pertinent to Phnom Penh's solid waste management, especially in addressing the differences between developing and underdeveloped communities. The guidelines call on the government to adopt a participatory approach by ensuring that all residents have a say in decisions that impact their communities. Furthermore, UNDP has advocated for public-private partnerships to improve solid waste management infrastructure as a strategy to boost Phnom Penh's solid waste management capacity.

In summary, international laws and frameworks play a crucial role in shaping national and local solid waste management policies, providing guidelines for attaining sustainability, minimizing environmental impacts, and enhancing public health. The frameworks covered in this review offer a comprehensive basis for improving waste management practices in urban environments, particularly in developing nations like Cambodia. Instruments such as the Basel Convention and the Paris Agreement stress the need for

12. United Nations Development Programme (UNDP), established the guideline principles on solid waste management, Access thought link: https://www.undp.org/sites/g/files/zskgke326/files/publications/GuidanceNote_Solid_Waste_Management.pdf

high-quality and environmentally-friendly solid waste disposal practices, while the Sustainable Development Goals (SDGs) stress waste reduction, recycling, and sustainable resource use.

For Phnom Penh, aligning its solid waste management policy with these international frameworks provides an opportunity to address urban management challenges, reduce solid waste generation, and improve public health. By implementing participatory approaches, strengthening governance structures, and putting international guidelines into practice, Phnom Penh can develop a more sustainable, inclusive, and effective waste management system that serves all residents, particularly vulnerable urban poor settlements.

Additionally, these guidelines encourage governments to adopt participatory strategies that ensure that all residents have a say in decisions that impact their communities. Furthermore, the United Nations Development Programme (UNDP) advocates for public-private partnerships to improve solid waste management infrastructure, which is a strategy that can upgrade Phnom Penh waste management capacity.

4. RESEARCH METHOD

4.1) Research Objectives

This research report on solid waste management in Phnom Penh, aims to compare urban poor settlement and general residential area to understand local solid waste management and compare urban poor settlement and general residential area to identify specific challenges. Four key aspects will be covered in this research report: first, resident participation, second, solid waste disposal methods, third, public awareness of solid waste management, and fourth, solid waste sorting. The study's key findings will be used to develop targeted recommendations for improving waste management in Phnom Penh. We will share these practical solutions with stakeholders and the public, helping guide the city toward its goal of maintaining a clean and hygienic environment.

4.2) Data gathering method

This study employed both qualitative and quantitative research methods to ensure comprehensive data collection. For the qualitative component, we conducted focus group discussions with groups of 10-15 participants to validate key elements of our quantitative questionnaire. The quantitative research involved detailed door-to-door interviews using a comprehensive questionnaire designed to capture statistical data across all study variables. These interviews, lasting 30-40 minutes each, were conducted in clusters of three to five households at a time. Additionally, researchers documented general environmental conditions in each study area to provide contextual background for the collected data.

4.3) Selected sample size

Sahmakum Teang Tnaut Organization's experience working with the 14 target urban poor settlements has shown that these urban poor settlements are facing solid waste management problems in the areas where they live. Therefore, Sahmakum Teang Tnaut Organization has chosen this research topic to determine the challenges. The sample size was determined using the YAMANE TARO formula (N: 1320HH & e: 10%) of 1967[13] to calculate the sample size for interviewees in the target areas. Our study focused on 14 urban poor settlements across six districts of Phnom Penh: Chamkar Mon, Mean Chey, Russey Keo, Por Sen Chey, Dangkor, and Chbar Ampov. We surveyed both urban poor settlement and people living in nearby villages to compare their living conditions and waste management experiences.

To ensure comprehensive data collection, we also interviewed key stakeholders in the waste management system, including village chiefs, commune officials, and solid waste collection operators.

13. Tenato, How to Calculate Sample Size for a Survey, 2022, Access thought link: https://www.tenato.com/market-research/what-is-the-ideal-sample-size-for-a-survey/

Table 1: Target urban poor settlement selected for the research

Research Target Areas	urban poor settlements	Number of Interviewees
Chamkar Mon	Sammaki Rongroeung Community	7
	Boeung Trobek Phum4 Community	9
Meanchey	Prek Takong 3 Community	3
	Reaksmey Samaki Community	6
Russey Keo	Strey Klahan Community	4
	Borey Deum Sral Community	8
Po Sen Chey	Pungro Sen Chey Community	15
Dangkor	Rolous Choeung Ek Community	6
Chbar Ampov	Rek Chamroeun Community	6
	Boeung Chouk Meanchey 2 Community	3
	Russey Sros Community	10
	Smor San Community	14
	Chamroeun Community	6
	Veal Sbov Community	7
Total		**104**

Picture 4: Urban poor settlement where interviews were given

Table 2: General residential areas elected for the research

Research Target Areas	General residential area	Number of Interviewees
Chamkar Mon	Village 4	7
	Village 5	9
Meanchey	Prek Takong 2 Village	3
	Russey 2 Village	6
Russey Keo	Spean Khpuos Village	4
	Metapheap Village (Kilometer No.6)	8
Po Sen Chey	Tuol Pungro Village	15
Dangkor	Srok Chek Village	6
Chbar Ampov	Prek Tapov Village	6
	Tangov Kandal Village	3
	Norea Village	10
	Kandal Village	9
	Deum Sleng Village	6
	Prek Thom 2 Village	7
Total		**99**

Picture 3: General residential location where interviews were given

Table 3: Sample size for this research

Interviewees	Amount	Percent
Urban poor settlement	104	48
General residential area	99	46
Village chief	10	5
District chief	1	0.5
Solid Waste Collection Company	1	0.5
Total	**215**	**100**

4.4) Data analysis

Using Kobo Toolbox, an electronic data gathering tool, a questionnaire was developed for this research. Microsoft Excel was used for data preparation and cleaning, and SPSS was used for data analysis and comparison.

4.5) Scope of the research

To validate our findings, we compared our research with similar studies from national and regional institutes, as well as reviewed solid waste management policies established by the Royal Government. While many documents were accessible through official ministry and organizational websites, some critical information required direct assistance from relevant ministries to enable comprehensive analysis of the issues identified in our study.

4.6) Demographic information

Interviews were conducted with 149 women and 54 men who lived in 14 villages, 6 districts, and 14 poor housing units. Two interviewees were sixteen, twenty-four were between seventeen and thirty, eighty-seven were between thirty-one and forty-five, and ninety were older than forty-five.

There were 134 residents who had been in the interviewed areas for less than 15 years, 108 residents who were between 16 and 35, and 60 residents who had been there for more than 35 years. Our survey respondents represented diverse occupations: 36% were grocery sellers and 23% were housewives. The remaining 41% included a wide range of professions, from factory workers and skilled trades (carpenters, tailors, repairers) to service providers (laundry workers, WING agents), food industry workers, transport workers, and civil servants.

Table 4: Ages of interviewees

Age of Interviewees	Urban poor settlement	General residential area
From 16	1	1
17-30	6	18
31-45	40	47
Older than 45	57	33
Total	**104**	**99**

Table 5: Duration of residence in the area where the interview was conducted

Duration of residence at the interviewee's area	Urban poor settlement	General residential area
1-5 Years	27	18
6-10 Years	45	24
11-15 Years	13	7
16-20 Years	32	14
21-25 Years	17	5
26-30 Years	16	5
31-35 Years	13	6
More than 35 Years	40	20
Total	**104**	**99**

Picture 5: A pile of garbage in front of a house awaiting for the garbage truck

5. FINDINGS OF THE RESEARCH

5.1) Waste storage area

Of the 203 people interviewed, 128 reported having no designated waste disposal area. This group included 75 residents from standard residential areas and 53 from urban poor settlements . The residents from standard areas primarily lived along main roads or national highways, including those situated approximately 50 meters from these major routes.

These residents reported being forced to dispose of waste in front of their homes due to the lack of proper disposal facilities. This improper waste management has led to several problems: neighbourhood conflicts over incorrect waste disposal, improper waste packaging, unauthorized dumping on vacant properties, and inadequate service from waste collection workers.

The situation is particularly severe in urban poor settlements, which lack designated waste storage area. These urban poor settlements are characterized by unplanned development, consisting of clusters of 10 or more houses built in areas without proper infrastructure or legal property documentation .[14] urban poor settlements face multiple challenges in managing their waste. The narrow streets between houses provide limited space for waste storage, and the urban poor settlements's layout only allows access by motorcycles or small cars. Located 100 to 500 meters from main roads, these urban poor settlements are inaccessible to waste collection trucks, and no alternative collection methods,such as corporate carts, are available.

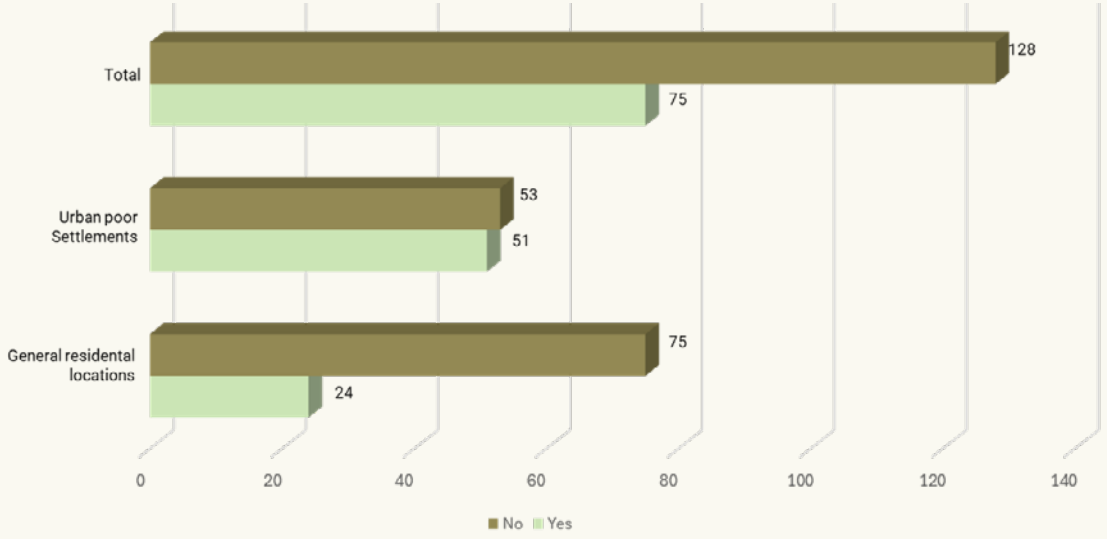
This situation forces residents to respond quickly whenever they hear a garbage truck on the main road. One female resident described the problem:

> "My urban poor settlements is quite isolated. I have to rush out with my trash whenever I hear a garbage truck. If I miss the truck, the waste sits in my house and creates an unbearable smell."

In urban poor settlements where garbage trucks cannot enter and their signals cannot be heard, residents are forced to store waste in their homes for days, waiting for an opportunity to dispose of it. This situation has led some urban poor settlements to develop their own solutions. For example, some have organized volunteer waste collectors who use small carts for daily collection. These volunteers, who receive no support from authorities or waste collection companies, rely on urban poor settlements donations of 1,000 to 2,000 riels per collection to sustain their service.

14. Sahmakum Teang Tnaut Organization, Report on Survey in Phnom Penh (2014), Access link through: https://teangtnaut.org/wp-content/uploads/2014/03/STT-_201402_Phnom-Penh-Survey.pdf :

Graphic 1: Waste storage area



5.2) Waste Disposal

Waste handling refers to the act of disposing waste at a site designated by local authorities. The number of respondents who stated that they have a dedicated garbage disposal site totaled 75. As a result, an analysis revealed that 59 people correctly implemented it or discarded their waste at the authorized disposal place, accounting for 79% of the total 75. As a result, just 16 of them had a designated garbage disposal site but did not follow correct disposal procedures.

In the case of persons who do not have a place to dispose of their waste, their disposal methods are as follows: 58 urban poor settlements, 46 of which temporarily stored wastes in their homes, 8 dumped wastes at the market, and 4 dumped wastes on the national road at night.

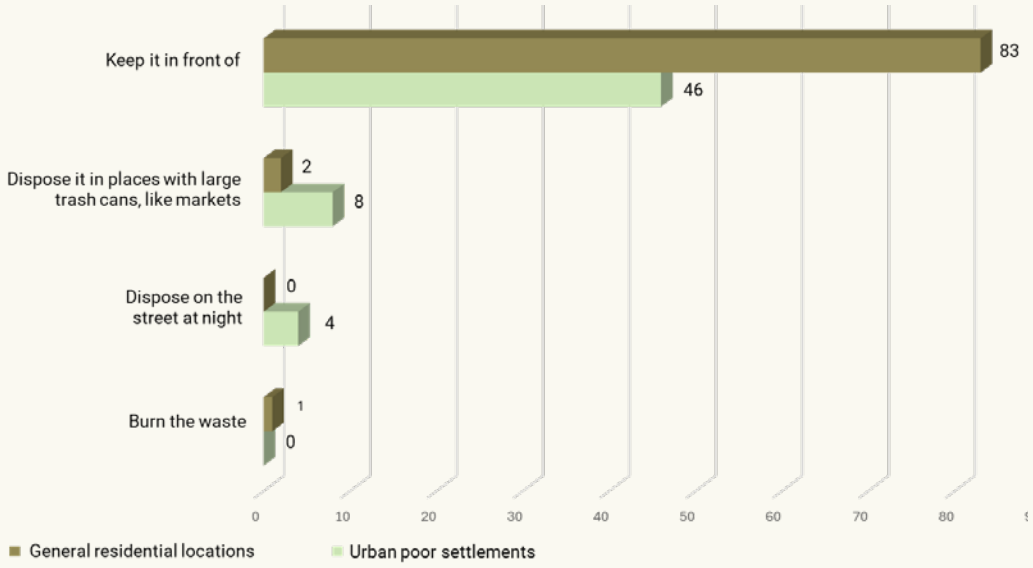
While 86 general residential area stated that dumping wastes in front of their homes was an undesignated location, it is likely that they were unaware that the location in front of their homes was permitted by simply knowing the waste collection time and waiting for the garbage truck to collect it according to the schedule.

In this case of dumping waste in the inappropriate area, one interviewee was instructed by the local authorities to stop dumping wastes in undesignated locations (on the road) since it generated a terrible odor for neighboring homes.

A violent dispute involving weapons (knives and sticks) erupted after temporary waste dumps in front of urban poor settlement homes released a bad odor into the neighbors' homes, resulting in considerable verbal abuse that escalated to violence between the two.

Local authorities also intervened in the dispute, resulting in the party temporarily storing wastes for several days paying compensation to the neighbor. All of these issues stem from waste dumping or a lack of a suitable place that is convenient for people.

Graphic 2: Waste disposal in undesignated locations



5.3) Waste sorting

The Phnom Penh Capital Hall mandates a two-category waste sorting system: wet waste (food waste, organic materials, fruits, and flowers) must be placed in black bags, while dry waste (paper, cardboard, plastic, rubber, metal, cans, and bottles) must go in white bags. However, our study found poor compliance with these regulations. Of the 203 respondents, only 64 practiced any form of waste sorting, and just four residents—all from urban poor settlement —properly followed the color-coded bag system.

Most respondents (139) did not sort their waste at all, citing the practice as unnecessary. These residents observed that waste collection workers mixed sorted and unsorted waste during collection, leading them to conclude that waste sorting was a waste of time and money.

Table 6: Motivating factors for waste separation implementation (more than one answer)

Motivating factors for waste separation implementation	General residential area	Urban poor settlement
Interviewee understanding that single bagging is a bad practice	16	27
Separating saleable dry waste such as cans or bottles	14	11
Receiving information on solid waste sorting from local authorities	4	5
Receiving training on the benefits of sorting or recycling from NGOs	0	5
Understanding that waste can be recycled	1	1
Awareness through school teaching	1	0
Total	**36**	**49**

Table 7: Results from the verification of the waste collection schedule of the three waste collection companies and the instruction of the Phnom Penh Capital Hall between the garbage discharge times of General residential area.

Target District	Number of Interviewees (person)	The garbage discharge of General residential area	
		Regular Schedule	Irregular Schedule
Cintri Waste Collection Company			
1. Chamkar Mon	16	14	2
2. Chbar Ampov	41	25	16
3. Mean Chey	9	2	7
Mizuda Waste Collection Company			
4. Dangkar	6	2	4
5. Po Sen Chey	15	4	11
800Supper/GAEA Waste Collection Company			
6. Russey Keo	12	9	3
Total	**99**	**56**	**43**

Table 8: Results from the verification of the waste collection schedule of the three waste collection companies and the instruction of the Phnom Penh Capital Hall between the garbage discharge times of urban poor settlements.

Target District	Number of Interviewees (person)	The garbage discharge of urban poor settlements	
		Regular Schedule	Irregular Schedule
Cintri Waste Collection Company			
1. Chamkar Mon	16	6	10
2. Chbar Ampov	46	22	24
3. Mean Chey	9	2	7
Mizuda Waste Collection Company			
4. Dangkar	6	2	4
5. Po Sen Chey	15	4	11
800Supper/GAEA Waste Collection Company			
6. Russey Keo	12	3	9
Total	**104**	**39**	**65**

5.4) Time of garbage disposal or discharge

Only 33 of the 203 interviewees said they received a waste collection schedule, while 170 said they did not. According to this research, just 22 people disposed of their trash properly, following the garbage collection schedule and the criteria set forth by the Phnom Penh Capital Hall [15], whereas 181 people disposed of their wastes improperly.

According to the verified waste collection schedule of the waste collection companies and the instructions of the Phnom Penh Capital Hall [16]:

Our analysis of waste disposal timing revealed significant non-compliance with official schedules set by the Phnom Penh Capital Hall and waste collection companies. Only 19% of urban poor settlement and 28% of general residential area followed the proper disposal schedule, while 53% of all respondents disposed of waste at incorrect times.

This widespread non-compliance appears to stem from several key issues. First, many residents never received specific waste disposal schedules. Second, there is poor coordination between waste collection trucks and residents. Third, there is insufficient monitoring of both resident disposal practices and waste collection company operations.

Local authorities explained that official disposal schedules were primarily designed for residents along national and main roads, while urban poor settlement were simply instructed to use designated disposal spots. This limited scope meant that urban poor settlement remained unaware of proper disposal times in their districts. Furthermore, neither authorities nor waste collection companies effectively communicated schedules to all villages. This communication breakdown has resulted in continuous waste accumulation throughout the city, negatively impacting urban aesthetics.

5.5) Knowledge of the interviewee on Phnom Penh's solid waste management rules and regulations

Our survey revealed varying levels of awareness about solid waste management regulations among residents. Of the 203 respondents, 106 demonstrated knowledge of waste management announcements, instructions, or sub-decrees, with this group comprising 66 urban poor settlement and 40 general residential areas. The remaining 97 respondents (38 urban poor settlement and 59 general residential areas) showed no awareness of these regulations. While a public forum in 2022 provided information about waste sorting, handling, and disposal, residents have requested more comprehensive training programs and regular inspections by local authorities and waste collection companies.

Local authorities currently address waste

15. ibid
16. ibid

management through monthly rotating village meetings, but these sessions primarily focus on general village and commune affairs, with solid waste and environmental cleanup treated as secondary issues. These meetings are conducted among officials without resident participation, and while public forums do occur, they are irregular and inconsistent.

Waste collection companies have attempted to engage the urban poor settlement through bi-monthly local cleanup events, attracting 40 to 80 participants each time. They also create and share instructional videos on websites and social media. However, these efforts have had limited reach, with only 10 percent of target villages covered by 2024.

5.6) Analyze how local residents participate in waste management and response of the local authorities

Our study revealed significant participation in waste management efforts across both urban poor settlements and general residential areas. Of the 203 respondents, 75 had access to designated waste disposal sites, with 59 (79%) actively using these locations. While 106 residents had some knowledge of solid waste management regulations, only 64 practiced waste sorting, and just 4 followed the designated color-coding system. Furthermore, of the 33 residents who received official garbage collection schedules, 22 adhered to them.

These statistics demonstrate residents' willingness to comply with waste management regulations when they have access to information and resources. However, several significant challenges hinder effective implementation:

First, limited access to information about specific waste discharge times has resulted in poor timing compliance, with less than 50% of residents following proper schedules.

Second, residents are largely excluded from waste management meetings between authorities and collection companies, leading to confusion about proper waste handling, packaging, sorting, and disposal procedures. This lack of engagement has even caused general residential areas to mistakenly treat their front yards as unofficial waste storage areas.

Third, current information dissemination methods are inadequate. While waste collection companies share instructional videos on their website and Facebook page, almost none of the interviewed residents were aware of these resources. Finally, the lack of effective monitoring and evaluation by authorities and waste collection companies has left residents without clear guidance for problem-solving or reliable responses to their reported issues.

CASE STUDY 01: URBAN POORSETTLEMENTWASTEMANAGEMENT

A. Costs more than service fees

The urban poor settlement 's waste management crisis stems from its infrastructure limitations: narrow routes that only accommodate motorbikes and small cars make it impossible for waste collection trucks to access these areas. In early 2023, urban poor settlement members attempted to address this problem by requesting small collection carts during a meeting with CINTRI (Cambodia) and local authorities. While the waste collection company initially provided the carts and shared contact numbers for reporting collection delays, these solutions proved temporary. The cart service was short-lived, and the provided phone numbers became unreachable, leaving residents without reliable waste collection services.

Picture 6: An urban poor settlement does not receive waste collection services

In response to this ongoing crisis, the Urban Poor Women Development (UPWD) organization stepped in with an alternative solution. They provided four small carts and recruited four volunteers, offering each a monthly stipend of US$80 for six months. However, when the funding expired after six months, the initiative faltered as volunteers could not continue working without compensation. Although urban poor settlement members met to discuss collectively funding the volunteers' wages, they couldn't reach an agreement on a payment structure.

Despite the lack of formal funding, some volunteers continued collecting waste, relying on voluntary contributions of 1,000 to 2,000 riels per household.

A 40-year-old female resident described the ongoing challenges:

> Even though we have waste collection volunteers in our urban poor settlement, problems persist. We have to save money for the volunteer collectors, and sometimes we must personally request them to collect waste from our houses.

Picture 7: The waste was kept in front of the house in an urban poor settlement and awaiting a volunteer to collect

B. Waste problems can lead to violence

Space constraints significantly impact waste management in the urban poor settlement, where most houses measure just 4 by 15 meters and lack dedicated storage areas. Without proper disposal sites nearby, residents are forced to temporarily store garbage in front of their homes. This practice recently led to a violent confrontation between neighbours.

A 38-year-old woman, who runs a crispy rice business, described the incident:

> Garbage had been accumulating in front of my house for days, creating an unbearable stench. This was particularly problematic because we need to dry rice for our business. When I asked the neighbour to remove his garbage, he said he would handle it in the evening and left to pick up his wife. Upon their return, his wife began shouting at us, and when I responded, her husband physically attacked me, prompting my husband to intervene.

The conflict required intervention from local authorities, who mediated a resolution requiring the offending household to pay 200,000 riels in compensation. This incident highlights how inadequate waste management infrastructure can escalate into serious urban poor settlement conflicts.

Picture 8: On the left side is a house producing crispy rice

Picture 9: The crispy rice is drying

C. Misunderstanding that urban poor settlement are not required to pay waste collection service fees

A urban poor settlement-wide misunderstanding about waste collection fees led to significant financial complications. Initially, residents believed waste collection was either free or included in their electricity bills. When local authorities organized a public forum to address unpaid fees, urban poor settlement members discovered they owed over one million riels in outstanding waste collection charges.

In 2020, the urban poor settlement successfully petitioned to have their historical debt cancelled, arguing they had never received proper services.

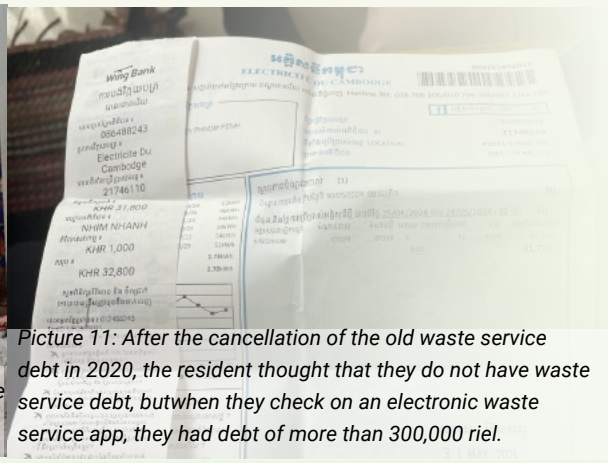
A 44-year-old woman explained their previous waste disposal method:

> We used to burn our waste at the pagoda every two or three days. Now, we dispose of waste in a bin at the urban poor settlement entrance.

Despite the debt cancellation, fundamental communication problems persisted. The municipality had separated waste collection fees from electricity bills, but most urban poor settlement members remained unaware of this change. As a result, they did not pay waste collection fees between 2021 and 2024, believing these costs were still included in their electricity bills.

The situation came to a head in early August when an electricity bill agent informed residents about their accumulated waste collection debt. Each household now faced an outstanding balance of approximately 400,000 riels.

Picture 10: The entrance to an urban poor settlement where waste collection trucks could not enter



Picture 11: After the cancellation of the old waste service debt in 2020, the resident thought that they do not have waste service debt, butwhen they check on an electronic waste service app, they had debt of more than 300,000 riel.

One resident, a retired teacher, expressed her frustration:

> I've always paid my electricity bill on time to avoid power cuts. I didn't know the garbage fee was now separate. Why didn't they inform us about this change?

An elderly woman's response captured the urban poor settlement's anxiety:

> I'm terrified of this huge debt. I can't afford 400,000 riels, especially with my chronic illness. If they fine us, they might take our house away.This statement reveals the profound financial strain and fear caused by the lack of clear communication about waste collection fees.

Picture 12: CINTRY, a waste collection company provides trash cans to an urban poor settlement.

Picture 13: Many elderly women expressed their regret at not receiving information about the separation of waste services fee from electricity bills and unknowingly incurring waste service debt.

CASE STUDY 02: WASTE MANAGEMENT BY GENERAL RESIDENTIAL AREA

A significant communication gap exists regarding waste disposal practices among general residential areas, with 79% misunderstanding the appropriate locations for garbage storage. Local authorities clarified that residents living on main roads are permitted to place garbage in front of their houses while awaiting collection trucks. However, this information is not uniformly distributed. A village chief in Khan Chbar Ampov highlighted the inconsistency:

> *Waste collection schedules are only shared with those living on main roads. Residents on sub-roads are left uninformed.*

Picture 14: CINTRY company employees and its waste collection truck.

2:39 PM

This selective information sharing creates confusion about proper waste disposal practices.

A local construction materials seller further illustrated the collection unpredictability:

> Garbage trucks are inconsistent in their collection times. They might arrive in the morning, afternoon, or even twice a day. This irregularity makes it challenging to dispose of waste without creating tension with neighbors.

Despite these challenges, some residents have adapted to the waste collection system. One interviewee proudly noted:

> "I pay my collection fees via Wing transfer every month, without fail."

Another resident on a main road stays informed by following the waste collection company's Facebook page for service updates.These varied experiences reveal a complex landscape of waste management communication, where access to information and collection services differs significantly between residents.

COMPARISON OF CASE STUDIES ON THE USE OF WASTE COLLECTION SERVICES BY URBAN POOR SETTLEMENT LOCATIONS AND GENERAL RESIDENTIAL AREA LOCATIONS

The case study revealed four critical challenges facing the urban poor settlement 's waste management system. First, residents were forced to spend significantly more on volunteer waste collectors than the standard service fees. Second, improper waste disposal led to escalating conflicts, including verbal disputes that sometimes turned violent. Third, residents consistently failed to receive notifications about ongoing waste collection fee payments. Finally, they accumulated substantial debt due to a lack of communication about the separation of waste collection bills from electricity bills.

These persistent problems stem from a fundamental lack of intervention by key stakeholders. Local authorities and waste collection companies appeared to have insufficient monitoring and evaluation mechanisms, and there was a notable absence of regular door-to-door customer service in target locations. Despite the urgent need for solutions, urban poor settlements continue to be responsible for monthly waste collection fees.

A stark contrast emerged between urban poor settlements and general residential area locations. General residential areas received solid waste disposal schedules and were regularly invited to meetings with authorities and waste collection companies. As a result, these residents demonstrated more comprehensive knowledge about the new waste management enterprise, including the nuanced process of paying separated service fees through electricity bill codes, money transfer agents, or electronic bank transfers.

The comparative analysis conclusively demonstrates an uneven delivery of waste collection services between urban poor settlement and general residential area locations. This disparity highlights significant systemic inequalities in waste management communication and service provision, leaving urban poor settlement residents at a distinct disadvantage.

6. CHALLENGES IN WASTE MANAGEMENT WITHIN TARGET AREAS WHERE INTERVIEWS TOOK PLACE

6.1. Major challenges from lack of involvement from local authorities

The current waste management system suffers from critical systemic gaps. Primarily, there is a complete absence of robust monitoring mechanisms for essential waste management practices, including segregation, packaging, and storage. This deficiency is particularly acute in areas struggling with daily waste disposal challenges.

Each Sangkat is staffed with only two environmental technical officers responsible for coordinating with waste collection companies. These limited personnel have failed to provide comprehensive training to local residents on crucial waste management techniques such as proper segregation, packaging, and storage. Moreover, there has been no systematic public communication about assessments of urban poor settlement participation and awareness in waste management.

The consequences of these institutional short comings are evident: both urban poor settlement and general residential areas have shown minimal participation in training programs organized by local authorities. This lack of engagement stems directly from inadequate outreach, insufficient information dissemination, and a clear absence of structured educational initiatives about waste management practices.

6.2. Major challenges because of sporadic involvement from the waste collection companies

- Waste collection companies have not systematically analysed their target user groups or assessed residents' smartphone access. This critical oversight means digital information channels like websites and Facebook pages are ineffective in reaching most residents.
- The companies' information dissemination remains severely limited. While they produce educational video clips and messages about waste collection and service fees, these materials are published on websites and Facebook pages with minimal visibility. As a result, few people are aware of these important communications.
- Local-level information sharing occurs infrequently, with collaborative efforts between waste collection companies and local authorities happening only

twice monthly. These sessions attract between 40 to 80 participants, which monthly. These sessions attract between 40 to 80 participants, which is grossly insufficient considering the total number of local residents. Waste collection companies demonstrate inadequate service delivery monitoring. Their current methods include, Traditional team leader area management and GPS tracking of garbage trucks (managed by the Ministry of Environment)These approaches prove ineffective, as garbage trucks frequently fail to follow established waste disposal schedules.

- The companies lack robust customer service assessment mechanisms. A striking 170 out of 203 surveyed residents have not received waste disposal schedules. This massive communication failure actively harms residents by pushing them into waste service debt while providing opaque and unreliable services. is grossly insufficient considering the total number of local residents. Waste collection companies demonstrate inadequate service delivery monitoring. Their current methods include, Traditional team leader area management and GPS tracking of garbage trucks (managed by the Ministry of Environment)These approaches prove ineffective, as garbage trucks frequently fail to follow established waste disposal schedules.
- The companies lack robust customer service assessment mechanisms. A striking 170 out of 203 surveyed residents have not received waste disposal schedules. This massive communication failure actively harms residents by pushing them into waste service debt while providing opaque and unreliable services.

7. CONCLUSION

Findings from the Research on Solid Waste Management in Phnom Penh
The study on solid waste management in Phnom Penh revealed critical insights into the challenges facing urban waste disposal:

First, the research identified a significant demographic challenge. More than half of the participants, predominantly urban poor settlement members aged 20-35, demonstrated low awareness of solid waste management policies. These residents primarily received information from non-governmental organizations rather than local authorities, highlighting a crucial gap in public communication and leadership capacity.

Second, approximately 40% of interviewees acknowledged non-compliance with waste disposal instructions. This widespread lack of knowledge has profound consequences, including:

- Improper waste disposal practices
- Potential public health risks
- Inefficient waste collection systems

Third, the study uncovered significant financial and communication barriers. Approximately 53% of participants misunderstood waste collection fees, believing they were included in electricity bills. This misconception led to widespread non-payment and service disruptions.

Fourth, the research exposed critical institutional limitations. Local authorities and waste management companies demonstrated:

- Poor coordination
- Inadequate monitoring systems
- Limited information dissemination

Despite some improvements like GPS tracking and urban poor settlement meetings, only a small number of households received comprehensive information about waste disposal schedules and practices.

Overall, the study concludes that digital systems and transparent communication are key to transforming solid waste management. Effective solutions require collaborative engagement between general residential areas, urban poor settlements, local authorities, and waste collection companies. By developing a more transparent, consistent, and inclusive approach, Phnom Penh can create a sustainable and equitable waste management framework.

8. KEY RECOMMENDATIONS

Based on the findings from this study, the following are general recommendations:

1. Expanding Waste Disposal Infrastructure and Ensuring Accessibility: In poor areas, there's often no proper system for getting rid of trash. We need to invest right away to create more trash collection points, especially in informal settlements. For instance, we can start small projects to use smaller garbage trucks that can navigate tight streets. Additionally, we can set up more collection points in hard-to-reach places. We should regularly check if this approach works and can be expanded.
2. Community-driven solid waste segregation initiatives: To enhance engagement in solid waste segregation, community-based incentive programs can be initiated to reward households which properly segregate solid waste. Furthermore, solid waste collection services must clearly reinforce the importance of segregation by separately collecting sorted solid waste. Emphasis should be placed on establishing a monitoring framework which allows communities to ensure they follow the solid waste collection workers.
3. Digital solid waste collection schedule and monitoring: Ensuring consistent solid waste collection requires the integration of modern technology. A mobile app that provides real-time updates on solid waste collection schedules and allows residents to report missed collections would greatly improve the reliability of the services. Moreover, a tracking system should be implemented to enable urban poor settlement s and local authorities to monitor the movement of solid waste collection vehicles, ensuring that they adhere to the schedules for both urban poor settlement and general residential area settings.
4. Promoting public-private partnerships for improved governance: Improving waste governance requires greater collaboration between public authorities, private solid waste management companies, and the urban poor settlement they serve. Regular urban poor settlement meetings should be institutionalized to allow residents to discuss solid waste management challenges and propose solutions. Training local leaders on coordination and problem-solving will empower them to effectively coordinate between residents and solid waste service providers.
5. Monitoring and evaluation of policy

implementation: It is essential to monitor the implementation of the national solid waste management policies at the local level. Evaluation by the third party can be conducted to evaluate the performance of solid waste management companies, especially in providing services to the urban poor settlement s. These evaluations should inform policy adjustments, ensuring that the services are more responsive to the needs of disadvantaged groups.

The findings from this study highlight an urgent need for an inclusive and responsive solid waste management system in Phnom Penh that bridges the gap between the policy framework and the real life of the residents, especially those in the urban poor settlement s. By improving targeted infrastructure, increasing public engagement, and adopting innovative technologies, Phnom Penh can address the key challenges of effective solid waste management. In the end, a cleaner, healthier, and more sustainable city is achievable through coordinated actions and ongoing participation among urban poor settlement s, the government, and private solid waste management service providers. This study calls for urgent interventions that prioritize the most vulnerable urban poor settlements and strengthening of governance structures to ensure that solid waste management practices are equitable and sustainable across all socio-economic groups in Phnom Penh.

Specific recommendations for stakeholders

Local residents both in urban poor settlement and general residential area settings

- Residents should familiarize themselves with the Facebook pages of solid waste collection companies and urban solid waste management enterprises to obtain information related to solid waste management
- All residents must participate in proper solid waste packaging and sorting practices for dry and wet solid waste to enjoy good environment and family well-being.
- Those who are in debt of solid waste service fees should seek explanation from Phnom Penh's urban solid waste management enterprises.
- Encourage residents to pay solid waste collection fees to solid waste management enterprises and monitor the types of service locations and newly determined service fees. If there is anything in doubt, immediately ask the enterprises for an explanation.
- Most residents misunderstood about paying for solid waste collection services and are requesting that the service fees be included in the electricity bills to minimize their confusion.

Local authorities

- The local authorities or solid waste management enterprises must, on a monthly basis, notify residents who fail to pay service fees regularly to reduce the risk of missing or not receiving information on solid waste service fee payments.
- The Municipal Administration or solid waste management enterprises should provide additional training to local officials to ensure effective implementation of solid waste management.
- The local authorities should designate specific locations or storage facilities that can store large amounts of solid waste without affecting public health and traffic congestion.
- The local authorities must improve their work practices with the Solid Waste Management Commissions on monitoring solid waste disposal sites to steer the residents away from engaging in potential disputes over solid waste issues.
- Solid waste issues should be included in the curriculum of primary education to instill participatory spirit.

A solid waste collection company

- The company should add more solid waste bins which indicate different types of solid waste by different colors at locations designated by local authorities for solid waste disposal.
- The solid waste collection company must add more people to regularly clean solid waste depots to eliminate odors and maintain cleanliness and hygiene.
- The solid waste collection company must continue to disseminate information in the local areas, especially in villages where dissemination has not taken place, to ensure that those residents receive the same information and to eliminate misunderstanding.
- The solid waste collection company must distribute solid waste collection programs or schedules to every household in the areas where it is in charge of delivering solid waste collection services to ensure consistency in solid waste discharge times and collection times.

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