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OVERVIEW

# WHAT A WASTE 2.0

## A Global Snapshot of Solid Waste Management to 2050

Silpa Kaza, Lisa Yao, Perinaz Bhada-Tata, and Frank Van Woerden

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# What a Waste 2.0

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# What a Waste 2.0

## A Global Snapshot of Solid Waste Management to 2050

Silpa Kaza, Lisa Yao, Perinaz Bhada-Tata, and Frank Van Woerden

With Kremena Ionkova, John Morton, Renan Alberto Poveda, Maria Sarraf, Fuad Malkawi, A.S. Harinath, Farouk Banna, Gyongshim An, Haruka Imoto, and Daniel Levine

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# Contents of *What a Waste 2.0: A Global Snapshot of Solid Waste Management to 2050*


**Foreword** xi

**Acknowledgments** xiii

**Abbreviations** xvii

**1 Introduction** 1
A Note on Data 9
Notes 13
References 13

**2 At a Glance: A Global Picture of Solid Waste Management** 17
Key Insights 17
Waste Generation 18
Projected Waste Generation 24
Waste Composition 29
Waste Collection 32
Waste Disposal 34
Special Wastes 36
Notes 37
References 37

**3 Regional Snapshots** 39
East Asia and Pacific 39
Europe and Central Asia 46
Latin America and the Caribbean 53
Middle East and North Africa 59
North America 66

South Asia 69
Sub-Saharan Africa 76
References 83
Additional Resources 84

**4 Waste Administration and Operations 87**
Key Insights 87
Solid Waste Regulations 89
Solid Waste Planning 91
Institutions and Coordination 93
Waste Management Operations 94
References 99

**5 Financing and Cost Recovery for Waste Management Systems 101**
Key Insights 101
Waste Management Budgets 102
Waste Management Costs 103
Waste Management Financing 105
References 112

**6 Waste and Society 115**
Key Insights 115
Environment and Climate Change 116
Technology Trends 121
Citizen Engagement 126
Social Impacts of Waste Management and the Informal Sector 129
Notes 133
References 133
Additional Resources 139

**7 Case Studies 141**
1. A Path to Zero Waste in San Francisco, United States 141
2. Achieving Financial Sustainability in Argentina and Colombia 143
3. Automated Waste Collection in Israel 147
4. Cooperation between National and Local Governments for Municipal Waste Management in Japan 148
5. Central Reforms to Stabilize the Waste Sector and Engage the Private Sector in Senegal 151
6. Decentralized Organic Waste Management by Households in Burkina Faso 152
7. Eco-Lef: A Successful Plastic Recycling System in Tunisia 153
8. Extended Producer Responsibility Schemes in Europe 155
9. Financially Resilient Deposit Refund System: The Case of the Bottle Recycling Program in Palau 158

10. Improving Waste Collection by Partnering with the Informal Sector in Pune, India 161
11. Improving Waste Management through Citizen Communication in Toronto, Canada 163
12. Managing Disaster Waste 165
13. Minimizing Food Loss and Waste in Mexico 167
14. Sustainable Source Separation in Panaji, India 170
15. Musical Garbage Trucks in Taiwan, China 173
16. The Global Tragedy of Marine Litter 174
17. Using Information Management to Reduce Waste in Korea 176
Notes 177
References 177
Additional Resources 180

**Appendix A Waste Generation (tonnes per year) and Projections by Country or Economy 185**

**Appendix B Waste Treatment and Disposal by Country or Economy 231**

# Foreword

As you will see in this report, the world is on a trajectory where waste generation will drastically outpace population growth by more than double by 2050. Although we are seeing improvements and innovations in solid waste management globally, it is a complex issue and one that we need to take urgent action on.

Solid waste management affects everyone; however, those most affected by the negative impacts of poorly managed waste are largely society's most vulnerable—losing their lives and homes from landslides of waste dumps, working in unsafe waste-picking conditions, and suffering profound health repercussions.

Too often, the environment also pays a high price. In 2016, the world generated 242 million tonnes of plastic waste—12 percent of all municipal solid waste. Plastic waste is choking our oceans, yet our consumption of plastics is only increasing. Cities and countries are rapidly developing without adequate systems in place to manage the changing waste composition of citizens.

Meanwhile, an estimated 1.6 billion tonnes of carbon dioxide–equivalent ($CO_2$-equivalent) greenhouse gas emissions were generated from solid waste management in 2016. This is about 5 percent of global emissions. Without improvements in the sector, solid waste–related emissions are anticipated to increase to 2.6 billion tonnes of $CO_2$-equivalent by 2050. More than 80 countries committed to reduce emissions through the historic 2017 Paris Agreement—improving waste management is one way of contributing to this effort.

Solid waste management is a critical—yet often overlooked—piece for planning sustainable, healthy, and inclusive cities and communities for all. However, waste management can be the single highest budget item for

many local administrations. Municipalities in low-income countries are spending about 20 percent of their budgets on waste management, on average—yet over 90 percent of waste in low-income countries is still openly dumped or burned. As these cities and countries grow rapidly, they desperately need systems to manage their growing waste and mechanisms to pay for the essential services that keep their citizens healthy and their communities clean.

We need cities and countries to plan holistically and manage our precious resources better than we have in the past. This report shows what governments around the world have done to manage their solid waste and highlights the latest trends across income levels and geographies. Building on *What a Waste: A Global Review of Solid Waste Management* from 2012, this report highlights the overwhelming cost of waste management and the need for solutions.

Using the rich findings and data from this report, I urge stakeholders to think ahead and to integrate waste management into their paradigm of economic growth and innovation. It is the responsibility of every citizen, government, business, city, and country to create the healthy, inclusive, and livable shared world that we strive for.

Ede Ijjasz-Vasquez
Senior Director
Social, Urban, Rural and Resilience Global Practice
The World Bank

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- Chapter 2 (At a Glance: A Global Picture of Solid Waste Management) was written by Silpa Kaza and Lisa Yao
- Chapter 3 (Regional Snapshots) was written by Silpa Kaza and Lisa Yao with inputs from regional focal points
- Chapter 4 (Waste Administration and Operations) was written by Lisa Yao with contributions from Frank Van Woerden
- Chapter 5 (Financing and Cost Recovery for Waste Management Systems) was written by Lisa Yao with contributions from Frank Van Woerden

- Chapter 6 (Waste and Society) was written by Silpa Kaza, Lisa Yao, and Perinaz Bhada-Tata with contributions from Frank Van Woerden
- Chapter 7 (Case Studies) was edited by Lisa Yao and Silpa Kaza and written by Perinaz Bhada-Tata, Thierry Martin, Kevin Serrona, Ritu Thakur, Flaviu Pop, Shiko Hayashi, Gustavo Solorzano, Nadya Selene Alencastro Larios, Renan Alberto Poveda, and Anis Ismail

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**Tokyo Development Learning Center**

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CHAPTER 1

# Introduction

Solid waste management is a universal issue affecting every single person in the world. Individuals and governments make decisions about consumption and waste management that affect the daily health, productivity, and cleanliness of communities. Poorly managed waste is contaminating the world's oceans, clogging drains and causing flooding, transmitting diseases via breeding of vectors, increasing respiratory problems through airborne particles from burning of waste, harming animals that consume waste unknowingly, and affecting economic development such as through diminished tourism. Unmanaged and improperly managed waste from decades of economic growth requires urgent action at all levels of society.

As countries develop from low-income to middle- and high-income levels, their waste management situations also evolve. Growth in prosperity and movement to urban areas are linked to increases in per capita generation of waste. Furthermore, rapid urbanization and population growth create larger population centers, making the collection of all waste and the procuring of land for treatment and disposal more and more difficult.

Urban waste management is expensive. Waste management can be the single highest budget item for many local administrations in low-income countries, where it comprises nearly 20 percent of municipal budgets, on average. In middle-income countries, solid waste management typically accounts for more than 10 percent of municipal budgets, and it accounts for about 4 percent in high-income countries. Budget resources devoted to waste management can be much higher in certain cases.

Costly and complex waste operations must compete for funding with other priorities such as clean water and other utilities, education, and health care. Waste management is often administered by local authorities with limited resources and limited capacity for planning, contract

management, and operational monitoring. These factors make sustainable waste management a complicated proposition on the path of economic development, and most low- and middle-income countries and their cities struggle to address the challenges. The impacts of poor waste management are dire and fall disproportionally on the poor, who are often unserved or have little influence on the waste being disposed of formally or informally near their homes.

Waste management data are critical to creating policy and planning for the local context. Understanding how much waste is generated—especially with rapid urbanization and population growth—as well as the types of waste being generated, allows local governments to select appropriate management methods and plan for future demand. This knowledge allows governments to design systems with a suitable number of vehicles, establish efficient routes, set targets for diversion of waste, track progress, and adapt as waste generation patterns change. With accurate data, governments can realistically allocate budget and land, assess relevant technologies, and consider strategic partners, such as the private sector or nongovernmental organizations, for service provision.

This report builds on previous World Bank publications from 2012 and 1999 titled *What a Waste: A Global Review of Solid Waste Management* (Hoornweg and Bhada-Tata 2012) and *What a Waste: Solid Waste Management in Asia* (Hoornweg and Thomas 1999). This current edition of *What a Waste* expands on the type of data collected and includes 217 countries and economies and 367 cities. The data are updated to recent years, and the waste generation data are scaled to a single year to allow for comparison across countries and economies. The projections for waste generation use the most comprehensive database available to date to determine how waste generation dynamically changes based on changes in economic development and population growth. The metrics included in this report expand from solid waste management generation, composition, collection, treatment, and disposal to include information on financing and costs, institutional arrangements and policies, administrative and operational models, citizen engagement, special wastes, and the informal sector.

Although the data from the past and current publications are not fully comparable because of methodological differences, there are some clear trends to report since 2012. The change in the composition of waste in low-income countries reflects changes in consumption patterns—the share of organic waste fell from 64 percent to 56 percent. The collection of waste in low-income countries significantly increased from about 22 percent to 39 percent, reflecting the prioritization of adequate waste collection in cities and countries. This progress is complemented by an overall global trend of increased recycling and composting. Finally, waste-to-energy incineration in upper-middle-income countries markedly increased from 0.1 percent to 10 percent, driven by China's shift to incineration.

*What a Waste 2.0: A Global Snapshot of Solid Waste Management to 2050* targets decision makers, policy makers, and influencers globally,

including local governments, international organizations, academics, researchers, nongovernmental organizations, civil society, and financiers. The aim of this report is to share objective waste management data and trends, as well as good and unique international practices, with the hope of improving waste management globally and enabling the optimal use of limited resources.

The world generates 2.01 billion tonnes of municipal solid waste[1] annually, with at least 33 percent of that—extremely conservatively—not managed in an environmentally safe manner. Worldwide, waste generated per person per day averages 0.74 kilogram but ranges widely, from 0.11 to 4.54 kilograms. Though they only account for 16 percent of the world's population, high-income countries generate about 34 percent, or 683 million tonnes, of the world's waste.

When looking forward, global waste is expected to grow to 3.40 billion tonnes by 2050. There is generally a positive correlation between waste generation and income level. Daily per capita waste generation in high-income countries is projected to increase by 19 percent by 2050, compared to low- and middle-income countries where it is anticipated to increase by approximately 40 percent or more. Waste generation was generally found to increase at a faster rate for incremental income changes at lower income levels than at high income levels. The total quantity of waste generated in low-income countries is expected to increase by more than three times by 2050. The East Asia and Pacific region is generating most of the world's waste, at 23 percent, and the Middle East and North Africa region is

**Figure O.1 Waste Generation and Gross Domestic Product**

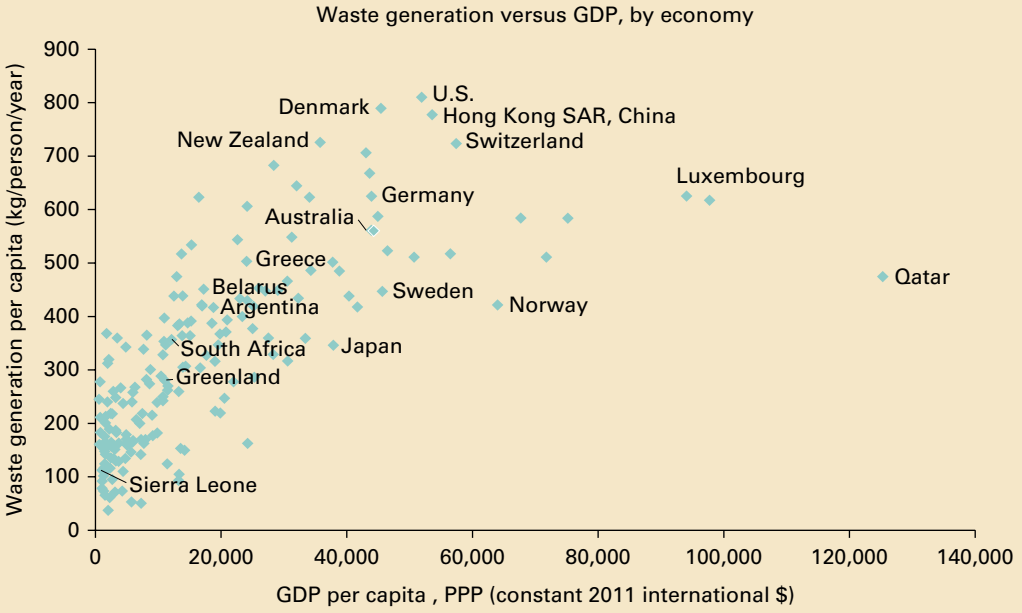
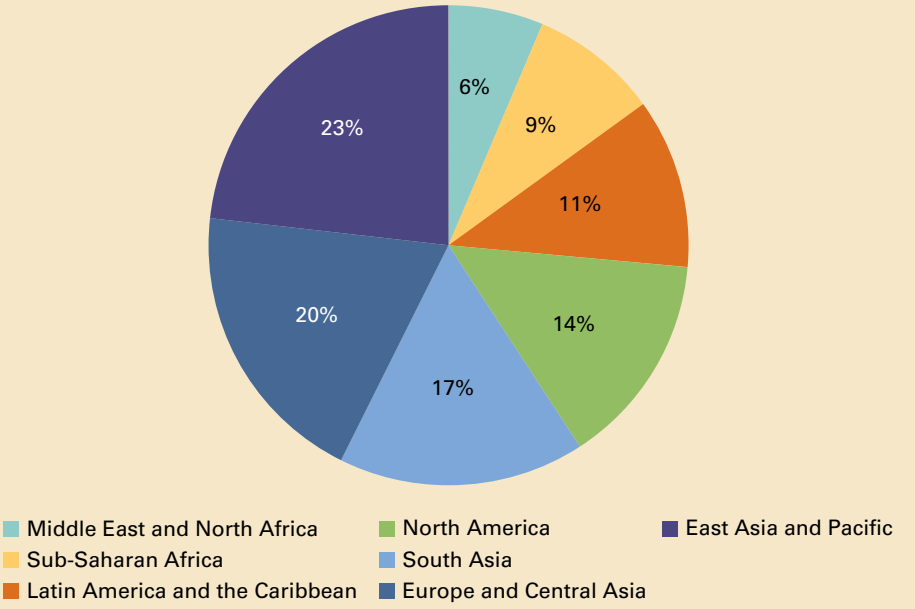
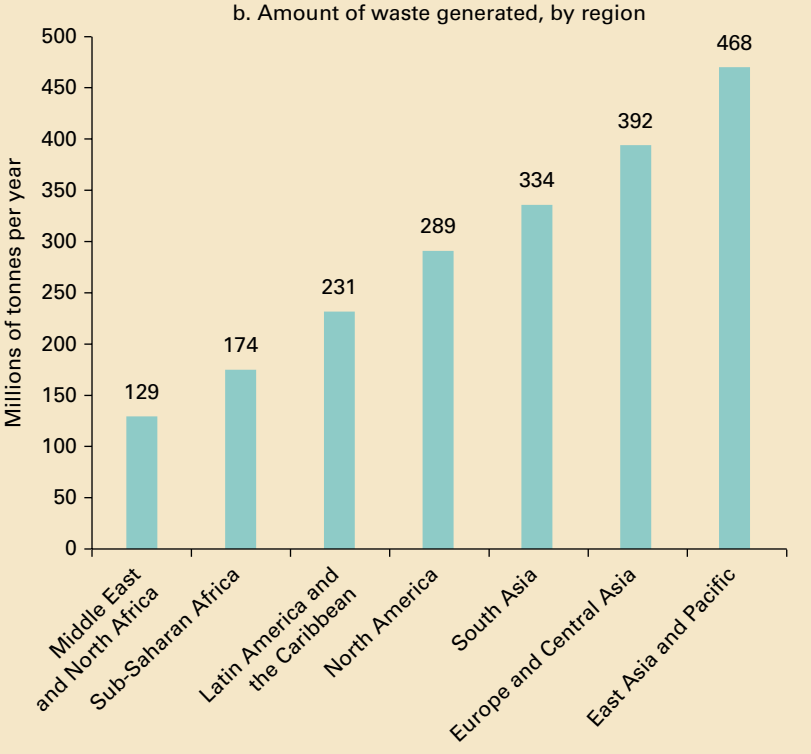


**Figure O.2 Waste Generation by Region**

a. Share of waste generated, by region
*percent*




b. Amount of waste generated, by region




*Note:* Data adjusted to 2016.

**Photo O.1 Plastic Waste at the Thilafushi Waste Disposal Site, Maldives**

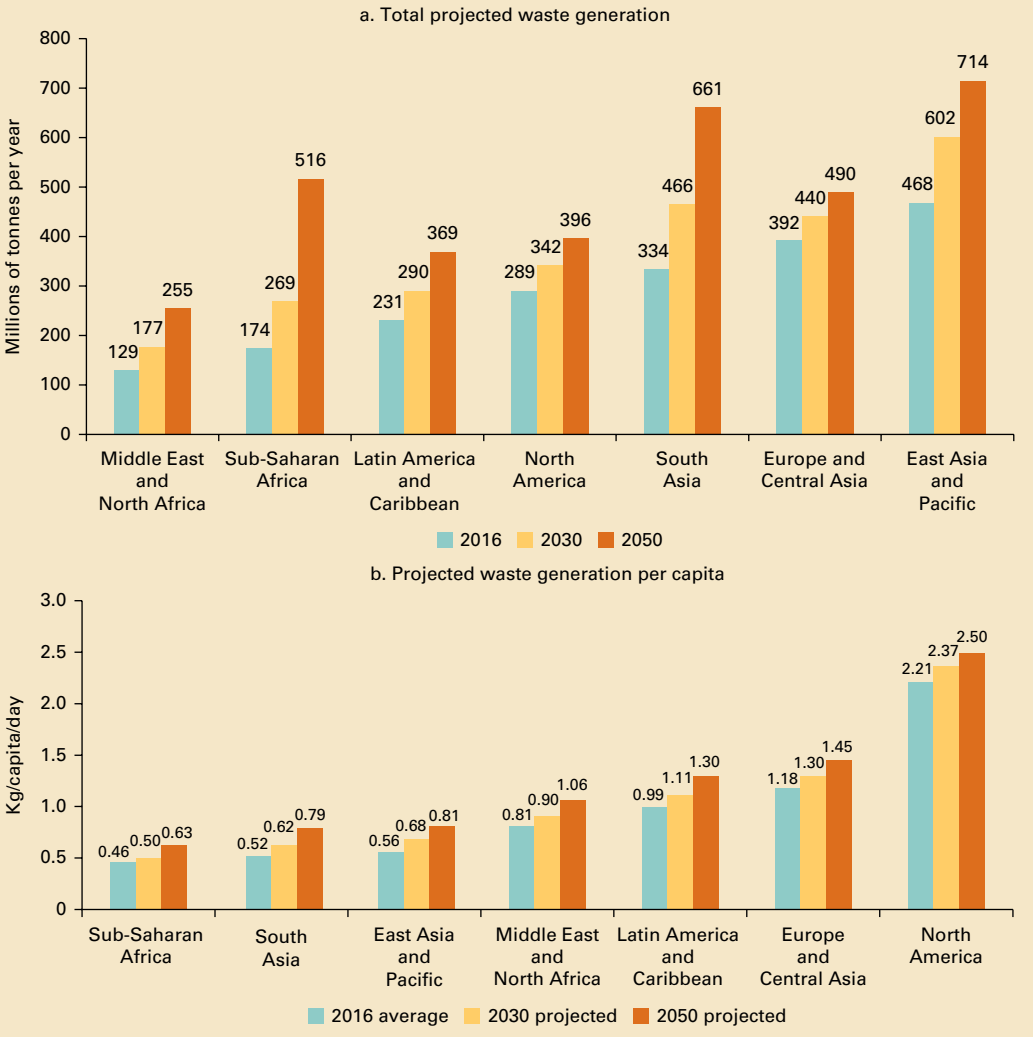
**Photo O.2 A Recycler Transports Waste Using a Modified Motorcycle, Bangkok, Thailand**

producing the least in absolute terms, at 6 percent. However, the fastest growing regions are Sub-Saharan Africa, South Asia, and the Middle East and North Africa where, by 2050, total waste generation is expected to nearly triple, double and double, respectively. In these regions, more than half of waste is currently openly dumped, and the trajectories of waste

growth will have vast implications for the environment, health, and prosperity, thus requiring urgent action.

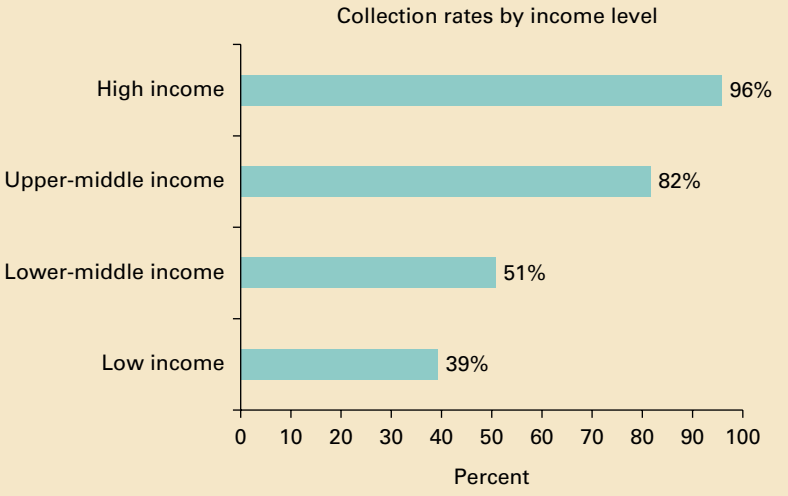
Waste collection is a critical step in managing waste, yet rates vary largely by income levels, with upper-middle- and high-income countries providing nearly universal waste collection. Low-income countries collect about 48 percent of waste in cities, but this proportion drops drastically to 26 percent outside of urban areas. Across regions, Sub-Saharan Africa collects about 44 percent of waste while Europe and Central Asia and North America collect at least 90 percent of waste.

**Figure O.3 Projected Waste Generation by Region**




*Note:* kg = kilogram.

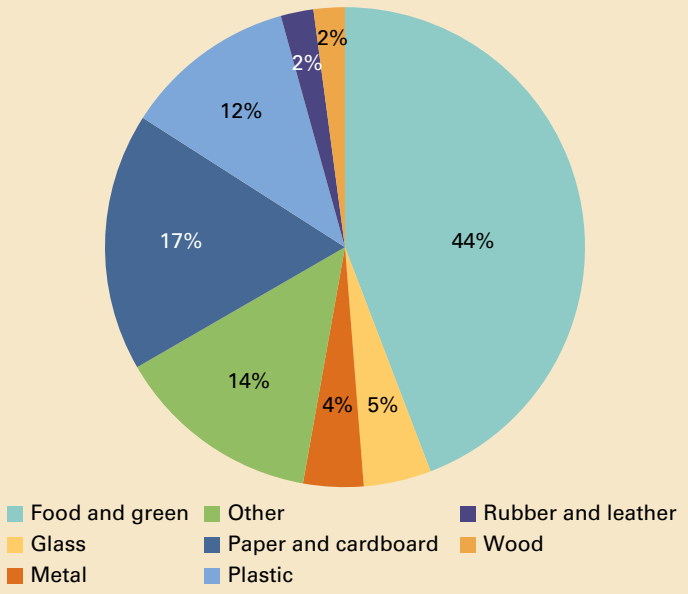
**Figure O.4 Waste Collection Rates**




Waste composition differs across income levels, reflecting varied patterns of consumption. High-income countries generate relatively less food and green waste, at 32 percent of total waste, and generate more dry waste that could be recycled, including plastic, paper, cardboard, metal, and glass, which account for 51 percent of waste. Middle- and low-income countries generate 53 percent and 56 percent food and green waste, respectively, with the fraction of organic waste increasing as economic development levels decrease. In low-income countries, materials that could be recycled account for only 16 percent of the waste stream. Across regions, there is not much variety within waste streams beyond those aligned with income. All regions generate about 50 percent or more organic waste, on average, except for Europe and Central Asia and North America, which generate higher portions of dry waste.

It is a frequent misconception that technology is the solution to the problem of unmanaged and increasing waste. Technology is not a panacea and is usually only one factor to consider when managing solid waste. Countries that advance from open dumping and other rudimentary waste management methods are more likely to succeed when they select locally appropriate solutions. Globally, most waste is currently dumped or disposed of in some form of a landfill. Some 37 percent of waste is disposed of in some form of a landfill, 8 percent of which is disposed of in sanitary landfills with landfill gas collection systems. Open dumping accounts for about 33 percent of waste, 19 percent is recovered through recycling and composting, and 11 percent is incinerated for final disposal. Adequate waste disposal or treatment, such as controlled landfills or more stringently operated facilities, is almost exclusively the domain of high- and upper-middle-income countries. Lower-income countries generally rely on open dumping; 93 percent of

**Figure O.5 Global Waste Composition**
*percent*




waste is dumped in low-income countries and only 2 percent in high-income countries. Upper-middle-income countries have the highest percentage of waste in landfills, at 54 percent. This rate decreases in high-income countries to 39 percent, with diversion of 35 percent of waste to recycling and composting and 22 percent to incineration. Incineration is used primarily in high-capacity, high-income, and land-constrained countries.

Based on the volume of waste generated, its composition, and how it is managed, it is estimated that 1.6 billion tonnes of carbon dioxide ($CO_2$) equivalent greenhouse gas emissions were generated from solid waste treatment and disposal in 2016, driven primarily by open dumping and disposal in landfills without landfill gas capture systems. This is about 5 percent of global emissions.[2] Solid waste–related emissions are anticipated to increase to 2.6 billion tonnes of $CO_2$-equivalent per year by 2050 if no improvements are made in the sector.

In most countries, solid waste management operations are typically a local responsibility, and nearly 70 percent of countries have established institutions with responsibility for policy development and regulatory oversight in the waste sector. About two-thirds of countries have created targeted legislation and regulations for solid waste management, though enforcement varies drastically. Direct central government involvement in waste service provision, other than regulatory oversight or fiscal transfers, is uncommon, with about 70 percent of waste services being overseen directly by local public entities. At least half of services, from primary waste collection through treatment and disposal, are operated

**Figure O.6 Global Waste Treatment and Disposal**
*percent*

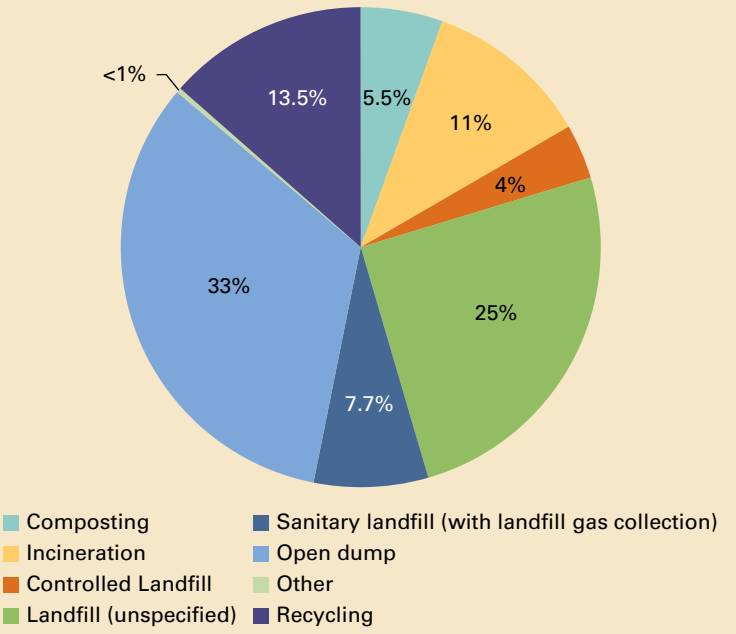
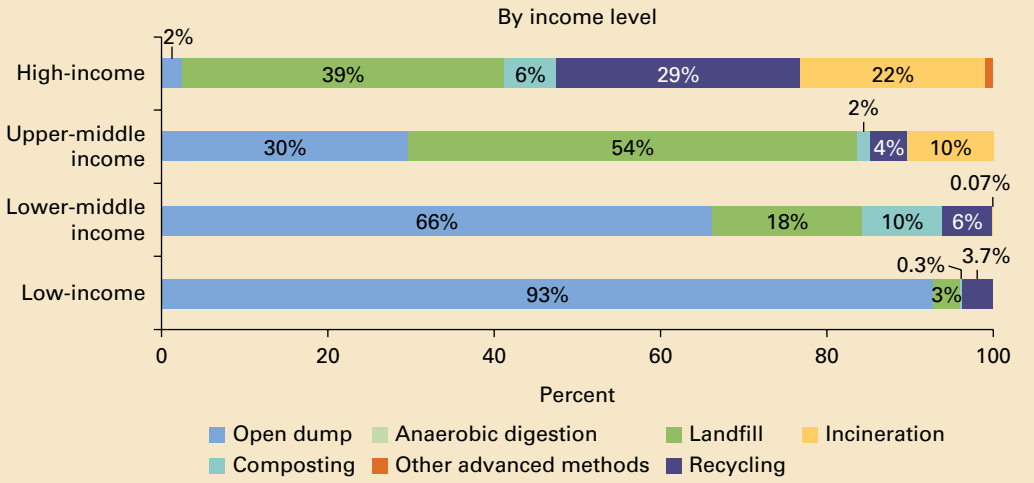



**Figure O.7 Disposal Methods by Income**




by public entities and about one-third involve a public-private partnership. However, successful partnerships with the private sector for financing and operations tend to succeed only under certain conditions with appropriate incentive structures and enforcement mechanisms, and therefore they are not always the ideal solution.

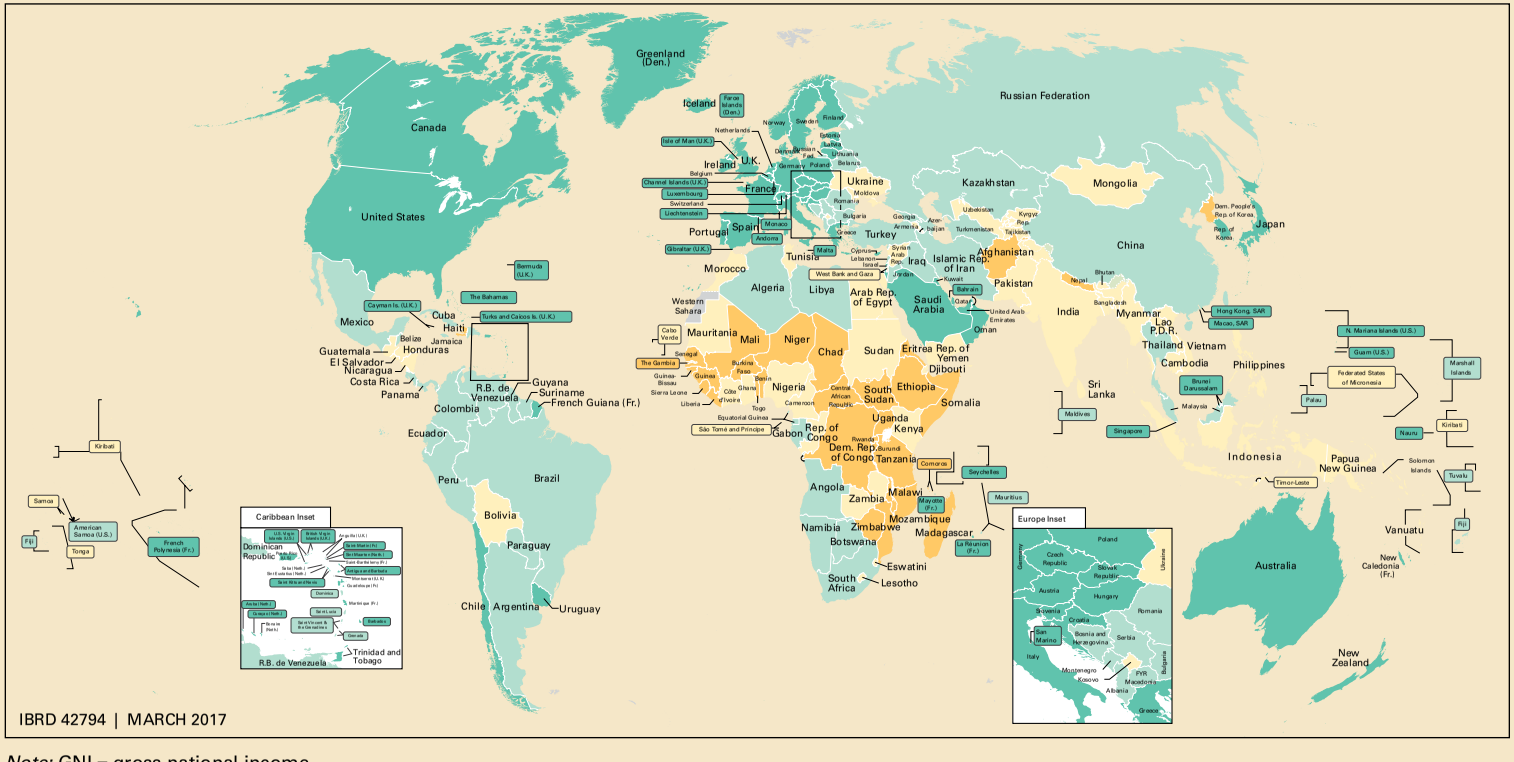
Financing solid waste management systems is a significant challenge, even more so for ongoing operational costs than for capital investments, and operational costs need to be taken into account upfront. In high-income countries, operating costs for integrated waste management, including collection, transport, treatment, and disposal, generally exceed $100 per tonne. Lower-income countries spend less on waste operations in absolute terms, with costs of about $35 per tonne and sometimes higher, but these countries experience much more difficulty in recovering costs. Waste management is labor intensive and costs of transportation alone are in the range of $20–$50 per tonne. Cost recovery for waste services differs drastically across income levels. User fees range from an average of $35 per year in low-income countries to $170 per year in high-income countries, with full or nearly full cost recovery being largely limited to high-income countries. User fee models may be fixed or variable based on the type of user being billed. Typically, local governments cover about 50 percent of investment costs for waste systems, and the remainder comes mainly from national government subsidies and the private sector.

The solid waste data presented in this report tell the story of global, regional, and urban trends. The book presents analyses and case studies in the following chapters:

- *Chapter 2: At a Glance: A Global Picture of Solid Waste Management*. Chapter 2 provides an overview of global solid waste management trends related to waste generation, composition, collection, and disposal.
- *Chapter 3: Regional Snapshots*. Chapter 3 provides analyses of waste generation, composition, collection, and disposal across seven regions—East Asia and Pacific, Europe and Central Asia, Latin America and the Caribbean, the Middle East and North Africa, South Asia, Sub-Saharan Africa, and North America.
- *Chapter 4: Waste Administration and Operations*. Chapter 4 provides planning, administrative, operational, and contractual models for solid waste management.
- *Chapter 5: Financing and Cost Recovery for Waste Management Systems*. Chapter 5 highlights typical financing methods and cost recovery options that are being implemented globally.
- *Chapter 6*: *Waste and Society*. Chapter 6 provides insights into how climate change, technology trends, citizens, and the informal sector all interact with and affect the solid waste management sector.
- *Chapter 7*: *Case Studies*. Chapter 7 details good and unique practices of waste management around the world, from cost recovery to coordination between different levels of government.

Please refer to maps O.1 and O.2 for the definitions of regions and income levels used in this report.

## Map O.1 Definition of Income Levels

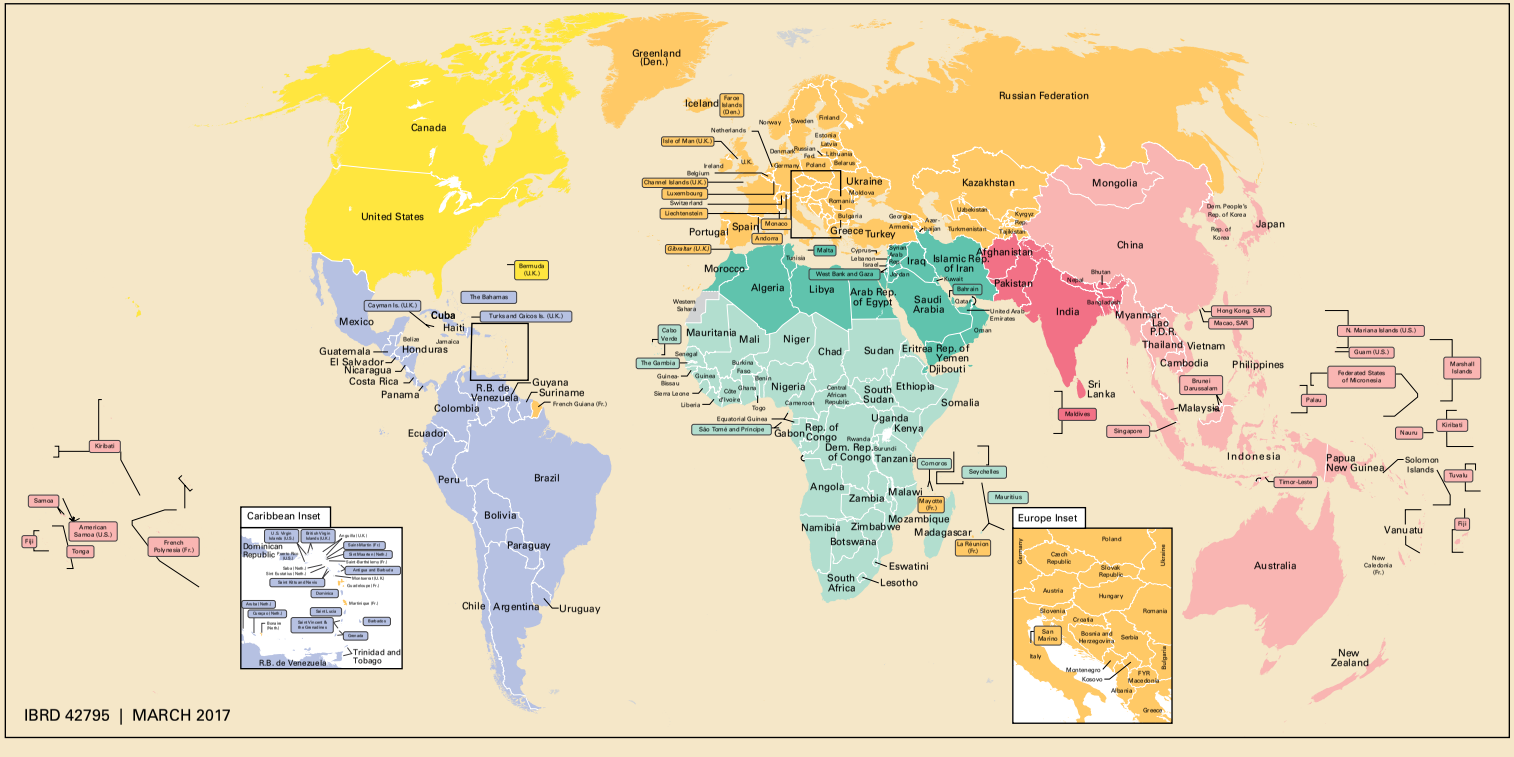



*Note:* GNI = gross national income.

## Map O.2 Definition of Regions

Classified according to World Bank analytical grouping

- East Asia and Pacific
- Europe and Central Asia
- Latin America and the Caribbean
- Middle East and North Africa
- North America
- South Asia
- Sub-Saharan Africa
- No data

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## A Note on Data

The *What a Waste* report compiles solid waste management data from various sources and publications and examines the data to provide meaningful trends and analyses for policy makers and researchers. For the purposes of this report, the definition of solid waste encompasses residential, commercial, and institutional waste. Industrial, medical, hazardous, electronic, and construction and demolition waste are reported separately from total national waste generation to the extent possible. Every effort has been undertaken to verify sources and find the most recent information available.

In general, solid waste data should be considered with a degree of caution because of inconsistencies in definitions, data collection methodologies, and availability. The reliability of solid waste data is influenced by several factors, including undefined words or phrases; incomplete or inconsistent definitions; lack of dates, methodologies, or original sources; inconsistent or omitted units; and estimates based on assumptions. Where possible, actual values are presented rather than estimations or projections, even if that requires using older data. In addition, when a source only provides a range for a data point, the average of the range is used for this study and is noted as such. Given the variety of methodologies used by sources, these data are not meant to be used for ordinal ranking of countries or cities but rather to provide trends.

The data reported are predominantly from 2011–17 although overall data span about two decades. Within a single country or city, data availability may cut across several years. Similarly, the year of origin for a specific indicator may vary across countries or cities. The year cited in the tables refers to the year of the data points. However, when a specific year is not available in the original source, the year of the publication is provided instead. Furthermore, when a year range is reported in the original source, the final year of the range is provided in this report's data set.

At a national level, this *What a Waste* study focuses on total waste generation rather than aggregated urban or rural waste generation because of data availability. By providing total waste generation, this study enables comparison across countries, income levels, and regions. To enable cross-comparability of data, all national waste generation statistics are adjusted to a common year using the methodology discussed in box 2.1., with original figures provided in appendix A. However, because urban data are essential for decision making and benchmarking, this study also reports data and trends from 367 cities.

To further maximize cross-comparability of data, statistics for waste composition, collection rates, and disposal methods are consistently reported as percentages in this report. Therefore, data reported by weight or population in the original sources have been converted to percentages wherever possible, and modifications are noted in the comments.

An overview of the methods used for several core indicators is as follows:

### Solid Waste Generation

- Data on waste generation at the country level are available for 215 countries and economies.
- Sources reported solid waste data in multiple ways, including total waste generation for the country, daily waste generation rates for the country, and per capita waste generation rates for the whole country or urban areas only.
- In rare cases in which national waste generation data were not available, total waste generation was estimated. Rural solid waste generation rates were estimated to be half that of an aggregate urban rate or that of one or more representative cities. The estimate of one-half as a rural-urban waste generation ratio is supported by several studies and is a conservative estimate that falls below trends observed in available data across regions (Karak, Bhagat, and Bhattacharyya 2012; GIZ and SWEEP-Net, various years). Total waste generation for the whole country was calculated by multiplying waste generation rates by urban and rural populations, using World Bank population data. This methodology mainly applied to 31 countries in the Sub-Saharan Africa region and 8 countries in other regions. The methodology followed for the Sub-Saharan Africa region is explained in box O.1. Appendix A indicates whether a national waste generation figure was directly reported or was estimated.

#### Box O.1 Data for the Sub-Saharan Africa Region

The Sub-Saharan Africa region generates a significant amount of solid waste, and this amount is expected to increase at a higher rate than for any other region given the high rate of urbanization and population growth in the coming decades (Hoornweg and Freire 2013). Although data availability is increasing significantly, statistics on waste generation, collection, treatment, and disposal in the region are currently relatively limited. The data that are available can follow varied definitions, methodologies, and collection methods, and span 23 years from 1993 to 2016.

Given the significance of Sub-Saharan Africa for solid waste generation in the future and the recognition of solid waste management as a priority by many national governments, this report provides estimates for waste generation for many African countries for which country-level data are not available.

To develop data-driven estimates, city-level data were used to extrapolate waste generation to the country level. Out of 48 countries in the Sub-Saharan Africa region, data were available at the country level for 13, or slightly more than a quarter of the total. For 31 countries (about 65 percent), one or more city waste generation rates, typically including the capital city, were used to estimate waste generation for the whole country. The city waste generation rate was used as a proxy rate for the urban population in the country. Half of the urban waste generation rate was used as an estimate for rural waste generation. For the remaining four countries for which no city-level data were available, an average waste generation rate for Africa was used as a proxy for the total amount generated for the country using national population.

- In this report, all figures shown use national waste generation statistics that are adjusted to a common base year of 2016, for cross-comparability. This analysis was conducted using the World Bank's World Development Indicators' gross domestic product (GDP) per capita, PPP data (constant 2011 international $) in conjunction with United Nations population statistics (UN 2017). National waste generation rates for 2016 are estimated using a projection model that is further detailed in box 2.1. All original numbers are provided in appendix A.
- Solid waste generation can be estimated or measured at various places, including at the generation source, point of collection, or disposal site, which may affect the amount of waste reported by sources. This report cites the most reliable measurements available.

### Solid Waste Composition

- Waste composition refers to the components of the waste stream as a percentage of the total mass generated.
- In a few cases, composition values do not add up to 100 percent or sum to more than 100 percent when data are cited from multiple sources. Data values provided are as reported in the original source.
- In summary statistics, food, yard, and green waste are combined into one category as food and green waste.

### Waste Collection Coverage

- Waste collection coverage data are reported according to multiple definitions: amount of waste collected, number of households served, population served, or geographic area covered. This report analyzes the type of collection coverage reported for countries and cities. If multiple values were reported, the maximum collection rate was used to represent the national or urban collection rate in summary statistics.
- Waste collection coverage is reported at the country level as well as for urban and rural areas, where data are available.

### Waste Treatment and Disposal

- Waste treatment and disposal includes recycling, composting, anaerobic digestion, incineration, landfilling, open dumping, and dumping in marine areas or waterways. Given the variability of types of landfills used, data were collected for three types of landfills: sanitary landfills with landfill gas collection systems, controlled landfills that are engineered but for which landfill gas collection systems do not exist or are unknown, and uncategorized landfills. In summary statistics, all landfills are reported together but detailed data are provided in appendix B.

- In cases where disposal and treatment percentages do not add up to 100 percent or where a portion of waste is uncollected, the remaining amount is categorized as waste "unaccounted for." The analyses, figures, and tables in this report assume that waste not accounted for by formal disposal methods, such as landfills or recycling, is dumped. Waste that is disposed of in waterways and that is managed in low- and middle-income countries in "other" manners is also assumed to be dumped. Breakdowns are available in appendix B.

**Municipal Waste Management Financials**

- Financial data are collected over a range of years, and accounting practices may vary by location.
- Financial data were collected in local currencies when possible, converted to U.S. dollars based on the annual average exchange rate normalized by purchasing power parity, and adjusted to 2011 using the consumer price index to account for potential differences in inflation and to ensure cross-comparability.
- Financial information for solid waste systems was the most scarce among all data categories. When the number of observations was limited, data were aggregated at an income level rather than by regions, and only metrics with substantial geographic diversity were used for summary statistics.

This edition of *What a Waste* features the results of the most extensive combined national and urban solid waste management data collection effort to date. The current data collection and verification effort was designed to revise and enhance a previous effort in 2012 by expanding national and urban data collection, increasing the scope of metrics included, and providing support to decision makers by sharing good practices and trends globally.

Data for this report were collected through a joint effort by regional experts who consulted local specialists and public agencies, sources in diverse languages, and active waste management facilities. Data were gathered from documents published by local and national governments, international organizations, multilateral and bilateral agencies, journals, books, websites, and news agencies. Data collection primarily took place during 2017. Additionally, regional World Bank solid waste experts provided insights beyond the data collected. These assertions are included in the regional snapshots to provide further context for each region but are not attributed to each expert.

The report aggregates extensive solid waste statistics at the national, urban, and rural levels. The current edition estimates and projects waste generation to 2030 and 2050, taking both urban and rural areas into account. Beyond the core data metrics already detailed, the report provides information on waste management costs, revenues, and tariffs; special wastes;

regulations; public communication; administrative and operational models; and the informal sector. In addition to national-level data for 217 countries and economies, a large amount of data were collected at the city level, for about one to two cities per country or economy.

The most up-to-date data can be accessed through the *What a Waste* website at www.worldbank.org/what-a-waste.

## Notes

1. This publication defines municipal solid waste as residential, commercial, and institutional waste. Industrial, medical, hazardous, electronic, and construction and demolition waste are reported separately from total national waste generation to the extent possible.
2. Excluding waste-related transportation.

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***Environmental Benefits Statement***

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Solid waste management affects every person in the world. By 2050, the world is expected to increase waste generation by 70 percent, from 2.01 billion tonnes of waste in 2016 to 3.40 billion tonnes of waste annually. Individuals and governments make decisions about consumption and waste management that affect the daily health, productivity, and cleanliness of communities. Poorly managed waste is contaminating the world's oceans, clogging drains and causing flooding, transmitting diseases, increasing respiratory problems, harming animals that consume waste unknowingly, and affecting economic development. Unmanaged and improperly managed waste from decades of economic growth requires urgent action at all levels of society.

*What a Waste 2.0: A Global Snapshot of Solid Waste Management to 2050* aggregates extensive solid waste data at the national and urban levels. It estimates and projects waste generation to 2030 and 2050. Beyond the core data metrics from waste generation to disposal, the report provides information on waste management costs, revenues, and tariffs; special wastes; regulations; public communication; administrative and operational models; and the informal sector.

Solid waste management accounts for approximately 20 percent of municipal budgets in low-income countries and 10 percent of municipal budgets in middle-income countries, on average. Waste management is often under the jurisdiction of local authorities facing competing priorities and limited resources and capacities in planning, contract management, and operational monitoring. These factors make sustainable waste management a complicated proposition; most low- and middle-income countries, and their respective cities, are struggling to address these challenges.

Waste management data are critical to creating policy and planning for local contexts. Understanding how much waste is generated—especially with rapid urbanization and population growth—as well as the types of waste generated helps local governments to select appropriate management methods and plan for future demand. It allows governments to design a system with a suitable number of vehicles, establish efficient routes, set targets for diversion of waste, track progress, and adapt as consumption patterns change. With accurate data, governments can realistically allocate resources, assess relevant technologies, and consider strategic partners for service provision, such as the private sector or nongovernmental organizations.

What a *Waste 2.0: A Global Snapshot of Solid Waste Management to 2050* provides the most up-to-date information available to empower citizens and governments around the world to effectively address the pressing global crisis of waste. Additional information is available at http://www.worldbank.org/what-a-waste.

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