EPA

Best Practices for Solid Waste Management
A Guide for Decision-Makers in Developing Countries

Equity in Solid Waste Management

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Best Practices for Solid Waste Management:
A Guide for Decision-Makers in Developing Countries

Equity in Solid Waste Management

United States Environmental Protection Agency
Office of Resource Conservation and Recovery

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Acronyms and Abbreviations

IAWP	International Alliance of Waste Pickers
MOPA	Monitoria Participativa Maputo
NIMBY	Not-In-My-Backyard
U.S. EPA	United States Environmental Protection Agency
USAID	United States Agency for International Development
UNESCO	United Nations Educational, Scientific, and Cultural Organization

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EQUITY IN SOLID WASTE MANAGEMENT

Key Resources

Best Practices for Solid Waste Management: A Guide for Decision-Makers in Developing Countries (U.S. EPA 2020)

A Seat at the Table – The Role of the Informal Recycling Sector in Plastic Pollution Reduction, and Recommended Policy Changes (GRID-Arendal 2022)

Bridging the Gap in Solid Waste Management, Governance Requirements for Results (World Bank 2022)

Section 1

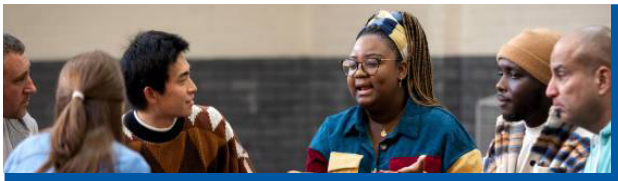
Introduction

The negative impacts of improper solid waste management are experienced unequally across communities and populations. When developing solid waste management strategies, it is critical to approach decision-making, stakeholder engagement, planning, and implementation with a focus on equity and environmental justice.

Equity in Solid Waste Management is part of the United States Environmental Protection Agency's **Best Practices for Solid Waste Management in Developing Countries Toolkit**. The Toolkit serves as a free resource for decision-makers implementing solid waste management programs. The Toolkit includes e-learning modules, communication materials, webinar materials, videos, and the **Best Practices Guide for Solid Waste Management in Developing Countries** (the Guide). The **Guide** describes key aspects of solid waste management and identifies best practices that can be implemented in medium and large cities in developing countries. **Equity in Solid Waste Management** is a companion chapter to the **Guide**.

This companion chapter defines equity in the context of solid waste management, discusses the challenges that contribute to inequitable solid waste management and the resulting impacts, and provides an overview of best practices for cities to address inequities while improving solid waste management.

This companion chapter is not intended to be a step-by-step implementation manual, but it highlights resources that local authorities and decision-makers can refer to for more detailed technical guidance. Approaches that may be successful in one city or region may not function everywhere, so the chapter presents decision-makers with the information and resources to improve equity in solid waste management within the context of their given situation.



KEY POINT

Defining Equity and Environmental Justice

Equity can be defined as "the consistent and systematic fair, just, and impartial treatment of all individuals, including individuals who belong to underserved communities that have been denied such treatment, such as Black, Latino, and Indigenous and Native American persons, Asian Americans and Pacific Islanders and other persons of color; members of religious minorities; lesbian, gay, bisexual, transgender, and queer (LGBTQ+) persons; persons with disabilities; persons who live in rural areas; and persons otherwise adversely affected by persistent poverty or inequality" (The White House 2021) .

The United States Environmental Protection Agency recognizes that to meet its mission to protect human health and the environment, the Agency's pursuit of equity must include environmental justice—the fair treatment and involvement of all people regardless of race, color, national origin, or income on the development, implementation and enforcement of environmental laws, regulations, and policies. The United States Environmental Protection Agency's pursuit of equity can help ensure vulnerable or marginalized populations receive equal access to protection from health and environmental hazards and are involved in decision-making processes.

Section 2

Why Focus on Equity?

An equitable solid waste management system promotes the fair treatment and involvement of all stakeholders—regardless of gender, race, ethnicity, caste, religion, or income—to reduce the disproportionate impacts of improperly managed waste. This involves ensuring that all members of a community have access to safe and effective waste management practices and are involved in decision-making processes related to waste management. For example, in low-income countries, only 39 percent of residents—mostly concentrated in high-income, urban areas—receive waste collection services (Kaza et al. 2018). As a result, around 93 percent of uncollected waste is burned in the open or dumped in roads, open land, or waterways, resulting in serious public health and environmental issues (Kaza et al. 2018).

Focusing on equity in solid waste management can protect the environment and mitigate climate change by reducing methane emissions and harmful pollutants from uncollected and mismanaged waste and address climate justice concerns by strengthening the adaptive capacity of vulnerable groups to climate impacts.

It can also improve public health by reducing incidences of waste-related diseases and hazardous exposures; enhance the productivity of the solid waste management system; and boost economic growth through resource recovery and job creation. Most importantly, advancing equity in solid waste management is a key step in dismantling the long-standing systemic inequities deeply embedded in the policies, practices, and norms of institutions and organizations.

Inequities in solid waste management are defined differently in national and international contexts:

- **National and subnational inequities**. Inequities at the national and subnational level may include disadvantaged communities' inadequate access to waste management services, limited or nonexistent provision of occupational health and safety protection to informal waste workers, and non-inclusive solid waste management planning and decision-making processes. The factors that contribute to these inequities may include weak governance, insufficient infrastructure, limited financial resources, failure to recognize the contributions of the informal sector, and lack of representation in decision-making.
- **International inequities**. Inequities at the international level refer to the transfer of waste from high-income to low- and middle-income countries that lack adequate solid waste management capacity and therefore become unjustly overburdened. The Basel Convention is a global agreement aimed at controlling trade of hazardous waste and other types of waste such as electronic waste (e-waste) and plastic waste through a prior informed consent (PIC) process which gives countries, who are members, the ability to refuse import of waste they are not able to manage or do not want.

Cities can advance equity in solid waste management by understanding the inequities that exist at every stage of the solid waste management process and developing policies and programs that address the root causes and systemic effects. Incorporating environmental justice principles into waste management practices helps ensure that waste-related pollution and health hazards (discussed below) do not disproportionately impact marginalized communities.

The following sections discuss the challenges and impacts of inequities in solid waste management and the best practices to address inequities.

Section 3

Challenges

Equity issues in solid waste management can be difficult to address because they are inextricably intertwined with other economic, political, and social issues. Cities can begin to overcome equity issues by understanding the underlying factors that contribute to inequities resulting from improper solid waste management and the treatment of the informal workers involved in solid waste management. These factors may include:

- **Lack of representation in decision-making.** Local communities and indigenous populations are often keenly aware of environmental degradation and can provide decision-makers with valuable, context-specific information. However, they may be excluded from political processes or face engagement barriers, including language differences, financial strain, time constraints, distrust in government authorities, and discriminatory laws and practices. As a result, decision-makers may be unable to craft solutions that address the needs and equity concerns of these groups (USAID 2015).

  Affluent communities are more likely to have a "Not-in-My-Backyard" (NIMBY) viewpoint—and to participate in and influence decision-making. Their socioeconomic status allows them to advocate for policies that may benefit their interests but may not accurately reflect or consider the interests of a community's entire population (e.g., regarding the siting of landfills).

- **Weak or ineffective governance.** Solid waste management rules and policies are often enacted at the national level and implemented at the local level. Weak governance at the national level results in weak policies, which lead to inadequate implementation, compliance, and enforcement at the local level. Local authorities may struggle to implement solid waste management strategies due to limited authority or capacity (World Bank 2021), which may result in an inequitable distribution of services or stakeholder engagement.

- **Limited financial resources, infrastructure, and planning.** Proper solid waste management infrastructure for collection, treatment, and disposal requires substantial financial resources. Cities with budgetary constraints may be unable to invest adequately in solid waste management infrastructure and improvements. Solid waste management costs increase with more advanced technology. In developing countries, basic waste collection and disposal costs over $35 per metric tonne. If cities include more technologically advanced means of solid waste management (e.g., recycling facilities), costs may increase to over $100 per metric tonne. The high cost of facility construction, equipment maintenance, and waste collector labor costs, make cost recovery difficult in low-income areas (Kaza et al. 2018).

  Local governments may also struggle to build and expand services to match the rate of urban population growth that many developing countries are experiencing. The already limited budget for solid waste management is often allocated to more affluent communities. For more information on solid waste collection costs, see the *World Bank's What a Waste 2.0 report* (Kaza et al. 2018).

- **Lack of inclusion and incorporation of the informal sector.** Historically, solid waste management policies rarely consider impacts on marginalized communities, especially women in the informal sector. In general, the informal sector consists of individuals, groups, and small businesses that perform waste services involving

the collection and sale of recyclables, usually through middlemen or intermediaries (Aparcana 2017) . The middlemen who aggregate and sell the recyclables sometimes operate in the informal sector as well. A significant proportion of informal recycling workers are women and children who need a source of income to support their impoverished families, persons with disabilities who are unable to find other occupations, people who are unable to find work because of criminal records, ethnic minorities, immigrants, or elderly people whose pensions are insufficient or nonexistent. Maintaining the informal sector as a separate, unequal part of the solid waste management program disproportionately excludes women and other marginalized groups (Exhibit 1).

- **Low-cost land typically available in socioeconomically disadvantaged areas.** Land near existing waste treatment and disposal facilities is typically more affordable and, therefore, more financially feasible for or accessible to low-income communities. Furthermore, project developers typically site new waste treatment and disposal facilities in low-income areas, where land costs are significantly lower. As a result, low-income areas may experience greater exposure to the environmental and health risks associated with inadequate waste treatment and disposal.
- **Insufficient infrastructure.** Developing countries are experiencing substantial population increases, with low-income individuals migrating to cities in search of economic opportunities. This results in the growth of unplanned or informal settlements (frequently referred to as "slums") that are densely populated by low-income communities. These areas lack sufficient infrastructure for effective solid waste management. For example, lack of transportation access due to informal housing density or poor road networks can limit waste collection. Informal settlements may be responsible for disposing of their own waste without proper infrastructure, which can result in waste being dumped in public spaces and vacant land or burned.

EXHIBIT 1 CASE STUDY

Partnership Between Informal Recyclers and Local Corporations in Pune and Pimpri Chinwad, India

In 1993, informal sector workers in Pune and Pimpri Chinwad, India, formed a trade union to network and advocate for their rights. Pune and Pimpri Chinwad were in the process of updating their solid waste management practices in accordance with new regulations that required waste segregation, door-to-door waste collection, and the elimination of illegal waste dumping (SWaCH n.d.).

The informal sector trade union, Kagad Kach Patra Kasthakari Panchayat, partnered with local corporations in 2005 to launch a pilot program that incorporated the informal sector into the formal solid waste management system. The workers began collecting waste door-to-door, which decreased the operating costs of solid waste collection. The success of the pilot program resulted in the creation of SWaCH, which describes itself as "India's first wholly-owned cooperative of self-employed waste collectors and other urban poor" (SwaCH n.d.). The organization collects waste and electronics, provides composting service, and works to raise awareness about the safe disposal of solid waste such as sanitary pads and diapers.

Today, roughly 80 percent of the trade union's members are women from low-income households and marginalized castes (SWaCH n.d.). The public-private partnership has both improved solid waste management through providing a reliable waste collection service and provided the workers with reliable income and safe working conditions.

For more information, see About SWaCH.

3.1. Impacts of Inequity in Solid Waste Management

Improper solid waste management—including solid waste collection, recycling, treatment, and disposal—can have disproportionate impacts on marginalized communities and groups (Exhibits 2 and 3). Identifying and assessing the impacts of inequities in solid waste management is a key step to developing policies that advance equity. The impacts of inequities may include:

- **Human health impacts.** Informal recyclers often collect recyclable materials from landfills and dumpsites without proper health and safety equipment, putting them at high risk of physical injuries and chronic illnesses from exposure to toxins and other materials (Gutberlet and Uddin 2017). Residents near waste treatment and disposal facilities may be exposed to fires, landslides, leakages of toxic chemicals, and harmful air pollutants that could lead to respiratory illnesses, cancers, and other diseases.

  Waste collection vehicles and heavy equipment used at landfills may increase local communities' exposure to vehicle emissions as well as noise pollution. Furthermore, residents living with high volumes of uncollected waste or near open dump sites—a breeding ground for insects and pests and a source of leachate that can contaminate drinking water—may be at high risk of contracting vector-borne diseases and gastrointestinal illnesses.

- **Local environmental impacts**. Marginalized communities that receive inadequate waste collection services often resort to the burning or dumping of waste by roadsides or open land areas as a waste disposal method. These processes release methane, black carbon, and carbon dioxide—harmful pollutants that contribute to climate change (see the **Solid Waste Management and Climate Change** companion chapter for more information) and air pollution. Water infiltration into waste at open dump sites contributes to the formation of leachate—a liquid that may include toxic chemicals that can contaminate local waterbodies and soil. Poor soil quality can impede plant growth, which may cause lower agricultural yields, increased soil erosion, and decreased biodiversity. Uncollected waste can clog drains and local waterbodies and cause flooding during rainy seasons.

- **Economic impacts**. The growth of improperly managed landfills and dumpsites from infrequent waste collection can decrease surrounding land and property values and impact local businesses, tourism, and economic development. It can also increase the environmental and public health costs incurred by governments. Tourism can also be impacted if air pollution increases due to burning of waste. The failure to integrate informal workers into formal employment can potentially increase unemployment and also fail to take advantage of their experience and expertise. This is especially true as cities transition to increase the coverage of formal waste collection and sanitary and covered landfills, which eliminate opportunities for informal recycling.

- **Social impacts**. Marginalized communities with inadequate access to waste management services and high volumes of uncollected waste may contract waste-related illnesses, endure odors associated with waste, and experience poorer quality of life, including worse physical and mental health. Furthermore, these communities' unsanitary living conditions may result in social stigma. Waste workers from the informal sector may also face social stigma because working with waste is not a desirable and recognized profession. Informal waste workers may be referred to by unfavorable terms, including "scavengers," "rag pickers," and "waste pickers."

Exhibit 2. Waste in a community in Nigeria.

CASE IN POINT

Ethiopia Landfill Disaster

Waste collection sites that are improperly maintained can lead to human health and environmental disasters. In 2017, a garbage landslide at the Koshe landfill in Ethiopia's capital Addis Ababa killed 116 people and buried dozens of homes built around the dump.

For more information, read the UN Habitat's article.

Exhibit 3: Factors Contributing to Inequities and Their Impacts

Collection	
Factors	**Impacts**
• Weak governance • Lack of representation • Limited financial resources • Insufficient infrastructure • Discriminatory laws and practices	**Health** • Marginalized communities with high volumes of uncollected waste are at risk of contracting chronic illnesses caused by toxins and air pollutants released from improperly disposed waste **Environmental** • Uncollected waste that is openly dumped or burned releases methane, black carbon, and carbon dioxide, which contribute to climate change and air pollution • Water infiltration in open dump sites contributes to the formation of leachate that contaminates groundwater and soil **Economic** • Uncollected waste that is openly dumped in unoccupied land can decrease land values and impact local businesses, tourism, and economic development • Uncollected waste that is openly dumped in unoccupied land can increase environmental and public health costs to governments • Informal collectors may be vulnerable to unemployment if cities increase coverage of formal waste collection **Social** • Marginalized communities with high volumes of uncollected waste are socially stigmatized because of their poor and unsanitary living conditions • Informal collectors face social stigma for their work
Recycling	
Factors	**Impacts**
• Weak governance • Limited financial resources • Non-inclusive policies • Low land value • Discriminatory laws and practices	**Health** • Informal recyclers are at risk of physical injuries and chronic illnesses from operating at landfills and dumpsites without health and safety equipment **Economic** • The formal recycling system may not be as productive without the experience and expertise of informal recyclers • Informal recyclers may be vulnerable to unemployment if cities close the open dump sites that informal workers rely on to collect recyclables **Social** • Informal recyclers face social stigma for their work

Treatment	
Factors	**Impacts**
• Weak governance • Lack of representation • Low land value • Discriminatory laws and practices	**Health** • Low-income residents near waste treatment facilities are at risk of exposure to harmful air pollutants and toxins that lead to respiratory or other chronic illnesses • Informal recyclers are at risk of physical injuries and chronic illnesses from operating treatment machinery and tools without health and safety equipment **Economic** • Poor operations and maintenance of waste treatment facilities may lead to the release of air pollutants or leachate that contaminate soil and water of surrounding low-income communities **Environmental** • The potential health and environmental impacts of waste treatment facilities may decrease the land and property values in surrounding areas
Disposal	
Factors	**Impacts**
• Weak governance • Limited financial resources • Low land value • Discriminatory laws and practices	**Health** • Low-income communities near unsanitary landfills and dumpsites without liners or covers are at higher risk of exposure to harmful pollutants and environmental disasters, such as dumpsite landslides and fires • Communities that burn waste, as a disposal option, are at risk of contracting chronic illnesses caused by resulting toxins and air pollutants • Communities located near disposal sites may be subject to increased air pollution as a result of idling collection vehicles and heavy equipment • Odors from unsanitary landfills and dumpsites and noise pollution from collection vehicles and heavy equipment can impact quality of life and mental health **Environmental** • Unsanitary landfills and dumpsites can emit methane and carbon dioxide, which contribute to climate change, or produce leachate that contaminate groundwater or soil **Economic** • Unsanitary landfills and dumpsites can decrease surrounding land values and impact local businesses, tourism, and economic development • Unsanitary landfills and dumpsites increase environmental and public health costs to governments **Social** • Low-income communities surrounding unsanitary landfills and dumpsites are socially stigmatized because of their poor and unsanitary living conditions

Section 4

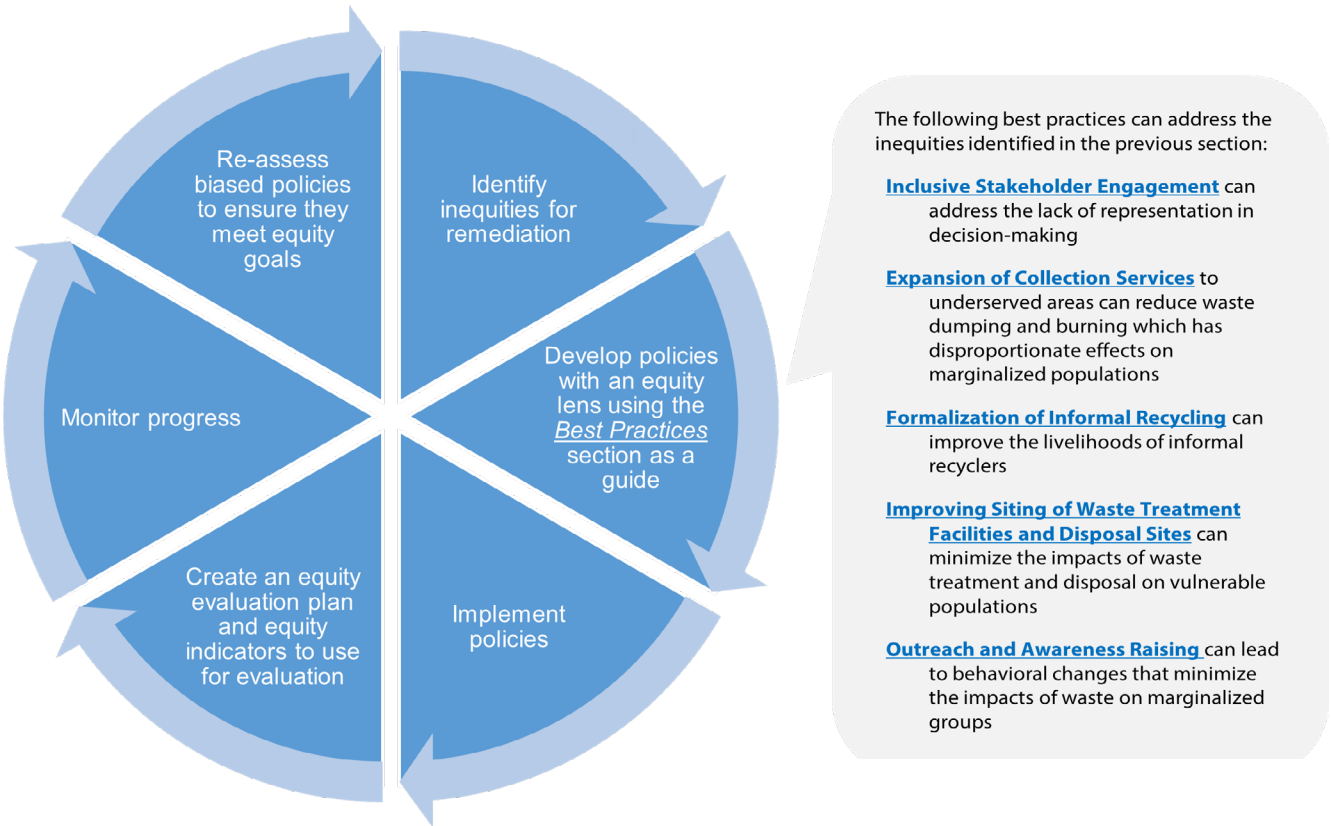
Best Practices

Equity in solid waste management is an evolving issue for cities to continuously examine, assess, and address. Exhibit 4 describes one process that cities can use when addressing inequities in solid waste management planning and implementation. While there is no one-size-fits-all approach, cities can use the information in the preceding sections to inform this process and then use the following best practices as a resource when developing and implementing inclusive solid waste management policies and programs.

Cities can start by using the information in the previous sections to identify any inequities and the factors that may be contributing to these issues. By understanding the inequities and existing challenges, cities can craft and implement targeted solutions to address them. To track progress, cities can create an equity monitoring and evaluation plan in partnership with affected stakeholders and relevant local organizations to ensure policies and programs align with equity goals.

Cities may consider developing and incorporating measurable equity goals and indicators into the monitoring and evaluation plan. Indicators may include the percentage of women in stakeholder meetings or percentage of inhabitants with regular waste collection services. Achieving equity takes time and is an iterative process. Regular evaluations are required to assess implementation and identify modifications to suit local conditions.

Exhibit 4: Illustrative example of a process for advancing equity in solid waste management



4.1 Inclusive Stakeholder Engagement

Incorporating input from marginalized populations early in the project lifecycle is crucial when planning and implementing solid waste management policies. It is best to develop policies with the input of all stakeholders to ensure that the policies benefit all members of a community equitably. Diverse perspectives and feedback from communities that have historically been excluded from solid waste management planning will result in a more comprehensive understanding of the system and inherent structural barriers. Decision-makers could explore how differences in local worldviews and knowledge can contribute to solid waste management strategies, and how solid waste management strategies impact traditional land uses and practices.

Decision-makers can use the following steps as a guide when establishing an inclusive stakeholder engagement strategy:

1. **Identifying stakeholders**. Marginalized groups may face economic, political, social, and cultural barriers that inhibit their ability to interact with government bodies and participate in decision-making processes. The following stakeholders are often overlooked in the solid waste management planning process:

    - ***Women***. Women are a key demographic to target for behavior changes, especially regarding household waste management. Women are often responsible for cleaning, food preparation, and domestic maintenance in their own households and the affluent households where they may work. Additionally, they form the majority of informal sector workers.

    - ***Informal recycling workers***. Informal recycling workers play a huge role in waste collection and recycling in developing countries and could provide valuable input.

    - ***Residents of informal settlements***. As mentioned earlier, rapid urbanization has increased the growth of informal settlements with inadequate services. Informal settlements do not abide by government regulations, and city authorities are not required by law to provide waste management services.

    - ***Indigenous groups***. Indigenous groups may have knowledge and land-use practices passed down through generations. As a result, these groups may have insights on the interactions between local ecological processes and human management systems that remote decision-makers lack.

    - ***Ethnic minorities***. Ethnic minorities may bring unique cultural practices and traditions related to solid waste management that can lead to more innovative and effective solutions.

2. **Ensuring that inclusive stakeholder engagement begins as early as possible**. Cities benefit from inclusive stakeholder engagement at all stages of planning and action. However, stakeholder engagement is especially useful at the early stages of the planning process because this allows stakeholders to influence design and suggest changes. A clear process for collecting stakeholder input periodically throughout the life of the project and presenting it to technical teams for consideration and evaluation will make it easier for decision-makers to collect feedback.

3. **Overcoming engagement barriers in marginalized groups**. To encourage active participation of all identified key stakeholders, decision-makers can consider practical ways to overcome engagement barriers (Exhibit 5), including:

    - ***Identifying the right professionals and individuals to engage marginalized groups*.** It is imperative to incorporate social workers and organizations that have experience working with marginalized groups. This includes assessing whether there are leaders in the target communities that would need to be engaged first before approaching the communities.

    - ***Adapting communication styles***. Spoken language and literacy pose challenges to engagement efforts. Written materials may be inaccessible to individuals who are illiterate or immigrants unfamiliar with the local language, and less appropriate for indigenous communities with a strong oral tradition. Decision-makers may benefit from adapting communication methods to suit different stakeholders. This may involve relying on visuals or working with translators and community leaders to convey messages and learn community perspectives.

- ***Improving accessibility***. When scheduling meetings, it is advisable to be mindful of the travel costs, time commitments, and opportunity costs to marginalized groups for attending. Decision-makers may also want to consider alternative ways to disseminate information to stakeholders (e.g., newsletters or mail) and avoid reliance on online platforms that are inaccessible to those without access to computers or the internet.
- ***Addressing stakeholder aversion***. Marginalized groups may be reluctant to engage with decision-makers due to the lack of trust in authorities or the majority population due to prior conflicts. For example, informal waste workers who have trespassed to collect recyclables from landfills or entered the country illegally may avoid participating for fear of retaliation. Decision-makers can partner with community-based organizations to better understand, build trust, and connect with a target community. Relevant community-based organizations can help inform the strategy for engagement and disseminate information.

4. **Organizing meetings with each marginalized group.** Women, young people, and people with disabilities may face social, political, cultural, and communication barriers that may inhibit them from participating effectively in large group settings. Holding separate, smaller meetings can overcome this barrier. For example, women-only group meetings can enable open participation by all women, especially those who are unable to participate in mixed-gender settings due to cultural reasons (USAID 2015).
5. **Facilitating collaboration between various stakeholder groups.** It is important to connect marginalized groups with each other and with policy or project implementers and other relevant organizations. Engaging with established indigenous stakeholder groups is a best practice to build trust for greater community participation.

EXHIBIT 5 CASE STUDY

Working Towards Zero Waste in San Fernando, Philippines

Waste management in San Fernando is regulated by national law but implemented locally by the city's 35 barangays. The Ecological Solid Waste Management Act of 2000 required segregation of waste at the source, and collection and delivery of waste to facilities for treatment and disposal (GAIA 2019).

Compliance with the legislation was initially poor. To improve household compliance with waste separation and proper disposal, San Fernando launched an extensive education and communication campaign. The campaign encouraged active participation from stakeholders and gave resident households a sense of ownership of the process. The city developed a solid waste management board with municipal and sectoral representatives to manage the waste program. The city also incorporated informal waste workers into the official solid waste management system and accorded voting membership on the solid waste management board to the waste workers' association. This ensured that different stakeholders met regularly.

A decentralized approach was successful in San Fernando primarily because of buy-in from stakeholders. This communication, which included marginalized communities, enabled the waste management program to endure transitions in government. The city's waste diversion increased from 12 percent in 2012 to 76 percent in 2017 because of the program.

For more information, see GAIA's Picking Up The Baton: Political Will Key to Zero Waste

CASE IN POINT

Stakeholder Aversion

Informal waste collectors who had illegally immigrated to South Africa declined to participate in a health survey due to fear that their participation would lead to deportation. It is important to give marginalized groups an inclusive and safe avenue for participation and to accommodate their needs if they are uncomfortable engaging with existing channels for stakeholder participation.

For more information, read the study on waste pickers in South Africa.

6. **Using a participatory planning approach.** A participatory planning approach incorporates the views of all stakeholders throughout the planning and management of projects. Decision-makers can compile findings from surveys, focus-group discussions, or group meetings and use them to inform decisions and reporting back to participating community groups and stakeholders.

7. **Establishing an oversight mechanism.** Strong governance is essential to ensure the stakeholder engagement process continues to be inclusive throughout the project lifecycle. For example, a project contract may require the implementer to track and disclose how many women or minority groups have engaged in the process and how the project has addressed their needs.

4.2 Expansion of Collection Services

Marginalized populations are often the most in need of waste collection services because they bear the brunt of the environmental and health impacts of uncollected waste. Despite this need, they tend to have inadequate access to solid waste collection services. An equitable waste collection system should be affordable and accessible, especially to underserved communities. The system would account for the quantity and characteristics of the waste, and the various geographical, social, and cultural characteristics unique to the local communities to be served. Decision-makers can use the following steps to improve access to collection services:

1. **Determining waste generation rates**. Understanding waste generation rates for all communities is a fundamental prerequisite for planning and designing an equitable and effective waste collection system. Waste from informal settlers is often unaccounted for because informal settlements fall outside of government control or regulation. An underestimation can result in inadequate provision of collection services, while an overestimation can lead to inefficient resource allocation (UN Habitat 2010). Cities can undertake surveys of informal settlements not covered by collection services to estimate the quantity of waste generated and help them plan future collection services.

2. **Characterizing waste composition**. The composition of waste impacts the frequency of necessary waste collection services. For example, areas with high volumes of organic waste may receive more frequent collection services, especially in hot and humid conditions where waste can decompose quickly and produce odors and leachate and attract disease-carrying pests and insects. Leachate can leak into groundwater and surface water, putting low-income communities that rely on these waters for drinking at risk of serious health impacts.

3. **Expanding collection areas**. Cities could expand collection areas to include informal settlements and underserved, marginalized populations. Decision-makers can use the findings from steps one and two to widen collection coverage. They could consider using spatial analysis tools to optimize the location of transfer stations and collection routes. If informal settlements are not easily navigable, cities can plan community collection bins that are more accessible to residents and collection vehicles. Cities can also empower community organizations to collect segregated waste and manage part of it (e.g., bale recyclables for sale, compost organic waste) and provide the residual waste for collection by the local government (APEC 2023).

4. **Selecting appropriate collection vehicles**. Marginalized populations may live in areas with narrow, unpaved roads that are inaccessible by large collection trucks. In these instances, small collection vehicles such as handcarts, tricycles, animal carts, three-wheel auto-rickshaws, or tractors and trailers might be appropriate (UN Habitat 2010).

5. **Accounting for ability to pay**. It is important to approach financing with the goal that services will be accessible to all members of the community, regardless of vulnerability and economic status. The fees for waste collection services may be unaffordable for low-income households. Instead of implementing a single fee for services, cities can implement higher fees for heavy waste producers, such as businesses and industrial sites, and for high-income households. Cities can use these higher fees to subsidize the cost for lower-income households (Parizeau et al. 2008).

   Cities may also want to consider pay-as-you-throw fees (based on weight) for bulk waste generators such as commercial enterprises. Decentralization and privatization of services may result in some providers serving lower-income communities as the majority or entirety of their service population. Decision-makers could explore changes to solid waste management service budgets and financing opportunities to offset service recipients' limited ability to pay.

6. **Incentivizing collectors.** Waste collectors are often poorly paid and face social stigma, which can impact their willingness to provide reliable services. Effective financing strategies ensure that waste collectors are paid on time and incentivized to collect waste. For example, in certain areas of Coimbatore, India, waste collectors can collect recyclables from households and sell them to a nonprofit organization to supplement their wages. Furthermore, recognizing the work of waste collectors as a public service with economic, social, and environmental benefits can eliminate the social stigma around waste collection. In Brazil, the National Waste Pickers Movement has been instrumental in advocating for changes in law and policy to destigmatize waste collection by formally recognizing it as a profession in the Brazil Occupation Classification (Diaz 2014).

CASE IN POINT

Monitoria Participativa Maputo (MOPA) Project in Maputo, Mozambique

Lower-income, suburban communities in Maputo receive inadequate and infrequent waste collection services because they are in areas inaccessible by collection vehicles. To address this challenge, the Maputo region decentralized waste collection services by outsourcing waste collection to private companies and micro-operators. However, this complicated the region's efforts to oversee daily collection operating procedures (UNESCO 2018).

In 2014, UX Information Technology, in collaboration with the World Bank, developed MOPA, a free communications platform that allows for participatory monitoring of waste collection in Maputo. The platform allows residents to notify localities of waste collection issues, including missed collections and overflowing waste containers. It provides Maputo with a structured process to identify waste collection needs, coordinate with private waste collection operators, and address needs by making collection services immediately available (UNESCO 2018).

For more information, read the MOPA case study.

CASE IN POINT

Informal sector participation in international treaty negotiations

The International Alliance of Waste Pickers (IAWP) was included as a stakeholder at a United Nations International Negotiating Committee negotiation for a global plastics treaty. IAWP is a global association of informal waste collector organizations in more than 28 countries. This engagement gives informal sector workers a platform for networking and advocating for their needs on the international stage (IAWP 2022).

To learn more, see IAWP's Call for Recognition of Waste-pickers in International Legally Binding Instrument on Plastics Pollution.

4.3 Formalization of Informal Recycling

The informal recycling sector is a major component of the solid waste management system in many developing countries. The sector brings long-established and elaborate networks of collectors; sorters; transporters; brokers; processors; and, in some cases, end markets for recyclables. However, informal recycling workers are often poorly paid and work in unsafe conditions without the proper protective equipment and health insurance that recyclers in the formal sector would typically receive. Integrating informal recycling workers into formal employment can both improve the livelihoods of informal workers and enhance the overall efficiency of solid waste management.

There may be situations where informal sector workers choose not to be integrated into the formal sector. In such cases, it is important to continue engaging with them to address the factors contributing to their marginalization. Decision-makers can use the following best practices for ensuring a better livelihood for informal recyclers and potentially incorporating them into formal employment:

1. **Addressing knowledge gaps.** The number, waste collection capacity, network structures, and contribution of informal recycling workers to the waste management chain are not usually measured and reported. Decision-makers may benefit from collecting data on informal recyclers' demographics, wages, organization, and waste management practices. Addressing this knowledge gap can help decision-makers publicly recognize the contribution of informal recyclers to solid waste management and develop targeted and impactful policies that improve stakeholder identification, ensure fair and reliable payment for services, and address occupational health and safety issues (GRID-Arendal 2022).

2. **Promoting legal recognition.** Informal recycling workers are consistently excluded from legal recognition and social protection. To give informal work the same credibility and legitimacy as formal employment and decriminalize informal work, decision-makers can:

   - Issue birth certificates, identification cards, and other legal documents
   - Recognize informal waste recycling as a profession by registering informal workers in city databases and entering into government or public-private partnership contracts with them
   - Include informal recyclers in national, regional, and city planning processes and policy initiatives
   - Include informal recyclers in social protection schemes to improve access to basic services, such as healthcare and childcare, pension schemes, retirement savings programs, or workers' compensation and social security programs, if they choose to be integrated into such systems
   - Destigmatize and facilitate recognition and acceptance of informal work through awareness campaigns

- Provide informal recyclers with uniforms and protective equipment, if they choose to be integrated into formal employment
- Promote the creation of local associations, unions, or cooperatives of informal recycling workers to give them a platform for networking and advocating for their needs with the municipal and national governments.

3. **Ensuring fair and reliable payment for services and guaranteed access to waste.** Cities can help informal recyclers set up contracts with waste generators to guarantee regular access to waste. Cities can grant informal recyclers the right to collect and sell recyclable materials from collection points, transfer stations, disposal sites, and other waste facilities. The contracts can specify that informal recyclers will be fairly and regularly compensated for their work. Decision-makers can make sure that contracts issued to informal recyclers have clearly defined steps for calculating the value of their work. Extended Producer Responsibility policies, which require producers to pay for the disposal of their product, could include details on industries or manufacturers paying for the costs of collection, sorting, and processing done by informal workers (GRID-Arendal 2022).

4. **Conducting inclusive stakeholder engagement**. Engaging with informal workers is critical to identifying solutions to help them integrate into the formal workforce. Taking a gender-sensitive approach to engagement is important because women make up a large percentage of the informal recycling workforce (Exhibit 6). Refer to the *Stakeholder Engagement section* for more details on best practices.

5. **Offering training and building capacity.** With training, informal recyclers will understand their roles and responsibilities in the solid waste management process and be informed about their right to protection. They can benefit from training on the best practices for collection and sorting of recyclables, communication with the public (i.e., waste generators), occupational health and safety procedures, entrepreneurship, and governance of waste workers' cooperatives. Decision-makers can establish a capacity-building program to help informal recyclers enhance their day-to-day operations and improve their profitability.

4.4 Siting of Waste Treatment Facilities and Disposal Sites

Land use planning is a critical step to addressing equity concerns in waste treatment and disposal. In developing countries, population surges and rapid urbanization limit the amount of cheap land available, pushing waste treatment facilities to rural areas. Low-income communities in rural areas are most vulnerable to the adverse impacts of waste management. The siting of waste treatment and disposal sites has other equity implications. Unequal access to sites may contribute to waste dumping in public areas, and poorly managed sites are at risk of causing environmental disasters. When siting waste management facilities, decision-makers may consider the following best practices to minimize impacts on vulnerable populations:

1. **Involving marginalized stakeholders throughout the project development cycle**. Cities can benefit most from public involvement that occurs early in the siting process and continues throughout the project development cycle. Siting committees can include residents surrounding the potential waste treatment and disposal site, who are often marginalized. Decision-makers may want to give special attention to the stakeholders most at risk of being excluded from the solid waste planning process. Decision-makers can meet with marginalized stakeholders to explain the solid waste problem, the need for new waste facilities, and the selection process for potential sites.

2. **Defining the siting criteria and selecting potential sites**. While no single set of criteria applies to all regions, decision-makers may consider some of the general siting considerations below to ensure waste facilities do not disproportionately impact nearby residents who are often marginalized:

   - Spatial distribution of waste management facilities
   - Vulnerabilities to climate impacts such as flooding from heavy rain or sea-level rise
   - Odor, noise, and visual impacts to surrounding communities
   - Air pollution and ground and surface water contamination risks to surrounding communities
   - Effects of limiting access to facilities and surrounding areas and potential for granting community access to these areas

- Present and future population density and the need for resettlement
- Transportation and traffic conditions
- Cultural, ethnic, and historic impacts and community demographics
- Altering existing land-use practices, including farming

Not all site selection criteria will receive equal weight. The scoring and ranking of potential sites based on the siting criteria is a subjective process. However, site selection will be more beneficial to communities as a whole if decision-makers consider marginalized communities living close to potential sites (Exhibit 7).

3. **Remediating existing disposal sites.** Poorly managed disposal sites, especially those located in populated areas, often need to be remediated and better managed. The first step is commonly to fence the disposal area and prevent informal recycling onsite. This affects the income of informal recyclers at such sites. The city can assess development of a materials recovery facility at the disposal site, which can allow the informal sector access to the waste prior to its disposal. This also benefits the city in reducing the waste to be disposed of. Other improvements to a poorly managed disposal site include ensuring slope stability to avoid landslides, installing leachate collection systems to prevent soil and groundwater contamination, and taking steps to control dust and prevent fires that contribute to local air pollution.
4. **Identifying host community benefits.** Decision-makers can grant some form of benefit to the host community in exchange for siting a waste management facility within its geographic boundaries. The benefits could come in the form of monetary compensation or provision of amenities or services. Conducting a land-use value assessment that considers the value of land according to its current use (e.g., for agriculture or forestry) rather than the market value will help to ensure fair compensation of a host community. The discussion of benefits before site permitting begins allows time for negotiation.
5. **Research-based facility placement**. Identifying the best location for facilities using science-based research will help to ensure equitable distribution of access to the facilities and disaster risk. Decision-makers can evaluate community impact, risks, transportation costs, and other factors.

EXHIBIT 6 CASE STUDY

Decentralized Waste Management in Paradeep, India

The Paradeep jurisdiction in India has established a successful model for decentralized and community-driven waste management. This model provides a unique opportunity for women and transgender groups to be involved in the solid waste management process. Women and transgender self-help groups have received training and participated in the door-to-door collection, transportation, and handling of waste at micro-composting centers and material recovery facilities. The revenue that facilities collect—from user fees and selling recyclables—is ultimately distributed to the women and transgender self-help groups, providing a stable income stream to improve their livelihoods (NITI Aayog 2021).

For more information, see the Waste Wise Cities Best Practices in Municipal Solid Waste Management.

4.5 Outreach and Raising Awareness

Outreach and awareness-raising activities can reduce inequities in solid waste management by shifting attitudes and beliefs and creating behavioral changes in marginalized groups and the public majority. Workshops and trainings can empower marginalized groups to proactively engage in decision-making and planning processes and influence policies that directly impact them. Furthermore, awareness campaigns to educate the public majority on the inequities that exist in solid waste management can help amplify the voices of marginalized groups and encourage public action. Decision-makers can use the following best practices when creating an outreach and awareness raising plan:

1. **Raising awareness about rights to social protection**. Informal work is associated with human rights abuses and unfair compensation. Unfortunately, many informal workers lack awareness of their rights, inhibiting their ability to stand up for themselves. Decision-makers can organize workshops and advocacy campaigns to increase agency of marginalized groups.
2. **Providing trainings to strengthen waste cooperatives (Exhibit 8)**. The formation of waste cooperatives gives informal waste workers the collective bargaining power to facilitate representation, better social protections, and improved working conditions, and negotiate deals and agreements with the public and private sector. Decision-makers can establish capacity-building programs to train informal waste workers on business and management skills to improve their productivity, increase scale, and move up the value chain.
3. **Advocating for national-level changes in attitudes towards informal work**. Informal waste workers are often ostracized from society because of the social stigma of working with waste. Decision-makers can organize campaigns around the contribution of informal workers to solid waste management and their entrepreneurial nature to shift public perception, remove bias, and destigmatize informal work.

Overall, achieving equity in solid waste management requires a holistic approach that considers the social, economic, and environmental factors that influence waste management practices. By working towards equity, communities can ensure that waste management practices are fair, just, and sustainable for all members of the community.

CASE IN POINT

Equitable Site Selection Models

A facility-siting model developed by researchers at the Universitas Muhammadiya Sarukarta in Indonesia measures the total travel distance from solid waste generators to disposal sites, weighted by the amount of waste produced and associated health and safety risks. The model calculates an equality measure as the difference between the maximum and minimum distance for all waste generators. The model incorporates both environmental justice and spatial equity as criteria for positioning waste management sites (Setiawan et al. 2019). Approaching site placement with a scientific approach will enable decision-makers to limit the interference of NIMBYism in site placement.

The model is currently an independent research project. The researchers tested it using solid waste management challenges in the Regency of Klaten, Central Java, Indonesia. They demonstrated that it is possible to incorporate equity considerations into site selection.

For more information, read the study on equity-based site selection.

EXHIBIT 7 CASE STUDY

Equitable Compost Plant Design in Matale, Sri Lanka, and Quy Nhon, Vietnam

A partnership between the United Nations Economic and Social Commission for Asia and the Pacific and Waste Concern worked to identify solutions to reduce transportation costs, improve sustainability, and increase waste collection volume equitably. The partnership used a decentralized compost model that Waste Concern had previously developed in Bangladesh as a guide for new initiatives in Matale, Sri Lanka, and Quy Nhon, Vietnam (Waste Concern 2012).

The compost facilities were located within the neighborhoods they serve, and waste collectors provide collection directly from households to promote accessibility. The waste is sorted into recyclables, organics, and non-recoverable waste. The waste that cannot be composted or recycled is transported by the local waste management service to a landfill. To keep household collection fees affordable while maintaining stable salaries for the waste collectors, the compost facility sells the compost material and recyclable waste for profit. Both sites have been economically and environmentally sustainable since 2007 (Waste Concern 2012).

For more information, see Waste Concern's Pro-Poor Solid Waste Management: For Secondary Cities and Small Towns in Asia and the Pacific

EXHIBIT 8 CASE STUDY

Training Programs for Informal Waste Associations in São Paulo, Brazil

In 2019, the city of São Paulo established Recicla+SP, a municipality funded training program to enhance the management of informal waste associations and cooperatives. The objective of the program is to improve the livelihoods and empower informal waste workers, while improving solid waste management (spRegula 2019).

The program includes a Support Center for Cooperatives made up of employees trained by the Institute of Management Foundation. Through the Center, cooperative members can receive training in areas such as occupational health and safety, business operations, finance, management, and more. The Center has offered training and qualification to around 2,400 members (spRegula 2019).

For more information, visit spRegula.

Questions for Decision-Makers

Stakeholder Engagement

- Who would be impacted/affected by the policy, program, or decision under review, and would the policy, program, or decision place a disproportionate burden or have a disparate impact on any particular stakeholder group or community?
- Are there marginalized stakeholders affected by or concerned with the policy, program, or decision under review?
- Have marginalized stakeholders been actively involved in the development of the policy, program, or decision under review? Which stakeholders have been excluded and why?
- What adverse or unintended consequences could result from the policy, program, or decision under review? Are all groups affected by these unintended consequences included as key stakeholders?
- What are practical ways to overcome engagement barriers in stakeholder groups at risk of being excluded or underserved?
- How can marginalized stakeholders be engaged throughout the life of the project?
- What oversight mechanism can be used to ensure marginalized stakeholders are involved in the decision-making process?
- How can active participation and engagement of the marginalized stakeholders be ensured?

Collection

- What are the best methods for waste collection in congested areas inaccessible by waste collection vehicles?
- How can collection be made financially accessible for low-income households?
- How can collection be expanded for informal settlements?

Recycling

- How can cities incorporate the work and knowledge of the informal recycling sector?
- How can the informal sector be formalized?

Siting Treatment Facilities and Disposal Sites

- How is equity being integrated into site suitability analyses of new waste recycling and treatment facilities and landfill sites?
- Are all foreseeable community health and environmental impacts being discussed and accounted for?
- How will the potential environmental and health risks of this site be monitored and mitigated?

Outreach and Awareness Raising

- How do the practices, traditions, and beliefs of marginalized groups vary from those of the general population?
- How is the access to information and ability to participate limited for marginal populations?
- What are the best means of communicating with marginalized populations?

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