



Wastepickers: Delhi's Forgotten Environmentalists?

(2018)

A Report by

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About Chintan Environmental Research and Action Group

We are a registered non-profit organization with a vision of inclusive, sustainable, and equitable growth for all. Our mission is to reduce ecological footprints and increase environmental justice through systemic change brought about through partnerships, capacity building at the grassroots, advocacy and research, and sustainable, scalable models on the ground.

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I. Introduction

India's waste woes: India is drowning under its own waste. Recent estimates suggest that per capita waste generation is currently 0.57kg/day and is expected to double by 2025. Landfills are filled, waste-to-energy is polluting the air and waste lies uncollected. This is a huge impact on human health and

the planet: landfills contaminate ground water irreversibly, and cancer clusters are often found near them. Waste to energy plants release toxics like dioxins, which are amongst the 12 most deadly chemicals poised for a global phase out. Flies breed on waste, and spread disease. And waste filled



Picture 1: Waste pickers work under hazardous conditions, without any provisions for health security or otherwise

drains result in backlogs and accompanying sanitation based illnesses. Over 3% of India's greenhouse gas emissions are on account of poor waste management.

Finally, waste is often seen as materials misplaced. Judicious waste management impacts how materials are saved, reused and the environment protected. For example, improved collection and recycling is directly linked with saving metals from being mined and importing pulp for paper.

India is urbanizing rapidly. Without putting into place key this situation will only worsen-making the quality of life significantly worse for urban and rural denizens.

Things would be worse if it was not for the informal recycling sector-waste-pickers, kabaris and recyclers. In Delhi, 150,000 such persons recycle at least 2000 tons of paper, plastic, metals and glass daily. They save the municipality upto a crore a day. A Chintan study shows this group saves 3.6 more times greenhouse gases in Delhi alone, compared to any other waste project in India receiving carbon credits. Unfortunately, they are treated like the waste they handle-stigmatized and brutalized by society. Their health suffers and they suffer bites, allergies and humiliation by the municipal authorities.

Challenges and Solutions to cleaning urban cities: Waste-pickers provide important waste collection, segregation and recycling services that contribute to cleaning our city. Unfortunately, there has been a trend to outsource waste management services to private firms across India. In many instances, this displaces waste-pickers, takes away their livelihoods and pushes them into even deeper levels of poverty. Even though many policies and rules that

are inclusive of waste-pickers exist, they are hardly ever implemented. Allowing waste-picker organizations to provide doorstep waste collection services and charging user fees from service consumers enabling them to provide better services and monitor service delivery, would go a long way in strengthening this informal sector, providing green clean livelihoods and addressing roadside dumping of waste.

Another worrying fact is the lack of segregation of waste at source not only puts the health of waste handlers at risk, but it also does not allow for optimal waste processing and treatment solutions. Further, by contaminating recyclable and compostable waste materials, it reduces their potential value in the market. Hence source segregation of waste should be mandatory.

Over 50 percent of the waste produced is organic or wet waste that is easily compostable. While there are composting plants in urban cities, there are a few problems with them. Some of them do not produce compost that is of a good enough quality because of lack of adequate segregation of waste. Others that do produce compost of acceptable quality often do not have markets for that compost.

Composting is one of the lowest cost waste management solutions. Bulk organic waste generators such as temples, hotels and large restaurants should have their own composting system in place or should pay for composting and/or buy-back the compost produced. Individual composting can help reduce the waste burden on the city. Contrary to popular belief, if done right, compost doesn't have smell or breed flies and insect. Those households that have space and the means to set

up such systems should be encouraged to do so. Decentralized composting at the neighborhood level can also help dramatically reduce the waste burden on the city. Additionally, in contrast to centralized composting systems, much of the compost produced in a decentralized manner can be used locally in public parks or by households that have gardens in the neighborhood.

It is therefore imperative that waste-pickers be included in waste management systems in cities which shall not only let the cities comply with established rules and policies, but also ensure stable, safe and secure livelihoods of a large section of the urban poor, thus securing their trust in and support for the municipal governments.



Picture 2: Providing waste pickers training on how to compost will enable decentralized waste treatment

II. Who are the wastepickers and what does the law say about them?

Who is a wastepicker

Waste pickers, the general term adopted by the **1st World Conference of Waste Pickers in 2008**, can range from people working on dumps or rummaging through garbage on the streets, to informal private collectors of recyclables who sell to middlemen or businesses or transform waste into new products. Some of them are organized pickers/sorters linked to unions, cooperatives or associations.¹

According to the **Solid Waste Management Rules, 2016**, “waste picker” means a person or groups of persons informally engaged in collection and recovery of reusable and recyclable solid waste from the source of waste generation the streets, bins, material recovery facilities, processing and waste disposal facilities for sale to recyclers directly or through intermediaries to earn their livelihood [Rule 3(1) (58)].

Further, according to the **Plastic Waste Management Rules, 2016**, “waste pickers” mean individuals or agencies, groups

of individuals voluntarily engaged or authorised for picking of recyclable plastic waste [Rule 3(z)].

Various Indian national policies have clearly recognized the informal recycling sector through referring to them and their work, as follows:

- *The National Action Plan for Climate Change, 2009*, states, “While the informal sector is the backbone of India’s highly successful recycling system, unfortunately a number of municipal regulations impede the operation of the recyclers, owing to which they remain at a tiny scale without access to finance or improved recycling technologies” This is part of the Mission on Urban Sustainability.
- *The CAG Audit on Municipal Solid Waste in India (December 2008)* also recommends (Chapter 3, Section 3.5) that “MOEF/states should consider providing legal recognition to rag pickers so that recycling work becomes more organized and also ensure better working conditions for them.”
- *The National Environment Policy, 2006*, which states “Give legal recognition to, and strengthen the informal sector

¹ Waste Pickers - The right to be recognized as workers, Women in Informal Employment Globalizing and Organizing, June 2013. Available at: <http://wiego.org/sites/wiego.org/files/resources/files/WIEGO-Waste-Pickers-Position-Paper.pdf>

systems of collection and recycling of various materials. In particular enhance their access to institutional finance and relevant technologies." (Section 5.2.8, point (e), Pg 36)

- *The Supreme Court accepted recommendations of the Report of the Committee constituted by the Supreme Court in 1999 (Solid Waste Management in Class 1 Cities in India). According to this report, in points 3.4.7 (Pg 34) and Pgs 3.4.8, rag pickers must be converted into doorstep waste collectors as a means of up gradation.*

National Committees

There have been several committees in the past years that have recognized the importance of including the waste recycling sector into mainstream activities. All of these favour the rights of waste pickers to access waste.

- **Asim Burman Committee:**

This was constituted by the Supreme Court as part of the Public Interest Litigation *Almitra Patel Vs The Union of India*. The committee was headed by Mr. Asim Burman, Municipal Commissioner, Calcutta Municipal Corporation, March 1999. This important committee clearly underscored the work of the recycling sector and its rights over waste. It made certain far reaching recommendations with regard to recycling and the informal sector. These included:

- Organizing wastepickers to collect recyclable waste from shops and establishments. It also acknowledged that these wastepickers help reduce the burden of Urban Local Bodies body by several million rupees annually in collection, transport and disposal cost and saving of landfill space.

- Ten percent of waste produced in India can be reused or recycled. Part of it is collected by wastepickers and the rest goes to the landfills. Recycling can be encouraged by promoting recycling industry through incentives like land allotment, power, water on priority, tax holiday, preferential purchase of recycled products by government and semi-government bodies.

- **Bajaj Committee:**

This 1995 High Power Committee on Urban Solid Waste Management in India was created by the Planning Commission, the highest policy-making body of the Indian Government, soon after the 1994 plague outbreak. It was headed by Prof. B.S Bajaj, who was a member of the Planning Commission. The Bajaj Committee made specific space in the waste management framework for the informal sector. This was in sharp contrast to the Municipal Corporation of Delhi's ban on the work of waste pickers during and after the plague. Some of the recommendations included:

- Replacing the informal sector scavenging from roadside dumps and disposal grounds by organised ward-level recycling and recovery centres, which could be managed by NGOs working with waste pickers. Municipal authorities could also employ waste pickers for this.

It is therefore clear that various policies have been consistently in favour of recycling by the informal sector, specifically, the waste pickers. However, these have been ignored in plans of privatization and waste to energy, including the new urban renewal plans.

Regional Legislation

There have been many instances of progressive regional legislation.

- **Ahmedabad:**

Paper waste from offices is expected to be handed over to women waste pickers.

- **Maharashtra:**

The order of the Government of Maharashtra; Water Supply and Sanitation Department. Government Circular No: Ghakavya 1001/ Pra. Kra 546/ Papu-22 Mantralaya Mumbai : 5 January, 2002 states that :

- The unorganized rag pickers collecting waste in different parts of the city should be organized with the help of the non-government organizations and register a cooperative. The local self-government should take an initiative to get these cooperatives registered. Registered rag pickers organization should be allotted the work of collecting waste in the city parts/wards with the help of non-government organizations.
- While allotting work to these cooperatives to collect waste from various places in the city, the citizens should be informed of this method. Also discussions should be held with non-government organizations, eminent citizens, Mahila Mandals and people's representatives.
- Those rag pickers who have not registered in the cooperative, can also be, under exceptional circumstances, allowed to collect waste on an individual basis after registering themselves.
- The civic authority should give preference to the

cooperatives formed by the rag pickers to collect dry waste.

- If the city has a waste processing unit, the waste collected by the rag pickers should be used for the same or the rag pickers should have the freedom to sell it in the market. This will provide income to the rag pickers and help improve their living standard.
- Civic authorities/ NGOs should issue identification cards to the registered rag pickers. This will enable the citizens to recognise the registered rag pickers.
- The civic authority/ NGO should allot a specific place, as per the situation, and give the task to the registered rag pickers or their organizations to collect waste from 250-300 homes.
- The task of collecting bio-Medical waste and polluted/ toxic waste should not be allotted to the rag pickers. Civic authorities should make provisions for collecting general waste and bio medical waste separately and storing it and disposing it and monitor it effectively.



Picture 3: Waste pickers efficiently managing waste at the Great Indian Gol Chakkar Carnival, 2016

What do laws and policies say about them?

Various laws, policies and committees, way back since 1995, have stressed on the importance of including the informal sector wastepickers in the formal waste management system. The revised **Solid Waste Management Rules, 2016** now lay down clear directions to various stakeholders as far as their duties are concerned. According to the revised SWM Rules, 2016:

1. Under duties of waste generators [Rule 4]:

- Responsibilities of waste generators have been introduced to segregate and store the waste generated by them in three separate streams namely bio-degradable i.e. wet waste, non-biodegradable i.e. dry waste (Plastic, Paper, metal, wood, etc.) and domestic hazardous wastes (diapers, napkins, empty containers of cleaning agents, mosquito repellents, etc.) in suitable bins and hand over segregated wastes to authorized waste pickers or waste collectors.

2. Under duties of Department of Urban Development in States and Union Territories [Rule 11]:

- They have been directed to prepare a state policy and solid waste management strategy for the state or the union territory in consultation with stakeholders including representative of waste pickers, self-help group and similar groups working in the field of waste management consistent with these rules, national policy on solid waste management and national urban sanitation policy of the ministry of urban development.

- Acknowledge the primary role played by the informal sector of waste pickers, waste collectors and recycling industry in reducing waste and provide broad guidelines regarding integration of wastepicker or informal waste collectors in the waste management system.
- Start a scheme on registration of waste pickers and waste dealers.

3. Under duties and responsibilities of local authorities and village Panchayats of census towns and urban agglomerations [Rule 15]:

- Establish a system to recognize organizations of waste pickers or informal waste collectors and promote and establish a system for integration of these authorized waste-pickers and waste collectors to facilitate their participation in solid waste management including door to door collection of waste.
- Direct waste generators not to litter i.e throw or dispose of any waste such as paper, water bottles, liquor bottles, soft drink canes, tetra packs, fruit peel, wrappers, etc., or burn or bury waste on streets, open public spaces, drains, waste bodies and to segregate the waste at source as prescribed under these rules and hand over the segregated waste to authorized the waste pickers or waste collectors.
- Setup material recovery facilities or secondary storage facilities with sufficient space for sorting of recyclable materials to enable informal or authorized waste pickers and waste collectors to separate recyclables from the waste

and provide easy access to waste pickers and recyclers for collection of segregated recyclable waste such as paper, plastic, metal, glass, textile from the source of generation or from material recovery facilities.

- Provide training on solid waste management to waste-pickers and waste collectors.

The introductory paragraphs of the revised **Plastic Waste Management Rules, 2016**, also stress upon the need of including the wastepickers in waste management from households or any other source of waste generation, as follows;

‘And whereas to implement these rules more effectively and to give thrust on plastic waste minimization, source segregation, recycling, involving waste pickers, recyclers and waste processors in collection of plastic waste fraction either from households or any other source of its generation or intermediate material recovery facility and adopt polluter’s pay principle for the sustainability of the waste management system...’

Therefore it is clear that policy on solid waste management has been in favour of creating an enabling environment for waste pickers and to a lesser extent, for reprocessors via improved technologies.

III. Wastepickers in Delhi

India's rapidly growing population directly leads to an increase in waste generation in the country. A 2014 report by the erstwhile Planning Commission claims that 62 million tonnes of municipal solid waste is generated annually by 377 million people in 7,935 urban centers of India. This is projected to increase to 165 million tonnes by 2031 and 436 million tonnes in 2050.² This burgeoning waste of our cities is managed by silent crusaders of environment called waste pickers. Approximately one percent of the total urban population (at least 15 million people) in developing countries earns its livelihood by collecting and sorting waste informally.³ Waste pickers collect waste, including plastics, metals, cardboard, etc and sell it to itinerant buyers and *kabariwallas*, who sort out this waste and sell it further to waste traders and recyclers. The waste pickers, waste recyclers, *kabariwallas* and junk dealers together

form the 'informal' waste recycling sector, since they are not formally organized or enumerated as a part of the formal economy. In India, estimates suggest that there are about 15 lakh people who make their living by recovering, sorting and selling recyclable materials.⁴ These waste pickers constitute the bottom layer of waste recycling pyramid of a city.

A survey of six cities has shown that the informal sector recycles as much as 66 percent of solid waste in cities.⁵ Officially, Delhi generates 8,360 tonnes per day (tpd) of municipal solid waste (Some sources claim it to be 8,500 tpd⁶). Waste generation is projected to touch 17,000-25,000 tpd

2 Report of the Task Force on Waste to Energy (Vol 1) 2014, Planning Commission, New Delhi, May, p ii. Available at: http://planningcommission.nic.in/reports/genrep/rep_wte1205.pdf

3 Martin Medina 2008, The informal recycling sector in developing countries, in Grid Lines. Available at: <https://openknowledge.worldbank.org/bitstream/handle/10986/10586/472210BRI0Box31ing1sectors01PUBLIC1.pdf>

4 Involving waste-pickers to improve door-to-door collection, in Compendium of Good Practices in Urban Solid Waste Management. Available at: <http://www.swachcoop.com/pdf/wastepickerstoimprovedoor-to-doorcollection.pdf>

5 GTZ/CWG 2011, The Economics of the Informal Sector in Solid Waste Management. Available at: <http://www.giz.de/en/downloads/giz2011-cwg-booklet-economicspects.pdf>

6 Minutes of the meeting on Operation of Landfill Sites and related Waste Management Projects in respect of existing 3 landfill sites by MCD convened at the Raj Niwas on 17th August 2011. Available at: <http://lgdelhi.nic.in/pdf/Solid%20Wates%20Management%20by%20MCD%2017.08.2011.pdf>

by 2021.⁷ There are three landfills in Delhi – Bhalswa, Ghazipur, and Okhla. Bhalswa was commissioned in 1994, Ghazipur in 1984 and Okhla in 1996, which are already saturated beyond their capacity.

Delhi has over 160,000 people involved in waste-picking and waste recycling. They collect 15-20 percent of Delhi's total waste (in terms of weight) and recycle about 2,000 tons of city's waste every day. Waste is collected and sorted in at least 42 distinct categories, such as paper, newspaper, cardboard, plastics, glass, metal, rubber, etc. Each waste picker picks at least 60 recyclable kg waste in a day to earn Rs 8,000-10,000 a month.

A survey was done by CASI and Chintan on the state of people working in the informal recycling sector, and a survey on wastepickers of Delhi (2015) conducted by Chintan in the slums of Nizamuddin, Bhalswa, Chaman Vihar, Takia Kale Khan, Sihai, Vijay nagar, Gazipur, Mulla Colony and Bhopura brought into focus various aspects of the population earning a livelihood in solid waste in Delhi as follows:

Where do they come from?

All cities except Delhi show significant domicile and in-state migrant populations in the sector. Delhi is the most diverse with migrants coming from UP, West Bengal, Bihar and Assam. The table below illustrates the range of migration.

7 Kartikey Handa et al 2013, Status of composting in India with emphasis on Delhi, in *International Journal for Research in Applied Science and Engineering Technology*, Vol 1, Issue 4, November. Available at: <http://www.ijraset.com/files/serve.php?FID=100>.

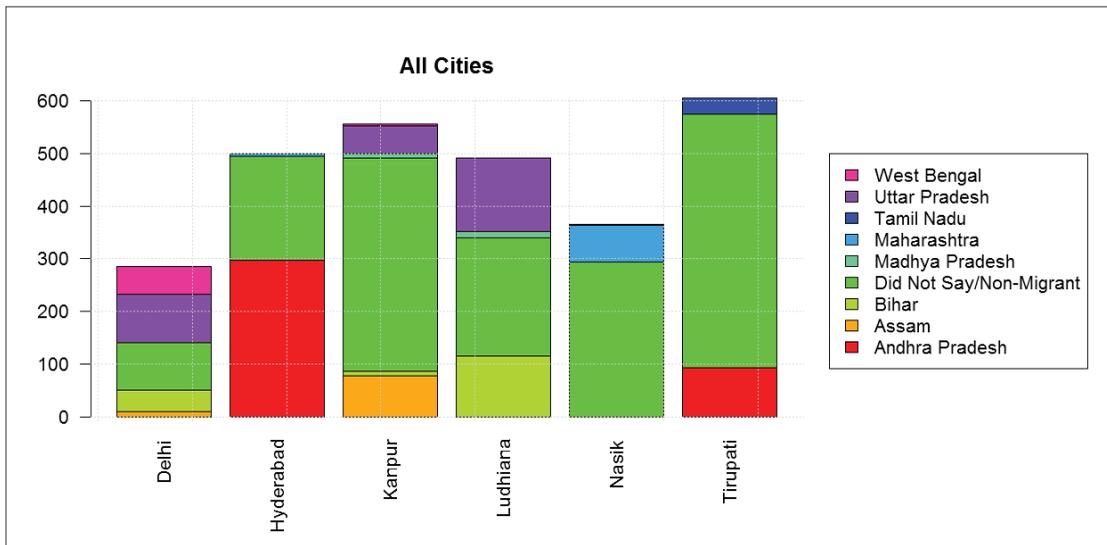


Figure 1: City wise migration

The most prominent reason for migration stated was unemployment followed by low income, and irregular work, showing how they move to city in hope of better prospects.

Figure 2: Reason for migration

- **What are their family Characteristics?**

The average size of the family is 5-6 members, and the waste picking population is skewed towards the adult members of the family. Approximately 85% of the waste picking population is above 18 years and only 15% lies in the age group of 0-18 years as seen in the table below.

be literate the level of education is abysmal, with an average 2 to 3 years of education. Despite poor literacy rates and levels of education in those surveyed, almost everyone agreed that education was indeed a means to social development.

- **Do they have Social Security?**

The social security cover of wastepickers according to the survey is very dismal. Majority of the wastepickers only have voter id cards, and only a mere 3% have BPL cards even though they live in abject poverty, which is shown in the table on

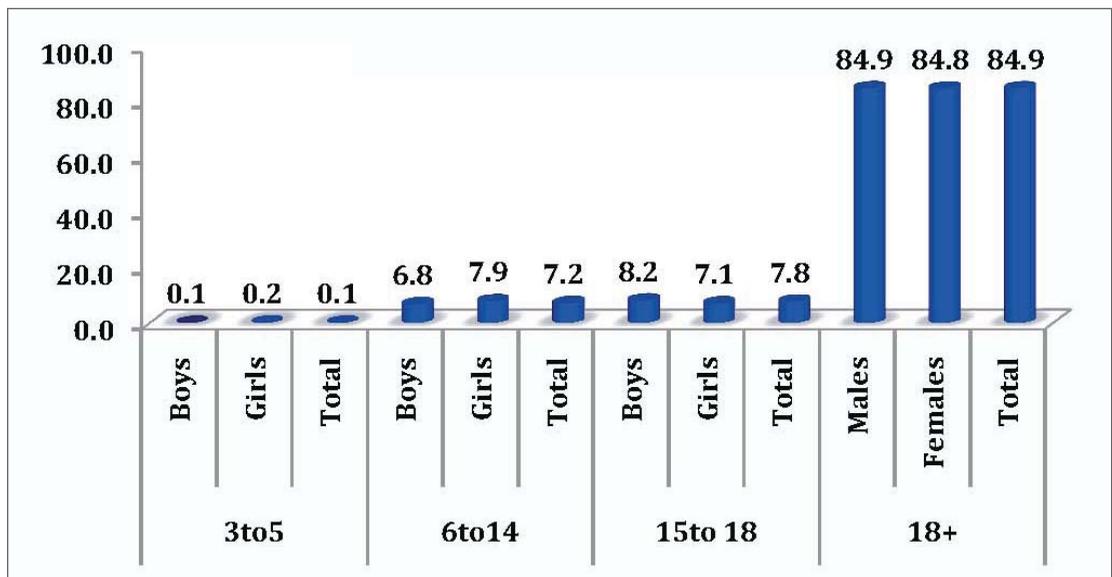


Figure 2: Age Distribution of population involved in waste picking

- **Are They Educated?**

On an average the literacy rate in Delhi is 55%. Among those who reported to

the next page. Hence it shows the social security cover is not reaching this strata of society.

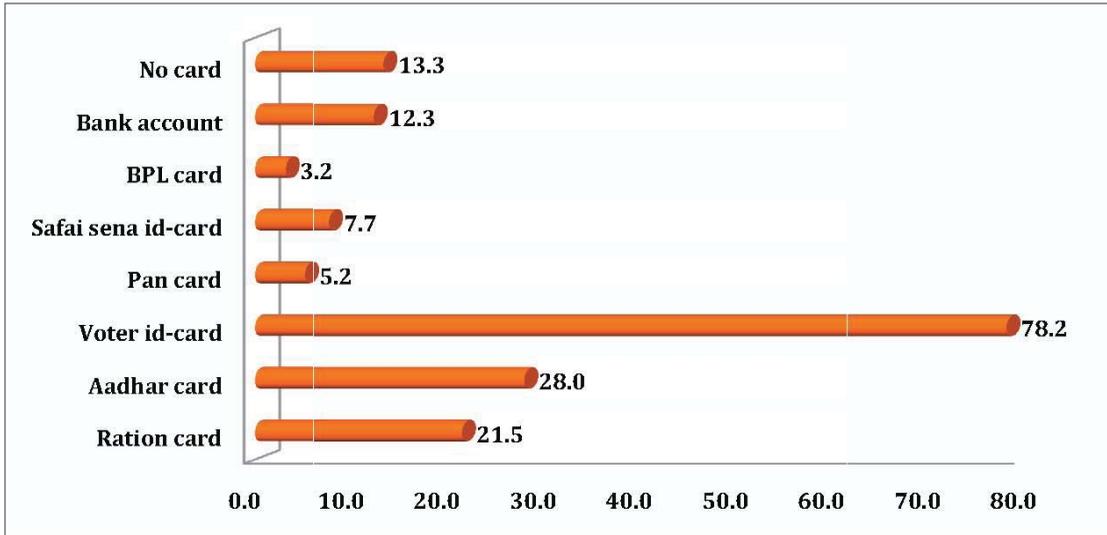


Figure 3: Distribution of social security cards in Wastepicker Population

• **Why are they Wastepickers?**

In Delhi the average duration of work in this field was reported to be 11 years, and most respondents were previously unemployed. Those who were previously employed listed previous occupation as labour work/ daily wage labour, *feriwala* (small street vendor), sweeper and

agricultural labour. Around 60-80 % of respondents mentioned family and friends as their source of training. The largest portion i.e. 32% of the population is in this sector because they have no other option and this is the only means for survival for them, as shown in the pie chart below.

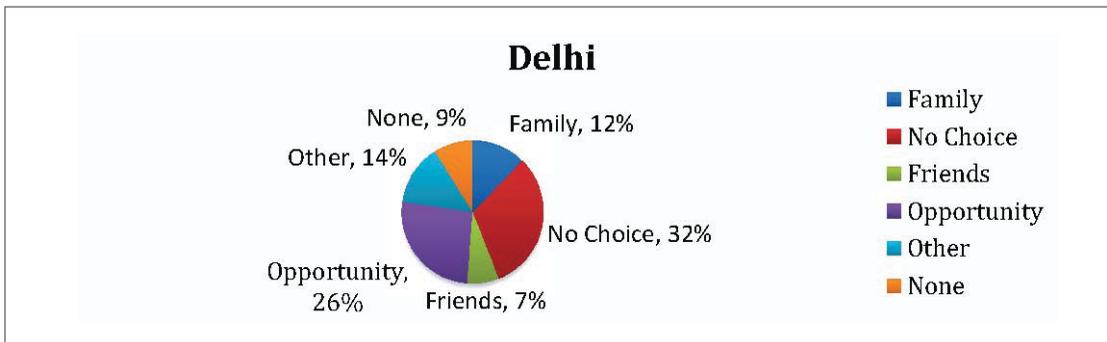
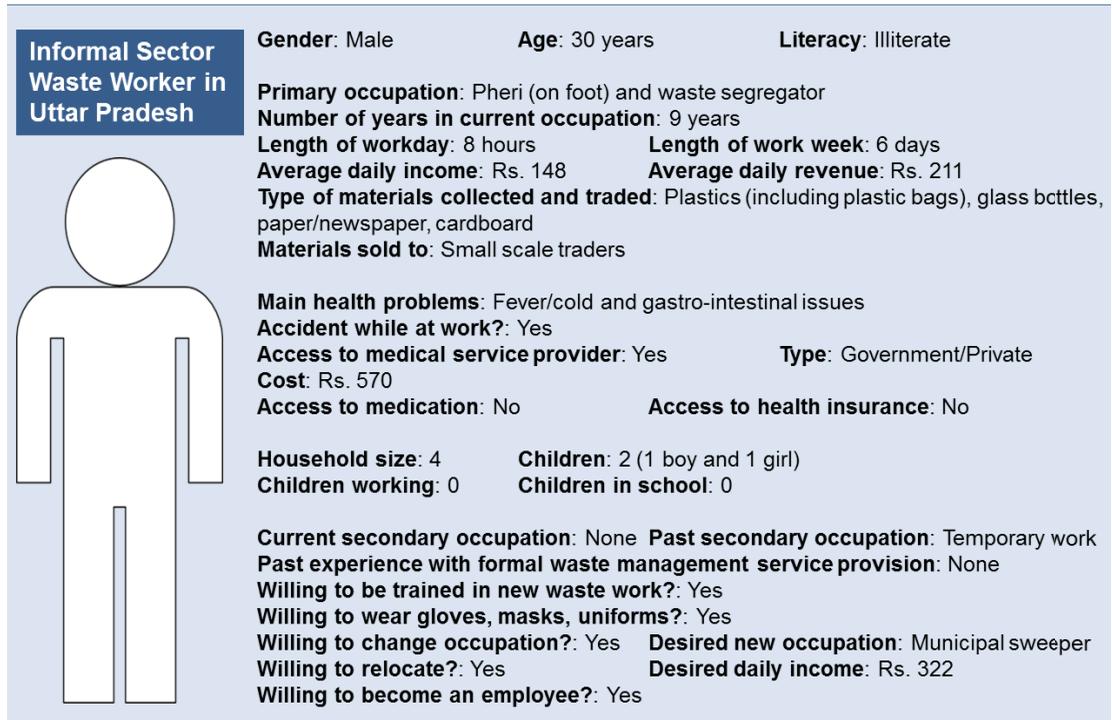


Figure 4: Reasons to choose wastepicking as an occupation

An average wastepicker faces plethora of problems in his day to day existence. The figure below shows a profile of an average person engaged in waste collection and recycling.

there are over 5,500 waste recycling units employing over 40,000 workers. These units are involved in trading, dismantling and reprocessing glass, metal, plastics, cardboard, paper and electronic wastes.



Picture 4: Profile of an average wastepicker

A survey of informal recycling units in Delhi conducted by Chintan Environmental Research and Action Group for the Delhi Pollution Control Committee showed that

The informal sector recycles over 2,000 tpd waste in Delhi. This informal waste sector in Delhi provides a crucial source of income to some of the city's poorest section.

IV. What value do they bring to Delhi? Why are they important?

India's capital, Delhi is steadily being buried under its waste. Spread over an area of 1483 sq kms, the city produces over 9000 tons of waste every day. Since 1975, Delhi has exhausted over 16 landfills, with the Okhla landfill being the most recent to finally be capped, more than a decade later than it's scheduled capping/closure.

Officially, Delhi generates 8,360 tonnes per day (tpd) of municipal solid waste (Some sources claim it to be 8,500 tpd⁸). But, the real figure could be much higher as the data sources and means of data collection are neither clear nor up to date.⁹ Some data are more than a decade old. Delhi's waste generation is projected to touch 17,000-25,000 tpd by 2021.¹⁰

Delhi is estimated to be home to over 40,000 wastepickers alone. Added to this are other

recyclers, itinerant buyers, small and large kabadis, re-processors and other waste workers adding to a total of a 1,50,000 strong informal sector in the capital. They collect 15-20 percent of Delhi's total waste (in terms of weight) and 55% (in terms of volume) and recycle about 2,000 tons of city's waste every day.¹¹

Presently, Delhi's mammoth quantities of waste are disposed at the two landfill sites



of Bhalaswa and Ghazipur. New landfill sites have been identified and a scientific landfill is being designed for the capital.

8 Minutes of the meeting on Operation of Landfill Sites and related Waste Management Projects in respect of existing 3 landfill sites by MCD convened at the Raj Niwas on 17th August 2011. Available at: <http://lgdelhi.nic.in/pdf/Solid%20Wates%20Management%20by%20MCD%2017.08.2011.pdf>

9 Waste management 2015, Department of Environment, Govt. of NCT of Delhi, April. Available at: <http://www.delhi.gov.in/wps/wcm/connect/environment/Environment/Home/Environmental+Issues/Waste+Management>

10 Id. at 7

11 Who recycles your waste, Chintan Environmental Research and Action Group. Available at: http://www.chintan-india.org/documents/fact_sheets/chintan_who_recycles_your_waste_fact_sheet.pdf

Waste management is an expensive task to conduct. Centralize SWM such as waste-to-energy plants and large scale compost plants require millions to construct and operate. The municipal corporation spends Rs 750 crore per annum, of which 80 percent is on waste collection and transportation, and only the balance 20 percent on disposal.¹²

The diagram alongside explains briefly the hierarchy of waste workers normally found in urban areas. Wastepickers typically collect waste from garbage stations, residences, alongside roads etc. Wastepickers do not pay for the waste they collect. *Thiawalas* are waste workers with a small space, where they sort waste they buy from wastepickers or cycle *kabadis*. Small and large *kabadis* own spaces to store and sort the waste they buy. Recyclers purchase waste from small and big *kabadis* for processing.

For a better understanding of the contribution of wastepickers to various

12 Rozita Singh 2013, Exploring the potential of decentralised solid waste management in New Delhi, TERI University. Available at: <http://saahas.org/wp-content-saahas/uploads/2015/02/SWMIndia9.pdf>

aspects of a city, we have examined it in three distinct categories of economic, environment and livelihoods.

Economic

The economic benefits are seen as the savings that the city or citizens privately have accrued on account of the work of the sector. It is important to note that there are several ways by which this can be viewed, but the most accepted indicator is that of avoided costs.

Municipal Savings

- In Delhi alone, the waste pickers save the municipal corporation at least Rs 1.7 crore a day in terms of labour cost only because of their free civic service and no minimum wage from the civic body.
- The 15 lakh waste pickers across the nation save municipalities over Rs. 54.75 crore annually.

The table below is summarized from a global study of 6 cities and reflects a universal trend of positive avoided costs on account of the work of the informal sector.

Table 1: Table: Annual savings and avoided costs on account of informal sector activities (Cost in INR.)

City	Avoided costs for collection	Avoided costs for disposal	Total avoided costs for disposal	Value created per informal livelihood
Cairo	752,916,900	129,911,700	882,828,600	26,779
Cluj	3,586,800	244,000	3,830,800	1,159
Lima	883,109,200	78,147,100	961,262,400	85,949
Lusaka	89,163,700	591,700	89,761,500	187,026
Pune	116,217,200	19,099,100	135,316,300	15,311
Quezon City	204,691,600	52,100,100	256,785,600	25,437
Total/Avg.	2,049,685,400	280,093,700	2,329,785,200	34,831

Source: Scheinberg, Anne, Michael H. Simpson, et al (2010): "Economic Aspects of the Informal Sector in Solid Waste." GTZ (German Technical Cooperation), Eschborn, Germany.

Looking at the system in this way, it appears that the informal sector in Lusaka creates a benefit of more than Rs. 1, 87,000 per person, but in Cluj that value is only Rs. 1,159. However, on average, the 66,000 informal livelihoods in the six cities provide a collective benefit of Rs. 2 billion per year, or about Rs. 34,770 per person. In some cities this benefit is more than the informal sector persons actually earn, meaning that they create as much value for their cities as they do for themselves.

In India, we often discount the economic benefits from the informal sector as this is not officially computed. However, savings to municipalities as wastepickers are able to segregate and divert the waste to up to 20%, saves expenditure on both transportation and on paying for waste collection, where there are private contractors. While there are no reliable statistics on the benefits of recycling, it is reasonable to assume that reducing extraction, transportation etc also has a positive economic impact.

The economic contribution of waste pickers should also not be overlooked. Informal recycling in Jakarta reduces the volume of waste by approximately 30 percent, thereby saving on collection and disposal costs, and extending the life of landfills.

In major Indian cities such as Delhi and Bangalore, waste pickers prevent at least 15 percent of MSW going to landfill, saving the government around US\$13,700 per day in waste collection and disposal costs.

Environment

Producing waste directly impacts climate change because it is linked to global

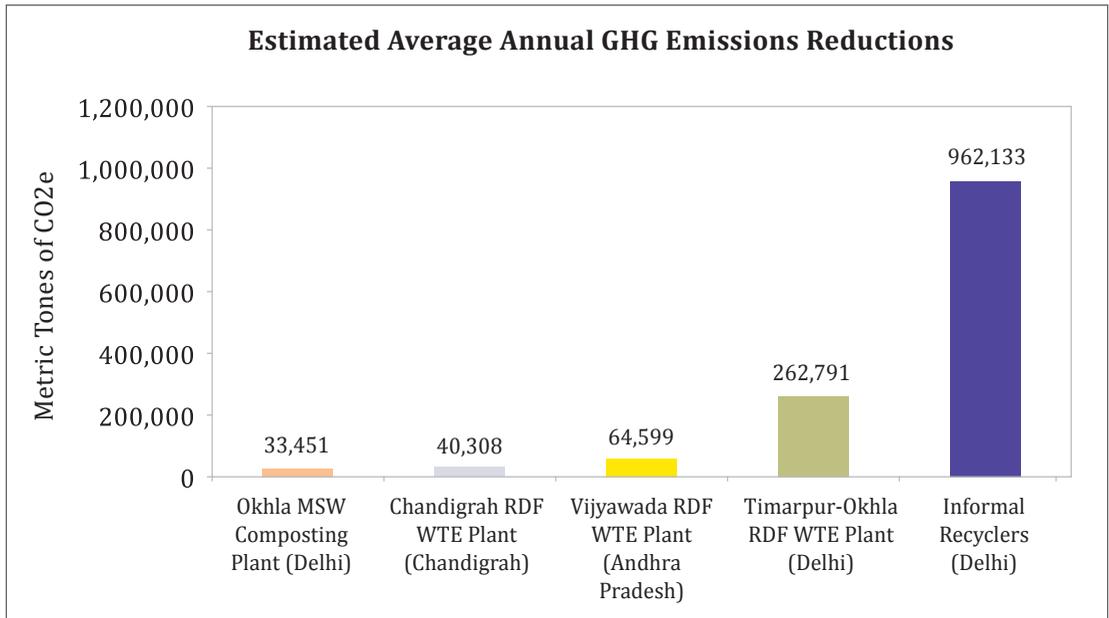
resource extraction, transportation, processing, and manufacturing. Waste is increasingly being identified as a source of GHG emissions and climate change by various developed and developing countries.

Wastes taken to landfills decompose under anaerobic conditions caused by microbial activity. Microbial communities contain methane-producing bacteria. As the microbes gradually decompose organic matter, a landfill gas is generated. It comprises methane (approximately 50 percent), carbon dioxide (approximately 50 percent), and other trace amounts of gaseous compounds (< 1 percent). The gradual decay of carbon stock in a landfill generates emissions even after waste disposal has ceased. This is because the chemical and biochemical reactions take time to progress and only a small amount of the carbon contained in waste is emitted in the year this waste is disposed. The presence of greenhouse gases (GHG) like methane and carbon dioxide (CO₂) in the atmosphere contribute to global warming and climate change.

Many environmental impacts occur from waste management. These have been discussed below.

Greenhouse Gas Mitigation

- A study showed that in Delhi, wastepickers have saved over 962,000 CO₂ tons per annum, which is nearly 3.6% higher than any waste project approved for CDM¹.



- About 6% of India’s greenhouse gas emissions are on account of solid waste. This is double that of the rest of Asia and is a poor record. Recycling is a well known way to reduce such emissions.
- GHG emissions from waste sector have increased from 23.23 (1.9 percent) in 1994 to 57.73 (3 percent) in 2007, calculates the environment ministry’s report.¹³

According to a May 2010 report of the Union Environment Ministry, *India: Greenhouse Gas Emissions 2007*, GHG emissions from India’s waste sector was 57.73 million tons of CO₂ eq in 2007, which was three percent of the net CO₂ eq emissions that year. Waste sector includes GHG emissions from municipal solid waste (MSW), industrial and domestic waste water. The report also

13 India: Greenhouse Gas Emissions 2007, Ministry of environment and forests, May 2010. Available at: http://www.moef.nic.in/downloads/public-information/Report_INCCA.pdf

estimated that the MSW generation and disposal resulted in the emission of 12.69 million tons of CO₂ eq in 2007.¹⁴

Conventional greenhouse gas inventory data indicates that the waste disposal sector in the US was solely responsible for 2.6 percent of all GHG emissions in 2005.¹⁵ Further, wasting was linked to 36.7 percent of total GHG emissions in the US in 2005. In 2005, greenhouse gas emissions from waste management represented about 2 percent of total emissions in the European Union.¹⁶

Total emissions in the US in 2014 were 6,870 million metric tons of CO₂ equivalents.

14 India: Greenhouse Gas Emissions 2007, Ministry of environment and forests, May 2010. Available at: http://www.moef.nic.in/downloads/public-information/Report_INCCA.pdf

15 Stop Trashing the Climate, June 2008, Institute of Local Self-Reliance, Washington DC. Available at: <http://www.zerowarming.org/downloads/Stop%20Trashing%20the%20Climate%20Report%20Executive%20Summary%20-%20low%20res.pdf>

16 *Better management of municipal waste will reduce greenhouse gas emissions*, EEA Briefing 2008: 01, European Environment Agency. Available at: www.eea.europa.eu/publications/briefing.../EN_Briefing_01-2008.pdf

Land-use change and forestry offsets about 11 percent carbon in the United States.

After waste prevention, recycling has been shown to result in the highest climate benefit. For instance, in the US, recycling materials found in MSW resulted in the avoidance of around 183 Mt CO₂-e in 2006.

¹⁷For every kilogram of plastic recycled,

¹⁷ Alison Smith *et al* 2001, *Waste Management Options and Climate Change*, July, p 30. Available at: http://ec.europa.eu/environment/waste/studies/pdf/climate_change.pdf

around 1.5-2 kg CO₂-e is saved.

Production of virgin aluminium requires 10-20 times more energy than recycling aluminium. Production of virgin steel requires around two times as much energy as production of steel from recycled scrap.¹⁸

¹⁸ Alison Smith *et al* 2001, *Waste Management Options and Climate Change*, July, p 30. Available at: http://ec.europa.eu/environment/waste/studies/pdf/climate_change.pdf

Box 1: Wastepickers can combat Delhi's Pollution

Delhi has been suffering from an air pollution crisis. This pollution is attributable to many reasons. While vehicular pollution is a key contributor, an influential study by IIT Delhi, released in 2016, also pointed to the role of burning Municipal Solid Waste. According to the study, about 2-3% of the 8,390 tons/day of MSW generated is openly burned. This amounts to about 250 tons per day, or the waste of about 5 lakh residents.

The estimated emissions are: 2,000 kg/day of PM10 and about 1,800 kg of PM2.5. MSW burning contributes nearly 10 percent of PM10 and PM2.5 to ambient air in winters. Stopping this can possibly see an improvement of 5-10 percent in air quality.

Hence, it is clear that controlling air pollution must include controlling burning waste.

The sources of waste burning are many, but a key one is spontaneous combustion of waste on landfills. Here, methane, a highly combustible gas formed by rotting wet waste, burns and spreads, often underground, setting more sections of the landfill on fire, and also burning any plastic bags in the waste.

A key strategy for this is to divert waste from the landfills of Delhi.

To do this, it is vital to compost the 45-50% of the wet waste in Delhi. How can we do this?

- Compost locally: transportation will only increase pollution
- RWAs and market associations, including with multiple restaurants, must compost within 2 kilometers of their location.
- Existing wastepickers currently all over India, and in limited cases, in Delhi, are engaged in undertaking this composting.
- Sales of compost will have to be facilitated by the Delhi Government, and all establishments in Delhi can play their part by purchasing compost from waste made by small composters (less than 10 tons a day)

By doing this, we can reduce the landfill load by upto 70%, reducing the burning and protecting all citizens from some sources of air pollution.

Segregation

Waste can be separated into different elements in order to make its collection efficient. Waste sorting can be done in many ways, including through curb side collection, in material recovery facilities, or biological treatment systems. Sorting can also be done manually at home. Source segregation of waste is the most preferred option as the first step to waste disposal.

Waste is collected and sorted in at least 42 distinct categories, such as paper, newspaper, cardboard, plastics, glass, metal, rubber, etc.

Source segregation reduces the total volume of waste sent to landfills. It also allows for better recovery of materials from pre-sorted waste by wastepickers and other waste service providers. By segregating at source, a number of unwanted or hazardous wastes are able to be disposed separately without making toxic the entire stream of waste. It allows for value addition to waste when segregated.

According to a July 2001 report of the European Commission, source segregation of municipal solid waste (MSW) followed by recycling (for paper, metals, textiles and plastics) and composting /anaerobic digestion (for putrescible wastes) gives the lowest net flux of greenhouse gases, compared with other options for the treatment of bulk MSW.¹⁹

One of the largest sources of GHG emissions from the management of solid wastes comes from incineration, estimated to contribute around 40 Mt CO₂-e, claims a 2010 report of UNEP.²⁰ The effects of methane are most

prominent over long periods of time, making it 72 times more potent than carbon dioxide over a 20 year time frame.²¹

In a majority of countries around the world, including India, controlled and uncontrolled landfilling of untreated waste is the primary method of disposal. For every ton of discarded products and materials destroyed by incinerators and landfills, about 71 tons of manufacturing, mining, oil and gas exploration, agricultural, coal combustion, and other discards are produced.²²

Circular Economy and Recycling

The informal waste sector in developing countries plays a crucial role in recycling waste materials and reducing GHG emissions, though their role is still not acknowledged and highlighted by the municipal bodies.

- Environmental benefits from the work of wastepickers are primarily understood as efficient recycling of materials (and therefore, conservation of resources) and additionally, saving green house gas emissions via this process.
- Wastepickers follow a regenerative and restorative model by recovering waste and reintroducing them in the materials chain.
- There is considerable value addition to discarded materials. For example, a single unit of plastic rises in value by 750% prior to even being sold as a new recycled product in the market.

19 Alison Smith *et al* 2001, *Waste Management Options and Climate Change*, July, p iii. Available at: http://ec.europa.eu/environment/waste/studies/pdf/climate_change.pdf

20 UNEP 2010, *Waste and Climate Change*. Available at: <http://www.unep.or.jp/ietc/Publications/spc/Waste&ClimateChange/Waste&ClimateChange.pdf>

21 Stop Trashing the Climate, June 2008, Institute of Local Self-Reliance, Washington DC. Available at: <http://www.zerowarming.org/downloads/Stop%20Trashing%20the%20Climate%20Report%20Executive%20Summary%20-%20low%20res.pdf>

22 Ibid.

Table 2: Global city-wise waste recovery (in tonnes and percent)

City	Tonnes recovered, all sectors	Percent materials prevented or recovered	Percent recovered by formal sector	Percent recovered by informal sector	Total percent recycled as materials	Total percent to agricultural value chain
Adelaide	2,611,214	54%	54%	0%	28%	26%
Bamako	392,893	85%	0%	85%	25%	31%
Bengaluru	524,688	25%	10%	15%	15%	10%
Belo Horizonte	145,134	7%	0.1%	6.9%	6.9%	0.1%
Canete	1,412	12%	1%	11%	12%	0%
Curepipe	NA	NA	NA	NA	NA	NA
Delhi	841,070	33%	7%	27%	27%	7%
Dhaka	210,240	18%	0%	18%	16%	2%
Ghorahi	365	11%	2%	9%	11%	NA
Kunming	600,000	38%	38%	NA	38%	0.05%
Lusaka	17,446	6%	4%	2%	6%	NA
Managua	78,840	19%	3%	15%	17%	2%
Moshi	11,169	18%	0%	18%	NA	18%
Nairobi	210,240	24%	NA	NA	20%	4%
Quezon City	287,972	39%	8%	31%	37%	2%
Rotterdam	90,897	30%	30%	0%	28%	1%
San Francisco	366,762	72%	72%	0%	46%	26%
Sousse	4,168	6%	0%	6%	2%	4%
Tompkins County	36,495	61%	61%	0%	61%	NA
Varna	37,414	27%	2%	26%	27%	NA
Average		30%	16%	15%	23%	9%
Median		25%	4%	11%	22%	4%

Source: Solid Waste Management in the World's Cities, Water and Sanitation in the World's Cities 2010. UNHABITAT

Waste prevention and recycling help address global climate change by decreasing the amount of greenhouse gas emissions and saving energy. Reduce and reuse of waste means less mining, less

transportation of waste and less dumping of waste in the landfills. The ultimate goal of any good solid waste management system has to be minimisation of waste generation.

Livelihoods

Many developing and transitional country cities still have active formal and informal sector recycling, reuse, and repair systems, which are achieving recycling rates comparable to those in the West, at no cost to the formal waste management sector. Not only does the informal recycling sector provide livelihoods to huge numbers of the urban poor, thus contributing to the Millennium Development Goals, but may save the city as much as 15-20% of its waste management budget, by reducing the amount of wastes that would otherwise have to be collected and disposed of by the City. In effect, the poor are subsidising the rest of the city.

Another area to consider is that of self-employment. While wastepickers's contributions are not reflected in the GDP, they are an important contributor to generating incomes, wealth and jobs. By being self employed, as against unemployed, they are able to invest in the well being of the next generation and productively contribute through environmental services to the city.

In India, the issue of livelihoods becomes particularly important as over 93% of jobs in the country are located in the informal sector and provide the poor with a means of livelihoods and therefore, survival.

Table 3: City wise livelihood and employment in informal sector

City	Total no. of livelihoods in informal waste sector (persons)	Total employment in the formal waste sector (persons)	Ratio of persons working in the informal waste sector to those employed in the formal waste sector	Informal sector households depending fully on income from informal waste and recycling activities
Cairo	33,000	6,750	4.9	91%
Cluj	3,226	330	9.8	n/a
Lima (1)	17,643	13,777	1.3	88%
Lusaka	480	800	0.6	69%
Pune	8,850	4,545	1.9	63%
Quezon	10,105	5,591	1.8	82%
Total/Avg	73,304	31,793	*2.3	**79%

Source: Scheinberg, Anne, Michael H. Simpson, et al (2010): "Economic Aspects of the Informal Sector in Solid Waste." GTZ (German Technical Cooperation), Eschborn, Germany.

Given that approximately 15 lakh people depend on wastepicking as a livelihood, this form of self-employment has direct implications for eradication of child labour, health and nutrition, education of children, particularly girls and smaller families as secure adult livelihoods are seen to reduce child labour and foster education.

V. What challenges do they face?

Challenges

Approximately 1% of India's urban population comprises of the informal sector waste recyclers, engaged in collection of waste from doorsteps, garbage stations, landfills, roadsides, factories, etc. Their livelihood depends entirely on their ability to collect and sell recyclables from waste. In the process of making a meagre livelihood, they provide a crucial public health and environmental service to the city, despite being marginalized from mainstream society and not receiving the recognition and legitimacy, they deserve. Since waste generation, rates are increasing, governments and urban local bodies across India are contracting out these services to big private companies. Such privatization of waste is a direct threat to the livelihood of informal sector waste recyclers and results in reduced access to waste and recyclable materials, shifting to even lower paid occupations, enlistment of previously non-working family members such as children into the workforce, and increased dependence on loans.

i. Occupational health and safety risks:

A large number of international and national studies conducted by independent health researchers and non-profit organizations have documented the impact of improper waste disposal on the health of waste pickers, ranging from skin rashes to tuberculosis. Because of the nature of their work, the life expectancy of waste pickers also falls systematically far below the national average, with the figure for India being a dramatic 39 years old (BS B2B Bureau, 2014)²³. Data from Denmark, Switzerland, Italy, Romania and the US reveals that waste handlers are at six times more exposed to infectious diseases than other professions, they face 2.6 times more risk to contract allergic and pulmonary disease, 1.4 times for non-allergic pulmonary diseases,

23 BS B2B Bureau. (2014). Mindtree launches cloud-based technology platform for waste pickers. *Business Standard*. Available at: http://www.business-standard.com/content/b2b-manufacturing-industry/mindtree-launches-cloud-based-technology-platform-for-waste-pickers-114061800911_1.html

2.5 times for risk for chronic bronchitis, 1.2 times increased risk of hepatitis, three times more risk for parasites, 10 times more risk for acute diarrhoea, two times more risk for coronary disease, 1.3 times more risk for injury, 10 times more risk for accidents, and 1.9 times more risk for musculoskeletal problems (Samuel, n.d)²⁴.

A study of informal waste pickers at the dumpsite of Managua in Nicaragua found them to be exposed to very high concentrations of pollutants. For one, blood analysis of children between 11 years and 15 years showed high traces of polybrominated diphenyl ethers (PBDEs, a chemical flame retardant), heavy metals, pesticides and polychlorinated biphenyls (PCBs) (Samarth, 2014)²⁵. Researcher blamed the direct contact with contaminants contained in waste, inhalation of contaminated particulate material and dust, and the consumption of polluted food.

The situation is no different in India. Last year, two researchers conducted a health survey among 60 randomly selected waste pickers in Pimpri-Chinchwad, near Pune, Maharashtra. Ninety-nine percent were women, and the results show waste pickers suffer systematically from diseases including asthma and tuberculosis (Sharma and Hebalkar, 2013; see table below).

Table 4: Ailments commonly suffered by waste pickers in Pimpri Chinchwad, Pune

Disease	Affected waste pickers (%)
Back/legs/body pain	70
Fever	26.66
Cough	16.66
Skin disease	21.66
Asthma	8.33
Tuberculosis	8.33

Source: Sharma and Hebalkar (2013)

Another study of 1,777 women waste pickers from 2009-10 carried out by Pune-based Kagad Kach Patra Kashtakari Panchayat (KKPKP) found that more than 70 percent women had chronic musculoskeletal symptoms, 30 percent had problems related to monthly periods, 25 percent had symptoms of gastrointestinal tract (GIT) infection, and 10 percent had symptoms of respiratory tract infection/sexually transmissible infections (Samarth, 2014)²⁶.

Interviews with wastepickers close to Hyderabad's dumping yard at Jawahar Nagar, between September and December 2009, indicated that 82 percent had wounds or injuries; six percent experienced acute body pain, and five percent had skin or lung diseases. Only seven percent said that they had not faced any health problem (Devi, Swami and Krishna, 2014). Studies on the health of waste pickers have also been done in New Delhi, where the highest number of waste pickers in the

24 Samuel, J. (n.d.). Assessment of selected occupational health problems of waste handlers. Available at: www.rguhs.ac.in/cdc/onlinecdc/uploads/05_N003_13653.doc

25 Samarth, U. (2014). The Occupational Health of Waste Pickers in Pune: KKP and SWaCH Members Push for Health Rights. Available at: http://wiego.org/sites/wiego.org/files/publications/files/Samarth_OHS_Health_of_WP_in_Pune.pdf

26 Samarth, U. (2014). The Occupational Health of Waste Pickers in Pune: KKP and SWaCH Members Push for Health Rights. Available at: http://wiego.org/sites/wiego.org/files/publications/files/Samarth_OHS_Health_of_WP_in_Pune.pdf

Box 2: Story of Saira Bano

Saira Bano is a 32 years old woman who lives next to the Bhalaswa dumping ground, in northeast Delhi. The only memory Bano has of her childhood is walking the streets of Delhi with her parents, sifting through garbage, occasionally cutting herself doing it and often falling sick. Her present, however, is not much different from her past. Earlier, as a young girl she used to accompany her parents. Now, one generation later, it's her children who are walking along with her, picking up recyclables as they walk. Every day feels like a *déjà vu* for Bano.

"In the profession of waste pickers like me, there is no day and no night. We sift through garbage all the time. Every morning, I leave home at 3 am to pick up waste. In between, I return home to cook food and do household chores. Once that is done, I am again out of the house to collect waste," says Bano, who gets bruises on her hands and feet daily, but does not think her wounds merits any mention. "I have lost count of the number of wounds I daily get while sifting through waste. One thing I can tell you, headaches in Delhi's peak heat are unbearable. No medicine works to control it. I know so many waste pickers who have died complaining of headache, but could never afford to consult a senior doctor at any hospital, you just never get used to it like other things", she adds.

Bano is part of the ubiquitous community of waste pickers (1-2 percent of the total urban population in developing countries) who make a bare living by salvaging recyclables from waste and selling them to scrap dealers. Informal waste pickers, waste recyclers and small scrap dealers form together a robust informal sector that is the backbone of the recycling industry. Though there is no official national-level data, it is estimated that about 15 lakh people across India depend on Wastepicking to make a living.

country works. A 2004 scientific study on the health of 98 waste pickers and 60 controls from Delhi found respiratory symptoms and lung function decrement in 94 percent and 52 percent of the waste pickers respectively, compared with 56 percent and 34 percent in control groups. Waste pickers also showed a higher prevalence of low haemoglobin, high circulating eosinophil and monocyte counts, unhealthy gums, frequent diarrhoea, and dermatitis, compared with control group results. Researchers also found inflammation

and cellular changes in the airways of wastepickers: "Wastepickers suffer from a multitude of health problems which seem related to their occupation" (Lahiri, 2004)²⁷.

Chintan conducted comprehensive studies of the health conditions of waste pickers in New Delhi. Results of its 2003 study show high disease burden. Eighty

27 Lahiri, T. (2003). Respiratory and general health impairments of ragpickers in India: A study in Delhi. *International Archives of Occupational and Environmental Health*, 77(8), 595-598.

four percent of child wastepickers were found to be anaemic. Seven percent children tested positive for round worms, whereas 17 percent were found to suffer from chronic GIT diseases. Amongst women wastepickers, 24 percent tested positive for round worms and three percent for hook worms. Over 12 percent of women were found to be suffering from chronic gastro intestinal problems.

There is more. Fever (25 percent) and GIT (17.13 percent) were the most frequent illnesses amongst the children. In the case of male wastepickers, Chintan's study found fever (11.41 percent), upper respiratory tract infections (URI) with fever (8.7 percent), and other GIT (8.7 percent) as recurring illnesses. For women, common ailments were GIT (18.75 percent) and body aches of an unknown origin (18.75 percent). The research team also calculated the economic burden of such illnesses on wastepickers, finding it to be Rs 674 per period of illness that lasted for about 5-7 days. In case of children, the amount was Rs 485 (approximately) for a comparable duration of illness.

More recently, in June 2014, Chintan conducted a baseline survey of wastepicking adults and their children in Tughlaqabad area of South Delhi. Results show that most of the respondents have reported fever (53 percent), and cough and cold (52 percent) as the major illness suffered during the previous year. Physical injuries reported by waste pickers include hand injury, leg injury and burns. During the same time, a similar study was done among waste pickers and their children in ten communities of Delhi/NCR. Two major

illnesses were reported – respiratory tract disorders, and gastroenteritis. The respondents also reported injuries from sharp objects while segregating the waste. Some even reported falling from a height. Credited studies have been showing the severe health impact of improper waste disposal since the 1990s. A 1996 study of 100 children (mainly girls) aged four to 15 and living in slums in Bangalore, one-third of whom engaged in wastepicking, found that child wastepickers suffered from various diseases, such as worm infestation, scabies, xerophthalmia, lymph node enlargement, etc., which the others did not (Hunt, 1996; see figure below).

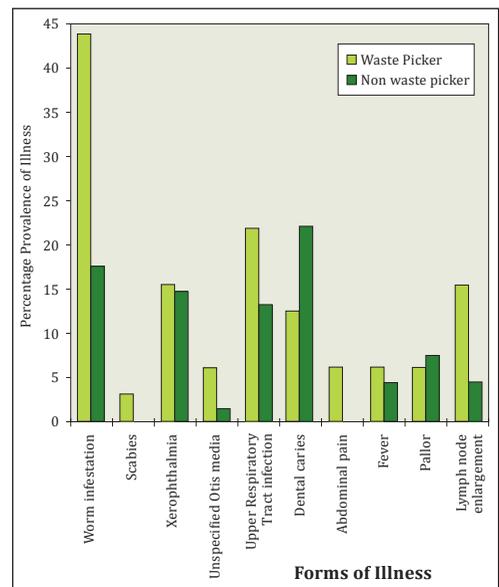


Figure 6: Health risks among children in wastepicking and non-wastepicking communities

Similarly, in mid-1990s, another one-year rapid assessment survey of the health and environmental impact of solid waste recycling among 180 waste handlers

was conducted at Kolkata's open dumps. 40 percent wastepickers were found to have chronic cough and 37 percent had jaundice. The average quarterly incidence of diarrhoea, fever, cough and cold, eye soreness or redness and skin ulcers was found to be 85 percent, 75 percent, 63 percent, 15 percent, and 29 percent respectively.

While waste pickers are already at the receiving end of 'traditional' forms of waste, a rise in the portion of waste electrical and electronic equipment (WEEE, commonly known as e-waste) in our cities' waste streams, has added to these health woes. In 2009, the Centre for Occupational and Environmental Health at the Maulana Azad Medical College studied 250 people working in New Delhi as e-waste recyclers and dismantlers, and found almost all suffered from breathing problems, such as asthma and bronchitis. Researchers also found dangerously high levels – 10 to 20 times higher than normal – of

lead, mercury and chromium in their blood and urine samples (Economic Times, 2010)²⁸.

There is enough evidence to show that unscientific waste disposal is a leading cause of increased disease burden in developing countries like India. Those engaged in waste professions like wastepicking and recycling are clearly overexposed. Unfortunately, this vulnerable group has not enough voice and visibility to advocate policy shifts. National governments and urban local bodies must urgently come up with effective programmes to safeguard the health of waste pickers and waste recyclers by putting in place an inclusive waste management system that includes them and recognise their work as a profession needing protection and safeguards.

28 Economic Times. (2010). India's rag-pickers at new risks from e-wastes. Available at: http://articles.economictimes.indiatimes.com/2010-07-06/news/27568552_1_e-waste-rag-pickers-waste-from-electronic-products

Box 3: Occupational health hazards in sanitary workers

Over 1.2 million scavengers in India are involved in sanitation activities, working in abysmal condition and facing social stigma. The nature of their work exposed them to various pollutants. These health hazards include exposure to harmful gases such as methane and hydrogen sulfide, cardiovascular degeneration, musculoskeletal disorders like osteoarthritic changes and intervertebral disc herniation, infections like hepatitis, leptospirosis and helicobacter, skin problems, respiratory system problems and altered pulmonary function parameters. A 1997 study of 26 sewer workers found that 53.8 percent developed sub-acute symptoms including sore throat, cough, chest tightness, breathlessness, thirst, sweating, irritability and loss of libido. The severity of symptoms seemed to be proportional to the exposure (Watt, Watt, and Seaton, 1997).

Osteoarthritic changes and intervertebral disc herniation are the most common spinal abnormalities reported by sanitation workers. In 2000, a study was conducted among 255 sewage workers to determine the prevalence of spinal troubles (i.e., neck, upper back and lower back pain) (Friedrich, Cermach, and Heiller, 2000). The researchers

from Department of Orthopaedic Physiotherapy, Speising Orthopaedic Hospital, Vienna, Austria, reported that the 12-month prevalence rates of neck, upper back and LBP were 52.4 percent, 54.8 percent and 72.8 percent, respectively. The prevalence of spinal troubles increased with age.

Sanitation workers often report infections, including leptospirosis, hepatitis and *Helicobacter pylori* infection (stomach infection caused by bacteria *H. pylori*). Rodents usually abound in underground sewers and are carriers of leptospira. Leptospira are excreted in the urine of the infected animals, putting sewer workers at great risk of infection. In 2004, researchers studied 78 sewer workers from five different municipal wards in Pune to determine the evidence of past infection with leptospira (Ambedkar et al., 2004). The prevalence rate was found to be 16.6 percent. Evidence of leptospiral infection was found to be maximum in sewer workers in the areas of the city that were infested with rodents and stray animals.

Meanwhile, an outbreak of airborne irritant contact dermatitis has been reported among incinerator workers employed in a sewage treatment facility. Contamination of the workplace and workers' clothing by sludge from the interstices of an incinerator exhaust fan proved to be the cause of the problem (Nethercott, 1981). Several other studies have been carried out to study the respiratory function of sewage workers, with all of them reporting that respiratory symptoms are common among this group of workers. Respiratory function studies also revealed abnormal respiratory functions in these workers. These symptoms may be due to exposure to endotoxins and airborne bacteria by way of bioaerosols (Tiwari, 2008).

- ii. ***Privatization of waste management services threatens wastepickers' livelihood:*** The search for solutions to India's growing waste management problems has led many cities across the country to outsource their waste management services to private contractors. For wastepickers, this has meant loss of livelihoods as privatization limits their access to waste materials and allows for new forms of rent-seeking from private agents. In Delhi, for instance, private companies were initially assigned contracts to transport waste from community bins or *dhalaos* to landfills. *Dhalaos* serve as important places where wastepickers

Box 4: Waste Management in NDMC areas

New Delhi Municipal Council (NDMC): More than 100 wastepickers work as doorstep waste collectors in the NDMC area. Recently, NDMC has authorized Metro Waste Handling Private Ltd. to provide doorstep waste collection to residents in the jurisdiction. However, now the dry waste, previously collected by these wastepickers is taken away by Metro Waste Handling, leaving the wastepickers devoid of their livelihoods.

collect, segregate and temporarily store recyclable materials. Privatization meant that wastepickers no longer had access to this crucial space (Chaturvedi and Gidwani, 2011)²⁹.

iii. **Lack of access to basic government services:** Although many governmental programs and services exist for the urban poor in India, wastepickers cannot often take advantage of these. Part of this problem is due to the fact that many in the informal sector do not have government-issued identification, partly it is because many do not know that such programs exist and partly it is because some of these programs had not been extended to the wastepicker community.

iv. **Lacklustre implementation of national rules and policies:** Many laws, rules and policies that are inclusive of the informal sector already exist (Chintan, 2011a)³⁰. But much work needs to be done to ensure that the spirit and letter of these is actually implemented on the ground. Many existing laws, rules and policies specifically ask for informal sector inclusion in waste management programs, but according to a 2008 audit by the Comptroller and Auditor General of India, a mere 17 percent of the sampled states recognized the role of rag pickers in reducing and recycling waste (CAG, 2008)³¹. A 2011 study similarly showed that none of the 14 cities surveyed fully implemented the laws,

Box 5: Story of Sarita Devi

Sarita Devi is a 35 year old wastepicker earning Rs. 5000 per month. Originally from Nalanda, Bihar, she moved to Delhi and has been living in Ruchi Vihar, Vasant Kunj for last 15 years. She migrated to Delhi in 2001 with her husband and a daughter for better livelihood opportunities. She has now 4 daughters who are studying in municipal school, from where they have their Aadhar Cards and Bank Accounts in their names. She has been trying to get herself registered on the voting list but has been unable to so far. In this eventuality, she has not been able to avail or make use of any social security schemes offered by the government.

“humaranahirashan card hai or na hi hum sarkarkimodayojnaoka koi fayedauthapaarahehai. Agar hamar bankkhatahota to ham apniladkiyonkishadi k liyebhi paisa jamakarsakte the”

“We neither have a ration card and nor are we able to benefit from any existing government schemes. If we had a bank account, we would even be able to save money for the weddings of our daughters.”

29 Chaturvedi, B. and V. Gidwani. (2011). The right to waste: Informal sector recyclers and struggles for social justice in post-reform urban India. In W. Ahmed, A. Kundu, & R. Peet (Eds.), *India's New Economic Policy: A Critical Analysis* (pp. 125–153). New Delhi: Routledge

30 Waste Rules in India, Chintan Environmental Research and Action Group. Available at: http://www.chintan-india.org/documents/research_and_reports/chintan-booklet-waste-rules-in-india.pdf

31 Union Audit Reports, Scientific Departments Management of Waste in India. Available at: <http://www.indiaenvironmentportal.org.in/files/Final.pdf>

rules and policies on inclusive waste management (Chintan, 2011b).³²

- v. **Harassment of wastepickers:** Criminalization of the urban poor is a general problem in urban India to begin with but this problem is exacerbated in the case of wastepickers (Ghertner, 2012).³³ Violence, daily harassment and rent-seeking behaviour from the police and municipal officials are commonplace. Wastepickers are often the first ones to be accused for thefts. In a 2013 survey of over 3,000 Delhi residents, when asked if they thought that wastepickers could be thieves, about 80 percent of respondents equally across all income categories agreed (Chintan, 2016)³⁴. Similarly, in many surveys of wastepickers in Delhi, harassment by the police, municipal officials and the public is one of the most immediate problems they flag.
- vi. **Space for Waste:** Master plans are critical documents that can serve to legitimize or delegitimize certain kinds of activities. Land in large cities is scarce and land allocation in master plans privileges certain kinds of commercial and residential land uses over more basic infrastructural needs of the informal sector and the

32 Failing the Grade - How Cities Across India are Breaking the Rules, Ignoring the Informal Recycling Sector and Unable to Make the Grade, Chintan Environmental Research and Action Group. Available at: http://www.chintan-india.org/documents/research_and_reports/chintan-report-failing-the-grade.pdf

33 Ghertner, D. (2012). Nuisance Talk and the Propriety of Property: Middle Class Discourses of a Slum-Free Delhi. *Antipode* 44 (4): 1161-1187

34 Chintan. (2016). *Making Delhi Swachh: Participatory Solid Waste Management Policy for Delhi*. New Delhi: Chintan Environmental Research and Action Group.

Box 6: Safai Sena

Safai Sena (SS) means An Army of Cleaners. SS is a registered group of wastepickers, doorstep waste collectors, itinerant and other small buyers, small junk dealers, and other types of recyclers, based in various cities in North India. It has more than 12000 members. Safai Sena's vision is that adult waste handlers should be able to upgrade their work to green jobs, which means that apart from being good for the environment, the work should be safe, respected, recognized and clean. SS's dream is to send their children to school and educate them instead of becoming wastepickers.

What do we do?

- Over 12,000 persons are part of Safai Sena. Organizing means that these wastepickers have all begin to understand their value in the city, identify key challenges and work towards safer, greener work as a group instead of as individuals.
- Educate other waste recyclers about the opportunities in clean recycling and green jobs.
- Create improved livelihoods for waste workers in partnerships with other organizations.
- Help train other members around key issues that are important to the work of waste pickers such as social security, health, management etc.
- Advocate for inclusive and equitable policies in the areas that impact wastepickers and waste handlers.
- Support each other to ensure waste picking children are able to get an education instead of ending up picking waste of their livelihoods.

housing needs of the poor. For instance, the Delhi Master Plan does not allocate spaces for segregation and recycling activities at all levels along the chain (DDA, 2010)³⁵. Similarly, the regional plan for the National Capital Region pays mere lip service to the needs of the informal waste sector (NCR Planning Board, 2013)³⁶. Inadequate inclusion of the needs of the urban poor and the informal sector has the effect of pushing them further out from areas where their work and services are most urgently needed. Poor planning can therefore not only have adverse effects on the urban poor but can also hinder the city's functioning.

- vii. ***Child labour and lack of access to alternatives and education make marginalization intergenerational:*** The problem of child labour in waste is widely recognized by the Indian government. To alleviate this problem to some extent, in 2013, the Government of India extended the benefits of its "Pre-Matric Scholarships to Children of those Engaged in Unclean Occupations" scheme to children of wastepickers. This provides financial incentives and support to wastepicker children for attending schools. While this is a positive move, implementation on the ground has been patchy. Further, eliminating child labour in waste is not only a function of access to educational opportunities; it depends crucially on the economic security of households. The implementation of waste management systems that displace wastepicker livelihoods are

35 DDA. (2010). *Master Plan for Delhi 2021*. Available at: http://dda.org.in/tendernotices_docs/jan12/reprint%20mpd2021.pdf

36 NCR Planning Board. (2013). *National Capital Region (NCR) Regional Plan 2021*. Available at: http://ncrpb.nic.in/pdf_files/rp_2021.pdf

bound to impact children's access to schooling, as Chintan has demonstrated in communities around the Okhla landfill that were adversely impacted due to the waste-to-energy plant.

- viii. ***Waste-to-Energy Technology:*** New expensive technologies for managing waste such as Waste-to-Energy is emerging as a popular solution to deal with growing problem of municipal solid waste (MSW) management in India. Waste-to-Energy (WtE) plants

Box 7: Impact of Waste-to-Energy Plant on Wastepickers' Livelihood

- Of the more than 450 individuals that relied on landfill waste before the establishment of the WtE facility, less than a 150 landfill-related waste workers are left there. Significant depopulation (40 percent decrease) in the three communities show, particularly among landfill workers (74 percent decrease).
- Waste provides a crucial source of livelihood to many residents (approximately 88 percent) near the Okhla landfill and WtE plant even though it is arduous work and unpredictable in terms of its income generation possibilities.
- Even though women in general work more than men, women experience greater income instability than men.
- WtE plant is one of the main factors in decreased incomes of waste pickers. Landfill workers are planning to take even more loans on average than they have in the past year.

- One of the most immediate impacts of decreased incomes has been the enlistment of previously non-working family members into the workforce and decreased school attendance for children.
- 67% of those whose children had stopped attending school cited having not enough money and having to enlist children as income earners as the reasons for their children stopping schooling”.

convert MSW into electricity through incineration, refuse-derived fuels (RDF) or other technology options. More than 35 such facilities are expected to be funded and developed across India.

There are three waste-to-energy plants in Delhi. Timar Pur Okhla Waste to Energy plant is the only one plant that is receiving carbon credits for reduction in emission of greenhouse gasses in Delhi. Although, WtE technologies are gaining popularity and being supported by Government, their appropriateness in the Indian context remains questionable due to the adverse environmental and social consequences. In environmental terms, not only do the emissions of dioxins, furans and other particulate matter cause pollution, the incineration of potentially recyclable materials is also environmentally irresponsible. Recent studies by CPCB on the environmental impacts of the WtE Sukhdev Vihar have revealed the air quality near the unit is 25 times more polluted than permissible limits. The National Green Tribunal (NGT) has asked Central Pollution Control

Board (CPCB) to conduct this study, which found that the levels of dioxins, furans and particulate matter around the Okhla plant far exceeded permitted limits imposed by the Delhi Pollution Control Committee (DPCC). Dioxins and furans are toxic substances released from burning plastic and cause a range of ailments including cancer. Particulate matter – smoke or soot – contains tiny, noxious components such as acid that cause lung and heart problems.³⁷ In a 2012 report³⁸, Chintan has shown the immediate impacts of WtE on waste recyclers’ livelihood. The Okhla landfill used to provide a means of livelihood to over 450 adults in the surrounding neighbourhoods. In January 2012, when the WtE facility became functional at Sukhdev Vihar, approximately 1300 tons of waste started being fed to the incinerator.

37 Kamala Kelkar, *Pollution level near Okhla waste-to-energy plant 25 times above limit*, Business Standard, June 3rd, 2013. Available at: <http://www.indianexpress.com/news/pollution-level-near-okhla-wastetoenergy-plant-25-times-above-limit/1124718/>

38 Give Back Our Waste - What the Okhla Waste-to-Energy Plant has Done to Local Wastepickers, Chintan Environmental Research and Action Group. Available at: http://www.chintan-india.org/documents/research_and_reports/chintan-report-give-back-our-waste.pdf

VI. Good practices everywhere

There are various practices around the country which emulate the law and show how informal sector can be included in waste management practices successfully.

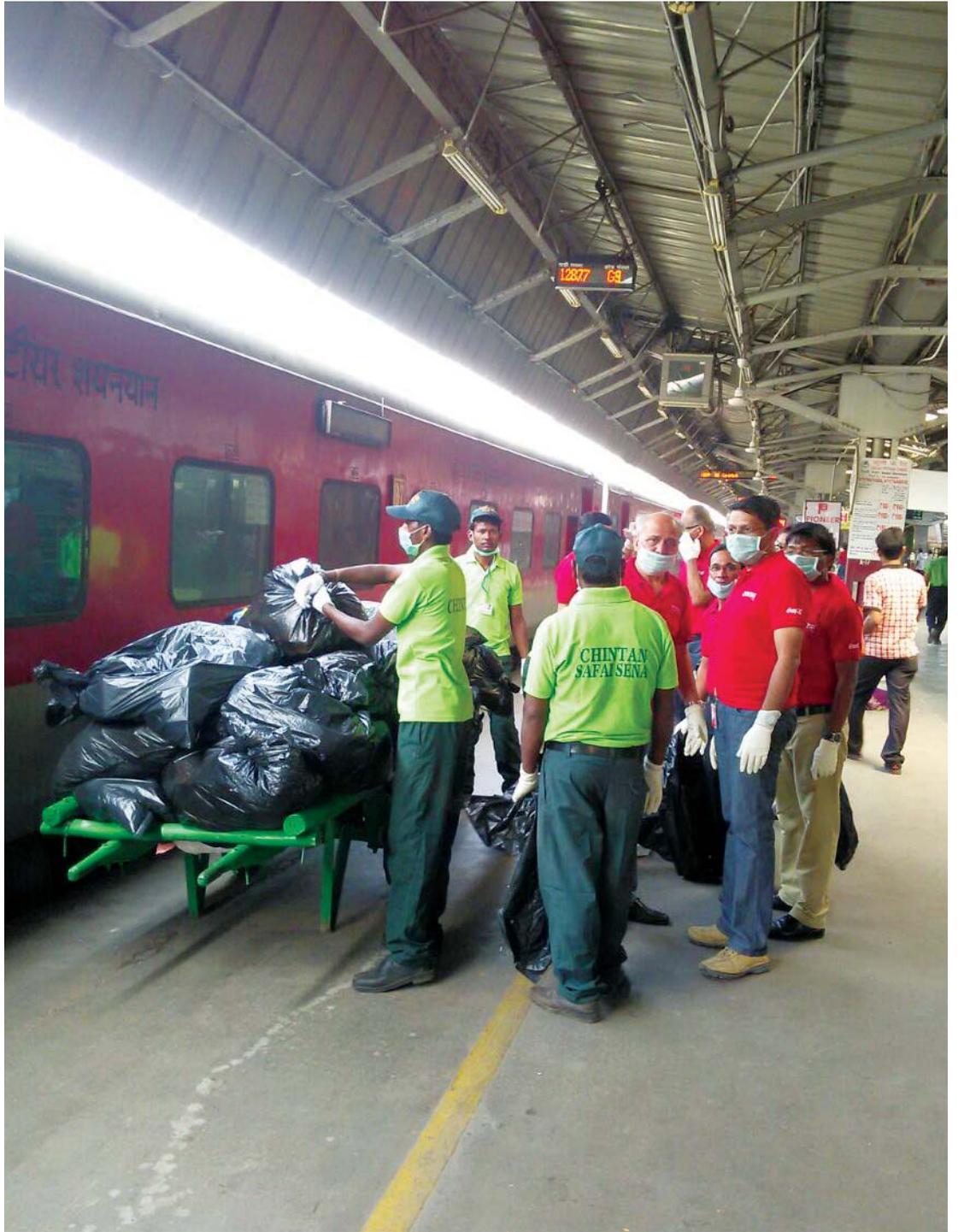
1. Chintan's Award Winning Zero Waste PPP Model

Chintan, a registered Delhi based NGO, works across the solid waste vertical. Its implementation work includes providing waste management services to waste generators. Chintan trains wastepickers to offer professional services, from e-waste handling to doorstep collection and facilitates waste handling across a number of sites in Delhi, Jammu and Kashmir, Uttar Pradesh and Haryana. In Delhi, Chintan along with Safai Sena – a registered association of wastepickers informal sector waste collectors, itinerant buyers and

junk dealers – has mobilized over 12000 wastepickers and trained them to deliver professional waste management services at grass-root level. Chintan has been able to generate over 2000 wastepicker livelihoods through its zero waste model.

Through Chintan's model over 21 tons of waste are collected, segregated, composted and recycled daily, with over 5,00,00 citizens benefitting from the waste services provided by Chintan every day.

Collected waste is brought to Material Recovery Facilities (MRFs) where waste is segregated into different varieties, value added and sold to authorized recyclers. The income generated is utilized to run the MRFs, augment their incomes and provide informal education to their children by running Learning Centres.



Picture 5: Chintan and Safai Sena's wastepickers at the New Delhi Railway Station

Waste Management System and Stakeholder Involvement

Chintan has been in partnership with the Northern Railways at four major railway stations across Delhi – New Delhi, Old Delhi, Hazrat Nizamuddin and Anand Vihar – to handle the waste from trains and platform bins. Under this, Chintan, in partnership with Safai collects waste from all trains as they arrive on the platform, provides liners for bins on platforms and collects the waste before it spills out and litters the station.

At the New Delhi Railway Station alone, over 300 trains and 360,000 passengers come in everyday, generating a mammoth quantity of solid waste.

The waste is collected and taken to a Material Recovery Facility (MRF), for which purpose land has been allocated to Chintan by the Northern Railways. At the MRF, waste is then segregated into various categories. At the New Delhi Railway Station, plastic PET bottles from the waste collected are cut to avoid any refilling and misuse. All the paper, plastics, metals, cardboard, glasses are then sent for recycling.

Chintan composts the organic food waste collected at the New Delhi Railway station which is well over 100 kilograms per day. Approximately 300 kilograms of compost is prepared per month thus saving 3 tonnes of waste per month from being dumped at the landfills.

Through this unique partnership Chintan and Safai Sena have been able to demonstrate that the Northern Railways can handle its waste, reduce pollution, create safe livelihood opportunities for the poor and make the railway stations cleaner and greener. No financial transactions are involved in this process, that is, neither

the Northern Railways nor Chintan exchange any payments for this service. Wastepickers earn their livelihoods from the sale of recyclable materials. This partnership handles over 4 tons of waste each day and has created 74 wastepicker livelihoods at the New Delhi Railway station alone.

Outcomes and Next Steps

For the wastepickers, steady livelihoods resulted in reduced vulnerability to many economic and social risks, access to medical care and health camps, personal protective equipment and a significantly cleaner work environment, reduced injuries and disease, education of children wastepicker children. A stable income and increased interaction with the railway police has increased security and eliminated bribes. By recycling waste, several environmental benefits accrued. Greenhouse gases that would be emitted from mining, transportation of raw materials and their processing were eliminated. Paper and cardboard, otherwise rotting in landfills and spewing methane, was prevented. Waste was not burned, hence, carbon dioxide and dioxins were prevented from being released. Vectors could not breed in waste not dumped in the open, as was widely prevalent at the station previously. Clearly, there is significant environmental benefit to both directly and indirectly impacted persons as well as the city of Delhi.

Chintan was awarded the prestigious Deutsche Bank Urban Age Award for this initiative in 2014.

This zero waste model demonstrates that alternative ways of managing urban wastes are financially viable and environmentally and socially responsible.

2. Government Steps Forward: Achieving zero waste goals through the integration of the informal sector in doorstep collection in Kolar

The city of Kolar serves as the headquarters of the Kolar district; one of 30 districts of the state of Karnataka. The Municipal Corporation of Kolar city has taken the initiative to make the city a zero waste city by implementing its model of zero waste management. The former District Collector, D K Ravi joined hands with Kolar City Municipal Corporation's assistant engineer, Kotreshappa Benni and junior health inspector KG Ramesh in order to revamp the city's waste management system and transform the city in to a clean area.

Waste Management and Stakeholder Involvement

We have continuously mentioned how waste management is a mega-task for most municipalities across the country, barring exceptions. Kolar was no different. Beginning 2014 saw the city suffer from acute waste management woes caused by the inability to manage a mere 64 tonnes per day. Authorities were struggling to find new places to create waste dumps, villages in the vicinity refused to allow dumping of waste on their lands and waste began to overflow on the streets.

The three authorities got together and involved students of nursing colleges to conduct a door-to-door campaign to generate awareness among residents about



Picture 6: Neatly segregated waste in Kolar, Karnataka.

benefits of waste segregation and how to go about it. Once the initial stages of awareness were completed, the authorities got strict with residents over unsegregated waste. Residents disposing unsegregated waste were penalized by the authorities thereby forcing them to take up segregation at source. A number of meetings were also held with bulk waste generators including hospitals, offices, restaurants, schools, etc. Amongst monetary penalties, failure to segregate waste at source led to authorities refusing to collect mixed waste. The initiative did face many hiccups in the initial stages with people refusing to, or not segregating. Over time however, these minor bumps were traversed.

Kolar has become a one of a kind city which does not need or use a landfill. The municipal solid waste system is so well defined that no waste really goes to waste. Of the 64 tonnes that are generated every day, 22-24 tonnes are household organic waste which is composted five composting yards. The rest of the waste generated is collected in the form of recyclables, inerts and from bulk generators. The dry waste is then sold to local vendors for recycling while inerts are sold to an entrepreneur at a rate of Rs. 1.10/kg to be made in to briquettes.

An effective part of this waste management system was the banning of plastic bags of all micron sizes. It has also helped keep litter in check. It is hard not to praise this well-worked system endlessly. The door-to-door waste collection is carried out by municipal sweepers pourakarmikas in Kannada) who come by each street with a cart carrying four bins each. A single cart is managed by 2 municipal sweepers provided with all safety and hygiene equipment including gloves, masks and coats. They also carry

with them a weighing scale in order to weigh each batch of waste they collect. This helps in monitoring the system, finding discrepancies in segregation as well as serves as a continuous waste audit of the city. At each collection point, bins are off loaded and fresh bins are placed at the site for the next round of collection. A municipal truck collects waste from the collection point. The municipal corporation has tied up with local waste dealers (*kabaddiwallah*), itinerant buyers (*raddiwallah*) and larger waste traders to whom all dry recyclables are sold to. The income from the sale of dry recyclables goes to the pourakarmikas, thereby giving them an additional source of income. As mentioned before, inerts along with low-grade plastics are sold to make briquettes.

The municipality has partnered with hospitals in the city wherein the municipal sweepers collect dry and wet waste from hospitals and biomedical waste (this is done free of cost). Biomedical waste is then transported to an incineration site 18 kilometers outside the city. The waste segregation mechanism is so well devised that it is one of the only places in the country where sanitary waste and diapers are collected separately by the municipal sweepers.

The municipal waste collectors are supervised by a route manager. In all, Kolar has 150 waste collectors who serve a population of 150000 individuals. The city has 10 route managers and one health inspector. Weighing waste allows a tab to be kept on the amount of waste and how well it is being segregated. Data gathered is filled in to a computerized system and revealing any discrepancies in the process.

Outcomes and Next Steps

A distinguishing feature of this exemplary model is that the initiative came from the government officials rather than from any community based organization as happens in most cases. The credit for this success lies in the hands of the three governing bodies who took responsibility to make Kolar a "Swachh Kolar". The system is so well designed that it even has a separate system for collection of broken glasses. This model goes to show how administrative, political and citizen willingness can go a long way in achieving targets and goals to make India *swachh*.

3. SWaCH: City wide doorstep waste collection with wastepickers in Pune

Pune in Maharashtra is the eighth largest city in India. It is witnessing urbanization at a rapid pace, which has put pressure on its infrastructure and municipal services. The city daily generates 1,500- 1,600 tonnes of

waste every day, which is expected to go up to 2,400 tonnes by 2021.

A few years ago, the Pune Municipal Corporation (PMC) decided to try out a 60 new model of solid waste management – commonly known as the SWaCH model – by involving waste pickers in door-to-door collection and decentralized management of waste. SWaCH is an organization of women waste pickers that has emerged out of Kagad Kach Patra Kashtakari Panchayat (KKPKP), a registered trade union of waste pickers and waste collectors in Pune.

Waste Management System and Stakeholder Involvement

In September 2008, a formal memorandum of understanding (MoU) was signed between PMC and SWaCH to decentralize door-to-door collection (DTDC) services for households, shops, offices, and small commercial establishments. According to this contract, 2,300 waste pickers of SWaCH were to cover over 4 lakh



Picture 7: Wastepickers from SWaCH, a co-operative in Pune

households, including slums, for doorstep waste collection. As a part of this, the corporation had to pump in Rs 8.5 crore in the designated five years towards overhead costs of the monitoring system (150 supervisors/coordinators, management information system), health insurance of waste pickers and providing hand carts, uniforms, etc to waste collectors. Out of the then 144 wards of Pune city, SWaCH was handed over 80 wards for waste management. At present, there are 76 wards (post re-organization of wards) in the city with two corporators from each ward.

The source of income for SWaCH waste pickers was the monthly user fee from the households and the sale of recyclables. Five percent of the monthly user fee per waste picker had to be given to SWaCH as an operational cost for the functioning of the organization. As per the MoU, in five years the SWaCH model had to become self-sustainable, with no further financial assistance from the PMC towards salaries of supervisors/coordinators.

In this model, the PMC provided wheelbarrows, hand carts, tricycles to 61 women waste pickers for waste collection. Areas within the 80 wards were divided among the waste pickers for door-to-door waste collection. SWaCH charged Rs 30 per household per month as user fee. Households were expected to segregate waste at source, an aspect of this model that was unsuccessful.

Organic wet waste collected by the waste pickers was composted in a decentralized manner. Recyclables were sold and money earned, whereas non-recyclables were sent for landfilling through the municipal trucks. It is estimated that SWaCH was handling 600 tonnes of waste every day,

of which 130 tonnes was composted in a decentralized manner and 150 tonnes was recycled.

The project took off well and waste pickers started door-to-door waste collection in 2008. Over 150 supervisors and coordinators were hired by SWaCH, whose salaries had to come from PMC funds, for creating a monitoring and feedback system (MIS). There was a mutually decided schedule as per which both the corporation and SWaCH had to come out with their respective deliverables.

Outcomes and Next Steps

The model was able to generate a source of livelihood for the wastepickers involved in the formal collection system.

The first phase allowed the PMC and SWaCH to understand the functioning of the model and improve on management and contract issues prior to renewal of the next phase. A major lesson learnt was that such waste management models cannot be financially sustainable without funds dedicated specifically for project management. As of today, in phase 2, the PMC and SWaCH have renewed their contracts. SWaCH will now cover the entire city with their operations. Rs. 3.2 crores with 5% escalation will be paid to the cooperative annually. Monthly household charges paid to wastepickers are Rs. 50 in urban areas and Rs. 30 in slums. Wastepickers are entitled to health insurance, banking, educational and other social security schemes.

Rs. 600 per year is paid to each wastepicker for maintenance of equipment, provided by the PMC. As of March 2016, the cooperative has received Rs. 1.12 crore of the 1.32 crore to be paid by the PMC as wastepicker reimbursement.

4. Hasiru Dala's Dry Waste Collection Centers

Hasiru Dala or Green Force is a member based organization of wastepickers in Bangalore. The organization works improving the working conditions of informal sector waste workers by ensuring continued access to livelihoods while attempting recognition for them as silent environmentalists. The organization seeks to secure for members benefits of various

government programs that they are entitled to, social security provisions that are required to enable enhanced quality of life as well as providing their children with better access to education.

The membership to the organization has been extended to all waste workers including wastepickers, itinerant waste buyers, small and large wholesalers and buyers of waste, a majority of whom are women.



Picture 8: Wastepicker women from Hasiru Dala, a cooperative in Bengaluru, Karnataka.

Waste Management System and Stakeholder Involvement

The model followed by Hasiru Dala was initiated as a tri-party model which has now settled in to a dual-party model mode of functioning. The collective of wastepickers works with the Bruhat Bengaluru Mahanagar Palike (BBMP), the municipal corporation of Bangalore. BBMP is divided into 198 wards, but works with Hasiru Dala in 33 wards currently, with plans for expansion.

Once an agreement for a particular location has been crafted, the BBMP constructs a Dry Waste Collection Center (DWCC) and hands it over to a group of waste workers of the organization. A single DWCC is managed by 4 waste workers. Once a DWCC has been constructed, a corporate partner such as ITC, Infosys etc are sought to fund the collection center for a period of 2 years.

The waste collected by wastepickers is sold to wholesalers of waste where they are able to access better process for segregated materials. A part of their waste is also bought from the waste workers of the BBMP – called “*pourakarmikas*”. In order to enable access to better prices of waste, the wastepickers sell the waste to larger dealer part of the organization itself, as opposed to selling to third part wholesalers and waste buyers.

Outcomes and Next Steps

The largest gain of the model is that wastepickers have been able to access education and technology which has been able to boost their confidence and work. Hasiru Dala and its waste workers are able to divert over 1050 tons of waste for recycling every day leading to saving of

Rs. 8400 lakh (84 crore) annually for the municipality.

The organization has been in talks with the BBMP and State Pollution Control Boards to collect low and no value calorific waste for use in the cement industry as raw material for furnaces. One such cement manufacturer has agreed to transport the waste from the DWCC to the factory free of cost; an MoU was signed for the same.

5. Chintan's 'Toxics to Green' Electronic Waste Model

For the past one and a half decade, Chintan has been working for an inclusive, sustainable and equitable growth for all. These efforts have been recognized at international level through different organization and government agencies. Year 2015 got Chintan the prestigious UNFCCC Climate Solutions Award under the Momentum for Change initiative. Chintan was amongst 16 ‘Lighthouse Activity’ winners, chosen from around the world and the award was presented at the COP21 held in December, 2015 in Paris.

Chintan received this award for their efforts in promoting safe, scientific and legal disposal of end-of-life electric and electronic waste, commonly known as e-waste. It stemmed from the alarming rate at which this waste is growing and the lack of awareness amongst the citizens of its hazards and ways of proper disposal. 2014 saw a mammoth increase in production of electronic waste with 1.7 million tons being generated, indicating a 21% increase since 2011. Unfortunately, 95% of this waste is handled directly by the informal sector in India.



Picture 9: Chintan's e-waste drive

Waste Management System and Stakeholder Involvement

Chintan, a licensed actor under the E-waste (Management and Handling) Rules, 2011, has channelized e-waste to authorized e-waste recyclers by training urban poor, particularly wastepickers, to take up last mile collection services for augmented incomes. Thus, Chintan has prevented it from releasing greenhouse gases by ending up in landfills. This is Chintan's 'Toxics to Green' campaign, under which more than 2000 workers have been trained so far to collect about 25 tons of e-waste every year for safe disposal. In addition to this, most of the wastepickers collect the e-waste in non-motorized vehicles, which means no greenhouse gases are being emitted during its collection and transportation.

It was through Chintan's efforts that the informal sector's contributions in saving considerable amount of greenhouse gas emissions are now being recognized by the government. Studies undertaken by Chintan and the Advocacy Project, Washington DC, show that the informal sector saves a considerable amount of greenhouse gases through its work. In fact, in Delhi, it saves 3.6 times more greenhouse gases than projects applying for CDM in the solid waste sector. Solid waste is responsible for over 3% of greenhouse gas emissions in India—the highest in South Asia.

Under this campaign, Chintan creates green livelihoods from toxic wastes by finding economic opportunity in the safe section of collection, and not recycling, as is traditionally believed. Besides, it has been able to modify the traditional doorstep waste collection model for waste and adopt it for better management of e-waste so that the e-waste reaches licensed recyclers

intact. Based on previous experience, it was also clear that there were very few financial resources available for e-waste handling. Hence, Chintan dovetailed it with other waste handling, so that the urban poor were richly incentivized to continue the work after Chintan ceased to supervise it.

Despite legislation and the presence of recycling companies, e-waste is not recycled. This is because it is financially unviable for companies to collect small amounts of waste from schools, homes, offices etc. Aggregated, this is nearly 90% of the e-waste in India.

Outcomes and Next Steps

By riding on an existing waste recycling system by wastepickers, Chintan was able to channelize such e-waste and prevent GHG emissions. Developing grassroots leadership from the urban poor, especially women was key to help expand, as they began to involve their wider families to be a part of this change. Chintan has focused on creating a process innovation in which the urban poor can contribute to climate change and bring about a reduction in the emission of greenhouse gases, instead of being mere passive victims of climate change.

Chintan's study titled 'Learning to Re-E-Cycle', documents their successes and failures in e-waste, and serves as a manual for managing electronic waste in a sustainable manner.

6. Bhopal Nagar Nigam's Initiative in Including NGOs and Wastepicker Organizations in Waste Management

In January 2011, the Bhopal Nagar Nigam issued notice to all the NGOs and associations within the city, calling them to



कार्यालय नगर निगम, भोपाल

क्र. 433/आ.क./2011

भोपाल, दिनांक 04/01/2011

प्रति,

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अध्यक्ष, साईनाथ सोसायटी फॉर एज्युकेशन हेल्थ एंड रूरल डवलपमेंट, साईबाबा मंदिर के पास प्रोफेसर कालोनी भोपाल	सचिव, भूमिका इंस्टीट्यूट फॉर रूरल डवलपमेंट 139/1, रोशनपुरा स्लम बापू की कुटिया के पीछे भोपाल (म.प्र.)
सचिव, क्षेत्रीय जन शिक्षा एवं विकास समिति एम आई जी 15, द्वितीय तल, एम एल ए क्वार्टर्स जवाहर चौक भोपाल	मेनेजिंग डायरेक्टर, एम पी कॉन लिमिटेड, ब्लाक 2, तृतीय तल पर्यावास भवन अरेरा हिल्स भोपाल

विषय :- शहर के विभिन्न स्थानों में पन्नी/कागज/प्लास्टिक/धातु/कांच एवं अन्य कबाड़ सामग्री बीनने वाले, फेरी लगाकर घरों, दुकानें, कार्यालयों एवं अन्य स्थानों से अनुपयोगी सामग्री कचरा-विच्छेद/संग्रहित करने वाले तथा स्केप खरीदने वाले फुटकर कबाड़ व्यवसायी व्यक्तियों एवं इन कार्यों में संलग्न गैर सरकारी संगठनों/समुदाय आधारित संगठनों समूहों के पंजीयन बावत् दैनिक समाचार पत्रों में दिनांक 28/09/10 को प्रकाशित विज्ञापित के संबंध में।

संदर्भ :- आपका प्राप्त प्रस्ताव दिनांक

उपरोक्त विषय में संदर्भित पत्र के माध्यम से आपकी संस्था का प्रस्ताव प्राप्त हुआ है। निगम द्वारा जोन क्र. 10 एवं 11 के 10 वार्डों में घर-घर से कचरा इकट्ठा करना, कचरे का निस्पादन, सर्वेक्षण, प्रशिक्षण एवं कचरा बीनने वाले व्यक्तियों की कार्य क्षमता बढ़ाना तथा जन जागरूकता अभियान चलाना इत्यादि कार्यों में संस्थाओं/गैर सरकारी संगठनों का सहयोग लिया जाना है। इन कार्यों में उन्हीं संस्थाओं का चयन किया जावेगा, जो कि तकनीकी एवं वित्तीय रूप से सक्षम पायी जावेगी। इसके लिये निगम द्वारा एक परिपत्र Request for Proposal तैयार किया है, जो कि इस पत्र के साथ संलग्न कर आपकी ओर भेजा जा रहा है।

कृपया Request for Proposal का अध्ययन कर इसके साथ संलग्न, ANNEXTURE "A" में आपकी संस्था से संबंधित जानकारी एवं आवश्यक वांछित दस्तावेज संलग्न कर इस पत्र के जारी होने की दिनांक से सात दिवस अर्थात् 10/01/2011 तक अनिवार्य रूप से जमा करें। निर्धारित तिथि के पश्चात् प्राप्त होने वाले प्रस्तावों पर विचार नहीं किया जावेगा।

संलग्न:- Request for Proposal Format

प्रमारी सहायक यंत्री
नगर निगम, भोपाल

Picture 10: Order from Bhopal Nagar Nigam

send relevant documents in response of the 'Request for Proposal' issued by the Nigam. The proposal was for various activities ranging from door-to-door waste collection, transportation, segregation, capacity building of informal sector wastepickers, etc.

Of the total 13 zones in Bhopal where waste recyclers were involved in waste management, only in three zones (zone nos. 1, 10 and 11), a total of 100 waste recyclers were involved in door-to-door waste collection. While in other 2 zones (zone nos. 12 and 13) a total 140 waste recyclers were

engaged in door-to-door waste collection in supervision of the Nigam.

Eventually, the project was granted to an NGO named 'Samman'. The Nigam provided uniforms, cycle rickshaws and auto to waste recyclers to pick up the waste. While the collected waste remained with the waste recyclers, they were paid Rs. 3000 per month by Nigam. User charges were collected from households by the Nigam itself. There was however no MoU signed between Samman and the Municipality. Wastepickers were only appointed for the door-to-door waste collection.

VII. How to do it? What does it all cost?

This section gives a step by step guide on how can municipalities include informal sector in formal waste management system.

Integrating the informal sector in waste management: a step-by-step guide

Faced with mounting challenges of managing urban waste, Delhi must be able to leverage existing resources to surmount them. To do this, a simplified approach is depicted in the figure below.

- **Step 3: Recognize and legitimize** informal sector service providers;
- **Step 4: Establish protocols and standards** for the performance of waste management service providers, both formal and informal;
- **Step 5: Communicate and train** stakeholders in the target waste management system; and
- **Step 6: Implement and monitor** the waste management system.



Figure 7: Step-by-step approach to integrating the informal sector

Delhi can adopt and tailor this high-level approach to fit their particular needs. Broadly, these steps are defined as follows:

- **Step 1: Plan** the target waste management system.
- **Step 2: Partner** with the informal sector, private waste management service providers, and the public;

Step 1: Plan

Defining a target waste management system is a crucial first step in developing an understanding of how the informal sector fits into the target system and then planning for their formal inclusion into that system. Waste management planning involves setting goals and strategies for meeting Delhi's current and future waste management needs.

Although goals and objectives should be defined based on the particular needs and contexts of the city, there are some general internationally accepted best practices and guidelines that should be kept in mind as plans are developed. Among these is the integrated waste management hierarchy – an internationally recognized strategy for management of municipal solid wastes – which places great emphasis on strategies and programs for avoiding and reducing waste, with treatment and disposal being the least favoured option. The work of the informal sector is in alignment with this hierarchy focusing on reuse and recycling and therefore should be given preference in waste management systems planning.

We propose the following four tasks that will help ensure that cities have adequately planned for their waste management needs by including the informal sector:

Task 1.1 Understand the challenges in the current waste management environment

Understanding these challenges and their root causes is a first step in being able to address them. Developing such an understanding involves documenting the following characteristics about the informal sector through formal and informal discussions, background research and quick surveys:

- Estimated number of informal sector workers in Delhi;
- Types of waste-related work performed in Delhi;
- Locations of informal sector work and habitation in Delhi; and
- Informal sector work systems and processes.

Task 1.2 Review applicable policies and rules and their implementation

There are many rules and policies in India applicable to the management of municipal solid wastes and the inclusion of the informal sector. Municipalities must have a clear understanding of what these rules and policies are, and what the roles and responsibilities of different stakeholders are in their successful implementation. Key applicable rules are noted below:

- **Solid Waste Management Rules, 2016** assign the following duties to the municipal authorities: “establish a system to recognize organizations of waste pickers or informal waste collectors and promote and establish a system for integration of these authorized waste-pickers and waste collectors to facilitate their participation in solid waste management including door to door collection of waste”, “setup material recovery facilities or secondary storage facilities with sufficient space for sorting of recyclable materials to enable informal or authorized waste pickers and waste collectors to separate recyclables from the waste and provide easy access to waste pickers and recyclers for collection of segregated recyclable waste such as paper, plastic, metal, glass, textile from the source of generation or from material recovery facilities” and “provide training on solid waste management to waste-pickers and waste collectors”.
- **Plastic Waste Management Rules, 2016** apply to the management of plastic wastes, specifically plastic carry bags and multilayered plastic pouches or sachets. These Rules assign

the municipalities the responsibility for “setting up, operationalization and co-ordination of the waste management system and for performing the associated functions, namely... engaging civil societies or groups working with waste pickers” and assign responsibility on the waste generators to “....ensure segregated storage of waste at source and hand over segregated waste to.... registered waste pickers’, registered recyclers or waste collection agencies”.

In addition to these, there may be state and city-level regulations and bye-laws that might need to be accounted for in the design of future waste management systems. If city level bye-laws are not compliant with national-level legislations, these will need to be updated accordingly.

Task 1.3 Develop informal sector inclusion goals for the next five years

Based on an understanding of the current challenges and a review of applicable regulations, the next task is to develop a set of goals that can address those challenges and comply with applicable regulatory requirements. Below are examples of some goals that comply with the Solid

Waste Management Rules, 2016, while simultaneously also addressing current challenges in waste management. Here are some suggested goals:

- Goal 1. Provide universal doorstep waste collection services by formalizing informal sector doorstep collectors and by training informal sector actors in areas where there is no collection yet.
- Goal 2. Enable and support recycling by the informal sector by establishing material recovery facilities (MRFs).
- Goal 3. Reduce overall waste burden through centralized and decentralized composting.
- Goal 4. Implement extended producer responsibility to reduce waste burden of specific streams.

Task 1.4 Establish baseline and target metrics to monitor performance against the goals

Once the goals have been set, there needs to be a mechanism to monitor performance against them. Typically this is done by establishing and monitoring metrics that allow us to measure the desired outcomes associated with those goals. The table below provides an example of some such metrics.

Table 5: Metrics to measure desired outcomes of the goals

Goal/Metric	Year 0 (Baseline)	Year 1 (Target)	Year 2 (Target)	Year 3 (Target)	Year 4 (Target)	Year 5 (Target)
Goal 1. Provide universal doorstep waste collection services						
Metric 1.1 Percentage of households with formalized doorstep collection services	25%	50%	75%	100%	100%	100%

Goal/Metric	Year 0 (Baseline)	Year 1 (Target)	Year 2 (Target)	Year 3 (Target)	Year 4 (Target)	Year 5 (Target)
Metric 1.2 Percentage of informal sector collectors formalized, providing this service	0%	50%	75%	100%	100%	100%
Goal 2. Enable and support Recycling						
Metric 2.1 Percentage of total waste recycled	10%	20%	25%	25%	25%	25%
Metric 2.2 Percentage of <i>godam</i> owners formalized	0%	25%	50%	100%	100%	100%
Metric 2.3 Number of MRFs established and operating	0	5	10	20	20	20
Goal 3. Reduce overall waste burden by implementing centralized and encouraging decentralized composting						
Metric 3.1 Percentage of organic waste at final disposal site	60%	40%	20%	10%	10%	10%
Metric 3.2 Percentage of households composting	0%	10%	20%	30%	40%	50%
Metric 3.3 Number of decentralized composting projects	0	25	50	100	150	200
Metric 3.4 Number of informal sector composters supporting projects	0	25	50	100	150	200
Metric 3.5 Amount of compost produced at composting facility as a proportion of estimated organic waste generated	0%	10%	25%	30%	40%	50%

Goal/Metric	Year 0 (Baseline)	Year 1 (Target)	Year 2 (Target)	Year 3 (Target)	Year 4 (Target)	Year 5 (Target)
Goal 4. Implement extended producer responsibility to reduce waste burden of specific streams						
Metric 4.1 Number of plastic waste collection centers established and registered	0	10	15	20	25	30
Metric 4.2 Estimated percentage of non-recyclable plastic waste diverted from landfills	0%	10%	20%	35%	45%	60%
Metric 4.3 Estimated percentage of e-waste collected through registered collection centers	0%	10%	20%	30%	40%	50%

Step 2: Partner

The goal of this step is to identify and partner with informal sector service providers and organizations, private formal sector service providers and other stakeholders affected by the target system. The success of the target system will depend on developing and enabling partnerships between all stakeholders – informal, formal, and city residents (or the public) – as shown in Figure below. It is important to share with each of these stakeholders the waste management goals so that everyone has a common understanding of the target waste management system. In the following sections, each of these is described separately.

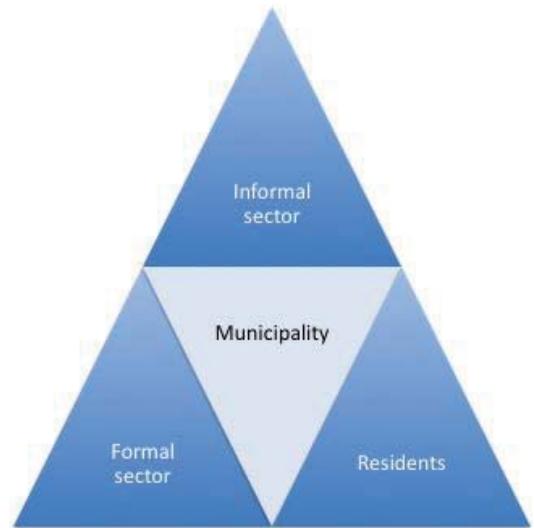


Figure 8: Partnering with stakeholders

Task 2.1 Partner with the informal sector

In Delhi, there are existing NGOs that work with informal sector actors in cities. The goal of this step is to identify such organizations. Partnering with an organization that works with the informal sector will help alleviate the administrative burden of managing the inclusion of the informal sector by the municipality. There is precedence where municipalities have supported the establishment of such organizations. For instance, Shimla Environment Heritage and Beautification (SEHB) Society was formed under the aegis of the Shimla Municipal Corporation to provide doorstep waste collection services by formalized informal sector workers in the city. The organization now functions as an independent entity but is supervised directly by the Municipal Commissioner and Health Officer³⁹.

Figure below provides a process flow that guides municipalities through the decisions involved in partnering with informal sector organizations:



Figure 9: Developing and maintaining informal sector partnerships

- The process starts with determining whether or not a potential partner organization already exists.
- The next step is to establish a partnership with the organization through a memorandum of understanding or a contract. This contractual document should clearly outline the roles and responsibilities of both the municipality and the organization. Informal sector organizations will require funding to do their work. If there are funds available in the municipal budget, they could be allocated for supporting their work. If not, the municipality should support the organization in finding government or external donor funding. One way to do this is by allowing the organization to collect doorstep waste collection fees from households. But aside from money, there are other ways in which the municipality can help informal sector groups (see Box 8).

³⁹ <http://www.shimlamc.gov.in/file.axd?file=2012%2F6%2FMSWM+Plan.pdf>

Box 8: Ways to support informal sector partners

Aside from funding, municipalities can support informal sector groups in the following key ways:

- Provide forms of identification);
 - Support their access to social security programs such as pension schemes, Aadhar card, ration card, health schemes, etc.
 - Enable their access to government medical facilities and services;
 - Provide places for them to wash their hands after work;
 - Provide space where they can segregate and store recyclable materials.
-
- Once the partnership has been established, it is necessary to maintain it. Ideally, there should be at least one person of contact within the municipality who is in charge of managing the partnership. Managing the partnership also means periodically assessing the relationship against the original terms and conditions, regularly meeting with the organization's representatives to understand and address their challenges, and monitoring their performance against benchmarks.

Box 9 : NDMC launch Eco-friendly Garbage Stations in New Delhi Municipal Council

The NDMC has been identified as a leader by both the Swachh Bharat Mission and the Smart Cities Program of the Government of India. NDMC has been the first to implement the inclusion of wastepickers as promulgated by the new rules.

The initiative between Chintan and NDMC builds on urban innovation and infrastructure, to create an inclusive model of waste handling. Existing garbage stations have been used by trained and formalized wastepickers to collect and handle both dry waste and e-waste. The public is being informed about this in many ways, such as information on the garbage stations sharing the idea and encouraging them to segregate and recycle. As waste is brought in, or deposited by residents, it undergoes secondary segregation and finally, recycling. Each garbage station is run by a set of trained waste handlers under the supervision of Chintan, who are responsible for their selection, training and functioning.

Box 10: The work will be undertaken following these rules:

- Doors and walls of the garbage station will be painted to look clean and appealing.
- Some of these will be used as electronic waste drop off centers and some for segregation of waste only.
- These will only be operated by trained wastepickers who will be within NDMC.
- Wastepickers will work in proper uniform and identity card.
- All these 'Zero Waste Stations' will be closed by 7 pm or dark, whichever is earlier, so no one can stay in them.
- Waste should not be stored overnight.
- No fires or cooking will be undertaken inside or nearby outside.

Task 2.2 Partner with the formal sector

In some cases, the municipality may already have a contract with a private firm as of today to provide certain waste management services. For example, the municipality may have hired a company to transport the waste to a designated dump site. In other cases, the municipality may be considering outsourcing certain waste management services to a private company. **Managing such a contract and ensuring that the contractor delivers services on time and in accordance with the standards in the contract is necessary but not the focus of this document.** This

section is focused on understanding the implications of privatization of solid waste management services on the informal sector and ensuring that the negative impacts are addressed. Some of the negative impacts of privatization of waste management services are provided in Box 11 below:

Box 11: Impacts of privatization on the informal sector

The table below provides examples of different types of services that are privatized and what the impact on the informal sector is.

Service	Impact
Doorstep collection	Informal sector loses access to waste materials. Often, children begin to work due to undue financial pressure on households.
Transportation from neighborhood bins to landfills	Informal sector loses access to temporary sorting and storage sites
Landfill O&M and closure	Informal sector loses access to waste collection site
Waste to Energy (incineration)	Informal sector loses access to recyclable materials as everything is burned to ashes. Once again, children may be forced to work to augment household incomes.

For this reason, it is important to partner with the formal service provider to ensure that the formal partner is following regulatory guidelines for the inclusion of the informal sector. A useful resource developed by Chintan for assessing the inclusion of the informal sector in waste management can be found on the Ministry of Urban Development's website⁴⁰. Requests for proposals (or RFPs) for waste management service contracts need to ensure that inclusion of the informal sector is stipulated in them. We reviewed a number of RFPs issued by municipalities across India and found that the informal sector was scarcely mentioned. In the figure below, we provide a step-by-step approach for the inclusion of the informal sector in waste management projects.

The process must start with asking the question whether or not informal sector workers are or will be displaced as a result of a waste management projects. In most instances as seen in Figure 10, the answer is yes but in some cases such as a composting project, they might not be. The informal sector earns their livelihood by collecting, sorting and selling recyclable materials from waste. Projects that hinder access to either recyclable materials or spaces of sorting and storage will have negative impacts on this sector. Composting does not have negative impacts because informal sector workers do not sell organic waste, although they can gain livelihoods by composting. The goal is to determine if and how many informal sector workers are displaced and to what extent. The Chintan toolkit mentioned previously provides a way to conduct an impact assessment or in the absence of

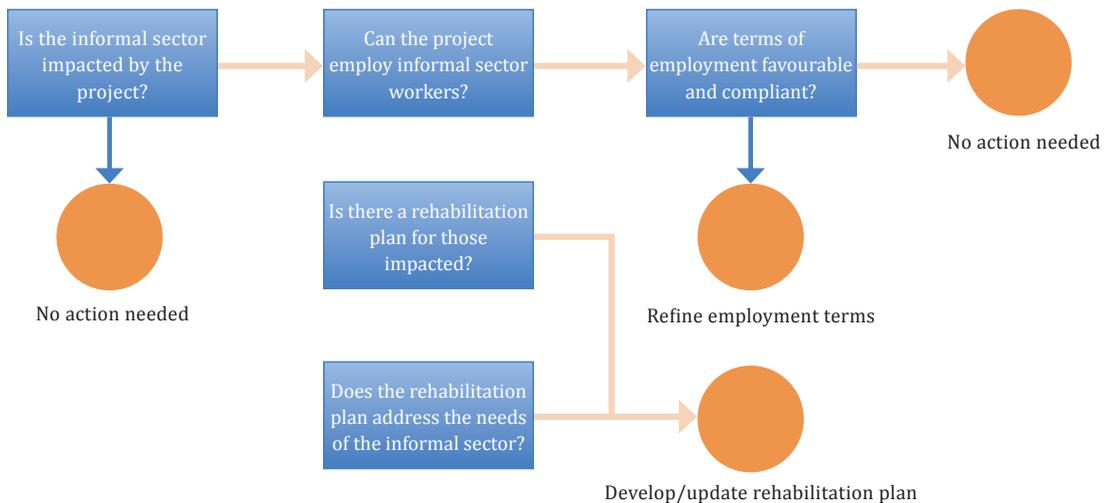


Figure 10: Assessing inclusion in formal waste management systems

40 <http://jnnurm.nic.in/wp-content/uploads/2013/11/Chintan-Inclusion-Tool-and-Appendices.pdf>

resources to conduct such an assessment. It provides a way to estimate the number of informal sector workers impacted. The next step is to whether or not the project employs or can employ informal sector workers. In most cases, a project should be able to employ some or the entire impacted workforce. To determine what parts of the project can employ existing informal sector workers, the municipality should use the steps outlined in Box 11.

Box 11: Assessing the feasibility of employing informal sector workers in waste management projects

- Document the work and number of workers required in the new process;
- Document the skill and literacy requirements of labor in the new process;
- Determine the skill and literacy levels of existing informal sector workers;
- Map the existing informal labor workers to new requirements;
- Document the number of workers that can be employed in the new process;
- Audit the project to ensure that existing informal sector workers have been employed in the appropriate portions of the project. It is not acceptable for any worker to be left out.

If the project can or does employ informal sector workers, then it is important to determine whether the terms and conditions of employment comply with

applicable regulations and are favorable to the workers. Box 12 provides a checklist for municipalities to assess this by doing a quick survey of the workers. Important questions to ask at this stage include whether remuneration rates meet minimum wage standards and are acceptable to the workers, whether appropriate health and safety measures are in place at work, whether workers are accorded the benefits that are due to them, and whether they were provided the appropriate training needed to perform the work. If employment terms are not satisfactory, then they should be refined based on consultation between the private firm, municipality and informal sector representatives. In the research conducted for this project, it was found that although none of the informal sector workers had experience working with formal waste management service providers, they are open to working for them. More than 95 percent of the informal sector respondents expressed their willingness to be employed. About 98 percent noted that they would be willing to be trained in new work in waste and follow protocols such as wearing masks, gloves and uniforms.

Box 12: Terms and Conditions Assessment Checklist

- Are workers paid minimum wages etc., stipulated by the jurisdiction?
- If yes, are workers earning above or below what they were earning before?
- Are they allowed to keep and sell the recyclables they collect?
- Are workers provided the appropriate safety gear for their work?

- Are workers provided training to perform the tasks they are allotted?
- Are workers provided the following:
 - o Breaks during work?
 - o On site bathroom facilities?
 - o Time off from work?

If the project does not or will not employ informal sector workers, or if it is able to employ only a portion of the impacted workforce, then this is not an ideal scenario and a rehabilitation plan is needed to find suitable alternative employment for them. To do this, a rehabilitation plan made along with the people it will apply to must be in place that details how alternative livelihoods might be secured. If a plan is in place, it should be assessed to ensure that it meets the needs of those who are or will be displaced. To do all this, it is necessary to develop a partnership with the private waste firms so that the needs of the informal sector are taken into account. Through such partnerships, the municipality can act as an intermediary between the private firm and the informal sector and ensure the success of the project.

Task 2.3 Partner with the public

Public participation is well recognized as crucial to the success of waste management systems. That the public is unconcerned about waste management and adopts an “out of sight, out of mind” mentality to their waste is not necessarily true anymore. There are many examples of community-led waste management initiatives from across India that attests to this. Further, recognition from the public is important for informal sector

workers who often face a lack of respect and recognition from the public. Partnering with the public is therefore going to be crucial for the success of inclusive waste management systems.

There are three key ways of engaging the public:

1. **Understand residents' waste management needs and problems:** One key way to ensure public participation is to understand what they want and what their key problems in waste management are. As producers of waste, it is important for the municipality to understand their knowledge, attitudes and practices with regards to waste management so that appropriate systems can be developed to address them. This can be done through household surveys, public forums, online social media feedback and polling systems. To understand public perceptions Chintan conducted a survey and found that residents were very interested in waste management issues. The study also found that the public were quite aware of the contribution that the informal sector makes towards waste management and recycling in Delhi. The survey also revealed some gaps in understanding of waste management systems and processes such as the difference between biodegradable and non-biodegradable waste.
2. **Spread awareness to induce positive behavior change:** The actions of Delhi's residents as waste generators can impact the fate of the waste stream. For instance, segregation-at-source is widely held to be the basis of an efficient waste management system that optimizes resource recovery and enables safer work conditions for waste

handlers. But if waste generators do not know how to segregate their waste into which categories, source segregation will be unsuccessful. Public awareness campaigns that induce behavior change and encourage people to segregate needs to be a first step. In this, informal sector partners can provide assistance by being trained on teaching people to segregate and monitoring their segregation practices. This is crucial for creating healthier conditions of work for waste handlers also. As mentioned previously, our survey showed that informal sector workers are at high risk of diseases and other health problems. Segregation of waste at-source can help minimize these risks.

3. Incentivize community waste management and monitoring systems:

Partnership with the public through their organizations such as resident welfare associations (RWAs) can be quite productive in two ways. First, it can help reduce the waste burden on Delhi by encouraging community-led decentralized waste management initiatives such as composting. Second, it can allow for constant monitoring of the performance of the waste management systems. Many cities such as Delhi use social media to allow residents to provide feedback and complaints on waste collection or street sweeping. Municipalities

need to find ways to incentivize such behavior by issuing small grants or awards for neighborhoods that perform well by taking charge of some of their waste management issues. Training neighborhoods to set up such systems is going to be the key.

Step 3: Recognize and Legitimize

Recognizing the informal sector for the important services it provides should be a fundamental step in its formalized inclusion into the Delhi's waste management system. But merely recognizing that the informal sector provides services is not enough. Municipalities also need to legitimize their contribution by treating them as legitimate service providers. To this end, something as simple as an identification card can go a long way. Partnering with informal sector organizations is the key to this process of providing recognition and legitimacy. While a formal memorandum of understanding or a contract with informal sector organizations legitimizes them as an entity that supports waste management service provision in the city, individual informal sector providers often face harassment from public officials and city residents. Formalizing informal service providers can help alleviate some of these problems. Figure below provides an overview of the tasks and activities involved in recognizing and legitimizing informal sector actors. These are described in detail in the following sections.

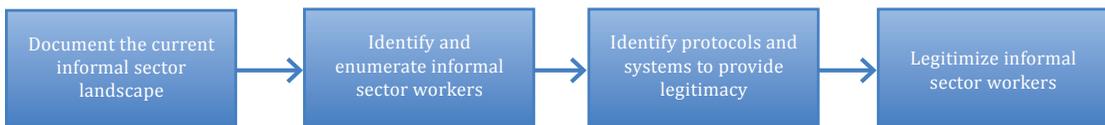


Figure 11: Recognizing and legitimizing informal sector workers

Task 3.1 Document the current informal sector landscape

Informal sector organizations currently working in Delhi may be able to provide a more comprehensive and realistic view of the existing landscape. This can be done by:

1. Observing the main sites of informal waste collection such as houses where doorstep collectors collect waste daily from, neighborhood garbage bins, public areas, and landfills.
2. Observing waste segregation activities that are typically done where waste collectors live and in *godams*;
3. Understanding who the main buyers of recyclable materials are: In many cities, in addition to *godam* owners, there are contractors who buy recyclable materials from collectors.

Task 3.2 Identify and enumerate informal sector workers

In the previous step, what the current informal sector landscape looks like was identified. In other words, it should tell us what types of waste collection and recycling work is currently happening and what main types of actors are involved. In this step, the quantity and type of actors involved in the different kinds of waste-related work in Delhi need to be identified. The survey shows that typically each actor performs multiple types of collection and segregation work. For instance, one person could simultaneously be involved in doorstep collection, be a *godam* owner and help segregate recyclables at the *godam*. Partnering with an informal sector organization will be very helpful in

identifying and enumerating informal sector workers. If resources for a detailed survey are not available, numbers can be estimated using a formula. For instance, if we know that a doorstep collector typically collects waste from 200 households daily, and there are 10,000 households in the city, then there should be approximately 50 doorstep collectors.

The survey should capture the following information about existing wastepickers:

- Name
- Gender
- Address
- Phone
- Type of waste work they are involved in (e.g. door-to-door collection, *pheri* etc.)
- Where do they collect waste from?
- Where do they sell the recyclables?
- Who do they sell to?
- If door-to-door collector, number of households they serve
- Work times (daily start and end times)
- Number of days per week they work
- Estimated daily income
- Years of waste-related work experience
- Challenges they face
- How many children do they have?
- What are their ages and genders?
- How many and which ones are in school?

- Are they interested in becoming members of an organization? If they express interest, a membership form must be provided and completed with the help of the informal sector partner organization.
- Are they interested in working with the partner organization in the door-to-door collection program?

Task 3.3 Identify protocols and systems to provide legitimacy

In this step, the municipality needs to determine how informal workers will be recognized as legitimate service providers. Identification cards and uniforms are two ways in which informal service providers can be granted legitimacy. These forms

of recognition should be contingent upon informal sector workers complying with protocols and standards. For instance, *godam* owners should follow certain occupational health and safety guidelines in their segregation and recycling operations that minimize the risk of fires and provide safe working conditions for segregators. *Godams* can be registered as material recovery facilities (MRFs) as long as they follow those guidelines. IDs should be renewed on a periodic basis. But without intensive training and periodic monitoring of such standards and protocols, informal sector workers cannot be expected to be compliant.

Figure below shows a sample design for a MRF.

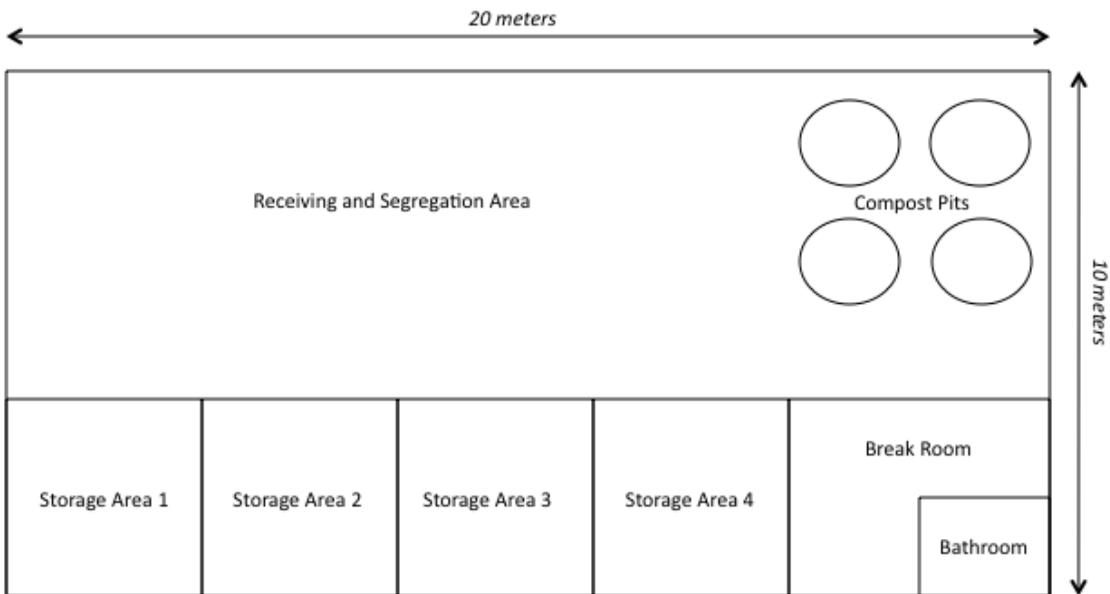


Figure 12: Sample design of an MRF

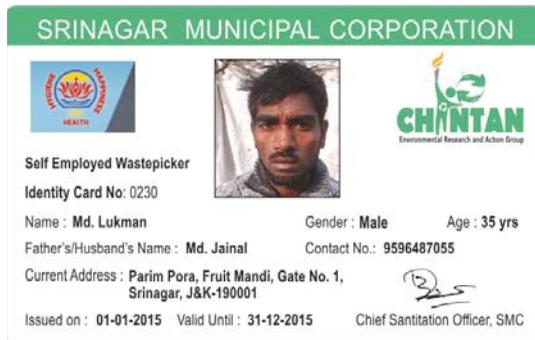
Task 3.4 Legitimize informal sector workers

Once protocols have been determined, the municipality should work with the partner informal sector organization to implement the new system. As a first step, the partner organization should sign a contract with individual waste pickers so that both parties are accountable for conditions specified in the contract. Identification cards are very simple and can be produced inexpensively. The partner organization should be in charge of maintaining the formal registry of identified workers. Figure below shows an example of an ID that Chintan has used to formalize doorstep collectors in New Delhi. Uniforms are more expensive but are more visible and therefore can be very useful for proffering public recognition to workers. If the municipality has funds for uniforms, they should invest in these.

- Contract signed? (Y/N)
- Date contract signed
- ID issued? (Y/N)
- ID expiration date
- Uniforms issued? (Y/N)
- Uniform issue date
- Rickshaw issued? (Y/N)
- Rickshaw number
- Rickshaw issue date

In addition to providing ID cards and uniforms, the municipality should do the following:

- Train the police and municipal workers (e.g. sanitation inspectors) to recognize ID cards and inform them about new protocols for the informal sector



Picture 11: Sample identification card

The registry should contain the following information about waste collectors:

- Name
- ID number
- Address
- Phone number

- Train informal sector workers on where and how to handle waste
- Make space available for sorting and temporary storage of recyclable materials for the informal sector;
- Convert existing *godams* into low cost material recovery facilities (MRFs) and/ or build new MRFs that can be

run either by *godam* owners or by organized wastepicker collectives;

- Provide a helpline number for informal sector actors so they can call their organization when needed.

Step 4: Establish Protocols and Standards

Although the informal sector provides valuable and crucial services, the challenge is to upgrade their work in order for Delhi to optimize and modernize their waste management systems in accordance with internationally accepted standards of environmental and occupational health and safety. As mentioned previously, the registration of informal sector providers and its periodic renewal must be contingent upon them following such protocols and standards. Below is a list of standards that municipalities can adopt:

- Doorstep waste collection must be timely and regular. In other words, doorstep collectors must collect waste at approximately the same time every day from a household. To ensure this, collection routes should be planned and the number of households that each collector provides services to should be standardized.
- Waste must be pre-segregated by the household and collected and transported separately by the collectors. This is primarily the responsibility of waste generators and collectors can help ensure that waste producers follow the appropriate source segregation practices.
- Neighborhood garbage bins must not be messy and should be cleared at least once daily. This is partly the

responsibility of the municipality or its contractor and partly of informal sector collectors. Informal sector collectors must ensure that the waste is confined to the garbage bin and not strewn about. To ensure this, the municipality or its contractor must empty the bin daily so that garbage does not overflow.

- MRFs (existing upgraded *godams* or new facilities) must be clean and should be designed to minimize occupational hazards such as fires. It should be the responsibility of *godam* (or MRF) owners to comply with basic design standards such that the risk of fires is mitigated. Some basic guidelines are provided in **Box 6**.

Box 13: Minimizing risk of fires in waste handling facilities

- Ban smoking inside the facility;
 - Do not handle material on fire or set fire to materials in the facility;
 - Examine materials visually for potential fire sources (glowing ash or glowing burning remains);
 - If fire sources are located, neutralize them with cover material immediately;
 - Furnish the facility with a fire extinguisher.
- Workers should follow occupational health and safety protocols by wearing the required safety gear and other equipment as specified in municipal protocols. The municipality, formal and informal organizational partners should ensure that workers

have access to safety gear. Detailed guidance on the appropriate safety gear is provided by the Ministry of Urban Development⁴¹ and is summarized in Box 14.

Box 14: Ensuring occupational health and safety

- Safety boots (always to be used while working outside the buildings);
 - Reflective vests (always to be used by all staff working outside the buildings),
 - Safety helmets (to be used in case of risk of injuries to the head e.g. during construction, loading or unloading activities, while operating machinery etc.);
 - Gloves (to be used in case of risk of injuries to the hands e.g. during loading/unloading or maintenance activities)
 - Ear protectors (to be used while working in noisy areas);
 - Disposable dust mask (to be used e.g. in case of exposure to dust)
 - First aid kits to be present in all MRFs. Training to be provided to staff on how to tend to minor injuries including cuts, burns, bandages. Also, on how to renew and refill the kits.
- Workers employed by formal and informal service providers should conform to minimum wage standards applicable to their jurisdictions. To

⁴¹ http://moud.gov.in/sites/upload_files/moud/files/pdf/Draft%20on%20manual.pdf

facilitate waste recovery and increase recycling rates, workers should be allowed to keep the recyclable materials so they can sell these to supplement their income. This will also incentivize them to perform better.

- Waste management service customers must have access to a system where complaints and grievances can be filed. Formal and informal service providers must have a complaint monitoring system that allows for tracking and addressing complaints. Such a system could be phone-based, online or in-person. Ideally, all three options should be made available to customers because not everyone will have access to web-based or phone-based systems. Box 15 provides guidance on setting up a customer helpline.

Box 15: Establishing and operating a customer helpline

Waste collection service customers, that is, households and commercial establishments should be provided a mechanism to file complaints on the web, on the phone and/or in-person. Information about this system should be shared with customers on a periodic basis by distributing flyers on a quarterly schedule for instance. Customers typically complain about service disruptions (e.g. waste has not been collected), behavioral problems with waste collectors, or quality of service (e.g. community bin not clean). Typically, the complaint redressal system works in the following way: A customer files a complaint. A data entry person collects the following information about the complaint:

name, address, phone number, complaint date, and what the complaint is. The person then forwards the complaint to the supervisor of the area that the complaint is from. The supervisor coordinates between the waste collector and the customer to resolve the issue. Once the complaint is resolved, the supervisor informs the data entry person. The data entry person marks the complaint as resolved along with the date in the complaint database. This data can then be used for reporting purposes to the municipality.

- Formal and informal service providers should conduct an annual customer feedback survey and share the results of the survey publicly. The inclusion tool available on the website of the MoUD provides detailed guidance on conducting a customer feedback survey. Box 16 provides a sample survey instrument.

Box 16: Customer feedback survey

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
Service is timely					
Service providers are professional courteous and respectful					
Complaints are addressed in a timely manner					
There has been an overall improvement in service since [organization name] started work					
I am satisfied with the overall quality of service					
What do you like best about our service?					

- Waste management service providers in the formal and informal sectors should not use child labor. Box 17 provides some ways in which municipalities can help eliminate child labor in the waste economy.

These are only some recommended standards and protocols that may be modified by the municipality to fit their particular needs.

Box 17: Eliminating child labor in waste

Child labor in waste is a problem in cities across the country. Unfortunately, it is a complex problem that cannot be addressed by simply banning child labor. The problem stems largely from household economic insecurity and lack of access to educational and alternative opportunities for children in waste picker households. Formalizing informal sector livelihoods such that parents have access to safe, stable and secure means of income is the first step in addressing child labor issues. In the survey mentioned earlier in this text, it was found that 25% of children in waste picker families perform some sort of employment work. Of those, more than 90% work in waste. Further, approximately 80% children do not attend school. Those children who work in waste are much less likely to be in school than those who work elsewhere. Clearly, access to education is a problem for children in waste picking communities. To address this, many organizations across India are providing parallel schooling and support classes to help children get into and remain in formal schools. Although the Right to Education Act, 2009, enacted by the Government of India makes education free and compulsory for all children up to the age of 14. In 2011, the age was extended to 16.

The following are recommendations as means for municipalities to support elimination of child labor in waste:

- Formalize informal sector livelihoods to ensure economic security for parents;
- Identify government programs that waste picker children can benefit from e.g. In May 2013, the Government of India included waste picking as one of the occupations eligible for inclusion in the "Pre-Matriculation Scholarship for children of those engaged in Unclean Occupations";
- Identify NGOs that provide education services for children in your city;
- Identify government and private schools that will enroll waste picker children.

Step 5: Communicate and Train

Once standards and protocols have been developed, all stakeholders who have the responsibility of implementing them need to be trained. In the following table are

provided some of the communication and trainings. Objectives for the particular audience, proposed frequency and recommended media of training and communication activities.

Table 6: Communication/ training objectives with proposed frequency and media

Communication/training objective	Frequency	Media
Audience: Formal and informal service provider organizations		
Follow environmental and occupational health and safety operational protocols	Quarterly	In-person and online
Address customer complaints and gather customer feedback	Annually	In-person and online
Comply with applicable environmental and labor regulations	Annually	In-person and online
Audience: Formal and informal sector workers		
Follow occupational health and safety operational protocols	Annually	In-person
Understand rights and applicable regulations	Annually	In-person
Provide services in accordance with established operational quality standards	Every six months	In-person
How to establish and run a material recovery facility (MRF)	Every six months	In-person
Audience: Police and municipal workers		
How to deal with informal sector workers	Every six months	In-person
Audience: Waste generators		
Segregate your waste	Every six months	Flyers, PSAs, and online
Set up a composting system at home, school or your Workplace	Annually	In-person, flyers, and Online
Set up a composting system in your neighborhood	Annually	In-person and online
File and track your complaints about waste management	Every six months	Flyers and online
How your waste turns into social wealth	Every six months	Flyers and online
Know your waste collector	Every six months	Flyers and online

Only when all stakeholders know and understand their roles and responsibilities will the target waste management system work successfully. The training and communication objectives outlined above are merely examples that can be tailored according to the specific needs of the municipality.

Step 6: Implement and Monitor

The final step in the process is to develop an implementation schedule for the set of

activities that will allow the municipality to meet its inclusive waste management goals and objectives. When developing such a schedule, it is important to bear in mind the resources required for implementing the activities and the dependencies between various activities. This will allow you to determine the most feasible timeline for achieving your objectives in a reasonable timeframe. The following table is an example of what such a timeline could look like.

Table 7: Implementation schedule to achieve objectives in a reasonable timeframe

Task/Activity	Year 0	Year 1	Year 2	Year 3	Year 4	Year 6
1. Plan						
1.1 Develop strategic goals, objectives and metrics	X					
1.2 Document baseline metrics	X					
1.3 Update waste management plan	X	X	X	X	X	
2. Partner						
2.1 Identify informal & formal sector partners	X					
2.2 Identify roles and responsibilities	X					
2.3 Establish contracts	X					
2.4 Understand public needs & challenges	X					
3. Recognize & legitimize						
3.1 Identify & enumerate informal sector workers	X					
3.2 Legitimize workers	X	X				
4. Establish protocols & standards	X					
5. Communicate & train	X	X	X	X	X	
6. Implement & monitor	X	X	X	X	X	

In addition to developing an implementation schedule, the municipality should periodically monitor the implementation of planned activities. Three types of such monitoring activities have been proposed.

Monitoring Activity 1: Periodic reporting

Informal and formal sector partners should provide periodic reports on their activities. We recommend quarterly reporting because this will allow the municipality to rectify issues as they emerge. Reporting requirements should be written into the partnership agreements or contracts. Figure below provides a sample of what such a report from an informal sector partner could look like.

Monitoring Activity 2: Periodic audits

In addition to the periodic reports, the municipality should also audit the operations of formal and informal service providers. These should be unplanned so that service providers are not able to predict when such an audit might happen. Figure below provides an example of an audit of

a doorstep collection program. Similar tools can be used to audit *godams* across Delhi as well as any services that a private contractor may be providing to the city. Data from such audits should be collated and reported publicly to build and maintain public trust.

[Municipality]
Doorstep Collection Audit Sheet

Date: _____ Auditor: _____

Place: _____ Time: _____

1. Was the collector on time?	Yes No
2. Wearing uniform?	Yes No
3. Carrying ID?	Yes No
4. Waste segregated by household?	Yes No
5. Neighborhood bin clean?	Yes No
6. Other observations	

Figure 14: Sample audit template

[Informal Sector Organization]
Quarterly Report

Reporting period: _____ Report date: _____

Number of informal sector workers: _____ Number of households serviced: _____

Number of new workers: _____ Number of new households: _____

Monthly dues collected: _____ Percentage of delinquent households: _____

Number of complaints received: _____ Number of complaints addressed: _____

Most common complaints received: _____

Issues that need to be addressed by the municipality: _____

Figure 13: Sample reporting template

Monitoring Activity 3: Annual progress reporting

The municipality needs to ensure that it is making progress against the goals and metrics developed as part of the planning process. To do this, the municipality should use the periodic reports and results of the audits in addition to gathering and analyzing other required data. At a very minimum, such reporting should occur on an annual basis. The table below provides a sample report of what such an annual progress report might look like.

a challenge to include the wastepickers on the ground. How have other municipalities done this?

Pune

In Pune, the Pune Municipal Corporation has partnered with SWaCH, a co-operative of wastepickers, to for collection of segregated waste from households, shops, offices and commercial establishments in areas under their jurisdiction. Waste is collected through its network of wastepickers members and waste is deposited in municipal containers,

Table 8: Metrics to measure annual progress report

Goal/Metric	Previous Year (Baseline)	Current Year	Current Year
Goal 1. Provide universal doorstep waste collection services			
Metric 1.1 Percentage of households with formalized doorstep collection services	25%	50%	40%
Metric 1.2 Percentage of informal sector collectors formalized	0%	50%	50%
Goal 2. Enable and support recycling			
Metric 2.1 Percentage of total waste recycled	10%	20%	25%
Metric 2.2 Percentage of <i>godam</i> owners formalized	0%	25%	30%
Goal 3. Reduce overall waste burden by implementing centralized and encouraging decentralized composting			
Metric 3.1 Percentage of organic waste at final disposal site	60%	40%	50%
Metric 3.2 Percentage of households composting	0%	10%	20%
Metric 3.3 Number of informal sector composters supporting projects	0	25	20

What does it all cost?

The core of any workable, scalable and replicable model for waste management is its financial foundation. Without some financial and infrastructure support, it has

vehicles or collection points in areas specified by the PMC under the contract. The waste collector or wastepickers in this case, have the right to sell the waste and keep with themselves earnings from the sale.

There are two sources of payment in Pune the households and the Municipality.

Households:

The service is not free for anyone. Everyone has to pay. The charge collected monthly for door step collection of waste by SWaCH and its members are:

Year of Operation	Households (collected per month)	Commercial Establishments, shops, etc. (collected per month)	Households in Slums (collected per month)
I	Rs. 50	Rs. 100	Rs. 30
II	Rs. 55	Rs. 110	Rs. 35
III	Rs. 60	Rs. 120	Rs. 40
IV	Rs. 65	Rs. 130	Rs. 45
V	Rs. 70	Rs. 140	Rs. 50

- i. Rs. 50/- per month per household (annual increase at 5% per annum)
- ii. Rs. 100/- per month for commercial establishments, shops, etc (annual increase at 10% per annum)
- iii. Rs 30/- per household per month in slums areas (annual increase at 5% per annum)

In order to determine user fees, a few criteria have been put in place:

- i. Separate residential units are treated as separate households for the purpose of collecting user fees
- ii. In residential societies, apartment blocks and other aggregations of generators, each individual property unit is chargeable as a household, irrespective of the occupancy status of the property uniting question

- iii. The user fee payable to SWaCH or its members involved in the actual collection of waste is depicted below. The user fee has to be paid on the basis of the depiction below, irrespective if the status of actual commencement of service to a particular user.

In order to make this system more robust, SWaCH is not entitled to refuse collection of waste from any generator willing to pay the user fee for any reason. SWaCH and its network of waste collectors are entitled to collect an extra charge from citizens for the collection of wastes other than solid waste such as electronic waste, domestic hazardous waste, construction and demolition waste, bio-medical waste, garden waste etc.

The Municipality

The PMC is also tasked with providing financial support and has allocated its budget accordingly. A detailed break up of finances according to the latest agreement between SWaCH and the PMC is given below:

Year of Operation	Period of Operation	Date of release of amount	Amount payable	Total amount for the year	Total amount in words
I	1st Jan 2016 – 31st Dec 2016	15 days of execution the agreement	16100000	32200000	Three crore twenty two lakhs only
		June 2006	16100000		
II	1st Jan 2017 – 31st Dec 2017	December 2016	16905000	33810000	Three crore thirty eight lakhs ten thousand only
		June 2017	16905000		
III	1st Jan 2018 – 31st Dec 2018	December 2017	17750250	35500500	Three crore fifty five lakhs five hundred only
		June 2018	17750250		
IV	1st Jan 2019 – 31st Dec 2019	December 2018	18637763	37275525	Three crore seventy two lakh seventy five thousand five hundred and twenty five only
		June 2019	18637763		
V	1st Jan 2020 – 31st Dec 2020	December 2019	19569651	39139301	Three crore ninety one lakhs thirty nine thousand three hundred and one only
		June 2020	19569651		

The payments above amount to a mere lakh a day for ensuring that not merely is waste being collected from the doorstep efficiently, but it is being well monitored and data is being kept and reported.

This ensures the municipality can outsource quality and be assured of it, instead of expecting the supervision and management to be paid for by collection fees, which is always too little for this. An additional charge would be levied for doorstep collection. By paying this amount to SWaCH, the PMC has ensured that open dumping is reduced, doorstep collection is provided to most residents, and that there is quality control, while including the poorest of the poor in the solution. The cost of not doing this would be higher.

Infrastructure

The costs for push carts, vehicles, uniforms, gloves, maintenance of equipment, office spaces as well as social welfare benefit are not included in the finances above and are to be borne separately by the PMC. The PMC is also entitled to provide office and desk spaces for SWaCH administration within each ward to facilitate administration by SWaCH and its members. PMC and SWaCH have also identified and allocated space and land for establishment of sorting sheds for recyclable waste based on the geography, population and size of the area in question. Here, the PMC is to bear all expenses and costs of construction and infrastructure, to be handed over to SWaCH for operation. Maintenance and renovation costs are also to be borne by the PMC.

Delhi

New Delhi Railway Station

The Northern Railways (NR) and Chintan work with the wastepicker's association, Safai Sena, in a partnership to manage waste at the New Delhi Railway station, along with three other railway stations - Old Delhi, Hazrat Nizamuddin and Anand Vihar – to handle the waste from trains and platform bins.

Infrastructure

The land for the purpose of the MRF as well as composting has been allocated by the Northern Railways. Chintan pays for the electricity consumed, as the railways have installed a meter at the site. The MRF was build by funds raised by Chintan.

Financial

The model currently works without any financial transactions between the NR and Safai Sena. The NR has provided the spaces for segregation, sorting and composting Safai Sena. In a typical model, vendors pay the Railways for the waste, but in this particular case it is a neutral payment model in order to make it successful in terms of quality control. The NR has also provided office spaces for the wastepickers to carry out administration and other tasks. A similar model can be replicated in larger stations as well as long as the wastepickers are able to earn adequately from the sale of waste generated.

New Delhi Municipal Council (NDMC)

New Delhi Municipal Council (NDMC) is the municipal council of the city of New Delhi, India, and the area under its administration is referred to as the NDMC area.

Infrastructure

The NDMC along with Chintan have initiated a project on urban innovation and infrastructure, to create an inclusive model of waste handling. Five (5) existing garbage stations have been used by trained and formalized wastepickers to collect and handle both dry waste and e-waste. Each garbage station is run by a set of trained waste handlers under the supervision of Chintan, who are responsible for their selection, training and functioning. This enables them to collect waste and e-waste from the neighbouring areas, segregate it optimally and sell it at the best prices daily. NDMC has also allocated space for an MRF to Chintan. NDMC has also worked with Chintan for e-waste collection.

Financial

The NDMC gave Chintan Rs. 3 lakhs for the training of wastepickers and giving them I-Cards and tri-cycles etc. for a pilot project. In subsequent areas, as doorstep collection expanded, the NDMC did not give financial assistance, but provided tricycles to wastepickers to aid in collection, segregation and transport of waste as well as space nearby for segregation. NDMC linked Chintan with the residents of most of the NDMC colonies, and helped them provide doorstep collection. A user fee of between Rs. 40 and 75 is charged from households depending on the type and quantity of waste generated, which the NDMC does not take any share of. The waste is also kept by the wastepickers: the amount of waste collected and sold by wastepickers under this project translates to appx. Rs. 12000 per month per wastepicker, as this is primarily an elite area. Some of the collection fees is used for supervision and some distributed amongst wastepickers.

VIII. Way Forward: What we Need

Delhi's various municipalities are working under enormous pressures, constraints and in a city that has crossed its carrying capacity. They alone cannot clean up Delhi. We propose that waste-pickers and waste workers are their key allies in effectively solving this crisis. Working with them offers both Delhi and India economic and environmental benefits, as well as an opportunity to find win-win solutions for cleaner cities. Working with waste-pickers implies working with organizations of waste-pickers or those working with them. Some key tools to ensure inclusion of waste-pickers and other waste workers are:

I. Recognition

Strengthen doorstep waste collection by waste-pickers: About 87% of Delhi is receiving doorstep collection already, including informally by waste-pickers. In order to clean up the city, this vital chain must be identified and trained to upgrade their services including becoming extension workers for segregation. In order for their expertise and skills to be optimally leveraged, they must be:

- Registered

- Given I-Cards (see below)
- Trained in first aid, occupational health and safety, teaching segregation to generators, composting and handling bio-methanation.
- Allowed to keep the recyclable waste they collect since their income comes from the sale of recyclable materials primarily.
- Allowed to keep the service fees paid by waste generators

The same should be applicable to those handling waste from bulk generators.

A registered organization working with waste-pickers or organization of waste-pickers must be treated as an ideal contractor for door-to-door collection.

Issue occupational identity cards: Waste-pickers must be given I-cards to enable them to be treated as legitimate actors in solid waste. It may be noted that these I cards do not mandate any employer-employee relationship or go beyond the relevant rules. Many cities listed in the previous section have already issued these to waste-pickers in their constituency. I-cards should be given to all those who come under the

legal definition of waste-pickers. It may be noted that the SDMC, EDMC and North Delhi Municipal Corporation have till now issued I-cards to less than 3000 waste-pickers out of the minimum 40,000 working in their area.

I-cards must be issued to remaining waste-pickers within three months.

Provide Social Security: Wastepickers must be provided ration cards, pension, Aadhar cards, accident, life and health insurance and other social security schemes available for them even if they don't have valid address proof. This is so because many waste-pickers live in unrecognized slums, and are unable to furnish adequate address proof. To receive these benefits, waste pickers also need bank accounts. They must therefore be provided with bank accounts under Jan Dhan Yojna, along with ATM cards for easy withdrawal.

All these services must be provided within 6 months by setting up camps for bank accounts, Aadhar, pension etc. in the areas where the waste-pickers predominantly live. Support can be taken from waste picker organisations to ensure maximum enrollment of waste pickers in this scheme.

All wastepickers must be given a BPL Card by default for them to uplift their lives.

Recognition of waste dealers: As of today, the waste dealer is not a pretty sight, and is often disliked by municipalities. Yet, they offer an important service and must be upgraded. However, there are approximately 6000 dealers in Delhi at present. They channelize almost 4000 tons of waste away from landfills into recycling daily. Their skills and working conditions must be upgraded in order to ensure that the waste they are currently handling can be recycled

in tandem with the changing landscape of Delhi. They require the following:

- Space for waste handling to at least 17 waste dealers per ward to be allocated by the municipalities. This data is based on an unpublished July 2018 survey of 100 wards by Chintan.
- Master plan must include 850 sq. ft. space for dealers at ward level.
- A set of norms for each shop including inventorization, receipts and financial processes and occupational health should be created
- Mandatory training on implementing these norms should be provided to shop owners and staff
- A sub-group to monitor their implementation must be created by the municipality
- An annual no-objection certificate should be issued to those who comply by these norms for 3 months satisfactorily

Recognition of waste recyclers: In a survey on the informal recycling sector conducted for the Delhi Pollution Control Committee (DPCC), Chintan found a total of informal 5,695 recycling units with 19,451 workers. Sustaining this economy that provides employment to such a large section of the urban population, and handles several hundred tons of waste every day requires that recyclable materials continue to be channelized into this system. For this, they should be provided state support to upgrade as follows:

- Workshops on legal compliance and up to 6 months of support by DPCC to meet the norms in Delhi
- All the units should be trained on safety and occupational health

- Annual meet to understand challenges and address them between recyclers and DPCC
- Leading engineering colleges like IIT Delhi, Delhi School of Engineering, IIT Roorkee should be asked to identify low cost upgraded technologies or retrofitting as required for key waste materials such as plastics and ferrous and non-ferrous metals in order to eliminate pollution.

II. Access to Waste

Access to doorstep collection of waste:

Only organized waste-pickers must be contracted to collect waste from doorsteps. All other aspects, such as transportation etc. may be contracted out. This may be done as follows:

- All municipalities must empanel as many organizations that work with waste-pickers in their jurisdiction, with the conditions that they keep the municipality informed of their work via quarterly reports and work in consultation with the municipality. Their work will be restricted to training waste-pickers and other waste recyclers, training waste generators for segregation, organizing or upgrading doorstep collection, collection of waste from any waste generator and hyper-segregating it, ensuring recyclables go to authorized recyclers and composting wet waste. It will not include transportation of waste except residual waste with permission of the municipality.
- All doorstep waste collection should be allocated to waste-pickers or their organizations only.
- All recyclable dry waste should be kept by the waste-pickers or their organization.

- No tippers for waste collection should be allowed as these directly displace waste-pickers and dis-incentivize source segregation.
- The door-to-door collectors should be provided space for segregation and storing in the Material Recovery Facilities (MRF).
- All railway stations should follow New Delhi Railway Station model for solid waste management whereby dry waste is handled by waste pickers and wet waste is composted either by them or by a third party.

Allotting space for waste: Delhi's Master Plan and zonal plans must identify space at multiple levels for efficient waste handling as follows:

Colony Level

- Each colony should have a demarcated space for segregation of waste by waste-pickers (500 sq. ft area per 250 households needed for both dry and wet waste handling)
- Waste workers who are not in the colony must be given 60 sq.ft. of land for segregation in garbage station (*Dhalao Ghar*) with space earmarked for this and designed for their safety.

Ward Level

Each ward should have a Material Recovery Facility (MRF) which provides space for:

- 70,000 sq. ft of space for segregation and storage of dry waste
- 108000 Sq. ft. of land to compost wet waste
- 900 sq. ft. of space for hand washing

- Space should also be earmarked for 17 waste dealers per ward at the rate of 850 sq. ft. per dealer to handle dry recyclable waste.
- Recycling units must be identified, and minimum 3000 sq. ft. of space must be provided to each of these in different wards of Delhi

Waste pickers who collect waste from the landfill must be provided space for segregation of dry waste must be provided at landfill sites as per need.

Financing their work:

- Waste-picker organizations should be allowed to collect user/service fee for providing doorstep collection services. This fee amount should not be set by municipality as these are often seen to be lower than that being paid currently.
- Residents Welfare Associations, shopping malls, hotel, institutions etc. working with waste-pickers for waste handling must be exempt from any additional taxation required by any municipality, provided they can present an MoU signed with waste picker organisation.
- Municipalities must set a rate to be paid by bulk generators to waste-pickers for waste handling.

III. Health

Waste workers must be offered following health services and benefits to ensure that they are not only able to work more effectively, but also so that they enjoy a good standard of living:

- Waste-pickers must be given training in handling minor health issues to prevent these from flaring up.

- Every *Mohalla* Clinic and government dispensary must include staff trained specifically to understand illnesses caused by waste work as well as to compassionately offer medical care to the sector.
- Special camps must be organized in slums where waste-pickers (recognised or unrecognised) undergo the following- de-worming, anti-tetanus, TB testing and treatment and allergies. Additional camps may be held for women in these communities. For medium or long term treatment, they must be referred to the local hospital.
- Practical safety equipment such as dual gloves (monthly), thick soled slippers for summers and shoes for winter (annual), fluorescent strips for night (annual), and zero powered eye glasses (annual) must be issued to all identified waste workers. Training must be given in their use. Broken or torn equipment must be returned by waste workers in order to receive new pieces.
- All identified waste recyclers should receive accident, life and health insurance annually.
- Technical training: Waste-pickers should be given training on occupational health hazards, first aid and handling dog bites, hand washing and hygiene.

IV. Monitoring

A monitoring committee should be formed comprising people from municipalities, civil society and NGOs, Department of Environment and Department of Urban Affairs to monitor progress on integration of waste pickers. They should submit a report on the progress every six months. A

plan should be made along with milestones to monitor. The Inclusion Manual for Integration of Informal Recycling Sector by Chintan may be used for this purpose.

V. Enable and assist municipalities

Municipalities are working under extra ordinarily challenging conditions, cleaning a city that has far exceeded its carrying capacity. To enable them to fulfill these requirements it is vital that they:

- Appoint an additional staff member in each municipality for the only task of

inclusion of waste pickers and other informal sector waste workers

- Release additional funds earmarked for waste-pickers
- Train municipal staff to undertake tasks for integration of informal workers
- Set up a lean nodal body for inter-departmental coordination
- Recognize and reward the most inclusive ward in each municipality

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