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FOR A BETTER URBAN FUTURE

# Urban Sustainability Assessment Framework [USAF]

## Technical Manual

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**Project Donors:**



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This report has been prepared under the Sustainable Cities Integrated Approach Pilot (SCIAP) project funded by the Global Environment Facility (GEF-6) through UNIDO. It documents the findings from the application of the Urban Sustainability Assessment Framework (USAF), which was developed under SCIAP for five pilot cities – Bhopal, Vijayawada, Jaipur, Mysore and Vijayawada. The report is produced using data provided by the state and municipal authorities of the four participating states and additional geospatial data collected from the National Platform for Sustainable Cities, European Space Agency. While UN-Habitat checks data to the fullest extent possible, the responsibility for the accuracy of the data lies with the original providers of the data. Information contained in this Report is provided without warranty of any kind, either express or implied, including, without limitation, warranties of merchantability, fitness for a particular purpose and non-infringement. UN-Habitat specifically does not make any warranties or representations as to the accuracy or completeness of any such data. Under no circumstances shall UN-Habitat be liable for any loss, damage, liability or expense incurred or suffered that is claimed to have resulted from the use of this Report, including, without limitation, any fault, error, omission with respect thereto. The use of this Report is at the User's sole risk. Under no circumstances, including, but not limited to negligence, shall UN-Habitat or its affiliates be liable for any direct, indirect, incidental, special or consequential damages, even if UN-Habitat has been advised of the possibility of such damages.

## List of Acronyms

<b>CityRAP</b>	City Resilience Action Planning Tool
<b>CPI</b>	City Prosperity Index
<b>CSCAF</b>	Climate Smart City Assessment Framework
<b>EOLI</b>	Ease of Living Index
<b>ESCI</b>	Emerging and Sustainable Cities Initiative
<b>GDP</b>	Gross Domestic Product
<b>GEF</b>	Global Environment Facility
<b>GHG</b>	Green House Gas
<b>GIS</b>	Geographical Information System
<b>GPSC</b>	Global Platform for Sustainable Cities
<b>MDPI</b>	Multidimensional Prosperity Index
<b>MoHUA</b>	Ministry of Housing and Urban Affairs
<b>MPI</b>	Municipal Performance Index
<b>NIF</b>	National Indicator Framework
<b>SCIAP</b>	Sustainable Cities Integrated Approach Pilot
<b>SDG</b>	Sustainable Development Goals
<b>SLB</b>	Service Level Benchmarking
<b>SS 2020</b>	Swachh Survekshan 2020
<b>SWM</b>	Solid Waste Management
<b>UNIDO</b>	United Nations Industrial Development Organisation
<b>UN-Habitat</b>	United Nations Human Settlements Programme
<b>URDPFI</b>	Urban and Regional Development Plans Formulation and Implementation
<b>USAF</b>	Urban Sustainability Assessment Framework

## Acknowledgement

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## Glossary

**Cities:** For the purpose of this document, city refers to a place/region that have local bodies like municipal corporations, municipalities, municipal committees, etc., irrespective of their demographic characteristics.

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## About SCIAP

The Sustainable Cities Integrated Approach Pilot (SCIAP) project, funded by GEF-6, is being implemented by UNIDO and UN-Habitat, in partnership with the Ministry of Housing and Urban Affairs (MoHUA) of the Government of India in Bhopal, Guntur, Jaipur, Mysuru and Vijayawada. The main goal is to infuse sustainability strategies into urban planning and management at the city level and create an enabling climate for investments in green infrastructure that would reduce greenhouse gas emissions, improve service delivery and enhance the quality of living for all citizens, thereby building resilience and strengthening the governance capacity of the cities.

The outputs for UN-Habitat's urban planning and management component are developing an Urban Sustainability Assessment Framework (USAF) for spatial planning in India, creating City Profiles and Diagnostics by applying it to the five cities, and Sustainable City Strategies for low-carbon and low-emission spatial planning with key actions and interventions.

## Introduction to USAF

The Urban Sustainability Assessment Framework (USAF) is designed as part of the Sustainable Cities Integrated Approach Pilot (SCIAP) project, which is funded by GEF-6. It is being implemented by UNIDO and UN-Habitat, in partnership with the Ministry of Housing and Urban Affairs (MoHUA) of the Government of India in Bhopal, Guntur, Jaipur, Mysuru and Vijayawada. The main goal of the project is to infuse sustainability strategies into urban planning and management at the city level and create an enabling climate for investments in green infrastructure. This would reduce greenhouse gas emissions, improve service delivery, and enhance the quality of living for all citizens, thereby building resilience and strengthening the governance capacity of the cities.

The Urban Sustainability Assessment Framework (USAF) is designed as a decision support tool for municipal commissioners and urban practitioners to support sustainable and resilient urban planning and management of cities in India. Urban diagnostics based on USAF cover 12 sectors, namely, governance and data management, finance and economy, housing and property, water, sanitation, waste management, clean energy, resilience, environment, public space-safety-urban form, transport, and social infrastructure. The performance of these sectors is measured using national and international benchmarks. USAF 'spatializes' several indicators of the framework for granular planning and identify inequalities in service delivery, resource allocation, accessibility of essential utilities, and recreational opportunities, among others, within a city. Furthermore, giving emphasis to spatially informed planning, USAF equips city managers to model area-based development strategies and assess their impact on improving sectoral performance against benchmarks. Area-based development strategies developed through USAF, when combined with a financing plan, lay the ground work for capital investment plans thereby providing a critical link between urban planning, finance and governance. It can also help decision-makers to adopt a data driven system for planning and implementing projects to effectively direct resources towards deprived targeted areas for maximum impact and benefit.

The Urban Sustainability Assessment Framework (USAF) is designed to support Indian cities develop sustainably and resiliently. It is primarily concerned with urban planning and management of cities and its spatial implications on sustainability, quality of life and leaving no one behind. As such, the USAF is meant to help standardize indicators that provide benchmarks in multiple sectors – urban form, public space and safety, housing and property, water, sanitation, solid waste management, transportation, social services and facilities, clean energy, disaster risk management, environment and ecology, governance and data management, finance and economy. There are 131 indicators in USAF which are formulated using 235 data inputs across 12 sectors. These data inputs are to be updated either every year (annual), once in two years (biennial), once in five years (quinquennial) or once in ten years (decadal). The entire framework may preferably be updated every year for the city officials to monitor progress with each update.

The USAF provides a baseline to evaluate a series of indicators within each sector that will allow city authorities and planning professionals to assess their city's current status in each sector, compare that status with those of peer cities, and set goals for future assessments.

## About USAF Report

The main USAF report covers all aspects of creating and finalizing the entire framework. The report includes following seven components/sections. First, the report starts by setting the stage by giving an overview of urbanization and major urban challenges faced in India. Second component is intent of the framework (key applications and target audience). Third component is the USAF development process which includes all phases and steps in formulating the framework. Fourth component is the details of all global and national frameworks analyzed in the process. Fifth, the process of indicator identification and defining of sectors has been elaborated in the report. Sixth component is a summary of all twelve USAF sectors. Lastly, the report details out application of the USAF (includes Urban Sustainability Indicators Report, City Profile and Diagnostic Issues development process and Sustainable City Strategies development process).

## About the Manual

USAF Technical Manual is a supplementary document to go along with the main USAF Report and contains the metadata of all 131 indicators. Indicator metadata includes details such as indicator rationale, formula for calculation, details of performance evaluation and recommendations for frequency of updating each primary data input. For complex quantitative and spatial indicators, the manual also includes a methodology note to compute them. The document will be a step-by-step guidebook for the city officials designated to update USAF. In the next section, each of the components of the metadata of USAF indicators have been elaborated.

## Components of USAF metadata

### Sector

The USAF acknowledges the inter-dependence and convergence of many elements that contribute to successful urban planning. Thus, it brings together enabling sectors like governance, data management, finance and economy, etc., traditionally divorced from urban planning, with the physical infrastructures and services such as housing, transportation, and basic services to ensure coherence among planning efforts, mechanisms to oversee enforcement and their realistic financial and logistical grounding to ensure implementation. Sections such as clean energy and disaster risk management complement the element of sustainability considered within all sectors throughout the framework. The twelve key sectors included in USAF are illustrated in Figure 1.

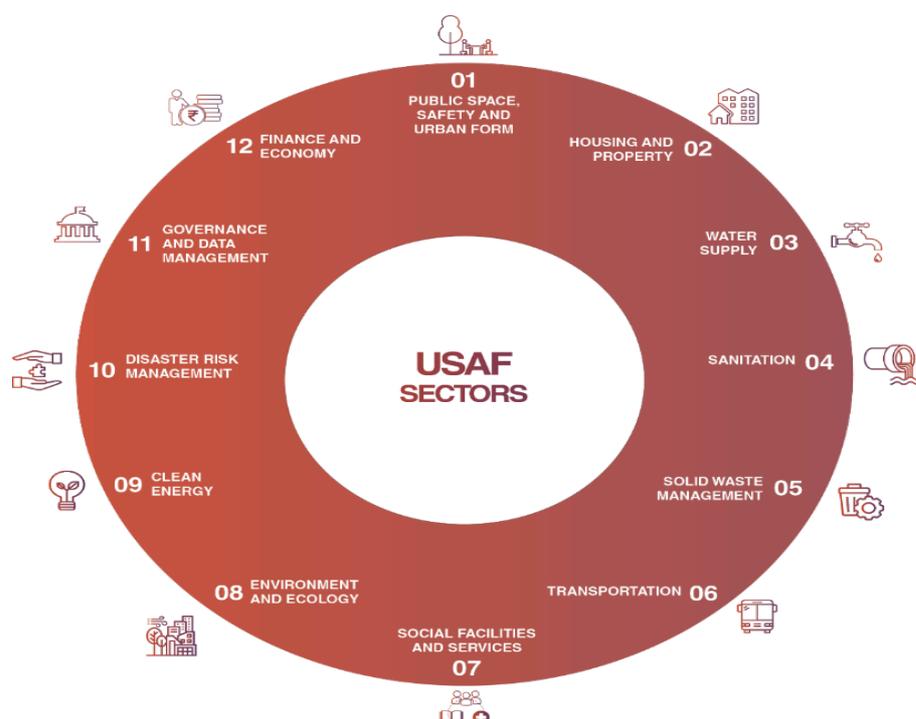


Figure 1 USAF Sectors

## Sub theme

Sub-theme of an indicator refers to a specific theme within a larger sectoral theme. USAF sub-themes attempt to cover different aspects of sustainability within a sector. The list of indicators in each sector isn't meant to be an exhaustive check of all dimensions of eminence of that sector. There can be numerous factors, which are collectively representative of the condition of the service delivery mechanism in the city. The USAF has been designed to emphasise on key focus areas and not be too cumbersome on the ULBs.

## Indicator Details

### Intent/rationale

The intent or rationale of an indicator refers to the purpose of including the indicator in framework. For each indicator, it is important to register the underlying principle(s) that justify the development and deployment of the indicator; i.e., why the indicator is needed and useful.

Cities prioritise their actions and investments based on a plethora of factors and aspirations. However, the essential dimensions which outline whether cities are growing sustainably are common across the board. The list of indicators in each sector isn't meant to be an exhaustive check of all dimensions of eminence of that sector. There can be many factors, which are collectively representative of the condition of the service delivery mechanism in the city. For instance, apart from accessibility of essential services to its resident, factors such as affordability and quality of the underlying service also decides the overall experience of availing them. These factors are outside the scope of this framework.

### Formula

Each USAF indicator is either measured through quantitatively which means it has a set formula for scoring or is qualitative in nature (can be either a yes/no question or option to choose from multiple options).

### Unit

The unit of USAF indicator can either be a number or a percentage.

### Level

The 131 indicators in USAF have been divided into three levels: 54 are primary, 55 are secondary and 22 are tertiary. The definitions of the levels are specified in Figure 2.



**Figure 2 Indicator Levels and their Definitions**

Along with being a primary, secondary or tertiary indicator, few indicators are also marked as ‘aspirational’ indicators. Indian cities may not be currently collecting information on certain key parameters to assess sustainability but should aim to build mechanisms to collate them in the near future. Data availability of these indicators has been marked as ‘aspirational indicator’. There are certain primary indicators which are marked aspirational and should be prioritised over the rest of the indicators.

### Type

USAF indicators have been categorised as either spatial or non-spatial. If an indicator is listed as spatial, it means that the information for these indicators is to be collected at sub-city level (wards/zones/grids). These indicators are analysed and calculated in a GIS platform using one or more spatial layers. Non-spatial indicators have a specified formula to calculate the indicator value but can be computed within the framework and do not require interim spatial analysis and reported as a single value for a city.

## Performance Evaluation

### Threshold and Benchmark

Scoring range for each indicator is based on benchmarks and thresholds derived from national standards/guidelines and linked to global standards wherever possible. Threshold for an indicator is the minimum level of performance that can be associated with an indicator and is the difference between ‘unsustainability’ and ‘sustainability’. Benchmarks on the other hand, are quantitative values given to an indicator that are used to assess the performance to reach the target.

In the USAF, for the indicators for which either threshold or benchmark wasn’t obtainable, national urban averages have been used to formulate the scoring range. For the indicators where neither (or only national average or threshold or benchmark) was available, sector experts were consulted who formulated the scoring range for such indicators.

If an indicator is listed as a ‘descriptive indicator’, it can either be a quantitative (with specified formula to measure it) or qualitative (yes or no), but will not have a set threshold and benchmark for scoring. The information from these parameters along with few other benchmarked indicators would be helpful in formulating the profile of the city.

## Scoring range

The USAF has a 7-point scoring scale (very low to excellent performance). The division of scoring range for continuous variables (or indicators) into seven defined breaks is based on equal intervals between the threshold and benchmark set for each indicator. On the other hand, indicators which are discrete or qualitative in nature are bifurcated only into three classes (very low – medium – excellent performance) and binary questions (yes/no) are classified as either very low or excellent. The score of 0 (or very low performance) is considered as the threshold figure, whereas score of 6 (or excellent performance) is to be considered as benchmark for each indicator. National urban averages are used as mid-point (score 3 or medium performance) wherever either thresholds or benchmarks weren't available. It is to be noted here that national averages are not always used as mid-point for scoring. After a round of review of indicators, if the experts recommended that the median for scoring should be higher or lower than the national average, the scoring range was thus adjusted.

For representation, the range of performance follows a spectral colour ramp and varies from two shades of red (very low - low) to two shades of green (high - excellent) with three shades of yellow in between (lower medium - medium - upper medium) (Figure 3).

Indicator Performance						
0	1	2	3	4	5	6
Very low performance	Low performance	Lower medium performance	Medium performance	Upper medium performance	High performance	Excellent performance

Figure 3 Colour gradient of indicator performance

## Data availability

### Input variable

For calculation of each indicator, the actual data inputs to be collected refers to the input variables. In the case of spatial indicators, in addition to primary data inputs (for example, population, number of households), GIS layers (vector, raster) are required to formulate them.

### Unit

Unit of input variables are harmonized with the unit of the corresponding indicator.

### Tentative data source

The tentative data sources have been listed taking cue from the data collection process from five SCIAP pilot cities and may vary for some cities. In the case of aspirational indicators the tentative source for data collection is indicative as these indicators are not currently collated by the ULBs and line departments.

### Suggested interval for data update

Each data input has been marked to be updated either every year (annual), once in two years (biennial), once in five years (quinquennial) or once in ten years (decadal). This parameter helps in assessing of how often USAF indicators should preferably be updated by city officials.

## Reference

### Source framework

A total of twelve frameworks (includes six global and six national frameworks) were analysed to formulate USAF indicators. To fill in any gaps in the purview of selected indicators from various national and international frameworks in USAF, a round of review was held with sector experts. These indicators have been marked as 'expert recommended' under source framework.<sup>1</sup> The final tally of indicators from each framework and sector has been laid out in Table 1.

### SDG indicator

Each USAF indicator which could be mapped to an SDG indicator has been marked with the SDG indicator and number in this column. It is to be noted here that an indicator has been only mapped to an SDG indicator if it could be taken verbatim (or almost verbatim) or otherwise marked as NA.

### Other framework

Several USAF indicators are associated with more than one source framework. This linkage may or may not be direct. In the other framework component, USAF indicators which correlate with other national or global frameworks have been listed.

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<sup>1</sup> The number in the parenthesis alongside the referenced framework refers to the number of the indicator in the original document.

Table 1 Tally of USAF Indicators

SECTORS	UPS	HP	WTR	SAN	SWM	TR	SCL	ENV	CE	DRM	GOV	FIN	TOTAL
<b>Total USAF Indicators</b>	<b>9</b>	<b>5</b>	<b>6</b>	<b>9</b>	<b>12</b>	<b>14</b>	<b>11</b>	<b>18</b>	<b>8</b>	<b>6</b>	<b>14</b>	<b>19</b>	<b>131</b>
<b>Primary</b>	5	2	4	5	5	6	3	6	5	4	5	4	54
<b>Secondary</b>	2	1	2	3	5	6	7	6	2	2	7	12	55
<b>Tertiary</b>	2	2	0	1	2	2	1	6	1	0	2	3	22
<b>NATIONAL FRAMEWORKS</b>													<b>60</b>
<i>Municipal Performance Index (MPI)</i>	1	-	3	2	1	1	-	-	-	-	9	4	21
<i>Ease of Living (EOLI)</i>	1	1	1	-	-	-	2	3	2	-	-	1	11
<i>Climate Smart Cities Assessment Framework (CSCAF)</i>	-	-	2	1	1	1	-	2	2	1	-	-	10
<i>Multidimensional Prosperity Index (MDPI)</i>	-	1	-	-	-	-	1	-	-	-	-	-	2
<i>National Indicator Framework (NIF)</i>	1	-	-	2	-	-	-	2	-	-	-	1	6
<i>Swachh Survekshan (SS 2020)</i>	-	-	-	2	8	-	-	-	-	-	-	-	10
<b>INTERNATIONAL FRAMEWORKS</b>													<b>41</b>
<i>Global Platform for Sustainable Cities (GPSC)</i>	1	2	-	-	-	7	6	7	1	2	2	5	33
<i>City Prosperity Index (CPI)</i>	1	1	-	-	-	2	-	-	-	-	-	1	5
<i>Emerging and Sustainable Cities Initiative (ESCI)</i>	-	-	-	-	-	-	-	1	-	1	-	-	2
<i>City Resilience Action Planning (CityRAP)</i>	-	-	-	-	-	-	-	-	1	-	-	-	1
<b>EXPERT RECOMMENDED</b>	4	-	-	2	2	3	2	3	2	2	3	7	30
<b>OTHER CATEGORY</b>													
<i>Aspirational</i>	1	-	-	-	-	1	1	5	1	-	-	5	14
<i>Descriptive Indicators</i>	3	1	-	-	-	2	3	4	1	-	-	6	20
<i>Spatial</i>	2	-	-	-	-	2	2	1	-	1	-	-	8
<i>Non-spatial</i>	7	5	6	9	12	12	9	17	8	5	14	19	123

## Indicator 1.1

Percentage of city roads covered with street lighting (%)

### Sub Theme

Safety

## Indicator Details

**Intent/Rationale:** Provision of street lighting services is an obligatory function of the cities in India. Public street lighting system by making the streets safer for the people and enabling an increase in commercial activities and thereby income, impacts the life of every citizen.<sup>2</sup>

**Formula:** [Length of roads (in km) within ULB covered by streetlights/ Total length of roads within ULB]\*100

**Unit:** Percentage

**Level:** Primary

**Type:** Non-spatial

## Performance Evaluation

### Threshold

80%

Determined after multiple rounds of consultations with sector experts

### Benchmark

100%

(Provision of street lighting is one of the mandatory functions of ULB as per the twelfth schedule of Indian constitution)

The Twelfth schedule of Indian constitution; Pg.356<sup>3</sup>

## Scoring Range

0(Very low performance)	1(Low performance)	2(Lower medium performance)	3(Medium performance)	4(Upper medium performance)	5(High performance)	6(Excellent performance)
<80%	80%-83.9%	84%-87.9%	88%-91.9%	92%-95.9%	96%-99.9%	100%

<sup>2</sup>[https://www.gfdrr.org/sites/default/files/D3\\_CaseStudy10\\_SummeetShukla\\_IFC\\_PSL\\_EE\\_Case\\_Study.original.1531294845.pdf](https://www.gfdrr.org/sites/default/files/D3_CaseStudy10_SummeetShukla_IFC_PSL_EE_Case_Study.original.1531294845.pdf)

<sup>3</sup> [https://www.india.gov.in/sites/upload\\_files/npf/files/coi-eng-schedules\\_1-12.pdf](https://www.india.gov.in/sites/upload_files/npf/files/coi-eng-schedules_1-12.pdf)

## Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update
Length of roads in the ULB covered by streetlights	kilometres (km)	Engineering Department/Electrical Department	Annually
Total length of road in the ULB	kilometres (km)	Engineering Department/Electrical Department	Annually

## Reference

Source Framework	SDG Indicator	Other Frameworks
MPI (1.6.1)	NA	MDPI (1.4); CRPT

## Indicator 1.2

Percentage change in the built-up area per capita in the city in between year 2000 and year 2014 (%)<sup>4</sup>

### Sub Theme

Urban form

## Indicator Details

**Intent/Rationale:** Information on the built-up area helps to form a better understanding of spatial extent of the city and the rate of expansion. The indicator provides aggregated information on urban spatial growth and its historical trends. Built-up area and population density are used in impact and risk assessment models and within the indicators system of disaster risk reduction frameworks (i.e., the Sendai Framework for DRR). The precise spatial information provided by built-up area and population density is also important to address the sustainability of cities by modelling the access to resources at the local level and the ability of the environment to absorb its metabolic wastes in urban settings.<sup>5</sup>

### Formula:

$$\left[ \frac{((\text{Built-up area of the city in year 2014} \times 10^6) / \text{Population of the city in year 2014}) - ((\text{Built-up area of the city in year 2000} \times 10^6) / \text{Population of the city in year 2000})}{1} \right] \times 100$$

**Unit:** Percentage

**Level:** Primary

**Type:** Spatial

## Performance Evaluation

### Threshold

[Descriptive Indicator]

### Benchmark

[Descriptive Indicator]

### Scoring Range

No scoring range as the indicator is descriptive

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<sup>4</sup> This indicator can be revised with the update in the availability of more recent satellite imagery (GHSL or other sources).

<sup>5</sup> <https://www.sciencedirect.com/science/article/pii/S1462901117305695>

## Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update
Built-up area of the city (Year 2000 and 2014)	Square Kilometre (Sqkm)	GHSL Built-up (Product: <b>GHS-BUILT</b> , epoch: <b>Multitemporal</b> , resolution: <b>30 m</b> , coordinate system: <b>Mercator</b> ) ( <a href="https://ghsl.jrc.ec.europa.eu/download.php">https://ghsl.jrc.ec.europa.eu/download.php</a> )	Quinquennially <sup>6</sup>
Population of the city (Year 2000 and 2014)	Number	Census 2000, Census 2011 and Census Projections	Quinquennially

## Computation Method

Built-up area in the city (GIS Analysis)<sup>7</sup>

### Input Layers:

- (a) City Boundary (.shp format)
- (b) Multitemporal built-up data (.tiff format): To be downloaded from GHSL

### Steps<sup>8</sup>:

1. GHSL built-up product for resolution of 30m is available as an multitemporal raster with built-up presence classification for four-time stamps (1975, 1990, 2000 and 2014). After downloading the raster from the shared link, the raster should be imported in QGIS platform.
3. At the bottom of QGIS window, the user can check the label Coordinate. As you move your cursor over the map, it will show you the X and Y coordinates at that location. At the bottom-right corner you will see EPSG:4326. This is the code for the current CRS (Projection) for the project.
2. To determine and set the layer's projection, we can look into the metadata. Switch to the Metadata tab in the Layer Properties dialog. Expand the Properties section. At the bottom, you will see the definition for the projection under Layer Spatial Reference System. Set the layer's projection according to the location of your raster layer.
3. GHSL layer is classified into 7 layers, the interpretation of which is as follows:
  - 0 = no data
  - 1 = water surface
  - 2 = land no built-up in any epoch
  - 3 = built-up from 2000 to 2014 epochs
  - 4 = built-up from 1990 to 2000 epochs

<sup>6</sup> Time stamps 2000 and 2014 were used since it is available freely through GHSL

<sup>7</sup> Details of Indicator calculation using QGIS in Annex A

<sup>8</sup> <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0233164#sec006>

5 = built-up from 1975 to 1990 epochs

6 = built-up up to 1975 epoch

4. Import the city boundary shape file on the QGIS platform. Using the command 'Clip raster by mask layer' from the raster-extraction tab, clip the raster to city's extent.
5. Next vectorize raster based on the values you want to calculate. Open a new vector and create a new column. Name it 'Area'. Use the field calculator to populate the column with the variable \$area.
6. The resultant area is the total built-up area for the specific year.

## Reference

Source Framework	SDG Indicator	Other Frameworks
GPSC	11.3.1	NA

### Indicator 1.3

Percentage of agriculture use area proposed for future developable uses in the Master Development Plan (%)

**Sub Theme**

Urban form

### Indicator Details

**Intent/Rationale:** Land use change should be in accordance with the City Development Strategy, Master Plan and Local Development Plan. The conversion of agricultural land into residential/commercial must be carefully assessed especially if not within the city limits. When the decision is made to convert agricultural land, it should be done only following a careful environmental and economic assessment of which lands are least productive and most suitable for other uses. The creation of townships should also follow overall city development to accommodate growth.<sup>9</sup>

**Formula:**

$$\left[ \frac{\text{Area under agriculture use as per the existing land use plan} - \text{area under agriculture use in the proposed land use plan}}{\text{Area under agriculture use as per the existing land use plan}} \right] * 100$$

**Unit:** Percentage

**Level:** Primary

**Type:** Non-spatial

### Performance Evaluation

**Threshold**

[Descriptive Indicator]

**Benchmark**

[Descriptive Indicator]

**Scoring Range**

No scoring range as the indicator is descriptive

### Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update
Area under agriculture use in the proposed land use plan:	Square Kilometres (Sqkm)	Zonal Development Plan (ZDP)/Master Plan	Decadal

<sup>9</sup> <https://www.adb.org/sites/default/files/project-document/81205/41609-012-tacr-01.pdf>

Area under agriculture use as per the existing land use plan	Square Kilometres (Sqkm)	Zonal Development Plan (ZDP)/Master Plans	Decadal
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## Reference

Source Framework	SDG Indicator	Other Frameworks
Expert recommended	NA	NA

## Indicator 1.4

Percentage of population within 500m distance to public park/open space (%)

### Sub Theme

Public space accessibility

## Indicator Details

### Intent/Rationale:

Accessible public spaces are critical to the health of any city. Such spaces allow social engagement, civic participation and help to build a sense of belonging and inclusivity. Moreover, public spaces are recreational spaces and help to fight spatial segregation<sup>10</sup>.

### Formula:

$$\left[ \frac{\text{Population residing within a distance of 500 m from the nearest park, public open space}}{\text{Population of the city}} \right] * 100$$

**Unit:** Percentage (%)

**Level:** Primary

**Type:** Spatial

## Performance Evaluation

### Threshold

50%

Determined after multiple rounds of consultations with sector experts

### Benchmark

80%

Determined after multiple rounds of consultations with sector experts

As per URDPFI guidelines 300 m to 800 m walkable distance (located within 5 - 15 minutes) is generally considered as proximity to a community facility. 500 m distance has been set to align the indicator with the indicator in the National Indicator Framework.

### Scoring Range

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<sup>10</sup> <http://www.unesco.org/new/en/social-and-human-sciences/themes/urban-development/migrants-inclusion-in-cities/good-practices/inclusion-through-access-to-public-space/>

0(Very low performance)	1(Low performance)	2(Lower medium performance)	3(Medium performance)	4(Upper medium performance)	5(High performance)	6(Excellent performance)
<50%	50%-55.9%	56%-61.9%	62%-67.9%	68%-73.9%	74%-79.9%	>=80%

## Computation Method

Accessibility analysis: Access to parks and open spaces is assessed by calculating the catchment of a resident's facilities within a 500m walking distance. This can be measured as-the-crow-flies for quick assessments or can be calculated along existing transportation routes of the city to reflect a more realistic and accurate picture. Once a buffer from the parks and open spaces is established, one can differentiate or select the number of residents falling within, (corresponding to), those buffers.

### Input Layers:

- (a) City boundary (.shp format)
- (b) Parks and open spaces (Polygon data in Projected CRS)
- (c) Road Network (Line data in Projected CRS).

### Steps:

- (a) Create 500m walksheds: To perform the analysis the road network file must be checked for any topological errors and rectified accordingly. Now the network is ready for analysis. To create the walksheds, one needs to open the "Iso-Area as polygon (from layer)" from the QNET3 toolbox and load the road network and the layer with polygon information on parks and open spaces. After configuring this setting, click run. The outcome gives a buffer of 500m radius from all polygons, but in a few places, there might be some buffers/polygons which would have covered more than 500m distance. To rectify we need to run a similar analysis on the "service area (from layer)" tool from the network analyst toolbox and load the road network layer into the first blank and parks and open space layer in the blank mentioned as start points. The outcome gives the 500m road network from all parks and open spaces polygons
- (b) Calculate population in 500m walksheds: Now that the 500m walking accessibility from parks and open spaces and the population distribution grid at 250m resolution from the Global Human settlements (GHSL) database, one can estimate the number of people residing within the 500m accessing polygons. To do this, choose the "Select by location" from the vector selection toolbox. Select the run option. All the polygons intersecting the 500m walkshed will be selected, deselect the polygons with less than 1/4 overlap with the walkshed by manually eyeballing the layers. Lastly, open the statistics tab and select the population density layer and the layer in which population data is available and check the "Selected features only" option.
- (c) The result is the population who have access to parks and open spaces within a walking distance of 500m.

## Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update
Shape file (polygon) with park, public open spaces in the city	Polygon shape file	Town Planning Department or Open Street Maps (OSM)	Quinquennial
Shape file (line) with road network	Line shape file	Town Planning Department or Open Street Maps (OSM)	Quinquennial
Municipal Boundary	Polygon shape file	City Municipal Corporation	Quinquennial
City population (Projections)	Number	Census Projections or ULB estimates	Quinquennial
Population grid @250m resolution <sup>11</sup>	Raster file	GHSL Population grid <a href="https://ghsl.jrc.ec.europa.eu/download.php?ds=pop">https://ghsl.jrc.ec.europa.eu/download.php?ds=pop</a>	Quinquennial

## Reference

Source Framework	SDG Indicator	Other Frameworks
NIF (11.7.1)	NA	EOLI Perception Survey (1.7)

<sup>11</sup> Product: GHS-POP, epoch: 2015, resolution: 9 arcsec, coordinate system: WGS84

## Indicator 1.5

Open space (includes recreational space, organised green, other common open spaces) per capita (sqm/person)

### Sub Theme

Environment

## Indicator Details

### Intent/Rationale:

The indicator looks at how accessible the open public spaces are to the population and whether the city has enough of open space. Open spaces are also associated with better air quality, reduced traffic noise, cooler temperatures, enhanced physical activity and promote diversity<sup>12</sup>.

### Formula:

[Total area under open spaces (includes recreational space, organised green, other common open spaces such as vacant lands/ open spaces including flood plains, forest cover etc. in plain areas in sqm) in the city / Population of the city]\*100

**Unit:** Square meter per person (sqm/person)

**Level:** Primary

**Type:** Non-spatial

## Performance Evaluation

### Threshold

10sqm

URDPFI, Vol 1, Pg. 362

<http://mohua.gov.in/upload/uploadfiles/files/URDPFI%20Guidelines%20Vol%20I.pdf>

### Benchmark

12sqm

URDPFI, Vol 1, Pg. 362

<http://mohua.gov.in/upload/uploadfiles/files/URDPFI%20Guidelines%20Vol%20I.pdf>

### Scoring Range

0(Very low performance)	1(Low performance)	2(Lower medium performance)	3(Medium performance)	4(Upper medium performance)	5(High performance)	6(Excellent performance)
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<sup>12</sup> City Prosperity Index Methodology and Metadata, UN Habitat

<10sqm	10-10.3 sqm	10.4-10.7 sqm	10.8-11.1 sqm	11.2-11.5 sqm	11.6-11.9 sqm	>=12sqm
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### Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update
Total area under open spaces (includes recreational space, organised green, other common open spaces such as vacant lands/ open spaces including flood plains, forest cover etc. in plain areas.) in the city	Square Kilometres (Sqkm)	City Development Plan (CDP)/Master Plan	Quinquennial
City population (Projections)	Population	Census Projections or ULB estimates	Quinquennial

### Reference

Source Framework	SDG Indicator	Other Frameworks
CPI (4.1)	11.7.1	GPSC; EOLI (1.7.1)

## Indicator 1.6

Percentage share of pedestrian fatalities in total fatalities (motorized/non-motorized transport) in road accident during a year (%)

### Sub Theme

Safety

## Indicator Details

### Intent/Rationale:

Cities are to be made pedestrian friendly as a priority as walking has become increasingly risky in urban areas. There is a need for planning and engineering measures that separate pedestrians and vehicles, reducing speeds, better illumination, improved signalling, all of which can be effective in reducing pedestrian fatalities. Pedestrian risk is increased when roadway design and land-use planning fail to plan for and provide facilities such as sidewalks, or adequate consideration of pedestrian access at intersections.<sup>13</sup> Planning and designing for walking is crucial for promoting a healthy public life, creating sustainable neighbourhoods, enhancing social life and economy.

### Formula:

$$\left[ \frac{\text{Total number of fatalities where pedestrians were involved in road accidents in the city}}{\text{Total number of fatalities recorded in road accidents within the city}} \right] * 100$$

**Unit:** Percentage (%)

**Level:** Secondary

**Type:** Non-spatial

## Performance Evaluation

### Threshold

19.25%

(Calculated using national average as the median value and the benchmark)

### National Average

Deaths of 7.7% (11,961 out of 1,54,732) of pedestrians in road accidents were reported in India during the year 2019

Accidental deaths & suicides in India - 2019 (Statistics) - Table 1A.3; National Crime Records Bureau

[https://ncrb.gov.in/sites/default/files/ads\\_i\\_reports\\_previous\\_year/Table-1A.3\\_2019.pdf](https://ncrb.gov.in/sites/default/files/ads_i_reports_previous_year/Table-1A.3_2019.pdf)

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<sup>13</sup> WHO – A Road Safety Manual for Decision-makers and Practitioners;

[https://apps.who.int/iris/bitstream/handle/10665/79753/9789241505352\\_eng.pdf;jsessionid=0E4865089A1CCFD2FB4DFDCFC7202702?sequence=1](https://apps.who.int/iris/bitstream/handle/10665/79753/9789241505352_eng.pdf;jsessionid=0E4865089A1CCFD2FB4DFDCFC7202702?sequence=1)

**Benchmark**

Zero per 1,00,000 population

**Scoring Range**

0(Very low performance)	1(Low performance)	2(Lower medium performance)	3(Medium performance)	4(Upper medium performance)	5(High performance)	6(Excellent performance)
>19.25%	19.25%-15.3%	15.4%-11.45%	11.55%-7.6%	7.7%-3.75%	3.85%-0.1%	0%

**Data Availability**

Input variable	Unit	Tentative data source	Suggested interval for data update
Total number of fatalities where pedestrians were involved in road accidents in the city	Number	Traffic Police Department or City Urban Transport Plan	Annual
Total number of fatalities recorded in road accidents within the city	Number	Traffic Police Department or City Urban Transport Plan	Annual

**Reference**

Source Framework	SDG Indicator	Other Frameworks
Expert recommended	3.6.1	NA

## Indicator 1.7

Percentage of recreational and open space (includes stadiums, theme parks, playgrounds, maidan) of total developable area (%)

### Sub Theme

Public space accessibility

## Indicator Details

### Intent/Rationale:

Health benefits of recreational and open spaces for urban areas are significant as they reduce chronic stress which becomes part of city life. Ample availability and access to safe, clean, and green open parks and recreational spaces that appeal to interests and activities across generations have been found to significantly improve health and wellbeing<sup>14</sup> Adequate recreational spaces and preserving open spaces calls for greater planning in the city, whereby various aspects of growth get managed resulting in preserving and protection of environment. Overall recreational and open space are essential for well-being and better quality of life.

### Formula:

$$\left[ \frac{\text{Area under parks and open space use in the city}}{\text{Total developable area in the city}} \right] * 100$$

**Unit:** Percentage (%)

**Level:** Secondary

**Type:** Non-spatial

## Performance Evaluation

### Threshold

25%

URDPFI, Vol 1, Pg. 144

<http://mohua.gov.in/upload/uploadfiles/files/URDPFI%20Guidelines%20Vol%20I.pdf>

### Benchmark

35%

URDPFI, Vol 1, Pg. 144

<http://mohua.gov.in/upload/uploadfiles/files/URDPFI%20Guidelines%20Vol%20I.pdf>

## Scoring Range

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<sup>14</sup>"The Health Benefits of Small Parks and Green Spaces: Health and Wellness: Parks and Recreation Magazine: NRPA." National Recreation and Park Association (NRPA), [www.nrpa.org/parks-recreation-magazine/2017/april/the-health-benefits-of-small-parks-and-green-spaces/](http://www.nrpa.org/parks-recreation-magazine/2017/april/the-health-benefits-of-small-parks-and-green-spaces/).

<b>0(Very low performance)</b>	<b>1(Low performance)</b>	<b>2(Lower medium performance)</b>	<b>3(Medium performance)</b>	<b>4(Upper medium performance)</b>	<b>5(High performance)</b>	<b>6(Excellent performance)</b>
<25%	25%-26.9%	27%-28.9%	29%-30.9%	31%-32.9%	33%-34.9%	>=35%

### Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update
Area under parks and open space use in the city	Square Kilometres (Sqkm)	City Development Plan or calculated from GIS Layer or Horticulture Department	Biannual
Total developable area in the city	Square Kilometres (Sqkm)	Land use plan	Quinquennial

### Reference

Source Framework	SDG Indicator	Other Frameworks
Expert recommended	11.7.1	NA

## Indicator 1.8

Rating of safety standards of the city

### Sub Theme

Safety

### Indicator Details

#### Intent/Rationale:

The indicator aims to assess safety standards of living in the cities as it contributes to quality of life; economic ability; and sustainability<sup>15</sup>. Prevalent of violent crime, extent of crime recorded against women, extend of crime recorded against children, extend of crime recorded against elderly are the parameters under which the city is evaluated here.

#### Formula:

NA

**Unit:** NA

**Level:** Secondary

**Type:** Non-spatial

### Performance Evaluation

#### Threshold

Poor

Ease of living- Perception survey) (Pg. 34)

<https://smartnet.niua.org/eol19/pdf/EOL-2019-Completed-Version.pdf>

#### Benchmark

Good

Ease of living- Perception survey) (Pg. 34)

<https://smartnet.niua.org/eol19/pdf/EOL-2019-Completed-Version.pdf>

#### Scoring Range

0(Very low performance)	1(Low performance)	2(Lower medium performance)	3(Medium performance)	4(Upper medium performance)	5(High performance)	6(Excellent performance)
Poor	NA	NA	Fair	NA	NA	Good

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<sup>15</sup> p.13, Ease of Living Index (2020), India (<https://smartnet.niua.org/eol19/pdf/EOL-2019-Completed-Version.pdf>)

### Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update
Rating of safety standards of the city	NA	Primary survey or Ease of Living – Perception Survey <sup>16</sup>	Annual

### Reference

Source Framework	SDG Indicator	Other Frameworks
EOLI (Perception Survey: 1.6)	NA	GPSC; ESCI (P.2)

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<sup>16</sup> The perception survey under EOLI hasn't been conducted for any city yet.

## Indicator 1.9

Amount spent in operations and maintenance per square metre area of parks in the city by the ULB (INR per sqm)

### Sub Theme

Public spaces

## Indicator Details

### Intent/Rationale:

Managing green spaces is important and it involves local planning, design and maintenance of parks and other open spaces. Thus, there is a cost involved in planning, design and management of open parks. However, open spaces also result in increased economic benefits such as higher property values, tax benefits, reduction in health costs and increased tourism revenue.

### Formula:

Total expenditure made by the ULB in a financial year towards operation and maintenance of parks in the city/ Total area (in sqm) under parks within ULB

**Unit:** Indian Rupees (INR)

**Level:** Tertiary

**Type:** Non-spatial

## Performance Evaluation

### Threshold

[Descriptive Indicator]

### Benchmark

[Descriptive Indicator]

### Scoring Range

No scoring range as the indicator is descriptive

## Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update
Total expenditure made by the ULB in a financial year towards operation and maintenance of parks in the city	Indian Rupees (INR) in Lakhs	ULB (Accounts department)/ Municipal budget)	Annual

Total area under parks within ULB	Square Meters (Sqm)	Horticulture Department	Annual
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## Reference

Source Framework	SDG Indicator	Other Frameworks
Expert recommended	NA	NA

## Indicator 2.1

Percentage of urban households living in slums/squatter settlements (%)

### Sub Theme

Slums

## Indicator Details

### Intent/Rationale:

Communities living in slum lack one or more of the following conditions: access to improved water, access to improved sanitation, sufficient living area and durability of housing. This leads to poor health and education outcomes, livelihood insecurities and environmental degradation<sup>17</sup>. This indicator measures the proportion of urban dwellers living in deprived housing conditions. It is a key indicator measuring the adequacy of the basic human need for shelter. An increase of this indicator is sign for deteriorating living conditions in urban areas<sup>18</sup>.

### Formula:

$$\left[ \frac{\text{Households residing in slums or squatter settlements in the city}}{\text{Total households in the city}} \right] * 100$$

**Unit:** Percentage (%)

**Level:** Primary

**Type:** Non-spatial

## Performance Evaluation

### Threshold

27.5%

Calculated using national average as the median value

### National Average

Hand Book of urban statistics 2019, Pg. no : 24

<http://mohua.gov.in/pdf/5c80e2225a124Handbook%20of%20Urban%20Statistics%202019.pdf>

### Benchmark

10%

Calculated using national average as the median value

### Scoring Range

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<sup>17</sup> <https://www.habitatforhumanity.org.uk/what-we-do/slum-rehabilitation/what-is-a-slum/>

<sup>18</sup> [https://www.un.org/esa/sustdev/natlinfo/indicators/methodology\\_sheets/poverty/urban\\_slums.pdf](https://www.un.org/esa/sustdev/natlinfo/indicators/methodology_sheets/poverty/urban_slums.pdf)

<b>0(Very low performance)</b>	<b>1(Low performance)</b>	<b>2(Lower medium performance)</b>	<b>3(Medium performance)</b>	<b>4(Upper medium performance)</b>	<b>5(High performance)</b>	<b>6(Excellent performance)</b>
>27.5%	27.5%-23.9%	24%-20.4%	20.5%-16.9%	17%-13.4%	13.5%-9.9%	<=10%

### Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update
Households residing in slums or squatter settlements in the city	Number	Ease of Living Index Data Repository or Town Planning Department	Quinquennial
Total households in the city	Number	Census Projections or ULB estimates	Quinquennial

### Reference

Source Framework	SDG Indicator	Other Frameworks
EOLI (1.3.4)	11.1.1	CPI (1.1); ESCI (I.2); NIF(11.1.1); GPSC

## Indicator 2.2

Percentage of city area under slums/squatter settlements (%)

### Sub Theme

Slums

## Indicator Details

### Intent/Rationale:

Communities living within informal settlements are often without access to safe water and sanitation, basic infrastructure, and public services. This leads to poor health and education outcomes, reduced livelihood opportunities, and environmental degradation. Insecure land tenure discourages investment in informal settlements and prevents rehabilitation. This indicator measures the proportion of the area of the city which are earmarked as slums/squatter settlements. It is a key indicator assessing the increase in slum dwellers, inadequate and overburdened infrastructure and services, waste collection and water and sanitation systems, worsening air pollution and unplanned urban sprawl<sup>1920</sup>

### Formula:

$[\text{Area under slums or square settlements in the city} / \text{Total area of the city}] * 100$

**Unit:** Percentage (%)

**Level:** Primary

**Type:** Non-spatial

## Performance Evaluation

### Threshold

[Descriptive Indicator]

### Benchmark

[Descriptive Indicator]

### Scoring Range

No scoring range as the indicator is descriptive

## Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update
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Area under slums or square settlements in the city	Square Kilometres (Sqkm)	Ease of Living Index Data Repository or Town Planning Department	Quinquennial
Total area of the city	Square Kilometres (Sqkm)	Town Planning Department	Quinquennial

## Reference

Source Framework	SDG Indicator	Other Frameworks
GPSC	NA	NA

## Indicator 2.3

Percentage of owner-occupied housing units to total housing units (%)

### Sub Theme

Ownership

## Indicator Details

### Intent/Rationale:

The ever-increasing disparity of city and its rural hinterland is expected to result in more migration creating increasing pressure on the urban infrastructure especially on housing. The indicator assesses the increasing pressure on the urban infrastructure due to migration and affordability of owning houses in the cities.<sup>21</sup>

Data about owners and renters, in combination with housing costs and the combined income of all people in a household, help communities understand whether housing is affordable for residents. The indicator helps to assess whether adequate housing is affordable for the city residents and provide and fund house assistance programs<sup>22</sup>.

### Formula:

$$\left[ \frac{\text{Number of households in the city living in owner-occupied housing units}}{\text{Total number of housing units in the city}} \right] * 100$$

**Unit:** Percentage (%)

**Level:** Secondary

**Type:** Non-spatial

## Performance Evaluation

### Threshold

51%

Calculated using national average as the median value

### National Average

69.16%

Hand Book of urban statistics 2019 pg. no : 170

<http://mohua.gov.in/pdf/5c80e2225a124Handbook%20of%20Urban%20Statistics%202019.pdf>

### Benchmark

80%

Calculated using national average as the median value

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<sup>21</sup> [https://niua.org/khub/wp-content/uploads/2017/07/multi\\_dimensional.pdf](https://niua.org/khub/wp-content/uploads/2017/07/multi_dimensional.pdf)

<sup>22</sup> <https://www.census.gov/acs/www/about/why-we-ask-each-question/ownership/>

### Scoring Range

0(Very low performance)	1(Low performance)	2(Lower medium performance)	3(Medium performance)	4(Upper medium performance)	5(High performance)	6(Excellent performance)
<51%	51%-56.9%	57%-62.9%	63%-68.9%	69%-74.9%	75%-80.9%	>=80%

### Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update
Number of households in the city living in owner-occupied housing units	Number	Census	Decadal
Total number of housing units in the city	Number	Census	Decadal

### Reference

Source Framework	SDG Indicator	Other Frameworks
MDPI (3.6)	NA	NA

## Indicator 2.4

Percentage of households spending greater than 30 percent of their income on accommodation expenses (%)

### Sub Theme

Affordability

## Indicator Details

### Intent/Rationale:

Urban housing markets are increasingly becoming expensive. Adequate, safe and affordable housing and basic services is a necessity in today's world. The indicator assesses the availability and need for affordable housing in the city. As a rule of thumb, 30% is the maximum share of gross rent in the total income and this gives us an income standard for housing affordability<sup>23</sup>. Cities have to design and develop innovative solutions to tackle affordable housing shortage.

### Formula:

$$\left[ \frac{\text{Population spending greater than 30\% income on accommodation expenses}}{\text{Total population of ULB}} \right] * 100$$

**Unit:** Percentage (%)

**Level:** Tertiary

**Type:** Non-spatial

## Performance Evaluation

### Threshold

[Descriptive Indicator]

### Benchmark

[Descriptive Indicator]

### Scoring Range

No scoring range as the indicator is descriptive

## Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update
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<sup>23</sup> 1969 amendment to US public housing- Brooke Amendment  
([https://www.hud.gov/sites/documents/LEGS\\_CHRON\\_JUNE2014.PDF](https://www.hud.gov/sites/documents/LEGS_CHRON_JUNE2014.PDF))

Population spending greater than 30% income on accommodation expenses	Number	Primary Survey/NSS consumption estimates at the city level <sup>24</sup>	Decadal
Total population of the city	Number	Census	Decadal

## Reference

Source Framework	SDG Indicator	Other Frameworks
GPSC	NA	NA

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<sup>24</sup> NSS consumption estimates will be applicable only for large (million-plus) cities, and if sample estimates are robust.

## Indicator 2.5

Percentage of households living in one room (%)

### Sub Theme

Overcrowding

## Indicator Details

### Intent/Rationale:

Safe, accessible, and affordable housing is a requirement of any person and affordability is primarily determined by the disposable income. A growing number of families are forced to living in one room who are victims of the housing crisis in the cities where properties are becoming increasingly unaffordable. The intent is to assess the overcrowding of housing infrastructure in the city. Overcrowding rate is an indicator of the household income and overcrowding rate decreases as household income increases.

### Formula:

$$\left[ \frac{\text{Number of households within the city with one room}}{\text{Total number of households in the city}} \right] * 100$$

**Unit:** Percentage (%)

**Level:** Tertiary

**Type:** Non-spatial

## Performance Evaluation

### Threshold

46.55%

Calculated using national average as the median value

### National Average

35.2%

Hand Book of urban statistics 2019 pg. no: 159

<http://mohua.gov.in/pdf/5c80e2225a124Handbook%20of%20Urban%20Statistics%202019.pdf>

### Benchmark

Calculated using national average as the median value<sup>25</sup>

### Scoring Range

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<sup>25</sup> The state of Kerala in India has the lowest proportion of households living in one room with 6.28%

<b>0(Very low performance)</b>	<b>1(Low performance)</b>	<b>2(Lower medium performance)</b>	<b>3(Medium performance)</b>	<b>4(Upper medium performance)</b>	<b>5(High performance)</b>	<b>6(Excellent performance)</b>
>46.55%	46.55%-42.6%	42.7%-38.75%	38.85%-34.9%	35%-31.05%	31.15%-27.2%	<=5%

### Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update
Number of households within the city with one room	Number	Census	Decadal
Total number of households in the city	Number	Census	Decadal

### Reference

Source Framework	SDG Indicator	Other Frameworks
CPI (1.5)	NA	MDPI (3.5); GPSC

### Indicator 3.1

Percentage of households with piped connection (%)

#### Sub Theme

Coverage

### Indicator Details

#### Intent/Rationale:

Total households covered by piped water connections is positively related with the performance of municipalities<sup>26</sup>

#### Formula:

$$\left[ \frac{\text{Total Households with piped water connection}}{\text{Total number of Households in the city}} \right] * 100$$

**Unit:** Percentage (%)

**Level:** Primary

**Type:** Non-spatial

### Performance Evaluation

#### Threshold

20%

Calculated using national average as the median value and the benchmark

#### National Average

68%

C-WAS (Centre for Water and Sanitation) - Interactive Dash Board for Water Supply (2018)

[https://www.pas.org.in/web/ceptpas/interactivedashboards?p\\_p\\_id=InteractiveDashboard\\_WAR\\_Portal&p\\_p\\_lifecycle=1&p\\_p\\_state=normal&p\\_p\\_mode=view&p\\_p\\_col\\_id=column-1&p\\_p\\_col\\_count=1&actionVal=Retrieve&SkipAccessChecking=false](https://www.pas.org.in/web/ceptpas/interactivedashboards?p_p_id=InteractiveDashboard_WAR_Portal&p_p_lifecycle=1&p_p_state=normal&p_p_mode=view&p_p_col_id=column-1&p_p_col_count=1&actionVal=Retrieve&SkipAccessChecking=false)

#### Benchmark

100%

Handbook of Service Level Benchmarking - CPHEEO; Pg. 23

<http://cpheeo.gov.in/upload/uploadfiles/files/Handbook.pdf>

#### Scoring Range

0(Very low)	1(Low performance)	2(Lower medium)	3(Medium)	4(Upper medium)	5(High performance)	6(Excellent)
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<sup>26</sup> Municipal Performance Index 2019: Assessment Framework-2019

<b>performance)</b>		<b>performance)</b>	<b>performance)</b>	<b>performance)</b>		<b>performance)</b>
<20%	20%-35.9%	36%-51.9%	52%-67.9%	68%-83.9%	84%-99.9%	100%

### Data Availability

<b>Input variable</b>	<b>Unit</b>	<b>Tentative data source</b>	<b>Suggested interval for data update</b>
Total Households with piped water connection	Number	MPI or EOLI data repository or SLB reporting	Annual
Total number of Households in the city	Number	Census Projections or ULB estimates	Quinquennial

### Reference

<b>Source Framework</b>	<b>SDG Indicator</b>	<b>Other Frameworks</b>
MPI (1.3.1)	NA	EOLI (1.4.2); CPI (1.2)

## Indicator 3.2

Percentage of water samples in a year that comply with national potable water quality standards (%)

### Sub Theme

Quality

## Indicator Details

### Intent/Rationale:

To reduce poverty, it is essential to increase access to drinking water and sanitation. Indeed, drinking water access is a basic necessity and right. On 28 July 2010, through Resolution 64/292, the United Nations General Assembly explicitly recognized the human right to water and sanitation and acknowledged that clean drinking water and sanitation are essential to the realisation of all human rights.<sup>27</sup> Inadequate or unsafe water supply systems and poor sanitation can result in health epidemics and environmental degradation. Time spent obtaining water from a safe source can impact on an individual's ability to work or gain an education.<sup>28</sup> The indicator assesses the availability and access to safe drinking water that comply with national potable quality standards in the city.

### Formula:

$$\left[ \frac{\text{Number of samples that meet the specified potable water standards in the month}}{\text{Total number of water samples collected in a month}} \right] * 100$$

**Unit:** Percentage (%)

**Level:** Primary

**Type:** Non-spatial

## Performance Evaluation

### Threshold

90%

Determined after multiple rounds of consultations with sector experts

### Benchmark

100%

Handbook of Service Level Benchmarking - CPHEEO; Pg. 33

<http://cpheeo.gov.in/upload/uploadfiles/files/Handbook.pdf>

### Scoring Range

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<sup>27</sup> [https://www.un.org/waterforlifedecade/human\\_right\\_to\\_water.shtml](https://www.un.org/waterforlifedecade/human_right_to_water.shtml)

<sup>28</sup> P97. <https://documents1.worldbank.org/curated/en/339851517836894370/pdf/123149-Urban-Sustainability-Framework.pdf>

<b>0(Very low performance)</b>	<b>1(Low performance)</b>	<b>2(Lower medium performance)</b>	<b>3(Medium performance)</b>	<b>4(Upper medium performance)</b>	<b>5(High performance)</b>	<b>6(Excellent performance)</b>
<90%	90%-91.9%	92%-93.9%	94%-95.9%	96%-97.9%	98%-99.9%	100%

### Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update
Number of samples that meet the specified potable water standards in the month	Number	EOLI data repository or SLB reporting	Annual
Total number of water samples collected in a month	Number	EOLI data repository or SLB reporting	Annual

### Reference

Source Framework	SDG Indicator	Other Frameworks
EOLI (3.1.1)	6.3.2	GPSC

### Indicator 3.3

Existence of Water Resources Assessment and Management Plan prepared in the last five years

#### Sub Theme

Resource management

### Indicator Details

#### Intent/Rationale:

As cities grow and economies expand, an increased competition for water for meeting various demands such as domestic, industrial, agriculture and municipal needs would emerge. The increased competition and the various risks would worsen in the wake of climate change too. Assessing water availability and demand in this context is important to develop strategies and take action, if required<sup>29</sup>.

#### Formula:

Yes/No

**Unit:** NA

**Level:** Primary

**Type:** Non-spatial

### Performance Evaluation

#### Threshold

No water resource assessment has been carried out

#### Benchmark

Water Resource Management (WRM) Plan is prepared with Short, Medium- and Long-Term Actions

#### Scoring Range

0(Very low performance)	1(Low performance)	2(Lower medium performance)	3(Medium performance)	4(Upper medium performance)	5(High performance)	6(Excellent performance)
No water resource assessment has been	NA	NA	Assessment of current water resources	NA	NA	Water Resource Management (WRM)

<sup>29</sup> page 41, [https://www.niua.org/csc/assets/pdf/CSCAF\\_2\\_Booklet.pdf](https://www.niua.org/csc/assets/pdf/CSCAF_2_Booklet.pdf)

carried out			along with future demand and water availability for at least five years			Plan is prepared with Short, Medium- and Long-Term Actions
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### Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update
Existence of water resources assessment and management Plan prepared in the last five years	NA	CSCAF reporting or Water Supply Department	Annual

### Reference

Source Framework	SDG Indicator	Other Frameworks
CSCAF (4.4: Indicator 1)	6.4.1, 6.5.1	NA

## Indicator 3.4

Extent of Non-Revenue Water (%)

### Sub Theme

Resource management

## Indicator Details

### Intent/Rationale:

Reducing Non-Revenue Water (NRW) allows utilities to expand and improve service, enhance financial performance, increase the resilience of cities and reduce energy consumption<sup>30</sup>

### Formula:

$$\left[ \frac{\text{Total water produced and put into the transmission and distribution system} - \text{Total water sold}}{\text{Total water produced and put into the transmission and distribution system}} \right] * 100$$

**Unit:** Percentage (%)

**Level:** Primary

**Type:** Non-spatial

## Performance Evaluation

### Threshold

40%

Determined after multiple rounds of consultations with sector experts

### Benchmark

20%

Handbook of Service Level Benchmarking - CPHEEO; Pg. 8 and Pg. 28

<http://cpheeo.gov.in/upload/uploadfiles/files/Handbook.pdf>

### Scoring Range

0(Very low performance)	1(Low performance)	2(Lower medium performance)	3(Medium performance)	4(Upper medium performance)	5(High performance)	6(Excellent performance)
>40%	40%-35.9%	36%-31.9%	32%-27.9%	28%-23.9%	24%-19.9%	<=20%

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<sup>30</sup> <https://blogs.worldbank.org/water/what-non-revenue-water-how-can-we-reduce-it-better-water-service>

## Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update
Total water produced and put into the transmission and distribution system	million litres per day (MLD)	EOLI data repository or SLB reporting	Annual
Total water sold	million litres per day (MLD)	EOLI data repository or SLB reporting	Annual

## Reference

Source Framework	SDG Indicator	Other Frameworks
CSCAF (4.4: Indicator 2)	NA	ESCI (A.3)

## Indicator 3.5

Water supply per capita (LPCD)

### Sub Theme

Coverage

### Indicator Details<sup>31</sup>

#### Intent/Rationale:

Growing population, increased consumption and expanding economy means resource intensive consumption patterns for water use in the city. Access to safe and adequate water and sanitation services is one of the most efficient ways of improving human health<sup>32</sup>.

#### Formula:

[Total water supplied in the city per day / Total population of the city]

**Unit:** Litres per capita per day (LPCD)

**Level:** Secondary

**Type:** Non-spatial

### Performance Evaluation

#### Threshold

135 LPCD

Handbook of Service Level Benchmarking - CPHEEO; Pg. 8 and Pg. 24

<http://cpheeo.gov.in/upload/uploadfiles/files/Handbook.pdf>

#### Benchmark

150 LPCD

Determined after multiple rounds of consultations with sector experts

#### Scoring Range

0(Very low performance)	1(Low performance)	2(Lower medium performance)	3(Medium performance)	4(Upper medium performance)	5(High performance)	6(Excellent performance)
<135 LPCD	135-137.9 LPCD	138-140.9 LPCD	141-143.9 LPCD	144-146.9 LPCD	147-149.9 LPCD	>=150 LPCD

<sup>31</sup> [http://www.unesco.org/new/fileadmin/MULTIMEDIA/HQ/SC/pdf/wwap\\_UNTF-IMR\\_Annex\\_of\\_Final\\_report\\_for\\_reporting\\_to\\_UNWater\\_edited-221210\\_2\\_.pdf](http://www.unesco.org/new/fileadmin/MULTIMEDIA/HQ/SC/pdf/wwap_UNTF-IMR_Annex_of_Final_report_for_reporting_to_UNWater_edited-221210_2_.pdf)

<sup>32</sup> [http://www.unesco.org/new/fileadmin/MULTIMEDIA/HQ/SC/pdf/wwap\\_UNTF-IMR\\_Annex\\_of\\_Final\\_report\\_for\\_reporting\\_to\\_UNWater\\_edited-221210\\_2\\_.pdf](http://www.unesco.org/new/fileadmin/MULTIMEDIA/HQ/SC/pdf/wwap_UNTF-IMR_Annex_of_Final_report_for_reporting_to_UNWater_edited-221210_2_.pdf)

### Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update
Total water supplied in the city per day	Million Litres per Day (MLD)	MPI or EOLI data repository or SLB reporting	Annual
Total population of the city	Number	Census projections or ULB population estimates	Annual

### Reference

Source Framework	SDG Indicator	Other Frameworks
MPI (1.3.2)	NA	EOLI (1.4.1); ESCI (A.3)

### Indicator 3.6

Extent of metering of water supply connections (%)

#### Sub Theme

Coverage

### Indicator Details

#### Intent/Rationale:

Water supply is an important function that citizens experience on a daily basis. The benefits of metering of water supply connections are:

- in conjunction with volumetric pricing, it provides an incentive for water conservation,
- it helps to detect water leaks in the distribution network, thus providing a basis for reducing the amount of non-revenue water.
- it is a precondition for quantity-targeting of water subsidies to the poor.

#### Formula:

$$\left[ \frac{\text{Total number of functional metered water supply connections in the city}}{\text{Total number of water connections in the city}} \right] * 100$$

**Unit:** Percentage (%)

**Level:** Secondary

**Type:** Non-spatial

### Performance Evaluation

#### Threshold

20%

Determined after multiple rounds of consultations with sector experts

#### Benchmark

100%

Handbook of Service Level Benchmarking - CPHEEO; Pg. 8 and Pg. 26

<http://cpheeo.gov.in/upload/uploadfiles/files/Handbook.pdf>

#### Scoring Range

0(Very low performance)	1(Low performance)	2(Lower medium performance)	3(Medium performance)	4(Upper medium performance)	5(High performance)	6(Excellent performance)
<20%	20%-21.9%	22%-23.9%	24%-25.9%	26%-27.9%	28%-29.9%	100%

### Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update
Total water produced and put into the transmission and distribution system	Million Litres per Day (MLD)	MPI data repository or SLB reporting	Annual
Total water sold	Million Litres per Day (MLD)	MPI data repository or SLB reporting	Annual

### Reference

Source Framework	SDG Indicator	Other Frameworks
MPI (1.3.3)	NA	NA

## Indicator 4.1

Percentage of properties in the ULB connected to sewerage network (%)

### Sub Theme

Coverage efficiency

## Indicator Details

### Intent/Rationale:

A third of urban houses in India are connected to the sewer system. The majority of the houses—38.2 per cent, as per Census 2011—use toilets connected to septic tanks. A proper system for the disposal of sewage sludge is required, whereas now, in most cases emptied out surreptitiously into water bodies and municipal sewers. A higher percentage of sewerage connections thus imply better waste water management<sup>33</sup>.

### Formula:

$$\left[ \frac{\text{Total number of properties with direct connection to the sewerage network}}{\text{Total number of properties in the city}} \right] * 100$$

**Unit:** percentage (%)

**Level:** Primary

**Type:** Non-spatial

## Performance Evaluation

### Threshold

80%

Calculated using national average as the median value and the benchmark

### National Average

86%

C-WAS (Centre for Water and Sanitation) - Interactive Dash Board for Sanitation (2018)

[https://www.pas.org.in/web/ceptpas/interactivedashboards?p\\_p\\_id=InteractiveDashboard\\_WAR\\_Portal&p\\_p\\_lifecycle=1&p\\_p\\_state=normal&p\\_p\\_mode=view&p\\_p\\_col\\_id=column-1&p\\_p\\_col\\_count=1&actionVal=Retrieve&SkipAccessChecking=false](https://www.pas.org.in/web/ceptpas/interactivedashboards?p_p_id=InteractiveDashboard_WAR_Portal&p_p_lifecycle=1&p_p_state=normal&p_p_mode=view&p_p_col_id=column-1&p_p_col_count=1&actionVal=Retrieve&SkipAccessChecking=false)

### Benchmark

100%

Handbook of Service Level Benchmarking - CPHEEO; Pg. 8 and Pg. 42

<http://cpheeo.gov.in/upload/uploadfiles/files/Handbook.pdf>

## Scoring Range

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<sup>33</sup> <https://www.coastaldrains.co.uk/blog/establishing-sewer-connections-everything-you-need-to-know/>

<b>0(Very low performance)</b>	<b>1(Low performance)</b>	<b>2(Lower medium performance)</b>	<b>3(Medium performance)</b>	<b>4(Upper medium performance)</b>	<b>5(High performance)</b>	<b>6(Excellent performance)</b>
<80%	80%-83.9%	84%-87.9%	88%-91.9%	92%-95.9%	96%-99.9%	100%

### Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update
Total number of properties with direct connection to the sewage network	Number	MPI data repository or SLB reporting	Annual
Total number of properties in the city	Number	MPI data repository or SLB reporting	Annual

### Reference

Source Framework	SDG Indicator	Other Frameworks
MPI (1.4.6)	NA	EOLI (1.4.5); SS 2020 (3.2)

## Indicator 4.2

Proportion of households having access to toilet facility (%)

### Sub Theme

Coverage efficiency

## Indicator Details

### Intent/Rationale:

Access to safe, clean sanitation facilities throughout the day is important as safely managed sanitation helps protect both human health and the environment.<sup>34</sup> The intent of the indicator is to estimate the population lacking at least basic water and sanitation access in urban areas.

### Formula:

[Total number of households with access to toilets / Total number of households in the city]\*100

**Unit:** percentage (%)

**Level:** Primary

**Type:** Non-spatial

## Performance Evaluation

### Threshold

90%

Determined after multiple rounds of consultations with sector experts

### Benchmark

100%

Handbook of Service Level Benchmarking - CPHEEO; Pg. 8 and Pg. 40

<http://cpheeo.gov.in/upload/uploadfiles/files/Handbook.pdf>

### Scoring Range

0(Very low performance)	1(Low performance)	2(Lower medium performance)	3(Medium performance)	4(Upper medium performance)	5(High performance)	6(Excellent performance)
<90%	90%-91.9%	92%-93.9%	94%-95.9%	96%-97.9%	98%-99.9%	100%

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<sup>34</sup> <https://blogs.worldbank.org/water/how-many-people-can-share-toilet>

### Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update
Total number of households with access to toilets	Number	MPI data repository or SLB reporting	Annual
Total number of households in the city	Number	MPI data repository or SLB reporting	Annual

### Reference

Source Framework	SDG Indicator	Other Frameworks
NIF (6.2.1)	6.2.1	NA

### Indicator 4.3

Percentage of sewage treated before discharge into surface water bodies (%)

#### Sub Theme

Treatment efficiency

### Indicator Details

#### Intent/Rationale:

Urban wastewater contains a large number of organic and inorganic compounds found in black water (loaded with urine and faeces), dirty water from food preparation, laundry and bathrooms and in runoff water. The discharge of untreated urban wastewater into surface water causes visual pollution (floating matter), reduced water transparency and siltation of lakes and rivers. The discharge of biodegradable substances promotes biological activity in watercourses, which leads to a decrease in dissolved oxygen concentration and even asphyxiation of the watercourses. Nitrogen and phosphorus discharges promote eutrophication. The release of micropollutants can have toxic effects on the fauna and flora of aquatic environments. The self-purifying capacities of rivers are generally insufficient. Wastewater must therefore be treated in treatment plants before being discharged into the natural environment<sup>35</sup>

#### Formula:

$$\left[ \frac{\text{Total sewage treated in the city}}{\text{Total sewage generated in the city}} \right] * 100$$

**Unit:** Percentage (%)

**Level:** Primary

**Type:** Non-spatial

### Performance Evaluation

#### Threshold

20%

Calculated using national average as the median value and the benchmark as maximum value achievable by the city.

#### National Average

43%

C-WAS (Centre for Water and Sanitation) - Interactive Dash Board for Sanitation (2018)

[https://www.pas.org.in/web/ceptpas/interactivedashboards?p\\_p\\_id=InteractiveDashboard\\_WAR\\_Portal&p\\_p\\_lifecycle=1&p\\_p\\_state=normal&p\\_p\\_mode=view&p\\_p\\_col\\_id=column-1&p\\_p\\_col\\_count=1&actionVal=Retrieve&SkipAccessChecking=false](https://www.pas.org.in/web/ceptpas/interactivedashboards?p_p_id=InteractiveDashboard_WAR_Portal&p_p_lifecycle=1&p_p_state=normal&p_p_mode=view&p_p_col_id=column-1&p_p_col_count=1&actionVal=Retrieve&SkipAccessChecking=false)

#### Benchmark

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<sup>35</sup> <https://www.encyclopedie-environnement.org/en/water/why-how-treat-urban-wastewater/>

100%

Handbook of Service Level Benchmarking - CPHEEO; Pg. 8 and Pg. 46

<http://cpheeo.gov.in/upload/uploadfiles/files/Handbook.pdf>

### Scoring Range

0(Very low performance)	1(Low performance)	2(Lower medium performance)	3(Medium performance)	4(Upper medium performance)	5(High performance)	6(Excellent performance)
<20%	20%-35.9%	36%-51.9%	52%-67.9%	68%-83.9%	84%-99.9%	100%

### Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update
Total sewage treated in the city	million litres per day (MLD)	Sanitation Department/ Swachh Survekshan Assessment/ SLB Reporting on Sewage and Drainage	Annual
Total sewage generated in the city	million litres per day (MLD)	Sanitation Department/ Swachh Survekshan Assessment/ SLB Reporting on Sewage and Drainage	Annual

### Reference

Source Framework	SDG Indicator	Other Frameworks
NIF (6.3.1)	6.3.1	SS 2020 (3.3), MPI (1.4.5)

## Indicator 4.4

Percentage of wastewater samples that passed the specified secondary treatment standards from the total samples collected in a year (%)

### Sub Theme

Treatment efficiency

## Indicator Details

### Intent/Rationale:

Raw municipal waste water undergoes preliminary, primary, secondary and in some cases, additional treatment to yield treated effluent. The quality of treated effluent depends on efficiency of treatment techniques. As some effluent is discharged to surface water and used to irrigate agricultural land, it is important that the treated effluent pass the secondary treatment standards so that waste water reuse can be ensured.

### Formula:

$$\left[ \frac{\text{Total treated effluent wastewater samples that passed the specified secondary treatment standards in a year}}{\text{Total treated effluent wastewater samples collected in a year}} \right] * 100$$

**Unit:** Percentage (%)

**Level:** Primary

**Type:** Non-spatial

## Performance Evaluation

### Threshold

70%

Determined after multiple rounds of consultations with sector experts

### Benchmark

100%

Handbook of Service Level Benchmarking - CPHEEO; Pg. 8 and Pg. 49

<http://cpheeo.gov.in/upload/uploadfiles/files/Handbook.pdf>

### Scoring Range

0(Very low performance)	1(Low performance)	2(Lower medium performance)	3(Medium performance)	4(Upper medium performance)	5(High performance)	6(Excellent performance)
<70%	70%-75.9%	76%-81.9%	82%-87.9%	88%-93.9%	94%-99.9%	100%

### Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update
Total treated effluent wastewater samples that passed the specified secondary treatment standards in a year	Number	Sanitation Department/SLB Reporting	Annual
Total treated effluent wastewater samples collected in a year	Number	Sanitation Department/SLB Reporting	Annual

### Reference

Source Framework	SDG Indicator	Other Frameworks
Expert recommended	NA	NA

## Indicator 4.5

Percentage of wastewater received at the treatment plant that is recycled or reused after appropriate treatment for various purposes (%)

### Sub Theme

Treatment efficiency

## Indicator Details

### Intent/Rationale:

Recycling and reuse of wastewater reduces the stress on the existing water resources, which are expected to be impacted by climate change<sup>36</sup>.

### Formula:

$$\left[ \frac{\text{Total wastewater recycled or reused after appropriate treatment}}{0.8 \times \text{Total water supplied in the city per day}} \right] \times 100$$

**Unit:** Percentage (%)

**Level:** Primary

**Type:** Non-spatial

## Performance Evaluation

### Threshold

10%

Determined after multiple rounds of consultations with sector experts

### National Average

9%

C-WAS (Centre for Water and Sanitation) - Interactive Dash Board for Sanitation (2018)

[https://www.pas.org.in/web/ceptpas/interactivedashboards?p\\_p\\_id=InteractiveDashboard\\_WAR\\_Portal&p\\_p\\_lifecycle=1&p\\_p\\_state=normal&p\\_p\\_mode=view&p\\_p\\_col\\_id=column-1&p\\_p\\_col\\_count=1&actionVal=Retrieve&SkipAccessChecking=false](https://www.pas.org.in/web/ceptpas/interactivedashboards?p_p_id=InteractiveDashboard_WAR_Portal&p_p_lifecycle=1&p_p_state=normal&p_p_mode=view&p_p_col_id=column-1&p_p_col_count=1&actionVal=Retrieve&SkipAccessChecking=false)

### Benchmark

20%

Handbook of Service Level Benchmarking - CPHEEO; Pg. 8 and Pg. 51

<http://cpheeo.gov.in/upload/uploadfiles/files/Handbook.pdf>

Climate Smart City Assessment Framework Pg. 47

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<sup>36</sup> Climate Smart Assessment Framework, India  
([https://www.niua.org/csc/assets/pdf/CSCAF\\_2\\_Booklet.pdf](https://www.niua.org/csc/assets/pdf/CSCAF_2_Booklet.pdf))

### Scoring Range

<b>0(Very low performance)</b>	<b>1(Low performance)</b>	<b>2(Lower medium performance)</b>	<b>3(Medium performance)</b>	<b>4(Upper medium performance)</b>	<b>5(High performance)</b>	<b>6(Excellent performance)</b>
<10%	10%-11.9%	12%-13.9%	14%-15.9%	16%-17.9%	18%-19.9%	>=20%

### Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update
Total wastewater recycled or reused after appropriate treatment	Million litres per day (MLD)	CSCAF reporting/ Swachh Survekshan Assessment	Annual
Total water supplied in the city per day	Million litres per day (MLD)	CSCAF reporting/ Swachh Survekshan Assessment	Annual

### Reference

Source Framework	SDG Indicator	Other Frameworks
CSCAF (4.4: Indicator 3)	NA	SS 2020 (3.7)

## Indicator 4.6

Percentage of city sewage that is treated in a sewage treatment plant (%)

### Sub Theme

Treatment efficiency

## Indicator Details

### Intent/Rationale:

Wastewater treatment is an important link in the water cycle that allows for water sanitation and reuse, facilitates energy generation, and allows for the recovery of products from waste<sup>37</sup>. The indicator assesses the capacity of the city to properly collect and treat sewage in a sewage treatment plant.

### Formula:

$$\left[ \frac{\text{Total sewage treatment capacity of the city}}{\text{Total sewage generated in the city}} \right] * 100$$

**Unit:** Percentage (%)

**Level:** Secondary

**Type:** Non-spatial

## Performance Evaluation

### Threshold

20%

Calculated using national average as the median value and the benchmark

### National Average

38%

Table: State-wise details of sewage generation in urban areas and treatment capacity available; National status of waste water generation & treatment

[http://www.sulabhenvi.nic.in/Database/STST\\_wastewater\\_2090.aspx](http://www.sulabhenvi.nic.in/Database/STST_wastewater_2090.aspx)

### Benchmark

100%

Municipal Performance Index Pg. 38

[https://smarnet.niua.org/eol19/pdf/MPI\\_Methodology.pdf](https://smarnet.niua.org/eol19/pdf/MPI_Methodology.pdf)

### Scoring Range

0(Very low)	1(Low performance)	2(Lower medium)	3(Medium)	4(Upper medium)	5(High performance)	6(Excellent)
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<sup>37</sup> <https://www.mdpi.com/2071-1050/8/12/1250/pdf>

<b>performance)</b>		<b>performance)</b>	<b>performance)</b>	<b>performance)</b>		<b>performance)</b>
<20%	20%-35.9%	36%-51.9%	52%-67.9%	68%-83.9%	84%-99.9%	100%

### Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update
Total sewage treatment capacity of the city	Million litres per day (MLD)	MPI reporting/ Swachh Survekshan Assessment/Sanitation Department	Annual
Total sewage generated in the city	Million litres per day (MLD)	MPI reporting/ Swachh Survekshan Assessment/Sanitation Department	Annual

### Reference

Source Framework	SDG Indicator	Other Frameworks
MPI (1.4.5)	NA	NA

## Indicator 4.7

Percentage of industries complying with waste water treatment as per CPCB norms (%)

### Sub Theme

Treatment efficiency

## Indicator Details

### Intent/Rationale:

Wastewater treatment plants are designed to convert liquid wastes into an acceptable final effluent and to dispose of solids removed or generated during the process. Wastewater can be recycled for reuse in plant processes to reduce disposal requirements. This practice also reduces water consumption. The indicator assesses the capacity and conformation of the industries in complying with the wastewater treatment as per CPCB norms.

### Formula:

$$\left[ \frac{\text{Total number of industries complying with waste water treatment as per CPCB norms}}{\text{Total number of industries in the ULB that require installation of waste water treatment plant}} \right] * 100$$

**Unit:** Percentage (%)

**Level:** Secondary

**Type:** Non-spatial

## Performance Evaluation

### Thresholds

80%

Determined after multiple rounds of consultations with sector experts

### Benchmark

100%

Determined after multiple rounds of consultations with sector experts

### Scoring Range

0(Very low performance)	1(Low performance)	2(Lower medium performance)	3(Medium performance)	4(Upper medium performance)	5(High performance)	6(Excellent performance)
<80%	80%-83.9%	84%-87.9%	88%-91.9%	92%-95.9%	96%-99.9%	100%

### Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update
Total number of industries complying with waste water treatment as per CPCB norms	Number	State Pollution Control Board	Annual
Total number of industries in the ULB that require installation of waste water treatment plant	Number	State Pollution Control Board	Annual

### Reference

Source Framework	SDG Indicator	Other Frameworks
Expert recommended	NA	NA

## Indicator 4.8

Existence of FSSM Action plan or notified San-benchmarks, byelaws/ guidelines/ policy notes by the ULB/Development Authority

### Sub Theme

Treatment efficiency

## Indicator Details

### Intent/Rationale:

This indicator would assess the extent of planning done by ULBs for Fecal Sludge and Septage Management and ODF++ certification. The ULB should disseminate the same with citizens.<sup>38</sup>

**Formula:** NA

**Unit:** Yes / No

**Level:** Secondary

**Type:** Non-spatial

## Performance Evaluation

### Threshold

No guidelines/policy/action plan prepared

Niti Aayog: Faecal Sludge and Septage Management in Urban Areas, Service and Business Models

<https://www.niti.gov.in/sites/default/files/2021-06/NITI-NFSSM-Alliance-Report-for-digital.pdf>

### Benchmark

Guidelines/policy/action plan prepared

Niti Aayog: Faecal Sludge and Septage Management in Urban Areas, Service and Business Models

<https://www.niti.gov.in/sites/default/files/2021-06/NITI-NFSSM-Alliance-Report-for-digital.pdf>

### Scoring Range

0(Very low performance)	1(Low performance)	2(Lower medium performance)	3(Medium performance)	4(Upper medium performance)	5(High performance)	6(Excellent performance)
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<sup>38</sup> Swachh Survekshan 2020, India

(<http://swachhbharaturban.gov.in/writereaddata/SBMODFBook24May20.pdf?id=13j48tn4c0wzu2zr>)

No guidelines/policy/action plan prepared	NA	NA	Work under progresses	NA	NA	Guidelines/policy/action plan prepared
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### Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update
Existence of FSSM Action plan or notified San-benchmarks, byelaws/ guidelines/ policy notes by the ULB/Development Authority	NA	Swachh Survekshan Assessment / Sanitation Department/Public Health Department	Quinquennial

### Reference

Source Framework	SDG Indicator	Other Frameworks
SS 2020 (3.1)	NA	NA

## Indicator 4.9

Percentage of Public Toilets (PTs) mapped on Google Maps (%)

### Sub Theme

Coverage efficiency

## Indicator Details

### Intent/Rationale:

Easy access to public toilet will improve public toilet usage. Floating population will also get benefited by searching and accessing the 'SBM toilets' on google map.<sup>39</sup>

### Formula:

[Total number of Public Toilets mapped on google maps / Total number of Public Toilets in the ULB]\*100

**Unit:** Percentage (%)

**Level:** Tertiary

**Type:** Non-spatial

## Performance Evaluation

### Threshold

80%

Determined after multiple rounds of consultations with sector experts

### Benchmark

100%

Swachh Bharat Mission Urban

<http://sbmtoilet.org/backend/web/index.php?r=site%2Flogin>

### Scoring Range

0(Very low performance)	1(Low performance)	2(Lower medium performance)	3(Medium performance)	4(Upper medium performance)	5(High performance)	6(Excellent performance)
<80%	80%-83.9%	84%-87.9%	88%-91.9%	92%-95.9%	96%-99.9%	100%

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<sup>39</sup> Swachh Survekshan 2020, India

(<http://swachhbharaturban.gov.in/writereaddata/SBMODFBook24May20.pdf?id=13j48tn4c0wzu2zr>)

### Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update
Total number of Public Toilets mapped on google maps	Number	Swachh Survekshan Assessment / Sanitation Department/Public Health Department	Annual
Total number of Public Toilets in the ULB	Number	Swachh Survekshan Assessment / Sanitation Department/Public Health Department	Annual

### Reference

Source Framework	SDG Indicator	Other Frameworks
SS 2020 (3.8)	NA	NA

## Indicator 5.1

Percentage of city's wet waste processed (%)

### Sub Theme

Processing

## Indicator Details

### Intent/Rationale:

Correct disposal is essential, and proper liquid waste management is particularly critical because of its potential for unexpected leaks, discharges and runoff causing pollution.<sup>40</sup> The intent is to advance the city towards zero waste. Action taken to process wet waste will produce near-term climate benefits too.

### Formula:

[Total quantity of wet waste processed by the ULB/Total quantity of wet waste collected by the ULB]\*100

**Unit:** Percentage (%)

**Level:** Primary

**Type:** Non-spatial

## Performance Evaluation

### Threshold

40%

Calculated using national average as the median value and the benchmark

### National Average

66%

PIB - Swacch Survekshan 2020

<https://pib.gov.in/PressReleasePage.aspx?PRID=1598072>

### Benchmark

70%

Determined after multiple rounds of consultations with sector experts

### Scoring Range

0(Very low performance)	1(Low performance)	2(Lower medium performance)	3(Medium performance)	4(Upper medium performance)	5(High performance)	6(Excellent performance)
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<sup>40</sup> <https://www.ercofusa.com/blog/7-common-liquid-waste-disposal-methods/>

<40%	40%- 43.9%	44%- 47.9%	48%- 51.9%	52%- 55.9%	56%- 59.9%	>=70%
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### Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update
Total quantity of wet waste processed by the ULB	Tonnes per day (TPD)	CSCAF reporting/ Swachh Survekshan Assessment/ MPI reporting	Annual
Total quantity of wet waste collected by the ULB	Tonnes per day (TPD)	CSCAF reporting/ Swachh Survekshan Assessment/ MPI reporting	Annual

### Reference

Source Framework	SDG Indicator	Other Frameworks
CSCAF (4.5: Indicator 4)	NA	SS 2020 (2.2); MPI (1.4.4)

## Indicator 5.2

Percentage of the city's dry waste that is separated and classified for recycling/material recovery (%)

### Sub Theme

Processing

## Indicator Details

### Intent/Rationale:

The fundamental challenge of dry waste management is to get as much out of the waste as possible for resource recovery. In India, the importance of resource recovery from dry waste is underlined by the fact that it provides livelihood to large numbers in the informal sector. Recycling/material recovery should also be given preference because it not only ensures resource recovery and re-utilization, conserving precious natural resources, but also saves energy and water. Different categories of recyclable dry waste need to be handed over to the appropriate authorized recycler or local franchise for processing and recovery. Pre-sorted/segregated dry waste further enhances resource recovery in cities.

### Formula:

$$\left[ \frac{\text{Total quantity of dry waste that is separated and classified for recycling/material recovery by the ULB}}{\text{Total quantity of dry waste collected by the ULB}} \right] * 100$$

**Unit:** Percentage (%)

**Level:** Primary

**Type:** Non-spatial

## Performance Evaluation

### Threshold

40%

Determined after multiple rounds of consultations with sector experts

### National Average

60%

PIB - Swacch Survekshan 2020

<https://pib.gov.in/PressReleasePage.aspx?PRID=1598072>

### Benchmark

60%

Determined after multiple rounds of consultations with sector experts

### Scoring Range

<b>0(Very low performance)</b>	<b>1(Low performance)</b>	<b>2(Lower medium performance)</b>	<b>3(Medium performance)</b>	<b>4(Upper medium performance)</b>	<b>5(High performance)</b>	<b>6(Excellent performance)</b>
<40%	40%-43.9%	44%-47.9%	48%-51.9%	52%-55.9%	56%-59.9%	>=60%

### Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update
Total quantity of dry waste that is separated and classified for recycling/material recovery by the ULB	Tonnes per day (TPD)	Swachh Survekshan Assessment	Annual
Total quantity of dry waste collected by the ULB	Tonnes per day (TPD)	Swachh Survekshan Assessment	Annual

### Reference

Source Framework	SDG Indicator	Other Frameworks
SS 2020 (2.3)	NA	CSCAF (4.5: Indicator 2)

## Indicator 5.3

Percentage of the city's solid waste that is used for energy recovery (incineration) or co-processing (%)

### Sub Theme

Processing

## Indicator Details

### Intent/Rationale:

Energy recovery from the combustion of municipal solid waste is a key part of the waste management strategy, mainly for non-recyclable high calorific value waste. According to the Solid Waste Management Rules, 2016, municipal bodies must ensure that recyclables are routed through appropriate vendors and only segregated non-recyclable high-calorific fractions are sent to WTE plants or for production of refuse-derived fuel (RDF) for co-processing in cement plants or to thermal power plants. Energy recovery ranks below source reduction and recycling/reuse but above treatment and disposal in the waste management hierarchy<sup>41</sup>.

### Formula:

[Total quantity of waste used for energy recovery (incineration) by the ULB /Total Municipal Solid Waste generated in the city]\*100

**Unit:** Percentage (%)

**Level:** Primary

**Type:** Non-spatial

## Performance Evaluation

### Threshold

Globally 11 per cent of the waste is incinerated  
Trends in Solid Waste Management, World Bank  
<https://datatopics.worldbank.org/what-a-waste/trends-in-solid-waste-management.html>

### Benchmark

5%

Determined after multiple rounds of consultations with sector experts

### Scoring Range

0(Very low performance)	1(Low performance)	2(Lower medium performance)	3(Medium performance)	4(Upper medium performance)	5(High performance)	6(Excellent performance)
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<sup>41</sup> <https://www.epa.gov/smm/energy-recovery-combustion-municipal-solid-waste-msw>

>10%	10%-8.9%	9%-7.9%	8%-6.9%	7%-5.9%	6%-4.9%	<=5%
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### Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update
Total quantity of waste used for energy recovery (incineration) by the ULB	Tonnes per day (TPD)	Swachh Survekshan Assessment	Annual
Total Municipal Solid Waste generated in the city	Tonnes per day (TPD)	Swachh Survekshan Assessment	Annual

### Reference

Source Framework	SDG Indicator	Other Frameworks
Expert Recommended	NA	NA

## Indicator 5.4

Percentage of the city's municipal solid waste that is disposed off in open dumps / controlled dumps, water bodies / is burnt (%)

### Sub Theme

Disposal

## Indicator Details

### Intent/Rationale:

Inadequate collection systems and lack of infrastructure for processing of solid waste (such as the lack of a sanitary landfill) leads people to convert available spaces into garbage dumps, where, for example, the burning of garbage produces gases that pollute the air; the leachate contaminates ground and surface water sources; these, in turn, negatively affect people's health. Thus, the implicit cost for society of not intervening with respect to solid waste disposal is represented by the costs generated from illnesses caused by the pollution.<sup>42</sup>

### Formula:

$$\left[ \frac{\text{Total Municipal Solid Waste generated in the city} - \text{Total waste processed}}{\text{Total Municipal Solid Waste generated in the city}} \right] * 100$$

**Unit:** Percentage (%)

**Level:** Primary

**Type:** Non-spatial

## Performance Evaluation

### Threshold

50%

Determined after multiple rounds of consultations with sector experts

### Benchmark

20%

India added 31 million tonnes of waste—out of 62 million tonnes of waste generation—to the legacy waste in its dumpsites (almost 50 per cent); globally 33 per cent of the waste is dumped openly (World Bank)

Annual report 2017-18 on solid waste management; Available at

[https://cpcb.nic.in/uploads/MSW/MSW\\_AnnualReport\\_2017-18.pdf](https://cpcb.nic.in/uploads/MSW/MSW_AnnualReport_2017-18.pdf); Global waste disposal in open dumpsites

<https://datatopics.worldbank.org/what-a-waste/trends-in-solid-waste-management.html>

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<sup>42</sup> Emerging and Sustainable Cities Initiative (ESCI)-2015  
([https://issuu.com/ciudadesemergentesysostenibles/docs/esci\\_indicators\\_en](https://issuu.com/ciudadesemergentesysostenibles/docs/esci_indicators_en))

### Scoring Range

0(Very low performance)	1(Low performance)	2(Lower medium performance)	3(Medium performance)	4(Upper medium performance)	5(High performance)	6(Excellent performance)
>50%	50%-43.9%	44%-37.9%	38%-31.9%	32%-25.9%	26%-19.9%	<=20%

### Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update
Total Municipal Solid Waste generated in the city	Tonnes per day (TPD)	SLB reporting/Health Department	Annual
Total waste processed	Tonnes per day (TPD)	SLB reporting/Health Department	Annual

### Reference

Source Framework	SDG Indicator	Other Frameworks
Expert Recommended	NA	NA

## Indicator 5.5

Percentage of waste remediated in the city (%)

### Sub Theme

Processing

## Indicator Details

### Intent/Rationale:

Dumpsites are reclaimed in two possible ways. The first is by bio-capping the dumpsite, used where reclaiming waste separately from the dumpsite is expensive because of large quantities of legacy waste, high levels of contamination or unpredictable material that would come out of the legacy dumpsite. The second way is by biomining and bioremediation, a process in which soil is recovered along with recyclable materials. The dumpsite is reclaimed in this process for secondary usage of the land. Waste remediation brings significant environment benefits, revenue, and health benefits. This parameter assesses whether remediation is being practiced as per the Solid Waste Management (SWM) Rules, 2016 or whether the city is dumping waste in an unplanned manner<sup>43</sup>.

### Formula:

Availability/status of Remediation and scientific landfill closure of existing dumpsites undertaken by the ULB

**Unit:** Percentage (%)

**Level:** Primary

**Type:** Non-spatial

## Performance Evaluation

### Threshold

40%

Determined after multiple rounds of consultations with sector experts

### Benchmark

95%

Determined after multiple rounds of consultations with sector experts

### Scoring Range

0(Very low)	1(Low performance)	2(Lower medium)	3(Medium)	4(Upper medium)	5(High performance)	6(Excellent)
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<sup>43</sup> SWACHH SURVEKSHAN 2020 page no: 33,

<http://sac.ap.gov.in/sac/UserInterface/Downloads/SS%202020%20Toolkit%20Final.pdf>

<b>performance)</b>		<b>performance)</b>	<b>performance)</b>	<b>performance)</b>		<b>performance)</b>
<40%	40%-79.9%	80%-119.9%	120%-159.9%	160%-199.9%	200%-239.9%	>=95%

### Data Availability

<b>Input variable</b>	<b>Unit</b>	<b>Tentative data source</b>	<b>Suggested interval for data update</b>
Availability/status of Remediation and scientific landfill closure of existing dumpsites undertaken by the ULB	Tonnes per day (TPD)	Swachh Survekshan Assessment	Annual

### Reference

<b>Source Framework</b>	<b>SDG Indicator</b>	<b>Other Frameworks</b>
SS 2020 (2.7)	NA	CSCAF (4.5: Indicator 6)

## Indicator 5.6

Percentage of wards practicing source segregation of waste which is maintained till processing/ disposal site (%)

### Sub Theme

Collection efficiency

## Indicator Details

### Intent/Rationale:

This parameter examines whether city has a system in place for collection of waste in segregated manner (wet, dry and domestic hazardous waste) as per the SWM Rules, 2016. The segregated waste thus collected should be maintained in three streams until it reaches the processing plant/site or Material Recovery Facilities (MRF).<sup>44</sup>

### Formula:

$$\left[ \frac{\text{Number of wards in the city in which segregation of waste is undertaken at the source of generation and maintained till processing or disposal}}{\text{Number of wards in the city}} \right] * 100$$

**Unit:** Percentage (%)

**Level:** Secondary

**Type:** Non-spatial

## Performance Evaluation

### Threshold

20%

Determined after multiple rounds of consultations with sector experts

### Benchmark

50%

1,476 out of 4,242 ULBs have initiated source segregation of waste in at least 50% of the wards.

(SS 2020 results, Pg. 15)

<https://www.swachhsurvekshan2020.org/ImpDocs/SS2020fullreport.pdf>

### Scoring Range

0(Very low performance)	1(Low performance)	2(Lower medium performance)	3(Medium performance)	4(Upper medium performance)	5(High performance)	6(Excellent performance)
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<sup>44</sup> Swachh Survekshan 2020, India (<http://www.swachhsurvekshan2020.org>)

<20%	20%- 25.9%	26%- 31.9%	32%- 37.9%	38%- 43.9%	44%- 49.9%	>=50%
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### Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update
Number of wards in the city in which segregation of waste is undertaken at the source of generation and maintained till processing or disposal	Number	Swachh Survekshan Assessment	Annual
Number of wards in the city	Number	Swachh Survekshan Assessment	Annual

### Reference

Source Framework	SDG Indicator	Other Frameworks
SS 2020 (1.2)	NA	MPI (1.4.1)

## Indicator 5.7

ICT based Monitoring Mechanism in place for:

- i) Ward wise Collection and Transportation (C&T)
- ii) Monitoring of Garbage Vulnerable Points (GVPs)
- iii) Attendance of Sanitation Staff

### Sub Theme

Monitoring mechanisms

## Indicator Details

### Intent/Rationale:

This indicator examines the ICT enabled mechanisms by which the ULB monitors its efficiency of the collection and transportation system, regularity of its staff and sustaining the transformation/cleanliness of Garbage Vulnerable Points<sup>45</sup>.

### Formula:

Availability of ICT based Monitoring Mechanism for SWM in place by the ULB. Each question carries a score. ULB that answers in the affirmative for each question will be scored 1; otherwise, 0. Total would be 3

**Unit:** NA

**Level:** Secondary

**Type:** Non-spatial

## Performance Evaluation

### Threshold

If 0 ICT Based Monitoring mechanisms

### Benchmark

If all 3 ICT Based Monitoring mechanisms

### Scoring Range

0(Very low performance)	1(Low performance)	2(Lower medium performance)	3(Medium performance)	4(Upper medium performance)	5(High performance)	6(Excellent performance)
If 0 ICT Based Monitorin	NA	NA	If 1 or 2 ICT Based Monitorin	NA	NA	If all 3 ICT Based Monitorin

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<sup>45</sup> <http://www.swachhsurvekshan2020.org>

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### Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update
Availability of ICT based Monitoring Mechanism for SWM in place by the ULB	NA	Swachh Survekshan Assessment	Annual

### Reference

Source Framework	SDG Indicator	Other Frameworks
SS 2020 (1.3)	NA	NA

## Indicator 5.8

Percentage of informal waste pickers integrated into sustainable SWM systems (%)

### Sub Theme

Inclusiveness

### Indicator Details

#### Intent/Rationale:

Formally integrating the informal waste pickers helps improve the living standards of urban poor by engaging them in areas including collection & transportation, processing (Material Recovery Facilities etc.), construction/ maintenance of toilets. or engaged with National Urban Livelihood Mission (NULM) and Skill India etc.<sup>46</sup>

Informal waste pickers are critical to MSW management in our cities and hence should have access to social, health and economic opportunities. This indicator informs about the level of inclusivity of informal sector by the ULBs

#### Formula:

$$\frac{[\text{Total Informal Waste Pickers formally integrated into Sustainable Livelihoods}]}{[\text{Total informal waste pickers in the city (Internal \& Outsourced)}]} * 100$$

**Unit:** Percentage (%)

**Level:** Secondary

**Type:** Non-spatial

### Performance Evaluation

#### Threshold

60%

Determined after multiple rounds of consultations with sector experts

#### Benchmark

80%

Determined after multiple rounds of consultations with sector experts

#### Scoring Range

0(Very low performance)	1(Low performance)	2(Lower medium performance)	3(Medium performance)	4(Upper medium performance)	5(High performance)	6(Excellent performance)
<60%	60%-63.9%	64%-67.9%	68%-71.9%	72%-75.9%	76%-79.9%	>=80%

<sup>46</sup> Swacch Survekshan 2020, India (<http://www.swachhsurvekshan2020.org>)

### Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update
Total Informal Waste Pickers formally integrated into Sustainable Livelihoods	Number	Swachh Survekshan Assessment	Annual
Total informal waste pickers in the city (Internal & Outsourced)	Number	Swachh Survekshan Assessment	Annual

### Reference

Source Framework	SDG Indicator	Other Frameworks
SS 2020 (1.4)	NA	NA

## Indicator 5.9

Percentage of C&D waste collected of the total C&D waste generated (%)

### Sub Theme

Processing

## Indicator Details

### Intent/Rationale:

This indicator assesses the extent of decentralized and centralized management of C&D waste generated. The indicator would also assess the extent of utilization of C&D waste in the city<sup>47</sup>

### Formula:

[Total quantity of C&D waste that is separated and classified for utilisation/processing / Total Construction & Demolition Waste generated]\*100

**Unit:** Percentage (%)

**Level:** Secondary

**Type:** Non-spatial

## Performance Evaluation

### Threshold

60%

Determined after multiple rounds of consultations with sector experts

### Benchmark

95%

Determined after multiple rounds of consultations with sector experts

### Scoring Range

0(Very low performance)	1(Low performance)	2(Lower medium performance)	3(Medium performance)	4(Upper medium performance)	5(High performance)	6(Excellent performance)
<60%	60%-66.9%	67%-73.9%	74%-80.9%	81%-87.9%	88%-94.9%	>=95%

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<sup>47</sup> Swachh Survekshan 2020, India (<http://www.swachhsurvekshan2020.org>)

## Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update
Total quantity of C&D waste that is separated and classified for utilisation/processing	Tonnes per day (TPD)	Swachh Survekshan Assessment	Annual
Total quantity of C&D waste collected	Tonnes per day (TPD)	Swachh Survekshan Assessment	Annual

## Reference

Source Framework	SDG Indicator	Other Frameworks
SS 2020 (2.6)	NA	CSCAF (4.5: Indicator 3)

## Indicator 5.10

Percentage of hazardous waste processed (%)

### Sub Theme

Processing

## Indicator Details

### Intent/Rationale:

Most of the hazardous wastes is openly disposed in dumpsites contaminating land and water resources. They also pose a health risk to the informal waste pickers who work at these sites. Effective management of hazardous waste will result in preventing the harmful chemicals and waste from entering the environment and improving overall human health. The safe management of household waste is also likely to be critical during the COVID-19 emergency. Medical waste such as contaminated masks, gloves, used or expired medicines, and other items can easily become mixed with domestic garbage, but should be treated as hazardous waste and disposed of separately. These should be separately stored from other household waste streams and collected by specialist municipality or waste management operators<sup>48</sup>. Cities are growing rapidly expanding and creation of waste is one of the major concerns of urban agglomerations. The urban waste generated consists of hazardous waste and thus have to be processed carefully. This indicator assesses the extent of decentralized and centralized management of hazardous waste generated in the city.

### Formula:

$$\left[ \frac{\text{Total quantity of hazardous waste processed in the city}}{\text{Total Hazardous waste collected}} \right] * 100$$

**Unit:** Percentage (%)

**Level:** Secondary

**Type:** Non-spatial

## Performance Evaluation

### Threshold

50%

Determined after multiple rounds of consultations with sector experts

### Benchmark

70%

About 7.17 Million MT of hazardous waste was generated between April 2016-and March 2017; 51.3 per cent is processed and 39.7 is disposed

### Scoring Range

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<sup>48</sup> <https://www.unep.org/news-and-stories/press-release/waste-management-essential-public-service-fight-beat-covid-19>

<b>0(Very low performance)</b>	<b>1(Low performance)</b>	<b>2(Lower medium performance)</b>	<b>3(Medium performance)</b>	<b>4(Upper medium performance)</b>	<b>5(High performance)</b>	<b>6(Excellent performance)</b>
<50%	50%-53.9%	54%-57.9%	58%-61.9%	62%-65.9%	66%-69.9%	>=70%

### Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update
Total quantity of hazardous waste processed in the city	Tonnes per day (TPD)	Swachh Survekshan Assessment	Annual
Total Hazardous waste collected	Tonnes per day (TPD)	Swachh Survekshan Assessment	Annual

### Reference

Source Framework	SDG Indicator	Other Frameworks
SS 2020 (2.5)	12.4.2	EOLI (3.1.4)

## Indicator 5.11

Total solid waste generation per capita per day (kg/capita/day)

### Sub Theme

Generation

## Indicator Details

### Intent/Rationale:

Waste is expected to increase at a rate of 5 per cent per year due to growth in urban population (growing at an annual rate of 3-3.5 per cent) and change in lifestyle. The average per capita waste generation in cities is taken as 0.6 kg/capita/day as per NEERI-CPCB assessment. This indicator assesses the waste generation per capita in cities highlighting the generation patterns across income groups (low, middle and high) .<sup>49</sup>

### Formula:

[Total MSW generated in the city] / [Total population of the city]

**Unit:** kilograms per capita per day (kg/capita/day)

**Level:** Tertiary

**Type:** Non-spatial

## Performance Evaluation

### Threshold

1.1

Determined after multiple rounds of consultations with sector experts

### National Average

0.11 kg/per capita/day

Swacch Bharat Mission, Part II Manual (2016) Pg. 83; World Bank

[https://datatopics.worldbank.org/what-a-](https://datatopics.worldbank.org/what-a-waste/trends_in_solid_waste_management.html)

[waste/trends in solid waste management.html](https://datatopics.worldbank.org/what-a-waste/trends_in_solid_waste_management.html)

<http://mohua.gov.in/upload/uploadfiles/files/Part2.pdf>

### Benchmark

0.11

Determined after multiple rounds of consultations with sector experts

### Scoring Range

0(Very low)	1(Low performance)	2(Lower medium)	3(Medium)	4(Upper medium)	5(High performance)	6(Excellent)
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<sup>49</sup> [https://datatopics.worldbank.org/what-a-waste/trends\\_in\\_solid\\_waste\\_management.html](https://datatopics.worldbank.org/what-a-waste/trends_in_solid_waste_management.html)

performance)		performance)	performance)	performance)		performance)
>1.1	1.1-0.89	0.9-0.69	0.7-0.49	0.5-0.29	0.3-0.01	<=0.11

### Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update
Total MSW generated in the city	Tonnes per day (TPD)	Swachh Survekshan Assessment	Annual
Total population of the city	Tonnes per day (TPD)	Swachh Survekshan Assessment	Annual

### Reference

Source Framework	SDG Indicator	Other Frameworks
SS 2020 (2.1)	NA	GPSC

## Indicator 5.12

Percentage Coverage of wards under Door-To-Door Collection System (%)

### Sub Theme

Collection efficiency

### Indicator Details

#### Intent/Rationale:

Door to Door waste collection is an important step in waste management ensuring minimal open dumping and littering. This indicator examines whether the ULB has put in systems for effective door-to-door collection of waste. Coverage of wards means each and every unit of household, commercial establishment and shops in the ward.

#### Formula:

$$\left[ \frac{\text{Number of wards in the city in which Door to Door collection of waste is being undertaken}}{\text{Total number of wards in the city}} \right] * 100$$

**Unit:** Percentage (%)

**Level:** Tertiary

**Type:** Spatial

### Performance Evaluation

#### Threshold

60%

Determined after multiple rounds of consultations with sector experts

#### Benchmark

96%

PIB - Swacch Survekshan 2020

<https://pib.gov.in/PressReleasePage.aspx?PRID=1598071>

#### Scoring Range

0(Very low performance)	1(Low performance)	2(Lower medium performance)	3(Medium performance)	4(Upper medium performance)	5(High performance)	6(Excellent performance)
<60%	60%-65.7%	65.8%-71.5%	71.6%-77.3%	77.4%-83.1%	83.2%-88.9%	>=96%

### Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update
Number of wards in the city in which Door to Door collection of waste is being undertaken	Number	MPI reporting	Annual
Total number of wards in the city	Number	MPI reporting	Annual

### Reference

Source Framework	SDG Indicator	Other Frameworks
MPI (1.4.1)	NA	SS 2020 (1.1)

## Indicator 6.1

Percentage of population within 500m distance to public transport stops (%)

### Sub Theme

Coverage

## Indicator Details

### Intent/Rationale:

Unaffordable or inadequate access to public transport can adversely affect health, educational attainment, and livelihood opportunities. Thus, accessible public transport is a crucial element in efforts to increase inclusion, diversity, curb urban sprawl, assist in environmental sustainability and economic development. Universal accessibility is a desired key criterion for public transportation development policies<sup>50</sup>.

### Formula:

$$\left[ \frac{\text{Population residing within a distance of 500 m from the nearest public transit stop within the city}}{\text{Total population of the city}} \right] * 100$$

**Unit:** Percentage (%)

**Level:** Primary

**Type:** Spatial

## Performance Evaluation

### Threshold

60%

Determined after multiple rounds of consultations with sector experts

### Benchmark

Determined after multiple rounds of consultations with sector experts

The distance of 500m distance has been taken as per recommendations in SLB in Urban Transport guidelines

SLB in Urban Transport, Pg. 12

[http://mohua.gov.in/upload/uploadfiles/files/Voulmel\\_Methodologyreport\\_final03.pdf](http://mohua.gov.in/upload/uploadfiles/files/Voulmel_Methodologyreport_final03.pdf)

### Scoring Range

0(Very low performance)	1(Low performance)	2(Lower medium performance)	3(Medium performance)	4(Upper medium performance)	5(High performance)	6(Excellent performance)
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<sup>50</sup> <https://www.urbanet.info/accessible-mobility-for-all/>

<60%	60%- 63.9%	64%- 67.9%	68%- 71.9%	72%- 75.9%	76%- 79.9%	>=80%
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## Computation Method

Accessibility analysis: Access to public transport stops is assessed by calculating the catchment of a resident's facilities within a 500m walking distance. This can be measured as-the-crow-flies for quick assessments or can be calculated along existing transportation routes of the city to reflect a more realistic and accurate picture. Once a buffer from the public transport stops is established, one can differentiate or select the number of residents falling within, (corresponding to), those buffers.

### Input Layers:

- (d) City boundary (.shp format)
- (e) Public transport stops (Point data in Projected CRS)
- (f) Road Network (Line data in Projected CRS).

### Steps:

- (d) Create 500m walksheds: To perform the analysis the road network file must be checked for any topological errors and rectified accordingly. Now the network is ready for analysis. To create the walksheds, one needs to open the “Iso-Area as polygon (from layer)” from the QNET3 toolbox and load the road network and the layer with polygon information on public transport stops. After configuring this setting, click run. The outcome gives a buffer of 500m radius from all polygons, but in a few places, there might be some buffers/polygons which would have covered more than 500m distance. To rectify we need to run a similar analysis on the “service area (from layer)” tool from the network analyst toolbox and load the road network layer into the first blank and public transport stops layer in the blank mentioned as start points. The outcome gives the 500m road network from all public transport stops.
- (e) Calculate population in 500m walksheds: Now that the 500m walking accessibility from public transport stops and the population distribution grid at 250m resolution from the Global Human settlements (GHSL) database, one can estimate the number of people residing within the 500m accessing polygons. To do this, choose the “Select by location” from the vector selection toolbox. Select the run option. All the polygons intersecting the 500m walkshed will be selected, deselect the polygons with less than 1/4 overlap with the walkshed by manually eyeballing the layers. Lastly, open the statistics tab and select the population density layer and the layer in which population data is available and check the “Selected features only” option.
- (f) The result is the population who have access to public transport stops within a walking distance of 500m.

## Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update
Shape file (polygon) with public transport in the city	Point shape file	Town Planning Department or Open Street Maps (OSM)	Quinquennial
Shape file (line) with road network	Line shape file	Town Planning Department or Open Street Maps (OSM)	Quinquennial
Municipal Boundary	Polygon shape file	City Municipal Corporation	Quinquennial
City population (Projections)	Number	Census Projections or ULB estimates	Quinquennial
Population grid @250m resolution <sup>51</sup>	Raster file	GHSL Population grid <a href="https://ghsl.jrc.ec.europa.eu/download.php?ds=pop">https://ghsl.jrc.ec.europa.eu/download.php?ds=pop</a>	Quinquennial

## Reference

Source Framework	SDG Indicator	Other Frameworks
GPSC	11.2.1	NA

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<sup>51</sup> Product: GHS-POP, epoch: 2015, resolution: 9 arcsec, coordinate system: WGS84

## Indicator 6.2

Kilometres of bicycle path per 100,000 population (km)

### Sub Theme

Coverage

### Indicator Details

#### Intent/Rationale:

Accessibility within cities is partly determined by the distance between where people live and where people work. People generally move between those two points using private or public motorized transport.<sup>34</sup> Policies that encourage high-density, mixed-use, balanced, transit-oriented development—with jobs close to homes and walkable streets—are vital to reduce private car use and increase the financial viability of public transport. Cities can reduce carbon emissions and improve health and well-being by promoting walking, cycling, and use of public transport and low-carbon or zero-carbon vehicles.<sup>52</sup>

#### Formula:

[Total length of the city roads with dedicated bicycle tracks/ Total population of the city]\*100000

**Unit:** kilometres (km)

**Level:** Primary

**Type:** Non-spatial

### Performance Evaluation

#### Threshold

15 km for every 1,00,000 population

Determined after multiple rounds of consultations with sector experts

#### Benchmark

25 km for every 1,00,000 population

Green cities programme methodology, Pg. 80

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<sup>52</sup> GPSC <https://documents1.worldbank.org/curated/en/339851517836894370/pdf/123149-Urban-Sustainability-Framework.pdf>

<https://www.ebrd.com/documents/technical-cooperation/green-city-action-plan-in-tirana.pdf>

### Scoring Range

0(Very low performance)	1(Low performance)	2(Lower medium performance)	3(Medium performance)	4(Upper medium performance)	5(High performance)	6(Excellent performance)
<15 km	15-16.9 km	17-18.9 km	19-20.9 km	21-22.9 km	23-24.9 km	>=25 km

### Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update
Total length of the city roads with dedicated bicycle tracks	Kilometres (km)	Engineering Department	Annual
Total population of the city	Number	Census Projections or ULB estimates	Annual

### Reference

Source Framework	SDG Indicator	Other Frameworks
GPSC	NA	CSCAF (4.3: Indicator 3)

### Indicator 6.3

Percentage of major roads covered with footpath (footpath wider than 1.2 meters) within the city (%)

**Sub Theme**

Coverage

### Indicator Details

**Intent/Rationale:**

Sidewalks separated from the roadway are the preferred accommodation for pedestrians. Sidewalks provide many benefits including safety, mobility, and healthier communities. Roadways without sidewalks are more than twice as likely to have pedestrian crashes as sites with sidewalks on both sides of the street.<sup>53</sup> Sidewalks or footpath are fundamental and necessary investment, and the indicator helps us to assess the general public health and social capital in the city.

**Formula:**

$$[\text{Length of footpath present on one side of the major road} + (2 \times \text{Length of footpath present on both sides of major road})] / 2 \times \text{Length of major road network in the city} \times 100$$

**Unit:** Percentage (%)

**Level:** Primary

**Type:** Non-spatial

### Performance Evaluation

**Threshold**

50%

Determined after multiple rounds of consultations with sector experts

**Benchmark**

75%

Urban transportation SLB 2B, pg. no : 68

<https://smartnet.niua.org/sites/default/files/resources/SLB%202B.pdf>

**Scoring Range**

0(Very low)	1(Low performance)	2(Lower medium)	3(Medium)	4(Upper medium)	5(High performance)	6(Excellent)
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<sup>53</sup>[https://safety.fhwa.dot.gov/ped\\_bike/tools\\_solve/walkways\\_trifold/#:~:text=Benefits%20of%20Sidewalks&text=Sidewalks%20provide%20many%20benefits%20including,sidewalks%20reduce%20other%20pedestrian%20crashes](https://safety.fhwa.dot.gov/ped_bike/tools_solve/walkways_trifold/#:~:text=Benefits%20of%20Sidewalks&text=Sidewalks%20provide%20many%20benefits%20including,sidewalks%20reduce%20other%20pedestrian%20crashes)

<b>performance)</b>		<b>performance)</b>	<b>performance)</b>	<b>performance)</b>		<b>performance)</b>
<50%	50%-54.9%	55%-59.9%	60%-64.9%	65%-69.9%	70%-74.9%	>=75%

### Data Availability

<b>Input variable</b>	<b>Unit</b>	<b>Tentative data source</b>	<b>Suggested interval for data update</b>
[Length of footpath present on one side of the major road	Kilometres (km)	Engineering Department	Annual
Length of footpath present on both sides of major road	Kilometres (km)	Engineering Department	Annual
Length of major road network in the city	Kilometres (km)	Engineering Department	Annual

### Reference

<b>Source Framework</b>	<b>SDG Indicator</b>	<b>Other Frameworks</b>
GPSC	NA	CSCAF (4.3: Indicator 3); EOLI (1.5.3)

## Indicator 6.4

Rate of increase in public transportation ridership (%)

### Sub Theme

Coverage

## Indicator Details

### Intent/Rationale:

Public transportation systems include a variety of transit options such as buses, light rail, and subways. The purpose of introducing or expanding public transportation is to increase access to and use of public transit while, at the same time, reducing motor vehicle miles driven and traffic congestion.<sup>54</sup>Public transportation services play an important role for people who are unable to drive, including those without access to personal vehicles, children, individuals with disabilities, and older adults.

### Formula:

$[(\text{Total public transport ridership in current year} / \text{Total public transport ridership in previous year}) - 1] * 100$

**Unit:** Percentage (%)

**Level:** Primary

**Type:** Non-spatial

## Performance Evaluation

### Threshold

Negative year on year ridership change

### Benchmark

Positive year on year ridership change

### Scoring Range

0(Very low performance)	1(Low performance)	2(Lower medium performance)	3(Medium performance)	4(Upper medium performance)	5(High performance)	6(Excellent performance)
Negative year on year ridership change	NA	NA	No change in ridership	NA	NA	Positive year on year ridership change

<sup>54</sup><https://www.cdc.gov/policy/hst/hi5/publictransportation/index.html#:~:text=The%20purpose%20of%20introducing%20or,miles%20driven%20and%20traffic%20congestion.>

## Data Availability

<b>Input variable</b>	<b>Unit</b>	<b>Tentative data source</b>	<b>Suggested interval for data update</b>
Total public transport ridership in current year	Number	State Road Transport Corporation	Annual
Total public transport ridership in previous year	Number	State Road Transport Corporation	Annual

## Reference

<b>Source Framework</b>	<b>SDG Indicator</b>	<b>Other Frameworks</b>
Expert recommended	NA	NA

## Indicator 6.5

Percentage of shared vehicles that operate on clean fuels like CNG, LPG, biofuels or are hybrid or electric vehicles (%)

### Sub Theme

Clean Technology

## Indicator Details

### Intent/Rationale:

Conventional fuel burning vehicles release an enormous amount of toxicants to atmosphere, cities must put efforts to introduce a cleaner fuel based shared vehicles.

### Formula:

[Total number of shared vehicles on clean technologies /Total number of shared vehicles in the city]\*100

**Unit:** Percentage (%)

**Level:** Primary

**Type:** Non-spatial

## Performance Evaluation

### Threshold

5%

Determined after multiple rounds of consultations with sector experts

### Benchmark

25%

Climate Smart Cities Assessment Framework 2.0, Pg. 36

[https://www.niua.org/csc/assets/pdf/CSCAF\\_2\\_Booklet.pdf](https://www.niua.org/csc/assets/pdf/CSCAF_2_Booklet.pdf)

### Scoring Range

0(Very low performance)	1(Low performance)	2(Lower medium performance)	3(Medium performance)	4(Upper medium performance)	5(High performance)	6(Excellent performance)
<5%	5%-8.9%	9%-12.9%	13%-16.9%	17%-20.9%	21%-24.9%	>=25%

## Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update

Total number of shared vehicles on clean technologies	Number	CSCAF reporting	Annual
Total number of shared vehicles in the city	Number	CSCAF reporting	Annual

## Reference

Source Framework	SDG Indicator	Other Frameworks
CSCAF (4.3: Indicator 1)	NA	NA

**Indicator 6.6**

Road density (km/Sqkm)

**Sub Theme**

Coverage

**Indicator Details****Intent/Rationale:**

Expansion of road networks is one of the key factors to reduce congestion and improve access to transportation and mobility. As road connectivity and density increases, travel distances declines and options for route optimisation increases, creating a more accessible and resilient system. In high density mixed-use urban areas, it is recommended that at least 30 per cent of land is allocated for roads and parking, and at least 15-20 per cent is allocated for open public space<sup>55</sup>.

**Formula:**

[Total road length in the city/ Total area of the city]

**Unit:** Kilometre per square kilometre (km/Sqkm)**Level:** Primary**Type:** Non-spatial**Performance Evaluation****Threshold**

[Descriptive Indicator]

**Benchmark**

[Descriptive Indicator]

**Scoring Range**

No Scoring Range as the Indicator is Descriptive

**Data Availability**

Input variable	Unit	Tentative data source	Suggested interval for data update
Total road length in the city	Kilometres (km)	MPI/EOLI reporting	Annual

<sup>55</sup> UN-Habitat, Page 3 <https://unhabitat.org/sites/default/files/download-manager-files/A%20New%20Strategy%20of%20Sustainable%20Neighbourhood%20Planning%20Five%20principles.pdf>

Total area of the city	Square kilometres (Sqkm)	MPI/EOLI reporting	Annual
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## Reference

Source Framework	SDG Indicator	Other Frameworks
MPI (1.6.4)	NA	EOLI (1.5.3); CPI (5.2); GPSC

## Indicator 6.7

Average travel speed in major roads of the city (kmph)

### Sub Theme

Road Congestion

## Indicator Details

### Intent/Rationale:

Traffic congestion, travel time predictability and reliability are a function of average travel speed. Lower speeds below an optimum road speed leads to congestion, decreased productivity, increased fuel consumption and automobile emissions which then leads to worsening air quality levels. Average travel speed of a city can indicate how well the road infrastructure is functioning and if there is a need to optimize or augment it.

### Formula:

Average speed of travel in arterial & sub arterial roads during peak hours

**Unit:** kilometres per hour (kmph)

**Level:** Secondary

**Type:** Non-spatial

## Performance Evaluation

### Threshold

16 kmph

Determined after multiple rounds of consultations with sector experts

### Benchmark

20 kmph

SLB in Urban Transport, pg. no : 29

[http://mohua.gov.in/upload/uploadfiles/files/Voulmel\\_Methodologyreport\\_final03.pdf](http://mohua.gov.in/upload/uploadfiles/files/Voulmel_Methodologyreport_final03.pdf)

### Scoring Range

0(Very low performance)	1(Low performance)	2(Lower medium performance)	3(Medium performance)	4(Upper medium performance)	5(High performance)	6(Excellent performance)
<16 kmph	16-16.7 kmph	16.8-17.5 kmph	17.6-18.3 kmph	18.4-19.1 kmph	19.2-19.9 kmph	>=20 kmph

## Data Availability

<b>Input variable</b>	<b>Unit</b>	<b>Tentative data source</b>	<b>Suggested interval for data update</b>
Average speed of travel in arterial & sub arterial roads during peak hours	Kilometres per hour (kmph)	Traffic and transportation study of the city	Quinquennial

## Reference

<b>Source Framework</b>	<b>SDG Indicator</b>	<b>Other Frameworks</b>
GPSC	NA	ESCI (K.4)

## Indicator 6.8

Percentage share of NMT in commuting (cycling and walking) (%)

### Sub Theme

Non-motorised transport

## Indicator Details

### Intent/Rationale:

Non-motorised transport (NMT) is often a key element of successfully encouraging clean urban transport. It can be a very attractive mode of transport for relatively short distances, which make up the largest share of trips in cities. NMT is a highly cost-effective transportation strategy and brings about large health, economic and social co-benefits, particularly for the urban poor<sup>56</sup>. Hence, with this indicator the attempt is to ascertain the extent of NMT integration and adoption by a city.

### Formula:

Percentage share of population using Cycles + Percentage share of population commute on foot

**Unit:** Percentage (%)

**Level:** Secondary

**Type:** Non-spatial

## Performance Evaluation

### Threshold

15%

Determined after multiple rounds of consultations with sector experts

### National Average

33%

Urban NMT share national average (Cycling + Walking)

UNCRD Mobility and NMT in Sustainable Urban Transport Development, Pg. 23

<https://www.uncrd.or.jp/content/documents/6988Background%20Paper%20for%20EST%20Plenary%20Session%205-11th%20Regiona%20EST%20Forum.pdf>

### Benchmark

33%

Determined after multiple rounds of consultations with sector experts

## Scoring Range

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<sup>56</sup> <https://www.ctc-n.org/technologies/promotion-non-motorised-transport>

<b>0(Very low performance)</b>	<b>1(Low performance)</b>	<b>2(Lower medium performance)</b>	<b>3(Medium performance)</b>	<b>4(Upper medium performance)</b>	<b>5(High performance)</b>	<b>6(Excellent performance)</b>
<15%	15%-18.5%	18.6%-22.1%	22.2%-25.7%	25.8%-29.3%	29.4%-32.9%	>=33%

### Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update
Percentage share of population using Cycles	Percentage (%)	Traffic and transportation study of the city	Annual
Percentage share of population commute on foot	Percentage (%)	Traffic and transportation study of the city	Annual

### Reference

Source Framework	SDG Indicator	Other Frameworks
Expert recommended	NA	CSCAF (4.3: Indicator 3)

## Indicator 6.9

Street intersection density (intersections/Sqkm)

### Sub Theme

Coverage

### Indicator Details

#### Intent/Rationale:

Street intersection density is an important measure of network connectivity. This indicator is commonly used in transportation design as well as urban planning to determine walkability of neighbourhoods. The greater the intersection density, the smaller the blocks and the more walkable the neighbourhood (Ewing, 1999). However, the size of blocks and connectivity is not sufficient to determine walkability in a city. Intersection density is often used when attempting to measure street connectivity, however, a compact network is not necessarily connected and vice versa.<sup>57</sup>

#### Formula:

[Number of intersections in the city/ Total area of the city]

**Unit:** Number per square kilometre (number/Sqkm)

**Level:** Secondary

**Type:** Non-spatial

### Performance Evaluation

#### Threshold

75 intersections per square kilometre

Determined after multiple rounds of consultations with sector experts

#### Benchmark

100 intersections per square kilometre

Economic Foundations for Sustainable Urbanization, UN-Habitat, Pg. 37

[https://unhabitat.org/sites/default/files/download-manager-files/3PA\\_Second%20Edition\\_ForWeb.pdf](https://unhabitat.org/sites/default/files/download-manager-files/3PA_Second%20Edition_ForWeb.pdf)

#### Scoring Range

0(Very low performance)	1(Low performance)	2(Lower medium performance)	3(Medium performance)	4(Upper medium performance)	5(High performance)	6(Excellent performance)
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<sup>57</sup> <https://www.cnu.org/our-projects/street-networks/street-networks-101>

Less than 75 intersections	NA	NA	Between 75 and 100 intersections	NA	NA	Greater than 100 intersections
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### Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update
Number of intersections in the city	Number	Road network shape file, OSM	Quinquennial
Total area of the city	Square Kilometre (Sqkm)	Town Planning Department	Quinquennial

### Reference

Source Framework	SDG Indicator	Other Frameworks
CPI (5.1)	NA	NA

## Indicator 6.10

Kilometres of road with public transit per 100,000 population (km)

### Sub Theme

Coverage

### Indicator Details

#### Intent/Rationale:

Policies that encourage high-density, mixed-use, balanced, transit-oriented development with jobs close to homes and walkable streets are vital to reduce private car use and increase the financial viability of public transport. Land value increases due to improved accessibility can be captured by local governments to further finance provision of public transport infrastructure. Efficient mobility integrates labour and consumer markets and is a driver of economic development. A successful transport policy helps in regional integration, boost economic performance and competitiveness, increases access to jobs, and helps to move towards an inclusive society with improved quality of life and better public health.

#### Formula:

[Total length of public transport route within the city/ Total population of the city]\*100000

**Unit:** kilometres (km)

**Level:** Secondary

**Type:** Non-spatial

### Performance Evaluation

#### Threshold

10 km

Determined after multiple rounds of consultations with sector experts

#### Benchmark

40 km

Green cities programme methodology, Pg. no: 80

<https://www.ebrd.com/documents/technical-cooperation/green-city-action-plan-in-tirana.pdf>

#### Scoring Range

0(Very low)	1(Low performance)	2(Lower medium)	3(Medium)	4(Upper medium)	5(High performance)	6(Excellent)
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<b>performance)</b>		<b>performance)</b>	<b>performance)</b>	<b>performance)</b>		<b>performance)</b>
Less than 10 km	NA	NA	Between 10km and 40 km	NA	NA	Greater than 40 km

### Data Availability

<b>Input variable</b>	<b>Unit</b>	<b>Tentative data source</b>	<b>Suggested interval for data update</b>
Total length of public transport route within the city	Kilometres (km)	State Road Transport Corporation	Quinquennial
Total population of the city	Number	Census projections or ULB population estimates	Quinquennial

### Reference

<b>Source Framework</b>	<b>SDG Indicator</b>	<b>Other Frameworks</b>
GPSC	NA	ESCI (K.1)

## Indicator 6.11

Fatal and serious injuries in road accidents per lakh population (number)

### Sub Theme

Safety

## Indicator Details

### Intent/Rationale:

Traffic fatalities is the eighth leading cause of death globally, and the leading cause of death for young people aged 15–29 years. This is not only a matter of health care, as many cities have found that by reducing traffic fatalities, they reduce related health and productivity losses (World Health Organization, 2004). A prosperous city seeks to reduce traffic fatalities through improvement of physical infrastructure and policy implementation. This indicator attempts to ascertain the level of safety in a city with fatal and serious injuries as a measure.

### Formula:

$(\text{Total number of fatalities recorded in road accidents within the city} + \text{Serious injuries recorded in road accidents within the city}) / \text{Population of the city} * 100000$

**Unit:** number per lakh population (number/100,000 population)

**Level:** Secondary

**Type:** Non-spatial

## Performance Evaluation

### Threshold

6 per lakh population

Determined after multiple rounds of consultations with sector experts

### Benchmark

Zero per lakh population

SLB in Urban Transport, pg. : 32

[http://mohua.gov.in/upload/uploadfiles/files/VoulmeI\\_Methodologyreport\\_final03.pdf](http://mohua.gov.in/upload/uploadfiles/files/VoulmeI_Methodologyreport_final03.pdf)

### Scoring Range

0(Very low performance)	1(Low performance)	2(Lower medium performance)	3(Medium performance)	4(Upper medium performance)	5(High performance)	6(Excellent performance)
>6	6-4.7	4.8-3.5	3.6-2.3	2.4-1.1	1.2--0.1	0

## Data Availability

<b>Input variable</b>	<b>Unit</b>	<b>Tentative data source</b>	<b>Suggested interval for data update</b>
Total number of fatalities recorded in road accidents within the city	Number	Traffic Police Department or City Urban Transport Plan	Annual
Serious injuries recorded in road accidents within the city	Number	Traffic Police Department or City Urban Transport Plan	Annual
Total population of the city	Number	Census projections or ULB population estimates	Annual

## Reference

<b>Source Framework</b>	<b>SDG Indicator</b>	<b>Other Frameworks</b>
GPSC	3.6.1	CPI (4.4); ESCI (K.3)

## Indicator 6.12

Accessibility of differently abled groups to public buses (%)

### Sub Theme

Universal Accessibility

### Indicator Details

#### Intent/Rationale:

Transportation is an extremely important policy issue for those with disabilities. People with disabilities have consistently described how transportation barriers affect their lives in important ways. An improvement would involve increased focus on educating drivers and about accommodating all travellers, use of technology in eliminating the barriers for boarding, getting off and enhancing user experience.

#### Formula:

$[\text{Number of buses as per urban bus specification II (2013)} / \text{Total number of buses in the city}] * 100$

**Unit:** Percentage (%)

**Level:** Secondary

**Type:** Non-spatial

### Performance Evaluation

#### Threshold

25%

SLB in Urban Transport, pg. : 26

[http://mohua.gov.in/upload/uploadfiles/files/Voulmel\\_Methodologyreport\\_final03.pdf](http://mohua.gov.in/upload/uploadfiles/files/Voulmel_Methodologyreport_final03.pdf)

#### Benchmark

75%

SLB in Urban Transport, pg. : 26

[http://mohua.gov.in/upload/uploadfiles/files/Voulmel\\_Methodologyreport\\_final03.pdf](http://mohua.gov.in/upload/uploadfiles/files/Voulmel_Methodologyreport_final03.pdf)

#### Scoring Range

0(Very low performance)	1(Low performance)	2(Lower medium performance)	3(Medium performance)	4(Upper medium performance)	5(High performance)	6(Excellent performance)
<25%	25%-34.9%	35%-44.9%	45%-54.9%	55%-64.9%	65%-74.9%	>=75%

## Data Availability

<b>Input variable</b>	<b>Unit</b>	<b>Tentative data source</b>	<b>Suggested interval for data update</b>
Number of buses as per urban bus specification II (2013)	Number	State Road Transport Corporation	Quinquennial
Total number of buses in the city	Number	State Road Transport Corporation	Quinquennial

## Reference

<b>Source Framework</b>	<b>SDG Indicator</b>	<b>Other Frameworks</b>
Expert recommended	11.2.1	NA

### Indicator 6.13

Workplace accessibility within 30 minutes of transit (%)

**Sub Theme**

Coverage

### Indicator Details

**Intent/Rationale:**

Cities are efficient at providing access to people, goods, services, and information: the better and more efficient this access, the greater the social and economic benefits of urban living. A sustainable city deploys connective infrastructure—transit infrastructure, airport connectivity, logistics, and information and communications technology—required to sustain both the population and the economy. This also provides better quality of life and equitable access to jobs, education, and health centres.

**Formula:**

$$\frac{\text{[Population residing within a travel time of 30 min from work place within the city/ Total population of the city]}*100$$

**Unit:** Percentage (%)

**Level:** Tertiary; Aspirational

**Type:** Spatial

### Performance Evaluation

**Threshold**

[Descriptive Indicator]

**Benchmark**

[Descriptive Indicator]

**Scoring Range**

No Scoring Range as the Indicator is Descriptive

### Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update
Population residing within a travel time of 30 min from work place within the city	Number	Spatial analysis to be conducted by the Planning	Quinquennial

		Department of the ULB	
Total population of the city	Number	Census projections or ULB population estimates	Quinquennial

## Reference

Source Framework	SDG Indicator	Other Frameworks
GPSC	NA	NA

**Indicator 6.14**

Percentage of total area of ULB allocated to streets (%)

**Sub Theme**

Coverage

**Indicator Details****Intent/Rationale:**

A prosperous city seeks an optimal allocation of land dedicated to streets to guarantee good performance of the mobility system, share space among modes and to avoid sizeable extensions of spaces dedicated to personal motor vehicles. Cities that have adequate street and public spaces and connectivity are more liveable and productive. Transportation systems consume large amounts of land from spaces allocated for both the circulation and parking of vehicles. Land must be allocated for complementary facilities such as public transport terminals, stations, offices and warehouses related to transportation (CAF, 2010). This indicator attempts to assess if the city has adequate space allocated to streets and roads as per the standards.

**Formula:**

$$[\text{Area under roads within the city} / \text{Total area of city}] * 100$$
**Unit:** Percentage (%)**Level:** Tertiary**Type:** Non-spatial**Performance Evaluation****Threshold**

15%

Determined after multiple rounds of consultations with sector experts

**Benchmark**

30%

Economic Foundations for Sustainable Urbanization, UN-Habitat, Pg. 74

[https://unhabitat.org/sites/default/files/download-manager-files/3PA Second%20Edition ForWeb.pdf](https://unhabitat.org/sites/default/files/download-manager-files/3PA%20Second%20Edition%20ForWeb.pdf)

**Scoring Range**

0(Very low performance)	1(Low performance)	2(Lower medium performance)	3(Medium performance)	4(Upper medium performance)	5(High performance)	6(Excellent performance)
<15%	15%-17.9%	18%-20.9%	21%-23.9%	24%-26.9%	27%-29.9%	>=30%

## Data Availability

<b>Input variable</b>	<b>Unit</b>	<b>Tentative data source</b>	<b>Suggested interval for data update</b>
Area under roads within the city	Square kilometres (Sqkm)	Existing Land use, Urban Development Authority	Quinquennial
Total area of city	Square kilometres (Sqkm)	Existing Land use, Urban Development Authority	Quinquennial

## Reference

<b>Source Framework</b>	<b>SDG Indicator</b>	<b>Other Frameworks</b>
CPI (5.3)	NA	GPSC

## Indicator 7.1

Percentage of population within 800m distance to healthcare facilities (public/private) (%)

### Sub Theme

Health

## Indicator Details

### Intent/Rationale:

Public health services help to ensure that city-scale health risks are monitored, epidemics are avoided, and wider health issues are managed. A healthy population is able to enjoy a good quality of life and make a full contribution to the economy. Access to adequate health care and public health services is essential to reduce the occurrence of infectious diseases. Effective welfare services are also important for ensuring people have access to adequate care, accommodation, and nutritional care to support good health.

### Formula:

[Population residing within a distance of 800 m from the nearest healthcare facility within the city/ Total population of the city]\*100

**Unit:** Percentage (%)

**Level:** Primary

**Type:** Spatial

## Performance Evaluation

### Threshold

80%

Determined after multiple rounds of consultations with sector experts

### Benchmark

95%

Determined after multiple rounds of consultations with sector experts

800m distance: A preferable 300 m to 800 m walkable distance (located within 5-15 minutes) is generally considered as proximity to a community facility. For this indicator, a distance of 800 m is considered as accessibility distance for healthcare facility.<sup>58</sup>

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<sup>58</sup> Health care delivery facilities should be within 30 min of walking distance (MoHFW 2014). A distance of 1.5 km is considered as accessibility distance for healthcare facility. Also, as per NUHM guidelines, one Primary Health Centre should be there for every 50,000 to 60,000 population. Considering the population

### Scoring Range

0(Very low performance)	1(Low performance)	2(Lower medium performance)	3(Medium performance)	4(Upper medium performance)	5(High performance)	6(Excellent performance)
<80%	80%-82.9%	83%-85.9%	86%-88.9%	89%-91.9%	92%-94.9%	>=95%

### Computation Method

Accessibility analysis: Access to healthcare facilities is assessed by calculating the catchment of a resident's facilities within an 800m walking distance. This can be measured as-the-crow-flies for quick assessments or can be calculated along existing transportation routes of the city to reflect a more realistic and accurate picture. Once a buffer from the existing healthcare facilities in the city is established, one can differentiate or select the number of residents falling within, (corresponding to), those buffers.

#### **Input Layers:**

- (g) City boundary (.shp format)
- (h) Healthcare facilities (Point data in Projected CRS)
- (i) Road Network (Line data in Projected CRS).

#### **Steps:**

- (g) Create 800m walksheds: To perform the analysis the road network file must be checked for any topological errors and rectified accordingly. Now the network is ready for analysis. To create the walksheds, one needs to open the "Iso-Area as polygon (from layer)" from the QNET3 toolbox and load the road network and the layer with point information on healthcare facilities. After configuring this setting, click run. The outcome gives a buffer of 800m radius from all polygons, but in a few places, there might be some buffers/polygons which would have covered more than 800m distance. To rectify we need to run a similar analysis on the "service area (from layer)" tool from the network analyst toolbox and load the road network layer into the first blank and healthcare facilities layer in the blank mentioned as start points. The outcome gives the 800m road network from all healthcare facilities points.
- (h) Calculate population in 800m walksheds: Now that the 800m walking accessibility from healthcare facilities and the population distribution grid at 250m resolution from the Global Human settlements (GHSL) database is imported, one can estimate the number

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density standard of 150 PPH prescribed by URDPFI and UN-Habitat, the average distance from the facility works out be 1.1 km (for 60,000 population).

of people residing within the 800m accessing polygons. To do this, choose the “Select by location” from the vector selection toolbox. Select the run option. All the polygons intersecting the 800m walkshed will be selected, deselect the polygons with less than 1/4 overlap with the walkshed by manually eyeballing the layers. Lastly, open the statistics tab and select the population density layer and the layer in which population data is available and check the “Selected features only” option.

- (i) The result is the population who have access to healthcare facilities within a walking distance of 800m.

## Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update
Shape file (point) with healthcare facilities in the city	Point shape file	Town Planning Department or Open Street Maps (OSM)	Quinquennial
Shape file (line) with road network	Line shape file	Town Planning Department or Open Street Maps (OSM)	Quinquennial
Municipal Boundary	Polygon shape file	City Municipal Corporation	Quinquennial
City population (Projections)	Number	Census Projections or ULB estimates	Quinquennial
Population grid @250m resolution <sup>59</sup>	Raster file	GHSL Population grid <a href="https://ghsl.jrc.ec.europa.eu/download.php?ds=pop">https://ghsl.jrc.ec.europa.eu/download.php?ds=pop</a>	Quinquennial

## Reference

Source Framework	SDG Indicator	Other Frameworks
GPSC	NA	CRPT

<sup>59</sup> Product: GHS-POP, epoch: 2015, resolution: 9 arcsec, coordinate system: WGS84

## Indicator 7.2

Percentage of females of ages 7 and above who are literate (%)

### Sub Theme

Education

## Indicator Details

### Intent/Rationale:

Education is essential for human development. Education increases the range and quality of livelihood opportunities, helping to reduce poverty and eradicate hunger. An educated workforce is better able to meet the skills demanded by businesses, and in turn helps local economies to grow and prosper. Equal access to education can help to eliminate gender and ethnic inequalities and empower marginalized and vulnerable groups. SDG 4 aims at eliminating gender disparities in education and ensuring equal access to all levels of education and vocational training for the vulnerable, including persons with disabilities, indigenous peoples, and children in vulnerable situations by 2030.

### Formula:

$$\left[ \frac{\text{Number of literate females aged 7 and above in the city}}{\text{Total female population aged 7 and above of city}} \right] * 100$$

**Unit:** Percentage (%)

**Level:** Primary

**Type:** Non-spatial

## Performance Evaluation

### Threshold

64%

Calculated using national average as the median value and the benchmark

### National Average

National urban average: 82.8%

NSS 75th round social consumption on education report Year: 2017-18

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[http://mospi.nic.in/sites/default/files/publication\\_reports/Report\\_585\\_75th\\_round\\_Education\\_final\\_1507\\_0.pdf](http://mospi.nic.in/sites/default/files/publication_reports/Report_585_75th_round_Education_final_1507_0.pdf)

### Benchmark

100%

National literacy target

**Scoring Range**

0(Very low performance)	1(Low performance)	2(Lower medium performance)	3(Medium performance)	4(Upper medium performance)	5(High performance)	6(Excellent performance)
<64%	64%-69.9%	70%-75.9%	76%-81.9%	82%-87.9%	88%-93.9%	100%

**Data Availability**

Input variable	Unit	Tentative data source	Suggested interval for data update
Number of literate females aged 7 and above in the city	Number	Census Primary Abstract	Decadal
Total female population aged 7 and above of city	Number	Census Primary Abstract	Decadal

**Reference**

Source Framework	SDG Indicator	Other Frameworks
GPSC	4.6.1	CPI (2.1), EOLI (1.1.2); ESCI (O.1)

## Indicator 7.3

Percentage of population within 800m distance to primary/secondary schools (public/private) (%)

### Sub Theme

Education

## Indicator Details

### Intent/Rationale:

Education is critical for driving inclusivity, employment, innovation and economic development. Access to public or private education is highly relevant especially for the vulnerable population- rural migrants slum dwellers and refugees<sup>60</sup>. In addition, education facilities should be spatially equitable in a city to ensure optimum access by all city residents.

### Formula:

[Population residing within a distance of 800 m from primary or secondary school within the city/ Total population of the city]\*100

**Unit:** Percentage (%)

**Level:** Primary

**Type:** Spatial

## Performance Evaluation

### Threshold

80%

Determined after multiple rounds of consultations with sector experts

### Benchmark

95%

Determined after multiple rounds of consultations with sector experts

800m distance: A preferable 300 m to 800 m walkable distance (located within 5-15 minutes) is generally considered as proximity to a community facility. For this indicator, a distance of 800m is considered as accessibility distance for primary and secondary schools.<sup>61</sup>

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<sup>60</sup> <https://www.devex.com/news/opinion-how-can-a-city-be-smart-if-it-doesn-t-include-education-89501>

<sup>61</sup> As per URDPFI guidelines, a Senior Secondary school is expected to service a population of 7500. Considering the population density standard of 150 PPH prescribed by URDPFI and UN-Habitat, the average distance from the facility works out be 400 m.

**Scoring Range**

0(Very low performance)	1(Low performance)	2(Lower medium performance)	3(Medium performance)	4(Upper medium performance)	5(High performance)	6(Excellent performance)
<80%	80%-82.9%	83%-85.9%	86%-88.9%	89%-91.9%	92%-94.9%	>=95%

**Computation Method**

Accessibility analysis: Access to primary/secondary schools is assessed by calculating the catchment of a resident's facilities within an 800m walking distance. This can be measured as-the-crow-flies for quick assessments or can be calculated along existing transportation routes of the city to reflect a more realistic and accurate picture. Once a buffer from the existing primary/secondary schools in the city is established, one can differentiate or select the number of residents falling within, (corresponding to), those buffers.

**Input Layers:**

- (j) City boundary (.shp format)
- (k) Primary/secondary schools (Point data in Projected CRS)
- (l) Road Network (Line data in Projected CRS).

**Steps:**

- (j) Create 800m walksheds: To perform the analysis, the road network file must be checked for any topological errors and rectified accordingly. To create the walksheds, one needs to open the "Iso-Area as polygon (from layer)" from the QNET3 toolbox and load the road network and the layer with point information on primary/secondary schools. After configuring this setting, click run. The outcome gives a buffer of 800m radius from all polygons, but in a few places, there might be some buffers/polygons which would have covered more than 800m distance. To rectify we need to run a similar analysis on the "service area (from layer)" tool from the network analyst toolbox and load the road network layer into the first blank and primary/secondary schools' layer in the blank mentioned as start points. The outcome gives the 800m road network from all primary/secondary schools points.
- (k) Calculate population in 800m walksheds: Now that the 800m walking accessibility from primary/secondary schools and the population distribution grid at 250m resolution from the Global Human settlements (GHSL) database is imported, one can estimate the number of people residing within the 800m accessing polygons. To do this, choose the "Select by location" from the vector selection toolbox. Select the run option. All the polygons intersecting the 800m walkshed will be selected, deselect the polygons with

less than 1/4 overlap with the walkshed by manually eyeballing the layers. Lastly, open the statistics tab and select the population density layer and the layer in which population data is available and check the “Selected features only” option.

- (l) The result is the population who have access to primary/secondary schools within a walking distance of 800m.

## Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update
Shape file (point) with primary/secondary schools in the city	Point shape file	Town Planning Department or Open Street Maps (OSM)	Quinquennial
Shape file (line) with road network	Line shape file	Town Planning Department or Open Street Maps (OSM)	Quinquennial
Municipal Boundary	Polygon shape file	City Municipal Corporation	Quinquennial
City population (Projections)	Number	Census Projections or ULB estimates	Quinquennial
Population grid @250m resolution <sup>62</sup>	Raster file	GHSL Population grid <a href="https://ghsl.jrc.ec.europa.eu/download.php?ds=pop">https://ghsl.jrc.ec.europa.eu/download.php?ds=pop</a>	Quinquennial

## Reference

Source Framework	SDG Indicator	Other Frameworks
MDPI (2.4)	NA	NA

<sup>62</sup> Product: GHS-POP, epoch: 2015, resolution: 9 arcsec, coordinate system: WGS84

## Indicator 7.4

Change in decadal population growth rate (1991-2001 and 2001-2011)<sup>63</sup> (%)

### Sub Theme

Demographic

## Indicator Details

### Intent/Rationale:

An increasing decadal population growth rate indicates a reducing under-five mortality rate. Under-five mortality rate means child survival. It also reflects the social, economic, and environmental conditions in which children (and others in society) live, including their health care<sup>64</sup>.

### Formula:

$$\left( \frac{(\text{Population of the city in 2011} - \text{Population of the city in 2001})}{\text{Population of the city in 2001}} - \left( \frac{(\text{Population of the city in 2001} - \text{Population of the city in 1991})}{\text{Population of the city in 1991}} \right) \right) * 100$$

**Unit:** Percentage (%)

**Level:** Secondary

**Type:** Non-spatial

## Performance Evaluation

### Threshold

[Descriptive Indicator]

### Benchmark

[Descriptive Indicator]

### Scoring Range

No Scoring Range as the Indicator is Descriptive

## Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update
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<sup>63</sup> This indicator can be revised to reflect the Census round 2021 once city level population stats are available for 2021.

<sup>64</sup> <https://www.who.int/data/gho/indicator-metadata-registry/indicator/7#:~:text=Under%2Dfive%20mortality%20rate%20measures%20child%20survival.&text=Under%2Dfive%20mortality%20rate%20is,mortality%20rates%20of%20that%20period>.

Population of the city in 2011	Number	Census 2011	Decadal
Population of the city in 2001	Number	Census 2001	Decadal
Population of the city in 1991	Number	Census 1991	Decadal

## Reference

Source Framework	SDG Indicator	Other Frameworks
GPSC	NA	NA

## Indicator 7.5

City Level Dependency Ratio (%)

### Sub Theme

Demographic

## Indicator Details

### Intent/Rationale:

The dependency ratio is a measure of the number of dependents aged zero to 14 and over the age of 65, compared with the total population aged 15 to 64. This demographic indicator gives insight into the number of people of non-working age, compared with the number of those of working age<sup>65</sup>.

### Formula:

$$\frac{[(\text{Number of people aged 0-14} + \text{Number of people aged 65 and above}) / \text{Number of people aged 15-64}] * 100}{}$$

**Unit:** Percentage (%)

**Level:** Secondary

**Type:** Non-spatial

## Performance Evaluation

### Threshold

[Descriptive Indicator]

### Benchmark

[Descriptive Indicator]

### Scoring Range

No Scoring Range as the Indicator is Descriptive

## Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update
Number of people aged 0-14	Number	Census 2011	Decadal

<sup>65</sup> <https://www.investopedia.com/terms/d/dependencyratio.asp>

Number of people aged 65 and above	Number	Census 2011	Decadal
Number of people aged 15-64	Number	Census 2011	Decadal

## Reference

Source Framework	SDG Indicator	Other Frameworks
GPSC	NA	CPI (1.2)

## Indicator 7.6

Under-five mortality rate per 1000 births (number)

### Sub Theme

Health

## Indicator Details

### Intent/Rationale:

Public health services help to ensure that city-scale health risks are monitored, epidemics are avoided, and wider health issues are managed. A healthy population enjoys a good quality of life and make full contribution to the economy. Access to adequate health care and public health services is essential to reduce the occurrence of infectious diseases. Effective welfare services are also important for ensuring people have access to adequate care, accommodation, and nutrition care to support health.

### Formula:

$$\left[ \frac{\text{Number of deaths of children under the age of five in the reference year}}{\text{Total number of live births in the reference year}} \right] * 1000$$

**Unit:** Number

**Level:** Secondary

**Type:** Non-spatial

## Performance Evaluation

### Threshold

47.5

Calculated using national average as the median value and the benchmark

### National Average

34.3

World Bank database (India for the year 2019)

<https://data.worldbank.org/indicator/SH.DYN.MORT?locations=IN>

### Benchmark

25 per 1000 live births

THE 2030 AGENDA SDG Goal 3.3, Pg. 20

<https://sustainabledevelopment.un.org/content/documents/21252030%20Agenda%20for%20Sustainable%20Development%20web.pdf>

### Scoring Range

<b>0(Very low performance)</b>	<b>1(Low performance)</b>	<b>2(Lower medium performance)</b>	<b>3(Medium performance)</b>	<b>4(Upper medium performance)</b>	<b>5(High performance)</b>	<b>6(Excellent performance)</b>
>47.5	47.5-42.9	43-38.4	38.5-33.9	34-29.4	29.5-24.9	<=25

### Data Availability

<b>Input variable</b>	<b>Unit</b>	<b>Tentative data source</b>	<b>Suggested interval for data update</b>
Number of deaths of children under the age of five in the reference year	Number	Public Health Department	Annual
Total number of live births in the reference year	Number	Public Health Department	Annual

### Reference

<b>Source Framework</b>	<b>SDG Indicator</b>	<b>Other Frameworks</b>
GPSC	3.2.1	NIF (3.2.1); CPI (1.2); ESCI (Q.1)

## Indicator 7.7

Bed density in public and private hospitals (Hospital beds per 10,000 residents)  
(number)

### Sub Theme

Health

## Indicator Details

### Intent/Rationale:

Hospital bed density has a significant impact on health indicators of a city and increasing the bed density has potential to improve measurable health indicators. It serves as a general measure of inpatient service availability and represents the ability of the health system to respond to health crises.

### Formula:

[Total number of beds in public and private hospitals in the ULB/ Total population of ULB]\*10000

**Unit:** Number

**Level:** Secondary

**Type:** Non-spatial

## Performance Evaluation

### Threshold

15 beds per 10,000 persons

Determined after multiple rounds of consultations with sector experts

### Benchmark

25 beds per 10,000 persons

EOLI , Indicator 1.2.4, Pg. 45

<https://smartnet.niua.org/eol19/pdf/EOL-2019-Completed-Version.pdf>

### Scoring Range

0(Very low performance)	1(Low performance)	2(Lower medium performance)	3(Medium performance)	4(Upper medium performance)	5(High performance)	6(Excellent performance)
<15	15-16.9	17-18.9	19-20.9	21-22.9	23-24.9	>=25

## Data Availability

<b>Input variable</b>	<b>Unit</b>	<b>Tentative data source</b>	<b>Suggested interval for data update</b>
Total number of beds in public and private hospitals in the ULB	Number	EOLI reporting	Annual
Total population of ULB	Number	EOLI reporting	Annual

## Reference

<b>Source Framework</b>	<b>SDG Indicator</b>	<b>Other Frameworks</b>
EOLI (1.2.4)	NA	ESCI (Q.2); MDPI (2.1)

## Indicator 7.8

Percentage reduction in prevalence of vector borne diseases(malaria, dengue) over the previous year (%)

### Sub Theme

Health

## Indicator Details

### Intent/Rationale:

Owing to population growth and increasing urban poverty, the urban environment in many places is deteriorating. Densely packed housing in shanty towns or slums and inadequate drinking-water supplies, garbage collection services, and surface-water drainage systems combine to create favourable habitats for the proliferation of vectors and reservoirs of communicable diseases. Controlling the vector diseases which are a major public health problem shall be the priority of urban governments<sup>66</sup>.

### Formula:

$$\left( \frac{\text{Total number of reported cases of Malaria and Dengue in the city in previous year} - \text{Total number of reported cases of Malaria and Dengue in the ULB in reference year}}{\text{Total number of reported cases of Malaria and Dengue in the city in previous year}} \right) * 100$$

**Unit:** Percentage (%)

**Level:** Secondary

**Type:** Non-spatial

## Performance Evaluation

### Threshold

25%

Determined after multiple rounds of consultations with sector experts

### Benchmark

50%

Disease Control Programmes, Pg.58

<https://main.mohfw.gov.in/sites/default/files/5201617.pdf>

### Scoring Range

0(Very low)	1(Low performance)	2(Lower medium)	3(Medium)	4(Upper medium)	5(High performance)	6(Excellent)
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<sup>66</sup> <https://pubmed.ncbi.nlm.nih.gov/1568273/>

<b>performance)</b>		<b>performance)</b>	<b>performance)</b>	<b>performance)</b>		<b>performance)</b>
<25%	25%-29.9%	30%-34.9%	35%-39.9%	40%-44.9%	45%-49.9%	>=50%

### Data Availability

<b>Input variable</b>	<b>Unit</b>	<b>Tentative data source</b>	<b>Suggested interval for data update</b>
Total number of reported cases of Malaria and Dengue in the city in previous year-	Number	Public Health Department; EOLI reporting	Annual
Total number of reported cases of Malaria and Dengue in the ULB in reference year	Number	Public Health Department; EOLI reporting of previous year	Annual

### Reference

<b>Source Framework</b>	<b>SDG Indicator</b>	<b>Other Frameworks</b>
Expert recommended	3.3.3	EOLI (1.2.5); NIF (3.3.3, 3.3.5, 3.3.6, 3.3.7)

## Indicator 7.9

Percentage reduction in prevalence of waterborne diseases (Diarrhoea, typhoid) over the previous year (%)

### Sub Theme

Health

## Indicator Details

### Intent/Rationale:

Water is integral part of urban life, sustenance and sanitation, connectivity and economic development. Poor water quality poses grave threats to human health. A significant number of diseases could be prevented especially, in developing countries through better access to safe water supply, adequate sanitation facilities and better hygiene practices<sup>67</sup>. As urban areas are expected to absorb a major part of population increase, it is more important to provide access to quality water sources to urban poor or migrants so as to prevent an epidemic.

### Prevalence of diseases

#### Formula:

$$\left( \frac{\text{Total number of reported cases of Diarrhoea and Typhoid in the city in previous year} - \text{Total number of reported cases of Diarrhoea and Typhoid in the ULB in reference year}}{\text{Total number of reported cases of Diarrhoea and Typhoid in the city in previous year}} \right) * 100$$

**Unit:** Percentage (%)

**Level:** Secondary

**Type:** Non-spatial

## Performance Evaluation

### Threshold

5%

Determined after multiple rounds of consultations with sector experts

### Benchmark

20%

<https://www.who.int/cholera/publications/global-roadmap.pdf>

### Scoring Range

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<sup>67</sup> <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3634161/>

<b>0(Very low performance)</b>	<b>1(Low performance)</b>	<b>2(Lower medium performance)</b>	<b>3(Medium performance)</b>	<b>4(Upper medium performance)</b>	<b>5(High performance)</b>	<b>6(Excellent performance)</b>
<5%	5%-7.9%	8%-10.9%	11%-13.9%	14%-16.9%	17%-19.9%	>=20%

## Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update
Total number of reported cases of Diarrhoea and Typhoid in the city in previous year	Number	Public Health Department; EOLI reporting	Annual
Total number of reported cases of Diarrhoea and Typhoid in the ULB in reference year	Number	Public Health Department; EOLI reporting of previous year	Annual

## Reference

Source Framework	SDG Indicator	Other Frameworks
Expert recommended	3.3.2; 3.3.4	EOLI (1.2.5); NIF (3.3.2, 3.3.4)

## Indicator 7.10

Percentage of schools with Access to Digital Education (%)

### Sub Theme

Education

### Indicator Details

#### Intent/Rationale:

Number of schools (public and private) with facilities for using digital educational content (availability of necessary infrastructure and connection to digital resources such as National Knowledge Network)

#### Formula:

$[\text{Number of schools within the city with access to digital education} / \text{Total number of schools in the city}] * 100$

**Unit:** Percentage (%)

**Level:** Secondary; Aspirational

**Type:** Non-spatial

### Performance Evaluation

#### Threshold

[Descriptive Indicator]

#### Benchmark

[Descriptive Indicator]

#### Scoring Range

No Scoring Range as the Indicator is Descriptive

### Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update
Number of schools within the city with access to digital education	Number	EOLI reporting	Annual
Total number of schools in the city	Number	EOLI reporting	Annual

## Reference

Source Framework	SDG Indicator	Other Frameworks
EOLI (1.1.7)	4.a.1	NA

## Indicator 7.11

Percentage of mobile network, by 3G and 4G technology subscriptions (%)

### Sub Theme

ICT

### Indicator Details

#### Intent/Rationale:

Cities are efficient at providing access to people, goods, services, and information: the better and more efficient this access, the greater the social and economic benefits of urban living. A sustainable city deploys the connective infrastructure—transit infrastructure, airport connectivity, logistics, and information and communications technology—required to sustain both the population and the economy and to provide better quality of life and equitable access to jobs, education, and health. Broadband quality and airport and logistics connectivity support a city’s access to global flows of information, high-level services, and goods.<sup>68</sup>

#### Formula:

[Total number of mobile phones with 3G or 4G subscriptions till reference year/ Total population of ULB]\*100

**Unit:** Percentage (%)

**Level:** Tertiary

**Type:** Non-spatial

### Performance Evaluation

#### Threshold

80%

Determined after multiple rounds of consultations with sector experts

#### Benchmark

95%

Determined after multiple rounds of consultations with sector experts

#### Scoring Range

0(Very low performance)	1(Low performance)	2(Lower medium performance)	3(Medium performance)	4(Upper medium performance)	5(High performance)	6(Excellent performance)
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<sup>68</sup> GPSC <https://documents1.worldbank.org/curated/en/339851517836894370/pdf/123149-Urban-Sustainability-Framework.pdf>

<80%	80%- 82.9%	83%- 85.9%	86%- 88.9%	89%- 91.9%	92%- 94.9%	>=95%
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### Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update
Total number of mobile phones with 3G or 4G subscriptions till reference year	Number	Telecom Regulatory Authority of India (TRAI) surveys	Annual
Total population of ULB	Number	Census projections or ULB population estimates	Annual

### Reference

Source Framework	SDG Indicator	Other Frameworks
GPSC	NA	NA

## Indicator 8.1

Clean Air Action Plan (Planning and Implementation)

### Sub Theme

Pollution and Contamination

## Indicator Details

### Intent/Rationale:

Unsustainable urban planning, lack of proper waste management, poor pollution control technology in industries and increased urban transport have all led to rise in air pollution in cities in India. A clean air plan is a collection of regulations, policies, and programmes, which aims to improve air quality and public health by identifying cost-effective measures to reduce emissions from all the known sources. In January 2019, the Ministry of Environment, Forest and Climate Change (MoEFCC) launched the National Clean Air Programme (NCAP) to prepare clean air action plans with an objective to reduce PM<sub>2.5</sub> pollution by 20–30% by 2024 as compared to 2017, in 122 cities ([NCAP, 2019](#)). The approved clean air action plan list sector-specific interventions with predetermined timelines and an agency responsible for execution. The plans in essence are developed to manage air quality in Indian cities<sup>69</sup>.

### Formula:

Yes/ No

**Unit:** NA

**Level:** Primary

**Type:** Non-spatial

## Performance Evaluation

### Threshold

No Air Pollutant Monitoring Clean Air Action Plan in the city

Climate Smart Cities Assessment Framework, Pg. 41-42

[https://www.niua.org/csc/assets/pdf/CSCAF\\_2\\_Booklet.pdf](https://www.niua.org/csc/assets/pdf/CSCAF_2_Booklet.pdf)

### Benchmark

Assessing impacts of Clean Air Action Plan

Climate Smart Cities Assessment Framework, Pg. 41-42

[https://www.niua.org/csc/assets/pdf/CSCAF\\_2\\_Booklet.pdf](https://www.niua.org/csc/assets/pdf/CSCAF_2_Booklet.pdf)

### Scoring Range

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<sup>69</sup> <https://www.sciencedirect.com/science/article/pii/S2590162120300368>

0(Very low performance)	1(Low performance)	2(Lower medium performance)	3(Medium performance)	4(Upper medium performance)	5(High performance)	6(Excellent performance)
No Air Pollutant Monitoring Clean Air Action Plan in the city	NA	NA	Clean Air Action Plan and Pollutants Source Identification	NA	NA	Assessing impacts of Clean Air Action Plan implementation

### Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update
Clean Air Action Plan (Planning and Implementation)	NA	CSCAF reporting/State Pollution Control Board	Annual

### Reference

Source Framework	SDG Indicator	Other Frameworks
CSCAF (4.3: Indicator 5)	NA	NA

## Indicator 8.2

Existence of a GHG emissions measurement system with a monitoring system (Y/N)

### Sub Theme

Pollution and Contamination

### Indicator Details

#### Intent/Rationale:

Cities need a good understanding of the sources and scale of their GHG emissions to develop strategies to reduce emissions and monitor progress toward emission reduction targets.

#### Formula:

Yes/ No

**Unit:** NA

**Level:** Primary

**Type:** Non-spatial

### Performance Evaluation

#### Threshold

No

#### Benchmark

Yes

#### Scoring Range

0(Very low performance)	1(Low performance)	2(Lower medium performance)	3(Medium performance)	4(Upper medium performance)	5(High performance)	6(Excellent performance)
No	NA	NA	NA	NA	NA	Yes

### Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update
Existence of a GHG emissions measurement system with a monitoring system	NA	State Pollution Control Board	Annual

## Reference

<b>Source Framework</b>	<b>SDG Indicator</b>	<b>Other Frameworks</b>
GPSC	NA	ESCI (F.1)

### Indicator 8.3

Total annual GHG emissions (MtCO<sub>2</sub>e)

#### Sub Theme

Pollution and Contamination

### Indicator Details

#### Intent/Rationale:

Urban actions could decrease global GHG emissions significantly. Reducing energy use through efficiency measures can deliver significant reductions in GHG emissions, with the added benefit of delivering significant monetary savings as well. The indicator would be a key input for the climate change mitigation strategies for urban planners, where for example GHG implications of land use or transportation options can be assessed before decision making.

**Formula:** NA

**Unit:** million metric tonnes of carbon dioxide equivalent (MtCO<sub>2</sub>e)

**Level:** Primary; Aspirational

**Type:** Non-spatial

### Performance Evaluation

#### Threshold

[Descriptive Indicator]

#### Benchmark

[Descriptive Indicator]

#### Scoring Range

No Scoring Range as the Indicator is Descriptive

### Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update
Total annual GHG emissions	MtCO <sub>2</sub> e	State Pollution Control Board	Annual

## Reference

Source Framework	SDG Indicator	Other Frameworks
GPSC	NA	ESCI (F.2)

## Indicator 8.4

Proportion of Tree Cover to the total ULB area (%)

### Sub Theme

Ecosystem Services

## Indicator Details

### Intent/Rationale:

Tree cover and green spaces provide a number of environmental benefits for the city. Trees act as a sink for carbon dioxide by fixing carbon during photosynthesis and storing carbon as biomass. Carbon storage by trees can offset the increasing carbon dioxide produced in the cities. Urban trees also influence air temperatures and building energy use, and consequently alter carbon emissions from numerous urban sources. They are also key for improving quality of life and making urban centres sustainable.

### Formula:

$[\text{Area of tree cover in the ULB} / \text{Total area of ULB}] * 100$

**Unit:** Percentage (%)

**Level:** Primary

**Type:** Spatial

## Performance Evaluation

### Threshold

5%

Determined after multiple rounds of consultations with sector experts

### Benchmark

10%

National Institute of Environmental Studies (NIES)

[http://cdn.narendramodi.in/ebooks/other-ebooks1/tree cover in urban area/files/assets/basic-html/index.html#22](http://cdn.narendramodi.in/ebooks/other-ebooks1/tree%20cover%20in%20urban%20area/files/assets/basic-html/index.html#22)

### Scoring Range

0(Very low performance)	1(Low performance)	2(Lower medium performance)	3(Medium performance)	4(Upper medium performance)	5(High performance)	6(Excellent performance)
<5%	5%-10.9%	11%-16.9%	17%-22.9%	23%-28.9%	29%-34.9%	>=10%

## Data Availability

<b>Input variable</b>	<b>Unit</b>	<b>Tentative data source</b>	<b>Suggested interval for data update</b>
Area of tree cover in the ULB	Square kilometres (Sqkm)	EOLI reporting	Annual
Total area of ULB	Square kilometres (Sqkm)	EOLI reporting	Annual

## Reference

<b>Source Framework</b>	<b>SDG Indicator</b>	<b>Other Frameworks</b>
EOLI (3.1.2)	NA	CSCAF (4.2: Indicator 2)

## Indicator 8.5

Extent to which city is acting for protection, conservation, and management of urban biodiversity

### Sub Theme

Ecosystem Services

## Indicator Details

### Intent/Rationale:

Urban biodiversity provides significant ecosystem services contributing to climate change mitigation and adaptation, such as carbon sequestration, air and water purification, mitigation of impacts of environmental pollution, noise reduction, and regulation of microclimate. High biodiversity increases the resilience of the city.

**Formula:** NA

**Unit:** NA

**Level:** Primary

**Type:** Non-spatial

## Performance Evaluation

### Threshold

No action initiated

Climate Smart Cities Assessment Framework, Pg. 30-31

[https://www.niua.org/csc/assets/pdf/CSCAF\\_2\\_Booklet.pdf](https://www.niua.org/csc/assets/pdf/CSCAF_2_Booklet.pdf)

### Benchmark

Implementation of actions

Climate Smart Cities Assessment Framework, Pg. 30-31

[https://www.niua.org/csc/assets/pdf/CSCAF\\_2\\_Booklet.pdf](https://www.niua.org/csc/assets/pdf/CSCAF_2_Booklet.pdf)

### Scoring Range

0(Very low performance)	1(Low performance)	2(Lower medium performance)	3(Medium performance)	4(Upper medium performance)	5(High performance)	6(Excellent performance)
No action initiated	NA	NA	NA	NA	NA	Implementation of actions

## Data Availability

<b>Input variable</b>	<b>Unit</b>	<b>Tentative data source</b>	<b>Suggested interval for data update</b>
Extent to which city is acting for protection, conservation, and management of urban biodiversity	NA	CSCAF reporting	Annual

## Reference

<b>Source Framework</b>	<b>SDG Indicator</b>	<b>Other Frameworks</b>
CSCAF (4.2: Indicator 3)	NA	GPSC

## Indicator 8.6

Number of structural and financial incentives for green buildings implemented (number)

### Sub Theme

Green Buildings

## Indicator Details

### Intent/Rationale:

Government incentives- structural and financial incentives are critical for expedited growth in green buildings. Green buildings are central to many initiatives: improving the environment, introducing considerable resource and utility savings, and creating new jobs.

### Formula:

Count of number of incentives implemented

INCENTIVE 1: Fast track environmental clearance for pre certified/ provisionally certified green building projects

INCENTIVE 2: Additional FAR based on green building certification level

INCENTIVE 3: Subsidy in the form of reimbursement, reduction on permit fees, tax rebates

**Unit:** Number

**Level:** Primary

**Type:** Non-spatial

## Performance Evaluation

### Threshold

No incentives

Government Incentives to IGBC-rated Green Building Projects

<https://igbc.in/igbc/redirectHtml.htm?redVal=showGovtIncentivesnosign#:~:text=Some%20of%20the%20Central%20and,to%20IGBCs'%20Green%20Rating%20Systems.&text=The%20Ministry%20of%20Environment%2C%20Forest,Precertified%2F%20Provisionally%20Certified%20by%20IGBC>

### Benchmark

All three incentives

Government Incentives to IGBC-rated Green Building Projects

<https://igbc.in/igbc/redirectHtml.htm?redVal=showGovtIncentivesnosign#:~:text=Some%20of%20the%20Central%20and,to%20IGBCs'%20Green%20Rating%20Systems.&text=The%20Ministry%20of%20Environment%2C%20Forest,Precertified%2F%20Provisionally%20Certified%20by%20IGBC>

### Scoring Range

<b>0(Very low performance)</b>	<b>1(Low performance)</b>	<b>2(Lower medium performance)</b>	<b>3(Medium performance)</b>	<b>4(Upper medium performance)</b>	<b>5(High performance)</b>	<b>6(Excellent performance)</b>
No incentives	NA	NA	One or two incentives	NA	NA	All three incentives

### Data Availability

<b>Input variable</b>	<b>Unit</b>	<b>Tentative data source</b>	<b>Suggested interval for data update</b>
Number of structural and financial incentives for green buildings implemented	Number	EOLI reporting and Municipal Corporation	Annual

### Reference

<b>Source Framework</b>	<b>SDG Indicator</b>	<b>Other Frameworks</b>
EOLI (3.2.2)	11.c.1	NA

## Indicator 8.7

Annual mean Air Quality Index (AQI) (number)

### Sub Theme

Pollution and Contamination

## Indicator Details

### Intent/Rationale:

Air pollution represents a prominent threat to all regions, especially urban areas by causing cascading effects on individual health, medical systems, ecosystem health, and economies. AQI is used to communicate to the public how polluted the air currently is or how polluted it is forecast to become. Public health risks increase as the AQI rises.

**Formula:** NA

**Unit:** Number

**Level:** Secondary

**Type:** Non-spatial

## Performance Evaluation

### Threshold

300

Hazardous Air Quality <https://aqicn.org/scale/>

### Benchmark

100

Moderate or better Air Quality <https://aqicn.org/scale/>

### Scoring Range

0(Very low performance)	1(Low performance)	2(Lower medium performance)	3(Medium performance)	4(Upper medium performance)	5(High performance)	6(Excellent performance)
Greater than 300	NA	NA	Between 101 and 300	NA	NA	Less than 100

## Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update

Annual mean Air Quality Index (AQI)	Number	EOLI reporting, State Pollution Control Board	Annual
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## Reference

Source Framework	SDG Indicator	Other Frameworks
EOLI (3.1.5)	11.6.2	ESCI (E.2)

## Indicator 8.8

Annual CO2 equivalent (GHG) emissions per capita (MtCO2e/capita)

### Sub Theme

Pollution and Contamination

### Indicator Details

#### Intent/Rationale:

Cities need a good understanding of the sources and scale of their GHG emissions to develop strategies to reduce emissions and monitor progress toward emission reduction targets.

#### Formula:

[Total annual CO2 equivalent emissions for the reference year/ Total population of ULB]

**Unit:** million metric tonnes of carbon dioxide equivalent per capita (MtCO2/capita)

**Level:** Secondary; Aspirational

**Type:** Non-spatial

### Performance Evaluation

#### Threshold

[Descriptive Indicator]

#### Benchmark

[Descriptive Indicator]

#### Scoring Range

No Scoring Range as the Indicator is Descriptive

### Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update
Total annual CO2 equivalent emissions for the reference year	Million metric tonnes of carbon dioxide equivalent (MtCO2e)	State Pollution Control Board	Annual
Total population of ULB	Number	Census projections or ULB population estimates	Annual

## Reference

<b>Source Framework</b>	<b>SDG Indicator</b>	<b>Other Frameworks</b>
GPSC	NA	ESCI (F.2)

## Indicator 8.9

Annual CO2 equivalent emissions from the transportation sector (MtCO2e)

### Sub Theme

Pollution and Contamination

## Indicator Details

### Intent/Rationale:

The transportation sector generates the largest share of greenhouse gas emissions. Greenhouse gas emissions from transportation primarily come from burning fossil fuel for our cars, trucks, ships, trains, and planes. In order to reduce greenhouse gas emissions, cities must bring in policy and technology innovations focusing on urban mobility using safe and sustainable modes of transportation.

**Formula:** NA

**Unit:** million metric tonnes of carbon dioxide equivalent (MtCO2e)

**Level:** Secondary; Aspirational

**Type:** Non-Spatial

## Performance Evaluation

### Threshold

[Descriptive Indicator]

### Benchmark

[Descriptive Indicator]

### Scoring Range

No Scoring Range as the Indicator is Descriptive

## Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update
Annual CO2 equivalent emissions from the transportation sector (MtCO2e)	Million metric tonnes of carbon dioxide equivalent (MtCO2e)	State Pollution Control Board	Annual

## Reference

Source Framework	SDG Indicator	Other Frameworks
Expert Recommended	NA	NA

## Indicator 8.10

Biochemical Oxygen Demand 3 day, 270C (mg/l)

### Sub Theme

Pollution and Contamination

## Indicator Details

### Intent/Rationale:

Biochemical oxygen demand (BOD) is an indicator of the total amount of dissolved oxygen required by microorganisms to break down organic matter in a sample of stormwater. Higher BOD measurements indicate greater oxygen depletion in the sampled waterbody. Common sources of higher BOD in urban stormwater runoff include plant debris, animal waste, trash, gasoline and motor oil, heavy metals, fertilizers, and pesticides. As oxygen is depleted from surface water through the decomposition of organic matter, it degrades aquatic habitats and negatively affects the survival of aquatic life<sup>70</sup> This indicator could indicate the level of pollution and overall health of urban water bodies.

**Formula:** Maximum of BOD level of sampled water bodies

**Unit:** NA

**Level:** Secondary

**Type:** Non-spatial

## Performance Evaluation

### Threshold

6 mg/l

<https://pib.gov.in/PressReleasePage.aspx?PRID=1602631>

### Benchmark

3mg/l

<https://pib.gov.in/PressReleasePage.aspx?PRID=1602631>

## Scoring Range

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<sup>70</sup><https://enviroatlas.epa.gov/enviroatlas/DataFactSheets/pdf/ESC/ReductioninMeanBiochemicalOxygenDemandBOD5duetotreecover.pdf>

<b>0(Very low performance)</b>	<b>1(Low performance)</b>	<b>2(Lower medium performance)</b>	<b>3(Medium performance)</b>	<b>4(Upper medium performance)</b>	<b>5(High performance)</b>	<b>6(Excellent performance)</b>
Greater than 6 mg/l	NA	NA	Between 3 and 6 mg/l	NA	NA	Less than 3 mg/l

### Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update
Maximum of BOD level of sampled water bodies	Milligrams of oxygen per litre (mg/l)	State Pollution Control Board	Annual

### Reference

Source Framework	SDG Indicator	Other Frameworks
Expert Recommended	NA	NA

## Indicator 8.11

Area under ULB covered by trees per inhabitant (sqm per person)

### Sub Theme

Ecosystem Services

## Indicator Details

### Intent/Rationale:

Urban areas are expanding across the country as are the benefits that urban forests provide. Conserving and maintaining these urban forests comes with certain challenge. Urban trees provide innumerable annual ecosystem services that affect both the local physical environment, such as air and water quality, and the social environment, such as individual and community well-being<sup>71</sup>.

### Formula:

[Total area covered by trees within ULB in sqm/ Total population of ULB]

**Unit:** Sqm per person

**Level:** Secondary

**Type:** Non-spatial

## Performance Evaluation

### Threshold

10 sqm

National Institute of Environmental Studies (NIES)

[https://cdn.narendramodi.in/ebooks/other-ebooks1/tree cover in urban area/files/assets/basic-html/page22.html](https://cdn.narendramodi.in/ebooks/other-ebooks1/tree%20cover%20in%20urban%20area/files/assets/basic-html/page22.html)

### Benchmark

15 sqm

National Institute of Environmental Studies (NIES)

[https://cdn.narendramodi.in/ebooks/other-ebooks1/tree cover in urban area/files/assets/basic-html/page22.html](https://cdn.narendramodi.in/ebooks/other-ebooks1/tree%20cover%20in%20urban%20area/files/assets/basic-html/page22.html)

### Scoring Range

0(Very low performance)	1(Low performance)	2(Lower medium performance)	3(Medium performance)	4(Upper medium performance)	5(High performance)	6(Excellent performance)
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<sup>71</sup> <https://www.fs.fed.us/openspace/fote/sustaining.html>

Less than 10 sqm	NA	NA	Between 10 sqm and 15 sqm	NA	NA	Greater than 15 sqm
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### Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update
Total area covered by trees within ULB	Square metres (sqm)	City Master Plans/Zonal Development Plan/ Horticulture department surveys	Annual
Total population of ULB	Number	Census Projections or ULB population estimates	Annual

### Reference

Source Framework	SDG Indicator	Other Frameworks
Expert Recommended	NA	EOLI (3.1.2)

## Indicator 8.12

Is there a land use plan that includes zoning with environmental protection and preservation zones? (Y/N)

### Sub Theme

Ecosystem Services

## Indicator Details

### Intent/Rationale:

Long-term-horizon concept plans define the city's spatial structure with broad land allocation, factoring in long-term population needs, economic growth projections, and so forth. Medium-term master plans (usually having a 10- to 15-year time horizon and reviewed every five years) define detailed and granular land use intensity as well as accompanying layers such as urban design, conservation guidelines, and so forth. Land use and zoning plans provide a consistent and coherent plan for development of the city over the short to long term. They should align with the city's vision for the future as expressed in its infrastructure, economic strategies, and trend projections. These should be developed in an integrated manner in collaboration with all city departments, partner agencies, and other key stakeholders. They should include inbuilt flexibility in zoning codes and planning incentives to allow some variation in planning and design parameters.

**Formula:** Yes/ No

**Unit:** NA

**Level:** Secondary

**Type:** Non-spatial

## Performance Evaluation

### Threshold

No

### Benchmark

Yes

### Scoring Range

0(Very low performance)	1(Low performance)	2(Lower medium performance)	3(Medium performance)	4(Upper medium performance)	5(High performance)	6(Excellent performance)
No	NA	NA	NA	NA	NA	Yes

### Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update
Presence of land use plan that includes zoning with environmental protection and preservation zones	NA	Zonal Development Plans	Quinquennial

### Reference

Source Framework	SDG Indicator	Other Frameworks
GPSC	NA	NA

## Indicator 8.13

Annual mean levels of PM10 ( $\mu\text{g}/\text{m}^3$ )

### Sub Theme

Pollution and Contamination

## Indicator Details

### Intent/Rationale:

The evidence on airborne particulate matter (PM) and its public health impact is consistent in showing adverse health effects at exposures that are currently experienced by urban populations in both developed and developing countries. . At present, most routine air quality monitoring systems generate data based on the measurement of PM10 as opposed to other particulate matter sizes. Consequently, the majority of epidemiological studies use PM10 as the exposure indicator. PM10 represents the particle mass that enters the respiratory tract and, moreover, it includes both the coarse (particle size between 2.5 and 10  $\mu\text{m}$ ) and fine particles (measuring less than 2.5  $\mu\text{m}$ , PM2.5) that are considered to contribute to the health effects observed in urban environments. The range of health effects is broad but are predominantly linked to the respiratory and cardiovascular systems. All population is affected, but susceptibility to the pollution may vary with health or age.<sup>72</sup>

**Formula:** NA

**Unit:** Micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ )

**Level:** Tertiary

**Type:** Non-spatial

## Performance Evaluation

### Threshold

60  $\mu\text{g}/\text{m}^3$

Revised National Ambient Air Quality Standards, Pg. 1-2

<https://cpcb.nic.in/displaypdf.php?id=aG9tZS9haXl0tcG9sbHV0aW9uL1JlY3ZlZC1OYXRpb25hbC5wZGY=>

### Benchmark

20  $\mu\text{g}/\text{m}^3$

WHO

[https://www.who.int/news-room/fact-sheets/detail/ambient-\(outdoor\)-air-quality-and-health](https://www.who.int/news-room/fact-sheets/detail/ambient-(outdoor)-air-quality-and-health)

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<sup>72</sup>[http://apps.who.int/iris/bitstream/handle/10665/69477/WHO\\_SDE\\_PHE\\_OEH\\_06.02\\_eng.pdf;jsessionid=871187899BE1F4585124F9D632B016A3?sequence=1](http://apps.who.int/iris/bitstream/handle/10665/69477/WHO_SDE_PHE_OEH_06.02_eng.pdf;jsessionid=871187899BE1F4585124F9D632B016A3?sequence=1)

**Scoring Range**

0(Very low performance)	1(Low performance)	2(Lower medium performance)	3(Medium performance)	4(Upper medium performance)	5(High performance)	6(Excellent performance)
Greater than 60 µg/m <sup>3</sup>	NA	NA	Between 60 µg/m <sup>3</sup> and 20 µg/m <sup>3</sup>	NA	NA	Less than 20 µg/m <sup>3</sup>

**Data Availability**

Input variable	Unit	Tentative data source	Suggested interval for data update
Annual mean levels of PM10	Micrograms per cubic meter (µg/m <sup>3</sup> )	State Pollution Control Board	Annual

**Reference**

Source Framework	SDG Indicator	Other Frameworks
NIF (11.6.2)	11.6.2	EOLI (3.1.5c); ESCI (E.2); GPSC

## Indicator 8.14

Annual mean levels of PM2.5 ( $\mu\text{g}/\text{m}^3$ )

### Sub Theme

Pollution and Contamination

## Indicator Details

### Intent/Rationale:

PM 2.5 originates primarily from combustion sources. In most urban environments, both coarse and fine mode particles are present. Negative health effects of PM 2.5 are significant. In developing countries, PM2.5 monitoring is important, where large populations are exposed to high levels of combustion particles derived from indoor stoves and fires.<sup>73</sup>

**Formula:** NA

**Unit:** Micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ )

**Level:** Tertiary

**Type:** Non-spatial

## Performance Evaluation

### Threshold

40  $\mu\text{g}/\text{m}^3$

Revised National Ambient Air Quality Standards, Pg. 1-2

<https://cpcb.nic.in/displaypdf.php?id=aG9tZS9haXl0tcG9sbHV0aW9uL1JlY3ZlZC10YXRpb25hbC5wZGY=>

### Benchmark

10  $\mu\text{g}/\text{m}^3$

WHO

[https://www.who.int/news-room/fact-sheets/detail/ambient-\(outdoor\)-air-quality-and-health](https://www.who.int/news-room/fact-sheets/detail/ambient-(outdoor)-air-quality-and-health)

### Scoring Range

0(Very low performance)	1(Low performance)	2(Lower medium performance)	3(Medium performance)	4(Upper medium performance)	5(High performance)	6(Excellent performance)
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<sup>73</sup>[http://apps.who.int/iris/bitstream/handle/10665/69477/WHO\\_SDE\\_PHE\\_OEH\\_06.02\\_eng.pdf;jsessionid=871187899BE1F4585124F9D632B016A3?sequence=1](http://apps.who.int/iris/bitstream/handle/10665/69477/WHO_SDE_PHE_OEH_06.02_eng.pdf;jsessionid=871187899BE1F4585124F9D632B016A3?sequence=1)

Greater than 40 µg/m <sup>3</sup>	NA	NA	Between 40 µg/m <sup>3</sup> and 10 µg/m <sup>3</sup>	NA	NA	Less than 10 µg/m <sup>3</sup>
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### Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update
Annual mean levels of PM2.5	Micrograms per cubic meter (µg/m <sup>3</sup> )	State Pollution Control Board	Annual

### Reference

Source Framework	SDG Indicator	Other Frameworks
NIF (11.6.2)	11.6.2	ESCI (E.2); GPSC

## Indicator 8.15

Annual concentration of NO<sub>2</sub> (µg/m<sup>3</sup>)

### Sub Theme

Pollution and Contamination

## Indicator Details

### Intent/Rationale:

The current WHO guideline value of 40 µg/m<sup>3</sup> (annual mean) was set to protect the public from the health effects of gaseous NO<sub>2</sub>. The rationale for this was that because most abatement methods are specific to NO<sub>x</sub>, they are not designed to control other co-pollutants and may even increase their emissions. If, however, NO<sub>2</sub> is monitored as a marker for complex combustion-generated pollution mixtures, a lower annual guideline value should be used (WHO, 2000)<sup>74</sup>.

**Formula:** NA

**Unit:** Micrograms per cubic meter (µg/m<sup>3</sup>)

**Level:** Tertiary

**Type:** Non-spatial

## Performance Evaluation

### Threshold

80 µg/m<sup>3</sup>

Determined after multiple rounds of consultations with sector experts

### Benchmark

40 µg/m<sup>3</sup>

Revised National Ambient Air Quality Standards, Pg. 1

<https://cpcb.nic.in/displaypdf.php?id=aG9tZS9haXItcG9sbHV0aW9uL1JlY3ZlZC1OYXRpb25hbC5wZGY=>

### Scoring Range

0(Very low performance)	1(Low performance)	2(Lower medium performance)	3(Medium performance)	4(Upper medium performance)	5(High performance)	6(Excellent performance)
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<sup>74</sup>[http://apps.who.int/iris/bitstream/handle/10665/69477/WHO\\_SDE\\_PHE\\_OEH\\_06.02\\_eng.pdf;jsessionid=871187899BE1F4585124F9D632B016A3?sequence=1](http://apps.who.int/iris/bitstream/handle/10665/69477/WHO_SDE_PHE_OEH_06.02_eng.pdf;jsessionid=871187899BE1F4585124F9D632B016A3?sequence=1)

Greater than 80 µg/m <sup>3</sup>	NA	NA	Between 80 µg/m <sup>3</sup> and 40 µg/m <sup>3</sup>	NA	NA	Less than 40 µg/m <sup>3</sup>
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### Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update
Annual concentration of NO <sub>2</sub>	Micrograms per cubic meter (µg/m <sup>3</sup> )	State Pollution Control Board	Annual

### Reference

Source Framework	SDG Indicator	Other Frameworks
GPSC	NA	EOLI (3.1.5b); ESCI (E.2)

## Indicator 8.16

Average daily concentration of SO<sub>2</sub> (µg/m<sup>3</sup>)

### Sub Theme

Pollution and Contamination

## Indicator Details

### Intent/Rationale:

It is recommended that a SO<sub>2</sub> concentration of 500 µg/m<sup>3</sup> should not exceed over averaging periods of 10 minutes duration. There are short term and long-term health adverse effects for SO<sub>2</sub> exposure.

### Formula:

[Sum of daily average SO<sub>2</sub> concentration for the reference year/ 365 (days)]

**Unit:** micrograms per cubic meter

(µg/m<sup>3</sup>)

**Level:** Tertiary

**Type:** Non-Spatial

## Performance Evaluation

### Threshold

80 µg/m<sup>3</sup>

Revised National Ambient Air Quality Standards, Pg. 1

<https://cpcb.nic.in/displaypdf.php?id=aG9tZS9haXltcG9sbHV0aW9uL1JlY3ZlZC1OYXRpb25hbC5wZGY=>

### Benchmark

20 µg/m<sup>3</sup>

WHO

[https://www.who.int/news-room/fact-sheets/detail/ambient-\(outdoor\)-air-quality-and-health](https://www.who.int/news-room/fact-sheets/detail/ambient-(outdoor)-air-quality-and-health)

### Scoring Range

0(Very low performance)	1(Low performance)	2(Lower medium performance)	3(Medium performance)	4(Upper medium performance)	5(High performance)	6(Excellent performance)
Greater than 80 µg/m <sup>3</sup>	NA	NA	Between 80 µg/m <sup>3</sup> and 20 µg/m <sup>3</sup>	NA	NA	Less than 20 µg/m <sup>3</sup>

### Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update
Average daily concentration of SO <sub>2</sub>	Micrograms per cubic meter (µg/m <sup>3</sup> )	State Pollution Control Board	Annual

### Reference

Source Framework	SDG Indicator	Other Frameworks
GPSC	NA	EOLI (3.1.5c); ESCI (E.2)

## Indicator 8.17

Total annual methane emissions (MtCO<sub>2</sub>e)

### Sub Theme

Pollution and Contamination

## Indicator Details

### Intent/Rationale:

Cities need a clear understanding of the sources and scale of their GHG emissions in order to develop strategies to reduce emissions and monitor progress toward emission reduction targets.

### Formula:

[Sum of daily average methane emissions for the reference year/ 365 (days)]

**Unit:** Million metric tonnes of carbon dioxide equivalent (MtCO<sub>2</sub>e)

**Level:** Tertiary; Aspirational

**Type:** Non-spatial

## Performance Evaluation

### Threshold

[Descriptive Indicator]

### Benchmark

[Descriptive Indicator]

### Scoring Range

No Scoring Range as the Indicator is Descriptive

## Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update
Total annual methane emissions	Million metric tonnes of carbon dioxide equivalent (MtCO <sub>2</sub> e)	State Pollution Control Board	Annual

## Reference

Source Framework	SDG Indicator	Other Frameworks
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GPSC	NA	NA
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## Indicator 8.18

Existence, monitoring, and enforcement of regulations on noise pollution (Y/N)

### Sub Theme

Pollution and Contamination

### Indicator Details

#### Intent/Rationale:

Many studies have shown the impacts of anthropogenic noise and concluded that it is potentially a threat to life on Earth. Urban lifestyle exposes people to high levels of environmental noise from sources like traffic, construction activities, subways, airports etc. High levels of noise adversely affect human health by increasing blood pressure, causing stress and loss of concentration. Urban noise pollution must be controlled through enforcement of regulations and effective monitoring systems.

#### Formula:

Yes/No

**Unit:** NA

**Level:** Tertiary

**Type:** Non-spatial

### Performance Evaluation

#### Threshold

No

#### Benchmark

Yes

#### Scoring Range

0(Very low performance)	1(Low performance)	2(Lower medium performance)	3(Medium performance)	4(Upper medium performance)	5(High performance)	6(Excellent performance)
No	NA	NA	NA	NA	NA	Yes

### Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update
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Existence, monitoring, and enforcement of regulations on noise pollution	NA	State Pollution Control Board	Quinquennial
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## Reference

Source Framework	SDG Indicator	Other Frameworks
ESCI (G.1)	NA	NA

## Indicator 9.1

Percentage of the city's households using LPG/PNG for cooking (%)

### Sub Theme

Energy Coverage

## Indicator Details

### Intent/Rationale:

There are many national and international efforts, that are making progress toward enabling wide-scale household adoption of cleaner and more efficient stoves and fuels. While significant challenges remain, these efforts offer considerable promise to save lives, improve forest sustainability, slow climate change, and empower women around the world.<sup>75</sup>

### Formula:

[Number of households in the city having LPG/PNG connection/ Total number of households in the city]\*100

**Unit:** Percentage (%)

**Level:** Primary

**Type:** Non-spatial

## Performance Evaluation

### Threshold

67%

Calculated using national average as the median value and the benchmark

### National Average

86.6%

Drinking water, Sanitation, Hygiene & Housing Conditions in India, Pg. 195

[http://mospi.nic.in/sites/default/files/NSS7612dws/Report\\_584\\_final.pdf](http://mospi.nic.in/sites/default/files/NSS7612dws/Report_584_final.pdf)

### Benchmark

100%

Determined after multiple rounds of consultations with sector experts

### Scoring Range

0(Very low)	1(Low performance)	2(Lower medium)	3(Medium)	4(Upper medium)	5(High performance)	6(Excellent)
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<sup>75</sup> <https://pubs.acs.org/doi/10.1021/es304942e>

<b>performance)</b>		<b>performa nce)</b>	<b>performa nce)</b>	<b>performa nce)</b>		<b>performa nce)</b>
<67%	67%-73.5%	73.6%- 80.1%	80.2%- 86.7%	86.8%- 93.3%	93.4%- 99.9%	100%

### Data Availability

<b>Input variable</b>	<b>Unit</b>	<b>Tentative data source</b>	<b>Suggested interval for data update</b>
Number of households in the city having LPG/PNG connection	Number	EOLI reporting	Annual
Total number of households in the city	Number	EOLI reporting	Annual

### Reference

<b>Source Framework</b>	<b>SDG Indicator</b>	<b>Other Frameworks</b>
EOLI (3.1.3)	7.1.2	GPSC; CSCAF (3); MDPI (3.13)

## Indicator 9.2

Percentage of total electrical energy in the city derived from renewable sources (%)

### Sub Theme

Energy Efficiency

## Indicator Details

### Intent/Rationale:

Fossil fuels such as coal, natural gas and oil are the major sources of energy generation in our country. Production of energy from cleaner renewable energy sources (solar PV, solar thermal, wind energy, hybrid-hydel power, small hydro, geo-thermal energy, tidal energy, biogas, waste to energy) would minimize GHG emission.

### Formula:

$$\left[ 0.8 \times \left( \frac{\text{Total electrical energy consumption (in kWh) from all on-grid renewable energy sources and is used in the city}}{\text{Total electricity consumption (in kWh) in the city}} \right) + 0.2 \times \left( \frac{\text{Cumulative installed capacity (in KW) of off grid renewable energy sources for self-consumption}}{\text{Total connected electrical load (in KW) in the city}} \right) \right] \times 100$$

**Unit:** Percentage (%)

**Level:** Primary

**Type:** Non-spatial

## Performance Evaluation

### Threshold

5%

Determined after multiple rounds of consultations with sector experts

### National Average

36.02%

The World Bank (Percentage of total final energy consumption)

<https://data.worldbank.org/indicator/EG.FEC.RNEW.ZS>

### Benchmark

15%

Determined after multiple rounds of consultations with sector experts

### Scoring Range

0(Very low performance)	1(Low performance)	2(Lower medium performance)	3(Medium performance)	4(Upper medium performance)	5(High performance)	6(Excellent performance)
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<5%	5%-6.9%	7%-8.9%	9%-10.9%	11%-12.9%	13%-14.9%	>=15%
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### Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update
Total electrical energy consumption from all on-grid renewable energy sources and is used in the city	kWh	CSCAF reporting	Annual
Total electricity consumption in the city	kWh	CSCAF reporting	Annual
Cumulative installed capacity of off grid renewable energy sources for self-consumption	kW	CSCAF reporting	Annual
Total connected electrical load in the city	kW	CSCAF reporting	Annual

### Reference

Source Framework	SDG Indicator	Other Frameworks
CSCAF (4.1: Indicator 2)	7.2.1	GPSC; CPI (3.1); EOLI (3.3.2)

## Indicator 9.3

Proportion of population in the city who have access to renewable energy (%)

### Sub Theme

Energy Efficiency

## Indicator Details

### Intent/Rationale:

The world's population is growing, and the demand for food, materials, and goods is increasing at an unprecedented rate. Yet there is a finite supply of many natural resources on which we rely. Cities are uniquely well placed to reduce demand on these finite resources through more efficient use, substitution of renewable resources, and implementation of circular economy principles. Sustainable consumption and production aim at "doing more and better with less." It increases net welfare gains from economic activities while reducing resource use, degradation, and pollution along the whole life cycle of the resource.

### Formula:

$[\text{Total population using clean fuel technologies} / \text{Total population in the city}] * 100$

**Unit:** Percentage (%)

**Level:** Primary; Aspirational

**Type:** Non-spatial

## Performance Evaluation

### Threshold

10%

Calculated using national average as the median value and the benchmark

### National Average

49%

Population with primary reliance on clean fuels and technologies

Data by country - World Health Organisation

<https://apps.who.int/gho/data/view.main.SDGFUELS712v>

### Benchmark

75%

Determined after multiple rounds of consultations with sector experts

### Scoring Range

<b>0(Very low performance)</b>	<b>1(Low performance)</b>	<b>2(Lower medium performance)</b>	<b>3(Medium performance)</b>	<b>4(Upper medium performance)</b>	<b>5(High performance)</b>	<b>6(Excellent performance)</b>
<10%	10%-22.9%	23%-35.9%	36%-48.9%	49%-61.9%	62%-74.9%	>=75%

### Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update
Total population using clean fuel technologies	Number	State Pollution Control Board	Annual
Total population in the city	Number	Census Projections or ULB estimates	Annual

### Reference

Source Framework	SDG Indicator	Other Frameworks
GPSC	7.1.2	NA

## Indicator 9.4

Percentage of energy-efficient street lighting in the city (%)

### Sub Theme

Energy Coverage

## Indicator Details

### Intent/Rationale:

Street lighting is a significant contributor to the city's electricity consumption. Energy efficient and renewable energy operated street lighting systems will reduce the dependence on electricity from fossil fuels thus indirectly reduce GHG emissions in the city.<sup>76</sup>

### Formula:

$$\left[ \frac{\text{Total number of energy efficient street lights} + \text{renewable energy operated street lights in the city}}{\text{Total number of street lights in the city}} \right] * 100$$

**Unit:** Percentage (%)

**Level:** Primary

**Type:** Non-spatial

## Performance Evaluation

### Threshold

25%

Determined after multiple rounds of consultations with sector experts

### Benchmark

100%

Street Light National Programme (SLNP), GoI

<https://slnp.eeslindia.org/>

### Scoring Range

0(Very low performance)	1(Low performance)	2(Lower medium performance)	3(Medium performance)	4(Upper medium performance)	5(High performance)	6(Excellent performance)
<25%	25%-30.9%	31%-36.9%	37%-42.9%	43%-48.9%	49%-54.9%	100%

<sup>76</sup> CSCAF, [https://www.niua.org/csc/assets/pdf/CSCAF\\_2\\_Booklet.pdf](https://www.niua.org/csc/assets/pdf/CSCAF_2_Booklet.pdf)

### Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update
Total number of energy efficient street lights	Number	CSCAF reporting	Annual
Renewable energy operated street lights in the city	Number	CSCAF reporting	Annual
Total number of street lights in the city	Number	CSCAF reporting	Annual

### Reference

Source Framework	SDG Indicator	Other Frameworks
CSCAF (4.1: Indicator 4)	NA	MPI (1.6.2);

## Indicator 9.5

Energy use per capita (kWh)

### Sub Theme

Energy Usage

## Indicator Details

### Intent/Rationale:

Cities are engines of local, regional, and national economic development. Agglomeration effects (the productive efficiencies that result from co-location of firms) are integral to urban economic development. Agglomeration effects tend to be spatially bound. Urban economic development is intricately linked to—and often a prerequisite for—service delivery, investments in infrastructure, and poverty reduction in cities. Cities that are more competitive can set aside additional resources to meet the needs of their citizens and the challenges of the future. Yet to grow, the economy may require natural resources and emit waste that pollutes land, water, and air and contributes to impacts on the global climate. Thus, cities in developing countries may need to tackle trade-offs between growth and environmental efficiency. Sustainable urban economic growth should be linked to increasing the efficiency of resource use, reducing carbon emissions in absolute terms, and encouraging low-carbon and climate-smart investments.

### Formula:

$$\left[ \frac{\text{Total electric power consumption (in kWh)}}{\text{Total population of the ULB}} \right] * 100$$

**Unit:** Kilowatts per hour (kWh)

**Level:** Primary

**Type:** Non-spatial

## Performance Evaluation

### Threshold

[Descriptive Indicator]

### Benchmark

[Descriptive Indicator]

### Scoring Range

No Scoring Range as the Indicator is Descriptive

## Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update
----------------	------	-----------------------	------------------------------------

Total electric power consumption	Kilowatts per hour (kWh)	Electricity Department	Annual
Total population of the ULB	Number	Electricity Department	Annual

## Reference

Source Framework	SDG Indicator	Other Frameworks
Expert Recommended	NA	NA

## Indicator 9.6

Percentage of the city's households with an authorized connection to electrical energy (%)

### Sub Theme

Energy Coverage

## Indicator Details

### Intent/Rationale:

Rapid urbanization will drive up India's energy use and GHG emissions as almost all urban centres expand, and towns become more urban.

The indicator aims to address the electrical access challenges in urban India<sup>77</sup>. To achieve low-carbon urbanization, we first need data on current energy use and carbon footprints in cities to establish a baseline for tracking progress. It is thus important to connect the households who are still off the grid so that electrical energy access and reliability can be increased and leverage innovative technology solutions to ensure universal billing, metering and collection. Thus, universal authorized connection to electrical energy would support the municipalities in improving the efficiency of energy management, determine an energy consumption baseline and a profile of sectoral demand in the city and examine the pre-feasibility of energy efficiency projects.

### Formula:

[Number of households in the city having an authorized electricity connection / Total number of households in the ULB]\*100

**Unit:** Percentage (%)

**Level:** Secondary

**Type:** Non-spatial

## Performance Evaluation

### Threshold

99.25%

Determined after multiple rounds of consultations with sector experts

### National Average

99.7%

Access to Electricity - Urban, The World Bank

<https://data.worldbank.org/indicator/EG.ELC.ACCS.UR.ZS>

### Benchmark

100%

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<sup>77</sup> <https://www.nature.com/articles/s41597-021-00853-7>

<https://www.india.gov.in/spotlight/pradhan-mantri-sahaj-bijli-har-ghar-yojana-saubhagya>

### Scoring Range

0(Very low performance)	1(Low performance)	2(Lower medium performance)	3(Medium performance)	4(Upper medium performance)	5(High performance)	6(Excellent performance)
<99.25%	99.25%-99.3%	99.4%-99.45%	99.55%-99.6%	99.7%-99.75%	99.85%-99.9%	100%

### Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update
Number of households in the city having an authorized electricity connection	Number	EOLI data reporting	Annual
Total number of households in the ULB	Number	EOLI data reporting	Annual

### Reference

Source Framework	SDG Indicator	Other Frameworks
EOLI (1.3.1)	NA	GPSC; ESCI (D.1); CPI (1.4)

## Indicator 9.7

Do existing building codes consider eco-friendly techniques and/or the use of local/renewable material? (Y/N)

### Sub Theme

Energy Regulations

## Indicator Details

### Intent/Rationale:

Urban development should be guided by sustainable planning and management vision that promotes interconnected green space, multi-modal transportation and mixed-use development. Building codes that promote eco-friendly techniques and/or use local/renewable material is central and critical to sustainability planning through promotion of green building practices.

Green building practices are primarily focused on developing sustainable sites, increasing water and energy efficiency, reducing waste and emissions, using eco-friendly building materials, and improving indoor environmental quality more efficiently than conventional designs<sup>78</sup>. The indicator assesses the existence of a green building policy by promotion of eco-friendly techniques and usage of local/renewable material in the city.

### Formula:

Yes/No

**Unit:** NA

**Level:** Secondary

**Type:** Non-spatial

## Performance Evaluation

### Threshold

No

### Benchmark

Yes

### Scoring Range

0(Very low performance)	1(Low performance)	2(Lower medium performance)	3(Medium performance)	4(Upper medium performance)	5(High performance)	6(Excellent performance)
No	NA	NA	NA	NA	NA	Yes

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<sup>78</sup> <https://www.completecommunitiesde.org/planning/sustainable/green-building-practices/>

### Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update
Do existing building codes consider eco-friendly techniques and/or the use of local/renewable material	NA	Town Planning Department	Quinquennial

### Reference

Source Framework	SDG Indicator	Other Frameworks
CityRAP	NA	NA

## Indicator 9.8

System Average Interruption Frequency Index (SAIFI) (number)

### Sub Theme

Energy Reliability

## Indicator Details

### Intent/Rationale:

This measure, System Average Interruption Frequency Index, or SAIFI in the energy industry, tracks the average number of times or frequency that a customer's electric service is interrupted during the fiscal year, and is an important indicator of the reliability of the system. The SAIFI is an important industry indicator for electricity service providers.<sup>79</sup>

### Formula:

NA

**Unit:** Number

**Level:** Tertiary

**Type:** Non-spatial

## Performance Evaluation

### Threshold

73.5

<https://www.ipds.gov.in/Whats New Files/ROM PPT 13022016.pdf>

### Benchmark

1

<https://www.ipds.gov.in/Whats New Files/ROM PPT 13022016.pdf>

## Scoring Range

0(Very low performance)	1(Low performance)	2(Lower medium performance)	3(Medium performance)	4(Upper medium performance)	5(High performance)	6(Excellent performance)
>73.5	73.5-58.9	59-44.4	44.5-29.9	30-15.4	15.5-0.9	<=1

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<sup>79</sup> <https://data.austintexas.gov/stories/s/System-Average-Interruption-Frequency-Index/n2pw-zgfg/#:~:text=This%20measure%2C%20System%20Average%20Interruption,the%20reliability%20of%20the%20system.>

### Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update
System Average Interruption Frequency Index (SAIFI)	Number	DISSCOM or Electricity department	Annual

### Reference

Source Framework	SDG Indicator	Other Frameworks
Expert Recommended	NA	NA

## Indicator 10.1

Presence of City Disaster Management Plan prepared / updated in last five years (Y/N)

### Sub Theme

Disaster Preparedness

## Indicator Details

### Intent/Rationale:

City disaster management plan is a key component of national disaster management plan and policy. Successful recovery depends heavily on local planning, local leadership and community involvement.

With a planning framework in place, a city is better situated to address pre-existing local needs, take advantage of available resources, and seize opportunities to increase local resiliency, sustainability, accessibility, and social equity. The presence of city disaster management plan establishes clear leadership roles, improves public confidence in the city leadership, result in effective, planning and management in cases of disaster recovery, improve stakeholder and survivor involvement, easily identify gaps in leadership and capabilities, better coordination with line departments. The indicator assesses the disaster preparedness of the city at the urban and ward level.

**Formula:** Yes/No

**Unit:** NA

**Level:** Primary

**Type:** Non-spatial

## Performance Evaluation

### Threshold

No Plan

Determined after multiple rounds of consultations with sector experts

### Benchmark

Plan prepared after year 2016

Determined after multiple rounds of consultations with sector experts

### Scoring Range

0(Very low performance)	1(Low performance)	2(Lower medium performance)	3(Medium performance)	4(Upper medium performance)	5(High performance)	6(Excellent performance)
No Plan	NA	NA	Plan prepared	NA	NA	Plan prepared

			before year 2016			after year 2016
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### Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update
Presence of City Disaster Management Plan prepared / updated in last five years	NA	City Disaster Management Plan	Quinquennial

### Reference

Source Framework	SDG Indicator	Other Frameworks
GPSC	NA	CSCAF (4.2: Indicator 4)

## Indicator 10.2

Existence of hazard vulnerability maps/risk maps (at city level) prepared / updated in the last five years for the main hazards threatening the city (Y/N)

### Sub Theme

Disaster Preparedness

## Indicator Details

### Intent/Rationale:

Identify risks and promoting evidence-based planning and development practices to reduce the risk is imperative for any disaster management plans. Existence of hazard vulnerability maps/risks maps in the city would help a city planner to design and implement hazard management plan and take proactive steps to reduce the various disaster risks. Maps based on geospatial technologies will help to develop better hazard vulnerability maps and undertake spatial analysis and design of risk mitigating projects.

### Formula:

Yes/No

**Unit:** NA

**Level:** Primary

**Type:** Non-spatial

## Performance Evaluation

### Threshold

Maps not prepared

Determined after multiple rounds of consultations with sector experts

### Benchmark

Maps prepared / updated in or after year 2016

Determined after multiple rounds of consultations with sector experts

### Scoring Range

0(Very low performance)	1(Low performance)	2(Lower medium performance)	3(Medium performance)	4(Upper medium performance)	5(High performance)	6(Excellent performance)
Maps not prepared	NA	NA	Maps prepared / updated prior to year 2016	NA	NA	Maps prepared / updated in or after year 2016

### Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update
Existence of hazard vulnerability maps/risk maps (at city level) prepared / updated in the last five years for the main hazards threatening the city	NA	Disaster Management Cell	Quinquennial

### Reference

Source Framework	SDG Indicator	Other Frameworks
GPSC	NA	ESCI (H.1)

### Indicator 10.3

Percentage of households at risk due to placement in areas of non-mitigable risk within the ULB (%)

#### Sub Theme

Disaster Preparedness

### Indicator Details

#### Intent/Rationale:

A combination of climate change, urbanization, and globalization means cities are more at risk than ever before from natural and man-made disasters (e.g., floods, droughts, cyclones, epidemics, terrorist attacks). Cities can implement prevention and mitigation measures to reduce risk and develop strategies to help them recover if a disaster should occur.

#### Formula:

$$\left[ \frac{\text{Number of households at high risk to natural disasters in the ULB}}{\text{Number of households in the ULB}} \right] * 100$$

**Unit:** Percentage (%)

**Level:** Primary

**Type:** Non-spatial

### Performance Evaluation

#### Threshold

20%

Determined after multiple rounds of consultations with sector experts

#### Benchmark

10%

Determined after multiple rounds of consultations with sector experts

#### Scoring Range

0(Very low performance)	1(Low performance)	2(Lower medium performance)	3(Medium performance)	4(Upper medium performance)	5(High performance)	6(Excellent performance)
>20%	20%-17.9%	18%-15.9%	16%-13.9%	14%-11.9%	12%-9.9%	<=10%

### Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update
Number of households at high risk to natural disasters in the ULB	Number	City Disaster Management Plan	Quinquennial
Number of households in the ULB	Number	Census projections/ULB households estimates	Quinquennial

### Reference

Source Framework	SDG Indicator	Other Frameworks
ESCI (H.2)	NA	GPSC

## Indicator 10.4

Percentage of buildings within 4km distance to fire service facility (%)

### Sub Theme

Disaster Preparedness

## Indicator Details

### Intent/Rationale:

The impacts of climate change, improper urban development, land use planning and closer proximity to forest areas put the urban areas under greater risk due to fires. The management, prevention and mitigation of urban fire risk are a priority. Improved Access to fire services go a long way in mitigating the urban fire risk.

### Formula:

$$\left[ \frac{\text{Number of buildings located within a distance of 4 km from a fire service facility}}{\text{Total number of buildings in the ULB}} \right] * 100$$

**Unit:** Percentage (%)

**Level:** Primary

**Type:** Spatial

## Performance Evaluation

### Threshold

70%

Determined after multiple rounds of consultations with sector experts

### Benchmark

100%

Determined after multiple rounds of consultations with sector experts

Distance: Sub fire station/Fire Post (Within 3 - 4 km radius); Fire station (within 5 -7 km radius)

URDPFI, Vol 1, Pg. 366

<http://mohua.gov.in/upload/uploadfiles/files/URDPFI%20Guidelines%20Vol%20I.pdf>

### Scoring Range

0(Very low performance)	1(Low performance)	2(Lower medium performance)	3(Medium performance)	4(Upper medium performance)	5(High performance)	6(Excellent performance)
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<70%	70%- 75.9%	76%- 81.9%	82%- 87.9%	88%- 93.9%	94%- 99.9%	100%
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### Computation Method

Accessibility analysis: Access to fire service facilities is assessed by calculating the catchment of a resident's facilities within an 800m walking distance. This can be measured as-the-crow-flies for quick assessments or can be calculated along existing transportation routes of the city to reflect a more realistic and accurate picture. Once a buffer from the existing fire service facilities in the city is established, one can differentiate or select the number of residents falling within, (corresponding to), those buffers.

#### **Input Layers:**

- (m) City boundary (.shp format)
- (n) Fire service facilities (Point data in Projected CRS)
- (o) Road Network (Line data in Projected CRS).

#### **Steps:**

- (m) Create 800m walksheds: To perform the analysis the road network file must be checked for any topological errors and rectified accordingly. To create the walksheds, one needs to open the “Iso-Area as polygon (from layer)” from the QNET3 toolbox and load the road network and the layer with point information on fire service facilities. After configuring this setting, click run. The outcome gives a buffer of 800m radius from all polygons, but in a few places, there might be some buffers/polygons which would have covered more than 800m distance. To rectify we need to run a similar analysis on the “service area (from layer)” tool from the network analyst toolbox and load the road network layer into the first blank and fire service facilities layer in the blank mentioned as start points. The outcome gives the 800m road network from all fire service facilities points.
- (n) Calculate population in 800m walksheds: Now that the 800m walking accessibility from fire service facilities and the population distribution grid at 250m resolution from the Global Human settlements (GHSL) database is imported, one can estimate the number of people residing within the 800m accessing polygons. To do this, choose the “Select by location” from the vector selection toolbox. Select the run option. All the polygons intersecting the 800m walkshed will be selected, deselect the polygons with less than 1/4 overlap with the walkshed by manually eyeballing the layers. Lastly, open the statistics tab and select the population density layer and the layer in which population data is available and check the “Selected features only” option.
- (o) The result is the population who have access to fire service facilities within a walking distance of 800m.

## Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update
Shape file (point) with fire service facilities in the city	Point shape file	Town Planning Department or Open Street Maps (OSM)	Quinquennial
Shape file (line) with road network	Line shape file	Town Planning Department or Open Street Maps (OSM)	Quinquennial
Municipal Boundary	Polygon shape file	City Municipal Corporation	Quinquennial
City population (Projections)	Number	Census Projections or ULB estimates	Quinquennial
Population grid @250m resolution <sup>80</sup>	Raster file	GHSL Population grid <a href="https://ghsl.jrc.ec.europa.eu/download.php?ds=pop">https://ghsl.jrc.ec.europa.eu/download.php?ds=pop</a>	Quinquennial

## Reference

Source Framework	SDG Indicator	Other Frameworks
Expert recommended	NA	NA

<sup>80</sup> Product: GHS-POP, epoch: 2015, resolution: 9 arcsec, coordinate system: WGS84

## Indicator 10.5

Presence of hazard early warning systems linked with command control system

### Sub Theme

Disaster Preparedness

### Indicator Details

#### Intent/Rationale:

An Early Warning System (EWS) can be defined as a set of capacities needed to generate and disseminate timely and meaningful warning information of the possible extreme events or disasters (e.g., floods, drought, fire, earthquake and tsunamis) that threatens people’s lives. The purpose of this information is to enable individuals, communities and organizations threatened to prepare and act appropriately and in sufficient time to reduce the possibility of harm, loss or risk<sup>81</sup>. Early warning systems (EWSs) are widely considered to be one of the most important mechanisms to prevent disasters around the globe. The increased risk for disasters has upended the need for command control system for effective and early warning and disaster management. The indicator is very relevant as the presence of early warning system enhances public safety and saves life and also protects nation’s resource base and productive assets. In order that early warning systems are effective, they are to be integrated with the disaster management policy.

#### Formula:

NA

**Unit:** NA

**Level:** Secondary

**Type:** Non-spatial

### Performance Evaluation

#### Threshold

Absence of hazard early warning system

#### Benchmark

Presence of hazard early warning system linked to ULB command control system

#### Scoring Range

0(Very low performance)	1(Low performance)	2(Lower medium performance)	3(Medium performance)	4(Upper medium performance)	5(High performance)	6(Excellent performance)
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<sup>81</sup> [https://www.nidm.gov.in/easindia2014/err/pdf/themes\\_issue/technology/early\\_warnings.pdf](https://www.nidm.gov.in/easindia2014/err/pdf/themes_issue/technology/early_warnings.pdf)

Absence of hazard early warning system	NA	NA	Presence of hazard early warning system but no linkage with ULB Command Control system	NA	NA	Presence of hazard early warning system linked to ULB command control system
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### Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update
Presence of hazard early warning systems linked with command control system	NA	Disaster Management Cell	Quinquennial

### Reference

Source Framework	SDG Indicator	Other Frameworks
Expert recommended	NA	GPSC; ESCI (H.1); CSCAF (4.2: Indicator 4)

## Indicator 10.6

Existence of urban flood / water stagnation risk assessment and management plan

### Sub Theme

Disaster Preparedness

### Indicator Details

#### Intent/Rationale:

With increased urbanization and high densities, cities are inherently vulnerable to flooding and water stagnation events. Climate change will only intensify the problem and increase the frequency of such risks. A flood risk assessment is the first step in developing robust flood management strategies and plans

#### Formula:

NA

#### Unit: NA

**Level:** Secondary

**Type:** Non-spatial

### Performance Evaluation

#### Threshold

City has not conducted urban flood / water stagnation risk assessment

#### Benchmark

City should conduct rapid / detailed flood risk assessment every five years

#### Scoring Range

0(Very low performance)	1(Low performance)	2(Lower medium performance)	3(Medium performance)	4(Upper medium performance)	5(High performance)	6(Excellent performance)
City has not conducted urban flood / water stagnation risk assessment	NA	NA	City has conducted rapid / detailed flood risk assessment older than five years.	NA	NA	City has conducted rapid / detailed flood risk assessment in the last five years

## Data Availability

<b>Input variable</b>	<b>Unit</b>	<b>Tentative data source</b>	<b>Suggested interval for data update</b>
Existence of urban flood / water stagnation risk assessment and management plan	NA	CSCAF reporting	Annual

## Reference

<b>Source Framework</b>	<b>SDG Indicator</b>	<b>Other Frameworks</b>
CSCAF (4.4: Indicator 4)	NA	NA

## Indicator 11.1

Number of planners per capita (number per 14000)

### Sub Theme

Effectiveness

## Indicator Details

### Intent/Rationale:

Central to the sustainability transformation is an integrated strategic planning approach coupled with a long-term vision of sustainable growth that extends beyond a political term. Strategic planning is the process by which the city determines what it intends to be in the future and how it will get there. Strategic planning assumes that certain aspects of the future can be created or influenced by the city. Strategic planning is ongoing; it is the process of self-examination, the confrontation of choices, and the establishment of priorities. The strength of the planning team at the ULB would indicate the technical capacity the city possesses to plan for its sustainable integrated development.

### Formula:

$[\text{Number of planners in the ULB} / \text{Total city population}] * 14000$

**Unit:** Number per 14000

**Level:** Primary

**Type:** Non-spatial

## Performance Evaluation

### Threshold

0.5 planner per 14,000 population

Determined after multiple rounds of consultations with sector experts

### Benchmark

1 planner per 14,000 population

URDPFI, Vol I, pg. 105

<http://mohua.gov.in/upload/uploadfiles/files/URDPFI%20Guidelines%20Vol%20I.pdf>

### Scoring Range

0(Very low performance)	1(Low performance)	2(Lower medium performance)	3(Medium performance)	4(Upper medium performance)	5(High performance)	6(Excellent performance)
<0.5	0.5-0.59	0.6-0.69	0.7-0.79	0.8-0.89	0.9-0.99	>=1

## Data Availability

<b>Input variable</b>	<b>Unit</b>	<b>Tentative data source</b>	<b>Suggested interval for data update</b>
Number of planners in the ULB	Number	Town Planning Department	Annual
Total city population	Number	Census projections/ULB population projections	Annual

## Reference

<b>Source Framework</b>	<b>SDG Indicator</b>	<b>Other Frameworks</b>
GPSC	NA	NA

## Indicator 11.2

Years since enforced master plan/development plan was last reviewed and updated (number of years)

### Sub Theme

Effectiveness

## Indicator Details

### Intent/Rationale:

Long-term-horizon concept plans define the city’s spatial structure with broad land allocation, factoring in long-term population needs, economic growth projections, and so forth. Medium-term master plans (usually having a 10- to 15-year time horizon and reviewed every five years) define detailed and granular land use intensity as well as accompanying layers such as urban design, conservation guidelines, and so forth.

### Formula:

[Current year] - [Year in which enforced master plan was last reviewed and updated]

**Unit:** Number of years

**Level:** Primary

**Type:** Non-spatial

## Performance Evaluation

### Threshold

10 years

Determined after multiple rounds of consultations with sector experts

### Benchmark

5 years

URDPFI, Vol I, Pg. 6

<http://mohua.gov.in/upload/uploadfiles/files/URDPFI%20Guidelines%20Vol%20I.pdf>

### Scoring Range

0(Very low performance)	1(Low performance)	2(Lower medium performance)	3(Medium performance)	4(Upper medium performance)	5(High performance)	6(Excellent performance)
>10 years	10-8.9 years	9-7.9 years	8-6.9 years	7-5.9 years	6-4.9 years	<=5 years

## Data Availability

<b>Input variable</b>	<b>Unit</b>	<b>Tentative data source</b>	<b>Suggested interval for data update</b>
Current year	NA	NA	Annual
Year in which enforced master plan was last reviewed and updated	NA	Zonal Development Plan	Annual

## Reference

<b>Source Framework</b>	<b>SDG Indicator</b>	<b>Other Frameworks</b>
GPSC	NA	MPI (4.1.1)

### Indicator 11.3

Number of services being managed through command-and-control system in the ULB (ex: SCADA, ICCC etc) (number)

#### Sub Theme

Revenue management

### Indicator Details

#### Intent/Rationale:

Command and control instruments involve a government issuing a command, which sets a standard and then controlling performance by monitoring and requiring adherence to that standard<sup>82</sup>. Command and control systems help urban areas in better management and building effectiveness.

#### Formula:

NA

**Unit:** Number

**Level:** Primary

**Type:** Non-spatial

### Performance Evaluation

#### Threshold

5

Determined after multiple rounds of consultations with sector experts

#### Benchmark

10

Determined after multiple rounds of consultations with sector experts

#### Scoring Range

0(Very low performance)	1(Low performance)	2(Lower medium performance)	3(Medium performance)	4(Upper medium performance)	5(High performance)	6(Excellent performance)
<5	5-5.9	6-6.9	7-7.9	8-8.9	9-9.9	>=10

<sup>82</sup> <https://www.sciencedirect.com/topics/earth-and-planetary-sciences/command-and-control>

## Data Availability

<b>Input variable</b>	<b>Unit</b>	<b>Tentative data source</b>	<b>Suggested interval for data update</b>
Number of services being managed through command-and-control system in the ULB (ex: SCADA, ICCC etc)	Number	MPI reporting	Annual

## Reference

<b>Source Framework</b>	<b>SDG Indicator</b>	<b>Other Frameworks</b>
MPI (3.1.2)	NA	NA

## Indicator 11.4

Number of functions being implemented by ULB out of 18 functions stipulated in the Twelfth schedule of Indian constitution (number)

### Sub Theme

Effectiveness

## Indicator Details

### Intent/Rationale:

The pace and growth of urbanization in India possess tremendous challenges for urban governance. Along with planning and policy building, it is imperative that empowerment of local bodies is carried out to translate the planning and policies in to action. In 1992, the 74th Constitutional Amendment formally recognized urban local bodies as the third tier of government and mandated that state governments transfer to local governments a set of specified functions under the 12th Schedule, assigning to them the responsibility for functions such as urban planning, including town planning; regulation of land use and construction of buildings, roads, and bridges; the provision of water; public health; and sanitation and solid waste management. The state government has to devolve adequate resources and build capacities of the cities to implement all the 18 functions. The intent of the indicators to assess the capacity of the urban local bodies to perform as vibrant democratic units of self-government.

### Formula:

NA

**Unit:** Number

**Level:** Primary

**Type:** Non-spatial

## Performance Evaluation

### Threshold

15

Determined after multiple rounds of consultations with sector experts

### Benchmark

All 18

In accordance with 74th Constitutional Amendment Act of India, the ULBs need to perform 18 functions stipulated in the Twelfth schedule of Indian constitution.

Twelfth Schedule (Article 243W) - 74 CAA; Pg. 10& 11

[https://www.mhrd.gov.in/sites/upload\\_files/mhrd/files/upload\\_document/74amend.pdf](https://www.mhrd.gov.in/sites/upload_files/mhrd/files/upload_document/74amend.pdf)

### Scoring Range

<b>0(Very low performance)</b>	<b>1(Low performance)</b>	<b>2(Lower medium performance)</b>	<b>3(Medium performance)</b>	<b>4(Upper medium performance)</b>	<b>5(High performance)</b>	<b>6(Excellent performance)</b>
Less than 15	NA	NA	Between 15 and 17	NA	NA	All 18

### Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update
Number of functions being implemented by ULB out of 18 functions stipulated in the Twelfth schedule of Indian constitution	Number	Municipal Corporation	Annual

### Reference

Source Framework	SDG Indicator	Other Frameworks
Expert recommended	NA	NA

## Indicator 11.5

Existence of Geographic information System (GIS) based Master Plan for the city

### Sub Theme

Data Management

### Indicator Details

#### Intent/Rationale:

GIS based master planning will enable efficient and accurate project implementation and ensure better monitoring and review. GIS has evolved as the corner stone of how urban planning create solutions to land development, sustainability and security. Devolving responsible strategies and plans for urban planning thus would require a robust and updated spatial information. The indicator is thus crucial to bring spatial thinking to transform the data in to actionable insights.<sup>83</sup>

Given the interrelations between city systems, an integrated approach to data collection, management, and sharing is critical. Existence of GIS based Master plans for the city and GIS based platforms that bring together data from across city departments and partner agencies can serve as powerful tools to support an integrated approach to urban planning and management.

#### Formula:

NA

**Unit:** NA

**Level:** Primary

**Type:** Non-spatial

### Performance Evaluation

#### Threshold

Absence of GIS base Master Plan

#### Benchmark

Presence of GIS base Master Plan prepared / updated after 2015

Formulation of GIS based Master Plans that include base map, land use map is one of the reforms under AMRUT mission. This reform was introduced in year 2015

#### Scoring Range

0(Very low)	1(Low performance)	2(Lower medium)	3(Medium)	4(Upper medium)	5(High performance)	6(Excellent)
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<sup>83</sup> <https://gis.usc.edu/blog/why-is-gis-important-in-urban-planning/>

performance)		performance)	performance)	performance)		performance)
Absence of GIS base Master Plan	NA	NA	Presence of GIS base Master Plan prepared / updated before 2015	NA	NA	Presence of GIS base Master Plan prepared / updated after 2015

### Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update
Existence of Geographic information System (GIS) based Master Plan for the city	NA	MPI reporting	Annual

### Reference

Source Framework	SDG Indicator	Other Frameworks
MPI (4.1.2)	NA	GPSC

## Indicator 11.6

Environmental status report with action plans published by the ULB for the last three years (Y/N)

### Sub Theme

Accountability

## Indicator Details

### Intent/Rationale:

Environmental status reports describe compliances measures taken for various issues, progress towards achieving environmental targets. For any condition that cannot be satisfied, it all suggests remedial actions. The tool is effective in environmental monitoring and evaluation.

### Formula:

Yes/No

**Unit:** NA

**Level:** Secondary

**Type:** Non-spatial

## Performance Evaluation

### Threshold

No

### Benchmark

Yes

### Scoring Range

0(Very low performance)	1(Low performance)	2(Lower medium performance)	3(Medium performance)	4(Upper medium performance)	5(High performance)	6(Excellent performance)
No	NA	NA	NA	NA	NA	Yes

## Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update

Environmental status report with action plans published by the ULB for the last three years	NA	MPI reporting	Annual
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## Reference

Source Framework	SDG Indicator	Other Frameworks
MPI (5.1.4)	NA	NA

### Indicator 11.7

Percentage of total staff trained during the year in any of the ULB functionary domains (%)

**Sub Theme**

Capacity Building

### Indicator Details

**Intent/Rationale:**

To create the best possible outcomes for the city projects and planning, it is imperative that the urban government staff are adequately trained in various domains.

**Formula:**

$[\text{Total ULB staff trained during the year} / \text{Total staff in the ULB}] * 100$

**Unit:** Percentage (%)

**Level:** Secondary

**Type:** Non-spatial

### Performance Evaluation

**Threshold**

50%

Determined after multiple rounds of consultations with sector experts

**Benchmark**

70%

Determined after multiple rounds of consultations with sector experts

**Scoring Range**

0(Very low performance)	1(Low performance)	2(Lower medium performance)	3(Medium performance)	4(Upper medium performance)	5(High performance)	6(Excellent performance)
<50%	50%-54.9%	55%-59.9%	60%-64.9%	65%-69.9%	70%-74.9%	>=75%

### Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update

Total ULB staff trained during the year	NA	MPI reporting	Annual
Total staff in the ULB	NA	MPI reporting	Annual

## Reference

Source Framework	SDG Indicator	Other Frameworks
MPI (5.4.3)	NA	NA

## Indicator 11.8

Number of E-governance initiatives undertaken by the ULB:

- a. ULB website (Y/N)
- b. Online Public Service Delivery (Services provided online as a proportion of total Services provided)
- c. Online Public Service Delivery on Mobile (Services provided via mobile as a proportion of total Services provided)
- d. Online Grievance Redressal (number of grievances received online as a proportion of total grievances received)
- e. Online Grievance Redressal on Mobile (Services provided via mobile as a proportion of total Services provided)

### Sub Theme

Effectiveness

## Indicator Details

### Intent/Rationale:

ICT led e-governance initiatives have opened up new platforms for economic and social economic opportunities in the city. The extensive prevalence of ICT can be leveraged to extend the reach and quality of public services. Improved connectivity with global markets, and the use of ICT (using GPS devices) to improve the efficiency of transportation, for instance, can also result in great cost savings and economic growth.<sup>84</sup>

### Formula:

NA

**Unit:** Number

**Level:** Secondary

**Type:** Non-spatial

## Performance Evaluation

### Threshold

2

Determined after multiple rounds of consultations with sector experts

### Benchmark

All 5

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<sup>84</sup><https://documents1.worldbank.org/curated/en/657421468009999091/pdf/715120WP0Box370Governance0Final0pub.pdf>

Determined after multiple rounds of consultations with sector experts

### Scoring Range

0(Very low performance)	1(Low performance)	2(Lower medium performance)	3(Medium performance)	4(Upper medium performance)	5(High performance)	6(Excellent performance)
Less than 2	NA	NA	Between 2 and 4	NA	NA	All 5

### Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update
Number of E-governance initiatives undertaken by the ULB	Number	MPI reporting	Annual

### Reference

Source Framework	SDG Indicator	Other Frameworks
MPI (3.1.1)	NA	NA

## Indicator 11.9

Local development control regulations and master plan / development plan are accessible completely through the web

### Sub Theme

Transparency

## Indicator Details

### Intent/Rationale:

Transparent urban planning can usher accountability, people participation and improved trust. Urban planning is a technical and political process concerned with the welfare of the city residents, control of the use of land, design of the urban environment including transportation and communication networks, and protection and enhancement of the natural environment". The intent of the indicator is to bring transparency in urban planning.

### Formula:

NA

**Unit:** NA

**Level:** Secondary

**Type:** Non-spatial

## Performance Evaluation

### Threshold

Both not available

### Benchmark

Both available online

### Scoring Range

0(Very low performance)	1(Low performance)	2(Lower medium performance)	3(Medium performance)	4(Upper medium performance)	5(High performance)	6(Excellent performance)
Both not available	NA	NA	One available online	NA	NA	Both available online

## Data Availability

<b>Input variable</b>	<b>Unit</b>	<b>Tentative data source</b>	<b>Suggested interval for data update</b>
Local development control regulations and master plan / development plan are accessible completely through the web	NA	Municipal Corporation	Decadal

## Reference

<b>Source Framework</b>	<b>SDG Indicator</b>	<b>Other Frameworks</b>
Expert recommended	NA	NA

### Indicator 11.10

Number of stipulated committees in the ULB:

- 1) Municipal Committee/Council
- 2) Ward Committee
- 3) Metropolitan Planning Committee / District Planning Committee
- 4) Project Coordination /Monitoring Committee
- 5) Town Vending Committee (Street vendors)
- 6) Heritage Conservation Committee

#### Sub Theme

Participation (in planning process)

### Indicator Details

#### Intent/Rationale:

74th constitutional amendment brought constitutional validity to urban governments. The municipal bodies of India are vested with a long list of functions delegated to them by the state governments under their respective municipal legislations. Stipulated committees as envisaged in constitutional amendment are to be formed.

#### Formula:

NA

**Unit:** Number

**Level:** Secondary

**Type:** Non-spatial

### Performance Evaluation

#### Threshold

3

#### Benchmark

6

#### Scoring Range

0(Very low performance)	1(Low performance)	2(Lower medium performance)	3(Medium performance)	4(Upper medium performance)	5(High performance)	6(Excellent performance)
Less than or equal to 3	NA	NA	Between 4 and 5	NA	NA	6

## Data Availability

<b>Input variable</b>	<b>Unit</b>	<b>Tentative data source</b>	<b>Suggested interval for data update</b>
Number of stipulated committees in the ULB	NA	Municipal Corporation	Annual

## Reference

<b>Source Framework</b>	<b>SDG Indicator</b>	<b>Other Frameworks</b>
Expert recommended	NA	MPI (5.3.3)

## Indicator 11.11

ULB's citizen charter and appeal mechanisms

### Sub Theme

Participation (in planning process)

### Indicator Details

#### Intent/Rationale:

Good governance is driver to urban development to achieve sustainability. The essence of good governance lies in transparency, accountability and responsiveness of organization/administration. A citizens' charter is a parallel tool to achieve good governance<sup>85</sup>.

#### Formula:

NA

**Unit:** NA

**Level:** Secondary

**Type:** Non-spatial

### Performance Evaluation

#### Threshold

Doesn't exist

#### Benchmark

Exists offline and online

#### Scoring Range

0(Very low performance)	1(Low performance)	2(Lower medium performance)	3(Medium performance)	4(Upper medium performance)	5(High performance)	6(Excellent performance)
Doesn't exist	NA	NA	Exist only offline	NA	NA	Exists offline and online

<sup>85</sup><https://pas.org.in/Portal/document/PIP%20Application/Model%20Citizens%20Charter%20Presentation.pdf>

## Data Availability

<b>Input variable</b>	<b>Unit</b>	<b>Tentative data source</b>	<b>Suggested interval for data update</b>
Presence of citizen charter in the ULB and types of appeal mechanisms in place	NA	MPI reporting	Annual

## Reference

<b>Source Framework</b>	<b>SDG Indicator</b>	<b>Other Frameworks</b>
MPI (5.4.1)	NA	NA

## Indicator 11.12

Presence of City data officer (Y/N)

### Sub Theme

Data Management

### Indicator Details

#### Intent/Rationale:

City planning in the present and future would largely revolve around quality data and data management. City leaders would need support for understanding the data better and how it can be used to develop solutions to the challenges and bring value. For data informed policy, it is imperative that there is leadership for data management in urban governments.

#### Formula:

Yes / No

**Unit:** NA

**Level:** Secondary

**Type:** Non-spatial

### Performance Evaluation

#### Threshold

No

#### Benchmark

Yes

#### Scoring Range

0(Very low performance)	1(Low performance)	2(Lower medium performance)	3(Medium performance)	4(Upper medium performance)	5(High performance)	6(Excellent performance)
No	NA	NA	NA	NA	NA	Yes

### Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update

Presence of City data officer	NA	MPI reporting	Annual
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## Reference

Source Framework	SDG Indicator	Other Frameworks
MPI (3.1.6)	NA	NA

**Indicator 11.13**

Proportion of Women councillors in Municipal Council (%)

**Sub Theme**

Representation

**Indicator Details****Intent/Rationale:**

A transparent, integrated, and inclusive process to include a wide range of stakeholders will help align different perspectives and goals to a common end and will leverage knowledge. Women have been historically underrepresented in decision making levels. Building an inclusive urban space would require understanding of gender dimensions of various sectors such as transportation, housing etc.

**Formula:**

$[\text{Number of women councillors} / \text{Total number of councillors in the municipal council}] * 100$

**Unit:** Percentage (%)**Level:** Tertiary**Type:** Non-spatial**Performance Evaluation****Threshold**

33%

At least 33 percent (Women representation shall not Less than one-third of the total number of seats)

74th Constitutional Amendment Act of India

[https://www.mhrd.gov.in/sites/upload\\_files/mhrd/files/upload\\_document/74amend.pdf](https://www.mhrd.gov.in/sites/upload_files/mhrd/files/upload_document/74amend.pdf)

**Benchmark**

50%

Determined after multiple rounds of consultations with sector experts

**Scoring Range**

0(Very low performance)	1(Low performance)	2(Lower medium performance)	3(Medium performance)	4(Upper medium performance)	5(High performance)	6(Excellent performance)
<33%	33%-36.3%	36.4%-39.7%	39.8%-43.1%	43.2%-46.5%	46.6%-49.9%	>=50%

## Data Availability

<b>Input variable</b>	<b>Unit</b>	<b>Tentative data source</b>	<b>Suggested interval for data update</b>
Number of women councillors	Number	MPI reporting	Annual
Total number of councillors in the municipal council	Number	MPI reporting	Annual

## Reference

<b>Source Framework</b>	<b>SDG Indicator</b>	<b>Other Frameworks</b>
MPI (5.2.2)	5.5.1	GPSC

## Indicator 11.14

Digital Governance: Presence on Open Data Portal (Y/N)

### Sub Theme

Data Management

### Indicator Details

#### Intent/Rationale:

The growth of urban areas and urban density provide many opportunities and challenges. Open data portal mobilizes civic participation to harness ideas and stimulate innovation.

#### Formula:

Yes / No

**Unit:** NA

**Level:** Tertiary

**Type:** Non-spatial

### Performance Evaluation

#### Threshold

No

#### Benchmark

Yes

#### Scoring Range

0(Very low performance)	1(Low performance)	2(Lower medium performance)	3(Medium performance)	4(Upper medium performance)	5(High performance)	6(Excellent performance)
No	NA	NA	NA	NA	NA	Yes

### Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update
Presence on Open Data Portal	NA	MPI reporting	Annual

## Reference

Source Framework	SDG Indicator	Other Frameworks
MPI (3.1.8)	NA	NA

## Indicator 12.1

Credit rating of the ULB

### Sub Theme

Finance

### Indicator Details

#### Intent/Rationale:

Credit rating is a forward-looking assessment of the ULB's willingness and ability to service debt obligations in a timely manner. The credit rating, thus, is an opinion on the issuer's likely performance (in terms of debt repayment) from the lender's/ investor's perspective.

#### Formula:

NA

**Unit:** Credit Rating Score

**Level:** Primary

**Type:** Non-spatial

### Performance Evaluation

#### Threshold

Lesser or equal to BBB

GPSC, Pg. 132

<http://documents1.worldbank.org/curated/en/339851517836894370/pdf/123149-Urban-Sustainability-Framework.pdf>

#### Benchmark

Greater or equal to AA

GPSC, Pg. 132

<http://documents1.worldbank.org/curated/en/339851517836894370/pdf/123149-Urban-Sustainability-Framework.pdf>

#### Scoring Range

0(Very low performance)	1(Low performance)	2(Lower medium performance)	3(Medium performance)	4(Upper medium performance)	5(High performance)	6(Excellent performance)
Lesser or equal to BBB	NA	NA	Between BBB and A	NA	NA	Greater or equal to AA

## Data Availability

<b>Input variable</b>	<b>Unit</b>	<b>Tentative data source</b>	<b>Suggested interval for data update</b>
Credit rating of the ULB	Credit Rating Score	MPI reporting	Annual

## Reference

<b>Source Framework</b>	<b>SDG Indicator</b>	<b>Other Frameworks</b>
MPI (2.4.3)	NA	GPSC

## Indicator 12.2

Total property tax collected as a percentage of total property tax billed in the same financial year (%)

### Sub Theme

Finance

## Indicator Details

### Intent/Rationale:

Property taxes are the financial backbone of local governments. Property taxes also shape local housing markets by influencing the costs of buying, renting, or investing in homes and apartment buildings. Understanding how changes in property taxes affect households and community development, therefore, allows local jurisdictions to design their tax systems more effectively.<sup>86</sup>

### Formula:

[Total Property Tax collected in the financial year/Total Property Tax billed in the financial year]\*100

**Unit:** Percentage (%)

**Level:** Primary

**Type:** Non-spatial

## Performance Evaluation

### Threshold

60%

Determined after multiple rounds of consultations with sector experts

### Benchmark

80%

Determined after multiple rounds of consultations with sector experts

### Scoring Range

0(Very low performance)	1(Low performance)	2(Lower medium performance)	3(Medium performance)	4(Upper medium performance)	5(High performance)	6(Excellent performance)
<60%	60%-63.9%	64%-67.9%	68%-71.9%	72%-75.9%	76%-79.9%	>=80%

<sup>86</sup> <https://www.urban.org/urban-wire/understanding-impact-property-taxes-critical-effective-local-policy-making>

## Data Availability

<b>Input variable</b>	<b>Unit</b>	<b>Tentative data source</b>	<b>Suggested interval for data update</b>
Total Property Tax collected in the financial year	Indian Rupees (INR) in Lakhs	MPI reporting	Annual
Total Property Tax billed in the financial year	Indian Rupees (INR) in Lakhs	MPI reporting	Annual

## Reference

<b>Source Framework</b>	<b>SDG Indicator</b>	<b>Other Frameworks</b>
MPI (2.1.5)	NA	GPSC; ESCI (U.2)

### Indicator 12.3

Financial dependency: Percentage of grants received from central and state governments to total revenue (%)

#### Sub Theme

Finance

### Indicator Details

#### Intent/Rationale:

Financing infrastructure development in urban areas is a challenge for many city governments. A high degree of dependence on resources transferred from other levels of government, no acquisition of debt, and are not able to collect taxes or set tariffs is not a desirable condition. The indicator assesses the creditworthiness and robustness of the city governments and also indicates access/capacity to finance their projects with private sector participation including public private partnerships.

#### Formula:

$[\text{Grants received from State and Central Government} / \text{Total Revenue}] * 100$

**Unit:** Percentage (%)

**Level:** Primary

**Type:** Non-spatial

### Performance Evaluation

#### Threshold

60%

Determined after multiple rounds of consultations with sector experts

#### Benchmark

30%

Determined after multiple rounds of consultations with sector experts

#### Scoring Range

0(Very low performance)	1(Low performance)	2(Lower medium performance)	3(Medium performance)	4(Upper medium performance)	5(High performance)	6(Excellent performance)
>60%	60%-65.9%	66%-71.9%	72%-77.9%	78%-83.9%	84%-89.9%	<=30%

## Data Availability

<b>Input variable</b>	<b>Unit</b>	<b>Tentative data source</b>	<b>Suggested interval for data update</b>
Grants received from State and Central Government	Indian Rupees (INR) in Lakhs	Municipal Budget documents	Annual
Total Revenue	Indian Rupees (INR) in Lakhs	Municipal Budget documents	Annual

## Reference

<b>Source Framework</b>	<b>SDG Indicator</b>	<b>Other Frameworks</b>
Expert Recommended	NA	NA

## Indicator 12.4

Growth rate of GDP per capita (%)

### Sub Theme

Economy

## Indicator Details

### Intent/Rationale:

Cities are engines of local, regional, and national economic development. Agglomeration effects (the productive efficiencies that result from colocation of firms) are integral to urban economic development. Agglomeration effects tend to be spatially bound. Cities that are more competitive have the ability to set aside additional resources to meet the needs of their citizens and the challenges of the future. Sustainable urban economic growth should be linked to increasing the efficiency of resource use, reducing carbon emissions in absolute terms, and encouraging low-carbon and climate-smart investments.

### Formula:

$$\left( \frac{\text{GDP (Price deflated) of the city in 2019}}{\text{Population of the city in 2019}} \right) / \left( \frac{\text{GDP (Price deflated) of the city in 2015}}{\text{Population of the city in 2015}} \right) - 1 \times 100$$

**Unit:** Percentage (%)

**Level:** Primary; Aspirational

**Type:** Non-spatial

## Performance Evaluation

### Threshold

[Descriptive Indicator]

### Benchmark

[Descriptive Indicator]

### Scoring Range

No Scoring Range as the Indicator is Descriptive

## Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update

GDP (Price deflated) of the city in 2019	Indian Rupees (INR) in Lakhs	State Department/Directorate of Economics and Statistics	Annual
Population of the city in 2019	Number	Census projections/ULB population estimates	Annual
GDP (Price deflated) of the city in 2015	Indian Rupees (INR) in Lakhs	State Department/Directorate of Economics and Statistics	Annual
Population of the city in 2015	Number	Census projections/ULB population estimates	Annual

## Reference

Source Framework	SDG Indicator	Other Frameworks
GPSC	8.1.1	ESCI (L.3)

## Indicator 12.5

Change in Own Source Revenue (number of years with OSR > 20%)

### Sub Theme

Finance

### Indicator Details

#### Intent/Rationale:

Many cities have found that through successful reforms and improvements in various stages of the revenue collection process (registration, assessment, billing, collection, and monitoring), they can increase their own-source revenue, often quite substantially. The best course of action is to increase the revenue yielded under existing tax, tariff, and fee rates before proposing an increase in rates. Improvement of revenue collection practices is an essential step in justifying any proposed increase in rates.<sup>100</sup>

#### Formula:

$$[\text{Total Taxes Collected} + \text{User Charges \& User Fee} + \text{Recurring Revenue}] / [\text{Total Revenue}] * 100$$

**Unit:** Percentage (%)

**Level:** Secondary

**Type:** Non-spatial

### Performance Evaluation

#### Threshold

Greater than 20% in one year

Determined after multiple rounds of consultations with sector experts

#### Benchmark

Greater than 20% for more 3 years

GPSC, Pg. 133

<http://documents1.worldbank.org/curated/en/339851517836894370/pdf/123149-Urban-Sustainability-Framework.pdf>

#### Scoring Range

0(Very low performance)	1(Low performance)	2(Lower medium performance)	3(Medium performance)	4(Upper medium performance)	5(High performance)	6(Excellent performance)
Greater than 20%	NA	NA	Greater than 20%	NA	NA	Greater than 20%

in one year			for more than 1 Year			for more 3 years
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### Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update
Total Taxes Collected	Indian Rupees (INR) in Lakhs	Municipal Budget documents	Annual
User Charges & User Fee	Indian Rupees (INR) in Lakhs	Municipal Budget documents	Annual
Recurring Revenue	Indian Rupees (INR) in Lakhs	Municipal Budget documents	Annual
Total Revenue	Indian Rupees (INR) in Lakhs	Municipal Budget documents	Annual

### Reference

Source Framework	SDG Indicator	Other Frameworks
Expert Recommended	NA	MPI (2.1.1); ESCI (U.1); CPI (2.1)

## Indicator 12.6

Operating margin: Difference in revenue and expenditure in the financial year (INR in Lakhs)

### Sub Theme

Finance

## Indicator Details

### Intent/Rationale:

A city's operating margin is its operating revenue (all revenue not specifically designated to fund the capital budget) minus its operating expenditures (all expenditures not included in the capital budget). To maintain an operating margin surplus, a city needs to keep operating expenditures below the level of annual recurrent operating revenues. Recurrent operating revenues are those that a city government can always expect to collect every year; that is to say, they are very predictable revenues (either own-source or transfers). To keep operating expenditures below the level of annual recurrent operating revenues, a city will need to plan efficiently.

### Formula:

[Total revenue - Total expenditure]

**Unit:** INR in Lakhs

**Level:** Secondary

**Type:** Non-spatial

## Performance Evaluation

### Threshold

Deficit

### Benchmark

Surplus

### Scoring Range

0(Very low performance)	1(Low performance)	2(Lower medium performance)	3(Medium performance)	4(Upper medium performance)	5(High performance)	6(Excellent performance)
Deficit	NA	NA	NA	NA	NA	Surplus

## Data Availability

<b>Input variable</b>	<b>Unit</b>	<b>Tentative data source</b>	<b>Suggested interval for data update</b>
Total revenue	INR in Lakhs	Municipal Budget documents	Annual
Total expenditure	INR in Lakhs	Municipal Budget documents	Annual

## Reference

<b>Source Framework</b>	<b>SDG Indicator</b>	<b>Other Frameworks</b>
GPSC	NA	NA

**Indicator 12.7**

Total cost of annual debt service as a percentage of expenditure (%)

**Sub Theme**

Finance

**Indicator Details****Intent/Rationale:**

A city's financial obligations (liabilities) have a major impact on its financial sustainability. If obligations become greater than the revenue and reserves available to pay them, the city is financially unsustainable. To be sure of having access to the capital required for maintaining and expanding essential infrastructure, cities must carefully manage their financial obligations. Lenders and investors will look carefully at the city's current debt (long or short term, fixed or variable interest rate, to be paid in local currency or foreign currency); the debt service burden; the needs for future debt financing; and other liabilities and contingent liabilities and how they are funded. In some cases, a serious risk to the fiscal management of a city comes from contingent liabilities—that is, liabilities that do not necessarily appear in the municipal government's budget or balance sheet because they are not due to be paid in the short term. These become a risk if they materialize without sufficient reserves to pay them when they are due.

**Formula:**

[Total annual debt service payments (Loan interest & repayment) /Total expenditure]\*100

**Unit:** Percentage (%)

**Level:** Secondary

**Type:** Non-spatial

**Performance Evaluation****Threshold**

[Descriptive Indicator]

**Benchmark**

[Descriptive Indicator]

**Scoring Range**

No Scoring Range as the Indicator is Descriptive

## Data Availability

<b>Input variable</b>	<b>Unit</b>	<b>Tentative data source</b>	<b>Suggested interval for data update</b>
Total annual debt service payments (Loan interest & repayment)	INR in Lakhs	Municipal Budget documents	Annual
Total expenditure	INR in Lakhs	Municipal Budget documents	Annual

## Reference

<b>Source Framework</b>	<b>SDG Indicator</b>	<b>Other Frameworks</b>
GPSC	NA	NA

## Indicator 12.8

Percentage of debt/loans in overall budget allocation (%)

### Sub Theme

Finance

### Indicator Details

#### Intent/Rationale:

Financing for urban development has to be sustainable. The financing gap is huge and impairing economic growth and living conditions of cities in developing countries. The cost of postponement of investment in planned urban development is huge and mortgages the future.

- Creditworthiness and transparency are key.
- Cities must have the capacity to develop bankable projects.
- Public-private partnerships can help if well-structured.

The indicator assesses the creditworthiness of the city and supports good governance.<sup>87</sup>

#### Formula:

$[\text{Total Loans \& Debt} / \text{Total budgeted spending}] * 100$

**Unit:** Percentage (%)

**Level:** Secondary

**Type:** Non-spatial

### Performance Evaluation

#### Threshold

70%

Determined after multiple rounds of consultations with sector experts

#### Benchmark

30%

Determined after multiple rounds of consultations with sector experts

#### Scoring Range

0(Very low performance)	1(Low performance)	2(Lower medium performance)	3(Medium performance)	4(Upper medium performance)	5(High performance)	6(Excellent performance)
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<sup>87</sup> UNHABITAT: FINANCING SUSTAINABLE URBAN DEVELOPMENT: CHALLENGES AND OPPORTUNITIES ([https://www.un.org/esa/ffd/ffd3/wp-content/uploads/sites/2/2015/03/Financing-Urban-Development\\_UN-Habitat.pdf](https://www.un.org/esa/ffd/ffd3/wp-content/uploads/sites/2/2015/03/Financing-Urban-Development_UN-Habitat.pdf))

>70%	70%- 61.9%	62%- 53.9%	54%- 45.9%	46%- 37.9%	38%- 29.9%	<=30%
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### Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update
Total Loans & Debt	INR in Lakhs	Municipal Budget documents	Annual
Total budgeted spending	INR in Lakhs	Municipal Budget documents	Annual

### Reference

Source Framework	SDG Indicator	Other Frameworks
Expert Recommended	NA	NA

## Indicator 12.9

Properties covered under the tax net expressed as percentage of total properties within the municipality (%)

### Sub Theme

Finance

### Indicator Details

#### Intent/Rationale:

Urban land, and the physical properties on this land, represent the largest source of untapped municipal revenues in many developing cities. The objective is to assess the performance of the city to widen property tax coverage as taxing property and land is fairer, efficient and self-sustaining than other forms of tax.

#### Formula:

$$\left[ \frac{\text{Number of properties covered under the tax net}}{\text{Total properties within the municipality on GIS/cadastral base}} \right] * 100$$

**Unit:** Percentage (%)

**Level:** Secondary

**Type:** Non-spatial

### Performance Evaluation

#### Threshold

85%

Determined after multiple rounds of consultations with sector experts

#### Benchmark

99%

Determined after multiple rounds of consultations with sector experts

#### Scoring Range

0(Very low performance)	1(Low performance)	2(Lower medium performance)	3(Medium performance)	4(Upper medium performance)	5(High performance)	6(Excellent performance)
<85%	85%-87.7%	87.8%-90.5%	90.6%-93.3%	93.4%-96.1%	96.2%-98.9%	>=99%

## Data Availability

<b>Input variable</b>	<b>Unit</b>	<b>Tentative data source</b>	<b>Suggested interval for data update</b>
Number of properties covered under the tax net	Number	MPI reporting	Annual
Total properties within the municipality on GIS/cadastral base	Number	MPI reporting	Annual

## Reference

<b>Source Framework</b>	<b>SDG Indicator</b>	<b>Other Frameworks</b>
MPI (2.1.3)	NA	NA

## Indicator 12.10

Efficiency of Capital expenditure spending: Actual capital expenditure spent expressed as a percentage of the budgeted capital expenditure in the financial year (%)

### Sub Theme

Finance

### Indicator Details

#### Intent/Rationale:

The intent of this indicator is to measure the performance of urban governments in managing their capital expenditure.

#### Formula:

$[\text{Actual capital expenditure spent} / \text{Capital expenditure budgeted for the same FY}] * 100$

**Unit:** Percentage (%)

**Level:** Secondary

**Type:** Non-spatial

### Performance Evaluation

#### Threshold

60%

Determined after multiple rounds of consultations with sector experts

#### Benchmark

80%

Determined after multiple rounds of consultations with sector experts

#### Scoring Range

0(Very low performance)	1(Low performance)	2(Lower medium performance)	3(Medium performance)	4(Upper medium performance)	5(High performance)	6(Excellent performance)
<60%	60%-63.9%	64%-67.9%	68%-71.9%	72%-75.9%	76%-79.9%	>=80%

### Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update

Actual capital expenditure spent	INR in Lakhs	Municipal Budget documents	Annual
Capital expenditure budgeted for the same FY	INR in Lakhs	Municipal Budget documents	Annual

## Reference

Source Framework	SDG Indicator	Other Frameworks
Expert Recommended	NA	NA

## Indicator 12.11

Cost Recovery in Water Supply: Total operating revenues expressed as a percentage of the total operating expenses incurred towards water supply services in the given financial year (%)

### Sub Theme

Finance

### Indicator Details

#### Intent/Rationale:

Internationally, the trend is for tariffs to cover the full costs of water supply and sanitation, including capital replacement and the remuneration of equity. In India, however, tariffs generally fall far short of recovering costs; even in as far as they attempt to do so, the common practice is one of operational cost recovery, and tariffs do not take into account capital costs<sup>88</sup>.

#### Formula:

[Revenue Collected in Water Supply / Operating expenditure in Water Supply]\*100

**Unit:** Percentage (%)

**Level:** Secondary

**Type:** Non-spatial

### Performance Evaluation

#### Threshold

30%

Determined after multiple rounds of consultations with sector experts

#### Benchmark

70%

Determined after multiple rounds of consultations with sector experts

#### Scoring Range

0(Very low performance)	1(Low performance)	2(Lower medium performance)	3(Medium performance)	4(Upper medium performance)	5(High performance)	6(Excellent performance)
<30%	30%-37.9%	38%-45.9%	46%-53.9%	54%-61.9%	62%-69.9%	>=70%

<sup>88</sup> <https://www.wsp.org/sites/wsp/files/publications/WSP-Cost-Recovery-Urban-Water-Services.pdf>

## Data Availability

<b>Input variable</b>	<b>Unit</b>	<b>Tentative data source</b>	<b>Suggested interval for data update</b>
Revenue Collected in Water Supply	INR in Lakhs	SLB reporting	Annual
Operating expenditure in Water Supply	INR in Lakhs	SLB reporting	Annual

## Reference

<b>Source Framework</b>	<b>SDG Indicator</b>	<b>Other Frameworks</b>
Expert Recommended	NA	NA

## Indicator 12.12

Cost Recovery in Sanitation: Total operating revenues expressed as a percentage of the total operating expenses incurred towards sanitation services in the financial year (%)

### Sub Theme

Finance

## Indicator Details

### Intent/Rationale:

Internationally, the trend is for tariffs to cover the full costs of water supply and sanitation, including capital replacement and the remuneration of equity. In India, however, tariffs generally fall far short of recovering costs; even in as far as they attempt to do so, the common practice is one of operational cost recovery, and tariffs do not take into account capital costs<sup>89</sup>.

### Formula:

$[\text{Revenue collected in sanitation} / \text{Operating expenditure in sanitation}] * 100$

**Unit:** percentage (%)

**Level:** Secondary

**Type:** Non-spatial

## Performance Evaluation

### Threshold

30%

Determined after multiple rounds of consultations with sector experts

### Benchmark

70%

Determined after multiple rounds of consultations with sector experts

### Scoring Range

0(Very low performance)	1(Low performance)	2(Lower medium performance)	3(Medium performance)	4(Upper medium performance)	5(High performance)	6(Excellent performance)
<30%	30%-37.9%	38%-45.9%	46%-53.9%	54%-61.9%	62%-69.9%	>=70%

<sup>89</sup> <https://www.wsp.org/sites/wsp/files/publications/WSP-Cost-Recovery-Urban-Water-Services.pdf>

## Data Availability

<b>Input variable</b>	<b>Unit</b>	<b>Tentative data source</b>	<b>Suggested interval for data update</b>
Revenue collected in sanitation	INR in Lakhs	SLB reporting	Annual
Operating expenditure in sanitation	INR in Lakhs	SLB reporting	Annual

## Reference

<b>Source Framework</b>	<b>SDG Indicator</b>	<b>Other Frameworks</b>
Expert Recommended	NA	NA

### Indicator 12.13

Cost Recovery in Solid Waste Management: Total operating revenues expressed as a percentage of the total operating expenses incurred towards solid waste management services in the financial year (%)

#### Sub Theme

Finance

#### Indicator Details

##### Intent/Rationale:

Financing and cost recovery of solid waste management is important to assess the possible technologies and investment requirements.

##### Formula:

$[\text{Revenue Collected in waste Management} / \text{Operating expenditure in Waste Management}] * 100$

**Unit:** Percentage (%)

**Level:** Secondary

**Type:** Non-spatial

#### Performance Evaluation

##### Threshold

30%

Determined after multiple rounds of consultations with sector experts

##### Benchmark

70%

Determined after multiple rounds of consultations with sector experts

##### Scoring Range

0(Very low performance)	1(Low performance)	2(Lower medium performance)	3(Medium performance)	4(Upper medium performance)	5(High performance)	6(Excellent performance)
<30%	30%-37.9%	38%-45.9%	46%-53.9%	54%-61.9%	62%-69.9%	>=70%

## Data Availability

<b>Input variable</b>	<b>Unit</b>	<b>Tentative data source</b>	<b>Suggested interval for data update</b>
Revenue Collected in waste Management	INR in Lakhs	SLB reporting	Annual
Operating expenditure in Waste Management	INR in Lakhs	SLB reporting	Annual

## Reference

<b>Source Framework</b>	<b>SDG Indicator</b>	<b>Other Frameworks</b>
Expert Recommended	NA	NA

**Indicator 12.14**

Unemployment rate of persons of age 15 years and above (%)

**Sub Theme**

Economy

**Indicator Details****Intent/Rationale:**

In a sustainable city, individuals are able to access diverse livelihood and employment opportunities to accrue personal savings that will support their development in ordinary times and their survival in times of crisis. Job creation in cities is at the forefront of the economic development challenge globally. Many developing countries are experiencing a demographic and spatial transition, with millions of new entrants to the labour market. Creating job opportunities in urban areas—quickly—is essential if countries are to take advantage of their “demographic dividend” and thus avoid the social disaster created by unemployment and inequality. Cities need jobs and opportunities for their citizens, and they need the means to generate tax revenues to fund projects that meet the growing demand for basic services<sup>90</sup>. The unemployment rate would also be a crucial indicator to development strategies and policies for economic development.

**Formula:**

$$\left[ \frac{\text{Number of unemployed persons}}{\text{Number of employed persons} + \text{Number of unemployed persons}} \right] * 100$$

**Unit:** Percentage (%)

**Level:** Secondary

**Type:** Non-spatial

**Performance Evaluation****Threshold**

14%

Calculated using national average as the median value and the benchmark

**National Average**

7.7%

Periodic Labour Force Survey (2017-18)

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[http://mospi.nic.in/sites/default/files/publication\\_reports/Annual%20Report%2C%20PLFS%202017-18\\_31052019.pdf?download=1](http://mospi.nic.in/sites/default/files/publication_reports/Annual%20Report%2C%20PLFS%202017-18_31052019.pdf?download=1)

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<sup>90</sup> <https://blogs.worldbank.org/sustainablecities/how-do-city-leaders-get-things-done-learning-mayors-japan>

## Benchmark

4%

Determined after multiple rounds of consultations with sector experts

## Scoring Range

0(Very low performance)	1(Low performance)	2(Lower medium performance)	3(Medium performance)	4(Upper medium performance)	5(High performance)	6(Excellent performance)
>14%	14%-11.9%	12%-9.9%	10%-7.9%	8%-5.9%	6%-3.9%	<=4%

## Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update
Number of unemployed persons	Number	Primary surveys/PLFS (only for million plus cities)	Annual
Number of employed persons	Number	Primary surveys/PLFS (only for million plus cities)	Annual

## Reference

Source Framework	SDG Indicator	Other Frameworks
NIF (8.5.1)	8.5.2	CPI (3.1); ESCI (M.1); GPSC

## Indicator 12.15

Inequality Index based on Consumption Expenditure- Gini Coefficient (score)

### Sub Theme

Economy

### Indicator Details

#### Intent/Rationale:

Gini coefficient will help us to assess the income inequality of the urban population.

#### Formula:

Calculated using Lorenz curve

Numerator: area Between the Lorenz curve of the distribution and the uniform distribution line

Denominator: area under the uniform distribution line

**Unit:** Score

**Level:** Secondary; Aspirational

**Type:** Non-spatial

### Performance Evaluation

#### Threshold

[Descriptive Indicator]

#### Benchmark

[Descriptive Indicator]

#### Scoring Range

No Scoring Range as the Indicator is Descriptive

### Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update
Gini Coefficient	Score	EOLI reporting	Annual

### Reference

Source Framework	SDG Indicator	Other Frameworks
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EOLI (2.3.1)	NA	GPSC
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## Indicator 12.16

Percentage of workforce employed in the service sector (%)

### Sub Theme

Economy

### Indicator Details

#### Intent/Rationale:

Service sector remains the primary source for workforce employment in the urban areas and it has a major role in urban revitalization.

#### Formula:

$[\text{Workers employed in the service sector} / \text{Total workforce}] * 100$

**Unit:** Percentage (%)

**Level:** Secondary; Aspirational

**Type:** Non-spatial

### Performance Evaluation

#### Threshold

[Descriptive Indicator]

#### Benchmark

[Descriptive Indicator]

#### Scoring Range

No Scoring Range as the Indicator is Descriptive

### Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update
Workers employed in the service sector	Number	State Department/Directorate of Economics and Statistics	Annual
Total workforce	Number	State Department/Directorate of Economics and Statistics	Annual

## Reference

Source Framework	SDG Indicator	Other Frameworks
GPSC	NA	NA

## Indicator 12.17

Total capital expenditure as percentage of total expenditure (%)

### Sub Theme

Finance

### Indicator Details

#### Intent/Rationale:

Financing capital investments in urban budgets is a challenge as the rewards are spread over a period where as cost is immediate. However urban development calls for capital investment in many areas. A capital plan provides a link between the municipality's strategic vision, its urban land use plan, and its annual budget<sup>91</sup>.

#### Formula:

$[\text{Capital expenditure} / \text{Total expenditure}] * 100$

**Unit:** Percentage (%)

**Level:** Tertiary

**Type:** Non-spatial

### Performance Evaluation

#### Threshold

10%

Determined after multiple rounds of consultations with sector experts

#### Benchmark

40%

Determined after multiple rounds of consultations with sector experts

#### Scoring Range

0(Very low performance)	1(Low performance)	2(Lower medium performance)	3(Medium performance)	4(Upper medium performance)	5(High performance)	6(Excellent performance)
<10%	10%-15.9%	16%-21.9%	22%-27.9%	28%-33.9%	34%-39.9%	>=40%

<sup>91</sup> <https://urban-regeneration.worldbank.org/node/12>

## Data Availability

<b>Input variable</b>	<b>Unit</b>	<b>Tentative data source</b>	<b>Suggested interval for data update</b>
Capital expenditure	INR in Lakhs	MPI reporting	Annual
Total expenditure	INR in Lakhs	MPI reporting	Annual

## Reference

<b>Source Framework</b>	<b>SDG Indicator</b>	<b>Other Frameworks</b>
MPI (2.2.3)	NA	NA

## Indicator 12.18

GDP density as a percentage of the built-up area of the local government (INR per Sqkm)

### Sub Theme

Economy

### Indicator Details

#### Intent/Rationale:

GDP density is the measure of economic activity by area. It is expressed as GDP per square kilometre and can be calculated by multiplying GDP per capita of an area by the population density of that area. Amongst other uses it demonstrates the effects of geography on economy. The indicator measures contribution of built-up area to the economic geography

#### Formula:

$[GDP \text{ (Price deflated)}] / [\text{Total Built-up area within the city}]$

**Unit:** INR per Sqkm

**Level:** Tertiary; Aspirational

**Type:** Non-spatial

### Performance Evaluation

#### Threshold

[Descriptive Indicator]

#### Benchmark

[Descriptive Indicator]

#### Scoring Range

No Scoring Range as the Indicator is Descriptive

### Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update
GDP (Price deflated)	INR	State Department/Directorate of Economics and Statistics	Annual
Total Built-up area within the city	Square Kilometres	GIS database/Town Planning Department	Annual

## Reference

Source Framework	SDG Indicator	Other Frameworks
GPSC	NA	NA

## Indicator 12.19

Informal employment as percentage of total employment (%)

### Sub Theme

Economy

### Indicator Details

#### Intent/Rationale:

In a sustainable city, individuals can access diverse livelihood and employment opportunities to accrue personal savings that will support their development in ordinary times and their survival in times of crisis. Most of the jobs in the urban areas are in informal economy. Developing basic infrastructure services, rolling out inclusive policies, urban planning and land allocation for street vendors would strengthen the contribution of informal economy and reduce urban poverty.<sup>92</sup>

#### Formula:

$[\text{Workforce without any social insurance} / \text{Total workforce}] * 100$

**Unit:** Percentage (%)

**Level:** Tertiary; Aspirational

**Type:** Non-spatial

### Performance Evaluation

#### Threshold

[Descriptive Indicator]

#### Benchmark

[Descriptive Indicator]

#### Scoring Range

No Scoring Range as the Indicator is Descriptive

### Data Availability

Input variable	Unit	Tentative data source	Suggested interval for data update
Workforce without any social insurance	Number	Primary surveys/PLFS (only	Annual

<sup>92</sup> <https://www.wri.org/wri-citiesforall/publication/including-the-excluded>

		for million plus cities)	
Total workforce	Number	Primary surveys/PLFS (only for million plus cities)	Annual

## Reference

Source Framework	SDG Indicator	Other Frameworks
CPI (3.3)	NA	ESCI (M.2)

## Annexure A: List of Assessment Frameworks

After a detailed assessment of all the shortlisted frameworks to determine the indicators for USAF, each framework was classified in terms of degree of its importance. This step was based on the analysis of the frameworks on the following characteristics:

- Comprehensive coverage across different sectors
- Clarity of indicators with data source
- Feasibility in terms of data availability
- Quantitative and/or qualitative analysis
- Includes spatial analysis
- Links/references to other assessment frameworks
- Applied in other cities

GPSC, National Indicator Framework and SS 2020 (for WASH) were categorised as the the frameworks to be prioritised over the rest of them. Table 2 details out how each framework faired on the above listed conditions. The structured assessment was recorded by filling cells green, yellow or red depending on whether the framework met (green), met with reservations (yellow) or did not meet (red) the desired qualities.

**Table 2 Detailed analysis of shortlisted frameworks**

NAME OF METHODOLOGY	1. Comprehensive coverage across different sectors	2. Clarity of indicators with data source	3. Feasibility in terms of data availability	4. Quantitative and/or qualitative analysis	5. Includes spatial analysis	6. Links/references to other assessment frameworks	7. Applied in other cities?
<b>INTERNATIONAL FRAMEWORKS</b>							
Global Platform for Sustainable Cities (GPSC): Urban Sustainability Framework	Most comprehensive list of indicators	Lists a menu of indicators, not all are applicable to all cities		Quantitative in nature	Weak in spatial elements/links	Builds on EBRD, CPI, ISO	Addis Abba (Diagnosis and Priority Actions)
City Resilience Action Planning (CityRAP)	Specific to disaster preparedness	Somewhat subjective		Indicators are qualitative	Includes spatial elements	Progressive evolution of CityRAP framework	Applied mostly in East Africa
City Resilience Profiling Tool (CRPT)	Emphasis on connecting local government and stakeholder groups around common projects	Indicators could be interpreted differently by different cities		Indicators are qualitative	Access to services and facilities is a focus; Does include some spatial elements	Non indicator based mapping/review/assessment	Asuncion (Paraguay), Barcelona (Spain), Dakar (Senegal), Maputo (Mozambique), Port Vila (Vanuatu), Yakutsk (Russia)
City Prosperity Index (CPI) - Methodology + Metadata	Fairly comprehensive; Weak in basic services assessment	Tentative sources listed for each indicator within document		Quantitative in nature	Few spatial indicators	Indicators of Sustainable Development: Guidelines and Methodologies, World Development Indicators	Addis Ababa, Multiple Mexican states, Bogota, Saudi Arabian Cities, Quito, Panama City, Lima, Fortaleza
Emerging and Sustainable Cities Initiative (ESCI)	Fairly comprehensive	Somewhat subjective		Quantitative in nature	Includes a socio-spatial element/links	No direct linkage	Mainly Latin American countries
City Strength Resilient Cities Program: Methodological Guidebook	Focus on resilience	Somewhat subjective		Mostly qualitative	Includes a socio-spatial element/links	No direct linkage	
<b>NATIONAL FRAMEWORKS</b>							
National Indicator Framework (Goal 11 and related indicators)	Most comprehensive framework; Official monitoring framework for tracking the progress made towards achieving SDGs at the national level.	Refers to concerned ministries as data source. At city level, data source would be local bodies/departments	Indicators are defined at national/state level	Quantitative in nature	Few spatial indicators	Implementation of SDGs in India	Indicators are defined at national/state level
Swachh Survekshan 2020 Survey Toolkit	Focus on Waste Management; Emphasis on collecting validating data through document check, physical audit and citizen perception survey	Each Indicator has: Unique Marks appointed, Why - Detailed explanation of the indicator and its intent, details required for supporting progress claimed (list), Marks-breakdown scoring for service provided, and its coverage (Data source is not mentioned)	4000+ Cities in India	Both quantitative and qualitative	Direct Observation at random locations to validate claims	No direct linkage	4000+ Cities in India
Municipal Performance Index	MPI is designed to assess the service delivery mechanism of municipalities. Covers major service mandates and financial and governance components of municipalities. Doesn't cover any information about social status of the city	Indicators are clearly defined. All information is sourced from municipalities. Each indicator: Expression (formula), Unit (score, ratio and desirable 'utopia', percentage), City Data Source(s), Validation Data Source, Scoring, SDG Mapping.	All smart cities and other million plus population cities	Quantitative in nature	Does not refer to any intra city variation	Linked to Ease of Living Index	Implemented in Smart cities and million plus population cities
Ease of Living Index	Covers wide range of sectors to assess citizen's QoL, Economic ability and sustainability to assess the progress made in cities, and compare them to global and national benchmarks.	Clearly defined with each indicator having: Expression (formula), Unit (score, ratio and desirable 'utopia', percentage), City Data Source(s), Validation Data Source, Scoring, SDG Mapping	All smart cities and other million plus population cities	All indicators are designed to be quantitative. Citizen Perception survey uses 3 point Likert scale to rate affordability, accessibility and quality	Does not refer to any intra city variation	Linked to Municipal Performance Index and SS2020	Implemented in Smart cities and million plus population cities
Climate SCAF	Concentrates on selected sectors for developing an urban climate action plan	Indicators are coherently defined; Rationale for each indicator. Responsible agency/department mentioned for all indicators	All smart cities and other million plus population cities	For indicators for which cannot be quantified, are measured by levels of progression (score 0 to 40)	Does not refer to any intra city variation	Meant to be an addition to the EOLI and SS survey	Designed for all smart cities, million plus population cities
Multi-dimensional Prosperity Index	Focuses on infrastructure (physical and financial infrastructure, health and educational infrastructure), housing and amenities and community assets	Tangible indicators, referred data sources - Census and NSS and MoUD reports	Most referred to data source is Census	Quantitative in nature	Does not refer to any intra city variation	No direct linkage	Phase 1: 20 SMART cities

## Annexure B.1: Illustration of Implementation of Spatial Indicators in QGIS

### Steps in Q-GIS to create 1500m Walk sheds

To be able to run the analysis we will need a list of input layers

1. Hospitals & Clinics (Point data in Projected CRS)
2. Road Network (Line data in Projected CRS).

To perform the analysis the road network file must be checked for any topological errors and rectified accordingly, Now the network is ready for analysis. To create the walksheds, we need to open the “Iso-Area as polygon (from layer)” from the QNET3 toolbox and load the road network and the layer with point information on hospitals and clinics and then do the variable setting as mentioned in the following table. After configuring this setting, click run.

Variable	Setting	Description
Size of Iso – Area (distance or time Value)	1500	This value that will define the distance in meters
Default direction	Both directions	as we are calculating the service area for walkability, we can set the direction parameter to both directions, if the travel time is calculated rest all advance parameters must be filled with respective fields
Default Speed	5	As average walking speed is 5 km/h

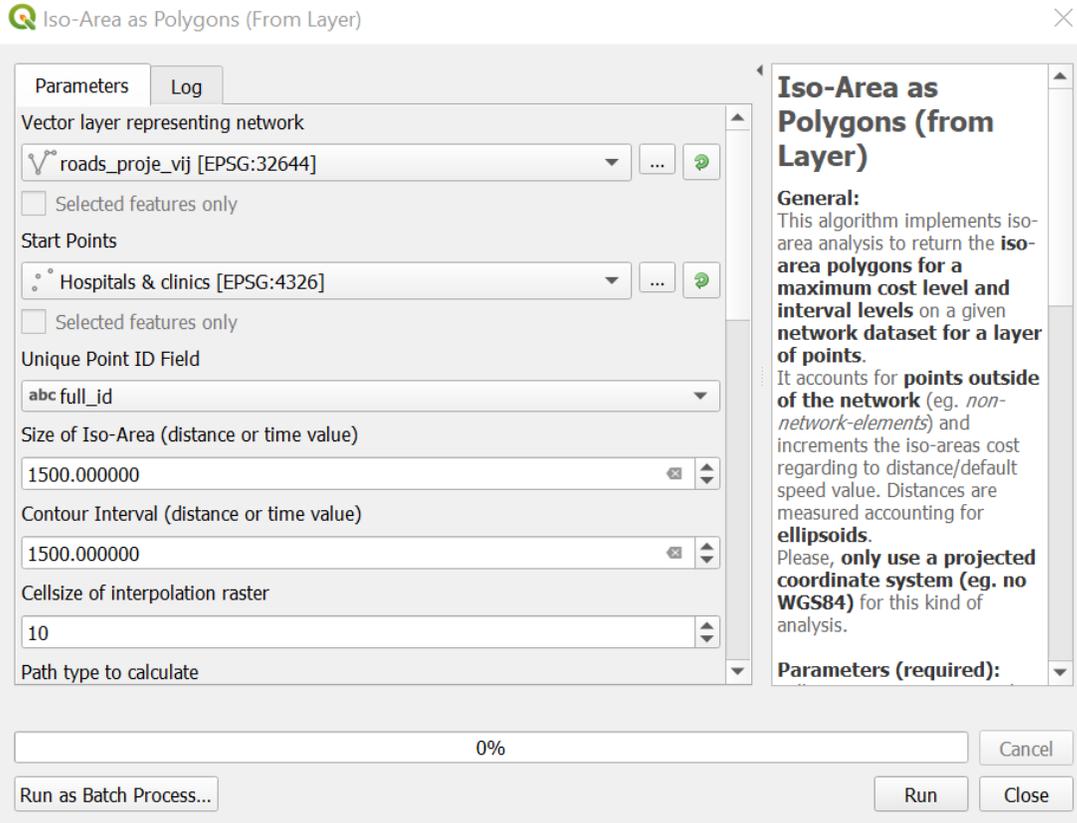


Figure 4: ISO area tool settings

The outcome gives a buffer of 1500m radius from all points, but in a few places, there might be some buffers/polygons which would have covered more than 1500m distance. To rectify we need to run a similar analysis on the “service area(from layer)” tool from the network analyst toolbox and load the road network layer into the first blank and hospitals layer in the blank mentioned as start points. The outcome gives the 1500 m road network from all hospital points.

Variable	Setting	Description
Path type to calculate	Shortest	To calculate the distance from the points of given distance on the network in all directions
Travel cost	1500	This value that will define the distance in meters
Default direction	Both directions	as we are calculating the service area for walkability, we can set the direction parameter to both directions, if the travel time

		is calculated rest all advance parameters must be filled with respective fields
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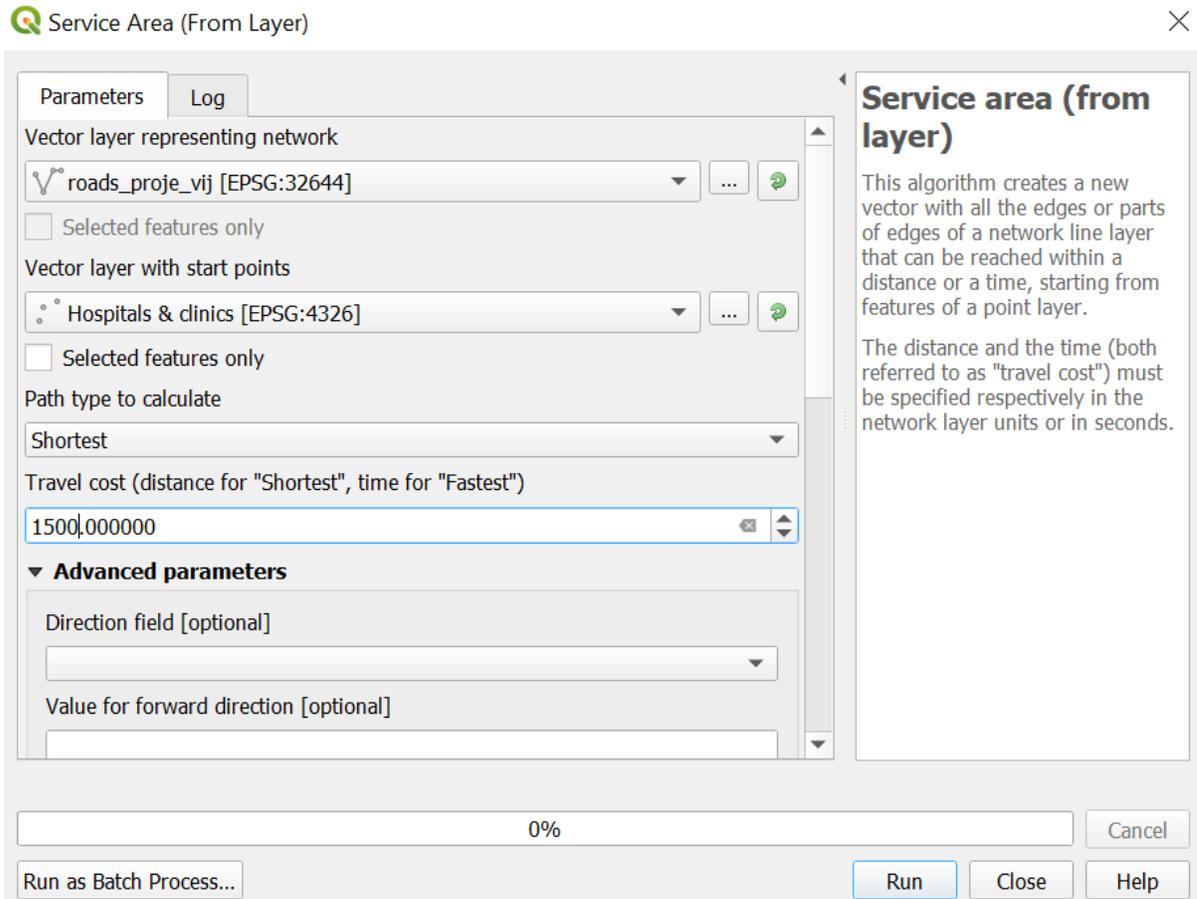


Figure 5: Service area analysis settings

Now compare both the results and edit the polygons from the QNET tool as per the network analyst tool.

### Calculating population in the 1500m walkshed

Now that we have the 1500m walking accessibility from hospitals & clinics and the population distribution grid at 250m resolution from the Global Human settlements (GHSL) database<sup>93</sup>, we can estimate the number of people residing within the 1500m accessing polygons<sup>94</sup>.

<sup>93</sup> [https://ghsl.jrc.ec.europa.eu/ghs\\_pop2019.php](https://ghsl.jrc.ec.europa.eu/ghs_pop2019.php)

<sup>94</sup> The analysis in this draft of USAF is for the given population density in the year 2015.

To do this we need to choose the “Select by location” from the vector selection toolbox and set the following settings

Variable	Setting	Description
Select features from	Load population density 2015 file	The polygons from this layer will be selected
Where the features (Geometric Predicate)	Intersect	helps make the selections based on the intersection with 1500m walkshed
By comparing to the features from	1500m walkshed	

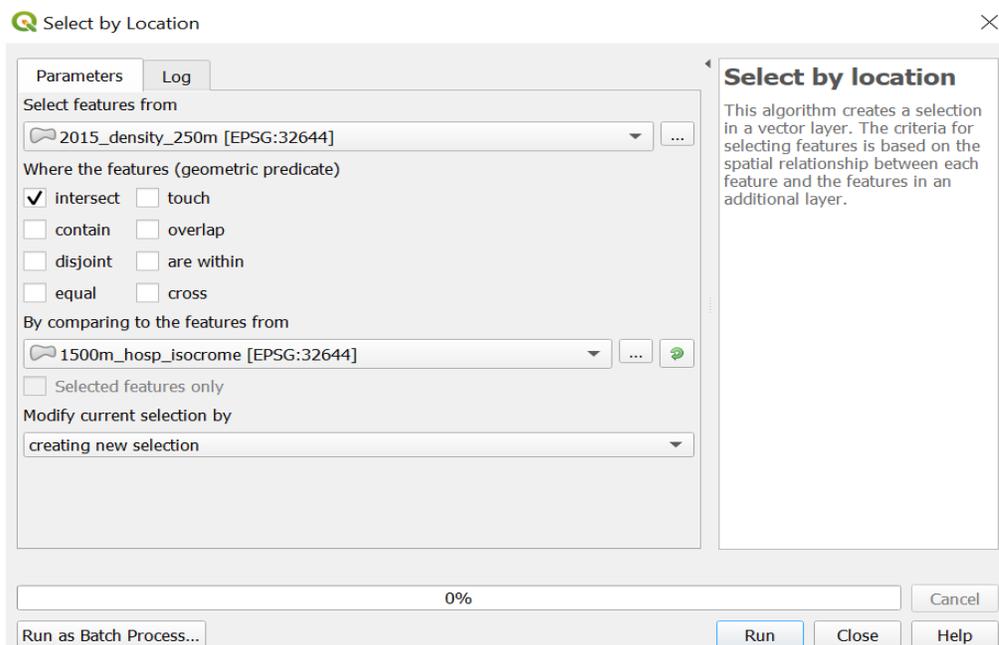


Figure 6: Selection by location tool settings

Select the run option. All the polygons intersecting the 1500m walkshed will be selected, deselect the polygons with less than ¼ overlap with the walkshed by manually eyeballing

the layers. Lastly, open the statistics tab and select the population density layer and the layer in which population data is available and check the “Selected features only” option.

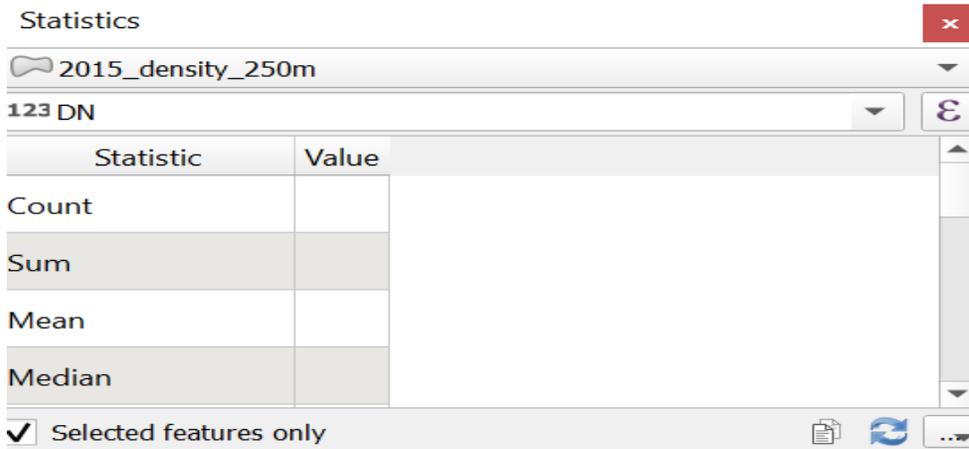


Figure 7 : Statistical tool settings

The result is the population who have access to hospitals and clinics within a walking distance of 1500m.

## B.2 Link to QGIS tutorials (UN-Habitat workshops and others available online)

1. Workshop: Introductory Session for GIS Training under the Sustainable Cities Integrated Approach Pilot (SCIAP) - A joint training session by UN-Habitat and NIUA for all five SCIAP project cities on 18 March 2021.  
Link: <https://youtu.be/3t4MG6UIMX4>
2. Workshop: Application of USAF's Spatial Indicators using the QGIS platform on 06 April 2021.  
Link: <https://youtu.be/8KqfVakyfk8>
3. Other QGIS tutorials
  - a. [https://www.qgistutorials.com/en/docs/3/service\\_area\\_analysis.html](https://www.qgistutorials.com/en/docs/3/service_area_analysis.html)
  - b. <https://www.youtube.com/watch?v=NHolzMgaqwE&t=1s>