

## Approach Paper

# An Evaluation of the World Bank Group's Support to Municipal Solid Waste Management, 2010–20

June 26, 2020

## 1. Background and Context

1.1 **Municipal solid waste (MSW) has emerged as one of the most pressing challenges for urban areas across the world.** Global MSW is increasing; currently, the world's cities produce 1.3 billion tons of waste annually, which will rise to 2.2 billion tons annually by 2025 (Kaza et al. 2018). Historically, the causes and effects of MSW were considered local or regional. But with increasing volumes and changing waste compositions, MSW has become a global challenge with public health, environmental, social, and economic costs. Developing countries face complex issues in MSW management (MSWM) ranging from policy and governance to capacity and cost recovery, attracting private sector expertise and investment, and integrating informal actors in the sector.

### Local and Global Impacts of MSW

1.2 On a local scale, improper waste management pollutes water bodies, contaminates air and land, attracts disease vectors, and causes flooding by clogging drains. Open dumping and burning of MSW—which is more common in low-income and lower-middle-income countries (LICs and LMICs)—pollutes the soil, air, and water bodies (groundwater, rivers, and oceans). Mismanaged waste can clog stormwater drains, resulting in standing water and flooding that damages infrastructure, and creates unsanitary conditions linked to outbreaks of vectorborne disease,<sup>1</sup> disproportionately affecting mostly the poor that live near or work at waste disposal locations (Guisti 2009).

1.3 Large numbers of waste pickers work in poor conditions in most developing countries, although there is potential for a range of jobs and small enterprises at all stages of MSWM. The informal sector worldwide has an estimated 24 million waste pickers, mostly in developing countries but also in richer countries (ILO 2013). Although the informal waste pickers recover a greater proportion of recyclables than the formal sector in most developing countries, they work under poor conditions, and do not get a fair value for recyclables. Improved MSWM and use of waste as a resource for generating other products holds great potential for jobs and small enterprises while preserving the livelihood and improving the welfare of informal waste pickers.

1.4 Poor MSWM contributes to climate change. Landfills and open dumps contribute about 4 percent of global greenhouse gas emissions, though waste can be a resource and a net sink of greenhouse gases through recycling and reuse (Barrera and Hooda 2016). Improved MSWM can readily contribute to meeting Nationally Determined Contribution targets for greenhouse gas emission reductions in client countries.

1.5 The impact of plastic pollution on land and water bodies is a specific and growing concern. In particular, the growing impact of plastic pollution on marine life and the coastal environment has captured public attention while policy and waste management efforts try to keep pace. Effective MSWM is essential to addressing marine plastic pollution. The two are interlinked, given that 80 percent of the ocean plastic comes from land and of that 75 percent comes from poorly operating MSWM systems.

1.6 The ongoing coronavirus pandemic (COVID-19) underlines the crucial local and global importance of effective MSWM in mitigating and preventing health crises. In this context, the United Nations Environment Program (UNEP) notes that unsound management of waste could cause unforeseen “knock-on” effects on human health and the environment. The ability to conduct safe handling and final disposal of waste is a vital element in an effective emergency response (Messenger 2020).

1.7 Overall, effective and environmentally sound MSWM contributes to clean cities and a healthy living environment, which is attractive to residents, tourists and visitors, businesses, and investors. Waste prevention avoids end-of-pipe waste management costs and greatly reduces the larger raw material, energy, and labor costs embedded in wasted products while reducing the burden on local government agencies. The business benefits of improved resource efficiency and waste prevention alone are believed to be more than \$1 trillion globally per year (UNEA, n.d.). Environmentally sound waste management, recycling dry and organic materials, and recovering energy from waste may lead to substantial “green” job creation.

## Characteristics and Dimensions of MSW

1.8 MSW is generated mainly from residential and commercial sources. MSW is broadly classified as *biodegradable* (organic/wet waste): food waste, paper, plants; and *nonbiodegradable* (inorganic or dry waste): humanmade materials—plastics, glass, metal—that do not degrade for long periods or even ever, unless incinerated. MSW includes hazardous materials, such as paints, batteries, and electronic waste (or e-waste), and some construction and industrial waste.<sup>2</sup>

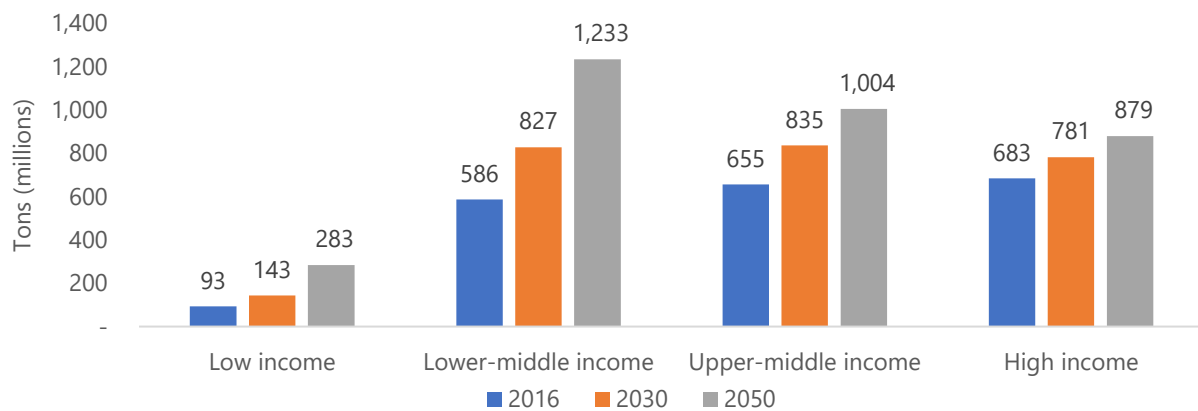
1.9 MSW is distinguished from waste generated by the industrial, mining, construction, and agricultural sectors. Waste from these sources is generally governed

by laws and regulation that fix accountability for proper disposal and is outside the scope of this evaluation.

1.10 Presently, waste generation is significantly higher in high-income countries (HICs) and upper-middle-income countries (UMICs) than in LMICs and LICs. The average quantity of waste generation per person per day is about 1.9 kilograms in HICs; 1.0–1.5 kilograms in UMICs; 0.5–1.0 kilograms in LMICs; and less than 0.5 kilograms in LICs. Overall, HICs and UMICs generate 66 percent of all waste around the world; OECD countries (with 16 percent of the world’s population) account for 50 percent of global waste generation.

1.11 However, waste generation is on a trajectory to nearly double in both LMICs and UMICs and triple in LICs by 2050; in contrast, this growth will be less than 30 percent in HICs over the same period. Although all country income categories face growing levels of MSW, fast-growing large and medium-size cities will put LMICs and UMICs on a trajectory to nearly double their waste generation by 2050. LICs will see even faster growth with annual waste generation tripling from 93 million tons to 283 million tons over the same period (Kaza et al. 2018; figure 1.1).

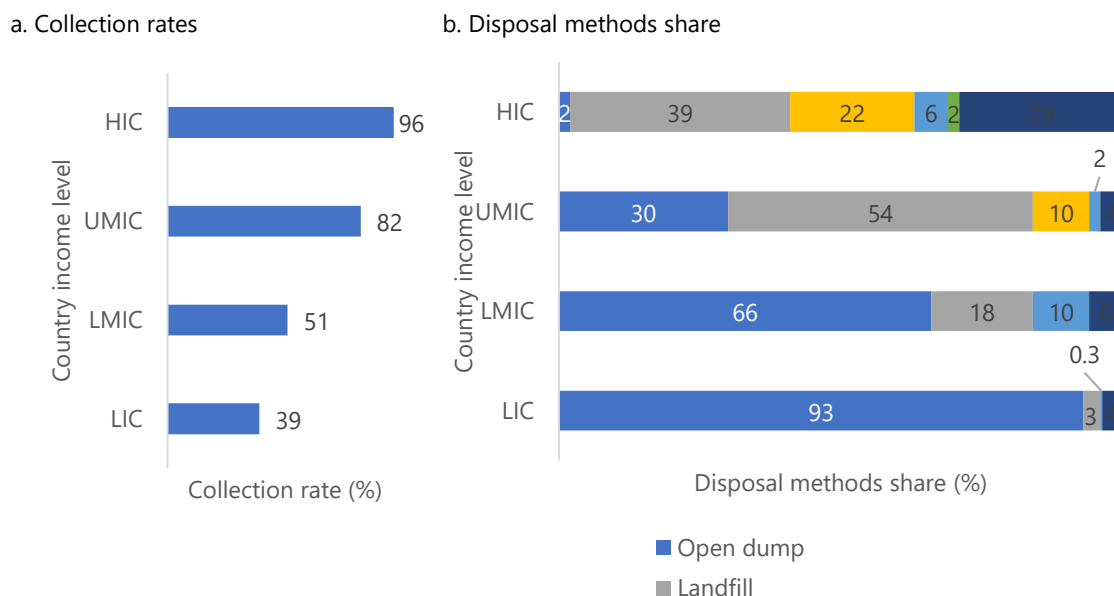
**Figure 1.1. Estimated Waste Generation by Country Income Category, 2016, 2030, 2050**



Source: Adapted from Kaza et al. 2018.

1.12 Developing countries (LICs, LMICs and UMICs) have major challenges with MSW collection treatment and disposal, which will become progressively worse with the projected steep increase in MSW generation in these countries. LICs and LMICs have low collection rates of 39 percent and 51 percent respectively, compared with 82 percent and 96 percent in UMICs and HICs. The collected waste ends up predominantly in open dumps in LICs (93 percent), LMICs (66 percent), and UMICs (36 percent), but not in HICs (2 percent). In terms of disposal, developing countries have few recycling and no incineration facilities (Kaza et al. 2018; figure 1.2).

**Figure 1.2. Select Municipal Solid Waste Parameters by Country Income Category**



Source: Adapted from Kaza et al. 2018.

Note: HIC = high-income country; LIC = low-income country; LMIC = lower-middle-income country; UMIC = upper-middle-income country.

1.13 Plastic waste accounts for a small share of all waste, but its mismanagement can have a disproportionate impact on land and water bodies. Plastic waste is about 13 percent of all waste in HICs and 7–11 percent in LICs and MICs. Plastic waste can remain in the environment for decades without degrading. Unchecked, this plastic waste outflow could increase dramatically as annual plastic production grows from 270 million tons in 2010 to 460 million tons by 2030. In the ocean, plastic is harming more than 800 species, including 40 percent of marine mammals and 44 percent of seabird species. On land, drainage systems and soil become clogged with plastic bags, films, and other items, causing flooding, affecting aquifer recharge, and harming land birds and farm animals (Hundertmark et al. 2018; Rubel et al. 2019). The top sources of marine plastic pollution are in developing regions, in contrast to developed regions, which manage plastic waste better.

### The Process of MSWM and the Main Actors

1.14 MSWM is generally carried out by local government bodies, and broadly consists of five steps: generation, collection, transport, treatment, and disposal. Local governments in LICs and MICs typically spend 3 percent to 15 percent of their budgets on MSWM, of which 80 percent to 90 percent is spent on waste collection (Rosenzweig et al. 2018), constraining their ability to address the subsequent steps. Local bodies in HICs spend less than 10 percent of their budgets on collection, with a far greater proportion

going to treatment and disposal of MSW (Kaza et al. 2018). In cities in developing country, the informal sector plays an important role in waste collection. Where appropriate and feasible, several waste treatment technology options are available to convert waste to more useful products (for example, electricity, compost, recycled materials) and mitigate environmental and health risks.<sup>3</sup> A range of disposal options are used in practice, from open dumping (90 percent of waste in LICs is dumped or burned in the open), which poses the greatest environmental and health hazards, to sanitary landfills (engineered facilities designed to collect and treat all the waste's byproducts).

1.15 Several actors have roles to play in MSWM. The general public is the primary source of waste, the beneficiary of MSW services, and the object of behavior change. The local government is the principal source of financing and service provision, and the central/regional government performs policy setting and regulatory functions and provides strategic financial support. The role of civil society and nongovernmental organizations is crucial for raising awareness for MSWM, holding service providers accountable, and supporting the informal waste-picker community. The private sector is a potential source of investment, improved practices, and service delivery efficiency. Private sector involvement is dependent on the availability of credible revenue models and a sound regulatory framework that is effectively enforced.

## **Current and Emerging Approaches to MSW**

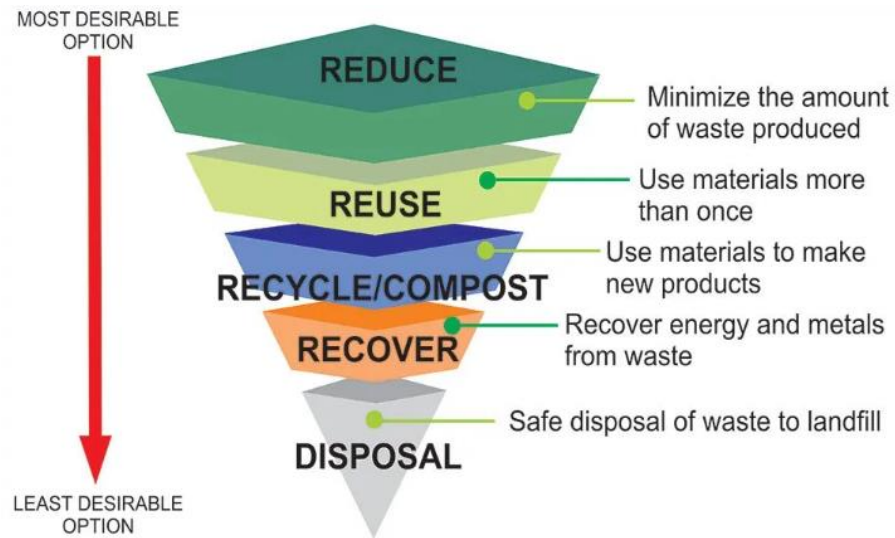
1.16 The waste management hierarchy is a widely accepted set of principles for managing waste efficiently and sustainably, which is evolving into a related and newer circular economy concept. The waste hierarchy is typically presented as an inverted pyramid that shows approaches to MSWM from most preferred to least preferred (figure 1.3, panel a). In this formulation, minimizing of consumption and source reduction, along with reuse, are preferable to recycling, which in turn is preferred to recovery (for example, waste to energy), before disposing of the remaining waste in the most environmentally responsible manner, such as in sanitary landfills.<sup>4</sup> Countries at different income levels can vary widely in the extent to which they have transitioned from less desirable to more desirable options in the waste management hierarchy.

1.17 The circular economy concept also emphasizes the first four steps of the waste management hierarchy but goes further in advocating for minimizing the quantity of waste that needs disposal. The circular economy is a proactive approach that advocates for designing products to reduce waste, using products and materials for as long as possible, and recycling end-of-life products back into the economy. In the transition to a circular economy it is important for consumers to demand extended producer responsibility whereby manufacturers are physically and financially responsible for the disposal of their products (figure 1.3, panel b).<sup>5</sup> Application of circular economy

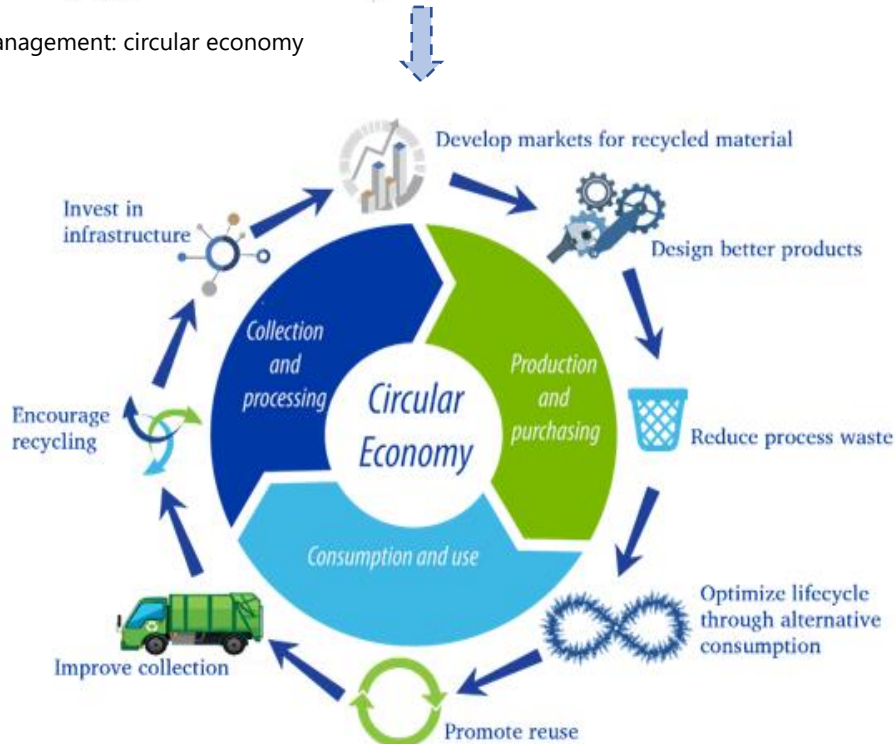
principles to MSWM is more typical of HICs and is still in its early stages in other country income categories.

**Figure 1.3. Waste Management Hierarchy and the Circular Economy**

a. Waste management hierarchy



b. Solid waste management: circular economy



Sources: panel a, <https://www.usgbcwm.org/>;  
panel b, <https://rco.on.ca/circular-economy>.

## Constraints and Challenges in MSW

1.18 The evaluation will address the challenges and opportunities in MSWM in client countries:

- **Increasing investments for infrastructure provision.** Investments in the core stages of MSWM and access to new technologies are constrained by insufficient access to finance, inadequate regulatory frameworks, constraints in land availability and acquisition, and the NIMBY (“not-in-my-backyard”) phenomenon.
- **Applying new technologies.** Approaches to collection and treatment of solid waste must be adapted to ensure they are appropriate to local needs, including the ability to maintain and upgrade equipment using local skills and labor.
- **Enhancing capacity of government institutions.** Policy-making, regulatory, technical, and managerial capacity of national and local governments is a major constraint, especially in LICs.
- **Ensuring financial sustainability of MSWM operations.** MSWM systems need remunerative tariffs supplemented by transfers from tax revenues to ensure cost recovery. At the same time, MSWM operations need to be affordable for beneficiaries to receive adequate and reliable services.
- **Attracting private sector participation and applying the cascade approach.** Structural and institutional barriers to private sector participation constrain financing sources, access to managerial skills, and the introduction and adoption of new technologies.
- **Uncovering factors leading to the Bank Group’s overall low engagement in MSWM in low-income countries.** Such factors inhibit greater engagement by the Bank Group in LICs for addressing the constraints and challenges listed here.

## 2. Evolution of the MSW Agenda

2.1 The global agenda for MSW is articulated by the Sustainable Development Goals (SDGs), which guide the Bank Group’s approaches for the sector. Several SDGs cover MSW and its negative impacts arising from improper management, led by SDG 11 for sustainable cities, which targets service delivery for waste management. Other SDGs address the following MSW impacts: health and well-being (SDG 3), clean water and sanitation (SDG 6), waste to energy (SDG 7), waste pickers’ welfare and employment (SDG 8), reducing waste (SDG 12), climate action (SDG 13), and marine plastic pollution (SDG 14). The SDGs point to the need for financially sustainable MSW services and the

scope for private participation. Appendix A presents a table with more details on SDGs and MSW.

**2.2 MSW concerns cut across the five business lines pursued by the World Bank’s urban practice as well other sectors and cross-cutting themes.** MSWM cuts across all the areas highlighted for support by the World Bank’s Urban and Local Government Strategy (2009): (i) city management, governance, and finance; (ii) urban poverty; (iii) cities and economic growth; (iv) city planning, land, and housing; and (v) urban environment, climate change, and disaster management. In addition, MSWM cuts across the water supply and sanitation and environment sectors and the jobs and social protection themes.

**2.3 The Bank Group’s approaches for MSWM can be grouped under two pillars: infrastructure and capacity building.** Elements of the Bank Group’s strategy are covered in its recent flagship publications “What a Waste: A Global Review of Solid Waste Management” (Hoornweg and Bhada-Tata 2012; Kaza et al. 2018) and other analytical work (Kaza 2019; Aramide Awe 2012). The Bank Group can be construed to have a two-pillar approach to supporting client countries for MSWM:

- **Pillar 1: Infrastructure provision.** Investments to build or upgrade waste sorting and treatment facilities, close dumps, build or refurbish landfills, and provide collection and conveyance infrastructure. Innovative public-private partnerships for methane capture through climate funds such as the Global Environment Facility and Clean Technology Fund.
- **Pillar 2: Policy and institutional strengthening to improve MSWM.** Policy and regulatory inputs to increase the impact of infrastructure improvements; governance; institutional strengthening and capacity building; social protection, for example, for waste pickers; environmental and health risk mitigation; and behavior change toward reduction, reuse, and recycling.<sup>6</sup>

2.4 These two pillars are supplemented through several partnerships, such as capacity building programs through the Tokyo Development Learning Center and the trust-funded PROBLUE program for preventing and reducing marine pollution.

### **3. Added Value of the Evaluation**

3.1 This evaluation is the Independent Evaluation Group’s (IEG) first major study of the Bank Group’s support for MSWM. The evaluation is timely given the rapidly increasing scale of MSW in most MICs and LICs and considering the spectacle of massive open garbage dumps in cities as diverse as Manila, Lagos, and New Delhi.



3.2 The evaluation will highlight the linkages of MSWM with other sectors and themes such as water supply and sanitation, environment, climate change, health, jobs, and social protection. This can point to how the Bank Group can better support the development of synergistic policy frameworks and regulations for MSWM in client countries. This has implications for developing systematic collaboration between various sectors within the Bank Group and among client government ministries and for leveraging opportunities for climate finance.

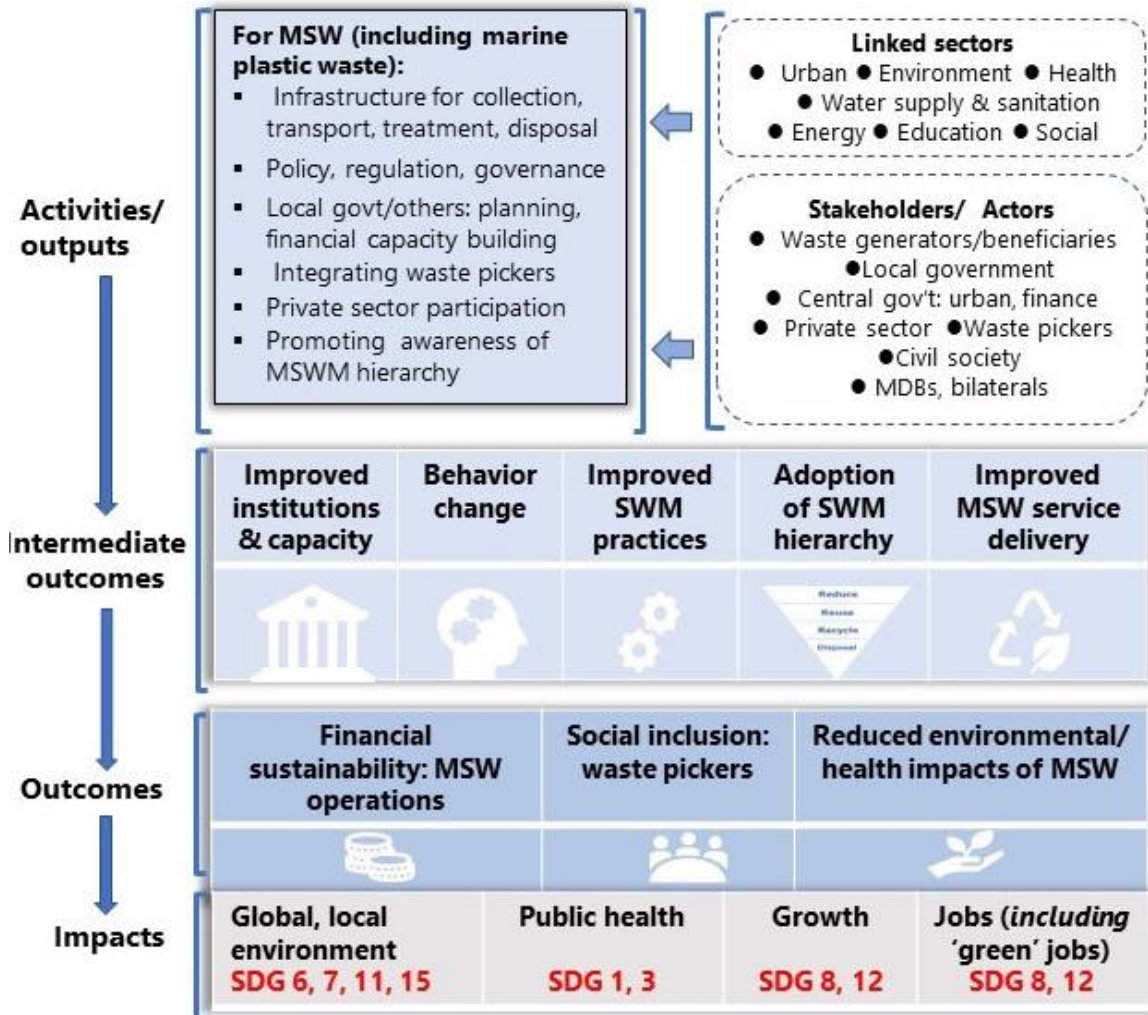
3.3 Based on MSWM practices and geospatial and information and communication technology applications in more advanced countries, the evaluation can highlight possibilities and enabling factors for cross-learning for client countries to “leap-frog” to improved processes and accountability. Especially for LICs that are at an earlier stage of MSW growth and for most MICs, this can lead to opportunities for the Bank Group to support client countries in making quicker transition to circular economy practices. However, it is recognized that existing systems and capacity need to be improved for local governments to absorb and implement more advanced technologies and processes:

- Introducing and mainstreaming new technology and practices in the MSWM cycle
- Inducing behavior change among beneficiaries, manufacturers, local governments, and cross-cutting sector actors
- Supporting a greater private sector role in MSWM for improved efficiency, finance, technology, and expertise
- Leveraging satellite and communications technology and data collection methods for improved planning, process control, governance, and accountability
- Ensuring the sustainable integration of informal workers into newer approaches and part of the process chain for MSWM

## **4. A General Theory of Change and Main Actors**

4.1 A general theory of change is proposed for MSWM, based on a targeted literature review and discussions with several Bank Group operational and technical staff and management, and leading practitioners in the sector (figure 4.1).<sup>7</sup> A more detailed initial Bank Group theory of change is presented in appendix D.

Figure 4.1. Municipal Solid Waste Management: General Theory of Change



Source: Independent Evaluation Group.

Note: MSW = municipal solid waste; MDB = multilateral development bank; MSWM = municipal solid waste management; SWM = solid waste management.

4.2 The theory of change is cast under the overarching SDG goals for MSWM. The activities/outputs are new or improved infrastructure facilities for MSWM; policy and regulation; institutional development and capacity building, supplemented by building awareness of MSWM among stakeholders; integrating the large numbers of waste pickers; and appropriate participation from the private sector. The intermediate outcomes would be improved institutions, MSW practices, and service delivery, and elements of the waste hierarchy (reduce, recycle, reuse, and dispose). The outcomes would be improved financial sustainability and social protection, and reduced environmental pollution and negative effects on human health. Broader impacts would

be reflected in the environment, public health, economic growth, and jobs, reflecting relevant SDGs.

4.3 The general theory of change also recognizes the multisectoral nature of MSWM. MSWM cuts across urban and environment (regulation, air and water pollution, greenhouse gas emissions) sectors and intersects significantly with water supply and sanitation (flooding), energy (waste to energy), health, education (MSW awareness), social protection (waste-picker welfare), and jobs.

## 5. Bank Group Support for MSW, Fiscal Years 2010–20

5.1 Bank Group–approved lending and guarantees for MSW activities amounted to \$3.1 billion during fiscal years (FY)10–20. Of this amount, the World Bank accounted for \$2.4 billion (78 percent) with 85 investment projects; the International Finance Corporation (IFC), \$519 million (17 percent) with 15 investments; and the Multilateral Investment Guarantee Agency (MIGA), \$106 million (4 percent) with 1 guarantee (table 5.1).

**Table 5.1. World Bank Group MSW Commitments, Approved FY10–20**

<b>Commitment Type</b>	<b>Projects (no.)</b>	<b>Investment (\$, millions)</b>
Projects or investments		3,073
World Bank projects	85	2,375
IFC investments	15	519
Analytic and advisory activities		
World Bank ASA	156	44
IFC advisory services	26	29
Guarantees		
MIGA	1	106

*Source:* World Bank Business Warehouse; IFC, MIGA databases.

*Note:* ASA = advisory services and analytics (World Bank); FY = fiscal year; IFC = International Finance Corporation; MIGA = Multilateral Investment Guarantee Agency; MSW = municipal solid waste.

5.2 Bank Group lending for MSW is concentrated in MICs. About 72 percent of World Bank lending for MSW is concentrated in 9 MICs: Brazil, China, Colombia, India, Kenya, Montenegro, Morocco, the Philippines, and Turkey; and one LIC, Tanzania. All IFC lending is accounted for by eight MICs: Brazil, China, India, Indonesia, Pakistan, Serbia, Sri Lanka, and Turkey. The MIGA guarantee is in Serbia, a UMIC. Preliminary analysis of Bank Group support in terms of top recipient countries, Global Practice, region, product line, and lending instruments is presented in appendix B.

## **6. Evaluation Questions, Scope, and Design**

6.1 The questions to be addressed by the evaluation are as follows:

### **EQ1. How relevant is the Bank Group’s approach to meeting client country needs for MSWM?**

- a. What explains the level, scope, and geographical location of Bank Group MSWM engagements (lending and nonlending) over the evaluation period?
- b. To what extent has the Bank Group’s approach reflected the latest evidence on MSWM practices, including their relevance and application to low- and middle-income client countries taking into account country context and readiness?

### **EQ2. How effective have Bank Group engagements been in delivering improved MSWM for clients?**

- a. What key results are associated with Bank Group engagements in MSWM over the evaluation period?
- b. How and to what extent have these results contributed to MSWM outcomes for client cities and countries?

### **EQ3. How coherent has Bank Group engagement been in MSWM?**

- a. How well have the World Bank, IFC, and MIGA collaborated to meet client needs for MSWM?
- b. How and to what extent has the Bank Group supported client country needs for private sector participation in service provision and as a source of finance, and in applying the “Cascade” approach to MSWM projects?
- c. How well have Bank Group institutions partnered with other actors to support better outcomes in MSWM?

## **Evaluation Scope**

6.2 The evaluation will focus on the core stages of MSWM (generation, collection, transport, treatment, and disposal) as they relate to issues of (i) environmental and public health—including COVID-19–related issues; (ii) impact on jobs and employment generation; (iii) social inclusion; and (iv) financial sustainability. The evaluation will cover local impacts of MSWM and not its global impacts to keep the evaluation scope manageable within the available resources and time frame and given COVID-19–related

international travel restrictions. The evaluation will build on the findings of IEG's FY18 Carbon Finance evaluation to assess climate change impacts of MSWM. The global impacts of marine plastic pollution may be covered in an upcoming IEG evaluation on biodiversity.

6.3 This evaluation will cover projects, investments, analytic and advisory activities, and guarantees with MSW components that were either approved or closed during FY10–20. This comprises 166 World Bank projects with MSW components, 15 IFC investments, and one MIGA guarantee. This cohort includes several operations that were approved before 2010. These are included to yield more operations with ratings validated by IEG and to provide a larger base of evaluative data for portfolio and country-level analysis.

6.4 Additionally, there are 156 World Bank advisory services and analytics and 26 IFC advisory services for FY10–20, which will be covered on a sample basis (table 5.1). The evaluation portfolio scope and identification criteria for portfolio selection are presented in appendix C.

## Evaluation Design

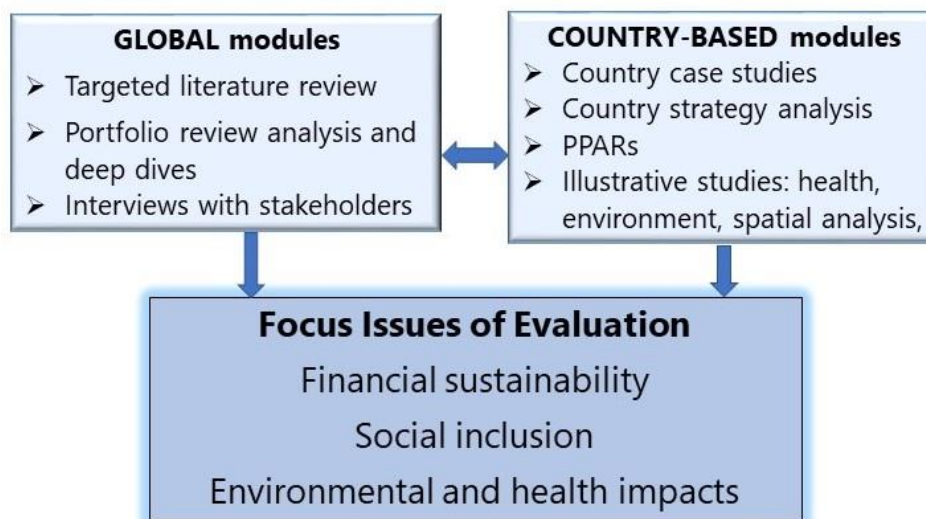
6.5 The evaluation will be carried out under overarching participatory, theory-based, and case-based principles:

- **Participatory.** From the outset, the evaluation team consulted with technical staff across Global Practices working on MSWM to identify key areas in which the evaluation findings can contribute to learning. Bank Group staff feedback helped the team frame the evaluation questions and design. This engagement is expected to continue throughout the evaluation to share sampling methods and interpret lessons of experience.
- **Theory-based.** The evaluation proposes a theory of change that traces Bank Group support to outcomes across relevant sectors (initial draft in appendix D). The knowledge gained from the country-level case studies and other components of the evaluation will be used to refine the theory of change to outline how the building blocks have been applied in the Bank Group's support for MSWM.
- **Case-based.** The evaluation will include a case-based analysis of the Bank Group portfolio in about seven countries with each covering up to two cities and their municipal and provincial governments.

## Evaluation Modules

6.6 The evaluation modules are grouped under the overall portfolio and country levels (figure 6.1). They combine both quantitative and qualitative evaluative evidence to address the evaluation questions, underpinned by evidence from the portfolio of investment, guarantee, and analytic and advisory activities. The modules are described briefly in this section and in more detail in appendix D.

Figure 6.1. Evaluation Design



Source: Independent Evaluation Group.

Note: PPAR = Project Performance Assessment Report.

## Overall Portfolio-Level Modules

6.7 The targeted literature review will selectively cover the Bank Group's research output, wider research, and relevant publications.

6.8 The portfolio review and analysis and deep dives will draw on documents from the project cycle and IEG evaluations. An analysis of key performance indicators will produce a disaggregated picture of outputs and outcome performance as a basis for uncovering causal linkages.

6.9 Stakeholder interviews will be mainly carried out through web-based videoconferencing or by telephone in the absence of international travel. Local institutions including nongovernmental organizations and universities will be engaged to facilitate stakeholder interviews, focus group discussions, and data collection. The respondents will include the Bank Group's operations staff and managers, of client country government officials, project implementation units, multilateral development banks and bilateral development agencies, key international organizations (European

Union, United Nations Environment Programme, United Nations High Commissioner for Refugees), sector and industry experts and technologists (especially those that can advise on leap-frogging at various stages of the MSWM cycle), civil society organizations, private firms, think tanks, beneficiaries, and waste pickers.

## Country-Level Modules

6.10 Country Strategies/Frameworks and Systematic Country Diagnostics will be analyzed for all client countries for the past 10 years in terms of MSWM issues raised, strategies proposed, and specific proposals for a work program.

6.11 Country-level case studies will be carried out for seven selected countries that will cover Bank Group interventions and efforts by other multilateral and bilateral development agencies, as well of the governments. The countries will be chosen for a reasonably balanced coverage of all World Bank lending regions; a range of World Bank, IFC, and MIGA involvement; country income level; country size; and salient issues covering policy, legal, and regulatory frameworks and three key outcome areas of financial sustainability; social inclusion including gender; and reduced environmental pollution. Potential case study countries are listed in table D.1. The country case study design will be developed with guidance from the methods adviser.

6.12 Project Performance Assessment Reports (PPARs) will be prepared for one project each in Azerbaijan, Liberia (landfill rehabilitation; capacity building), and Morocco (development policy support covering MSWM) to provide inputs to the evaluation. *Illustrative studies* on health impacts and spatial analysis and use of information and communication technology applications in MSWM will be prepared in one or two case study countries each.

6.13 In view of COVID-19–related travel restrictions on international travel, these studies will also rely largely on web-based video or audio meetings and be supplemented by local consultants and institutions for preparing targeted background papers, collection of relevant data, and conducting fieldwork where possible. If international travel is permitted early enough, field visits will be conducted by core team members to the East Asia and Pacific, South Asia, and Sub-Saharan Africa regions as feasible. The precise scope and content of these studies may need to be adjusted according to the capacities of the local consultants and institutions. More details on case studies design, PPARs, and illustrative studies on health, environment, spatial analysis, and information and communication technology are provided in appendix D.

6.14 **Study limitations.** Data relating to cost recovery and financial sustainability for MSWM and health impacts of MSW may not be systematically collected or analyzed in most country-level case study countries. The study may need to rely on stylized facts or

anecdotal evidence in some cases. The findings from the proposed illustrative studies on health impacts will depend on the sample size that can be covered within the schedule and budget. The same may be the case in respect of learning from more advanced client countries and HICs to leap-frog to more advanced MSWM methods.

6.15 **Triangulation.** The evaluation will bring together interview-based information (for example, related to project-level cases), evidence from PPARs, evidence from portfolio review analysis and key performance indicator analysis, and illustrative studies to shed light on the three dimensions of financial sustainability of MSW services, reduction in environmental pollution and health impacts from MSW, and social inclusion of informal waste pickers. Table D.3 gives details on evaluation methodology and design.

## **7. Quality Assurance Process**

7.1 The quality and usefulness of the evaluation's findings will be assessed through IEG's quality assurance processes and peer review by four independent external experts: Antonis Mavropoulos (founder and CEO of D-Waste and president of the International Solid Waste Association); Dr. Linda Godfrey (principal scientist at the Council for Scientific and Industrial Research, South Africa, and coordinating lead author of UNEP's Africa Waste Management Outlook 2018); Dr. Suneel Pandey (senior fellow and director, Environment and Waste Management Division, Tata Energy Research Institute, New Delhi); Mr. Masato Ohno, (chairman and director, EX Research Institute, Tokyo, Japan, and director of the Japan Waste Research Foundation). Together, they bring worldwide experience with MSWM issues and trends in new strategies and technologies, in-depth exposure to specific regions, linkages with larger development issues and other sectors, and academic and research depth.

## **8. Expected Outputs, Timeline, and Outreach**

8.1 The evaluation draft and IEG management review are planned for the third quarter of FY21. Bank Group management review and Committee on Development Effectiveness discussions are expected to take place in the fourth quarter of FY21. The main output will be a report of about 30 pages with appendixes.

8.2 A dissemination plan will be developed with IEG's knowledge and communications team, and in consultation with Bank Group staff. This will include dissemination through two or three regional workshops in collaboration with other multilateral development banks and bilateral development agencies, the International Solid Waste Association annual conference in 2021, and possibly another industry conference in 2022.



## 9. Resources

9.1 The evaluation will have an estimated budget of \$784,844. The core team members are Victor Vergara (task team leader), Ramachandra Jammi (task team leader), Victoria Alexeeva, Ebru Karamete, Kavita Mathur, and Chikako Miwa; Mari Noelle Roquiz and Hiroyuki Yokoi; and Vijay Jagannathan and Ozlem Onerci (consultants). Romayne Pereira will provide administrative support. Other senior consultants and subject matter experts will be added for overall technical and sector guidance, possible background papers, and country-level case studies and PPARs. The work will be conducted under the guidance of Jozef Leonardus Vaessen (methods adviser), Marialisa Motta (manager), José Carbajo Martínez (director), and Alison Evans (Director-General, Evaluation).

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<sup>1</sup> Vectorborne diseases are, for example, those that are spread by rodents and insects.

<sup>2</sup> Municipal solid waste is distinguished from waste generated by the industrial, mining, construction, agricultural, and medical sectors. Waste from these sources is generally governed by liability laws and regulation that fix accountability for proper disposal and is outside the scope of this evaluation.

<sup>3</sup> Biodegradable waste can be composted to produce fertilizer, electricity via anaerobic digestion, or liquid fuel through conversion to ethanol. Nonbiodegradable waste can be reused, made into new products through recycling, or converted to energy using incineration, pyrolysis, and gasification. Pyrolysis is a technology that can be used for the conversion of biomass into fuel and valuable hydrocarbons that can be used as industrial chemicals. Gasification is a technological process that can convert any carbonaceous (carbon-based) raw material such as coal into fuel gas.

<sup>4</sup> See <https://www.epa.gov/smm/sustainable-materials-management-non-hazardous-materials-and-waste-management-hierarchy>.

<sup>5</sup> Extended producer responsibility is a concept whereby manufacturers and importers of products should bear significant responsibility for the environmental impacts of their products throughout the products' life cycle, including upstream impacts inherent in the selection of materials for the products, impacts from manufacturers' production process itself, and downstream impacts from the use and disposal of the products. Producers design their products to minimize life-cycle environmental impacts and accept legal, physical, or socioeconomic responsibility for environmental impacts that cannot be eliminated by design. See <https://www.oecd.org/env/waste/factsheetextendedproducerresponsibility.htm>.

<sup>6</sup> The strategy pillars are supplemented through partnerships, such as capacity building programs from the Tokyo Development Learning Center, the Climate and Clean Air Coalition, the Korean Green Growth Trust Fund, the Global Partnership on Results-Based Approaches, and knowledge sharing with the International Solid Waste Association and the Cities Alliance.

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Beginning in 2018, the World Bank Group has prioritized action against marine plastic pollution. Initiatives include the high-level Bank Group Marine Litter Working Group, the IDA Marine Litter Initiative, and the trust-funded PROBLUE's second pillar for preventing and reducing marine pollution. The Bank Group also coordinates with the Basel Convention, the European Union Plastics Plan, the Association of Southeast Asian Nations, the High-Level Panel on Sustainable Blue Economy, and the Global Plastics Action Partnership.

<sup>7</sup> Leadership and participants of the International Solid Waste Association Annual Conference, Bilbao, Spain, October 7–9, 2019.

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## Appendix A. Municipal Waste Management and the Sustainable Development Goals

Table A.1. Municipal Waste Management and the Sustainable Development Goals

Driver	SDG Goal	Specific Target	MSW Issue	
Public Health	SDG 11: Sustainable cities	11.1 Ensure access for all to adequate, safe, and affordable basic services; upgrading slums	Uncollected waste dumped in waterways or burned in the open air causes pollution and contamination and clogs drains, causing flooding and stagnant water, which contribute to waterborne diseases and malaria. Children are affected the most.	
		SDG 3: Good health and well-being		3.2 End preventable deaths of children under five years
				3.3 End malaria and combat waterborne diseases
	Local	SDG 11: Sustainable cities		3.9 Reduce illnesses from hazardous chemicals and air, water, and soil pollution, and contamination
				11.6 Reduce the adverse environmental impact of cities; special attention to waste management
		SDG 12: Responsible consumption and production		12.4 Environmentally sound management of chemicals and all wastes to minimize their adverse impacts on human health and the environment
		SDG 6: Clean water and sanitation		6.3 Improve water quality by reducing pollution, eliminating dumping, and minimizing release of hazardous materials
Environment	SDG 15: Life on land	15.1 Ensure the conservation of terrestrial and inland freshwater ecosystems and their services	Underlines environmentally sound management of all wastes, particularly hazardous wastes (either chemical or biological hazardous wastes)	
	Global	SDG 7: Clean energy		7.2 Increase share of renewable energy in the global energy mix
		SDG 13: Climate action		Take urgent action to combat climate change and its impacts
		SDG 14: Life below water		14.1 Prevent marine pollution of all kinds, in particular from land-based activities, including marine debris
	Resource Value	SDG 12: Responsible consumption and production		12.3 Halve global food waste and reduce food losses along production and supply chains
12.5 Reduce waste through prevention, reduction, recycling, reuse				
Inclusivity	SDG 8: Decent work and economic growth	Promote inclusive and sustainable economic growth, employment, and decent work for all	In developing countries, MSW services are often provided by individuals and small and microenterprises	

Source: Adapted from Rodic-Wiersma and Wilson 2017.

Note: MSW = municipal solid waste; SDG = Sustainable Development Goal.

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Rodic-Wiersma, Ljiljana, and David Wilson. 2017. "Resolving Governance Issues to Achieve Priority Sustainable Development Goals Related to Solid Waste Management in Developing Countries." *Sustainability* 9 (3): 1–18.



## Appendix B. World Bank Group Support with Municipal Solid Waste Components, Approved 2010–20

Tables B.1 to B.5 show analysis for the World Bank by top 10 countries by commitment, Global Practice, region, product line, and lending instrument. Table B.6 shows IFC investments, and table B.7 shows the MIGA guarantee.

**Table B.1. World Bank: Municipal Solid Waste Projects Approved FY10–20, Top 10 Countries by Lending Commitments**

Country	Income Category	Projects (no.)			MSW Commitments (\$, millions)			
		Active	Closed	Total	Active	Closed	Total	Average
Morocco	LMIC	1	2	3	70	294	364	121
India	LMIC	4	0	4	341	0	341	85
Colombia	UMIC	1	2	3	38	251	289	96
China	UMIC	5	6	11	175	14	189	17
Philippines	LMIC	3	2	5	116	7	123	25
Tanzania	LIC	2	0	2	123	0	123	61
Kenya	LMIC	1	1	2	60	15	75	38
Montenegro	UMIC	1	1	2	68	5	73	36
Turkey	UMIC	0	1	1	0	70	70	70
Brazil	UMIC	2	3	5	33	32	64	13
Total of top 10		20	18	38	1,023	688	1,711	
Top 10%		42	49	45	68	79	72	
Total		48	37	85	1,502	873	2,375	

Source: World Bank Business Warehouse; IFC, MIGA databases.

Note: FY = fiscal year; LIC = low-income country; LMIC = low-middle-income country; MSW = municipal solid waste; UMIC = upper-middle-income country.

Note: Top 10 = Top 10 countries by World Bank lending commitments.

**Table B.2. World Bank: Municipal Solid Waste Projects Approved FY10–20, by Global Practice**

Global Practice	Projects		MSW Commitments	
	(no.)	(%)	(\$, millions)	(%)
Urban, Resilience, and Land	43	51	1,247	52.5
Water	13	15	509	21.4
Environment, Natural Resources, and the Blue Economy	20	24	488	20.5
Energy	1	1	70	2.9
Climate Change	2	2	17	0.7
Finance, Competitiveness, and Innovation	1	1	15	0.6
Health, Nutrition, and Population	1	1	15	0.6
Transport	1	1	5	0.2
Macroeconomics, Trade, and Investment	1	1	5	0.2
Social; Social Protection and Jobs	2	2	4	0.2
<b>Total</b>	<b>85</b>	<b>100</b>	<b>2,375</b>	<b>100</b>

Source: World Bank Business Warehouse; IFC, MIGA databases.

Note: Names of Global Practices shown here may not match current names.

FY = fiscal year; MSW = municipal solid waste.

**Table B.3. World Bank: Municipal Solid Waste Projects Approved FY10–20, by Region**

Region	Projects				MSW Commitments			
	(no.)				(\$, millions)			
	Active	Closed	Total	(%)	Active	Closed	Total	(%)
AFR	12	5	17	20	285	71	356	15
EAP	12	10	22	26	358	50	409	17
ECA	6	7	13	15	222	135	357	15
LAC	4	7	11	13	93	299	391	16
MNA	3	6	9	11	136	310	446	19
SAR	11	2	13	15	407	9	416	18
<b>Total</b>	<b>48</b>	<b>37</b>	<b>85</b>	<b>100</b>	<b>1,502</b>	<b>873</b>	<b>2,375</b>	<b>100</b>

Source: World Bank Business Warehouse; IFC, MIGA databases.

Note: AFR = Africa; EAP = East Asia and Pacific; ECA = Europe and Central Asia; FY = fiscal year; LAC = Latin America and the Caribbean; MNA = Middle East and North Africa; MSW = municipal solid waste; SAR = South Asia.

**Table B.4. World Bank: Municipal Solid Waste Projects Approved FY10–20, by Product Line**

<b>Product Line</b>	<b>Projects (no.)</b>	<b>MSW Commitments (\$, millions)</b>
Carbon offset	7	150
GEF	6	24
IBRD/IDA	50	2,110
IDF	1	0
Recipient executed	20	85
Special financing	1	6
<b>Total</b>	<b>85</b>	<b>2,375</b>

Source: World Bank Business Warehouse; IFC, MIGA databases.

Note: FY = fiscal year; GEF = Global Environment Facility; IBRD = International Bank for Reconstruction and Development; IDA = International Development Association; IDF = International Development Fund; MSW = municipal solid waste

**Table B.5. World Bank: Municipal Solid Waste Projects Approved FY10–20, by Lending Instrument**

<b>Lending Instrument</b>	<b>Projects (no.)</b>	<b>MSW Commitments (\$, millions)</b>
IPF	57	1,439
SIL	10	163
TAL	5	3
P4R	3	85
DPL	2	599
ERL	2	23
APL	1	19
SIM	1	20
Other	4	24
<b>Total</b>	<b>85</b>	<b>2,375</b>

Note: APL = adaptable program loan; DPL = development policy loan; ERL = economic reform loan; FY = fiscal year; IPF = investment project financing; SIL = specific investment loan; SIM = sector investment and maintenance loan; TAL = technical assistance loan; P4R = Program-for-Results.

**Table B.6. International Finance Corporation: Municipal Solid Waste Commitment: Investments Approved FY10–20, by Country,**

Country	Income Category	Projects (no.)		IFC Commitments (\$, millions)		
		Active	Closed	Active	Closed	Total
China	UMIC	4	2	174	60	234
Serbia	UMIC	1	0	84	0	84
Indonesia	LMIC	1	0	75	0	75
Turkey	UMIC	1	0	50	0	50
India	LMIC	2	0	45	0	45
Brazil	UMIC	1	0	24	0	24
Sri Lanka	UMIC	1	1	7	0.1	7
Pakistan	LMIC	0	1	0	0.3	0.3
<b>Total</b>		<b>11</b>	<b>4</b>	<b>459</b>	<b>60.4</b>	<b>519.3</b>

Source: International Finance Corporation Projects Portal.

Note: FY = fiscal year; IFC = International Finance Corporation; LMIC = low-middle-income country; UMIC = upper-middle-income country.

**Table B.7. Multilateral Investment Guarantee Agency: Municipal Solid Waste Gross Exposure by Country: Guarantees Approved or Closed, FY10–20**

Country	Income Category	Projects (no.)		MIGA Gross Exposure (\$, millions)		
		Active	Closed	Active	Closed	Total
Serbia	UMIC	1	0	106	0	106

Source: MIGA Projects Portal.

Note: FY = fiscal year; LMIC = low-middle-income country; MIGA = Multilateral Investment Guarantee Agency; UMIC = upper-middle-income country

## Appendix C. Evaluation Portfolio Scope and Identification

### Evaluation Portfolio Scope

This evaluation will cover municipal solid waste (MSW) projects, investments, analytic and advisory activities, and guarantees that were either approved or closed during fiscal years (FY) 2010–20. This cohort includes several operations that were approved before 2010. These are included to yield more operations with ratings validated by the Independent Evaluation Group and to provide a larger base of evaluative data for the portfolio review analysis and deep dives, and for country-level case studies.

### Criteria for Portfolio Identification

**World Bank investment portfolio.** The Independent Evaluation Group identified the MSW portfolio in two stages from the Business Intelligence Database for the evaluation period FY10–20. First, projects with the sector codes WB (Waste Management), WF (PA Water, Sanitation) and WZ (Other Water, Sanitation and Waste) were extracted and the presence of MSW objectives or components was verified. Based on this exercise, it was found that projects with the sector codes WF and WZ did not contain any relevant MSW components, and the identification of MSW projects was restricted to those carrying the WB sector code. Projects with at least 15 percent of their commitments dedicated to MSW are considered “core” projects and the rest “noncore.”

**World Bank advisory services and analytics portfolio.** Like the investment portfolio, advisory services and analytics were extracted from the Business Intelligence Database by applying the sector code WB. The database currently includes activities that were approved during FY10–18. Data on activities for FY19 and FY20 will be updated as available during the evaluation.

**International Finance Corporation (IFC) investments.** The MSW portfolio for investments approved or closed during FY10–20 was extracted using Industry Group Level 3 classification, identifying projects under (i) Waste Collection Treatment and Management; and (ii) Waste to Energy, and further using the Tertiary Sector Name classification, with projects under (i) Municipal Finance—Water, Wastewater, District Heating and Waste [Project only] (W-BC); (ii) Waste Collection Treatment and Management (C-DA); and (iii) Waste to Energy—Power (C-DB). Projects related to derivatives such as swaps, rights issue, transfer of commitment to another project, project split for initial public offering purposes, risk management, and equity sale entry are excluded.

**IFC advisory services (AS).** Like IFC investments, AS were extracted from the AS Operational Portal using the same sector and industry methodology as for the Investment portfolio. Only AS at the “Completed” and “Portfolio” project stages are included.

**Multilateral Investment Guarantee Agency (MIGA) guarantees.** The preliminary portfolio was obtained by extracting the Solid Waste Management sector code in the MIGA Portal, yielding one project guarantee during FY10–20.

**Table C.1. World Bank Group: Municipal Solid Waste Projects Approved or Closed, FY10–20**

Category	Projects (no.)			MSW Commitment (\$, millions)			IEG Outcome Rating of MS+ (percent)
	Closed	Active	Total	Closed	Active	Total	Total
World Bank <sup>a</sup>	118	48	166	1,810	1,502	3,312	70
IFC <sup>b</sup>	4	11	15	60	459	519	n.a.
MIGA <sup>c</sup>	0	1	1	0	106	106	n.a.
Total	123	59	182	1,870	2,067	3,937	70

Source: World Bank Business Intelligence Database, IFC Management Information System Database, IFC Advisory Services Operations Portal, and MIGA Portal.

Note: FY = fiscal year; IEG = Independent Evaluation Group; IFC = International Finance Corporation; MIGA = Multilateral Investment Guarantee Agency; MS+ = moderately satisfactory and above; MSW = municipal solid waste; n.a. = not applicable (there are no evaluated IFC or MIGA projects).

a. MSW share of project commitments

b. Matured in case of IFC/MIGA. IFC net commitments = original less canceled commitment.

c. MIGA amount is gross exposure amount.

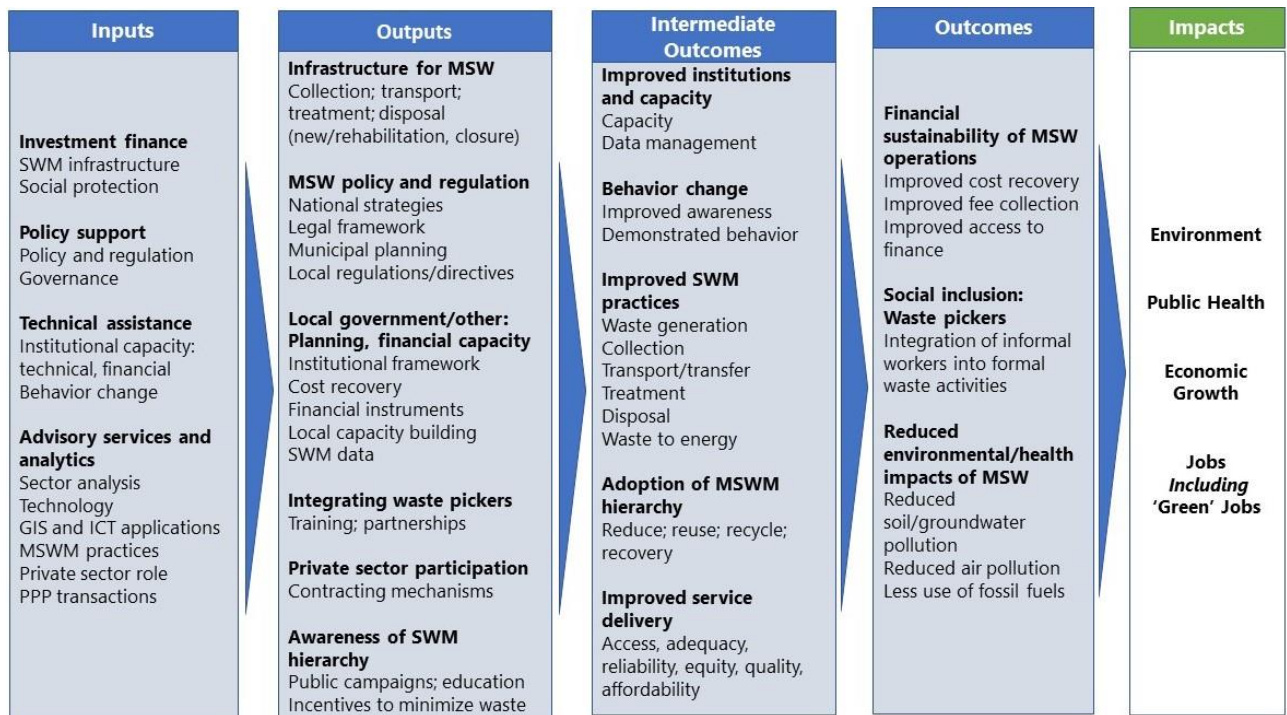
The data have been verified with IFC and MIGA counterparts. The World Bank portfolio will be verified with the Global Sector Group for MSW after it completes its ongoing portfolio identification exercise.

## Appendix D. Evaluation Methodology and Design

### Evaluation Methodology

The evaluation will be based on a World Bank Group theory of change for the municipal solid waste (MSW) sector, which is consistent with and expands on the general theory of change presented in figure 4.1 (figure D.1). The evaluation will source evidence from the Bank Group portfolio; feedback from stakeholders; a targeted literature review; country-level case studies; and illustrative studies on health impacts, spatial analysis, and information and communication technology (ICT) applications relating to MSW.

Figure D.1. Municipal Solid Waste Management: World Bank Group Theory of Change



Source: Independent Evaluation Group.

Note: GIS = geographic information systems; ICT = information and communication technology; MSW = municipal solid waste; MSWM = municipal solid waste management; PPP = public-private partnership; SWM = solid waste management

The evaluation design adopts an overall portfolio-level and country-level analysis and combines quantitative and qualitative evaluative evidence gathered through the following modules:

- **Portfolio-level.** (i) targeted literature review; (ii) portfolio review and analysis including deep dives on prioritized issues; and (iii) interviews with stakeholders

- **Country-based.** (iv) country-level case studies; (v) country strategy analysis; (vi) reviews of relevant Project Performance Assessment Reports (PPARs); and (vii) illustrative studies on health impacts, spatial analysis, and ICT applications.

## Portfolio-Level Modules

**Targeted literature review.** This will selectively cover the wider research, publications, and analytical news features from prominent sources on MSW; the Bank Group’s research papers, reports, publications, and other economic and sector work; and relevant literature and publications from the Tokyo Development Learning Center and multilateral development banks and bilateral donors. The review will mainly cover products from fiscal years (FY)10–20 but will reach back to earlier years as needed to support individual desk and country case studies.

**Portfolio review analysis.** The portfolio analysis will cover the identified cohort of projects approved or closed during fiscal years 2010–20 (table C.1). Targeted data and information will be extracted from project appraisal documents, Implementation Completion and Results Reports, the Independent Evaluation Group’s Implementation Completion and Results Report Reviews, Expanded Project Supervision Reports, Project Completion Reports, Project Evaluation Reports, and PPARs.

Key performance indicators for all operations will be mapped to outputs and outcomes in the results framework and will be rated on a four-point scale. These output and outcome level ratings will be used to produce a disaggregated and nuanced picture of performance in terms of key outputs and outcomes. The mapping of these indicators can also aid in tracing causality between outputs and outcomes.

**Interviews with stakeholders.** Semistructured interview formats will be used for stakeholder interviews. The evaluation team will work with the methods team to develop these instruments and innovative means of gathering feedback. The evaluation team will aim to cover all Bank Group staff and management that have significant dealings with MSW. For other categories of stakeholders, the team will be more selective to keep the numbers manageable and remain within the resource envelope while ensuring representative coverage. Bank Group operations staff and management in relevant Global Practices dealing with MSW issues will be covered: urban, environment, water, health, and education. The range of other stakeholders that will be covered are multilateral banks and bilateral developmental agencies (Asian Development Bank, African Development Bank, Japan International Cooperation Agency, UK Department for International Development), leading policy-making organizations: European Union, United Nations Environment Programme, and the United Nations High Commissioner for Refugees, and leading academics and researchers in the field. Country-level case



studies (discussed further in the following section) will provide the opportunity to cover national, state, and local government officials; civil society organizations; private firms; think tanks; beneficiaries; waste pickers; and facilities for waste treatment. The evaluation team has already completed a preliminary round of interviews with selected managerial and operational staff in the World Bank and the International Finance Corporation (IFC) to gather input for this approach paper.

## **Country-Based Modules**

**Country-level case studies.** The evaluation team will prepare case studies in about seven selected countries, all of which will be desk-based in view of COVID-19–related travel restrictions. The case studies will cover Bank Group interventions and efforts by other multilateral and bilateral developmental agencies, and the governments. The countries will be chosen for balanced coverage of all World Bank lending regions; breadth of World Bank, IFC, and Multilateral Investment Guarantee Agency lending involvement; country income level; country size; salient issues; and relative emphasis on MSW. Potential case study countries are listed in table D.1. The findings from the country-level case studies will result in a comparative analysis across policy, legal, and regulatory frameworks, and three key outcomes: financial sustainability; social inclusion, including gender; and reduced environmental pollution; additionally, they will assess the readiness for transitioning to a circular economy. The country-level case studies will also reveal reasons for different levels of engagement in different country groups. Detailed protocols for the country-level case studies will be prepared with inputs from the methods team.

**Country strategy analysis.** Country Partnership Strategies/Frameworks, Systematic Country Diagnostics, and related Independent Evaluation Group reviews will be assessed for all countries for the past 10 years. These documents will be analyzed in terms of MSW issues raised, strategies proposed, and specific proposals for a work program.

**PPARs.** PPARs for one project each in Azerbaijan and Liberia (landfill rehabilitation; capacity building), and Morocco (development policy support covering MSW management [MSWM]) will provide inputs to the evaluation. It is proposed that in the absence of international travel, these assessments will be carried out with the support of local consultants and institutions, and through web-based video or audio meetings with stakeholders. The evaluation will also draw on findings from an earlier PPAR for a project in Brazil.

**Nested project-level case-based analysis.** The evaluation will look at selected projects within country-level case studies in more detail. This would include interviews with

relevant project stakeholders and project documents desk review. Under the country-level case studies, comparative analysis of a typology of projects will be carried out across countries (for example, landfill rehabilitation, MSWM capacity strengthening, and so on). Each type of project will also be looked at in more detail, in terms of performance and outcomes in multiple contexts, which strengthens both internal validity (the ability to say something about outcomes or impact) and external validity (generalizability) of findings.

**Illustrative studies – health impacts, spatial analysis, ICT applications.** Illustrative studies on health impacts, spatial analysis, and use of ICT applications in MSWM will be prepared (table D.1). It is proposed that an Independent Evaluation Group academic fellow with appropriate background be co-opted to study the health and environmental impacts of MSW for one or two case study countries. <sup>1</sup> Team members with prior experience on the subject will carry out the studies on spatial analysis and ICT applications. These studies will also be carried out through local consultants and institutions and web-based video or audio meetings. The precise scope and content of these studies may need to be adjusted in the face of travel restrictions and availability of qualified local consultants.

**Table D.1. Potential Case Study Countries**

Country	Region	Income Category	World Bank Group Projects (no.)	MSW Commitment (\$, millions)	Salient Issues
Azerbaijan	ECA	UMIC	2	110	<ul style="list-style-type: none"> <li>• Landfill; legacy issues</li> </ul>
Brazil	LAC	UMIC	8	115	<ul style="list-style-type: none"> <li>• Sanitary landfill; carbon offset</li> </ul>
China	EAP	UMIC	17	455	<ul style="list-style-type: none"> <li>• Waste to energy; soil/water pollution; marine plastic pollution</li> </ul>
Colombia	LAC	UMIC	3	289	<ul style="list-style-type: none"> <li>• Local government accountability</li> </ul>
Ghana	AFR	LMIC	1	42	<ul style="list-style-type: none"> <li>• Private participation; waste pickers</li> </ul>
India	SAR	LMIC	5	346	<ul style="list-style-type: none"> <li>• Urban flooding; national cleanliness drive/ program; marine plastic pollution</li> </ul>
Indonesia	EAP	LMIC	7	146	<ul style="list-style-type: none"> <li>• Local government capacity building; cost recovery;</li> </ul>

Country	Region	Income Category	World Bank	MSW	Salient Issues
			Group Projects (no.)	Commitment (\$, millions)	
Liberia	AFR	LIC	1	15	<ul style="list-style-type: none"> <li>Landfill; local government capacity; waste pickers</li> </ul>
Morocco	MNA	LMIC	4	464	<ul style="list-style-type: none"> <li>DPL instrument</li> </ul>
Philippines	EAP	LMIC	5	123	<ul style="list-style-type: none"> <li>Marine plastic pollution</li> </ul>
Tanzania	AFR	LIC	1	103	<ul style="list-style-type: none"> <li>Private participation; waste pickers</li> </ul>
West Bank Gaza	MNA	LMIC	3	23.6	<ul style="list-style-type: none"> <li>Output based aid project, financial sustainability, waste pickers, ICT for citizen engagement and education</li> </ul>

Source: World Bank Business Warehouse; IFC, MIGA databases.

Note: AFR = Africa; DPL = development policy loan; EAP = East Asia and Pacific; ECA = Europe and Central Asia; LAC = Latin America and the Caribbean; LIC = low-income country; LMIC = low-middle-income country; MNA = Middle East and North Africa; MSW = municipal solid waste; SAR = South Asia; UMIC = upper-middle-income country.

## Data Collection and Analysis

Table D.2 highlights the main sources of data, information, and analysis for addressing each evaluation question.

**Table D.2. Methodological Building Blocks of the Evaluation**

Data Collection and Analysis Methods			Data Sources
Literature review	Targeted literature review		Selected articles from academic journals; economics and financial news magazines; in-depth newspaper features
PRA	Portfolio review analysis and related deep dives; key performance indicator analysis for World Bank /IFC/MIGA investments and guarantees		Project documents; IEG ICR reviews; XPSRs; IEG PPARs
World Bank ASA analysis	Advisory services and analytics analysis		Advisory services and analytics: Documents; workshop reports; policy notes
IFC AS	IFC advisory services		IFC advisory services: Completion notes; IEG evaluation notes; evaluations
Interviews	Interviews with stakeholders		World Bank Group: World Bank /IFC/MIGA operational staff and management: task team leaders, investment officers, technical specialists, management in HQ and selected country offices (Bank Group interviews)

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		<p>External experts: Sector and technical experts: selected internationally recognized experts—practitioners and researchers in MSWM</p> <p>State/federal government officials: Ministries of urban government; environment; sanitation; health; social protection</p> <p>Project implementation units: For World Bank projects</p> <p>Client companies: For IFC investments</p> <p>Research institutions: Researchers; academics</p> <p>Local government officials: Officials in charge of MSWM</p> <p>Civil society: Households; small business establishments; civil society organizations; beneficiaries; MSW workers</p> <p>Informal sector: Waste pickers; middlemen</p>
CSA	Country strategy analysis	Country Assistance Strategies/Country Partnership Frameworks; Systematic Country Diagnostics for past 15 years
Illustrative studies	Illustrative studies—health impacts; spatial analysis and ICT for planning and monitoring	<p>Health Impacts: Tailored study in one or two CCS countries based on desk review, field observations, and interviews with stakeholders</p> <p>Spatial analysis and ICT applications: Tailored study in one or two CCS countries based on secondary data; interviews with stakeholders</p>
PPARs	Project performance assessment reports	IEG project assessments (to be carried out with the support of local consultants in the absence of international travel)
Field CCS <i>(none planned currently; some desk CCS may be partly converted to field if travel restrictions are lifted)</i>	Field-based country-level case studies	Literature review; PRA; World Bank ASA analysis; IFC AS; (interviews: all categories); CSA; illustrative studies (one or more each for health effects, spatial analysis, and ICT applications); nested project-level case-based analysis. (The health effects study will be designed in one or two case study countries, and will use a targeted literature survey, interviews with stakeholders, and a limited sample survey; the spatial analysis and ICT study will build on existing work being carried out in a case study country for which a partner will be identified)
Desk CCS	Desk-based country-level case studies	Literature review; PRA; World Bank ASA analysis; IFC AS; (interviews: Bank Group; external experts only; to be carried out with the support of local consultants and institutions in the absence of international travel); CSA
Discussions with OECD institutions and SWM forums	Discussions with selected institutions in OECD countries: for example, OECD; International Solid Waste Association; City of Yokohama International Cooperation Department	Developments in new technology; new MSWM practices geared toward circular economy principles; extended producer responsibility; knowledge exchange initiatives; technology transfer

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Note: AS = advisory services (IFC); ASA = advisory services and analytics (World Bank); CCS = country-level case studies; CSA = country strategy analysis; HQ = headquarters; ICR = Implementation Completion and Results Report; ICT = information and communication technology; IEG = Independent Evaluation Group; IFC = International Finance Corporation; MIGA = Multilateral Investment Guarantee Agency; MSW = municipal solid waste; MSWM = municipal solid waste management; OECD = Organisation for Economic Co-operation and Development; PPAR = Project Performance Assessment Report; PRA = portfolio review analysis; SWM = solid waste management; XPSR = Expanded Project Supervision Report.

Table D.3. Evaluation Design Matrix

Key Questions	Data Collection and Analysis Methods	Information Required and Sources	Strengths and Limitations
<p><b>EQ1. How relevant is the World Bank Group’s approach to meeting client country needs for MSWM?</b></p> <p><b>EQ1 a.</b> What explains the level, scope, and geographical location of Bank Group MSWM engagements (lending and nonlending) over the evaluation period?</p>	<ul style="list-style-type: none"> <li>Literature review</li> <li>Country strategy analysis</li> <li>Portfolio review and analysis</li> <li>Case-based project-level analysis</li> <li>World Bank ASA and IFC AS analysis based on desk review and interviews with team leaders of a representative sample</li> <li>Interviews: Bank Group</li> <li>Interviews: All categories (for CCS countries)</li> </ul>	<ul style="list-style-type: none"> <li>Assessment of country needs (CSA, literature review; World Bank ASA; interviews)</li> <li>Bank Group’s engagement (PRA; World Bank ASA; IFC AS; interviews)</li> <li>Efforts made to increase engagement, including those that may have been inconclusive or resulted in operations and reasons therefor</li> </ul>	<p>The feedback from the literature review, interviews with Bank Group task team leaders and management; external experts; and respondents in the CCSs will help triangulate and confirm the main internal and external drivers of the scope of the Bank Group’s engagement in MSWM.</p>
<p><b>EQ1 b.</b> To what extent has the Bank Group’s approach reflected the latest evidence on MSWM practices, including their relevance and application to low- and middle-income client countries taking into account country context and readiness?</p>	<ul style="list-style-type: none"> <li>Literature review</li> <li>Country strategy analysis; case-based project-level analysis</li> <li>Interviews: Bank Group</li> <li>Interviews: External experts</li> <li>Interviews: All categories (for CCS countries)</li> </ul>	<ul style="list-style-type: none"> <li>All the items mentioned under “Data Collection and Analysis Methods” in this row are expected to inform the study, especially evidence on MSWM practices, including their relevance and application to low- and middle-income client countries</li> </ul>	<p>Systematic comparative information relating to country MSWM needs is mainly available from World Bank and United Nations sources. This will be supplemented by country-specific sources where available.</p>
<p><b>EQ2. How effective have Bank Group engagements been in delivering improved MSWM for clients?</b></p> <p><b>EQ2 a.</b> What key results associated are with Bank Group</p>	<ul style="list-style-type: none"> <li>Portfolio review and analysis</li> <li>Case-based project-level analysis World Bank ASA analysis; IFC AS</li> </ul>	<ul style="list-style-type: none"> <li>Project components/ KPIs mapped to cost recovery and financial sustainability; findings from PPARs</li> <li>Magnitude and trends in cost</li> </ul>	<p>Data relating to cost recovery and financial sustainability and for health impacts of MSWM may not be systematically collected or analyzed in most client countries. It may be needed to rely on</p>

Key Questions	Data Collection and Analysis Methods	Information Required and Sources	Strengths and Limitations
engagements in MSWM over the evaluation period?	<ul style="list-style-type: none"> <li>Interviews: Bank Group</li> <li>Interviews: All categories (for CCS countries)</li> </ul>	recovery and financial sustainability of MSWM (literature review); CCS	stylized facts or anecdotal evidence in some cases.
<b>EQ2 b.</b> How and to what extent have these results contributed to MSWM outcomes for client cities and countries?	<ul style="list-style-type: none"> <li>Literature review</li> <li>Portfolio review and analysis</li> <li>Case-based project-level analysis</li> <li>World Bank ASA analysis; IFC AS</li> <li>Interviews: Bank Group</li> <li>Interviews: All categories (for CCS countries)</li> <li>Illustrative studies: Health impacts</li> </ul>	<ul style="list-style-type: none"> <li>Project components/ KPIs; findings from PPARs</li> <li>Findings from ASA</li> <li>Interviews: CCS; national research institutions</li> </ul>	Same as for EQ2 a. Further, the findings from the proposed illustrative studies in one or two countries will depend on the sample size that can be covered within the schedule and budget.
<b>EQ3. How coherent has Bank Group engagement been in MSWM?</b> <b>EQ3 a.</b> How well have the World Bank, IFC, and MIGA collaborated to meet client needs for MSWM?	<ul style="list-style-type: none"> <li>Portfolio review and analysis</li> <li>Bank ASA; IFC AS</li> <li>Interviews: Bank Group</li> <li>Interviews: All categories (for CCS countries)</li> </ul>	<ul style="list-style-type: none"> <li>Project components/ KPIs; findings from PPARs</li> <li>Findings from ASA</li> </ul>	Interviews with Bank Group task team leaders and managers can be a very valuable source of information on the institutional factors, capacity, and level of collaboration across units and sectors within the Bank Group and corresponding relationships among client ministry counterparts.
<b>EQ3 b.</b> How and to what extent has the Bank Group supported client country needs for private sector participation in service provision and as a source of finance, and in applying the	<ul style="list-style-type: none"> <li>Case-based project-level analysis</li> <li>Bank ASA; IFC AS</li> <li>Interviews: Bank Group</li> <li>Interviews: All categories (for CCS countries)</li> </ul>	<ul style="list-style-type: none"> <li>Portfolio review and analysis</li> <li>World Bank ASA findings; IFC AS</li> </ul>	Interviews with Bank Group task team leaders and managers can be a very valuable source of information on the institutional factors, capacity, and factors driving or inhibiting the cascade effort.

Key Questions	Data Collection and Analysis Methods	Information Required and Sources	Strengths and Limitations
'cascade' approach to MSWM projects?			
<b>EQ3 c.</b> How well have Bank Group institutions partnered with other actors to support better outcomes in MSWM?	<ul style="list-style-type: none"> <li>• Case-based project-level analysis</li> <li>• Bank ASA; IFC AS</li> <li>• Discussions (interviews) with multilateral and bilateral development agencies; OECD institutions and SWM forums</li> <li>• Interviews: All categories (for CCS countries)</li> </ul>	<ul style="list-style-type: none"> <li>• Plans and initiatives for collaboration between OECD countries and "hot spot" countries for technical assistance and technology transfer</li> </ul>	The extent of evidence-based findings may be limited. A significant amount of information may be strategic and forward looking.

*Note:* AS = advisory services (IFC); ASA = advisory services and analytics (World Bank); CCS = country-level case studies; CSA = country strategy analysis; IFC = International Finance Corporation; KPI = key performance indicator; MSWM = municipal solid waste management; OECD = Organisation for Economic Co-operation and Development; PPAR = Project Performance Assessment Report; PRA = portfolio review analysis; SWM = solid waste management.

<sup>1</sup> A candidate for the Independent Evaluation Group academic fellow program, with expertise on health and environment, has been proposed to work in conjunction with one or two country-level case study/ Project Performance Assessment Reports for the illustrative study on health impacts of municipal solid waste management.