

# CITIZEN SCIENCE GUIDE FOR UNITED NATIONS SDG INDICATORS



11 SUSTAINABLE CITIES  
AND COMMUNITIES  
Indicator 11.6.1



### **SDG 11- Make Cities and Human Settlements Inclusive, Safe, Resilient and Sustainable.**

#### **Targets**

**11.1** By 2030, ensure access for all to adequate, safe and affordable housing and basic services and upgrade slums.

**11.2** By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons.

**11.3** By 2030, enhance inclusive and sustainable urbanization and capacity for participatory, integrated and sustainable human settlement planning and management in all countries.

**11.4** Strengthen efforts to protect and safeguard the world's cultural and natural heritage.

**11.5** By 2030, significantly reduce the number of deaths and the number of people affected and substantially decrease the direct economic losses relative to global gross domestic product caused by disasters, including water-related disasters, with a focus on protecting the poor and people in vulnerable situations.

**11.6** By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management.

**11.7** By 2030, provide universal access to safe, inclusive and accessible, green and public spaces, in particular for women and children, older persons and persons with disabilities.

**11.a** Support positive economic, social and environmental links between urban, peri-urban and rural areas by strengthening national and regional development planning.

**11.b** By 2020, substantially increase the number of cities and human settlements adopting and implementing integrated policies and plans towards inclusion, resource efficiency, mitigation and adaptation to climate change, resilience to disasters, and develop and implement, in line with the Sendai Framework for Disaster Risk Reduction 2015–2030, holistic disaster risk management at all levels.

**11.c** Support least developed countries, including through financial and technical assistance, in building sustainable and resilient buildings utilizing local materials.

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### The Challenge

More than half of humanity – 4.2 billion people – lives in cities today and by 2030, it is estimated that six out of ten people will be city dwellers. By 2030, the world is projected to have 43 megacities with more than 10 million inhabitants each, most of them in developing regions the world's cities occupy just 3% of the planet's land but account for 60-80% of all energy consumption and 75% of the planet's carbon emissions (*Ref.: United Nations in India*)<sup>1</sup>. Rapid urbanisation is exerting pressure on fresh water supplies, sewage, the living environment and public health. Our rapidly growing urban world is experiencing congestion, a lack of basic services, a shortage of adequate housing, and declining infrastructure. More than thirty percent of the world's urban population lives in slums, and in Sub-Saharan Africa, over half of all city dwellers are slum dwellers.

**Target: 11.6** By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management.

### Indicators

**11.6.1** Proportion of municipal solid waste collected and managed in controlled facilities out of total municipal waste generated, by cities.

**11.6.2** Annual mean levels of fine particulate matter (e.g. PM2.5 and PM10) in cities (population weighted).

#### 11.6.1

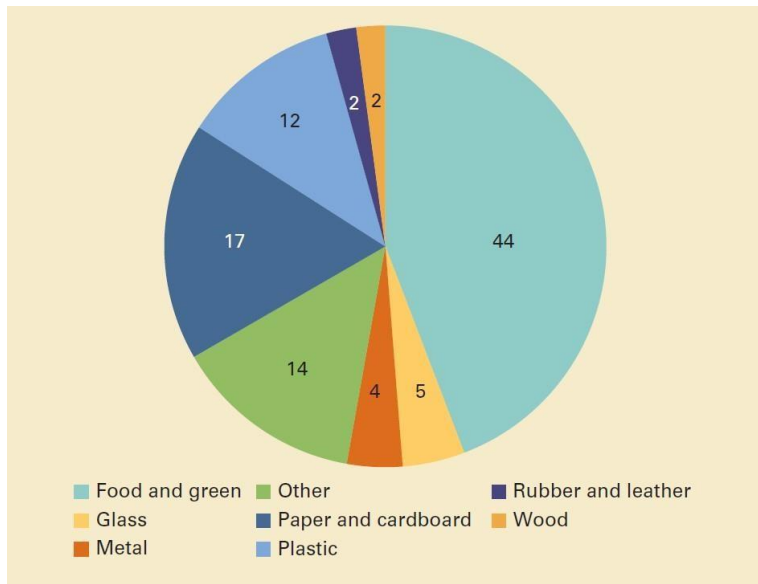
The term “solid waste collection” is taken to include the initial storage of waste at the household, shop or business premises, construction and demolition waste in small quantities, general solid wastes from hospitals (excluding hazardous wastes), the loading, unloading and transfer of waste, and all stages of transporting the waste until it reaches its final destination – a treatment plant or disposal site. The sweeping of streets and public places, the cleaning of open storm drains and the removal of these wastes are also included.

***Regularly Collected Municipal Solid Waste*** refers to municipal solid waste that is routinely collected from specific addresses or designated collection points. Waste collection is conducted directly by municipal authorities or private contractors licensed/commissioned by municipal authorities with a regular schedule of the day of

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the week and time of collection. In some cases, private waste collection companies have contracts with clients individually and provide collection services.

**Uncollected Municipal Solid Waste** refers to waste generated in a city but uncollected due to the lack of collection services. In many cities informal settlements areas do not have access to this basic service. The amount of uncollected waste can be estimated by waste generation per capita in the city multiplied by the population who does not have access to the solid waste collection service.



*Figure 1: Global Waste Composition (percent)*

Ref.: *What a Waste 2.0: A Global Snapshot of Solid Waste Management to 2050.*<sup>2</sup>

**Total Municipal Solid Waste Generated by the City** is sum of municipal solid waste, or the sum of regularly collected municipal solid waste and uncollected municipal solid waste.

**Municipal Solid Waste with Adequate Final Treatment and Disposal** refers to the total municipal solid waste destined for treatment or disposal facilities that at least reached an intermediate level of control. The level of adequacy for a particular facility can be assessed using the qualitative criteria including:

- 1) degree of control over waste reception and general site management
- 2) degree of control over waste treatment and disposal and,
- 3) degree of monitoring and verification of environmental control.

A score of at least 10 on each criterion is the threshold required to be considered as 'adequate final treatment and disposal'.

### Comments and limitations

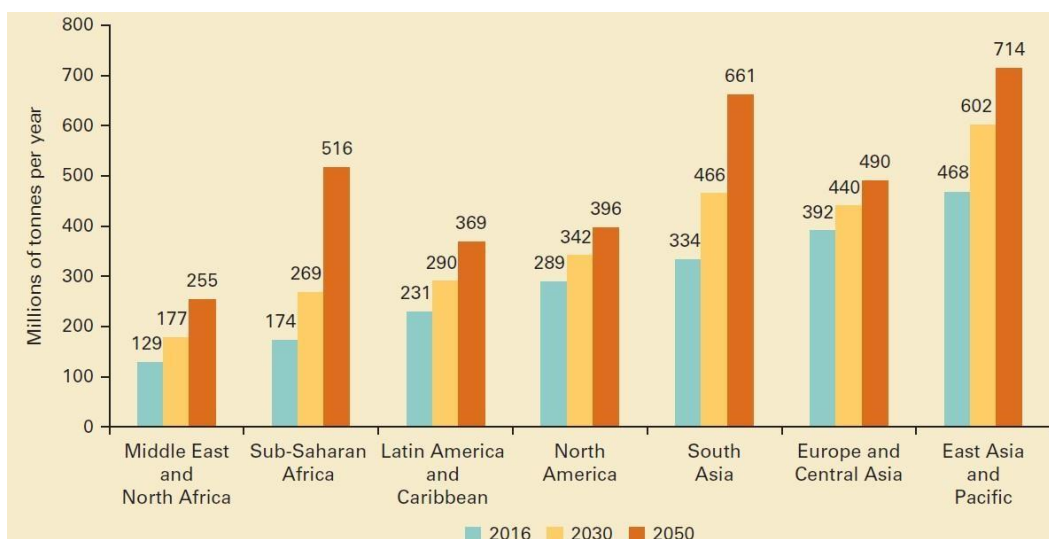
Collection of data for the indicator is not infeasible but it will require training and capacity development. The data on total municipal solid waste generation is globally available although the precision of data is disputable. In general, developed countries have solid waste data collection systems but most of the middle- and low-income countries do not have data. In these countries and cities, household survey and other complimentary surveys can be conducted for the estimation of municipal waste generation per capita. However, one of the key challenges of data precision in the middle to low income countries is the lack of accurate population data in their jurisdiction, particularly regarding slums, where usually no waste collection service is taking place.

### Alarming Statistics

*Ref.: What a Waste 2.0: A Global Snapshot of Solid Waste Management to 2050.<sup>2</sup>*

The world generates 0.74 kilogram of waste per capita per day, yet national waste generation rates fluctuate widely from 0.11 to 4.54 kilograms per capita per day. Waste generation volumes are generally correlated with income levels and urbanization rates.

- An estimated 2.01 billion tonnes of municipal solid waste were generated in 2016, and this number is expected to grow to 3.40 billion tonnes by 2050 under a business-as-usual scenario.



*Figure 2: Projected waste generation, by region (millions of tonnes/year)*



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- The total quantity of waste generated in low-income countries is expected to increase by more than three times by 2050. Currently, 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 producing the least in absolute terms, at 6 percent. However, waste is growing the fastest in Sub-Saharan Africa, South Asia, and the Middle East North Africa regions, where, by 2050, total waste generated is expected to approximately triple, double, and double, respectively.
- Food and green waste comprise more than 50 percent of waste in low- and middle-income countries. In high-income countries the amount of organic waste is comparable in absolute terms but, because of larger amounts of packaging waste and other nonorganic waste, the fraction of organics is about 32 percent.
- Recyclables make up a substantial fraction of waste streams, ranging from 16 percent paper, cardboard, plastic, metal, and glass in low-income countries to about 50 percent in high-income countries. As countries rise in income level, the quantity of recyclables in the waste stream increases, with paper increasing most significantly.
- More than one-third of waste in high-income countries is recovered through recycling and composting.
- Waste collection rates vary widely by income levels. High- and upper middle-income countries typically provide universal waste collection. Low-income countries tend to collect about 48 percent of waste in cities, but outside of urban areas waste collection coverage is about 26 percent. In middle-income countries, rural waste collection coverage varies from 33 percent to 45 percent.
- **Globally, about 37 percent of waste is disposed of in some type of landfill, 33 percent is openly dumped, 19 percent undergoes materials recovery through recycling and composting, and 11 percent is treated through modern incineration.**
- Adequate waste disposal or treatment using 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 waste is dumped in low-income countries and only 2 percent in high-income countries.
- Upper-middle-income countries practice the highest percentage of landfilling, at 54 percent. This rate decreases in high-income countries to 39 percent, where 35 percent of waste is diverted to recycling and composting and 22 percent to incineration.

**Computation Method**

The numerator of this indicator is ‘municipal solid waste regularly collected with adequate final treatment and disposal’ and the denominator is ‘total municipal solid waste generated by the city’.

$$x = \frac{\text{municipal solid waste regularly collected with adequate final treatment and disposal}}{\text{Total municipal solid waste generated by the city}} \times 100\%$$

Multiplication of the municipal solid waste generation per capita and population of the city can estimate total municipal solid waste generated by the city<sup>3</sup>. When the municipal solid waste generation per capita is not available, household survey for a daily waste generation in household and other premises (e.g. restaurants, hotels, hospitals, schools, etc.) should be conducted.

Country	National SDG 11.6.1 Indicator score
India	53%
Australia and New Zealand	94%
Europe and Northern America	89.60%
Latin America and the Caribbean	80.40%
Northern Africa and Western Asia	73.50%
Eastern and South-Eastern Asia	72%
Central and Southern Asia	66.70%
Sub-Saharan Africa	43.40%

*Table 1: Proportion of urban solid waste regularly collected and with adequate final discharge out of total urban solid waste generated<sup>4,5</sup>.*

**What happens if the waste is not disposed of properly? Or Why is the increased production of Solid waste concern us?**

Solid waste management is inextricably linked to environmental outcomes and their subsequent economic consequences. At the local and regional levels, inadequate waste collection, improper disposal, and inappropriate siting of facilities can have negative impacts on environmental and public health. At a global scale, solid waste contributes to climate change and is one of the largest sources of pollution in oceans.

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- In low- and many middle-income countries, inadequate waste collection and uncontrolled dumping or burning of solid waste are still an unfortunate reality, polluting the air, water, and soil. When waste is burned, the resulting toxins and particulate matter in the air can cause respiratory and neurological diseases.
- Creating new Landfills mean increasing deforestation, loss of habitable/agricultural land. Piles of waste produce toxic liquid runoff called leachate, which drain into rivers, groundwater, and soil.
- Landfill construction can cost a municipality roughly US\$10 million to serve a population of 1 million people. An incinerator with heat and energy recovery cost about \$600/annual tonne for capital costs (defined as the total capital cost for the lifetime of the plant divided by the total annual capacity)<sup>2</sup>.
- In 2016, the world generated 242 million tonnes of plastic waste—12 percent of all municipal solid waste. This waste primarily originated from three regions—57 million tonnes from East Asia and the Pacific, 45 million tonnes from Europe and Central Asia, and 35 million tonnes from North America<sup>2</sup>.
- Emissions from solid waste treatment and disposal, primarily driven by disposal in open dumps and landfills without landfill gas collection systems, were calculated using the CURB tool, and they account for about 5 percent of total global GHG emissions.
- As climate patterns change, waste management systems must prepare for extreme weather patterns that may cause waste to clog drainage systems during floods, landfills and dumps to collapse under heavy rains, or damage to infrastructure that may dramatically increase waste volumes.

### **What is the role of a citizen in Solid Waste Management?**

The success of sustained solid waste management is critically linked with public engagement and trust. Waste managers rely on citizens to consciously reduce the amount of waste they generate, separate or manage specific waste types at home, dispose of waste properly, pay for waste management services, and approve new disposal sites.

Educational programs are a key aspect of raising awareness for solid waste.

### **Awareness and implementation**

- Coalitions of diverse social and environmental movements cooperating on specific solid waste concerns;



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- citizen contribution of labour for city clean-ups;
- monitoring of waste issues by consumers and environmental groups;
- initiatives of SWM departments;
- media coverage of waste problems;
- charitable organizations projects that link waste recovery with social betterment and improvement of garbage problems;
- children's initiatives;

Along with the individual practice of Segregation and implanting the 6R's of sustainability:

- Rethink: what could be done differently?
- Refuse: are there materials a designer would not use?
- Reduce: can the use of materials be reduced?
- Reuse: can the product be used again for another purpose?
- Recycle: can materials be used that are easy to recycle when the product is finished with?
- Repair: can the product be repaired instead of thrown away?
- At the primary source of waste origin has been a proven to be the most effective way to tackle the Solid waste Management.

### **References:**

1. <https://in.one.un.org/page/sustainable-development-goals/sdg-11/>
2. "Kaza, Silpa; Yao, Lisa C.; Bhada-Tata, Perinaz; Van Woerden, Frank. 2018. *What a Waste 2.0 : A Global Snapshot of Solid Waste Management to 2050. Urban Development;* Washington, DC: World Bank. © World Bank. <https://openknowledge.worldbank.org/handle/10986/30317> License: CC BY 3.0 IGO."
3. <https://unstats.un.org/sdgs/files/metadata-compilation/Metadata-Goal-11.pdf>
4. <https://sdg-tracker.org/cities>
5. [https://niti.gov.in/sites/default/files/SDG-India-Index-2.0\\_27-Dec.pdf](https://niti.gov.in/sites/default/files/SDG-India-Index-2.0_27-Dec.pdf)

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**Sustainable Development Goal 11 methods in other countries. Please refer to them:**

- Canada: <https://ottawa.ca/en/garbage-and-recycling/solid-wastedataand-reports#facts-and-overview>
- Bangladesh: <http://dspace.bracu.ac.bd/xmlui/handle/10361/399>
- China: <https://www.thenatureofcities.com/2015/02/01/waysforwardfrom-chinas-urban-waste-problem/>
- UK: <https://sdgdata.gov.uk/11-6-1/>
- Italy: <https://www.eea.europa.eu/publications/managing-municipalsolidwaste/italy-municipal-waste-management>