

**Designing an Intervention Strategy: A Case on Plastic Pollution in India**  
**Addressing the open dump accumulated garbage problem in a neighbourhood**

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**Problem Statement**

India, with a population of 1.4 billion, generates approximately 9.3 million tonnes of plastic waste per year, securing the top spot as the world's largest polluter. A significant portion of the waste ends up in landfills, open dumps, or is burned. Plastic accounts for 12% of municipal solid waste (MSW). The plastic debris, when present as part of accumulated garbage (open dumps), can become breeding grounds for disease-carrying arthropods with vector-borne diseases such as malaria, dengue, Lyme disease, etc. Additionally, studies have indicated the presence of microplastics in the urban environment as it spreads in the air and leaches into groundwater reservoirs, highlighting the need to address this omnipresent evil.

In major cities of India, there is some form of formal waste collection system that offers door-to-door garbage collection services, but they often fail to serve the neglected or low-income sections of society. Waste pickers (informal sector), in many ways, fill this gap by providing a service that is not offered by local government bodies. These waste pickers help in collecting garbage from neglected communities or open garbage hotspots to a designated garbage dump area, which, unfortunately, in many cases, are present around populated areas. There is an urgent need to address this issue through the active involvement of Resident Welfare Associations (RWAs) and the Waste Management Department to facilitate the removal of accumulated garbage into designated garbage handling units away from the population.

***Neighborhood Selected for this Case Study:***

Neighbourhood	JJ Colony, Madanpur Khadar
District	South East District, Delhi
Estimated Population (2011 Census)	25,000
Socio-Economic Condition	Predominantly Low-Income Families (Such as Drivers, unskilled labourers, vendors, etc)
Waste Collection	Irregular Municipal Waste Collection Services

**Program Objectives:**

To completely solve the issue of accumulated garbage in the neighbourhood through multi-stakeholder involvement and systematic improvement. The program objectives aim to address the persistent issue of garbage accumulation in a sustainable manner. The strategy involves mobilizing the community, formal and informal systems in tandem to actively contribute to the waste management solution.

**1. Community Participation:**

Active involvement of residents is crucial for achieving long-term results. This will include:

- **Awareness Campaigns:**  
Organizing educational drives to inform the public about proper disposal when dumping outside their homes
- **Monetary Help:**  
Earmark funds for one month of free garbage collection for RWA residents if intervention is successful after active community participation of 12 months.

- **Vigilance and Community Monitoring:**  
Resident representatives to act as waste vigilance volunteers, documenting open garbage hotspots weekly through photographs and reporting them to the municipality for timely action and monitoring.

## **2. Municipal Corporation Garbage Collection:**

- **Employment of waste pickers (informal sector):**  
Integrating waste pickers into the municipal waste management system by providing with stable income and necessary allowances/perks, which will lead to greater accountability and efficient collection.
- **Training of existing formal and informal sector staff:**  
Conducting workshops and capacity building programs to improve operational practices, promoting hygiene and safety, and ensuring efficient collection, segregation and disposal of waste.

## **3. Monitoring Progress and Behaviour Change:**

- **Awareness training/Group Discussion:**  
Organizing awareness trainings and group discussions to understand how the residents see the accumulated garbage issue before the intervention and during the intervention, to modify how the program will evolve over the 12 months.
- **Behavioural Change:**  
Measure the behavioural change in residents pre- and post-intervention in terms of how they manage the disposal of garbage at the individual and community level.

RESEARCH DESIGN FRAMEWORK

MONITORING

Research Questions	Objectives	Variables		Indicators	
		Data Sources (Means of Verification)	Frequency of Data Collection	Methods	Analysis
What is the situation of accumulated garbage in the neighbourhood, and the level of awareness regarding plastic pollution among the community members at the pre-intervention stage?	<b>Output:</b> Based on the survey design, if a designated number of survey exercises happen or not?	<ul style="list-style-type: none"><li>Visible Hotspots</li><li>Community Members</li></ul>	<b>Specific Intervals</b> – Twice a week for 5 weeks	<b>Data Collection</b> <ul style="list-style-type: none"><li>Images of visible hotspots taken (in numbers)</li><li>Pre-Intervention Surveys (as % of community members who are part of this survey)</li></ul>	<b>Data Analysis Tool:</b> Excel/Python  <b>Data Analysis Techniques:</b> Correlation, Visualization, Statistical Methods  <b>Responsible Parties:</b>  <i>I. Representatives from Municipal Corporation</i> <ul style="list-style-type: none"><li>Project Manager: Organise the preliminary surveys</li><li>Interviewer/Survey Team: Conduct GDs/PIs, etc.</li><li>Research/Data Analyst – Waste Mgmt Domain (Municipal corporation)</li></ul> <i>II. Representatives from Third Party</i> <ul style="list-style-type: none"><li>External Evaluator: Designated staff from a third party</li><li>Psychologist: Understand the behavioural aspect of the community members</li></ul> Note: The survey will be undertaken by the interview team and the psychologist to understand the status quo of the situation.  <b>Reporting Format:</b> Recorded using CAPI and output will be audio/text version links on shared Google Sheet

					<p>between Municipal corporation and external evaluator</p> <p><b>Reporting Frequency:</b> Once a week</p>
<p>Are awareness workshops and trainings implemented according to the planned schedule, and what is the attendance level among members?</p>	<p><b>Output:</b> Whether 6 awareness sessions are conducted or not?</p> <p><b>Outcome:</b> Are members aware about methods to dispose of waste outside their homes?</p> <p>Awareness about how to execute waste vigilance exercise</p>	<ul style="list-style-type: none"> <li>• Visible Hotspots</li> <li>• Community Members</li> </ul>	<p><b>Specific Intervals</b> – twice a month for 3 months</p>	<p><b>Data Collection</b> Images of visible hotspots taken (in numbers)</p> <p>Attendance rate (%) of community members in each session</p> <p>Attendance photo documentation</p> <p>% of members participated in a survey about waste management practices and vigilance exercise</p>	<p><b>Data Analysis Tool:</b> Excel/Python</p> <p><b>Data Analysis Techniques:</b></p> <ul style="list-style-type: none"> <li>• Use of AI to detect the amount of garbage present after completion of every awareness workshop and training session</li> <li>• Attendance trends over 3 months,</li> <li>• Survey analysis</li> </ul> <p><b>Responsible Parties:</b></p> <p><i><b>I. Representatives from Municipal Corporation</b></i></p> <ul style="list-style-type: none"> <li>• Project Manager: Organise the awareness workshops</li> <li>• School Teachers/Counselors: Hired to conduct the awareness and training session.</li> <li>• Research/Data Analyst (Waste Mgmt Domain): Use AI to analyze the quantity of accumulated garbage after each awareness session</li> </ul> <p><i><b>II. Representatives from Third Party</b></i></p> <ul style="list-style-type: none"> <li>• External Evaluator: Surprise visit to check how the trainings are being conducted.</li> </ul>

					<p><b>Reporting Format:</b> Workshop summary report to the municipal corporation and external evaluator</p> <p><b>Reporting Frequency:</b> Twice a month to the municipal corporation and once to the external evaluator.</p>
How consistent is the weekly reporting by resident waste vigilance volunteers in addressing the open garbage hotspots	<p><b>Output:</b> If images are getting in once every week with proper designated hotspot number</p>	<ul style="list-style-type: none"> <li>Visible Hotspots</li> <li>Community Members</li> </ul>	<p><b>Specific Intervals</b> – Twice a week for 5 weeks</p>	<p><b>Data Collection</b> Images of visible hotspots taken (in numbers)</p>	<p><b>Data Analysis Tool:</b> Excel/Python</p> <p><b>Data Analysis Techniques:</b> Use of AI to detect the quantity of garbage every week to perform trend analysis.</p> <p><b>Responsible Parties:</b></p> <p><i><b>I. Representatives from the community</b></i></p> <ul style="list-style-type: none"> <li>Community Member: Selected randomly from the community each week to serve as a waste vigilance volunteer will send images clicked between 5 PM to 6 PM to the municipal corporation WhatsApp group</li> </ul> <p><i><b>II. Representatives from Municipal Corporation</b></i></p> <p>Project Manager: Responsible for collating and logging them properly (Use MIS if required)</p> <p><b>Reporting Format:</b> The images taken by the waste vigilator will be shared to the municipal corporation whatsapp group with garbage hotspot identified with a designated serial number and date (JPEG Format)</p> <p><b>Reporting Frequency:</b> Once a week</p>

Are waste disposal bins and infrastructure installed and functional	<p><b>Output:</b> If disposal bins are being used instead of littering after installation?</p> <p><b>Outcome:</b> Behavioural change among community members regarding littering</p>	<ul style="list-style-type: none"> <li>• Visible Hotspots</li> <li>• Community Members</li> <li>• Garbage Disposal Bins</li> </ul>	<p><b>Specific Intervals –</b> Once in a month</p>	<p><b>Data Collection</b></p> <ul style="list-style-type: none"> <li>• Images of visible hotspots taken (in numbers)</li> <li>• Images of designated garbage bins (in numbers)</li> </ul>	<p><b>Responsible Parties:</b></p> <p><i><b>I. Representatives from Municipal Corporation</b></i></p> <ul style="list-style-type: none"> <li>• Dedicated staff from Municipal Corporation</li> </ul> <p><i><b>II. Representatives from Third Party</b></i></p> <ul style="list-style-type: none"> <li>• External Evaluator: Surprise visit to check the overall condition of littering and garbage bins</li> </ul> <p><b>Reporting Format:</b> Images to be shared by the dedicated staff with the project manager in with designated serial numbers and date (JPEG Format)</p> <p><b>Reporting Frequency:</b> Once a month</p>
Is there a need for additional awareness training based on observed community behaviour post initial workshops?	<p><b>Output:</b> Based on observations and post-workshop engagement, determine if refresher sessions are required and if they are done?</p>	<ul style="list-style-type: none"> <li>• Community Members</li> <li>• Vital Hotspots</li> </ul>	<p><b>Specific Intervals:</b></p> <p>Once after initial 3 months (or more if required)</p>	<p><b>Data Collection:</b></p> <ul style="list-style-type: none"> <li>• Images of garbage bins and garbage hotspots</li> <li>• Midline Survey Participation Rate</li> </ul>	<p><b>Data Analysis Tool:</b> Excel/Python</p> <p><b>Data Analysis Techniques:</b> Statistical comparison with baseline data and trend evaluation</p> <p><b>Responsible Parties:</b></p> <p>Representatives from Municipal Corporation:</p> <ul style="list-style-type: none"> <li>• Project Manager: Organize the refresher workshop and training</li> <li>• Interviewer/Survey Team: Conduct the survey</li> </ul> <p><b>Reporting Format:</b> Recorded using CAPI and output will be audio/text version links</p>

					<p>on shared Google Sheet between Municipal corporation and external evaluator</p> <p>Reporting Frequency: One-time mid-program (or more if required)</p>
Have informal waste pickers been formally engaged and supported?	<p><b>Output:</b> Are informal waste pickers working as full-time/outsourcing agents for the municipal corporation?</p> <p>Are official trainings given to waste pickers as scheduled?</p> <p><b>Outcome:</b> Improved quality of life with health benefits for the informal sector</p>	<ul style="list-style-type: none"> <li>No. of waste pickers working</li> </ul>	<p><b>Specific Intervals</b></p> <p>Attendance Daily</p> <p>Payroll – Once a month</p>	<p><b>Data Collection:</b></p> <ul style="list-style-type: none"> <li>HR records/Payroll sheets/Waste Dept</li> <li>% of waste pickers working out of total waste picker manpower (Attendance Logs)</li> </ul>	<p><b>Responsible Parties:</b></p> <p><b>I. Representatives from Municipal Corporation</b></p> <ul style="list-style-type: none"> <li>Project Manager: Act as liaison between all stakeholders</li> <li>Dedicated staff from Municipal Corporation: Overhead the work done by waste pickers</li> <li>Human Resources Dept: Maintain and process the salaries (with code of conduct)</li> </ul> <p><b>II. Representatives from Third Party</b></p> <ul style="list-style-type: none"> <li>Labour Law Advocate</li> </ul> <p><b>Reporting Format:</b> Attendance, Payroll, Training, MIS, other documents to be drafted and sent to the advocate for transparency</p> <p><b>Reporting Frequency:</b> Once a month</p>

## EVALUATION

Research Questions	Objectives	Variables		Indicators	
		Data Sources (Means of Verification)	Frequency of Data Collection	Methods	Analysis
Has awareness among residents improved post-intervention and if volume of garbage has	<p><b>Output:</b> Based on the survey design, if a designated number of survey</p>	<ul style="list-style-type: none"> <li>Visible Hotspots</li> <li>Community Members</li> </ul>	<p><b>Specific Intervals –</b></p> <p>Twice a week for 5 weeks</p>	<p><b>Data Collection</b></p> <ul style="list-style-type: none"> <li>Images of visible hotspots taken (in numbers)</li> <li>Post-Intervention</li> </ul>	<p><b>Data Analysis Tool:</b> Excel/Python</p> <p><b>Data Analysis Techniques:</b> Correlation, Visualization, Statistical Methods</p>

reduced/eliminated entirely?	<p>exercises happen or not?</p> <p><b>Outcome:</b> Impact of intervention at the community level</p>			Surveys (as % of community members who are part of this survey)	<p>(comparing the pre- and post-intervention)</p> <p><b>Responsible Parties:</b></p> <p><i><b>I. Representatives from Municipal Corporation</b></i></p> <ul style="list-style-type: none"> <li>Project Manager: Organise the Endline surveys</li> <li>Interviewer/Survey Team: Conduct GDs/PIs, etc.</li> <li>Research/Data Analyst – Waste Mgmt Domain (Municipal corporation)</li> </ul> <p><i><b>II. Representatives from Third Party</b></i></p> <ul style="list-style-type: none"> <li>External Evaluator – Designated staff from a third-party agency</li> <li>Psychologist: Understand the behavioural aspect of the community members</li> </ul> <p>Note: <i>The survey will be undertaken by the interview team and the psychologist to understand change in behaviour of the community members towards garbage issue.</i></p> <p><b>Reporting Format:</b> Recorded using CAPI and output will be audio/text version links on shared Google Sheet between Municipal corporation and external evaluator</p> <p><b>Reporting Frequency:</b> One time at the end of the program</p>
Have vector-borne diseases been reduced compared to non-intervened	<b>Output:</b> Number of designated	<ul style="list-style-type: none"> <li>Disease case counts – Malaria.</li> </ul>	<b>Specific Intervals:</b>	<b>Data Collection:</b>	<b>Data Analysis Tool:</b> Excel/Python



neighbourhoods of similar socio-economic backgrounds	<p>interviews with local doctors</p> <p><b>Outcome:</b> Measure the impact of intervention on disease prevention</p>	Dengue, Lyme Disease, etc	No specific intervals	<ul style="list-style-type: none"> <li>Healthcare centre/Clinic reports</li> <li>% Drop in reported cases (intervention vs. non-intervention neighbourhoods)</li> <li>Interviews with local doctors</li> </ul>	<p><b>Data Analysis Techniques:</b> Correlation, Visualization, Statistical Methods (comparing the intervention and non-intervention neighbourhoods)</p> <p><b>Responsible Parties:</b></p> <p><i><b>I. Representatives from Municipal Corporation</b></i></p> <ul style="list-style-type: none"> <li>Project Manager: Organise the entire exercise</li> <li>Health Expert Interviewer: Conduct interviews with local doctors</li> <li>Research/Data Analyst – (Medical Domain): Analyse data based on all the data collected</li> </ul> <p><i><b>II. Representatives from Third Party</b></i></p> <ul style="list-style-type: none"> <li>External Evaluator – Designated staff from a third-party agency</li> <li>Local Doctors: Will act as interviewees before the health expert</li> </ul> <p>Note: The survey will be undertaken by the interview team and the doctor to quantify the change in reported cases of vector-borne diseases</p> <p><b>Reporting Format:</b> Recorded using CAPI and output will be audio/text version links on shared Google Sheet between Municipal corporation and external evaluator</p> <p><b>Reporting Frequency:</b> One time at the end of the program</p>
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**Detailed Funding Requirements Table**

Component	Area	Funding Required For
1. Surveys & Data Collection	Pre-Intervention Surveys	Surveyors, psychologists, CAPI devices/software, data storage, field logistics
	Post-Intervention Surveys	Interview teams, behavioural psychologists, mobile data collection tools, logistics
	Awareness Survey Spot Checks	Repeat surveys before/after awareness sessions, community interaction tools
	Disease Impact Assessment	Interview costs for local doctors, health expert interviewers and clinic/health center data access
2. Staff & Human Resources	Project Coordination	Project Managers' salaries
	Data Collection & Interviews	Survey teams, interviewers for GDs and Pls
	Behavioural Assessment	Psychologists for both pre- and post-intervention analysis
	Data Analysis	Analysts with domain expertise in the waste and health sectors
	Awareness Trainers	School teachers/counsellors to conduct training and awareness sessions
	Third-Party Evaluation	External evaluator staff for surprise visits and independent assessments
	Health Field Team	Health expert interviewers for disease-related evaluations
	Legal Compliance	Labour law advocate for oversight of waste picker engagement
	Field Execution	Dedicated municipal staff for hotspot logging and monitoring
3. Technology & Tools	Data Collection Tools	CAPI devices, licenses or subscriptions
	Analysis & Visualization Tools	Excel/Python setups or any software subscriptions
	Cloud Collaboration	Google Workspace (if premium access/control is required)
	Garbage Image Recognition	AI tools or platforms to analyze garbage quantity trends via images
4. Waste Infrastructure	Garbage Bin Installation	Procurement of bins with plastic/non-plastic compartments
	Maintenance of Infrastructure	Monitoring and upkeep of installed bins
5. Training & Awareness	Awareness Workshops	Venue booking, logistics, trainer honorariums, session materials
	Educational Material	Printed, digital, or AV materials for community distribution

	Vigilance Program	Training residents to report garbage issues regularly
6. Waste Picker Engagement	Workforce Inclusion	Formalizing roles of informal waste pickers, payroll setup
	Training & Development	Orientation programs, skill enhancement workshops for waste pickers
	Safety & Equipment	PPE kits (gloves, masks, boots), ID cards, uniforms
	Welfare & Support	Health checkups, incentives, health insurance schemes
7. Reporting & Documentation	Reporting Channels	Internet/data for sharing reports
	Session Documentation	Summary reports of each workshop, image tagging system
	Audit Trail	Files, MIS, legal documentation (prepared for advocate and evaluators)
8. Health Monitoring	Health Data Access	Coordination with clinics, partnerships with health departments
	Doctor Consultations	Incentives for participating local doctors
9. Miscellaneous	Miscellaneous	Extra funds allocated for miscellaneous/or contingencies

# CERTIFICATE OF COMPLETION



THIS IS TO CERTIFY THAT

**Tuhin Das**

has successfully completed the **Monitoring, Evaluation and Research Upskilling Program**, conducted by Qualitative Research Network and Agzistence Intelligence Pvt Ltd from 21<sup>st</sup> February to 12<sup>th</sup> April, 2025.



*Bijayashree Satpathy*

**Dr Bijayashree Satpathy**  
Founder, Agzistence

*Sohini Basu*

**Dr Sohini Basu**  
Founder, QRN