Independent Assessment/ Monitoring of Waste Collection System in EDMC Area

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The Energy and Resources Institute (TERI)

Work order: EE(PIU)/2018-19/D-44 Dated: 25 September 2018

Progress

Pre Audit — DONE

- Data Collection, Stakeholder mapping, Questionnaire and checklist preparation for conducting audit
- Selection of wards on sample basis to understand the collection mechanism

On-site Audit — DONE

- Assessment of primary collection mechanism
- Assessment of secondary collection mechanism
- Identification of gaps in infrastructure, data and programs
- Preparation of draft report and preliminary exposition of findings with EDMC.

Post Audit — DONE

- Mapping of existing system against requirements of SBM and CPHEEO guidelines and benchmarks.
- Identification of gaps in infrastructure, and motivational mechanisms.
- Preparation of Final report including shortcomings identified
- Recommendations, action plan and time frame for execution.

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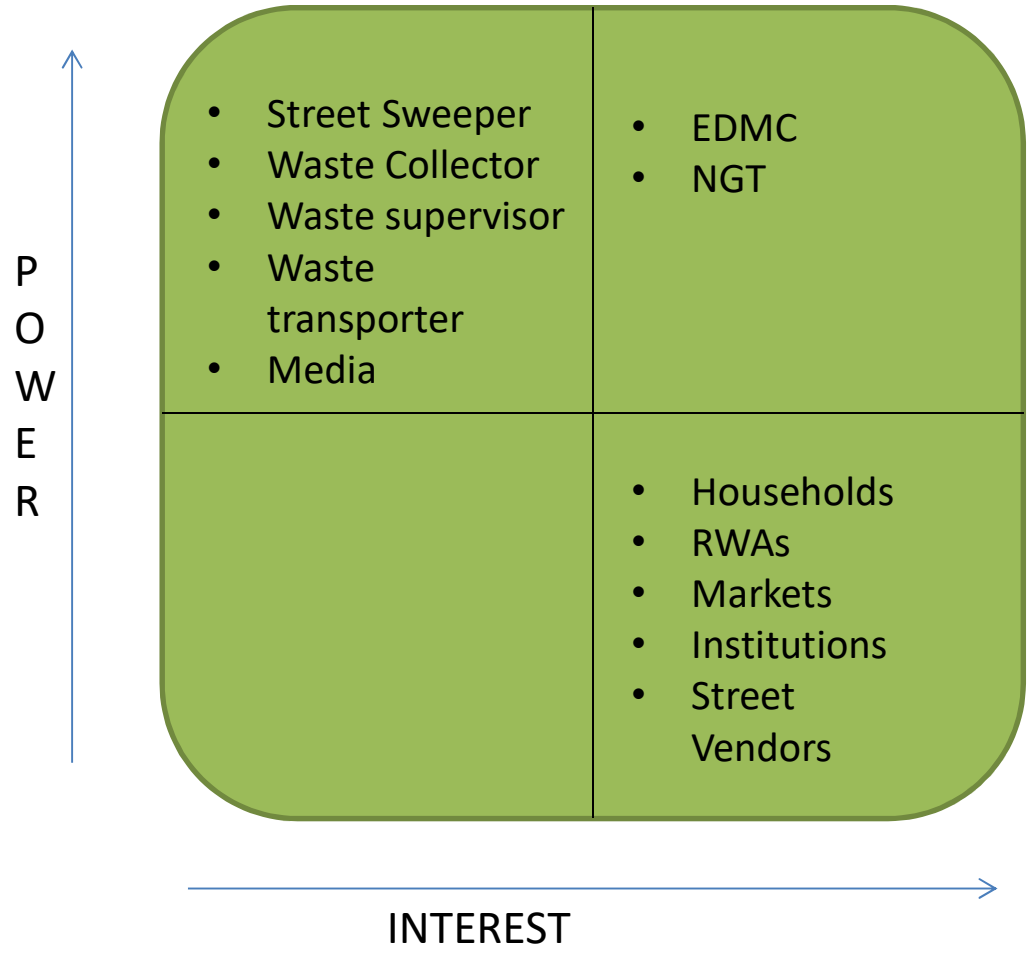
Pre Audit

- **Data Collection**
- **Mapping key stakeholders**
- **Questionnaire and checklist preparation:** A detailed questionnaire has been prepared to gather information about collection mechanisms for audit and has also been share and discussed with Municipal officials.
- **Selection of wards** and colonies:
    - Based on statistical analysis (>90% confidence level) 60 colonies covered spread among 40wards.
    - Colonies have been selected based on the category C, D, E F G H, in proportionate manner.
- **Dialogue with households:** To triangulate and test the questionnaire, a pilot was conducted with households in the colonies equally from different Income groups.

Stakeholders Mapping

- Households
- RWA
- Market/shops
- Institution
- Street vendors
- Waste collector
- Street sweeper
- Waste supervisors
- Waste transporter
- Ghazipur disposal site



Sample colony selection criteria

- With 40 wards and 60 colonies, approximately 1-2 colonies have been selected per ward
- A random selection of colonies from different categories was undertaken keeping in mind that whole EDMC area is captured geographically
- The selected colony list was finalised after discussion with Municipal officials
- The colonies selected are further captured for questions based on a 200 x 200 grid matrix

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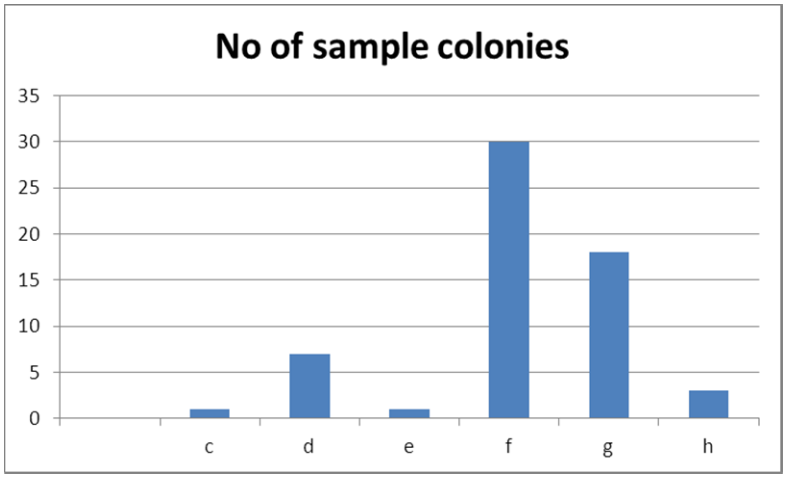
On Site Audit

Sample size:

- 60 colonies
- 40 wards
- Ghazipur SLF

Category	No of existing colonies	Percent	sample size (60)	round off
c	2	0.43%	0.3	1
d	52	11.09%	6.7	7
e	9	1.92%	1.2	1
f	239	50.96%	30.6	30
g	144	30.70%	18.4	18
h	23	4.90%	2.9	3
Total	**469**	**100%**		**60**



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Survey Findings

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Households

- 38 % respondents store/throw their organic waste separately.
- 64% respondents do not use dustbins to store waste. (use of polythenes more prevalent)
- Only 19% respondents hand over their domestic hazardous waste separately.
- Waste gets collected before 12 noon from 92% of the households
- There are no municipal bins in 84% of the surveyed colonies
- 36% respondents find Dhalaos in their locality clean (similar % from market and street vendor surveys)
- 42% respondents have either seen/heard that waste needs to be segregated

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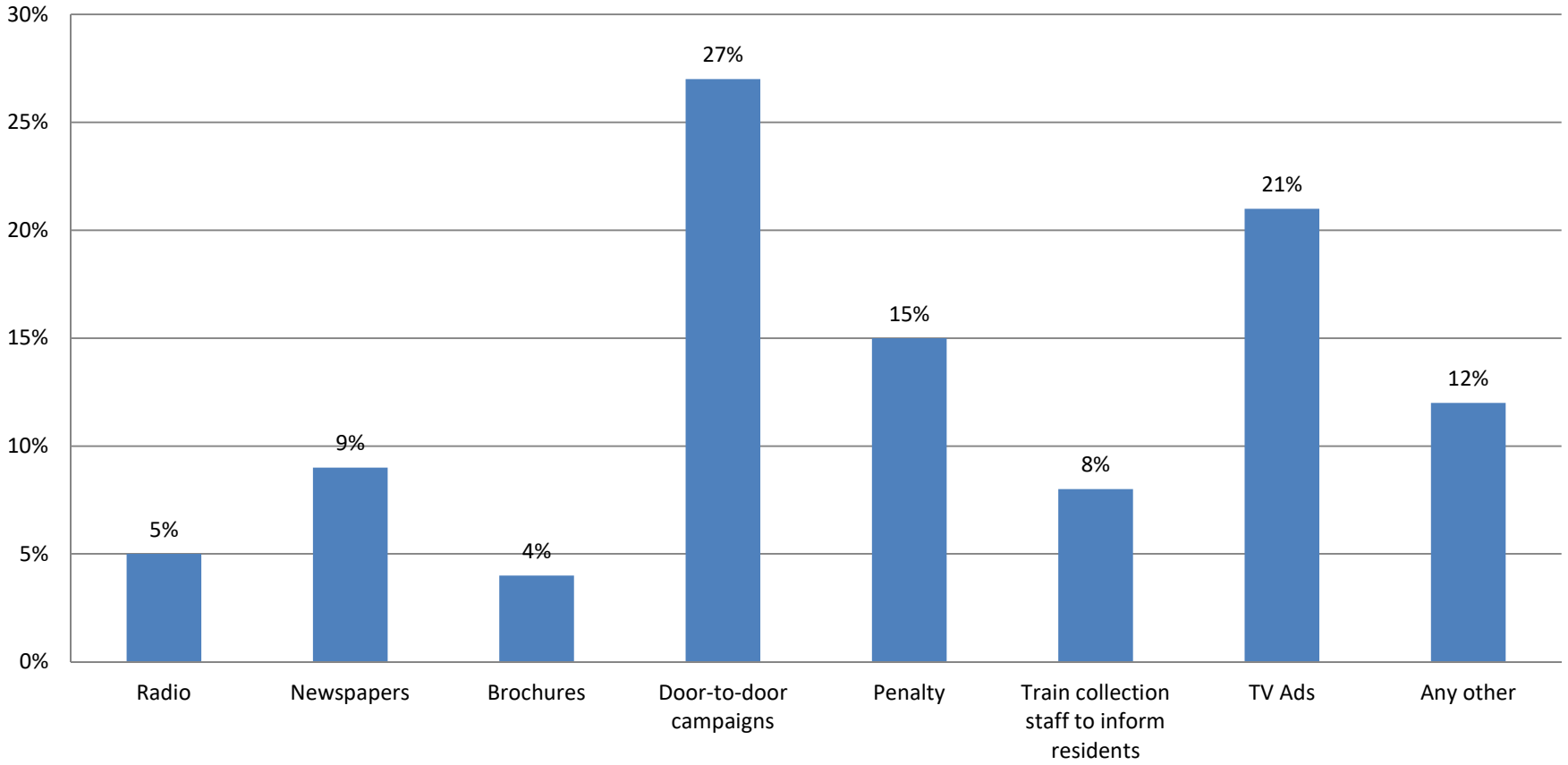
What are the most effective methods of awareness generation?



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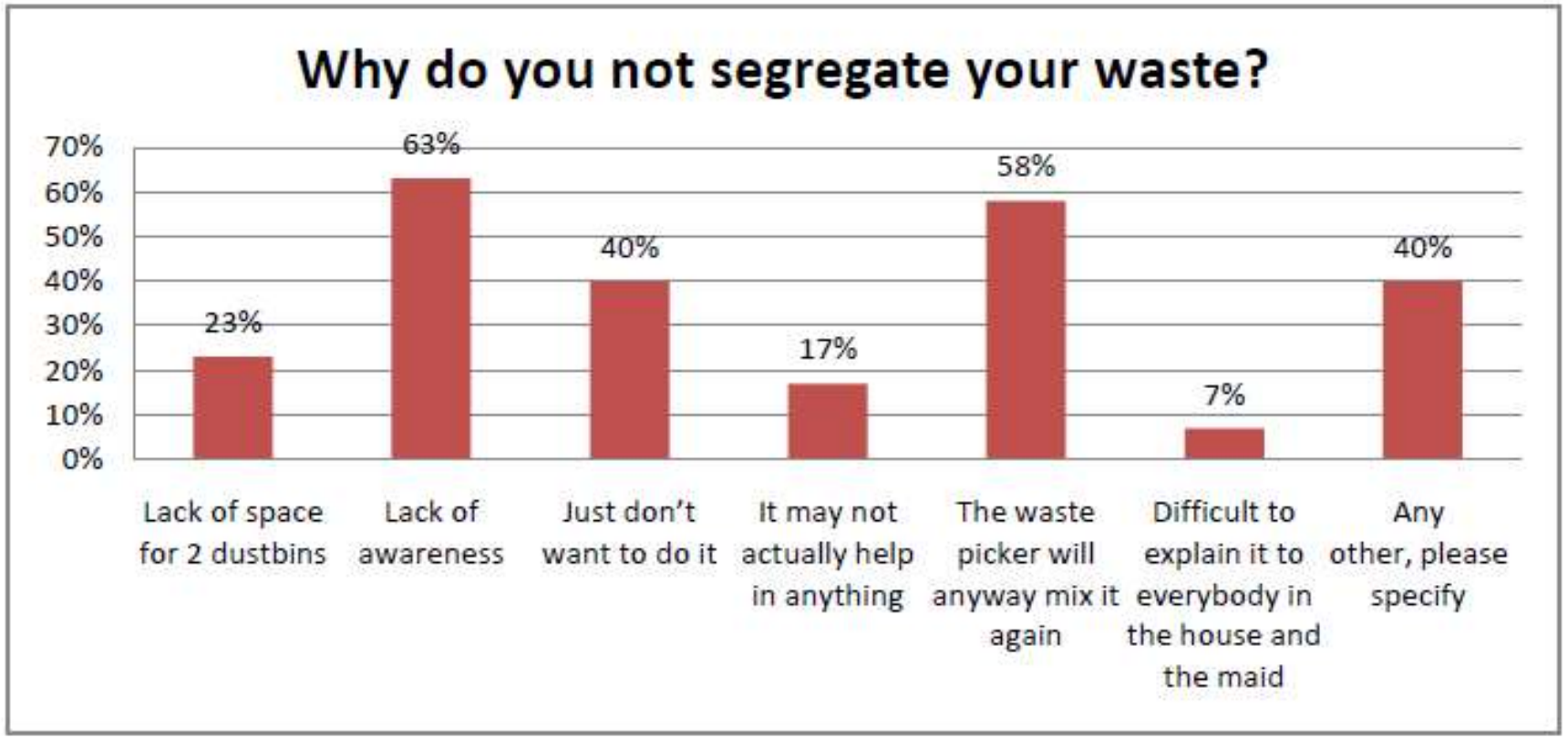

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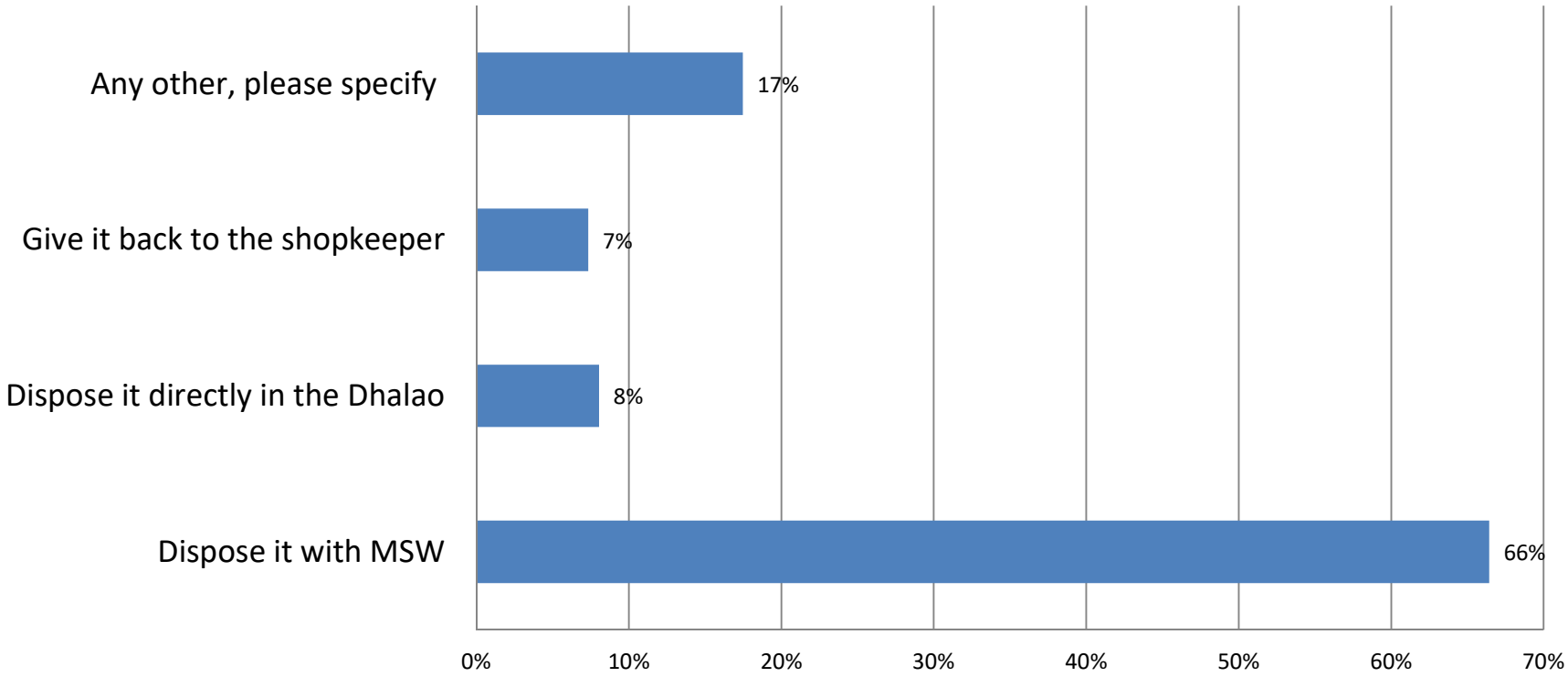
What do you do with special wastes generated ?



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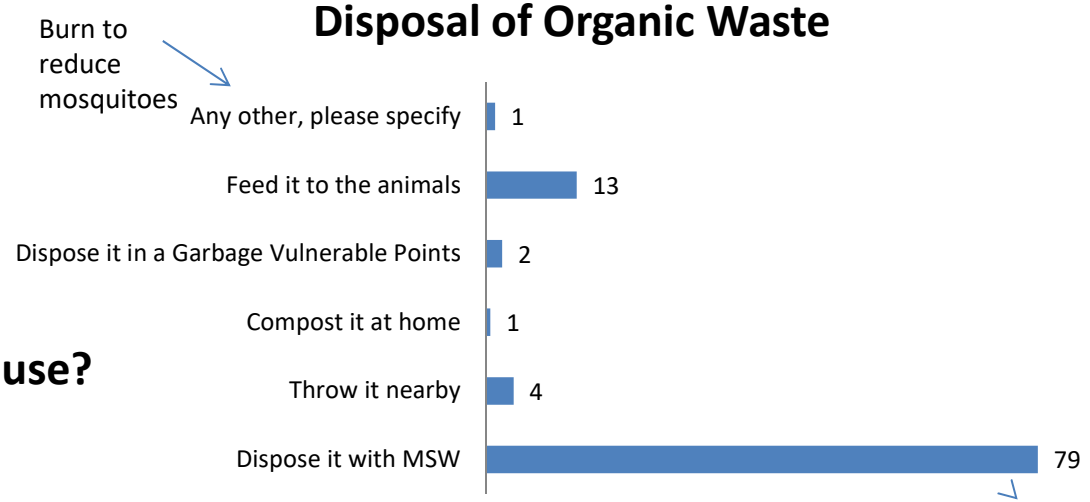
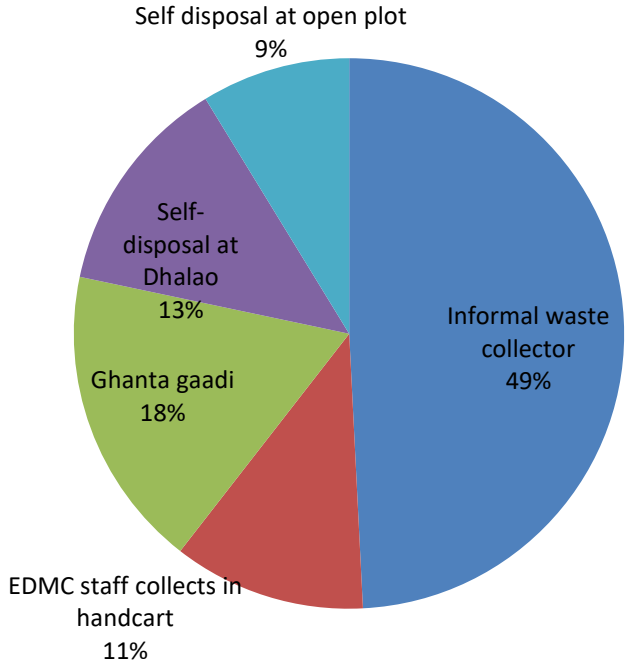
- 80% people said that there is no helpline number where they can call to complain/share feedback regarding MSW in their colony and there is a need for one.
- In 73% of the colonies, street sweeping is undertaken regularly
- In 44% of these colonies, street sweeping is not undertaken efficiently
- 50% respondents are aware of mechanical sweeping
- Only 7% respondents said that mechanical sweeping is being undertaken in/around their localities
- 69% respondents said that mechanical sweeping shall be helpful and should be done
- 63% respondents said that they will remove their cars if mechanical sweeping is undertaken in their area
- 50% respondents were aware of the water sprinkling efforts by EDMC
- 82% said that water sprinkling is needed and 64% said that it should be done before street sweeping

Disposal of Organic Waste



How is waste collected from your house?



Reasons for not using Ghanta gaadi:

1. Timing doesn't match
2. Ghanta Gaadi runs only on bigger roads
3. In certain areas, no music on arrival/doesn't stop to allow disposal of waste (eg. Khichripur)

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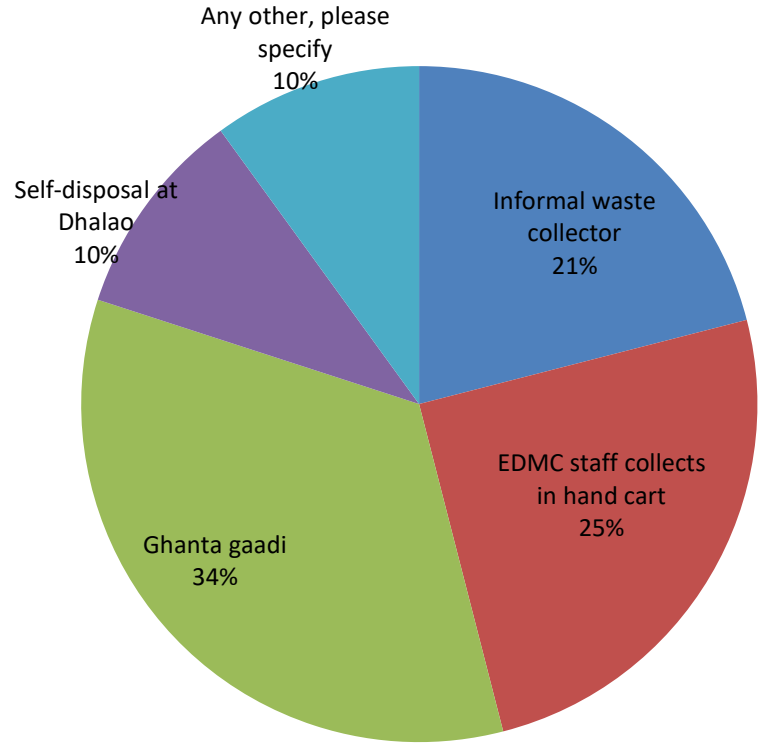
Markets

How is waste disposed from your establishment?



Any other:
Open disposal in drains/street

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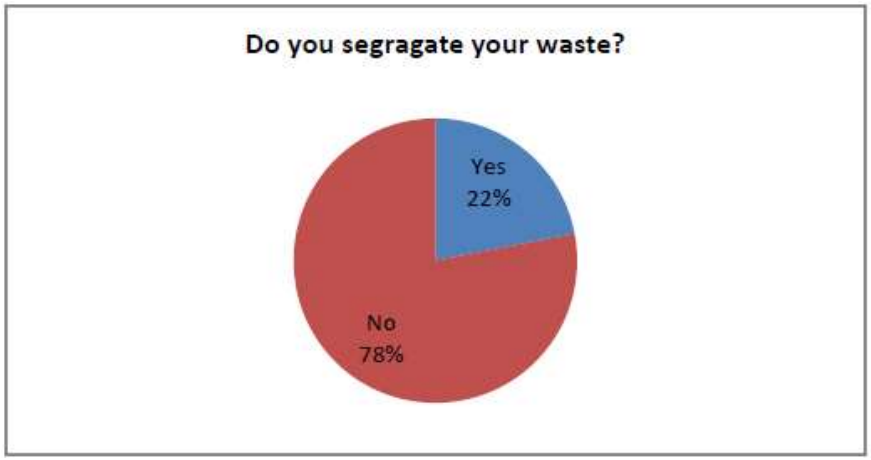
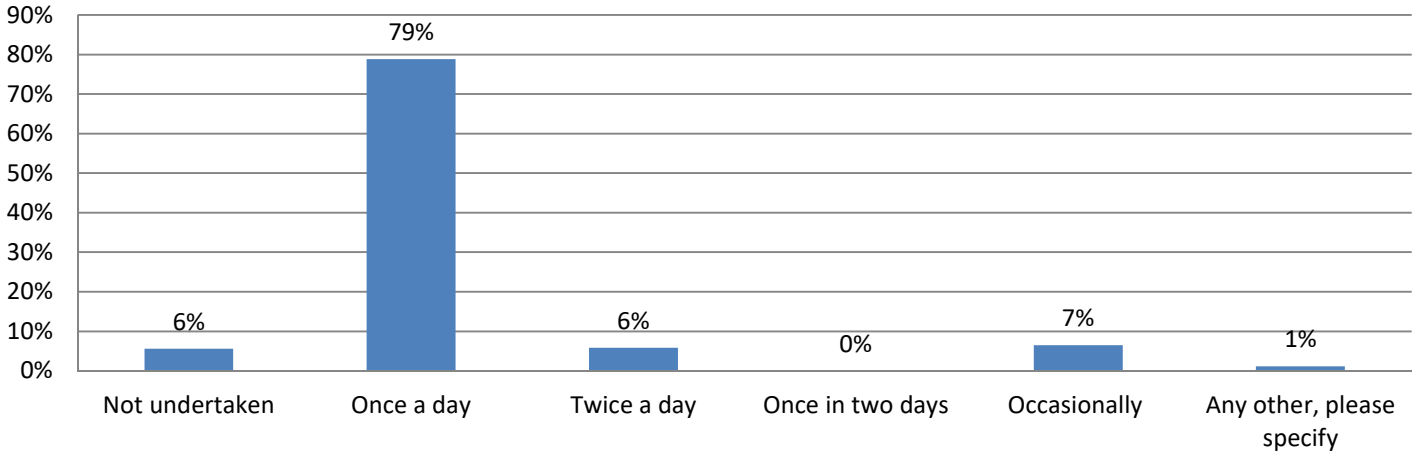


How many times is street sweeping undertaken from your market area?



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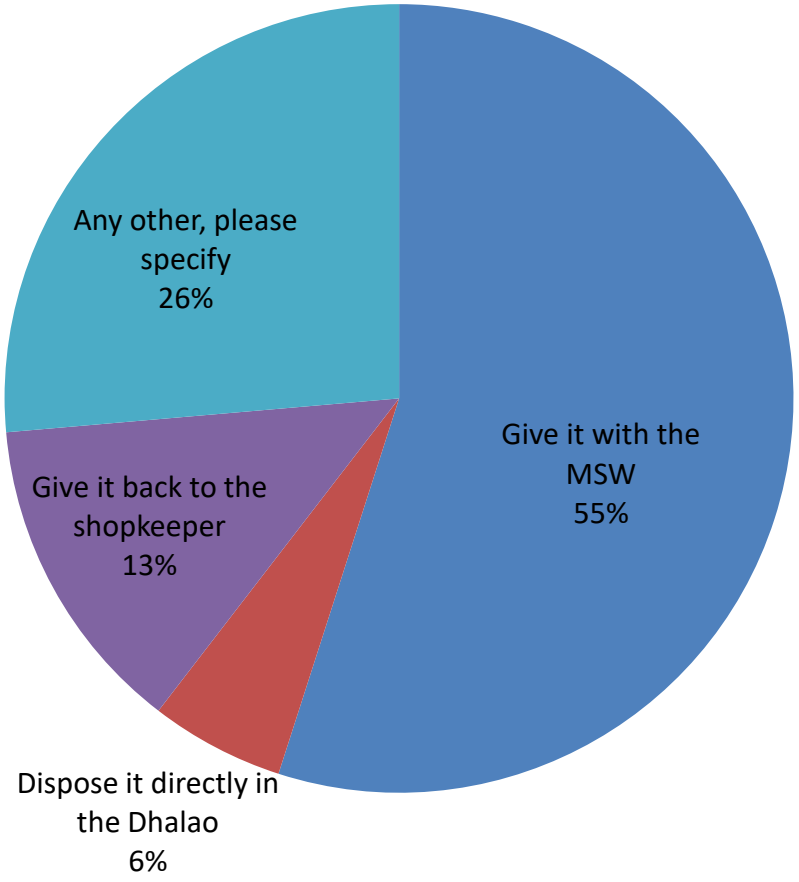
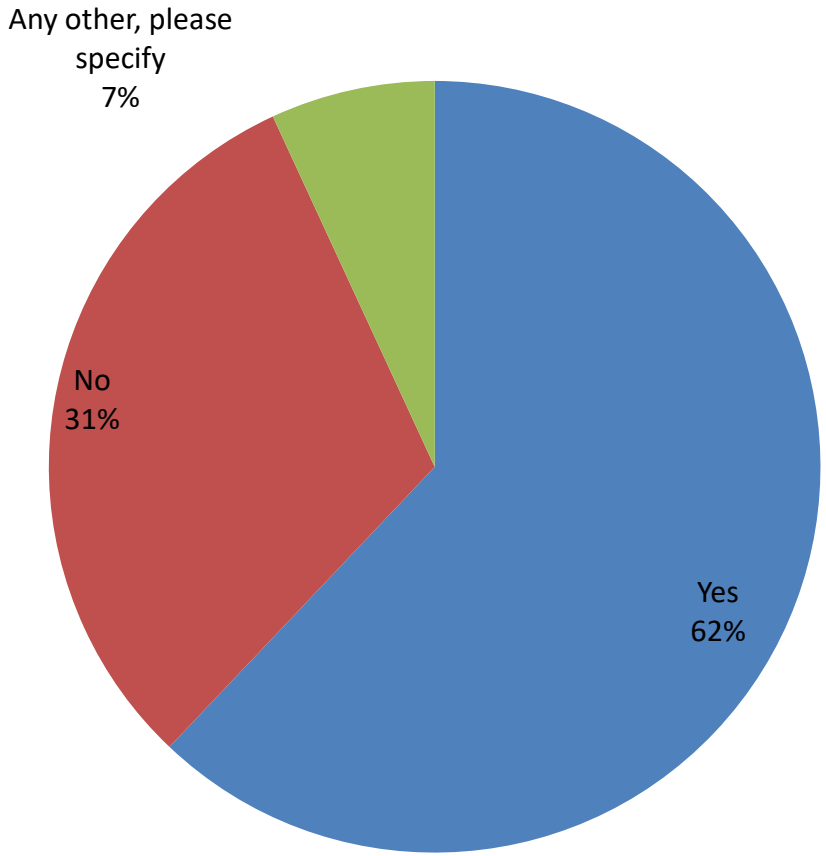
Disposal of Special/hazardous waste



Is night sweeping reqiored in market areas?



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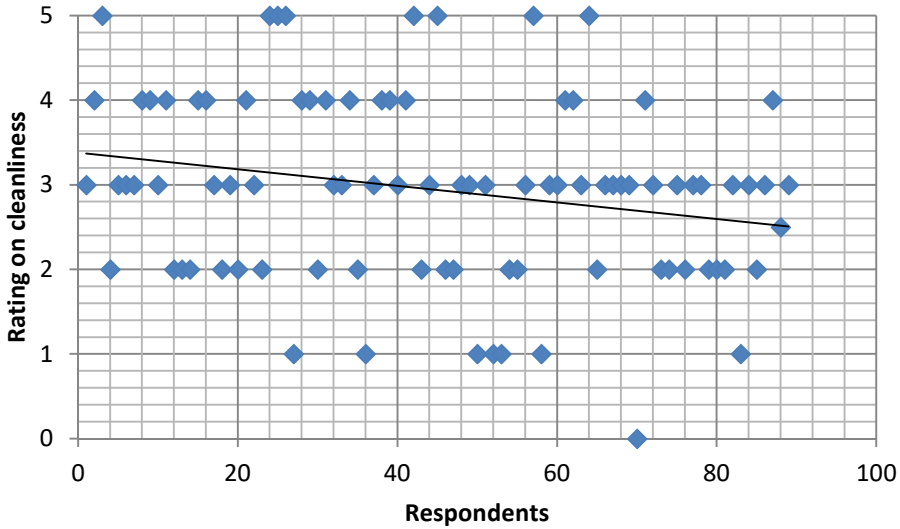
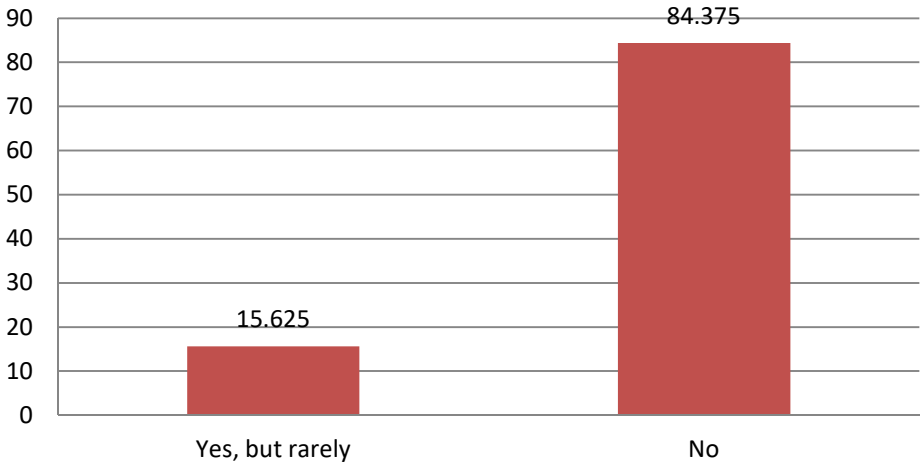
Do you find your area clean? Rate on a scale of 1-5



Open Burning in the market area?



Mode: 3





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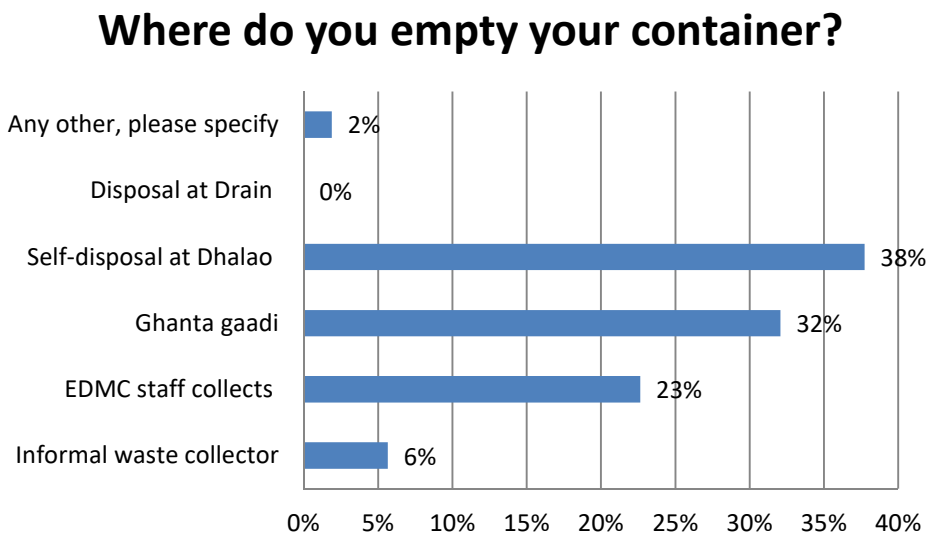
Street Vendors

- 36% street vendors do not have a dustbin to dispose their waste. (Either kept on the cart eg. Fruit peels or thrown on the streets/drain)
- 81% street vendors say that street sweeping is undertaken once a day
- 62% said that they find the streets clean after cleaning is undertaken
- Fruit peels being dried and used as fuel for cooking (high calorific value of dried mausami peals)



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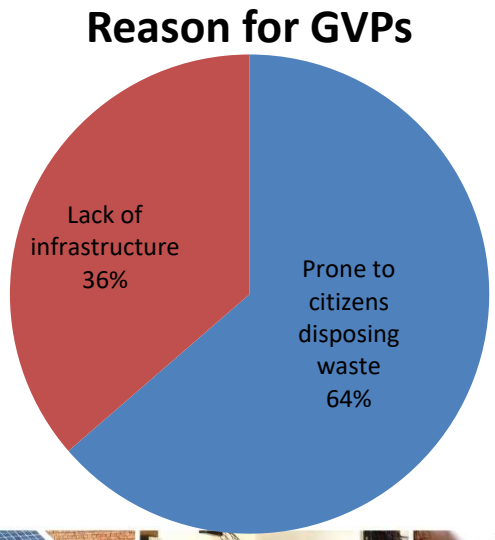
Waste Supervisor

- Attendance report is made by 100% of the respondents
- 50% of the GVPs were on disputed/vacant plots
- 87% respondents allow informal waste collectors to sort the waste in dhalaos to recover sellable recyclables
- None of the dhalaos had separate garbage bins at the dhalao to collect wet, dry and hazardous waste separately.



Infrastructure here refers to Dhalaos and Dustbins

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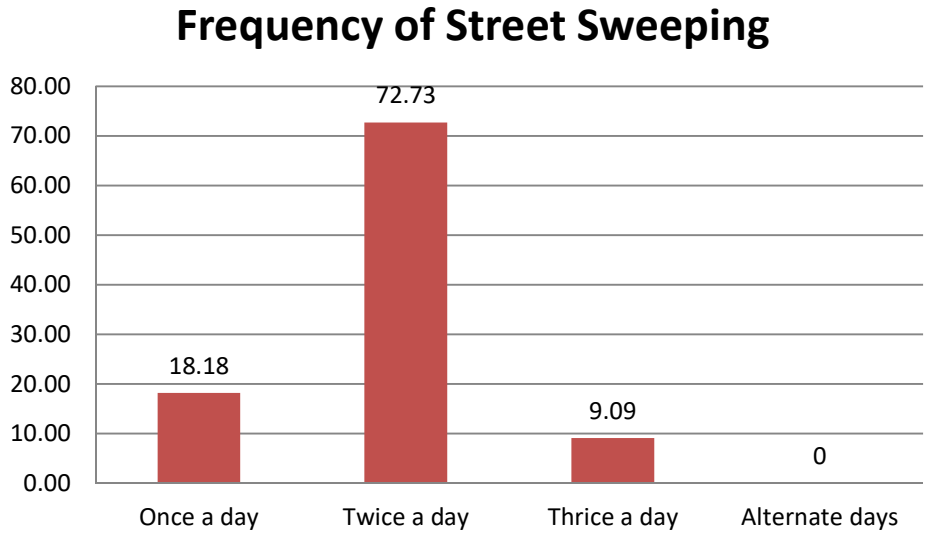
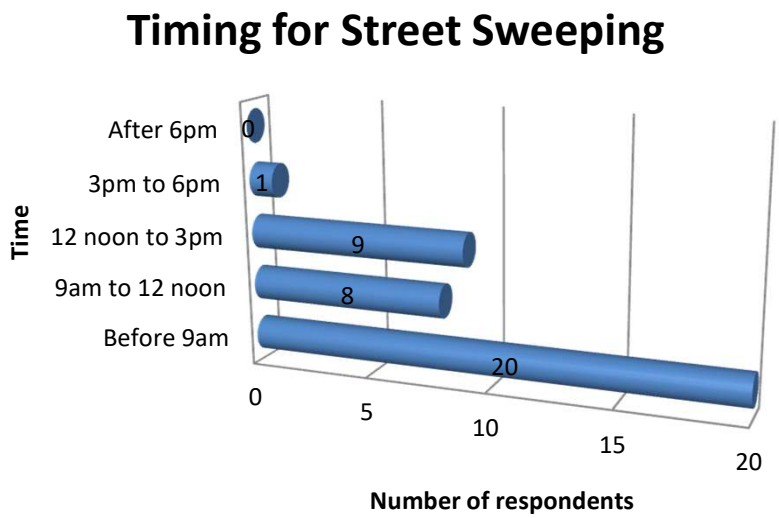
Waste Transporters

- Memo issued is collected under 4T
- Lack of performance recognition of drivers, leading to low motivation
- Leachate spillage happens- no mechanism to manage it
- Per dhalao, the time consumed by transporter varies from 20 mins to 2 hrs.
- Hardly any wait time at the Ghazipur SLF weigh bridge
- No PPEs
- No health check ups for drivers

Street Sweeper

- No PPEs, provided only before inspection
- Sweeping done only on main roads (as shared by residents)





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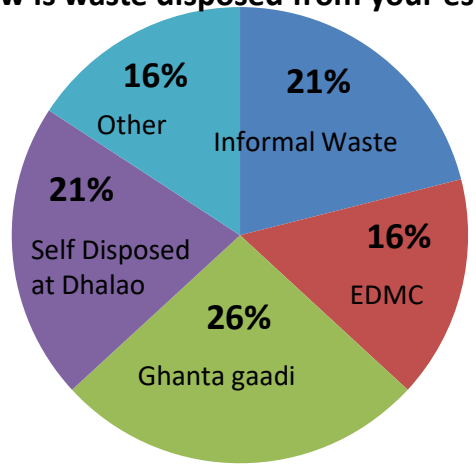
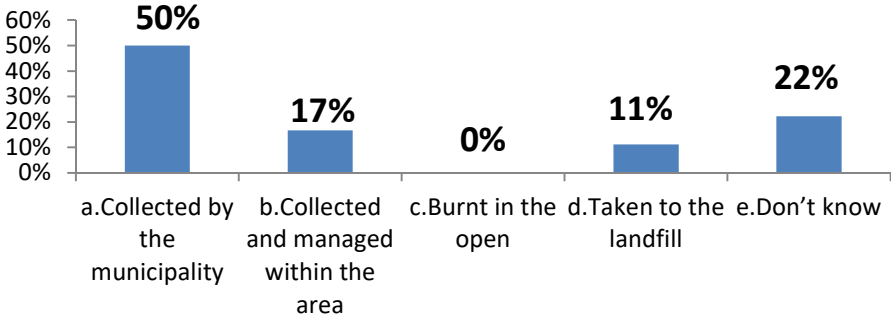
Institution

- 58% Institutions have their waste collected/disposed once a day
- 68% find the area around the institution clean
- Spot fines are not done or collected around the institution area
- Organic waste disposed with MSW
- 47% Have not seen any board/information in the public areas to promote segregation of waste
- 71% do not have a twin bin system in their areas

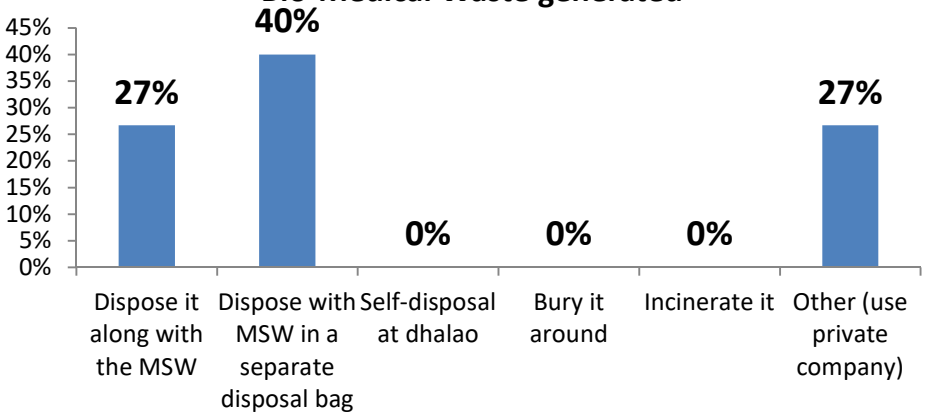
How is waste disposed from your establishment



Collection, management of garden waste



Bio-Medical Waste generated



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Waste Collector

- 70% waste collectors are municipal employees
- 60% without I-cards issued by EDMC
- 73% announce their arrival to the community by loud announcement, music, or doorbell
- 12% attended health check-up camps organized by EDMC
- 30% segregate organic and inorganic waste in the collection cart
- 12% segregate for recyclable and dispose non recoverables
- Household do not give segregated waste
- 64% dispose segregated waste in dhalao
  - 7% take segregated waste for composting
- Domestic hazardous waste is disposed with MSW
- 24% received training on how to segregate waste
- 12% received training on wearing personal protective equipment/health effects

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Segregated Waste Cart
(Vivek Vihar colony)

Twin Bin system (Vivek Vihar)

Clean street (Jhilmil colony)


Clean street (Mansarovar Park)


Clean Dhalao (Vivek Vihar)





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Waste collector(GTB Enclacve)


Waste collector (Jhilmil colony)


Waste collector (Bhagirathi Vihar)


Unclean street (New Seemapuri)


Unclean street (Bihar colony)


Twin Bins(Dilshad colony)


Street Sweeper (Dilshad colony)


Open Drain/ Clogged (GTB Enclacve)


Unclean Dhalao (Johripur)

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Mechanical Sweeping

- 1 out of 4 trucks audited by TERI -DL-1GC-7152
- Shift : 10 hr 20 min long
- Effective sweeping : 39 kms in 7 hrs (5.5 kmph) – 69% of the total shift time spent on sweeping

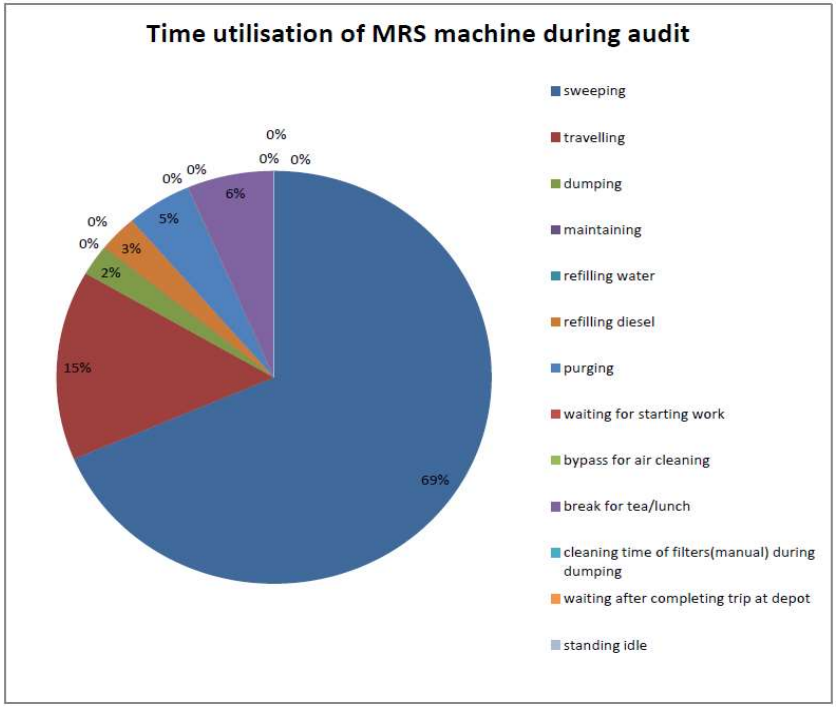

Fig: TERI Auditor with MRS

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Mechanical Road Sweeping

Best-Practices :

1. Operating staff was in uniform
2. Driver accompanied by 2 cleaners, operators and supervisor
3. Cleaner was provided with PPEs
4. Effective sweeping of 39 km in 7 hrs 5 min
5. Dust was weighed (2680 Kg) before dumping
6. Dumping ground was 4km away from end point of route
7. Purging effectively done for 20 minutes, increasing effectiveness of sweeping

Identified Gaps

1. Back pipe not used
2. One of the sprinkling nozzles close to right brush was ineffective in terms of spray release (mist formation)
3. After dumping, the machine could sprinkle only for 5 min because of the low availability of water.
4. If diesel is provided to truck at depot before start of the shift- 1 hr more sweeping can be undertaken

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Identified Gaps

Behavioural:

1. Lack of segregation of waste
2. Lack of use of Personal Protective Equipment (PPEs) by Safai Karamcharis
3. Lack of awareness on colour coded 2 bin system

Administrative:

1. Lack of incentives and penalties in the system
2. Lack of integration of informal waste pickers
3. Lack of Communication and knowledge dissemination between waste generators and collectors
4. No quantifiable measure to determine impact of behaviour change in waste generators
5. Lack of coordination between service providers within EDMC and with other departments such as PWD, DDA etc

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Identified Gaps (continued)

Infrastructural:

1. Lack of decentralized waste management options
2. Under-utilized capacity of collection fleet
3. Lack of processing capacity for MSW
4. Lack of collection fleet with segregated compartments
5. No Material Recovery facilities (MRF)
6. No Hazardous waste management facility
7. Lack of segregation of sanitary waste
8. No segregated storage at dhalaos
9. Waste carried on trucks to the landfill partially covered as the cloth becomes tampered
10. Lack of shelter for the sanitation workforce
11. No leachate management in trucks

Identified Gaps (continued)

Financial:

1. Lack of a business model to strengthen the collection system
2. Lack of awareness and complete implementation of institutional SWM bye-laws 2018 among stakeholders

Institutional:

1. Shortage of safai karamchari staff in certain wards

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Clean Dhalao (Vivek Vihar)

Unclean Dhalao (Johripur)





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Key factors affecting good waste management in colonies

- Activeness of Nigam Parshad
- Availability of bins in the colony
- Availability of dhalaos within the colony
- Active waste supervisor in the colony

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Recommendations

1. **Capacity building** of waste generators to increase waste segregation
2. To ensure proper segregation, a **three bin system** needs to be introduced
3. **Color coding of waste collection fleet** – primary and secondary:
   - Green truck- organic waste
   - Blue - recyclables, non-recyclables, combustibles, etc
4. **MSWM plan** to be prepared by the ULB including a short term (20-25 years) and short term plan (next 5 years)
5. Stronger implementation of **EPR**
6. **Incentives to segregate at source**

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Recommendations (continued)

7. **Decentralized waste management** systems such as composting facilities at colony level
8. **Integration of Informal Sector**
9. Setup **material recovery facilities**
10. **Tie-ups** with material recycling facilities, composting units, sewage treatment plants (STPs), and Waste-to-Energy plants required to ensure less requirement for landfilling of waste
11. Establish waste deposition centres for **domestic hazardous waste**
12. Provide **training on solid waste management** to waste-pickers and waste collectors

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Recommendations (continued)

13. **Decentralized compost plant** or bio-methanation plant for waste collection from major sabji mandis
14. Set up **covered secondary storage facility** for temporary storage of street sweepings
15. **Synchronization between primary and secondary waste collectors** required to avoid spillage and contamination of different waste streams
16. A **monthly progress report of MRV** should be made and shared with concerned department to monitor the progress and necessary actions

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Thank You

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