UN HABITAT
FOR A BETTER URBAN FUTURE

The Global Urban Monitoring Framework

A Guide for urban monitoring of SDGs and NUA and other urban-related thematic or local, national and global frameworks

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UN-HABITAT
FOR A BETTER URBAN FUTURE

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Domains, City Objectives, & Indicators of the UMF 37

Acronyms and Abbreviations

AES	Adult Education Survey
CDIS	Culture for Development Indicators
CEDAW	Convention on the Elimination of All Forms of Discrimination against Women
CPI	City Prosperity Initiative/City Prosperity Index
CRING	Country Reporting on Indicators for Goals
CSO	Civil Society Organizations
CVS	Crime Victimization Surveys
DHS	Demographic and Health Surveys
DMC	Domestic Material Consumption
DRR	Disaster risk reduction
ECLAC	United Nations Economic Commission for Latin America and the Caribbean
EU-SILC	European Union Statistics on Income and Living Condition
FUA	Functional Urban Area
GBD	Global Burden of Disease
GBV	Gender-based Violence
GIS	Geographic Information System
GNI	Gross National Income
GTFS	General Transit Feed Specification
HIES	Household Income Expenditure Survey
HLPF	High-Level Political Forum
IAEG-GS	Inter-Agency and Expert Group on Gender Statistics
IBE	International Bureau of Education
ICATUS	International Classification of. Activities for Time Use Statistics
ICCS	International Classification of Crime for Statistical Purposes
ICLS	International Conference of Labour Statisticians
IGES	Institute for Global Environmental Strategies
IPUMS	Integrated Public Use Microdata Series
ISCED	International Standard Classification of Education
ITU	International Telecommunication Union
IUCN	International Union for Conservation of Nature
JMP	Joint Monitoring Programme for Water Supply, Sanitation and Hygiene
LFS	Labour Force Survey
LSMS	Living Standards Measurement Study
MDGs	Millennium Development Goals
MICS	Multiple Indicator Cluster Surveys
MSW	Municipal Solid Waste
NCDs	Non-communicable diseases
NEET	(Youth) Not in Education, Employment or Training
NSO	National Statistics Office

NUA	New Urban Agenda
NUP	National Urban Policy
OECD	Organization for Economic Co-operation and Development
OIEWG	Open-Ended Intergovernmental Expert Working Group
OSM	Open Street Map
SIMPOC	Statistical Information and Monitoring Programme on Child Labour
SNA	United Nations System of National Accounts
STMA	Standard Material Transfer Agreement
UIS	UNESCO Institute for Statistics
UNDESA	United Nations Department of Economic and Social Affairs
UNECA	United Nations Economic Commission for Africa
UNECE	United Nations Economic Commission for Europe
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
UNIDO	United Nations Industrial Development Organization
UNISDR	United Nations Office for Disaster Risk Reduction
UNSD	United Nations Statistics Division
UWWTPs	Urban Wastewater Treatment Plants
VLR	Voluntary Local Review
VNR	Voluntary National Review
WASH	Water, Sanitation, and Hygiene
WHO	World Health Organization
WVS	World Values Survey

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Cities play a crucial role of forging new linkages among actors and offer innovative solutions that have the potential to be included in national agendas with greater possibilities of influencing regional and global development

UN-Habitat (2012)
State of the World's Cities Report 2012: Prosperity of Cities

A view of Izmir at night © Namik Ugur/ World Bank

Introduction

Background

Cities are home to more than half of the world's 7.9 (approx.) billion people. Current urbanization trends indicate that an additional three billion people will be living in cities by 2050, increasing the urban share of the world's population to two-thirds[1]. More cities are identified as the locus for change and the venue where policies and actions are mobilized. Cities play a crucial role of forging new linkages among actors and offer innovative solutions that have the potential to be included in national agendas with greater possibilities of influencing regional and global development[2]. Cities have been catalysts of productivity, creating innovative solutions and institutional arrangements that contribute to the enhancement of equity, social inclusion and quality of life.

However, poor planning, the absence of effective governance and legal frameworks, fragile institutions, low capacity of local authorities and the lack of a sound monitoring mechanism diminish the possibility to promote integrated and long-term sustainable urban development. Indeed, a large share of cities often formulate policies and action plans without relying on clear evidence and information. Despite considerable progress in recent years, still whole groups of people and places are not being counted and important aspects of people's lives and city conditions are not properly measured in cities due to this inherent lack of evidence-based planning and programming. For people, this can lead to the denial of basic rights, and for the city, the likelihood that they do not take full advantage of the transformative potential of urbanization to achieve better impacts.

In response to the evidence that cities don't often use evidence or lack adequate, reliable and timely data, numerous organizations have developed different indexes to measure the prosperity of cities (UN-Habitat City Prosperity Index; Prosperity Index by the Regional Research Institute; Legatum Prosperity Index; Redefining Prosperity by the UN Sustainable Development Commission); the sustainability of cities (European Union, UK; Sustainability City Index by Arcadis; Sustainability Index by the I-ADB); the performance and creativity of cities (Creative City Index by Charles Landry; cities' creative performance by MDPI; Innovation Cities Index by 2thinknow; culture for development indicators UNESCO).

Current urbanization trends indicate that an additional three billion people will be living in cities by 2050, increasing the urban share of the world's population to two-thirds

1 Aromar R., Rosenzweig C. (2013) The Urban Opportunity: Enabling Transformative and Sustainable Development, Background Research paper Submitted to the High-Level Panel on the Post-2015 Development Agenda.

2 UN-Habitat (2012), State of the World's Cities Report 2012: Prosperity of Cities.

Similarly, there are a series of indexes and indicators tools focused on the environmental sustainability of cities, such as Ecological Footprint; Environmental Sustainability Index; the Dashboard of Sustainability; Environmental Vulnerability Index; the environmental policy index; Living Planet Index; Environmentally adjusted Domestic Product.

Many other applications and composite index that combine multivariate indicators responded to the notion of Smart Cities, particularly ITU-T Smart Sustainable Cities; MD World Competitiveness Center; Smart City Observatory; the Global liveable and Smart Cities Index from Singapore; and the Smart City Strategy Index by Roland Berger, to name just a few. Some other indexes are sectoral in nature, responding to crime (Crime City Index), health (Urban Health Index from Georgia State University), poverty (Multi-Dimensional Poverty Index), etc.

All these indexes and measurement tools have their merits, advantages, and limitations. Some provide a focused or thematic regard of the city, others a more integrated view, and still others a national perspective of development. These tools allow city planners, city managers and policymakers to gauge general city conditions, or elements such as the socio-economic, environmental impact or competitiveness of the city. In general terms, they allow for the diagnosis of single thematic challenges and opportunities with limited integrations, and thus the identification of areas that would profit from being addressed through policies and specific actions, good governance, and science-based responses. They also allow cities to monitor the success and impact of sustainability interventions but with limited analysis on the interconnections. They can be useful to guide policymaking or in some cases provide misleading policy messages. They can also be quite accurate or involve subjective judgments. The information they provide can attract public and stake holder interest, or on the contrary, hide more of what they reveal. They can serve to identify common trends and complex issues, or to ratify specific ideas and already-taken decisions.

However, given the complexities of the issues at play in cities today, a more integrated approach to the assessment, and analysis of the city challenges and opportunities is preferred.

These tools allow city planners, city managers and policymakers to gauge general city conditions, or elements such as the socio-economic, environmental impact or competitiveness of the city

Why a Global Urban Monitoring Framework

Urbanization calls for evidence-based policies, action plans and programs in cities for them to achieve their full potential. In 2018, the UN Secretary General convened a meeting of UN principals and tabled a discussion on urban issues and sustainable development which resulted in the Secretary General's proclamation that urbanization is no longer confined to one UN agency, but a system approach is necessary.[3] Due to the inherent interlinkages of the SDGs, four main areas of change were identified as key if sustainable urban development is to be achieved. This formed the basis of the United Nations system wide strategy on urban development:

a. Eradication of poverty and reduction of spatial inequality,
b. Advancing prosperity and bringing about economic transformation,
c. Promoting climate action and environmental sustainability and,
d. Prevention of urban crises and ensuring effective recovery in urban settings.

This strategy provides for an accelerate approach to work with the New Urban Agenda (NUA) as a key driver for achieving the urban dimensions of the SDGs. It also offers an opportunity to unpack the NUA and make it more available as a tool for Member States and other UN agencies to speed up the implementation of the SDGs, Paris Agreement for Climate Change, Sendai Framework for Disaster Risk Reduction and other urban related global and national frameworks. Some key areas for broader implementation include a) National Urban Policies b) How to strengthen the relationship between central and local governments c) Inclusive urban planning and d) Urban economy and finance.

In 2019 UN-Habitat and various stakeholders formally requested the United Nations Statistics Commission to consider approving and using a single monitoring framework for the urban dimensions of the SDGs and NUA targets. Also, during the 36th session[4] of the UN Executive board, UN-Habitat was tasked to lead the consultation process towards a UN System-wide strategy on sustainable urban development and the resulting document recognized the need for a UN System-wide approach to urban data management that would align to the protocols of data sharing and comparability at the global level.

3 https://unhabitat.org/sites/default/files/documents/2019-07/un-system-wide-strategy-on-sustainable-urban-development-1.pdf

4 https://unhabitat.org/sites/default/files/documents/2019-07/un-system-wide-strategy-on-sustainable-urban-development-1.pdf

In July 2020, UN-Habitat and various partners including the City Council of Madrid convened an Expert Group Meeting (EGM) in response to the request made by the United Nations Statistical Commission to UN-Habitat to work towards a more effective coordination mechanism for the work on human settlements statistics at the international level. The EGM was attended by representatives from Member States, UN agencies, private sector, civil society organizations, local governments, and academia. The EGM considered guiding principles for developing a Global Urban Monitoring Framework (UMF). The EGM endorsed the constitution of a Task Team for the creation of this Global Urban Monitoring Framework. The purpose of the Task Team was to review the guidelines and principles for the implementation of the City Prosperity index (CPI) **as a global urban monitoring mechanism**[5,6] by assessing existing indexes and indicators for city monitoring, scanning of present and future needs of urban data users through the lens of SDGs and NUA, and develop conceptual and analytical urban/city indicators framework development.

This UMF harmonizes existing urban indexes and tools, and offers a universal framework that will be used to measure the urban SDGs and the NUA. It also serves as a monitoring tool for the UN-Habitat Flagship Programme *SDG Cities,* supports the UN-system wide framework's mandate on the implementation of the urban SDGs and aligns with Member States' search for greater coherence to measure progress and report on the urban dimensions of the SDGs. It also addresses the economic, social, and environmental dimensions of sustainable urban development, including a rural urban interlinkage ensuring no one is left behind. Finally, the UMF framework is a useful tool for the preparation of Voluntary Local Reviews (VLRs) and the preparation of urban data for the Common Country Assessments with the UN Country Teams.

This UMF harmonizes existing urban indexes and tools, and offers a universal framework that will be used to measure the urban SDGs and the NUA

5 https://unstats.un.org/unsd/statcom/50th-session/documents/2019-18-HumanSettlements-E.pdf

6 https://unstats.un.org/unsd/statcom/50th-session/documents/Report-on-the-50th-session-of-the-statistical-commission-E.pdf (decision 50/118).

CHART

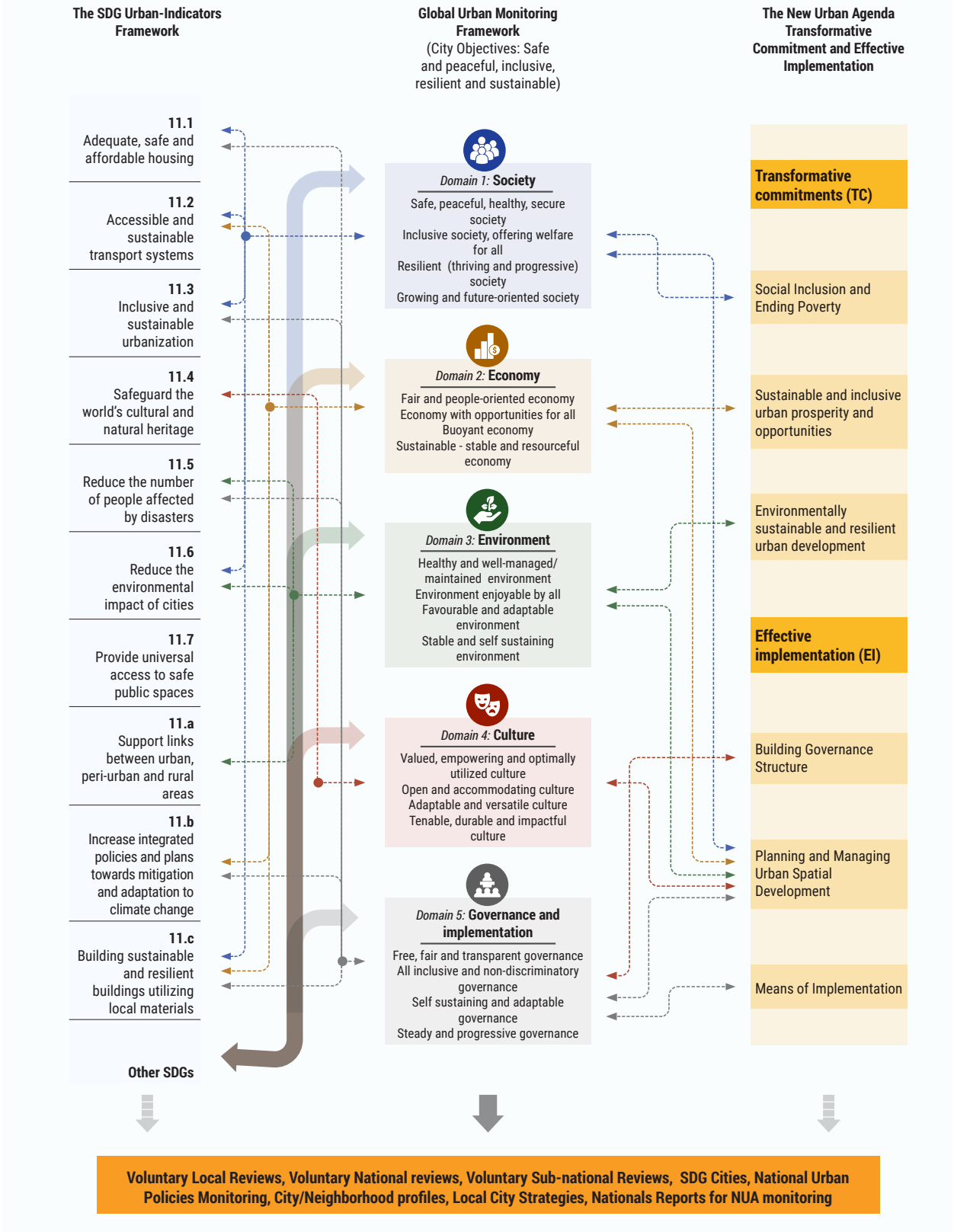


Chart: Relationship between UMF, VLR, SDG cities and other urban monitoring and development frameworks

Objective of the Global Urban Monitoring Framework

Drawing together the outcomes from the EGM and Task Team discussions, the Global urban monitoring framework (UMF) objective, which has guided its development and should guide its implementation, is:

"An efficient, effective and harmonized framework to monitor the transformation towards a more sustainable, inclusive, safe and resilient urban area."

- **Efficient** – that is the UMF should not be a burden on cities, many of which will have limited (albeit improving) data collection and analytics capacity and many other competing demands on resources.
- **Effective** – that is, the UMF should be able to assist cities to track how they are progressing in their efforts to meet the SDGs, particularly, but not exclusively SDG11, as well as the NUA commitments. So, for example, measuring an indicator should produce actionable information for making policy or investment decisions.
- **Harmonized** – this refers to the essential requirement to ensure data is comparable. To achieve this requires an accepted definition of an urban area and agreement on the type of data to be collected.

Moreover, the monitoring should be undertaken in the context of achievement of the six transformative commitments of the New Urban Agenda and, at the least, the objectives of the core goal of SDG11. However, as cities are increasingly the dominant form of settlement, they are central to all SDG targets' achievement. So, the UMF must assist in measuring some aspects of SDGs other than SDG11.

"An efficient, effective and harmonized framework to monitor the transformation towards a more sustainable, inclusive, safe and resilient urban area."

An over view of Slum Houses in Port-Au-Prince, Haiti © Julius Mwelu /UN-Habitat

An over view of Slum Houses in Port-Au-Prince, Haiti © Julius Mwelu / UN-Habitat

The Global Urban Monitoring Framework Structure

The NUA Commitments and SDG 11 Objectives

The NUA includes transformative commitments to sustainable development. These are:

- Sustainable urban development for social inclusion and ending poverty.
- Sustainable and inclusive urban prosperity for all.
- Environmentally sustainable and resilient development.

There are also three categories of effective implementation of the NUA that should also be reported on:

- Building governance structures.
- Planning and managing urban spatial development.
- The means of implementation.

These NUA commitments form the basis of the UMF, supporting its design and the selection criteria for indicators. SDG11 is at the core of the UMF, although it should not necessarily define the limit of targets or objectives that may be monitored.

The SDG11 seeks to ***'Make cities and human settlements inclusive, safe, resilient, and sustainable'.***

Within this goal, there are four critical objectives that cities seek: to be safe, inclusive, resilient, and sustainable. With the minor adjustment to include 'safe and peaceful', rather than just 'safe', these are the scales upon which the city's development is measured in the UMF.

Contributing to monitoring critical areas

At the same time, the UMF needs to contribute to the UN agenda for sustainable development and its focus on five critical areas and other key urban priorities. While it may comprise a discrete matrix of monitoring objectives, cities can draw from it to measure themes effectively creating a 'third dimension' for the UMF.

The urban system domains

The Task Team members acknowledged that cities are complex systems and that the different domains of urban systems are not self-contained. They are connected through multiple cause and effect relationships. In some respects, it is unproductive to think of cities as a set of separate domains, including when monitoring city development. However, the Task Team also recognized that some form of simple organizational structure must make the UMF manageable and comprehensible to users.

The recommendation was to build the UMF around a simple and useful structure that has broad recognition. The various existing urban monitoring frameworks (both commercial and public) adopt different types

The SDG11 seeks to 'Make cities and human settlements inclusive, safe, resilient, and sustainable'.

of structures for this. However, most can trace their lineage back to the three domains that are used to define most human systems: 'society', 'economy' and 'environment'.

For simplicity, the EGM and the Task Team agreed to adopting the three domains of society, economy and environment. However, further discussions acknowledged the unique features of two other domains that required separate monitoring: i.e., the cultural domain and governance, particularly the capacity of cities to implement the UMF and respond to its UMF outputs.

To that end, the three original domains were expanded to include

- **Culture**. This is due to its fundamental importance to human wellbeing and resilience.
- **Governance and Implementation**[7] to allow for the monitoring of the systems of decision-making that supports implementation of the UMF and use its outputs.

To offset the 'compartmentalization' of cities into these domains, it was stressed by various partners that there are important links between different domains, different systems, and different areas (e.g., rural to urban). Consequently, indicators should be chosen to capture this complexity (note that SDG Target 11a makes explicit reference to this). For example, indicators that measure food security or travel to work distances can shed light on the way an urban area interacts with the rural hinterland, measuring aspects of several dimensions (in this case, land-use change as growing urban areas draw on rural resources for food, water etc.; health; transport; and poverty).

These relationships can be captured in various urban dimensions and developing their system of metrics requires consideration of the cause-and-effect relationships between different urban systems. To ensure this feature becomes part of the UMF, it was proposed that, as indicators were selected, they were interrogated (and subsequently described) for their capacity to measure several features of urban areas or indirect effects. From this, it may be possible to derive a suite of thematic indices. For example, a 'health' index may be derived by selecting indicators from across the UMF matrix.

The city objectives

The Task Team noted that the UMF should not solely focus on SDG11 but rather the whole set of urban dimensions of the SDGs. With Goal 11 having its implicit objective around being safer, more inclusive, more resilient, and more sustainable, these objectives cover a useful spectrum for any city and its systems.

Although prosperity was also suggested as another significant, well-understood and potentially discrete objective (i.e., development to create a more prosperous city), it was not included in the proposed foundation structure. There were three primary reasons for this:

- With SDG11 the foundation for the UMF, it makes organizational sense to retain the four objectives written into SDG11.
- Prosperity is implicit in many of the other objectives. Consider a safer and more peaceful city has a people-centric meaning in that it relates to making the city safe for anyone to live, work and recreate, regardless of age, gender, ethnicity, or religion. It also has a commercial meaning. A safe city will have robust institutions, infrastructure and legal frameworks that generate confidence in commercial activity and, consequently, facilitate personal and business prosperity.
- The UMF is designed to encourage cities to explore topics they are particularly interested in via indices that extract information from the UMF, or through subject matter specialized frameworks. The City Prosperity Index (CPI), for example, is a standalone framework focused on prosperity. The CPI reflects a very broad definition of prosperity: one that cannot be comprehensively captured in the UMF if the UMF is to be a lean and efficient monitoring tool.

Monitoring all five of the UN's critical areas for sustainable development (the pillars or '5 Ps' of People, Peace, Prosperity, Planet and Partnerships) can be carried out by drawing relevant indicators from the UMF into a separate index.

7 The term 'governance' is supplemented with 'implementation' to align it with the NUA nomenclature and to emphasize this domain relates to both the administrative and operational aspects of both running cities and running the UMF.

The Foundational Structure of the UMF

The basic, foundational structure of the UMF – its matrix - is shown in Figure 1.

For the UMF, each cell defines an 'attribute' of a city which needs to be measured. For example, a 'safe and peaceful society', 'resilient economy and 'inclusive culture'. The UMF will, then, have up to 20 attributes to monitor. Each attribute will require some minimum number of indicators to be effective.

Moreover, as with the '5 P' pillars, each attribute can contribute indicators to the measurement of unique, subject matter specific features that may cut across several domains or objectives. For example, assuming the UNICEF recommended child wellbeing indicators are included, these may appear across numerous attributes but can be compiled into a single index for measuring that urban feature (Figure 1).

FIGURE 1: Matrix of Domains and Objectives

Domains	City Objectives			
	Safe & Peaceful	Inclusive	Resilient	Sustainable
Society	X	X	X	X
Economy	X	X	X	X
Environment	X	X	X	X
Culture	X	X	X	X
Governance and Implementation	X	X	X	X

Indicators from several attributes can be combined to measure different subject matter specific features.

FIGURE 2: Creating Subject Matter Indices

Domains	City Objectives			
	Safe & Peaceful	Inclusive	Resilient	Sustainable
Society	A1, A2, A3, A4, A5	B1	C1, C2, C3, C4	D1, D2, D3, D4, D5, D6
Economy	E1, E2, E3, E4, E5	F1, F2, F3, F4	G1, G2	H1
Environment	I1, I2, I3, I4	J1, J2, J3, J4, J5	K1, K2, K3, K4	I1, I2
Culture	M1, M2, M3	N1	O1, O2, O3, O4, O5, O6	P1, P2, P3, P4
Governance and Implementation	Q1, Q2	R1, R2	S1	T1, T2, T3, T4, T5

Indicators from several attributes can be combined to measure different subject matter specific features.

PROSPERITY
(E.G) A1, E5, G3, M3, N1

Defining the boundary within an 'attribute'

It is important to note that, with this structure, it is still possible for a broad definition of each attribute. For example, 'Safe & Peaceful Society' can refer to many dimensions of safety: from those relating to crime and physical harm, to features such as access to safe drinking water, or protection from conflict.

This degree of flexibility is useful as it will allow different cities (with their different priorities) to adapt the UMF to their needs. However, it also means a solution will be required for selecting indicators to measure the attribute and identifying what aspect (or theme) of that attribute is being measured.

Ensuring a comparable and sound city definition

The collection of harmonised indicators for cities, urban and rural areas requires harmonised definitions for the delineation of these areas. National definitions vary considerably across countries and thus limit international comparability. A new method, called the Degree of Urbanisation, was endorsed by the 51st session of the United Nations' Statistical Commission as the recommended method for international comparisons (https://unstats.un.org/unsd/statcom/51st-session/documents/BG-Item3j-Recommendation-E.pdf). The Degree of Urbanisation classifies the entire territory of a country into three classes: 1) cities, 2) towns and semi-dense areas and 3) rural areas. The Degree of Urbanisation has two extensions. The first extension identifies: cities, towns, suburban or peri-urban areas, villages, dispersed rural areas and mostly uninhabited areas. The second extension adds a commuting zone around each city to create a functional urban area (FUA) or metropolitan area. Details on the Degree of urbanization approach can be accessed at (https://ec.europa.eu/eurostat/web/products-manuals-and-guidelines/-/ks-02-20-499).

Indicator Principles and Selection Criteria

The preliminary principles for the UMF characteristics define the type, number of and way indicators can and should be chosen. These principles were for the UMF:

- To draw on existing frameworks and data sources where possible;
- To be people centric;
- To be city centric;
- To be able to respond to current and future shocks;
- To adopt elements that will make it useable and useful; and
- To be internally consistent.

TABLE

Framework Principles	Indicator Selection Principles
Draw on existing frameworks	**A lean, efficient, flexible and robust set of indicators** Indicators drawn from SDGs and similar frameworks ensure the UMF is a comprehensive monitoring tool that does not increase the burden on cities but allows the UMF to contribute to the UN system-wide frameworks for sustainable development.
Be people-centric	**People-centric indicators** 1. Where possible indicator data can be disaggregated by age, sex, ethnicity, race, socio-economic status, location, disability status, migration status, etc. 2. Indicators monitoring the outcomes are encouraged over indicators measuring inputs so that meaningful transformation is being observed (that is, tangible improvement to the lives of the city's citizens). 3. Indicators will provide rich and understandable data to inform policy and investment decisions. That is useable output.
Be city-centric	**City-centric indicators** Both attributes and indicators must be relevant to the policy objectives and responsibilities of cities and measurable at the urban scale. This can create some conflict with the principle to include people-centric indicators as it can emphasise metrics that measure the provision of urban infrastructure.
Make it useable and useful	**Useful and useable** Several elements emerged from this discussion, including the need to adopt an open data approach and allow for alternative data sources, while enabling benchmarking. Moreover, while the selected set of indicators needs to avoid being overly burdensome, it also needs to be comprehensive. Flexible indicators that can be combined to measure different attributes or other features may be the most effective approach. That is, 'multi-purpose' indicators. This will enable informed users to derive composite indices to measure specific matters. Given the relative complexity of this, detailed guidelines will need to be prepared to assist cities in implementation.
Monitor responses to current and future shocks	**Measure resilience to shocks** The capacity for the UMF to measure resilience to shocks came out of the concerns generated by the COVID-19 pandemic. It also recognises that there will be problems in the future. Urban areas will need to determine their capacity to respond to them, particularly health shocks such as future pandemics, food security and access to healthy water supplies.

Table shows how the relevant framework principles were interpreted to develop principles to guide the selection process for the indicators.

The Selection Principles

A lean, flexible, and complementary framework

A common set of indicators is recommended that align the UMF with both the NUA and the SDGs. This will reduce the burden on cities. It means that, for example, national reporting against SDGs may contribute to a city's reporting against the UMF and *vice versa*. Similarly, taking indicators from the UNESCO *Culture2030* framework means cities can contribute data to the UMF and this proposed new cultural monitoring framework.

The overlap of indicators is considered one of the most important aspects of the UMF. However, Task Team members also recognised it was equally important to minimise the total number of indicators that make up the UMF. In fact, several partners pointed out that collecting any data is a good start for some cities, as it will draw attention to the methods for more sustainable development.

There is also the risk that too much focus on measuring diverts attention from applying efforts to making tangible change. Research by Fisher and Fukuda-Parr (2019) noted we should be careful in the selection of indicators:

"…the use of quantitative targets and indicators can alter power relations, affect the distribution of resources, reorganize national and local priorities, create perverse incentives for performance, and produce narratives that shape thinking and communication." (2019, 375).

The risk is in having indicators that can be easy to collect and, superficially at least, suggest sustainable activity (e.g., the provision of clean water), but are not measuring the true cost of that activity (e.g., the overuse of chemicals to clean the water).

It also creates a collection burden on statistical offices. Consequently, the Task Team proposed that the number of indicators should only be as many as are required to effectively monitor an attribute for the benefit of the city, while also providing a means for benchmarking cities (i.e., via composite indices). It was concluded that this requires:

- Ensuring indicators are **measurable and attributable**.
- To the extent that it is possible, use indicators that produce data in compliance with the **Fundamental Principles of Official Statistics**[8];
- Using indicators that can **measure more than one feature or be combined with others to do so.** For example, a reduction in under-5 mortality rates is likely to occur due to numerous positive outcomes in a city, including a higher per capita number of health professionals, a more spatially distributed health service, and improved access to good nutrition.
- Including enough indicators so that 'no city is left behind'. This means different cities can choose different indicators to reflect their local social, economic, environmental, and cultural characteristics. The indicators should be **adapted to the data and the city**; and
- Using **well-established indicators,** *preferably* but not exclusively from the SDG set of indicators. This will help gain support for the UMF and ensure greater efficiency in data collection and reporting requirements. Moreover, it means the UMF will be drawing on quantitative and qualitative indicators that have, for the most part, been carefully designed, and for which there will be, or can be existing supporting material. This should not, however, exclude the use of non-conventional sources that can fill data gaps and provide a more comprehensive picture.

"…the use of quantitative targets and indicators can alter power relations, affect the distribution of resources, reorganize national and local priorities, create perverse incentives for performance, and produce narratives that shape thinking and communication." (2019, 375).

8 See Appendix for the Principles.

People-centric

A simple broadly agreed-upon principle is for the UMF to be 'people-centric'. This means it would use indicators that could monitor whether cities were becoming more livable for all, regardless of gender, age, ethnicity etc.

To enable this principle, the partners recognized the need for the UMF to generate data:

- that can be broken down by socio-demographic and spatial cohorts.
- that measures the actual outcomes for people, rather than necessarily the inputs that might generate those outcomes. For example, measuring under-5 mortality, rather than the number of doctors per capita.

This will enable the identification of those at risk of being left behind. By doing this, the UMF will be a useful tool for informing strategies to prioritize the principle of 'Leave No One Behind.

People-centric indicators may not always be possible or appropriate, but it can form a starting point for selecting the best indicators. Indicators must respond to:

1. The importance of ensuring that, where relevant and possible, data is disaggregated along key spatial and socio-demographic attributes.
   This may include age, sex, ethnicity, race, socio-economic status, location, disability status, migration status, etc. Data disaggregation will ensure that marginalized groups can be supported with appropriate actions and policies.
2. The benefit of measuring the tangible outcomes of urban policy and investment decisions and not just the inputs.
   For example, measuring mortality rates (an outcome) is a more direct measure of how well a city is progressing against a range of SDGs (including SDG3), than measuring the number of health service workers (an input). Although the latter may be a useful risk factor, it is not a direct measure.

City-centric

The UMF is intended to be distinct from other UN monitoring frameworks in that it is city-focused, rather than regional or national. It must, therefore, be relevant to the functions and responsibilities of city governments.

This can be enabled by selecting indicators that can be measured at the urban scale and, more importantly, can be influenced by relevant city agencies: the bodies responsible for the good governance of and service provision for, cities.

It was acknowledged that there is the potential that this principle will conflict with having people-centric indicators.

It is true that many city governments are directly responsible for urban infrastructure and planning and therefore may wish to monitor these features (typically via an input indicator). However, they can also lobby, or work with other tiers of government to influence policy on matters outside of their jurisdiction that are important to their sustainable development objectives. These are the type of features more likely to require an outcome-focused indicator (such as health outcomes).

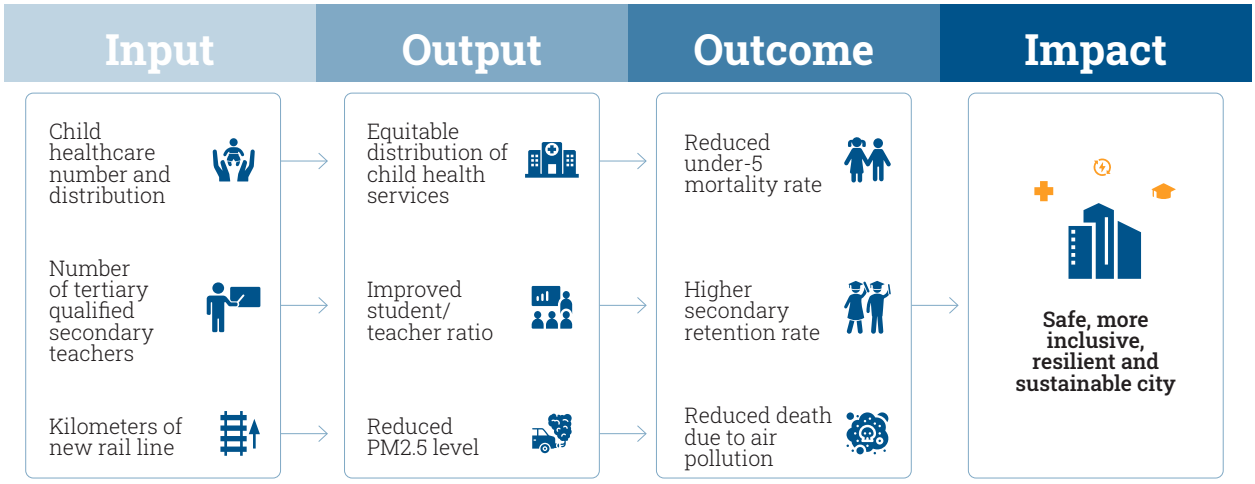
While being city-centric, there also needs to be an acknowledgement that the ecological footprint of cities can impact on rural areas and, in turn, the drain of resources from cities puts important features such as food security at risk. Monitoring of this should form part of the UMF: either selecting an appropriate indicator in the Environmental Sustainability attribute or through a composite index.

There are several dimensions to this:

- The indicators must be measuring attributes definable at the urban scale.
- For the UMF to be useful for city governments and their stakeholders, the attributes being monitored (and therefore the indicators) must relate to policy objectives and policy responsibilities of cities. Systems and issues that are regional or national matters may not be relevant.
- The entire footprint of the city should be considered when monitoring its progress, particularly in terms of environmental sustainability.

On the first point, a filtering exercise can identify only those indicators that can be disaggregated to the correct scale. The subsequent points require further consideration.

FIGURE 2: Example Results Chain



Because they are performance-based, impact measures more directly monitor the wellbeing of people and respect the fact that cities take different policy and investment pathways to their objectives. However, as noted below, many cities will have more direct responsibility for input features (such as infrastructure). The UMF, therefore, must allow cities to use both types

Useable and useful

One particular concern was consistently brought up by partners, and this was the risk that the UMF becomes a framework for 'reporting up', with little bearing on the day-to-day operations or as a tool to inform evidence-based decision-making in urban areas. In time, this means the UMF process could become stranded within an organization and ultimately defunded.

Urban, regional, and national policy priorities will always, ultimately determine the decisions made. However, the UMF can have a place in this if it can provide useful information to the decision-makers. It was agreed this can be facilitated by:

- Encouraging (albeit not exclusively) **outcome metrics**.
- Ensuring there are detailed instructions (in the form of **guidelines**) on how to collect, interpret and use the data.
- Embracing **open[9] and alternative data principles** (discussed earlier) and encourage data visualisation of results that is accessible and easy-to-interpret[10].
- Including a **process for revising the UMF** to ensure it retains relevance as cities and priorities change.
- Including enough indicators so that **composite indices** can be composed for benchmarking cities against one another and for capturing change in different aspects of a city.

9 Open data has a specific meaning. Data is considered open if it is provided promptly; in an open file format; (where relevant) in machine-readable form; and permanently available via a stable and accessible public platform.

10 This does not necessitate costly software investment. There is an open data reporting platform available for free for cities (see https://www.sdgreporting.org/).

The discussion of these principles led to the Task Team agreeing on the importance of:

- Having a simple and transparent selection criteria process to filter, organize and choose the indicators.
- Encouraging data sharing and visualisation. This is a critical step to encourage widespread adoption of the UMF and for strengthening the link between the UMF and the policy process. This was on the basis that, if data is not made broadly available via an easy-to-find and understandable platform, it risks becoming the preserve of data reporting agencies, which may not always have close connections with decision-makers. Moreover, open data will encourage intellectual contributions and, in time may help fine-tune the UMF.
- Developing a set of indicators for each attribute that allows cities to select from a shortlist of both input and impact indicators (except for the Cultural Domain)[11]. Then using pre-determined sets of indicators from across one or more attributes to create composite subject matter indices (recall Figure 1).

Interlinkages, themes, and indices

Further definition of indicators both within attribute sets and across is necessary for three reasons:

- Due to resource constraints, many cities will have to limit the number of indicators for which they collect data. It is important they chose the best indicators and a sensible mix to give as comprehensive a picture as possible.
- Any index created to analyze a particular feature or for benchmarking need to be created from the indicators. This will require some guidance on which indicators can be meaningfully combined.
- Interlinkages between indicators and urban systems can be complex. Many partners with field experience highlighted how indirect investments can sometimes be necessary to trigger positive outcomes. For example, access to WASH facilities may be the trigger needed to, ultimately, generate greater access to cultural opportunities.

It was proposed that indicators be described in terms of the themes or city features they can measure. For example, we may have themes such as health, personal safety, education, the overall status of the city as a sustainable exemplar, child wellbeing, the rate of decoupling and so forth. Moreover, these themes can be organized into the larger themes or critical areas recognized by the UN: the 5 Ps.

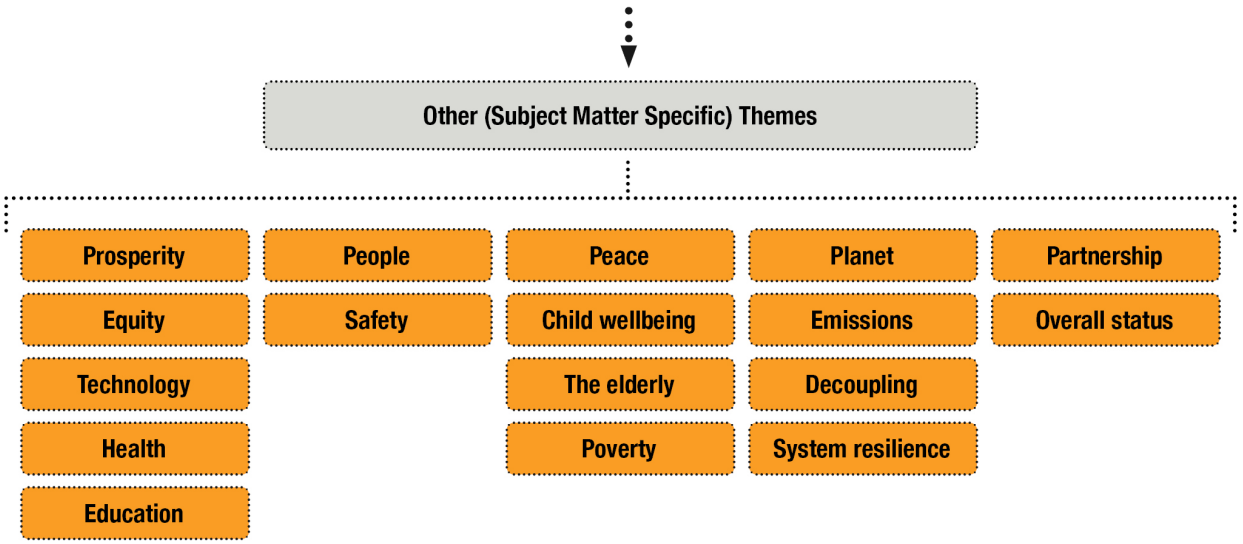
This will also assist cities in selecting subsets of indicators where they need to. If health is a critical issue for them, they may go to the WHO indicator framework, but in the absence of the resources for this, they may use the indicators that make up the Health Index for the UMF.

It is also proposed the subject matter indicator sets should draw at least one indicator from each objective (i.e., from the columns 'Safe', 'Inclusive', 'Resilient' and 'Sustainable'). In this way, the subject matter analysis will also contribute to the broader goal of the UMF.

11 Ideally, cities will collect data for all of the indicators within each attribute. This will make city benchmarking easier. However, many cities will not have the capacity to do this. By allowing some flexibility (in that a city could start by collecting data for just a few, or even one of the attribute indicators), cities can manage their resource use and, over time, build up their capacity.

FIGURE 3: Example Composite Indices and Themes

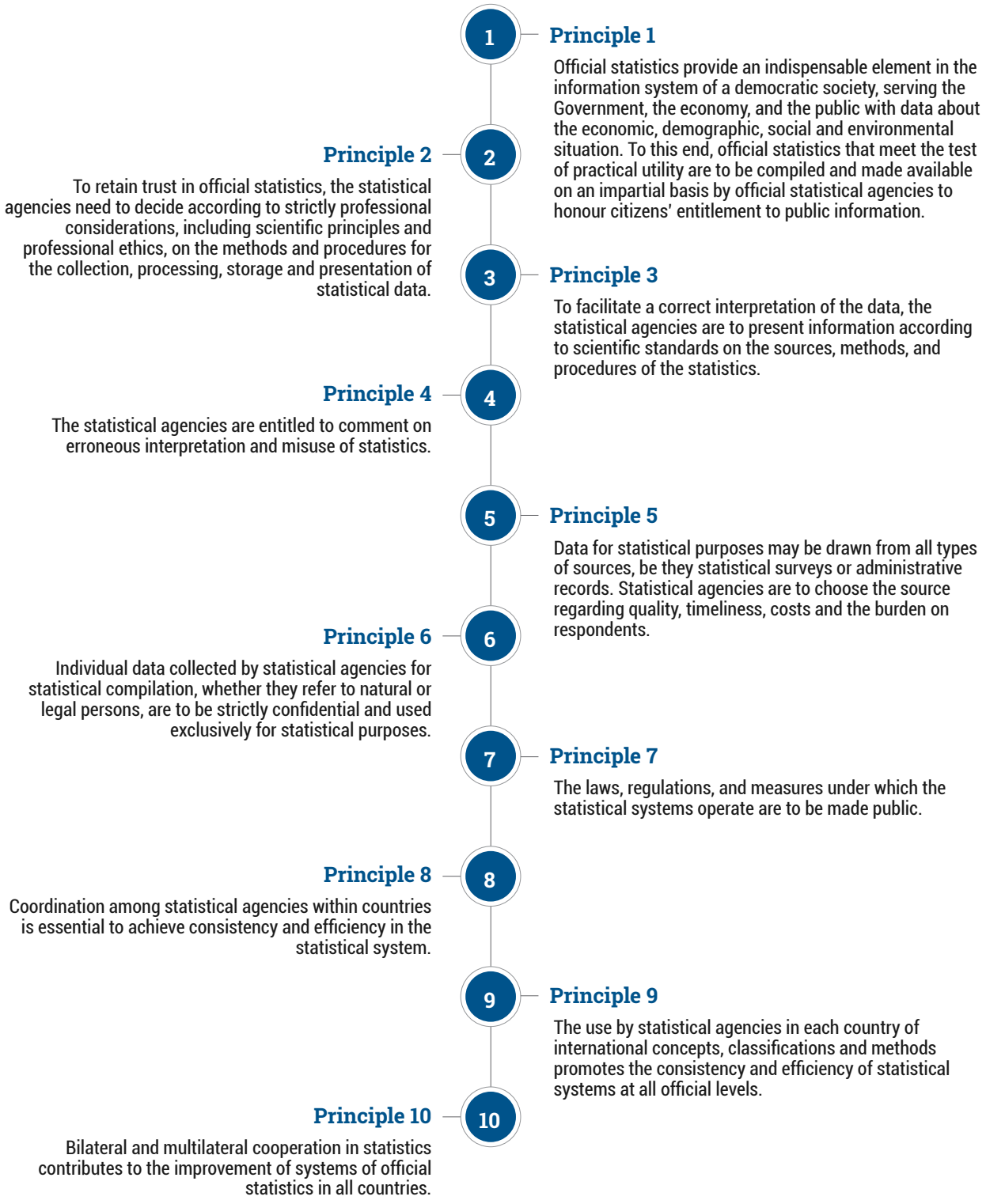
DOMAINS	CITY OBJECTIVES			
	Safe & Peaceful	Inclusive	Resilient	Sustainable
SOCIETY	A	B	C	D
ECONOMY	E	F	G	H
ENVIRONMENT	I	J	K	L
CULTURE	M	N	O	P
GOVERNANCE AND IMPLEMENTATION	Q	R	S	T



This shows an example attribute from the UMF and the indicator lists. Each attribute may have two sets of recommended indicators, organized in order of suitability and, in some cases, measuring a theme (Health and Violence are shown here). Note that the indicators shown here are illustrative only.

Fundamental Principles of Official Statistics

The UN's Fundamental Principles of Official Statistics is referenced in the analysis. These are:



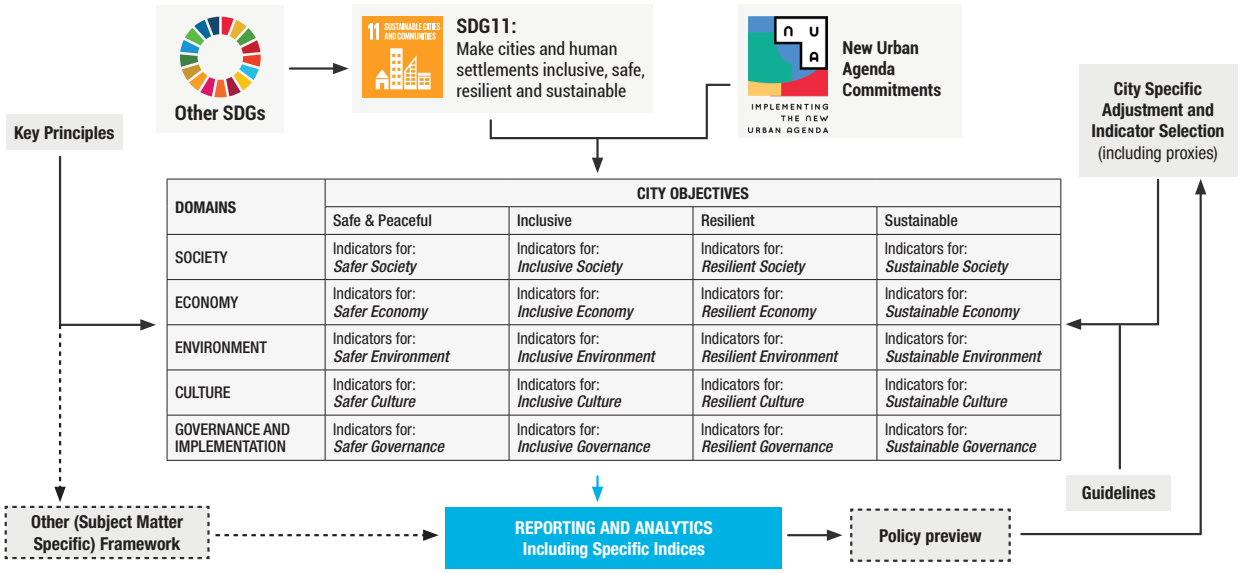
The Global Urban Monitoring Framework

The Global Urban Monitoring Framework (UMF) covers all three traditional 'domains' of urban monitoring: Society, Economy and Environment and recognizes the importance of adding the distinctive domains of Culture and Governance. These five domains form one of the main foundational axes of the Framework architecture. The other relates to the objectives for urban areas. SDG11 provides a simple and clear language for this, and so it forms the other foundational axis. The cross-referencing of these two components creates a matrix of attributes to be monitored. Other structural elements are the principles, functions, and operational aspects of the UMF. This draws on the foundation principles described earlier and proposes eight components:

1. A statement of intent to communicate the **purpose** of the UMF. That is, to collect data so that a city's development can be monitored against the New Urban Agenda Commitments and the relevant Sustainable Development Goals.
2. The **principles** that have informed the development of the UMF and its content.
3. The **domains** in which the UMF will enable monitoring. This provides one axis of the organisational structure for the UMF: the mostly spatial, substantive elements of urban systems.
4. The **objectives** for sustainable cities. These are the temporal, dynamic elements of urban systems.
5. By cross-referencing domains on one 'axis' with objectives on the other, we have **attributes** for monitoring.
6. The **indicators** themselves. That is the selection of measures that can be used to measure whether the objectives are being achieved in each domain.
7. The **reporting and analysis**. Data visualisation is critical to ensuring the UMF outputs can be clearly and widely interpreted and, therefore, used to inform policy and investment decisions.
8. The **complementary frameworks** that can guide cities seeking to examine certain dimensions in more detail.
9. **Guidelines** and supporting material.

Figure 4: UMF Structure illustrates the structure of the UMF. The UMF works as a matrix cross-referencing the domains with the objectives being evaluated in that domain. For example: 'Safe & Peaceful Society' or 'Resilient Economy' are the attributes. Table 3 shows the indicators that make up the UMF, outlaying the domains and respective objectives.

FIGURE 4: UMF STRUCTURE



The conjunction of an Objective and a Domain creates an Attribute which can be measured

4.4.1 Sustainable management of heritage
4.4.2 Climate adaptation and resilience
4.4.3 Open space for culture

4.3.1 Cultural employment
4.3.2 Expenditure on heritage

4.2.1 Access to culture
4.2.2 Cultural participation

4.1.1. Culture for social cohesion
4.1.2. Cultural Knowledge

5.4.1. Registered births
5.4.2 National urban policies/regional development plans
5.4.3 Governance of culture

5.3.1 Own Revenue Collection
5.3.2 Financial autonomy
5.3.3. Local disaster risk reduction strategies

5.2.1 Participation in Urban planning and Management
5.2.2. Utilization of E-Governance and Digital Governance Tools
5.2.3 Proportion of seats held by women in sub-national/ local governments
5.2.4 Legal frameworks for equality
5.2.5. Efficiency in urban governance

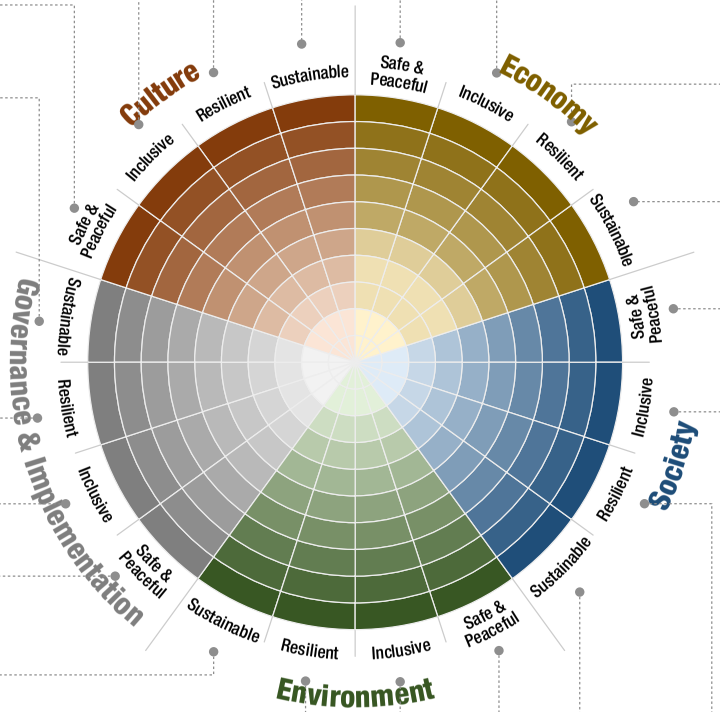
5.1.1 Victims of Intentional Homicide
5.1.2. Victims of Physical and Sexual Violence
5.1.3 Intimate partner violence
5.1.4 Reporting of Violence
5.1.5 Bribery

3.4.1. Total greenhouse gas emissions per year
3.4.2. Efficient land use
3.4.3. Budget on Climate Change Mitigation and Adaption

3.3.1. Renewable energy share
3.3.2. Green area per capita
3.3.3. Change in tree cover
3.3.4. Protected Natural Areas

3.2.1. Access to Open Public Spaces
3.2.2. Education for Sustainable Development

3.1.1. Wastewater safely treated
3.1.2. Solid Waste Collection and Disposal
3.1.3. Air quality
3.1.4. Hazardous waste



2.1.1 Children engaged in child labor
2.1.2 Time spent on unpaid domestic and care work

2.2.1 Unemployment Rate
2.2.2 Youth not in education, employment or training (NEET)
2.2.3 Use of Public transport
2.2.4 Internet use

2.3.1. City Product (GDP) per Capita (PPP)
2.3.2 Youth and adults in formal and non-formal education and training
2.3.3 Adult population with a qualification from a recognized tertiary education institution
2.3.4 Fixed Internet broadband subscriptions
2.3.5 Small-scale industries in total industry value added
2.3.6 Days to start a business
2.3.7 Patent application

2.4.1 Sub-national debt
2.4.2 Mean household income

1.1.1 Under-5 mortality rate
1.1.2 Safely managed drinking water services
1.1.3 Safely managed sanitation services
1.1.4 Safely managed hand-washing facility with soap and water
1.1.5 Proportion of births in all health facilities
1.1.6 Neighborhood safety
1.1.7 Adolescent birth rate
1.1.8 Traffic fatalities

1.2.1 Basic services
1.2.2 Access to public transport
1.2.3 Education completion rate
1.2.4 Secure tenure rights to land
1.2.5a Prevalence of malnutrition (Overweight) in children under 5
1.2.5b Prevalence of malnutrition (Wasting) in children under 5
1.2.6 Proportion of vaccinated children
1.2.7 Welfare of migrants
1.2.8 Multilingual education

1.3.1 Life expectancy at birth
1.3.2 Mortality rate (diseases)
1.3.3 Suicide mortality rate
1.3.4 Population affected by hazardous events
1.3.5 Mortgage debt relative to GDP
1.3.6. Food Insecurity

1.4.1 Slum population
1.4.2 Gini coefficient

TABLE 3: Domains, City objectives and Indicators of the UMF

City Objectives	Indicator		Sources/ Origins	Spatial Indicator
1. Society				
1.1 Safe and Peaceful	1.1.1 (UMF-01)	Under-5 mortality rate	SDG 3.2.1	No
	1.1.2 (UMF-02)	Safely managed drinking water services	SDG 6.1.1	No
	1.1.3 (UMF-03)	Safely managed sanitation services	SDG 6.2.1a	No
	1.1.4 (UMF-04)	Safely managed hand-washing facility with soap and water	SDG 6.2.1b	No
	1.1.5 (UMF-05)	Proportion of births in all health facilities	UNICEF 8	No
	1.1.6 (UMF-06)	Neighborhood safety	SDG 16.1.4	No
	1.1.7 (UMF-07)	Adolescent birth rate	SDG 3.7.2	No
	1.1.8 (UMF-08)	Traffic fatalities	SDG 3.6.1	No
1.2 Inclusive	1.2.1 (UMF-09)	Basic services	SDG 1.4.1	Yes
	1.2.2 (UMF-10)	Access to public transport	SDG 11.2.1	Yes
	1.2.3 (UMF-11)	Education completion rate	SDG 4.1.2	No
	1.2.4 (UMF-12)	Secure tenure rights to land	SDG 1.4.2	No
	1.2.5a (UMF-13a)	Prevalence of malnutrition in children under 5 (Overweight)	SDG 2.2.2a	No
	1.2.5b (UMF-13b)	Prevalence of malnutrition in children under 5 (Wasting)	SDG 2.2.2b	No
	1.2.6 (UMF-14)	Proportion of vaccinated children	UNICEF 9	No
	1.2.7 (UMF-15)	Welfare of migrants	SDG 10.7.2	No
	1.2.8 (UMF-16)	Multilingual education	C2030-15	No
1.3 Resilient	1.3.1 (UMF-17)	Life expectancy at birth	CPI	No
	1.3.2 (UMF-18)	Mortality rate (diseases)	SDG 3.4.1	No
	1.3.3 (UMF-19)	Suicide mortality rate	SDG 3.4.2	No
	1.3.4 (UMF-20)	Population affected by hazardous events	SDG 11.5.1	No
	1.3.5 (UMF-21)	Mortgage debt relative to GDP	NUA 3.7	No
	1.3.6 (UMF-22)	Food Insecurity	SDG 2.1.2	No
1.4 Sustainable	1.4.1 (UMF-23)	Slum population	SDG 11.1.1	No
	1.4.2 (UMF-24)	Gini coefficient	CPI	No

City Objectives	Indicator		Sources/ Origins	Spatial Indicator
2. Economy				
2.1 Safe and Peaceful	2.1.1 (UMF-25)	Children engaged in child labor	SDG 8.7.1	No
	2.1.2 (UMF-26)	Time spent on unpaid domestic and care work	SDG 5.4.1	No
2.2 Inclusive	2.2.1 (UMF-27)	Unemployment Rate	CPI	No
	2.2.2 (UMF-28)	Youth not in education, employment, or training (NEET)	SDG 8.6.1	No
	2.2.3 (UMF-29)	Use of Public transport	CPI	No
	2.2.4 (UMF-30)	Internet use	SDG 17.8.1	No
2.3 Resilient	2.3.1 (UMF-31)	City product (GDP) per Capita (PPP)	CPI	No
	2.3.2 (UMF-32)	Youth and adults in formal and non-formal education and training	SDG 4.3.1	No
	2.3.3 (UMF-33)	Adult population with a qualification from a recognized tertiary education institution	OECD E	No
	2.3.4 (UMF-34)	Fixed Internet broadband subscriptions	SDG 17.6.1	No
	2.3.5 (UMF-35)	Small-scale industries in total industry value added	SDG 9.3.1	No
	2.3.6 (UMF-36)	Days to start a business	CPI	No
	2.3.7 (UMF-37)	Patent application	OECD 9.5	No
2.4 Sustainable	2.4.1 (UMF-38)	Sub-national debt	CPI	No
	2.4.2 (UMF-39)	Mean household income	CPI	No

City Objectives	Indicator		Sources/ Origins	Spatial Indicator
3. Environment				
3.1 Safe and Peaceful	3.1.1 (UMF-40)	Wastewater safely treated	SDG 6.3.1	No
	3.1.2 (UMF-41)	Solid Waste Collection and Disposal	SDG 11.6.1	No
	3.1.3 (UMF-42)	Air quality	SDG 11.6.2	No
	3.1.4 (UMF-43)	Hazardous waste	SDG 12.4.2	No
3.2 Inclusive	3.2.1 (UMF-44)	Access to Open Public Spaces	SDG 11.7.1	Yes
	3.2.2 (UMF-45)	Education for Sustainable Development	SDG 12.8.1	No
3.3 Resilient	3.3.1 (UMF-46)	Renewable energy share	SDG 7.2.1	No
	3.3.2 (UMF-47)	Green area per capita	CPI	Yes
	3.3.3 (UMF-48)	Change in tree cover	OECD 15.1	Yes
	3.3.4 (UMF-49)	Protected Natural Areas	NUA-48	Yes
3.4 Sustainable	3.4.1 (UMF-50)	Total greenhouse gas emissions per year/per capita	SDG 13.2.2	No
	3.4.2 (UMF-51)	Efficient land use	SDG 11.3.1	Yes
	3.4.3 (UMF-52)	Budget on Climate Change Mitigation and Adaption	NUA-50	No

City Objectives	Indicator		Sources/ Origins	Spatial Indicator
4. Culture				
4.1 Safe and Peaceful	4.1.1 (UMF-53)	Culture for Social Cohesion	C2030-18	No
	4.1.2 (UMF-54)	Cultural Knowledge	C2030-14	No
4.2 Inclusive	4.2.1 (UMF-55)	Access to culture	C2030-20	Yes
	4.2.2 (UMF-56)	Cultural participation	C2030-21	No
4.3 Resilient	4.3.1 (UMF-57)	Cultural employment	C2030-7	No
	4.3.2 (UMF-58)	Expenditure on heritage	C2030-01	No
4.4 Sustainable	4.4.1 (UMF-59)	Sustainable management of heritage	C2030-02	No
	4.4.2 (UMF-60)	Climate adaptation and resilience	C2030-03	No
	4.4.3 (UMF-61)	Open space for culture	C2030-05	Yes

City Objectives	Indicator		Sources/ Origins	Spatial Indicator
5. Governance and Implementation				
5.1 Safe and Peaceful	5.1.1 (UMF-62)	Victims of Intentional Homicide	SDG 16.1.1	No
	5.1.2 (UMF-63)	Victims of physical and sexual violence	SDG 16.1.3	No
	5.1.3 (UMF-64)	Intimate partner violence	SDG 5.2.1	No
	5.1.4 (UMF-65)	Reporting of Violence	SDG 16.3.1	No
	5.1.4 (UMF-66)	Bribery	SDG 16.5.1	No
5.2 Inclusive	5.2.1 (UMF-67)	Participation in Urban planning and Management	SDG 11.3.2.	No.
	5.2.2 (UMF-68)	Utilization of E-Governance and Digital Governance Tools	NUA-75	No
	5.2.3 (UMF-69)	Proportion of seats held by women in sub-national/ local governments	SDG 5.5.1b	No
	5.2.4 (UMF-70)	Legal frameworks for equality	SDG 5.1	No
	5.2.5 (UMF-71)	Efficiency in urban governance	CPI/UGI	No
5.3 Resilient	5.3.1 (UMF-72)	Own Revenue Collection	CPI	No
	5.3.2 (UMF-73)	Financial autonomy	NUA 58	No
	5.3.3 (UMF-74)	Local disaster risk reduction strategies	SDG 11.b.2	No
5.4 sustainable	5.4.1 (UMF-75)	Registered Births	SDG 16.9.1	No
	5.4.2 (UMF-76)	National urban policies	SDG 11.a.1	No
	5.4.3 (UMF-77)	Governance of culture	C2030-12	No

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City landscape, Tianjin, China © Yang Aijun / World Bank

Indexing & Variable Standardization

Introduction

A variety of studies exist that use different methodologies for combining indicators to produce indices that represent performance over a range of outcomes in a single number and allow comparisons across cities or countries. All these methodologies for aggregating indicators follow a standard procedure for selecting, transforming, normalizing, and weighting the different variables.

Variable selection: Various statistical techniques exist to determine which variables should be included in the indices. One well-known approach is principal component analysis (PCA), which extracts statistically significant linear combinations of underlying variables from a set of variables that are the most significant and also explain the most variance in the data. However, the successful application of the various statistical techniques depends on the sample size and the nature of the variables (binary or quantitative).

Transformation: After variables are selected, their transformation helps to overcome saturation effects or extreme values, while their normalization ensures that the scales of the different variables are similar. To illustrate, a "saturation" effect is quite common for many income-related variables. Higher incomes lead to a less than proportional increase in most measures of variables such as health, education, and so on. For comparison with these variables, it is best to use a transformation, which compresses the higher values, such as logarithm or square root.

Normalization: Afterwards, variables are normalized in percentage along the interval between the maximum and minimum values, so that the minimum value becomes 0, the maximum 100, and the intermediate values are spaced accordingly.

Weighting of variables: This can be done in various ways and depends on the type of data and the objective of index development. Some approaches give equal weight to the different (standardized) components of the index, while others weight the components according to their importance. For example, PCA determines which variables have the greatest statistical significance and thus helps recommend weights for different variables.

This section details the approach for applying the different modeling modalities to develop a synthetic index for the world's cities.

Developing the Index Using Dimensions

In this approach, the synthetic index is composed of 5 sub-indices. These sub-indices measure a specific dimension as mentioned previously (society, economy, environment, culture, and governance).

Posit the global index as:

$$I = \sum_{i=1}^{5} \omega_i I_i \text{ with } \sum_{i=1}^{5} \omega_i = 1 \quad \text{.....} \textbf{(1)}$$

ω_i represent the weights assigned to the dimensions.

Each dimension is associated with the four objectives targeted by cities, namely, Safety and Peace, Inclusiveness, Resilience, and Sustainability. These objectives are common to each dimension. Thus, each dimension sub-index is a function of k objectives with $k = 1, 2, 3, 4.$

Noting o_k as the objective k; then, o_{ik} stands for the k-objective of dimension i.

The subindex I_i of dimension i is then defined as follows:

$$I_i = \sum_{k=1}^{4} \mu_k o_{ik} \quad \text{.....} \textbf{(2)}$$

Equations ***(1)*** and ***(2)*** give:

$$I = \sum_{i=1}^{5} \omega_i \sum_{k=1}^{4} \mu_k o_{ik} \quad \text{.....} \textbf{(3)}$$

For each k-objective of dimension i the approach selects a set of suitable variables in connection with the characteristics of the dimension in question. The selection of these variables is based on the indicator matrix of the Urban Monitoring Framework (UMF). A reduced version of this matrix is adopted for this analysis.

The matrix is composed of M variables in each row, each variable is labeled j with $j = 1 \ldots M.$ The approach defines ν_{ik}^{j} as a suitable variable j of k-objective of dimension i. In each row of the matrix, if a variable ν_{ik}^{j} is not of relevance to a given dimension i, its value is zero. Table 1 gives the variables selected.

Denoting ω_{ik}^{j} as the weight of a variable j of interest for k-objective of dimension i. Then, there is:

$$o_{ik} = \sum_{j=1}^{M} \omega_{ik}^{j} \nu_{ik}^{j} \text{ with } \sum_{j=1}^{M} \nu_{ik}^{j} = 1 \quad \text{.....} \textbf{(4)}$$

Replacing ***(4)*** in ***(2)***, gives:

$$I_i = \sum_{k=1}^{4} \mu_k \sum_{j=1}^{M} \omega_{ik}^{j} \nu_{ik}^{j} \quad \text{.....} \textbf{(5)}$$

Replacing ***(5)*** in ***(3)***, gives:

$$I = \sum_{i=1}^{5} \omega_i \sum_{k=1}^{4} \mu_k \sum_{j=1}^{M} \omega_{ik}^{j} \nu_{ik}^{j} \quad \text{.....} \textbf{(6)}$$

Rewrite this equation by swapping the first two summations of the formula, then:

$$I = \sum_{k=1}^{4} \mu_k \sum_{i=1}^{5} \omega_i \sum_{j=1}^{M} \omega_{ik}^{j} \nu_{ik}^{j} \quad \text{.....} \textbf{(7)}$$

TABLE 1

Dimensions		Objectives		Suitable variables				
Rubrics	**weights**	**Rubrics**	**weights**	**var** 1	**...**	**var** j	**...**	**var** M
Economy $(i-1)$	ω_1	Inclusiveness *(k=1)*	μ_1	ν_{11}^1		ν_{11}^j		ν_{11}^M
		Safety and Peace *(k=2)*	μ_2	ν_{12}^1		ν_{12}^j		ν_{12}^M
		Resilience *(k=3)*	μ_3	ν_{13}^1		ν_{13}^j		ν_{13}^M
		Sustainability *(k=4)*	μ_4	ν_{14}^1		ν_{14}^j		ν_{14}^M
Environment $(i-2)$	ω_2	Inclusiveness *(k=1)*	μ_1	ν_{21}^1	...	ν_{21}^j		ν_{21}^M
		Safety and Peace *(k=2)*	μ_2	ν_{22}^1		ν_{22}^j		ν_{22}^M
		Resilience *(k=3)*	μ_3	ν_{23}^1		ν_{23}^j		ν_{23}^M
		Sustainability *(k=4)*	μ_4	ν_{24}^1		ν_{24}^j		ν_{24}^M
Culture $(i-3)$	ω_3	Inclusiveness *(k=1)*	μ_1	ν_{31}^1	...	ν_{31}^j		ν_{31}^M
		Safety and Peace *(k=2)*	μ_2	ν_{32}^1		ν_{32}^j		ν_{32}^M
		Resilience *(k=3)*	μ_3	ν_{33}^1		ν_{33}^j		ν_{33}^M
		Sustainability *(k=4)*	μ_4	ν_{34}^1		ν_{34}^j		ν_{34}^M
Governance $(i-4)$	ω_4	Inclusiveness *(k=1)*	μ_1	ν_{41}^1	...	ν_{41}^j		ν_{41}^M
		Safety and Peace *(k=2)*	μ_2	ν_{42}^1		ν_{42}^j		ν_{42}^M
		Resilience *(k=3)*	μ_3	ν_{43}^1		ν_{43}^j		ν_{43}^M
		Sustainability *(k=4)*	μ_4	ν_{44}^1		ν_{44}^j		ν_{44}^M
Society $(i-5)$	ω_5	Inclusiveness *(k=1)*	μ_1	ν_{51}^1	...	ν_{51}^j		ν_{51}^M
		Safety and Peace *(k=2)*	μ_2	ν_{52}^1		ν_{52}^j		ν_{52}^M
		Resilience *(k=3)*	μ_3	ν_{53}^1		ν_{53}^j		ν_{53}^M
		Sustainability *(k=4)*	μ_4	ν_{54}^1		ν_{54}^j		ν_{54}^M

Table 1 captures this relationship and shows the structure of each row and the links between variables, objectives, and dimensions.

Developing the Index Based on the Objectives

From this angle, the global index is defined as follows:

$$I = \sum_{k=1}^{4} \mu_k o_k \quad \text{(8)}$$

Where o_k stands for Safety and Peace, Inclusiveness, Resilience, and Sustainability.

$$o_k = \sum_{i=1}^{5} \omega_i D_{ki} \quad \text{(9)}$$

Where D_{ki} captures k-objective encompassed in dimension i, with:

$$D_{ki} = \sum_{j=1}^{M} \omega_{ki}^{j} \nu_{ki}^{j} \quad \text{(10)}$$

Replacing (9) in (8) gives:

$$I = \sum_{k=1}^{4} \mu_k \sum_{i=1}^{5} \omega_i D_{ki} \quad \text{(11)}$$

Otherwise:

$$I = \sum_{i=1}^{5} \omega_i \sum_{k=1}^{4} \mu_k D_{ki} \quad \text{(12)}$$

As a result:

$$I = \sum_{i=1}^{5} \omega_i \sum_{k=1}^{4} \mu_k \sum_{j=1}^{M} \omega_{ki}^{j} \nu_{ki}^{j} \quad \text{(13)}$$

Equations ***(3)*** and ***(11)*** are equivalent to one another provided that o_{ki} matches D_{ki}.

TABLE 2

Objectives		**Dimensions**		**Suitable variables**				
Rubrics	**Weights**	**Rubrics**	**Weights**	**var** 1	**...**	**var** j	**...**	**var** M
Inclusiveness *(k=1)*	μ_1	Economy *(i=1)*	ω_1	ν_{11}^{1}		ν_{11}^{j}		ν_{11}^{M}
		Environment *(i=2)*	ω_2	ν_{12}^{1}		ν_{12}^{j}		ν_{12}^{M}
		Culture *(i=3)*	ω_3	ν_{13}^{1}		ν_{13}^{j}		ν_{13}^{M}
		Governance *(i=4)*	ω_4	ν_{14}^{1}		ν_{14}^{j}		ν_{14}^{M}
		Society *(i=5)*	ω_5	ν_{15}^{1}	...	ν_{15}^{j}	...	ν_{15}^{M}

Objectives		**Dimensions**		**Suitable variables**				
Rubrics	**Weights**	**Rubrics**	**Weights**	**var** 1	**...**	**var** j	**...**	**var** M
Safety and Peace *(k=2)*	μ_2	Economy *(i=1)*	ω_1	ν_{21}^{1}		ν_{21}^{j}		ν_{21}^{M}
		Environment *(i=2)*	ω_2	ν_{22}^{1}		ν_{22}^{j}		ν_{22}^{M}
		Culture *(i=3)*	ω_3	ν_{23}^{1}		ν_{23}^{j}		ν_{23}^{M}
		Governance *(i=4)*	ω_4	ν_{24}^{1}	...	ν_{24}^{j}		ν_{24}^{M}
		Society *(i=5)*	ω_5	ν_{25}^{1}		ν_{25}^{j}		ν_{25}^{M}
Resilience *(k=3)*	μ_3	Economy *(i=1)*	ω_1	ν_{31}^{1}		ν_{31}^{j}		ν_{31}^{M}
		Environment *(i=2)*	ω_2	ν_{32}^{1}		ν_{32}^{j}		ν_{32}^{M}
		Culture *(i=3)*	ω_3	ν_{33}^{1}		ν_{33}^{j}		ν_{33}^{M}
		Governance *(i=4)*	ω_4	ν_{34}^{1}		ν_{34}^{j}		ν_{34}^{M}
		Society *(i=5)*	ω_5	ν_{35}^{1}	...	ν_{35}^{j}	...	ν_{35}^{M}
Sustainability *(k=4)*	μ_4	Economy *(i=1)*	ω_1	ν_{41}^{1}		ν_{41}^{j}		ν_{41}^{M}
		Environment *(i=2)*	ω_2	ν_{42}^{1}		ν_{42}^{j}		ν_{42}^{M}
		Culture *(i=3)*	ω_3	ν_{43}^{1}		ν_{43}^{j}		ν_{43}^{M}
		Governance *(i=4)*	ω_4	ν_{44}^{1}	...	ν_{44}^{j}		ν_{44}^{M}
		Society *(i=5)*	ω_5	ν_{45}^{1}		ν_{45}^{j}		ν_{45}^{M}

Table 2 visualizes the connections between the variables, objectives, and dimensions as expressed in Equation 13.

Standardization, Weighting, and Transformation

Standardizing the Variables

In order to normalize the variables used in the construction of the various sub-indices, the following interpolation method is used:

$$z(y) = \frac{y - m}{M - m}$$

With:

- $z(m) = 0$ and $z(M) = 1$;
- y is the observed value of the variable to be normalized.
- m and M being respectively the minimum and maximum values of the variable y; these are obtained as follows:

$$m = minimum\ value\ of\ y - \frac{standard\ deviation\ of\ y}{10}$$

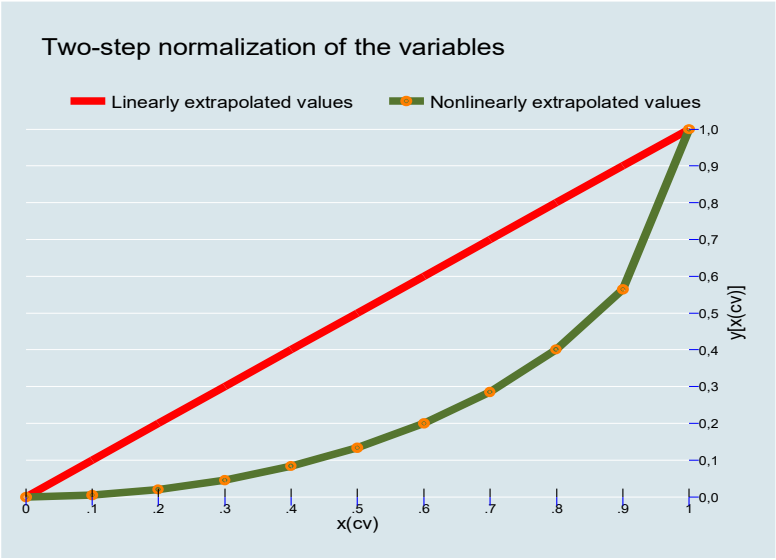
$$M = maximum\ value\ of\ y - \frac{standard\ deviation\ of\ y}{10}$$

This procedure overcomes saturation effects or extreme values by replacing the highest or lowest values of a given variable y with reasonable scores. But for a variable with a negative load on the index, such as the rate of stunted children, the procedure suggested above can exaggerate the contribution of that variable to the index calculation.

Performing a nonlinear interpolation of $z(y)$ using a modified function of the formula below overcomes this:

$$f[z(y)] = 1 - (1 - (z(y)^2)^{\frac{1}{2}}, where\ \frac{\partial f}{\partial z} > 0\ and\ \frac{\partial^2 f}{\partial^2 z} > 0$$

The following graph illustrates that reducing the values of variables with negative attributes is equivalent to pulling the red line towards the green curve.



Weighting

Detailed instructions for the allocation of weights and subsequent loads to the indicators in the different sub-indices are presented in the UMF data entry (Ms. Excel) file. Once the sub-indices for each dimension or objective are generated, the overall index is calculated by applying equal weights to each sub-index.

Transformation

The transformation to be applied uses the following function:

$$f(x) = \sqrt{1 - (1 - x)^2}$$

This transformation allows users to get reasonable values for the index while still holding it in the interval [0,1].

It can easily be verified that the transforming function is increasing, as $f(0) = 0$ and $f(1) = 1$.

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Domain 1: Society

The indicator variables within the Society domain are presented below:

City Objectives

Safe and Peaceful	Inclusive	Resilient	Sustainable
Indicators	**Indicators**	**Indicators**	**Indicators**
1.1.1 Under-5 mortality rate	**1.2.1** Basic services	**1.3.1** Life expectancy at birth	**1.4.1** Slum population
1.1.2 Safely managed drinking water services	**1.2.2** Access to public transport	**1.3.2** Mortality rate (diseases)	**1.4.2** Gini coefficient
1.1.3 Safely managed sanitation services	**1.2.3** Education completion rate	**1.3.3** Suicide mortality rate	
1.1.4 Safely managed hand-washing facility with soap and water	**1.2.4** Secure tenure rights to land	**1.3.4** Population affected by hazardous events	
1.1.5 Proportion of births in all health facilities	**1.2.5a** Prevalence of malnutrition (Overweight) in children under 5	**1.3.5** Mortgage debt relative to GDP	
1.1.6 Neighborhood safety	**1.2.5b** Prevalence of malnutrition (Wasting) in children under 5	**1.3.6** Food Insecurity	
1.1.7 Adolescent birth rate	**1.2.6** Proportion of vaccinated children		
1.1.8 Traffic fatalities	**1.2.7** Welfare of migrants		
	1.2.8 Multilingual education		

1.1 Safe and Peaceful City Objective

1.1.1. Under-5 Mortality Rate

Indicator:	(UMF-01) Under-5 mortality rate
Source/ Origins	**SDG Indicator 3.2.1**
Definition and method of computation:	Under-5 mortality is the probability of a child born in a specific year or period dying before reaching the age of 5 years, if subject to age specific mortality rates of that period, expressed per 1000 live births. The under-5 mortality rate as defined here is, strictly speaking, not a rate (i.e. the number of deaths divided by the number of population at risk during a certain period of time), but a probability of death derived from a life table and expressed as a rate per 1000 live births (Ref. to SDG Indicator 3.2.1 Metadata for models applied in generating figures for this indicator).
Rationale and interpretation:	Mortality rates among young children are a key output indicator for child health and well-being, and, more broadly, for social and economic development. It is a closely watched public health indicator because it reflects the access of children and communities to basic health interventions such as vaccination, medical treatment of infectious diseases and adequate nutrition. The under-5 mortality rate as defined here is, strictly speaking, not a rate (i.e. the number of deaths divided by the number of population at risk during a certain period of time), but a probability of death derived from a life table and expressed as a rate per 1000 live births.
Disaggregation:	The common disaggregation for this indicator includes disaggregation by sex, age (neonatal, infant, child), wealth quintile, residence, and mother's education. Disaggregated data are not always available. Disaggregation by geographic location may be the city's/regions administrative units. Data from well-functioning vital registration systems can provide further geographical breakdowns.
Sources and data collection:	Estimates of child mortality can be derived from several sources, including civil registration and sample surveys at city, regional or national levels. Demographic surveillance sites and hospital data are excluded as they are rarely representative. The preferred source of data is a civil registration system that records births and deaths on a continuous basis. If registration is complete and the system functions efficiently, the resulting estimates will be accurate and timely. However, many countries/cities do not have well-functioning vital registration systems. In such cases, household surveys, such as the UNICEF-supported Multiple Indicator Cluster Surveys (MICS), the USAID-supported Demographic and Health Surveys (DHS) and periodic population censuses have become the primary sources of data on under-5 mortality. These surveys ask women about the survival of their children, and it is these reports that provide the basis of child mortality estimates for a majority of low- and middle- income countries. These data, however, are often subject to sampling or/and non-sampling errors, which might be substantial.
Comments and limitations:	Many regions/cities lack a single source of high-quality data covering the last several decades. Data from different sources require different calculation methods and may suffer from different errors, for example random errors in sample surveys or systematic errors due to misreporting.
References:	• Alkema L, Chao F, You D, Pedersen J, Sawyer CC. (2014). National, regional, and global sex ratios of infant, child, and under-5 mortality and identification of countries with outlying ratios: a systematic assessment. The Lancet Global Health. 2014; 2(9): e521–e530. • Pedersen J, Liu J. (2012). Child Mortality Estimation: Appropriate Time Periods for Child Mortality Estimates from Full Birth Histories. Plos Medicine. 2012;9(8), http://journals.plos.org/plosmedicine/article?id=10.1371/journal.pmed.1001289 • Silva R. (2012). Child Mortality Estimation: Consistency of Under-5 Mortality Rate Estimates Using Full Birth Histories and Summary Birth Histories. Plos Medicine. 2012;9(8). Available at: http://journals.plos.org/plosmedicine/article?id=10.1371/journal.pmed.1001296

	• United Nations Inter-Agency Group for Child Mortality Estimation (UN IGME) (2021). Levels & trends in child mortality; Estimates developed by the UN Inter-agency Group for Child Mortality Estimation. UNICEF. https://data.unicef.org/wp-content/uploads/2022/01/UNICEF-IGME-2021-Child-Mortality-Report.pdf • United Nations Statistics Division (2022). SDG Indicator 3.2.1 Metadata, https://unstats.un.org/sdgs/metadata/files/Metadata-03-02-01.pdf • Walker N, Hill K, Zhao FM. (2012). Child Mortality Estimation: Methods Used to Adjust for Bias due to AIDS in Estimating Trends in Under-5 Mortality. Plos Medicine. http://journals.plos.org/plosmedicine/article?id=10.1371/journal.pmed.1001298

1.1.2. Safely Managed Drinking Water

Indicator:	(UMF-02) Proportion of population using safely managed drinking water services
Source/Origin	**SDG Indicator 6.1.1.**
Definition and method of computation:	Proportion of population using safely managed drinking water services is currently being measured by the proportion of population using an improved basic drinking water source which is located on premises, available when needed and free of faecal (and priority chemical) contamination. 'Improved' drinking water sources include piped water into dwelling, yard, or plot; public taps or standpipes; boreholes or tube wells; protected dug wells; protected springs; packaged water; delivered water and rainwater. **Methodology** $$Access\ to\ safe\ drinking\ water = 100\left[\frac{Number\ of\ people/\ persons\ using\ safely\ managed\ drinking\ water\ source}{Total\ population}\right]$$
Rationale and interpretation:	Access to water and sanitation are considered core socio-economic and health indicators, and key determinants of child survival, maternal, and children's health, family wellbeing, and economic productivity. Drinking water and sanitation facilities are also used in constructing wealth quintiles used by many integrated household surveys to analyse inequalities between rich and poor. Access to drinking water and sanitation is therefore a core indicator for most household surveys. The JMP developed the concept of 'improved' water sources, which was used as a proxy for 'safe water', as such sources are likely to be protected against faecal contamination, and this metric has been used since 2000 to track progress towards the MDG target. International consultations since 2011 have established consensus on the need to build on and address the shortcomings of this indicator; specifically, to address normative criteria of the human right to water including accessibility, availability, and quality. The above consultation concluded that JMP should go beyond the basic level of access and address safe management of drinking water services, including dimensions of accessibility, availability, and quality.
Disaggregation:	Disaggregation should be done by place of residence (urban/peri-urban/rural or city/region's sub-units), and socioeconomic status (wealth, affordability), and by other stratifiers of inequality (subnational, gender, disadvantaged groups, etc.) where data permits. Drinking water services will be disaggregated by service level (including no services, basic, and safely managed services) following the JMP drinking water ladder.

Sources and data collection:	Household surveys and censuses currently provide information on types of basic drinking water sources listed above and indicate if sources are on premises. These data sources often have information on the availability of water and increasingly on the quality of water at the household level, through direct testing of drinking water for faecal or chemical contamination. These data will be combined with data on availability and compliance with drinking water quality standards (faecal and chemical) from city/regional and other administrative reporting or regulatory bodies. City/regional level data may be filtered from census or acquired from city authorities.
Comments and limitations:	Data on availability and safety of drinking water is increasingly available through a combination of household surveys and administrative sources including regulators, but definitions have yet to be standardized. Data on faecal and chemical contamination, drawn from household surveys and regulatory databases, may not cover some countries and may not be disaggregated to urban units.
References:	• United Nations Statistics Division (2022). SDG Indicator 6.1.1 Metadata, https://unstats.un.org/sdgs/metadata/files/Metadata-06-01-01.pdf • WHO-UNICEF-JMP (2017). Drinking Water, https://washdata.org/monitoring/drinking-water • World Health Organization (2020). Water, sanitation and hygiene (WASH), https://www.who.int/health-topics/water-sanitation-and-hygiene-wash

1.1.3. Safely Managed Sanitation Services

Indicator:	**(UMF-03) Proportion of population using safely managed sanitation services**
Origin/Source	**SDG indicator 6.2.1a**
Definition and method of computation:	The proportion of the population using safely managed sanitation services is defined as the proportion of the population using an improved sanitation facility which is not shared with other households and where excreta are safely disposed of in situ or removed and treated off-site. 'Improved' sanitation facilities are those designed to hygienically separate human excreta from human contact. These include wet sanitation technologies such as flush and pour flush toilets connected to sewers, septic tanks or pit latrines, and dry sanitation technologies such as dry pit latrines with slabs, ventilated improved pit latrines and composting toilets. **Methodology** The percentage of the population using safely managed sanitation services is calculated by combining data on the proportion of the population using different types of basic sanitation facilities with estimates of the proportion of faecal waste which is safely disposed in situ or treated off-site.
Rationale and interpretation:	Access to safe sanitation and hygiene services is essential for good health, welfare and productivity and is widely recognized as a human right. Unsafe management of human excreta and poor sanitation practices are closely associated with diarrhoeal diseases, which exacerbate malnutrition and remain a major public health concern and a leading global cause of child deaths, as well as parasitic infections such as soil transmitted helminths (worms) and a range of other neglected tropical diseases. While access to a hygienic toilet facility is essential for reducing the transmission of pathogens, it is equally important to ensure safe management, treatment and disposal of the excreta produced. Sharing of sanitation facilities is also an important consideration given the negative impacts on dignity, privacy and personal safety. Lack of access to suitable sanitation and hygiene facilities is a major cause of risks and anxiety, especially for women and girls. For all these reasons, access to sanitation and hygiene services that prevent disease, provide privacy and ensure dignity has been recognized as a basic human right. The SDG target 6.2 relating to sanitation and hygiene aim to achieve this right through universal access to safely managed services.

	Concepts: An 'improved sanitation facility' is defined as one designed to hygienically separate human excreta from human contact. Improved sanitation facilities include wet sanitation technologies such as flush or pour flush toilets connected to sewer systems, septic tanks or pit latrines; and dry sanitation technologies such as dry pit latrines with slabs (constructed from materials that are durable and easy to clean), ventilated improved pit (VIP) latrines, pit latrines with a slab, composting toilets and container based sanitation. If a household uses a flush or pour flush toilet but does not know where it is flushed to, the sanitation facility is considered to be improved since the household may not be aware about whether it flushes to a sewer, septic tank or pit latrine. 'Unimproved sanitation facilities' include flush or pour flush toilets connected to open drains; pit latrines without slabs; open pits; buckets, pans, 'trays' or other unsealed containers; hanging toilets/latrines; defecation in the bush or field or ditch and defecation into surface water (drainage channels, beaches, rivers, streams or the sea). If a household uses a flush or pour flush toilet and survey respondents report that it is not flushed to sewer systems, septic tanks or pit latrines but elsewhere, the sanitation facility is considered to be unimproved. Improved sanitation refers only to the type of facility used, irrespective of whether the facilities are shared. Public toilets, as well as privately owned sanitation facilities which are shared by two or more families, are classified as 'shared facilities'. Use of improved sanitation facilities which are not shared is defined as a 'basic sanitation service', while use of improved sanitation facilities which are shared is defined as a 'limited sanitation service'. 'Basic sanitation services' may also be counted as 'safely managed sanitation services', but additional information is required about the management of excreta. For detailed guidance on safe sanitation, please refer to the most recent version of the WHO Guidelines on Sanitation and Health: https://www.who.int/teams/environment-climate-change-and-health/water-sanitation-and-health/sanitation-safety
Disaggregation:	Disaggregation is recommended at geographical level/by urban settlements, socioeconomic status (wealth, affordability), and service level for sanitation (including no services, basic, and safely managed services) following the JMP sanitation ladder.
Comments and limitations:	Data on safe disposal and treatment are not available for all cities
Data sources	• Censuses, which in principle collect basic data from all people living within a country and led by national statistical offices; city/ sub-national level data may be filtered from national dataset. • Household surveys, which collect data from a subset of households. These may target specific populations, or more limited project or sub-national areas. An appropriate sample design is necessary for survey results to be representative, and surveys are often led by or reviewed and approved by national statistical organizations. • Administrative data, which may consist of information collected by government or non-government entities involved in the delivery or oversight of services. Examples include water and sanitation inventories and databases, and reports of regulators. • Other datasets may be available such as compilations by international or regional initiatives (e.g. Eurostat), studies conducted by research institutes, or technical advice received during country consultations.

References:	• Ram, P., Practical Guidance for Measuring Handwashing Behavior: 2013 update, World Bank Water Supply and Sanitation Programme, 2013. • United Nations Statistics Division, 2021. SDG Indicator Metadata. https://unstats.un.org/sdgs/metadata/files/Metadata-06-02-01a.pdf and • United Nations Statistics Division. 2022. Questionnaire on Environment Statistics (water section) https://unstats.un.org/unsd/envstats/questionnaire • World Health Organization & UNICEF, 2017. JMP Wash Data. https://washdata.org/report/jmp-2017-report-final

1.1.4. Hand-Washing Facility with Soap and Water

Indicator:	**(UMF-04) Proportion of population with handwashing facilities with soap and water**
Origin/Source	**SDG indicator 6.2.1b**
Definition and method of computation:	The proportion of the population with basic hygiene services is defined as the proportion of population with a handwashing facility with soap and water available at home. Handwashing facilities may be located within the dwelling, yard or plot. They may be fixed or mobile and include a sink with tap water, buckets with taps, tippy-taps, and jugs or basins designated for handwashing. Soap includes bar soap, liquid soap, powder detergent, and soapy water but does not include ash, soil, sand or other handwashing agents. **Methodology** The proportion of the population with basic hygiene services is defined as the proportion of population with a handwashing facility with soap and water available at home. Handwashing facilities may be located within the dwelling, yard, or plot.
Rationale and interpretation:	Handwashing with soap is widely agreed to be the top hygiene priority for improving health outcomes. Improved hygiene is one of the most important measures to prevent the spread of infectious diseases including diarrhoeal diseases and acute respiratory infections which remain leading global causes of disease. Most infectious diseases are caused by bacteria or viruses which are transmitted either through the air, via surfaces or food, or via human faeces. Because people frequently touch their face, food, and surfaces, handwashing reduces the spread of these bacteria and viruses and is widely regarded as a top priority for improving global health outcomes. **Concepts:** Household handwashing facilities may be located in the dwelling, yard or plot. A handwashing facility is a device to contain, transport or regulate the flow of water to facilitate handwashing. Handwashing facilities may be fixed or mobile and include a sink with tap water, buckets with taps, tippy-taps, and jugs or basins designated for handwashing. Soap includes bar soap, liquid soap, powder detergent, and soapy water but does not include ash, soil, sand or other handwashing agents. In some cultures, ash, soil, sand or other materials are used as handwashing agents, but these are less effective than soap and are therefore counted as limited handwashing facilities. In 2008, the JMP supported a review of indicators of handwashing practice and determined that the most practical approach leading to reliable measurement of handwashing in national household surveys was observation of the place where household members wash their hands and noting the presence of water and soap (or local alternative) at that location. This provides a measure of whether households have the necessary tools for handwashing and is a proxy for their behaviour. Observation by survey enumerators represents a more reliable, valid and efficient indicator for measuring handwashing behaviour than asking individuals to report their own behaviour.

Data sources:	• Censuses, which in principle collect basic data from all people living within a country and led by national statistical offices; sub-national data may be filtered from national level data. • Household surveys, which collect data from a subset of households. These may target certain populations, or more limited project or sub-national areas. An appropriate sample design is necessary for survey results to be representative, and surveys are often led by or reviewed and approved by national statistical organizations. • Other datasets may be available such as compilations by international or regional initiatives (e.g. Eurostat), studies conducted by research institutes, or technical advice received during country consultations.
Disaggregation:	Disaggregation is recommended at geographical level/by urban settlements, socioeconomic status (wealth, affordability), and service level for sanitation (including no services, basic, and safely managed services) following the JMP sanitation ladder.
Comments and limitations:	Presence of a handwashing station with soap and water does not guarantee that household members consistently wash hands at key times but has been accepted as the most suitable proxy.
References:	• Ram, P., Practical Guidance for Measuring Handwashing Behavior: 2013 update, World Bank Water Supply and Sanitation Programme, 2013. • United Nations Statistics Division, 2021. SDG Indicators Metadata. https://unstats.un.org/sdgs/metadata/files/Metadata-06-02-01b.pdf • United Nations Statistics Division. 2022. Questionnaire on Environment Statistics (water section) https://unstats.un.org/unsd/envstats/questionnaire • World Health Organization & UNICEF, 2017. JMP Wash Data. https://washdata.org/report/jmp-2017-report-final

1.1.5. Proportion of Births in Health Facilities

Indicator:	**(UMF-05) Proportion of births in health facilities**
Source/Origin	**World Health Organization, Global Health Observatory Indicator; UNICEF**
Definition and method of computation:	The percentage of births delivered in health facilities, or 'institutional deliveries.' **Methodology** **For "population-based surveys":** Percentage of women who gave birth in a health facility (number of women with live birth in a health facility/ total number of live births in the same geographic or administrative area x 100). **For "facility-based data":** Percentage of women who gave birth in a health facility (number of deliveries in health facilities/ estimated total number of live births (or all births if available) x 100). In household surveys, such as the Demographic and Health Surveys, the Multiple Indicator Cluster Surveys, and the Reproductive Health Surveys, the respondent is asked about each live birth and where the childbirth took place for a period up to five years (or three or two depending on survey type) before the interview. Service/facility records could be used where a high proportion of births occur in health facilities.

Rationale and interpretation:	All women should have access to skilled care during pregnancy and childbirth to ensure prevention, detection and management of complications. Assistance by properly trained health personnel working within an enabling environment is needed to eliminate preventable maternal and newborn deaths. A key strategy to ensure skilled care during childbirth is to that all births take place in health facilities in which obstetric complications can be treated when they arise. The minimum target for this indicator should be set by national or local governments, and many countries have made having 100% of deliveries in institutions their main strategy for reducing maternal mortality.
Disaggregation:	Age, socio-economic situation, facility type, geographic location
Sources and data collection:	• National, regional or city ministries and departments • Household surveys (e.g., DHS, MICS); • Facility reporting system; • Civil registration
References:	**Bibliographic references** • World Health Organization, Global Health Observatory Indicators (2022), https://www.who.int/data/gho/indicator-metadata-registry/imr-details/institutional-birth

1.1.6. Neighborhood Safety

Indicator:	**(UMF-06) Proportion of population that feel safe walking alone around the area they live after dark**
Source/Origins	**SDG Indicator 16.1.4**
Definition and method of computation:	This indicator refers to the proportion of the adult population who feel safe walking alone in their neighbourhood at night Methodology The question used in victimization surveys is: How safe do you feel walking alone in your area/ neighbourhood at night? Answer options are typically: (1) Very safe, (2) safe, (3) unsafe (4), very unsafe, (5) I never go out alone at night/does not apply, (99) don't know. It is recommended that where the respondent's answer is "I never go out alone at night", the following probing question is asked: "How safe would you feel if you went outside at night?" The proportion of population that feel safe is calculated by summing up the number of respondents who feel "very safe" and "safe" and dividing the total by the total number of respondents, and multiplying by 100 $= \frac{Number\ of\ respondents\ who\ feel\ safe\ walking\ alone\ at\ night\ in\ the\ neighbourhood}{Total\ number\ of\ survey\ respondents} \times 100$
Rationale and interpretation:	Perception of safety is considered a subjective wellbeing indicator. It affects the way in which human beings interact with their surroundings, their health, and consequently, their quality of life. This indicator taps into the concept of 'fear of crime', which has been elicited in dozens of crime victimization surveys, and the standard formulation used here has been shown to be applicable in different cultural contexts.[12]

12 UNODC-UNECE (2010) Manual on Victimization Surveys, p. 56

	It is important to note that fear of crime is a phenomenon that is separate from the prevalence of crime and that fear of crime may be even largely independent from actual experience. The perception of crime and the resulting fear of it is influenced by several factors, such as the awareness of crime, the public discussion, the media discourse, and personal circumstances. Nevertheless, fear of crime is an important indicator in itself as high levels of fear can negatively influence well-being and lead to reduced contacts with the public, reduced trust and engagement in the community, and thus represent an obstacle to development. Fear of crime also differs across demographic groups and this indicator helps to identify vulnerable groups. **Concepts:** "Neighbourhood" – the indicator aims to capture fear of crime in the context of people's everyday lives. It does so by limiting the area in question to the "neighbourhood" or "area they live in". Various other formulations of local neighbourhood may be appropriate depending on cultural, physical and language context. "At night"- the indicator should specifically capture respondent's feelings and perceptions when walking alone at night/after dark. The specific reference to that point of the day is important because according to research, darkness is one of the factors individuals perceive as important when assessing whether a situation is dangerous.
Disaggregation:	By age and sex, time of day
Sources and data collection:	**Collection process:** Cities, regions, and countries can collect data for this indicator based on a single survey question ('How safe do you feel walking alone in your area/neighbourhood at night?') to be included in a general population survey. It is recommended that the sample size is sufficiently large to allow for disaggregation by age, gender, ethnicity, and other relevant. If the scope of data collection is national level, data collected by UNODC through the annual United Nations Survey of Crime Trends and Operations of the Criminal Justice Systems (UN-CTS) data collection initiative may be used.
Comments and limitations:	The survey question assumes that respondents do the following: (1) go out, (2) go out alone, (3) go out in their neighbourhood, and (4) go out after dark. For many respondents, the reasons for not going out alone in their neighbourhood after dark may have nothing or little to do with crime and more to do with personal and circumstantial issues, such as lack of mobility, childcare commitments, or the use of a car that allows them to travel further afield. Moreover, the question does not explicitly refer to 'crime', but rather it is implicit in the question. There may be other reasons unrelated to crime (e.g. wild animals, traffic, etc.) why respondents may not feel safe walking around their neighbourhood after dark.
References:	**Bibliographic references** • United Nations Statistics Division (2022). Metadata, SDG 16.1.4, https://unstats.un.org/sdgs/metadata/files/Metadata-16-01-04.pdf

1.1.7. Adolescent Birth Rate

Indicator:	(UMF-07) Adolescent birth rate (aged 10-14 years; aged 15-19 years) per 1,000 women in that age group.
Source/Origin	SDG Indicator 3.7.2
Definition and method of computation:	**Methodology** The adolescent birth rate is computed as a ratio. The numerator is the number of live births to women aged 15-19 years, and the denominator an estimate of exposure to childbearing by women aged 15-19 years. The computation is the same for the age group 10-14 years. **Note:** The numerator and the denominator are calculated differently for civil registration, survey and census data. • In the case of civil registration data, the numerator is the registered number of live births born to women aged 15-19 years during a given year, and the denominator is the estimated or enumerated population of women aged 15-19 years. • In the case of survey data, the numerator is the number of live births obtained from retrospective birth histories of the interviewed women who were 15-19 years of age at the time of the births during a reference period before the interview, and the denominator is person-years lived between the ages of 15 and 19 years by the interviewed women during the same reference period. • With census data, the adolescent birth rate is computed on the basis of the date of last birth or the number of births in the 12 months preceding the enumeration.
Rationale and interpretation:	Reducing adolescent fertility and addressing the multiple factors underlying it are essential for improving sexual and reproductive health and the social and economic well-being of adolescents. There is substantial agreement in the literature that women who become pregnant and give birth very early in their reproductive lives are subject to higher risks of complications or even death during pregnancy and birth and their children are also more vulnerable. Therefore, preventing births very early in a woman's life is an important measure to improve maternal health and reduce infant mortality.
Sources and data collection:	Civil registration is the preferred data source. Some cities may have these data in their databases. Census and household survey are alternate sources when there is no reliable civil registration.
Disaggregation	Age, education, number of living children, marital status, socioeconomic status, geographic location and other categories, depending on the data source and number of observations.
Comments and limitations:	The adolescent birth rate is commonly reported as the age-specific fertility rate for ages 15-19 years in the context of calculation of total fertility estimates. It has also been called adolescent fertility rate. A related measure is the proportion of adolescent fertility measured as the percentage of total fertility contributed by women aged 15-19
References:	• United Nations Statistics Division (2022), SDG Indictor 3.7.2. Metadata, https://unstats.un.org/sdgs/metadata/files/Metadata-03-07-02.pdf • World Health Organization, Indicator and Monitoring Framework for the Global Strategy for Women's, Children's and Adolescents' Health (2016-2030), (2016), https://www.who.int/life-course/publications/gs-Indicator-and-monitoring-framework.pdf) • UNFPA, Adolescents and Youth Dashboard (2022), https://www.unfpaopendata.org/libraries/aspx/Home.aspx

1.1.8. Traffic Fatalities

Indicator:	(UMF-08) Death rate due to road traffic injuries
Source/Origins	**SDG Indictor 3.6.1**
Definition and method of computation:	A traffic fatality is defined as any person killed immediately or dies within 30 days because of a road traffic accident. This is calculated as the ratio of the total number of fatalities from traffic accidents per year to the total city population, expressed per 100,000 people. Methodology $Traffic\ \ fatalities = 100,000\left[\frac{Total\ traffic\ \ fatalities}{City\ \ population}\right]$
Rationale and interpretation:	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). Over one-third of road traffic fatalities in low and middle-income countries involve pedestrians and cyclists. Less than 35% of low and middle-income countries have policies to protect these road users (World Health Organization, 2013). A prosperous city seeks to reduce traffic fatalities through improvement of physical infrastructure and policy implementation.
Sources and data collection:	The sources of data for this indicator are records and reports from traffic or transportation authorities, urban or city police departments and hospitals.
Disaggregation	• Age • Type e.g cyclist, pedestrian
Comments and limitations:	Traffic fatalities are not frequently reported or are partially reported by the authorities. It is necessary that this information is recorded by each city to allow for global comparability in a bid to improve road safety.
References:	• United Nations Statistics Division (2022), SDG 3.6.1. Metadata, https://unstats.un.org/sdgs/metadata/files/Metadata-03-06-01.pdf • World Health Organization (2004). World report on road traffic injury prevention. Geneva. • World Health Organization (2013). Global report on road safety. Luxembourg.

1.2. Inclusive City Objective

1.2.1. Basic Services

Indicator:	(UMF-09) Proportion of population living in households with access to basic services
Source/Origins	**Different for each sub-indicator**
Definition and method of computation:	Basic Services refer to public service provision systems that meet human basic needs including drinking water, sanitation, hygiene, energy, mobility, waste collection, health care, education and information technologies. The basic services indicator is therefore based on these components. These components are captured in various standalone indicators of the SDGs, which means that the concepts and definitions of SDG indicator 1.4.1 will be derived from or are the same as those of these specific SDG indicators. Access to basic services implies that sufficient and affordable service is reliably available with adequate quality. Under this UMF indicator, only indicators not covered by other standalone UMF indicators are included. They are: 1. **Access to Health Facilities** (spatial indicator) refers to access to a health facility within five minutes walking radius (equivalent to 400-meter distance along the streets network) from homes/residences. The measure estimates the share of population with access health facilities out of the total population in the city/ urban area. The sub-indicator computation will require spatial data on health facilities' locations, street networks, and geographically disaggregated/gridded population datasets. Data should be disaggregated by sex, age and persons with disabilities. 2. **Coverage of Essential Health Services** (non-spatial indicator) refers to access to services that cover in and out-of-area emergency services, inpatient hospital and physician care, outpatient medical services, laboratory and radiology services, and preventive health services. Basic health care services also extend to access to limited treatment of mental illness and substance abuse in accordance with minimum standards prescribed by local and national ministries of health. This is connected to and will be measured through SDG indicator 3.8.1 – Coverage of essential health services. 3. **Access to primary schools** (spatial indicator) refers to access to a primary school facility within five minutes walking radius (equivalent to 400-meter distance along the streets network) from homes/ residences. The computation approach and desired levels of data disaggregation are similar to that of the sub-indicator 2 above (access to health facilities). 4. **Access to food shops** (spatial indicator) refers to access to a food shop facility within five minutes walking radius (equivalent to 400-meter distance along the streets network) from homes/residences. The computation approach and desired levels of data disaggregation are similar to that of the sub-indicator 2 above. 5. **Access to recreational opportunities** (spatial indicator) refers to access to at least one recreational opportunity (theatres, museums, cinemas, stadiums or cultural attractions) within 15 minutes of cycling. The measure estimates the of share of population with access at least one recreational facility out of the total population in the city/ urban area. The computation approach and desired levels of data disaggregation are similar to that of the sub-indicator 2 above.

Rationale and interpretation:	Poverty has many dimensions. It is not only a lack of material well-being but also a lack of opportunities to live a tolerable life. Living under the extreme poverty line often encompasses deprivations of safe drinking water, proper sanitation, access to modern energy, sustainable mobility to economic resources, information technology, healthcare, education, etc. Poverty is also a manifestation of hunger and malnutrition, limited access to education and other basic services, social discrimination and exclusion as well as the lack of participation in decision-making. In other words, poverty is multidimensional and covers many aspects of life ranging from access to opportunities, livelihoods and means of survival. Among the different aspects of poverty, this indicator focuses on 'access to basic services. In the Quito implementation plan for the New Urban Agenda adopted in Habitat III conference, member states commit to "promoting equitable and affordable access to sustainable basic physical and social infrastructure for all, without discrimination, including affordable serviced land, housing, modern and renewable energy, safe drinking water and sanitation, safe, nutritious and adequate food, waste disposal, sustainable mobility, health care and family planning, education, culture, and information and communications technologies". Providing access to basic services such as safe drinking water, sanitation facilities, sustainable energy and mobility, housing, education, healthcare etc, helps to improve the quality of life of the poor. The lack of basic services provision and the lack of empowerment and involvement of local governments in basic service delivery undermine the economic growth and quality of life in any community. Adequate basic service delivery systems promote socio-economic improvements and help to achieve economic growth, social inclusion, poverty reduction and equality. More specifically, city residents should be able to access basic services that they regularly require within reasonable distances from their homes. This includes access to health facilities, education facilities (primary schools), food shops as well as recreational opportunities.
Disaggregation:	Different levels of disaggregation will be applied as applicable in each sub-indicator. They include by location, gender, age, level of service, and the specific ones captured in the indicators' source metadata.
Sources and data collection:	The main source of data for this indicator remains household surveys including DHS, MICS, LSMS, World Bank, UNICEF and UNDP, the censuses, and administrative data. Access-to-services indicators utilize spatial data which can be acquired from city planning/GIS departments, open data sources (e.g., OpenStreetMap) GTFS, and global gridded population datasets. These data sources are also described in the various metadata for the constituent SDG indicators. A lot of the pre-processed data is also derived from the SDG indicators that form this indicator.
Comments and limitations:	Different local characteristics of what constitutes "basic services" around the world by some concerned authorities and stakeholders compelled the team to work on modules and global guides for this indicator. This draws on definitions available for many other SDG indicators. For example, elements of basic services are measured under indicators 3.8.1 (health), 4.1.1 (education), 6.1.1 (water), 6.2.1 (sanitation), 7.1.1 (energy), 11.2.1 (public transport), etc. Finally, many cities still have limited capacities for data management, data collection and monitoring, and continue to struggle with limited data on large or densely populated geographical areas. This means that complementarity in data reporting in a few exceptions is needed to ensure that both national and global figures achieve consistencies in the final reported data for access to basic services.

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1.2.2. Access to Public Transport

Indicator:	(UMF-10) Proportion of population that has convenient access to public transport, by sex, age and persons with disabilities
Source/Origin	SDG Indicator 11.2.1
Definition and method of computation:	This indicator will be monitored by the proportion of the population that has convenient access to public transport. The access to public transport is considered convenient when a stop is accessible within a walking distance along the street network of 500 meters from a reference point such as a home, school, work place, market, etc. to a low-capacity public transport system (e.g. bus, Bus Rapid Transit) and/or 1 km to a high-capacity system (e.g. rail, metro, ferry). Additional criteria for defining public transport that is convenient include: a. Public transport accessible to all special-needs customers, including those who are physically, visually, and/or hearing-impaired, as well as those with temporary disabilities, the elderly, children and other people in vulnerable situations. b. Public transport with frequent service during peak travel times c. Stops present a safe and comfortable station environment **Methodology** This indicator is computed based on the following criteria: The identification of service areas is typically achieved using the network analysis operation (using GIS) by constructing a zone of proximity along street networks around each public transport stop or each public transport route. The metadata proposes to identify the size of the coverage area by the network distance of 500 m or 1 km (instead of using a mere buffer of 500 m - equal proximity) around the transport stop. Hence, for indicator 11.2.1, public transport is considered "convenient" for those living within a 500 m walkable distance of the nearest low-capacity transport system stop and/or 1 km to the nearest high-capacity transport system stop. Using network distance (the walking distance computed using the street network to reach a public transport feature) will help to realistically reflect the configuration of the street network and to recognize the presence of any barriers preventing direct access to public transport features. While the service area for each stop should be created separately, all areas should be merged to create a continuous service area for all public transport modes. Countries are encouraged to disaggregate the analysis by the two types of public transport carriers (low and high capacity), since this will help them understand the prevailing public transport strengths and limitations, and in turn the identification of the required actions and investments. Countries are furthermore encouraged to distinguish between formal and informal public transport systems in the dataset, as service quality features may vary greatly and need to be taken into consideration for planning and investment decisions. In addition to using the above-mentioned distance measures, others have suggested the use of travel time to public transport features as a measure of proximity to places of opportunity. Using travel time has the advantage of potentially accounting for pedestrian-unfriendly factors such as steep terrains. However, because of the additional data requirements and the amount of processing effort involved, travel time measures are more difficult to use in practice. The recommendation is therefore to use network distance to the public transport stop to develop its service area – but provide the option to consider travel time as a sub-indicator.

The identification of the population served

Once a service area is created, the next step is to overlay the area onto other polygons, such as census tracts or zones, for which socio-demographic data (such as population figures, disabled persons, type of residence area, etc.) is available. Gridded population, which disaggregates population data from the different sized enumeration areas or other data release units into uniformly sized grids is becoming popular with many countries and is a good source of the socio-demographic attributes for this indicator. Where possible, population data from individual buildings that is collected by national statistical offices is recommended.

Integrating local temporal availability

The methodology described above covers public transport service solely based on spatial access to stops or routes and does not address the temporal dimension associated with the availability of public transport. We note that temporal aspect of public transport availability is important because a service within walking distance is not necessarily considered as available if waiting times go beyond a certain threshold level that is required. This wait time for public transport is related to the frequency of the service as well as the threshold for tolerable waits for potential public transport users. We will leave out completely the temporal measurement for global comparison, but countries that can additionally capture this component are encouraged to collect and report this information as part of the disaggregation.

Finally, the share (%) of the population with convenient access to public transport out of the entire city population will be computed as:

$$= 100 \times \frac{Total\ population\ within\ the\ merged\ service\ areas\ for\ low\ and\ (or)\ high\ capacity\ public\ transport\ stops}{City\ population}$$

Additional methodological comments:

The method to estimate the proportion of the population that has convenient access to public transport is based on five steps (core indicator) (Refer to SDG Indicator 11.2.1 Metadata for details on each of the 5 stages (UNSD, 2022)):

- Delimitation of the urban area/ or city which will act as the spatial analysis scope,
- Inventory of the public transport stops in the city or the service area,
- Network analysis based on street network to measure walkable distance of 500 m and/or 1 km to nearest transport stop ("service area")
- Estimation of population within the walkable distance to public transport, and
- Estimation of the proportion of the population with convenient access out of the total population of the city.

Recommended secondary indicators

While the core indicator provides a good measurement that will help cities and urban areas identify their public transport situation, it does not cover the entire spectrum of information required to comprehensively analyse "convenient access" to public transport and to in turn inform policy and investments. Here, we recommend some secondary indicators which can be used to measure "convenient access" to public transport, and which may provide a useful complement to the core indicator of spatial distance to stops. Several are identified here, but there may be others. It should however be noted that these secondary indicators may require more data inputs and sometimes field-based surveys, and that their collection may vary significantly across jurisdictions making comparisons difficult. Despite this, these indicators provide critical information that can help cities and urban areas improve their public transport systems and ensure the needs of all urban dwellers are catered for. The suggested secondary indicators include:

	• **Transit system performance:** The methodology described above for monitoring the core indicator covers public transport service solely based on spatial access to stops and does not address the performance of the system, such as frequency of service, capacity, comfort, etc. We note that performance aspects of public transport are important because a service within walking distance is not necessarily considered as accessible if waiting times are long, frequency of service is low or if conditions are unsafe/insecure. The system cannot also be considered as accessible and reliable when passengers spend many hours from their trip origin to destination. These are not included in the core indicator, but countries are encouraged to collect and report this information as a secondary indicator. Transport stakeholders participating in Expert Group Meeting held in Berlin on 19 -20 October 2017 recommended the use of 20 minutes average waiting time during peak hours (from 5 am to 9 pm) to assess the frequency of the service. This data can be acquired from public transport timetables for some cities, from public transport service providers or through surveys. This measurement may however be limited in cities where paratransit modes are prevalent since they often do not operate according to fixed schedules. • **Affordability:** This can be used to further explain the indicator since access is only convenient for those who can afford the transport services. Affordability is often measured as the percentage of household income spent on transport of the poorest quintile of the population. Data can be obtained from surveys. The recommended indicator for affordability is that the poorest quintile should not spend more than 5% of their net household income on transport. • **Safety/security:** This parameter may be difficult to measure but could be quantitatively captured in part from accident and crime statistics near stations and on the transit systems themselves. For example, safety of the public transport can be measured by the share or number of crimes within the public transport system to the total crimes in the city. In addition, it is recommended to include a question on the perception of safety of public transport in the national crime surveys, or in transport user surveys. • Comfort & Access to Information: An additional feature of "convenient access" may be the presence of information systems such as real-time electronic schedule displays or other user information systems (e.g. apps), while comfort may also relate to features on the system and typical crowding or load factor levels. • **Modal shift to sustainable transport:** It is important to continuously monitor the modal share (percentage of travelers using a particular type of transportation incl. private cars, taxis, Non-motorized Transport, Public Transport, etc.), as well as passenger-km travelled on electric vehicles as percentage of total passenger-km travelled in the urban area from city mobility surveys. This parameter is important to understand the city's overall mobility mix, monitor the modal shift towards more sustainable transport over time, and provide actionable recommendations to move towards low carbon, shared, high-capacity mobility systems in the future. The data on this secondary indicator is largely available for many cities. UN-Habitat thus requests for such information in the country reporting template every year to understand the transitions in the modal share. Other measurement considerations which can be considered in the indicator measurement, and which can further improve understanding of prevailing public transport trends in cities include: • **Alternative metrics of "spatial access":** In some cities, alternative modes to reach a public transport stop exist - such as safe cycling lanes, bike share systems or other forms of micro-mobility. In these contexts, experts in the transport sector have suggested that a cycling distance of 2 km can be included in the creation of service areas to each public transport stop.

	• **Obstacles to reaching stations:** Distance to stations may be adjusted by taking into account factors that create obstacles and make accessing the station difficult, at least for some travelers. An obvious example is the presence of walkways along the street network and the need to take stairs or steep ramps to reach a station, making it difficult for elderly or people with disabilities. Alternative routes would need to be identified, or stations indicated as not providing convenient access for some population groups. To identify the prevailing limitations, field observations will be required, which should capture, among other information, availability of safe walkways along the street network and existence of ramps or elevators ("universal access"), and special seating areas for the elderly and disabled. **Achieving a higher level of "convenient access" – Access to opportunities** Beyond the secondary indicators for measuring convenient access to public transport lies another approach that understands Transportation as a means, not an end. This is based on the purpose of 'transportation' to gain access to destinations, activities, services and goods. Ultimately, people do not wish to access transit stations, they wish to access destinations, and even access non-physical objectives such as "opportunities". Operationally, access to "opportunities" means the ability of individuals to reach desired final destinations in a reasonable amount of time, for a reasonable cost, with adequate safety/security/ comfort, etc. For example, this may be measured as a maximum one-hour travel time between any origins and destinations (O-Ds) within a city, or at least those O-D combinations used (or desired to be used) by individuals. While measuring "access to opportunities" has more analytical and policy value to measuring "access to transit stations", it is more difficult and data intensive, so it is not proposed as the core indicator. Though, as data systems improve and cities become more able to collect the needed data, it may eventually make sense to shift to this as a core indicator. We note here that there are three basic types of data needed to construct this indicator: • Data on the residential locations of individuals • Data on the desired destinations of individuals (such as job, shopping, school, hospital locations) • Data on the available travel options and travel times linking the origins to the destinations. In fact, the first and third of these are very similar to what is needed to construct the core indicator, since residential locations and transit data are needed. The main additional data requirement is on the destinations, and there may be some additional complexities in putting the three types of data together. Efforts are ongoing to try to operationalize this approach and help cities beginning to collect the needed data.
Rationale and interpretation:	This indicator aims to successfully monitor the use of and access to the public transportation system and the move towards easing the reliance on the private means of transportation, improving the access to areas with a high proportion of transport disadvantaged groups such as elderly citizens, physically challenged individuals, and low-income earners or areas with specific dwelling types such as high occupancy buildings or public housing and reducing the need for mobility by decreasing the number of trips and the distances travelled. The accessibility based urban mobility paradigm also critically needs good, high-capacity public transport systems that are well integrated in a multimodal arrangement with public transport access points located within comfortable walking or cycling distances from homes and jobs for all.

	The ability of residents including persons with disabilities and businesses to access markets, employment opportunities, and service centers such as schools and hospitals is critical to urban economic development. The transport system provides access to resources and employment opportunity. Moreover, accessibility allows planners to measure the effects of changes in transport and land use systems. The rising traffic congestion levels and the resulting negative air quality in many metropolitan areas have elevated the need for a successful public transportation system to ease the reliance on the private means of transportation. Cities that choose to invest in effective public transportation options stand out to gain in the long run.
Disaggregation:	Typical types of disaggregation include: • Disaggregation by location (intra-urban). • Disaggregation by income group. • Disaggregation by sex (female-headed household). • Disaggregation by age group (categories on children and elderly to be included). • Disaggregation by type of public transport system (low-capacity vs high-capacity systems) • Disaggregation by formality of public transport carrier (formal vs paratransit transport modes) • Disaggregation by mode to reach public transport (walking vs cycling) • Disaggregation in respect to persons with disabilities/special needs (special-needs children, including those who are physically, visually, and/or hearing-impaired, as well as those with temporary disabilities). **Quantifiable Derivatives:** • Proportion of urban area that is served by convenient public transport systems. • Proportion of population/urban area that has convenient access to public transport stop with universal accessibility for people with disabilities. • Proportion of population/urban area that has frequent access to public transport during peak hours. • Proportion of population/urban area that has frequent access to public transport during off-peak hours. • Proportion of population with access to low-capacity systems (e.g. bus) and high capacity systems (e.g. metros), access by walking vs. biking, etc. • Proportion of population with access to formal vs paratransit transport modes • Share of population using different transport modes (modal share)
Sources and data collection:	• **Location of public transport stops:** typically, available from city administration or transport service providers, General Transit Feed Specification (GTFS) feeds, OpenStreetMap, Google (if not available at all, for instance in cities with informal paratransit services, innovative technologies/ apps and stakeholder consultations could assist the cities to map out the routes and stops). • **Street Network:** Ideally available from city administration but could also come from OpenStreetMap, the Global Roads Open Access Data Set (gROADS) and other open-source streets data providers. • **Population data:** available from censuses or other demographic surveys at individual dwelling units or enumeration zones, which can be further disaggregated to uniform grids through population modelling approaches. • **Number of residents per dwelling unit:** available from census/household surveys. • **Demographic data for disaggregation:** typically, available from household surveys that collect information both on household/individual characteristics and travel patterns. Must also provide information on the location of the respondent.

Comments and limitations:	Data and information gaps are anticipated in the first few years of collection of data for this indicator, and this will be largely because of the slow adoption of the proposed methodology by the national, regional and city governments. The spatial nature of the indicator and the variations in the definitions of what is public transport by countries will all affect the availability of data. Hence missing data for selected countries will be scored incrementally based initially on whether an existing public transport system is in place or not.
References:	• Alain Bertaud (2014). Cities as Labor Markets, https://marroninstitute.nyu.edu/uploads/content/Cities_as_Labor_Markets.pdf (Accessed January 20, 2022) • Andersen J and Landex A. (2008). Urban Transport XIV, Catchment areas for public transport, Department of Transport, Technical University of Denmark, https://www.witpress.com/Secure/elibrary/papers/UT08/UT08017FU1.pdf • Ditigal Matatus (2022). http://digitalmatatus.com/intro_lite.html • Fulton, L, 2017. Summary of recommendations provided by key stakeholders towards a refined Monitoring Methodology of SDG 11.2. Urban Pathways Conference, 19-20 October 2017, Berlin. • London Datastore (2017). Transport for London. Public Transport Accessibility Level, https://data.london.gov.uk/dataset/public-transport-accessibility-levels • Social economic Data and Applications Centre (SEDAC) (2022). Columbia University, New York, https://sedac.ciesin.columbia.edu/data/set/ghsl-population-built-up-estimates-degree-urban-smod • Poelman, H., L. Dijkstra, 2015. Regional Working Paper 2015: Measuring access to public transport in European cities, WP01/2015. Accessed at https://ec.europa.eu/regional_policy/sources/docgener/work/2015_01_publ_transp.pdf. • The World Bank (2015). Mobility for All: Getting the Right Urban Indicator Shifting from the Proximity of Transport to the Accessibility of Opportunities, https://www.worldbank.org/en/topic/transport/brief/connections-note-25 • The World Bank (2017). Global Mobility Report, Tracking Sector Performance, Open Knowledge, https://openknowledge.worldbank.org/bitstream/handle/10986/28542/120500.pdf?sequence=6 • UN-Habitat (2022). Planning and Design for Sustainable Urban Mobility: Global Report on Human Settlements 2013. UN-Habitat.

1.2.3. Education Completion Rate

Indicator:	**(UMF-11) Completion rate (primary education, lower secondary education, upper secondary education)**
Source/Origin	**SDG Indicator 4.1.2**
Definition and method of computation:	Percentage of a cohort of children or young people aged 3-5 years above the intended age for the last grade of each level of education who have completed that grade. **Methodology** The number of persons in the relevant age group who have completed the last grade of the given level of education is expressed as a percentage of the total population (in the survey sample) of the same age group. As with attendance rates, individuals are assigned completion age group based on actual or assumed age at the beginning of the school year. Formula: $CR_n = \frac{P_{C_n,\, AG_{a+3t5}}}{P_{AG_{a+3t5}}}$

	where: CR_n = completion rate for level n of education $P_{C_n\ Age_{a+3t5}}$ = population aged 3 to 5 years above the official entrance age a into the last grade of level n of education who completed level n $P_{Age_{a+3t5}}$ population aged 3 to 5 years above the official entrance age a into the last grade of level n of education n = ISCED level 1 (primary education), 2 (lower secondary education), or 3 (upper secondary education)
Rationale and interpretation:	The indicator is explicitly referenced in the text of target 4.1: *'ensure that all girls and boys complete […] primary and secondary education'*. A completion rate at or near 100% indicates that all or most children and adolescents have completed a level of education by the time they are 3 to 5 years older than the official age of entry into the last grade of that level of education. A low completion rate indicates low or delayed entry into a given level of education, high drop-out, high repetition, late completion, or a combination of these factors. The completion rate can be used either as a self-standing indicator or in combination with SDG indicator 4.1.1 (proportion of children and young people (a) in Grade 2 or 3; (b) at the end of primary education; and (c) at the end of lower secondary education achieving at least a minimum proficiency level in (i) reading and (ii) mathematics). Combining the completion rate with indicator 4.1.1 provides information on the percentage of children or young people in a cohort who achieve a minimum level of proficiency, and not only on the percentage of children in school who achieve minimum proficiency. **Concepts:** The intended age for the last grade of each level of education is the age at which pupils would enter the grade if they had started school at the official primary entrance age, had studied full-time and had progressed without repeating or skipping a grade. For example, if the official age of entry into primary education is 6 years, and if primary education has 6 grades, the intended age for the last grade of primary education is 11 years. In this case, 14-16 years (11 + 3 = 14 and 11 + 5 = 16) would be the reference age group for calculation of the primary completion rate.
Disaggregation:	The indicator is disaggregated by sex, location, wealth, and other dimensions specified in global indicator 4.5.1 (parity index).
Sources and data collection:	The data can be obtained from population censuses and household surveys that collect information on the highest level of education completed by children and young people in a household. Typical questions in a survey to collect data on educational attainment are: • What is the highest level of education [name of household member] has attended? • What is the highest grade of education [name of household member] has completed at that level? Sources include the national, regional and city governments' ministries and departments, and publicly available data from Demographic and Health Surveys (DHS), Multiple Indicator Cluster Surveys (MICS), European Union Statistics on Income and Living Condition (EU-SILC), the Integrated Public Use Microdata Series (IPUMS), and national household surveys and censuses. **Collection process:** Data from all publicly available household surveys and censuses with the required information are compiled and used to calculate the completion rate. For international comparability, national data are mapped to the International Standard Classification of Education (ISCED) before indicator calculation.

Comments and limitations:	The age group 3-5 years above the official age of entry into the last grade for a given level of education was selected for the calculation of the completion rate to allow for some delayed entry or repetition. In countries where entry can occur very late or where repetition is common, some children or adolescents in the age group examined may still attend school and the eventual rate of completion may therefore be underestimated. The indicator is calculated from household survey data and is subject to time lag in the availability of data. When multiple surveys are available, they may provide conflicting information due to the possible presence of sampling and non-sampling errors in survey data. The Technical Cooperation Group on the Indicators for SDG 4 - Education 2030 (TCG) has requested a refinement of the methodology to model completion rate estimates, following an approach similar to that used for the estimation of child mortality rates. The model would ensure that common challenges with household survey data, such as timeliness and sampling or non-sampling errors are addressed to provide up-to-date and more robust data.
References:	**Bibliographic references** • United Nations Statistics Division (2022). Metadata for SDG Indicator 4.1.2.

1.2.4. Secure Tenure Rights to Land

Indicator:	**(UMF-12) Proportion of total adult population with secure tenure rights to land, (a) with legally recognized documentation, and (b) who perceive their rights to land as secure, by sex and type of tenure**
Source/Origin	**SDG Indicator 1.4.2**
Definition and method of computation:	Indicator 1.4.2 measures the relevant part of Target 1.4 (ensure men and women have equal rights to economic resources, as well as access to, ownership of, and control over land and other forms of property, inheritance, natural resources). It measures the results of policies that aim to strengthen tenure security for all, including women and other vulnerable groups. Under the Urban Monitoring Framework, this indicator covers, all types of land use within the monitored urban/regional area, and all land tenure types as recognized at the country level, such as freehold, leasehold, public land, customary land. An individual can hold land in his/her own name, jointly with other individuals, as a member of a household, or collectively as member of group[13], cooperative or other type of association. **Secure tenure rights:** comprised of two sub-components: 1. **Legally recognized documentation:** Legal documentation of rights refers to the recording and publication of information on the nature and location of land, rights and right holders in a form that is recognized by government and is therefore official. For purposes of computing this indicator, the country specific metadata will define what documentation on land rights will be counted as legally recognized (see next section for rationale).

13 Group rights include shared or collective rights, and examples include the ejido in Mexico, indigenous territories in Honduras, perpetual DUAT for rural communities in Mozambique. Collective rights occur in a situation where holders of rights to land and natural resources are clearly defined as a collective group and have the right to exclude third parties from the enjoyment of those rights.

	2. Perceived security of tenure: Perception of tenure security refers to an individual's perception of the likelihood of involuntary loss of land, such as disagreement of the ownership rights over land or ability to use it, regardless of the formal status and can be more optimistic or pessimistic. Although those without land rights' documentation may frequently be perceived to be under threat, and those with documentation perceived as protected, there may be situations where documented land rights alone are insufficient to guarantee tenure security. Conversely, even without legally recognized documentation, individuals may feel themselves to be protected against eviction or dispossession. Therefore, capturing and analysing these diverse ranges of situations will enable a more comprehensive understanding of land tenure security, based on a country specific context. For purposes of constructing the indicator (see next section for rationale), we define perceptions of tenure to be secure if: i). The landholder does not report a fear of involuntary loss of the land within the next five years due to, for example, intra-family, community or external threats and ii). The landholder reports having the right to bequeath the land. **Total adult population:** A country's adult population[14] is measured by census data or through surveys using an adequate sampling frame. **Computation Method:** Indicator 1.4.2 is composed of two parts: (A) measures the incidence of adults with legally recognized documentation over land among the total adult population; while (B) focuses on the incidence of adults who report having perceived secure rights to land among the adult population. Part (A) and part (B) provide two complementary data sets on security of tenure rights, needed for measuring the indicator. Part (A): $\frac{People\ (Adult)\ with\ legally\ recognized\ documentation\ over\ land}{Total\ adult\ population} \times 100$ Part (B): $\frac{People\ (Adult)\ who\ percieve\ their\ rights\ as\ sec\ ure}{Total\ adult\ population} \times 100$ Part A will be computed using data either held by the city/regional government departments, national census data, or household survey data generated by the national statistical system and/or administrative data generated by land agency (depending on data availability). Part B will be computed from city or regional databases, national census data, or household survey data that feature the perception questions globally agreed.
Rationale and interpretation:	The governance of tenure is a crucial element in determining if and how people, communities and others acquire rights, and their associated obligations, to use and control land and natural resources. All forms of tenure should provide people with a degree of tenure security, with states protecting legitimate tenure rights, ensuring that people are not arbitrarily evicted and that their legitimate tenure rights are not otherwise extinguished or infringed. Perceptions of tenure security matter because they influence the way that land is used. This indicator will inform policy and allow for the assessment of specific outcomes and practical priorities for further improvements of tenure security at the country level.
Disaggregation:	Recommended disaggregation includes by sex, type of tenure, income groups, and urban subregions/ estates
Sources and data collection:	Data sources include city/regional or national governments' land registries, and/or land physical planning departments. Other common sources are census, multi-topic household surveys conducted by national statistical Organizations (Ref to SDG Indicator 1.4.2 for details on these data sources).

14 Country specific legal definition of an 'adult' will be applied.

Comments and limitations:	Countries and cities with paper-based systems will have more difficulties with reporting on administrative data and household surveys will be the main source of data for this indicator in these countries. The expansion of digitization of records and land data management is one way to facilitate the ease of reporting administrative data for this indicator. Coverage may, however, be geographically skewed, for example towards urban or specific rural regions where cadastral coverage is concentrated, and therefore sub-national dimensions should be properly considered and conveyed in narrative reporting by specific countries to accompany the headline data.
References:	**Bibliographic references** • Kilic, T., and Moylan, H. (2016). "Methodological experiment on measuring asset ownership from a gender perspective (MEXA): technical report." Washington, DC: World Bank • Africa Union, African Development bank and United Nations Economic Commission for Africa (1999). Land Policy in Africa: A Framework to Strengthen Land Rights, Enhance Productivity and Secure Livelihoods. Available at: https://www.uneca.org/publications/framework-and-guidelines-landpolicy-africa • Africa Union, African Development bank and United Nations Economic Commission for Africa (2014). Guiding Principles on Large-Scale Land-Based Investment in Africa. Nairobi. Available at: https://www.uneca.org/sites/default/files/PublicationFiles/guiding_principles_eng_rev_era_size.pdf • United Nations Statistics Division (2022). SDG Indicator 1.4.2 Metadata. https://unstats.un.org/sdgs/metadata/files/Metadata-01-04-02.pdf

1.2.5. Prevalence of Malnutrition among Children Under Five Years of Age (Overweight and Wasting)

The indicator has two sub-indicators. Based on the relevance of the sub-indicator to a city/region, one of the sub-indicators should be applied.

1.2.5. a). Prevalence of Overweight

Indicator:	**(UMF-13a) Prevalence of overweight (weight for height >+2 standard deviation from the median of the World Health Organization (WHO) Child Growth Standards) among children under 5 years of age.**
Source/ Origin	**SDG indicator 2.2.2a**
Definition and method of computation:	Prevalence of overweight (weight for height >+2 standard deviation from the median of the World Health Organization (WHO) Child Growth Standards) among children under 5 years of age. **Methodology** Survey estimates are based on standardized methodology using the WHO Child Growth Standards as described elsewhere (Ref: Anthro software manual). Global and regional estimates are based on methodology outlined in UNICEF-WHO-The World Bank: Joint child malnutrition estimates - Levels and trends (UNICEF/WHO/WB 2012)

Rationale and interpretation:	Child growth is an internationally accepted outcome area reflecting child nutritional status. Child overweight refers to a child who is too heavy for his or her height. This form of malnutrition results from expending too few calories for the amount of food consumed and increases the risk of noncommunicable diseases later in life. Child overweight is one of the World Health Assembly nutrition target indicators. **Concepts:** **Overweight** – The official MDG indicator is overweight as assessed using weight for height. Overweight can however also be assessed with other indicators such body mass index for age. In general BMI for age is not used in the joint dataset but has been considered in absence of any other available estimates.
Disaggregation:	Desired disaggregation includes by geography (city, sub-national) and stratified estimates (e.g. sex, age groups, wealth, mothers' education, residence).
Sources and data collection:	Data may be available with the city/regional governments' health departments or ministries. For most countries, nationally representative household surveys constitute the data source. For a limited number of countries data from surveillance systems is used if sufficient population coverage is documented (about 80%). For both data sources, the child's height and weight measurements have to be collected following recommended standard measuring techniques (WHO, 2008) (For collection process of UNICEF, WHO and World Bank Group joint review, refer to SDG Indicator 2.2.2. Metadata).
Comments and limitations:	Survey estimates come with levels of uncertainty due to both sampling error and non-sampling error (e.g., measurement technical error, recording error etc.,). None of the two sources of errors have been fully considered for deriving estimates neither at country nor at regional and global levels. Of particular concern for overweight is the fact that data for high income countries are scarce yet the rates are generally higher among the high-income countries with data and so the lack of representation from high income countries may affect the global and even regional rates.
References:	• BMC Pediatrics 2008, 8:19 (2008). Algorithms for converting estimates of child malnutrition based on the NCHS reference into estimates based on the WHO Child Growth Standards, https://bmcpediatr.biomedcentral.com/articles/10.1186/1471-2431-8-19 • De Onis M, Blössner M, Borghi E, et al. (2004), Methodology for estimating regional and global trends of childhood malnutrition. Int J Epidemiol, 33(6):1260-70. • United Nations Children's Fund, World Health Organization, The World Bank (2012). UNICEF-WHO-World Bank Joint Child Malnutrition Estimates. (UNICEF, New York; WHO, Geneva; The World Bank, Washington, DC; 2012). • United Nations Statistics Division (2022). SDG Indicator 2.2.2a. Metadata, https://unstats.un.org/sdgs/metadata/files/Metadata-02-02-02a.pdf World Health Organization (2008). Training Course on Child Growth Assessment: WHO Child Growth Standards

1.2.5. b). Prevalence of Wasting

Indicator:	**(UMF-13b) Prevalence of wasting (weight for height <-2 standard deviation from the median of the World Health Organization (WHO) Child Growth Standards) among children under 5 years of age.**
Source/ Origin	**SDG indicator 2.2.2b**
Definition and method of computation:	Prevalence of wasting (weight for height <-2 standard deviation from the median of the World Health Organization (WHO) Child Growth Standards) among children under 5 years of age.

	Methodology Survey estimates are based on standardized methodology using the WHO Child Growth Standards as described elsewhere (Ref: Anthro software manual). Global and regional estimates are based on methodology outlined in UNICEF-WHO-The World Bank: Joint child malnutrition estimates - Levels and trends (UNICEF/WHO/WB 2012)
Rationale and interpretation:	Child growth is an internationally accepted outcome reflecting child nutritional status. Child wasting refers to a child who is too thin for his or her height and is the result of recent rapid weight loss or the failure to gain weight. A child who is moderately or severely wasted has an increased risk of death, but treatment is possible. Child wasting is one of the World Health Assembly nutrition target indicators. **Concepts:** **Wasting** – The official MDG indicator is wasting as assessed using weight for height. Wasting can however also be assessed with mid upper arm circumference (MUAC). Estimates of wasting based on MUAC are not considered for the joint dataset. In addition, while wasting constitutes the major form of moderate acute malnutrition (MAM), there are acutely malnourished children who would not be picked up with weight for-height or MUAC, namely those presenting bilateral pitting odema (characterized by swollen feet, face and limbs). For Surveys that report oedema cases, in the joint data set these are included in the prevalence of low weight-for-height.
Disaggregation:	Desired disaggregation includes by geography (city, sub-national) and stratified estimates (e.g. sex, age groups, wealth, mothers' education, residence).
Sources and data collection:	Data may be available with the city/regional governments' health departments or ministries. For most countries, nationally representative household surveys constitute the data source. For a limited number of countries data from surveillance systems is used if sufficient population coverage is documented (about 80%). For both data sources, the child's height and weight measurements have to be collected following recommended standard measuring techniques (WHO, 2008) (For collection process of UNICEF, WHO and World Bank Group joint review, refer to SDG Indicator 2.2.2. Metadata).
Comments and limitations:	Survey estimates come with levels of uncertainty due to both sampling error and non-sampling error (e.g. mesasurement technical error, recording error etc.,). None of the two sources of errros have been fully taken into account for deriving estimates neither at country nor at regional and global levels. Surveys are carried out in a specific period of the year, usually over a few months. However, this indicator can be affected by seasonality, factors related to food availability (e.g. pre-harvest periods), disease (e.g. rainy season and diarrhoea, malaria, etc.), and natural disasters and conflicts. Hence, country-year estimates may not necessarily be comparable over time. Consequently, only latest estimates are provided.
References:	• BMC Pediatrics 2008, 8:19 (2008). Algorithms for converting estimates of child malnutrition based on the NCHS reference into estimates based on the WHO Child Growth Standards, https://bmcpediatr.biomedcentral.com/articles/10.1186/1471-2431-8-19 • De Onis M, Blössner M, Borghi E, et al. (2004), Methodology for estimating regional and global trends of childhood malnutrition. Int J Epidemiol, 33(6):1260-70. • United Nations Children's Fund, World Health Organization, The World Bank (2012). UNICEF-WHO-World Bank Joint Child Malnutrition Estimates. (UNICEF, New York; WHO, Geneva; The World Bank, Washington, DC; 2012). • United Nations Statistics Division (2022). SDG Indicator 2.2.2b. Metadata, https://unstats.un.org/sdgs/metadata/files/Metadata-02-02-02b.pdf • World Health Organization (2008). Training Course on Child Growth Assessment: WHO Child Growth Standards

1.2.6. Vaccinated Children

Indicator:	(UMF-14) DTP3 immunization coverage
Source/Origins	**World Health Organization/Global Health Observatory Indicators; UNICEF**
Definition and method of computation:	Proportion of children (12-23 months) in urban areas who received 3rd dose of Diphtheria Tetanus Pertussis containing (DTP) vaccines **Methodology** Numerator: Number of children aged 12–23 months receiving three doses of DTP3 vaccine. Denominator: Total number of children aged 12–23 months surveyed *Note: In certain countries, the time period of 12–23 months is adjusted to align with alternative national immunization periods (18–29 months or 15–26 months).*
Rationale and interpretation:	Immunization is an essential component for reducing under-5 mortality. Immunization coverage estimates are used to monitor coverage of immunization services and to guide disease eradication and elimination efforts. It is a good indicator of health system performance.
Disaggregation:	Age (current mother's age), Economic status (wealth quintile and wealth decile), Education (mother's education), Place of residence, Sex, urban sub-regions
Sources and data collection:	• City, regional, and national health ministry/ Departments. • Household surveys (e.g. DHS, MICS); Facility reporting system; Civil registration
References:	• World Health Organization, Global Health Observatory (2022) https://www.who.int/data/gho/indicator-metadata-registry/imr-details/3335

1.2.7. Welfare of Migrants

Indicator:	(UMF-15) Availability/existence of migration policies to facilitate orderly, safe, regular and responsible migration and mobility of people
Source/Origins	**SDG Indicator 10.7.2**
Definition and method of computation:	The conceptual framework for this indicator is IOM´s Migration Governance Framework (MiGOF), which was welcomed by 157 countries (IOM Council Resolution C/106/RES/1310). The MiGOF has three principles and three objectives (figure 1). Figure 1. Principles and objectives of the Migration Governance Framework 

The three principles propose the necessary conditions for migration to be well-managed by creating a more effective environment for maximized results for migration to be beneficial to all. These represent the means through which a State can ensure that the systemic requirements for good migration governance are in place.

The three objectives are specific and do not require any further conventions, laws or practices than the ones that are already existing. Taken together, these objectives ensure that migration is governed in an integrated and holistic way, responding to the need to consider mobile categories of people and address their needs for assistance in the event of an emergency, building resilience of individuals and communities, as well as ensuring opportunities for the economic and social health of the State.

In line with the MiGOF, the proposed methodology for this indicator (also SDG Indicator 10.7.2) is comprised of six policy domains, with one proxy measure for each domain (table 1).

Table 1. Domains and proxy measures for SDG indicator 10.7.2

	Domain	Proxy measure
1.	Migrant rights	Degree to which migrants have equity in access to services, including health care, education, decent work, social security and welfare benefits
2.	Whole-of-government/ Evidence-based policies	Dedicated institutions, legal frameworks and policies or strategies to govern migration
3.	Cooperation and partnerships	Government measures to foster cooperation and encourage stakeholder inclusion and participation in migration policy
4.	Socioeconomic well-being	Government measures to maximize the positive development impact of migration and the socioeconomic well-being of migrants
5.	Mobility dimensions of crises	Government measures to deliver comprehensive responses to refugees and other forcibly displaced persons
6.	Safe, orderly and regular migration	Government measures to address regular or irregular immigration

For each of the domains and corresponding proxy measures, one question was specified, each one of them informed by five sub-categories or responses (table 2), to capture key aspects of the range of migration policies at the national level, while allowing the indicator to detect relevant variations across countries and over time.

Table 2. Questions and sub-categories for SDG indicator 10.7.2

	Question	Sub-categories
Domain 1:	Does the Government provide non-nationals equal access to the following services, welfare benefits and rights?	a. Essential and/or emergency health care b. Public education c. Equal pay for equal work d. Social protection e. Access to justice

	Domain 2:	Does the Government have any of the following institutions, policies or strategies to govern immigration or emigration?	a. A dedicated Government agency to implement national migration policy b. A national policy or strategy for regular migration pathways, including labour migration c. A national policy or strategy to promote the inclusion or integration of immigrants d. Formal mechanisms to ensure that the migration policy is gender responsive e. A mechanism to ensure that migration policy is informed by data, appropriately disaggregated
	Domain 3:	Does the Government take any of the following measures to foster cooperation among countries and encourage stakeholder inclusion and participation in migration policy?	a. An inter-ministerial coordination mechanism on migration b. Bilateral agreements on migration, including labour migration c. Regional agreements promoting mobility d. Agreements for cooperation with other countries on return and readmission e. Formal mechanisms to engage civil society and the private sector in the formulation and implementation of migration policy
	Domain 4:	Does the Government take any of the following measures to maximize the positive development impact of migration and the socioeconomic well-being of migrants?	a. Align, through periodic assessments, labour migration policies with actual and projected labour market needs b. Facilitate the portability of social security benefits c. Facilitate the recognition of skills and qualifications acquired abroad d. Facilitate or promote the flow of remittances e. Promote fair and ethical recruitment of migrant workers
	Domain 5:	Does the Government take any of the following measures to respond to refugees and other persons forcibly displaced across international borders?	a. System for receiving, processing and identifying those forced to flee across international borders b. Contingency planning for displaced populations in terms of basic needs such as food, sanitation, education and medical care c. Specific measures to provide assistance to citizens residing abroad in countries in crisis or post-crisis situations d. A national disaster risk reduction strategy with specific provisions for addressing the displacement impacts of disasters e. Grant permission for temporary stay or temporary protection for those forcibly displaced across international borders and those unable to return

	Domain 6:	Does the Government address regular or irregular immigration through any of the following measures?	a. System to monitor visa overstays b. Pre-arrival authorization controls c. Provisions for unaccompanied minors or separated children d. Migration information and awareness-raising campaigns e. Formal strategies to address trafficking in persons and migrant smuggling
	Methodology The indicator includes a total of 30 sub-categories, under 6 questions/domains. All sub-categories, except for those under domain 1, have dichotomous "Yes/No" answers, coded "1" for "Yes" and "0" for "No". For the sub-categories under domain 1, there are three possible answers: "Yes, regardless of immigration status", coded "1"; "Yes, only for those with legal immigration status", coded "0.5"; and "No" coded "0". For each domain, the computational methodology is the unweighted average of the values across sub-categories: $D_i = \frac{\sum_j^{\square} s_{ji}}{n} 100$ Where D_i refers to the value for domain i; $\sum_j^{\square} s_{ji}$ refers to the sum of the values across sub-categories (indexed by j) under domain i; and n refers to the total number of sub-categories in a domain (n=5). Results are reported as percentages. For each domain, values of range from a minimum of 0 to a maximum of 100 per cent. The overall summary indicator 10.7.2 for a country is obtained by computing the unweighted average of the values of the 30 sub-categories under the six domains, with values ranging between 0 and 100 per cent.		
Rationale and interpretation:	For ease of interpretation and to summarize results, the resulting country-level averages (for the overall indicator and by domain) are then categorized as follows: values of less than 40 are coded as "Requires further progress"; values of 40 to less than 80 are coded as "Partially meets", values of 80 to less than 100 are coded as "Meets"; and values of 100 are coded as "Fully meets"[15].		
Disaggregation:	Six policy domains: (i) migrant rights; (ii) whole-of-government/evidence-based policies; (iii) cooperation and partnerships; (iv) socioeconomic well-being; (v) mobility dimensions of crises; and (vi) safe, orderly and regular migration		
Sources and data collection:	Data may be collected at the city/country level based on the guide provided by the SDG indicator 10.7.2 Metadata. At the national level, the sources of data include the UN Inquiry among Governments on Population and Development, which has been used to survey global population policies since 1963, including policies on international migration.		
Comments and limitations:	The indicator is broad in scope and many, but not all, of the terms are well defined. The IOM Glossary on Migration provides a definition of key concepts such as orderly and regular migration, but not others such as safe and responsible migration. According to the Glossary, orderly migration refers to "the movement of a person from his/her usual place of residence, in keeping with the laws and regulations governing exit of the country of origin and travel, transit and entry into the host country". Regular is defined as "migration that occurs through recognized, legal channels".		

15 For additional information see: SDG Indicator 10.7.1. Metadata.

	While the concept of "well-managed migration policies" is not explicitly defined, according to the IOM Glossary, it is included in references to migration management, migration governance and facilitated migration. Migration management refers to the planned approach to the development of policy, and legislative and administrative responses to key migration issues. Migration governance is defined as a system of institutions, legal frameworks, mechanisms and practices aimed at regulating migration and protecting migrants. Facilitated migration refers to fostering or encouraging regular migration, for example through streamlined visa application process.
References:	• Department of Economic and Social Affairs (2020). Population Division, http://www.un.org/en/development/desa/population/index.shtml • Organization for Economic Co-operation and Development (2021), Migration. http://www.oecd.org/migration/ • UN Population Division, (2019), UN Inquiry among Governments on Population and Development: https://esa.un.org/PopPolicy/Inquiry.aspx • UN-Migration (IOM), (2020). Making Migration Work for All, https://www.iom.int/ • UN-Migration (IOM). (2020). Migration Governance Framework (MiGOF): https://www.iom.int/sites/default/files/about-iom/migof_brochure_a4_en.pdf

1.2.8. Multilingual Education

Indicator:	**(UMF-16) Multilingual education (extent in primary and secondary education)**
Source/Origins	**Culture 2030 (15)**
Definition and method of computation:	Percentage of instructional hours dedicated to multilingualism in relation to the total number of instructional hours dedicated to languages in: • Primary (ISCED 1) • Lower secondary school (ISCED 2) Multilingual education refers to the use of at least three languages, for example, the mother tongue, a regional or national language and an international language in education. **Methodology** Indicator = $ILR + II + (1 - 1/B) \times ION$ ION is the annual percentage of instructional hours dedicated to official or national languages during a particular level of schooling (ISCED 1 or ISCED 2), in relation to the total number of hours dedicated to teaching languages; ILR is the annual percentage of instructional hours dedicated to local or regional languages during a particular level of schooling, in relation to the total number of hours dedicated to teaching languages; II is the annual percentage of instructional hours dedicated to international languages during the same level of schooling, in relation to the total number of hours dedicated to teaching languages; B is the number of official or national languages taught.
Rationale and interpretation:	The indicator is used to give an approximate value for the extent to which multilingualism is promoted in primary and secondary education as an approximation of the levels of promotion of intercultural dialogue, safeguarding and understanding of cultural diversity within the education system.
Sources and data collection:	• UNESCO data: Education Sector of UNESCO, IBE • National and local sources: Official school curriculum obtained from the Ministry of Education

Comments and limitations:

Urban Level

The original CDIS indicator was developed by UNESCO applied only the first two years of lower secondary school. The current version of the indicator has been adjusted to conform to the International Standard Classification of Education (ISCED 2011). This increases international comparability and increases conformity with indicators for SDG 4.

The indicator will be applied separately for primary (ISCED 1) and lower secondary education (ISCED 2). There are few dimensions of culture that can be examined at the level of primary education; however, language of instruction is one. The indicator for primary education would also then reflect UNESCO guidance that mother tongue teaching should be used in primary school.

In covering primary and lower secondary education, this and the subsequent indicators are the prime metric for the status of culture in the formal school system. Subsequent indicators examine the place of culture in post-secondary and non-formal education. It is important to note that a National Curriculum may not reflect what is taught in schools. For example, a limited supply of teachers from minority groups may prevent lessons being taught in local languages. However, few countries have clearly documented records of 'actual' language of instruction.

It has been suggested that curricula may not differ between national and urban levels. However, this indicator is still valid for urban analysis as

- In some countries there are major differences between national and regional/local curricula.
- The indicator will allow consideration of the degree to which curricula at local level reflect the cultural/linguistic composition of the city which may be different from that at national level.
- The indicator will allow consideration as to the extent to which mother tongue education takes place in the city (consideration of teachers' language skills would be needed in addition to the current indicator).

	Hours of Instruction		Source	Year
	Primary	Lower Secondary		
Percentage of the total annual instructional hours dedicated to official or national languages in secondary school in relation to the total number of hours dedicated to teaching languages				
Percentage of the total annual instructional hours dedicated to local or regional languages in secondary school, in relation to the total number of hours dedicated to teaching languages				
Percentage of the total annual instructional hours dedicated to international languages in secondary school, in relation to the total number of hours dedicated to teaching languages				

References:

- UNESCO (2019). Culture 2030 Indicators. http://uis.unesco.org/sites/default/files/documents/publication_culture_2020_indicators_en.pdf

1.3. Resilient City Objective

1.3.1. Life Expectancy at Birth

Indicator:	(UMF-17) Life expectancy at birth
Source/Origins	**CPI**
Definition and method of computation:	Average number of years that a newborn could expect to live if he or she were subject to the age-specific mortality rates of a given period (United Nations, 2007). **Methodology** The most generalized and widely accepted procedure to estimate this indicator in case it is not available at city level is to construct a life table. The World Health Organization (2014) mentions, "life tables have been developed for all Member States for years 1990-2012 starting with a systematic review of all available evidence from surveys, censuses, sample registration systems, population laboratories and vital registration on levels and trends in under-5 and adult mortality rates." According to Fitzpatrick (2001), the information needed to estimate a life table is: a) Population expressed in year age bands (usually in 5 years age bands) and b) Deaths in year age bands (usually in 5 years age bands). Based on that information all other columns of data and the expectation of life can be calculated. The final estimation of life expectancy is made through the following formula: $Life\ expctancy\ at\ birth: e_0 = \frac{T_0}{l_0}$ This equation has been adapted from the following generalized life expectancy estimation formula used to estimate the life table: $e_x = \frac{T_x}{l_x}$ where: e_x : Life expectancy at age "x", which means the number of years a person aged "x" can be expected to live. T_x : Total number of years lived at age "x" after the interval. l_x : Number of people alive at the start of the interval Both "T_x" and "l_x" include previous calculations of the probability of surviving, the average proportion of the year lived by those who die and intervals' corrections and adjustments (For more estimation details, see Fitzpatrick, 2001). It is important to note that as mentioned by World Health Organization (2014) there are alternative ways of estimating life tables and life expectancy; some of them may include adjustments for health and country conditions (e.g., high levels of HIV). Then, the procedure selected depends on the country.
Rationale and interpretation:	A health system's main objective is to preserve individuals' lives. Life expectancy is the most used measure to describe population health as it reflects the overall mortality levels of a population. It measures on average how long a person is expected to live, based on current age and sex-specific death rates. The life expectancy for a particular person or population group depends on variables such as their lifestyle, access to healthcare, diet, economic status and the relevant mortality and morbidity data (AIHW, 2015). It is, therefore, related to the health conditions of the population, which are key factors in fostering economic growth, sustainable development and increase people's well-being (Medical Net, 2015).

	Life expectancy at birth is expressed as the number of years of life a newborn is expected to live if current mortality rates continue to apply; it summarizes the mortality pattern that prevails across all age groups - children and adolescents, adults and the elderly (WHO, 2006). A prosperous city will thus seek to increase the life expectancy of its citizens in order to increase their quality of life.
Sources and data collection:	Usually this indicator is already estimated (and projected) by the Statistics Department of the city/ government, Country's Statistics Department: Vital registration systems, censuses, or demographic surveys; United Nations Department of Economic and Social Affairs (Population Division; United Nations Children's Fund (UNICEF); and World Health Organization (WHO).
Comments and limitations:	Usually, this indicator is estimated every five years. As a result of this, yearly changes may not be available. When high quality data on deaths (from vital registrations) or appropriate age adjustments cannot be found, population censuses can provide adequate information. If high quality data is not available, a method that encompasses indicators of mortality from indirect information on the risks of death obtained from special questions included in censuses or demographic surveys can be used (United Nations, 2007).
References:	• AIHW (Australian Institute of Health Welfare), (2015), Life Expectancy and Deaths, http://www.aihw.gov.au/deaths/life-expectancy • Fitzpatrick, Justine (2001). Calculating life expectancy and infant mortality rates Technical Supplement • Light Sleeper (2014). London Health Observatory • Medical Net (2015). What is Life Expectancy? http://www.news-medical.net/health/What-is-Life-Expectancy.aspx • The World Bank (2014). Life Expectancy at Birth. • United Nations (2007). Indicators of Sustainable Development: Guidelines and Methodologies. Third Edition, United Nations, New York. • World Health Organization (WHO). (2006). Metadata: Life Expectancy at Birth. • World Health Organization (WHO). (2018). WHO Methods and data sources for life tables 1990 - 2016 • World Health Organization (2014). WHO methods for life expectancy and healthy life expectancy – Department of Health Statistics and Information. Systems (page 5). Geneva, Switzerland

1.3.2. Mortality Rate (Diseases)

Indicator:	**(UMF-18) Mortality rate attributed to cardiovascular disease, cancer, diabetes or chronic respiratory disease**
Source/Origins	**SDG Indicator 3.4.1**
Definition and method of computation:	Mortality rate attributed to cardiovascular disease, cancer, diabetes, or chronic respiratory disease. Probability of dying between the ages of 30 and 70 years from cardiovascular diseases, cancer, diabetes or chronic respiratory diseases, defined as the per cent of 30-year-old-people who would die before their 70th birthday from cardiovascular disease, cancer, diabetes, or chronic respiratory disease, assuming that s/he would experience current mortality rates at every age and s/he would not die from any other cause of death (e.g., injuries or HIV/AIDS). This indicator is calculated using life table methods.

	Methodology There are 4 steps involved in the calculation of this indicator: 1. Estimation of WHO life tables based on the UN World Population Prospects 2012 revision. 2. Estimation of cause-of-death distributions. 3. Calculation of age-specific mortality rates from the four main NCDs for each five-year age range between 30 and 70. 4. Calculation of the probability of dying between the ages of 30 and 70 years from cardiovascular diseases, cancer, diabetes or chronic respiratory diseases. Data is often managed at the national level, with the methods used for the analysis of causes of death depending on the type of data available from countries/regions/cities: • For countries with a high-quality vital registration system including information on cause of death, the vital registration that member states submit to the WHO Mortality Database are used, with adjustments where necessary, e.g., for under-reporting of deaths. • For countries or cities without high-quality death registration data, cause of death estimates is calculated using other data, including household surveys with verbal autopsy, sample or sentinel registration systems, special studies and surveillance systems. In most cases, these data sources are combined in a modelling framework. The probability of dying between ages 30 and 70 years from the four main NCDs was estimated using age-specific death rates of the combined four main NCD categories. Using the life table method, the risk of death between the exact ages of 30 and 70, from any of the four causes and in the absence of other causes of death, was calculated using the equation below. The ICD codes used are: Cardiovascular disease: I00-I99, Cancer: C00-C97, Diabetes: E10-E14, and Chronic respiratory disease: J30-J98 Formulas to (1) calculate age-specific mortality rate for each five-year age group between 30 and 70, (2) translate the 5-year death rate into the probability of death in each 5-year age range, and (3) calculate the probability of death from age 30 to age 70, independent of other causes of death, can be found on page 6 of the NDC Global Monitoring Framework Document (World Health Organization, 2014).
Rationale and interpretation:	Disease burden from non-communicable diseases (NCDs) among adults is rapidly increasing in developing countries due to ageing. Cardiovascular diseases, cancer, diabetes and chronic respiratory diseases are the four main causes of NCD burden. Measuring the risk of dying from these four major causes is important to assess the extent of burden from premature mortality due NCDs in a population.
Disaggregation:	Sex, age and cause of death
Sources and data collection:	The preferred data source is death registration systems with complete coverage and medical certification of cause of death. City level data may be acquired from geographically disaggregated country level data, or from city departments. Other possible data sources include household surveys with verbal autopsy, and sample or sentinel registration systems.
Comments and limitations:	Cause of death estimates have large uncertainty ranges for some causes and some regions. Data gaps and limitations in high-mortality regions reinforce the need for caution when interpreting global comparative cause of death assessments, as well as the need for increased investment in population health measurement systems. The use of verbal autopsy methods in sample registration systems, demographic surveillance systems and household surveys provides some information on causes of death in populations without well-functioning death registration systems, but there remain considerable challenges in the validation and interpretation of such data, and in the assessment of uncertainty associated with diagnoses of underlying cause of death.

References:	• United Nations Statistics Division (2022). SDG 3.4.1. Metadata: https://unstats.un.org/sdgs/metadata/files/Metadata-03-04-01.pdf • World Health Assembly Resolution, WHA66.10 (2014): Follow-up to the Political Declaration of the High-level Meeting of the General Assembly on the Prevention and Control of Non-communicable Diseases. Including Appendix 2: Comprehensive global monitoring framework, including 25 indicators, and a set of nine voluntary global targets for the prevention and control of noncommunicable diseases: http://apps.who.int/gb/ebwha/pdf_files/WHA66/A66_R10-en.pdf?ua=1 • World Health Organization (2013). Global Action Plan for the Prevention and Control of Noncommunicable Diseases 2013-2020: http://apps.who.int/iris/bitstream/10665/94384/1/9789241506236_eng.pdf?ua=1 • World Health Organization (2014). NCD Global Monitoring Framework: Indicator Definitions and Specifications. Geneva: (http://www.who.int/nmh/ncd-tools/indicators/GMF_Indicator_Definitions_FinalNOV2014.pdf?ua=1) • World Health Organization (2017). WHO methods and data sources for global causes of death, 2000–2015: http://www.who.int/healthinfo/global_burden_disease/GlobalCOD_method_2000_2015.pdf • World Health Organization (2020). Global Health Observatory visualizations: Indicator Metadata Registry: http://apps.who.int/gho/indicatorregistry/App_Main/view_indicator.aspx?iid=3354

1.3.3. Mortality Rate (Suicide)

Indicator:	**(UMF-19) Suicide mortality rate**
Source/Origins	**SDG Indicator 3.4.2**
Definition and method of computation:	The Suicide mortality rate as defined as the number of suicide deaths in a year, divided by the population, and multiplied by 100 000. **Methodology** *Suicide mortality rate (per 100,000 population) = (Number of suicide deaths in a year x 100,000) / Mid–year population for the same calendar year* The methods to be used for the analysis of causes of death depend on the type of data available from cities/countries: For cities/countries with a high-quality vital registration system including information on cause of death, the vital registration may be used with adjustments where necessary, e.g. for under-reporting of deaths. For cities/countries without high-quality death registration data, cause of death estimates is calculated using other data, including household surveys with verbal autopsy, sample or sentinel registration systems, special studies and surveillance systems. In most cases, these data sources are combined in a modelling framework.
Rationale and interpretation:	Mental disorders occur in all regions and cultures of the world. The most prevalent of these disorders are depression and anxiety, which are estimated to affect nearly 1 in 10 people. At its worst, depression can lead to suicide. In 2012, there were over 800,000 estimated suicide deaths worldwide. Suicide was the second leading cause of deaths among young adults aged 15–29 years, after road traffic injuries.
Disaggregation:	Sex, age group
Sources and data collection:	City level may be held by the city health ministry's/ departments. Data reported to the WHO is often available at the national level, and city level data may be acquired from its geographical disaggregated. Around 70 countries currently provide WHO with regular high-quality data on mortality by age, sex and causes of death, and another 40 countries submit data of lower quality.

Regional and global estimates	Country estimates of number of deaths by cause are summed to obtain regional and global aggregates.
References:	• World Health Organization (2020). Global Health Observatory visualizations: Indicator Metadata Registry: http://apps.who.int/gho/indicatorregistry/App_Main/view_indicator.aspx?iid=3354 • World Health Organization (2017). WHO methods and data sources for global causes of death, 2000–2015: http://www.who.int/healthinfo/global_burden_disease/GlobalCOD_method_2000_2015.pdf • World Health Assembly Resolution WHA66.8 (2013): Comprehensive mental health action plan 2013–2020, including Appendix 1: Indicators for Measuring Progress Towards Defined Targets of the Comprehensive Mental Health Action Plan 2013-2020 (http://apps.who.int/gb/ebwha/pdf_files/WHA66/A66_R8-en.pdf?ua=1) • United Nations Statistics Division (2022). SDG 3.4.2. Metadata: https://unstats.un.org/sdgs/metadata/files/Metadata-03-04-02.pdf

1.3.4. Population Affected by Hazardous Events

Indicator:	**(UMF-20) Number of deaths, missing persons and directly affected persons attributed to disaster per 100,000 population**
Source/Origins	**SDG 11.5.1**
Definition and method of computation:	This indicator measures the number of people who died, went missing or were directly affected by disasters per 100,000 population. **Methodology** $$X = \frac{(A_2 + A_3 + B_1)}{Total\ Population} \times 100{,}000$$ Where: A_2 Number of deaths attributed to disasters. A_3 Number of missing persons attributed to disasters; and B_1 Number of directly affected people attributed to disasters.
Rationale and interpretation:	The Sendai Framework for Disaster Risk Reduction 2015-2030, adopted by UN Member States in March 2015 as a global policy of disaster risk reduction, targets to substantially reduce global disaster mortality and the number of affected people by 2030. Progress in the realization of these targets contributes to sustainable development and strengthen economic, social, health and environmental resilience. **Concepts:** **Death:** The number of people who died during the disaster, or directly after, as a direct result of the hazardous event. **Missing:** The number of people whose whereabouts is unknown since the hazardous event. It includes people who are presumed dead, for whom there is no physical evidence such as a body, and for which an official/legal report has been filed with competent authorities. **Directly affected:** The number of people who have suffered injury, illness or other health effects, who were evacuated, displaced, relocated or have suffered direct damage to their livelihoods, economic, physica A_2 l, social, cultural and environmental assets. Note: *Indirectly affected are people who have suffered consequences, other than or in addition to direct effects, over time, due to disruption or changes in economy, critical infrastructure, basic services, commerce or work, or social, health and psychological consequences.*

Disaggregation:	• Number of deaths attributed to disasters. • Number of missing persons attributed to disasters; and • Number of directly affected people attributed to disasters. Desirable disaggregation: Hazard, geography (administrative unit), sex/gender, age (3 categories), disability, income
Sources and data collection:	National, region and local governments often have disaster data collected by line ministries/departments. National disaster loss databases are established and managed by special purpose agencies including national disaster management agencies, civil protection agencies, and meteorological agencies. National level data may be held by the Country's Sendai Framework Focal Points.
References:	**Bibliographic references** • United Nations Statistics Division (2022). SDG 11.5.1. Metadata: https://unstats.un.org/sdgs/metadata/files/Metadata-11-05-01.pdf

1.3.5. Mortgage Debt Relative to GDP

Indicator:	**(UMF-21) Mortgage debt relative to GDP**
Source/Origins	**NUA-37**
Definition and method of computation:	A mortgage is a debt whose collateral is the real estate property itself. The borrower owns the structure once he/she has paid off the mortgage. The advantage of a mortgage is that it allows the borrower to spread loan repayments over a period that is manageable to the borrower. There are big variations in levels of mortgage debt to GDP among countries. However, this is partly explained by differences in home ownership levels (The Economist). **Computation Method:** $Mortgage\ debt\ as\ a\ percentage\ of\ GDP = 100\left[\frac{Mortgage\ debt}{GDP}\right]$ Mortgage debt in national currency. GDP is at current prices in national currency
Rationale and interpretation:	There are many reasons to monitor mortgage debt. Most households cannot afford to pay for a house or flat without getting a mortgage loan. Hence, the availability of mortgage loans is key to increasing homeownership. Increasing homeownership is one of the major ways to achieving adequate housing for all, one of the key commitments in the New Urban Agenda (NUA §31). Houses and apartments provide housing for households and are also a major asset for households. The more mortgage loans are readily available, the more households become homeowners. There are also macroeconomic reasons for monitoring mortgage debt, it is important that policies are in place to ensure that borrowers purchase properties that they can afford. It is important to monitor mortgage debt. The financial crisis in 2008/2009 began in the housing sector. **Concepts:** Mortgage Dept is the outstanding mortgage debt relative to GDP and gauges the depth of mortgage markets by focusing on the total volume (Badev & Others, 2014). Housing Loan Penetration: The percentage of adult population with an outstanding loan to purchase a home (Badev & Others, 2014).
Sources and data collection:	The Ministry selected by the government as the focal point for this indicator. The most common data source for mortgage debt is a country's Central Bank. City/regional or local data may be available from the disaggregation of national data or from local government departments. At the national level, the Data from 2016 Housing Finance in Africa Yearbook can be used as baseline data for those countries covered (Centre for Affordable Housing in Africa, "2016).

References:	• Badev A., Thorsten B., Ligia V., Simon W., (2014). "Housing Finance Across Countries New Data and Analysis", Policy Research Working Paper 6756, page 5. World-Bank Document, data sources are listed in Appendix A1 of this World Bank Working paper. • Centre for Affordable Housing in Africa. (2016). Housing Finance in Africa Yearbook", Housing Finance - Yearbook • The Economist (2007). Economic and Financial Indicators; Mortgage Debt and GDP. The Economists - Financial Indicators • UN-Habitat (2020). NUA Monitoring Framework and Related Indicators. https://unhabitat.org/sites/default/files/2020/10/nua-monitoring-framework-and-related-indicators_1.pdf

1.3.6. Food Insecurity

Indicator:	**(UMF-22) Prevalence of moderate or severe food insecurity in the population, based on the Food Insecurity Experience Scale- FIES**
Source/Origins	**SDG Indicator 2.1.2**
Definition and method of computation:	**Definition:** The indicator measures the percentage of individuals in the population who have experienced food insecurity at moderate or severe levels during the reference period. It is a measure of access to food. The severity of food insecurity, defined as a latent trait, is measured on the Food Insecurity Experience Scale global reference scale, a measurement standard established by FAO through the application of the Food Insecurity Experience Scale in more than 140 countries worldwide, starting in 2014. **Concepts:** Extensive research over more than 25 years has demonstrated that the inability to access food results in a series of experiences and conditions that are fairly common across cultures and socio-economic contexts. These range from being concerned about the ability to obtain enough food, to the need to compromise on the quality or the diversity of food consumed, to being forced to reduce the intake of food by cutting portion sizes or skipping meals, up to the extreme condition of feeling hungry and not having means to access any food for a whole day. Food Insecurity Experience Scale (FIES) is experience-based measures of household or individual food security. The FIES Survey Module (FIES-SM) consists of eight questions regarding people's access to adequate food and can be easily integrated into various types of population surveys. The FIES-SM questions refer to the experiences of the individual respondent or of the respondent's household as a whole. The questions focus on self-reported food-related behaviours and experiences associated with increasing difficulties in accessing food due to resource constraints: During the last 12 months, was there a time when, because of lack of money or other resources: link 1. You were worried you would not have enough food to eat? 2. You were unable to eat healthy and nutritious food? 3. You ate only a few kinds of foods? 4. You had to skip a meal? 5. You ate less than you thought you should? 6. Your household ran out of food? 7. You were hungry but did not eat? 8. You went without eating for a whole day? Responses: 0- No, 1-Yes, 98-Don't Know, and 99-Refused

	Method of computation: Data at the individual or household level is collected by applying an experience-based food security scale questionnaire within a survey. The food security survey module collects answers to questions asking respondents to report the occurrence of several typical experiences and conditions associated with food insecurity. The data is analysed using the Rasch model (also known as one-parameter logistic model, 1-PL) (Ref. SDG Metadata 2.1.2 for detailed methodology: Link).
Rationale and interpretation:	People experiencing moderate food insecurity face uncertainties about their ability to obtain food and have been forced to reduce, at times during the year, the quality and/or quantity of food they consume due to lack of money or other resources. People facing severe food insecurity, on the other hand, have likely run out of food, experienced hunger and, at the most extreme, gone for days without eating, putting their health and well-being at grave risk.
Disaggregation:	If applied at household level, disaggregation is possible based on household characteristics such as location, household income, composition (including for example presence and number of small children, members with disabilities, elderly members, etc.), sex, age and education of the household head, etc. If applied at the individual level, proper disaggregation of the prevalence of food insecurity by sex is possible as the prevalence of food insecurity among male and among female members of the same population group can be measured independently.
Sources and data collection:	Data can be collected using the Food Insecurity Experience Scale survey module (FIES-SM) developed by FAO, or any other experience-based food security scale questionnaires, including: • the Household Food Security Survey Module (HFSSM) developed by the Economic Research Service of the US Department of Agriculture, and used in the US and Canada; • the Latin American and Caribbean Food Security Scale (or Escala Latinoamericana y Caribeña de Seguridad Alimentaria – ELCSA), used in Guatemala and tested in several other Spanish speaking countries in Latin America; • the Mexican Food Security Scale (or Escala Mexicana de Seguridad Alimentaria, - EMSA), an adaptation of the ELCSA used in Mexico; • the Brazilian Food Insecurity Scale (Escala Brasileira de medida de la Insegurança Alimentar – EBIA) used in Brazil; • the Household Food Insecurity Access Scale (HFIAS); or any adaptation of the above that can be calibrated against the global FIES. Two versions of the FIES-SM are available for use in surveys of individuals or households respectively.
Comments and limitations:	Adoption of this indicator requires regular data collection in surveys (via telephone or face-to-face). Only a few cities in the world currently collect experience-based food insecurity data that are representative of their urban populations. Country-level statistics are available for a large number of countries on FAOSTAT and the UN SDG monitoring webpage, starting in 2014 (3-year averages, only, while annual values are provided for regional aggregates). While FIES data is relatively easy and inexpensive to collect, the analytic protocols involving application of the Rasch Model require sophisticated statistical expertise.
References:	• Cafiero C, Viviani S, Nord M. (2018). Food security measurement in a global context: the Food Insecurity Experience Scale. Measurement. 2018; vol 116; p.146-152. https://www.sciencedirect.com/science/article/pii/S0263224117307005#! • FAO, 2018. SDG Indicator 2.1.2 – Using the Food Insecurity Experience Scale (FIES) (e-learning course). https://elearning.fao.org/course/view.php?id=360 • FAO. 2016. Methods for estimating comparable rates of food insecurity experienced by adults throughout the world. Rome. i4830e.pdf (fao.org) • FAO. 2018. Voices of the hungry. In: FAO [online]. Rome. www.fao.org/in-action/ voices-of-the-hungry • United Nations Statistics Division (2022). SDG Indicator 2.1.2 Metadata. https://unstats.un.org/sdgs/metadata/files/Metadata-02-01-02.pdf

1.4. Sustainable City Objective

1.4.1. Slum Population

Indicator:	(UMF-23) Proportion of urban population living in slums, informal settlements, or inadequate housing
Source/Origins	SDG Indicator 11.1.1
Definition and method of computation:	As per the 2030 Agenda, it is necessary to identify and quantify the proportion of the population that live in slums, informal settlements and those living in inadequate housing in order to inform the development of the appropriate policies and programmes for ensuring access for all to adequate housing and the upgrading of slums. **a. Slums** An expert group meeting was convened in 2002 by UN-Habitat, the United Nations Statistics Division and the Cities Alliance to agree on an operational definition for slums to be used for measuring the indicator of MDG 7 Target 7.D. The agreed definition classified a 'slum household' as one in which the inhabitants suffer one or more of the following 'household deprivations': 1. Lack of access to improved water source, 2. Lack of access to improved sanitation facilities, 3. Lack of sufficient living area, 4. Lack of housing durability and, 5. Lack of security of tenure. By extension, the term 'slum dweller' refers to a person living in a household that lacks any of the above attributes. For each component, the experts agreed with the following sub-definitions: **1) Access to improved water** – A household is considered to have access to improved drinking water if the household members use a facility that is protected from outside contamination, from fecal matters' contamination. Improved drinking water sources include: piped water into dwelling, plot or yard; public tap/stand pipe serving no more than 5 households; protected spring; rainwater collection; bottled water (if secondary source is also improved); bore hole/tube well; and, protected dug well. **2) Access to improved sanitation** – A household is considered to have access to improved sanitation if household members have access to a facility with an excreta disposal system that hygienically separates human waste from human contact. Improved facilities include flush/pour-flush toilets or latrines connected to a sewer, septic tank or pit; ventilated improved pit latrine; pit latrine with a slab or platform, which covers the pit entirely; and, composting toilets/latrines. **3) Sufficient living area /overcrowding**– A dwelling unit provides sufficient living area for the household members if not more than three people share the same habitable room. Additional indicators of overcrowding have been proposed: area-level indicators such as average in-house living area per person or the number of households per area. Additionally, housing-unit level indicators such as the number of persons per bed or the number of children under five per room may also be viable. However, the number of persons per room has been shown to correlate with adverse health risks and is more commonly collected through household survey. UN-Habitat believes that the definition as it stands does not reflect the practical experience of overcrowding and as noted below, is proposing an alternative.

4) Structural quality/durability of dwellings – A house is considered as 'durable' if it is built on a non-hazardous location and has a permanent and adequate structure able to protect its inhabitants from the extremes of climatic conditions such as rain, heat, cold, and humidity. The following criteria are used to determine the structural quality/durability of dwellings: permanency of structure (permanent building material for the walls, roof and floor; compliance with building codes; the dwelling is not in a dilapidated state; the dwelling is not in need of major repair); and location of house (hazardous location; the dwelling is not located on or near toxic waste; the dwelling is not located in a flood plain; the dwelling is not located on a steep slope; the dwelling is not located in a dangerous right of way: rail, highway, airport, power lines).

5) Security of tenure – Secure tenure is the right of all individuals and groups to effective protection by the State against forced evictions. Security of tenure is understood as a set of relationships with respect to housing and land, established through statutory or customary law or informal or hybrid arrangements, that enables one to live in one's home with security, peace and dignity (A/HRC/25/54). Regardless of the type of tenure, all persons with security of tenure have a legal status against arbitrary unlawful eviction, harassment and other threats. People have secure tenure when: there is evidence of documentation that can be used as proof of secure tenure status; and, there is either de facto or perceived protection from forced evictions. Important progress has been made to integrate the measurement of this component into the computation of the people living in slums.

b) Informal Settlements

Informal settlements are usually seen as synonymous of slums, with a particular focus on the formal status of land, structure, and services. They are defined by three main criteria, according to Habitat III Issue Paper #22, which are already covered in the definition of slums. These are:

1. Inhabitants have no security of tenure vis-à-vis the land or dwellings they inhabit, with modalities ranging from squatting to informal rental housing,
2. The neighborhoods usually lack, or are cut off from, formal basic services and city infrastructure, and
3. The housing may not comply with current planning and building regulations, is often situated in geographically and environmentally hazardous areas, and may lack a municipal permit.

Informal settlements can be occupied by all income levels of urban residents, affluent and poor.

c) Inadequate Housing

Article 25 of the Universal Declaration of Human Rights includes housing as one of the components of the right to adequate standards of living for all.[16] The United Nations Committee on Economic, Social and Cultural Rights' general comments No.4 (1991) on the right to adequate housing and No.7 (1997) on forced evictions have underlined that the right to adequate housing should be seen as the right to live somewhere in security, peace and dignity. For housing to be adequate, it must provide more than four walls and a roof, and at a minimum, meet the following criteria:

1. **Legal security of tenure,** which guarantees legal protection against forced evictions, harassment and other threats.
2. **Availability of services, materials, facilities and infrastructure,** including safe drinking water, adequate sanitation, energy for cooking, heating, lighting, food storage or refuse disposal.
3. **Affordability,** as housing is not adequate if its cost threatens or compromises the occupants' enjoyment of other human rights.
4. **Habitability,** as housing is not adequate if it does not guarantee physical safety or provide adequate space, as well as protection against the cold, damp, heat, rain, wind, other threats to health and structural hazards.

16 Article 25 (1) "Everyone has the right to a standard of living adequate for the health and well-being of himself and of his family, including food, clothing, housing and medical care and necessary social services, and the right to security in the event of unemployment, sickness, disability, widowhood, old age or other lack of livelihood in circumstances beyond his control."

5. **Accessibility,** as housing is not adequate if the specific needs of disadvantaged and marginalized groups are not taken into account (such as the poor, people facing discrimination; persons with disabilities, victims of natural disasters);
6. **Location,** as housing is not adequate if it is cut off from employment opportunities, health-care services, schools, childcare centres, and other social facilities, or if located in dangerous or polluted sites or in immediate proximity to pollution sources; and
7. **Cultural adequacy,** as housing is not adequate if it does not respect and consider the expression of cultural identity and ways of life.

	Slums	Informal Settlements	Inadequate Housing
Access to water	X	X	X
Access to sanitation	X	X	X
Sufficient living area, overcrowding	X		X
Structural quality, durability and location	X	X	X
Security of tenure	X	X	X
Affordability			X
Accessibility			X
Cultural adequacy			X

Methodology

The indicator considers two components to be computed as follows:

a). Percentage of people living in Slum/Informal Settlements households (SISH):

$$= 100 \left[\frac{Number\ of\ people\ living\ in\ SISH}{\frac{Urban}{City} Population} \right]$$

b). Percentage of people living in Inadequate housing households (IHH):

$$= 100 \left[\frac{Number\ of\ people\ living\ in\ IHH}{\frac{Urban}{City} Population} \right]$$

The unit of measurements for all these indicators will be %

Rationale and interpretation:

As seen in Table 1, most of the criteria for defining slums, informal settlements and inadequate housing overlap. The three criteria of informal settlements are essentially captured in the definition of slums, which sustains the combination of both (slums/informal settlements). Both aspects of slums and informal settlements are therefore combined into one component of the indicator, providing some continuity with what was captured under MDG 7. At a later stage, a composite index will be developed that will incorporate all measures (combining slum/informal settlements and inadequate housing) and provide one estimate.

The second component of the indicator is on inadequate housing. From the seven criteria of adequate housing, the three that are not covered by slums / informal settlements are affordability, accessibility and cultural adequacy. However, affordability is the most relevant and easier to measure.

In this regard, housing affordability is not only a key housing adequacy criterion but is a suitable means of measuring inadequate housing in a more encompassing manner, as it remains a global challenge across different countries and income levels, with strong negative impact on urban inequality.

	The underlying principle is that household financial costs associated with housing should not threaten or compromise the attainment and satisfaction of other basic needs such as, food, education, access to health care, transport, etc. Based on the existing method and data of UN-Habitat's Urban Indicators Program (1996-2006), unaffordability is currently measured as the net monthly expenditure on housing cost that exceeds 30% of the total monthly income of the household (Refer to SDG 11.1.1 Metadata for definitions and measurement criteria for slums, informal settlements, and inadequate housing).
Disaggregation:	**Potential Disaggregation:** Disaggregation by location (intra-urban); income group; sex, race, ethnicity, religion, migration status (head of household); age (household members); and disability status (household members) **Quantifiable Derivatives:** • Proportion of households with durable housing • Proportion of households with improved water • Proportion of households with improved sanitation • Proportion of households with sufficient living space • Proportion of households with security of tenure • Proportion of households with one (1) housing deprivation • Proportion of households with multiple (2 or more) housing deprivations • Proportion of households with approved municipal permit • Proportion of households with (in) adequate housing (affordability)
Sources and data collection:	Data for the slum/informal settlements components of the indicator can be computed from Census and national household surveys, including DHS and MICS. Data for the inadequate housing component can be computed through income and household surveys that capture housing expenditures. City, regional and global estimates can be derived from national figures with an appropriate disaggregation level.
Comments and limitation	As with all indicators, there are some potential challenges and limitations. Some of these are outlined below. Difficulties to agree universally on some definitions and characteristics when referring to deteriorated housing conditions, often due to political or economic considerations. Lack of appropriate tools at national and city levels to measure all components required by Indicator 11.1.1, sometimes resulting in the underestimation of deteriorated housing units. The complicated relation between security of tenure with land and property makes it a difficult, but vital, aspect to include in the different surveys, and thus, to measure and monitor. Indicator 11.1.1 does not capture homelessness. Many countries still have limited capacities for data collection, management and analysis, their update and monitoring. These are key to ensure national and global data consistency.
References:	• Habitat for Humanity (2012). Global Housing Indicators; Evidence for Action: https://globalurban.org/Global_Housing_Indicators_report.pdf • UN-Habitat (2020). Global Urban Indicators Database. Nairobi: https://data.unhabitat.org/ • United Nations General Assembly (2013). A/HRC/25/54- Report of the Special Rapporteur on adequate housing as a component of the right to an adequate standard of living, and on the right to non-discrimination in this context • United Nations Statistics Division (2022). SDG 11.1.1. Metadata: https://unstats.un.org/sdgs/metadata/files/Metadata-11-01-01.pdf [refer to this SDG Indicator 11.1.1 Metadata for the expanded list of references – (UNSD, 2022)]

1.4.2. Gini Coefficient

Indicator:	(UMF-24) Gini coefficient
Source/Origins	**CPI**
Definition and method of computation:	The Gini Index (Gini Ratio or Gini Coefficient) measures the extent to which the distribution of income (or consumption expenditure) among individuals or households within an economy deviates from a perfectly equal distribution (The World Bank, 2019). A Gini coefficient of zero expresses perfect equality, where all values are the same i.e. where everyone has the same income. A Gini coefficient of one (or 100%) expresses maximal inequality among values i.e. a city in which one person has all the income (Mandal, 2014). **Method of computation:** $$Gini = \frac{1}{2m}\frac{1}{n^2}\sum_{i=1}^{n}\sum_{j=1}^{n}\left\lvert y_i - y_j \right\rvert$$ Where: y_i = Minimum level of income y_j = Maximum level of income n = Total population m = Average income If available, consumption expenditure is preferable to income. However, most household surveys do not have this information. The measure of welfare used is household per capita income which includes labour (both monetary and in kind), and non-labour income (both monetary and in kind).
Rationale and interpretation:	The Gini coefficient is an indicator widely known to measure income inequality across the income (or consumption expenditure) distribution. In this context, it is intended to estimate the income distribution of a city. Cities are the cores of economic development, and a prosperous city cannot develop under conditions of large income inequalities. Moreover, income inequality should be considered as the core of policies that aim to build a more equitable and inclusive city. There is compelling evidence on the relationship between urban development and income inequality. Glaeser et al., (2008) demonstrates that income inequality is related to high crime rates, unhappiness and lower growth rates (of both income and population). A prosperous, equitable and inclusive city seeks to reduce income disparities among its inhabitants.
Data Sources	Cities household surveys; National level surveys with representative city household data; Income and expenditure surveys.
Comments and limitations:	Due to data characteristics, some cities may switch to households rather than individuals. When population households are measured with inconsistent definitions, results are not fully comparable. Given the construction of the Gini coefficient, cities with similar incomes and Gini coefficients may have different income distributions. Given that the Gini coefficient measures relative wealth, it should be noted that an increase of the Gini coefficient does not imply absolute poverty reduction; therefore, a complementary measure of poverty is needed.
References:	• Glaeser, Edward L., Resseger, Matt and Tobio, Kristina, (2009), Inequality in cities, Journal of Regional Science, 49, issue 4, p. 617-646. • Mandal, R.M. (2014). Economic Inequality among the Rural Tribal People in Arunachal Pradesh: An Empirical Study. Journal of Global Economy 10.1: 24-36. • The World Bank (2014). World Development Indicators 1960 – 2013. [2] • The World Bank (2019); Gini Index (World Bank Estimates) http://data.worldbank.org/indicator/SI.POV.GINI?page=5, Accessed April 11, 2019. • UN-Habitat (2012). Measurement of City Prosperity Methodology and Metadata. https://unhabitat.org/programme/city-prosperity-initiative

Tan Mai Ward market relayout © Healthbridge

Women selling vegetables at a makeshift market in Bitot, Labutta Township. Myanmar. Photo © Markus Kostner / World Bank

Domain 2: Economy

The indicator variables within the Economy domain are classified below:

City Objectives

Safe and Peaceful	Inclusive	Resilient	Sustainable
Indicators	**Indicators**	**Indicators**	**Indicators**
2.1.1 Children engaged in child labor	**2.2.1** Unemployment Rate	**2.3.1** City Product (GDP) per Capita (PPP)	**2.4.1** Sub-national debt
2.1.2 Time spent on unpaid domestic and care work	**2.2.2** Youth not in education, employment or training (NEET)	**2.3.2** Youth and adults in formal and non-formal education and training	**2.4.2** Mean household income
	2.2.3 Use of Public transport	**2.3.3** Adult population with a qualification from a recognized tertiary education institution	
	2.2.4 Internet use	**2.3.4** Fixed Internet broadband subscriptions	
		2.3.5 Small-scale industries in total industry value added	
		2.3.6 Days to start a business	
		2.3.7 Patent application	

2.1. Safe and Peaceful City Objective

2.1.1. Children Engaged in Child Labour

Indicator:	**(UMF-25) Proportion and number of children aged 5-17 years engaged in child labour, by sex and age**
Source/Origins	**SDG Indicator 8.7.1**
Definition and method of computation:	The number of children engaged in child labour corresponds to the number of children reported to be in child labour during the reference period (usually the week prior to the survey). The proportion of children in child labour is calculated as the number of children in child labour divided by the total number of children in the population. For the purposes of this indicator, children include all persons aged 5 to 17. **Methodology** • Children aged 5-17: Number of children aged 5-17 reported in child labour during the week prior to the survey divided by the total number of children aged 5-17 in the population, multiplied by 100. For desired age disaggregation, include: • Children aged 5-14: Number of children aged 5-14 reported in child labour during the week prior to the survey divided by the total number of children aged 5-14 in the population, multiplied by 100. • Children aged 15-17: Number of children aged 15-17 reported child labour during the week prior to the survey divided by the total number of children aged 15-17 in the population, multiplied by 100.
Rationale and interpretation:	Far too many children in the world remain trapped in child labour, compromising their individual future and our collective futures. According to the latest ILO global estimates, about 152 million children worldwide– 64 million girls and 88 million boys -are child laborers', accounting for almost 10percent of the child population. These stark figures underscore the need for accelerated progress against child labour in the lead up to the 2025 target date for ending child labour in all its forms, and the accompanying need for child labour statistics to monitor and guide efforts in this regard. Reliable, comprehensive, and timely data on the nature and extent of child labour provide a basis for determining priorities for national global action against child labour. Statistical information on child labour, and more broadly on all working children, also provide a basis for increasing public awareness of the situation of working children and for the development of appropriate regulatory frameworks and policies.
Sources and data collection:	City or regional level data may be held by the local governments' ministries and departments, either extracted from national datasets or surveys. At the national level, household surveys such as National Labour Force Surveys, National Multipurpose Household Surveys, UNICEF-supported Multiple Indicator Cluster Surveys (MICS), Demographic and Health Surveys (DHS), ILO-supported Statistical Information and Monitoring Programme on Child Labour (SIMPOC), and World Bank Living Standard Measurement surveys (LSMS) are among the most important instruments for generating information on child labour in developing countries. Estimates of child labour generated by these survey instruments are increasingly relied on by countries to monitor progress towards national and global child labour elimination targets. Many countries also produce national labour estimates and reports that often include data on child labour and/or employment among children. UNICEF undertakes a wide consultative process of compiling and assessing data from national sources for the purposes of updating its global databases about children (Refer to SDG Indicator 8.7.1 Metadata for more information on UNICEF data).

Comments and limitations:	While the concept of child labour includes working in activities that are hazardous in nature, to ensure comparability of estimates over time and to minimize data quality issues, work beyond age-specific hourly thresholds are used as a proxy for hazardous work for the purpose of reporting on SDG indicator 8.7.1. Further methodological work is needed to validate questions specifically aimed at identifying children in hazardous working conditions. Similarly, while the worst forms of child labour other than hazardous also form part of the concept of child labour more broadly, data on the worst forms of child labour are not currently captured in regular household surveys given difficulties with accurately and reliably measuring it. Therefore, this element of child labour is not captured by the indicators used for reporting on SDG 8.7.1.
References:	• International Labour Organization (2020). Advancing Social Justice, Promoting Decent Work: Child Labour Statistics. http://www.ilo.org/ipec/ChildlabourstatisticsSIMPOC/lang--en/index.htm • International Labour Organization (2020). Surveys. Child Labour Statistics. http://www.ilo.org/ipec/ChildlabourstatisticsSIMPOC/Questionnairessurveysandreports/lang--en/index.htm • UNICEF (2019). Understanding Children's Work: An Inter-Agency Research Cooperation Project. www.ucw-project.org • UNICEF (2021). UNICEF Data: Child Labour. http://data.unicef.org/child-protection/child-labour.html • United Nations Statistics Division (2022). SDG Indicator .8.7.1. Metadata: https://unstats.un.org/sdgs/metadata/files/Metadata-08-07-01.pdf

2.1.2. Time Spent on Unpaid Domestic and Care Work

Indicator:	**(UMF-26) Proportion of time spent on unpaid domestic and care work, by sex, age and location**
Source/Origins	**SDG Indicator 5.4.1.**
Definition and method of computation:	This indicator is defined as the proportion of time spent in a day on unpaid domestic and care work by men and women. Unpaid domestic and care work refers to activities related to the provision of services for own final use by household members, or by family members living in other households. These activities are listed in ICATUS 2016 under the major divisions: • "3 - Unpaid domestic services for household and family members" and • "4 - Unpaid caregiving services for household and family members" (Statistical Commission, 2017). **Methodology** Data presented for this indicator are expressed as a proportion of time in a day. Weekly data is averaged over seven days of the week to obtain the daily average time. Proportion of time spent on unpaid domestic and care work is calculated by dividing the daily average number of hours spent on unpaid domestic and care work by 24 hours. Proportion of time spent on unpaid domestic and care work ($Indicator\ 5.4.1$) is calculated as: $$Indicator\ 5.4.1 = \frac{Daily\ number\ of\ hours\ spent\ on\ domestic\ work + Daily\ number\ of\ hours\ spent\ on\ care\ work}{24} \times 100$$ Where. $$Daily\ number\ of\ hours\ spent\ on\ relevant\ activities = \frac{Total\ number\ of\ hours\ spent\ by\ the\ population\ on\ relevant\ activities}{Total\ population\ (regardless\ of\ whether\ they\ participated\ in\ the\ activity)}$$ If data on time spent are weekly, data are averaged over seven days of the week to obtain daily time spent.

Rationale and interpretation:	Unpaid domestic and care work refers to activities including food preparation, dishwashing, cleaning and upkeep of the dwelling, laundry, ironing, gardening, caring for pets, shopping, installation, servicing and repair of personal and household goods, childcare, and care of the sick, elderly or disabled household and family members, among others. Concepts and definitions for this indicator are based on the following international standards: • System of National Accounts 2008 (SNA 2008) • The Resolution concerning statistics of work, employment and labour underutilization, adopted by the International Conference of Labour Statisticians (ICLS) at its 19th Session in 2013 • International Classification of Activities for Time Use Statistics 2016 (ICATUS 2016) Relevant specific concepts are presented below: • An activity is said to be productive or to fall within the "general production boundary" if it satisfies the third-person criterion (the activity can be delegated to another person and yield the same desired results). • Productive activities can be further classified based on the ILO framework for work statistics (included in the 19th ICLS resolution) into: a. Own-use production work (activities to produce goods and services for own final use; the intended destination of the output is mainly for final use of the producer in the form of capital formation, or final consumption by household members or by family members living in other households; in the case of agricultural, fishing, hunting or gathering goods intended mainly for own consumption, a part or surplus may nevertheless be sold or bartered) b. Employment (activities to produce goods or provide services for pay or profit) c. Unpaid trainee work (any unpaid activity to produce goods or provide services for others, in order to acquire workplace experience or skills in a trade or profession) d. Volunteer work (any unpaid, non-compulsory activity to produce goods or provide services for others) e. Other forms of work The own-use production work can be differentiated based on whether goods or services are produced. *Indicator 5.4.1 only considers the own-use production work of services, or in other words, the activities related to unpaid domestic services and unpaid caregiving services undertaken by households for their own use. These activities are listed in ICATUS 2016 under the major divisions "3. Unpaid domestic services for household and family members" and "4. Unpaid caregiving services for household and family members".* As much as possible, statistics compiled by UNSD are based on the International Classification of Activities for Time Use Statistics 2016 (ICATUS 2016), which classifies activities undertaken by persons during the survey period. ICATUS 2016 was adopted by the United Nations Statistical Commission for use as an international statistical classification at its 48th session, 7-10 March 2017.
Disaggregation:	This indicator should be disaggregated by the following dimensions: sex, age and location. The categories for disaggregation, by dimension, are as follows: • Sex: female/male; • Age: the recommended age groups are: 15+, 15-24, 25-44, 45-54, 55-64 and 65+ • Location: urban/rural (following national definitions given the lack of international definition) These categories have been recommended by the Inter-Agency and Expert Group on Gender Statistics (IAEG-GS) during its 11th meeting in Rome, Italy on 30-31 October 2017.

Sources and data collection:	Most data on time use are collected through dedicated time use surveys or from time-use modules integrated in multi-purpose household surveys, conducted at national level. City departments and ministries may readily have this data, or may have acquired it from the national government departments, where disaggregation by location favours city data extraction. Data on time-use can be collected through a 24-hour diary (light diary) or stylized questionnaire. With diaries, respondents are asked to report on what activity they were performing when they started the day, what activity followed, and the time that activity began and ended (in most of the cases based on fixed intervals), and so forth through the 24 hours of the day. Stylized time-use questions ask respondents to recall the amount of time they allocated to a certain activity over a specified period, such as a day or a week. Often, stylized time-use questions are attached as a module to a multipurpose household survey. The 24-hour diary method yields better results than the stylized method but is a more expensive mode of data collection (Refer to SDG Indicator 5.4.1. Metadata on application of Time use statistics).
References:	• United Nations Statistical Commission (2017). Forty-eighth session. 7 – 10 March 2017. https://unstats.un.org/unsd/statcom/48th-session/documents/BG-3h-ICATUS-2016-13-February-2017-E.pdf • UN-DESA (2005). Guide to Producing Statistics on Time-Use: Measuring Paid and Unpaid Work (https://unstats.un.org/unsd/publication/SeriesF/SeriesF_93E.pdf) • United Nations Statistics Division (2017). International Classification of Activities for Time Use Statistics 2016 (https://unstats.un.org/unsd/demographic-social/time-use/icatus-2016/) • UN-DESA (2013). Minimum Set of Gender Indicators (http://genderstats.un.org) • United Nations Statistics Division (2022). SDG Indicator 5.4.1. Metadata. https://unstats.un.org/sdgs/metadata/files/Metadata-05-04-01.pdf

2.2. Inclusive City Objective

2.2.1. Unemployment Rate

Indicator:	**(UMF-27) Unemployment rate**
Source/Origin	CPI
Definition and method of computation:	The unemployment rate is calculated by dividing the total number of unemployed (for a country or a specific group of workers) by the corresponding labour force, which itself is the sum of the total persons employed and unemployed in the group. Persons in unemployment are defined as all those of working age who were not in employment, carried out activities to seek employment during a specified recent period and were currently available to take up employment given a job opportunity. The number of unemployed people as a proportion of the total labour force. • **Unemployed Person** - according to the International Labour Organization (2013), an unemployed person is one that, during the reference period, is without work but available to work and is actively seeking employment. • **Labour force** – The labour force comprises all those persons in the working age population (as specified by the country) who either had jobs (the Employed), or those who did not have jobs but were willing, able and looking for work (the Unemployed).

	The labour force excluded some groups of people who have voluntarily or involuntarily left the labour market [3]. These include: • People on disability allowance (unable to work) • People on sickness benefits (unable to work) • Women having children on maternity leave • Fathers on paternity leave. • People demotivated by years of unemployment and so no longer seek work. • People who have taken early retirement • Adults in full time education **Methodology** $Unemployment\ rate = 100\left[\frac{Unemployed}{Labour\ Force}\right]$
Rationale and interpretation:	Information on unemployment by age illustrates the different dimensions of the lack of jobs for people of a given age group. For example, in a country where the youth unemployment rate is high and the ratio of the youth unemployment rate to the adult unemployment rate is close to one, it may be concluded that the problem of unemployment is not specific to youth, but is country-wide. The problem of unemployment is unequally distributed when, in addition to a high youth unemployment rate, the proportion of youth unemployment in total unemployment is high. In this case, employment policies might usefully be directed towards easing the entry of young people into the world of work. Work can be defined as a founding value of the human society. This interpretation was not motivated by mere economic reasons, but rather stemmed from the recognition that work is the most appropriate tool for the expression of the human personality in society and that it is an asset and a right that will increase the dignity of every person. Also, it corresponds to a fundamental human desire to fulfill oneself in relationship with other persons and the entire world (Darity and Goldsmith, 1996). Unemployment rate, therefore, is one of the most comprehensive indicators of economic activity and general human well-being. A prosperous city will seek to reduce unemployment to lead the economy into a growth path with better opportunities for all its inhabitants.
Disaggregation:	Data are available by gender and age (Note: This disaggregation should allow computation of youth unemployment (15 to 24 years)).
Sources and data collection:	City department or national government ministries may have city level data with official estimates on unemployment at city level based on city surveys, labour Markets surveys, living standards surveys, censuses, labour force sample surveys and household surveys (LFS, HIES, LSMS, Integrated HH surveys, etc.). The ILO has estimates of the unemployed (number and rate) disaggregated by sex and age (youth and adult) for the world as a whole and by (flexible) regional groupings. The global and regional estimates are based on both real and imputed values.
Comments and limitations:	The age coverage used to calculate the unemployment rate is 15 years and over. However, some countries have a lower age limit or have imposed an upper age-limit. This means that country comparisons have to be made with caution. Additionally, unemployment rate says nothing about the type of unemployment - whether it is cyclical and short term or structural and long term. Finally, this measure masks information on the composition of the jobless population and therefore misses out on the particularities of the education level, ethnic origin, socioeconomic background, work experience, etc. (ILO, 2013).

References:	• Darity, William Jr. and Goldsmith, Arthur H. (1996). Social Psychology, Unemployment and Macroeconomics. The Journal of Economic Perspectives. Vol 10 (1). • http://www.economicshelp.org/blog/569/economics/size-of-labour-force-and-working-population/, accessed April 19, 2016 • International Labour Organization (2016). Long term effects on youth unemployment on mental health, http://www.ncbi.nlm.nih.gov/pubmed/21298870 - Work as a basic human need and health promoting factor. Accessed January 19, 2022 • International Labour Organization (ILO). (2013). Key Indicators of the Labour Markets. 8th edition. • Statistical Institute of Belize (2020). Labour Force Survey Report. http://www.sib.org.bz/documentation/labour-force, accessed January 19, 2022 • The World Bank (2014). World Development Indicators 1960 – 2013. [4] • UN-Habitat (2012). Measurment of City Prosperity, Methodology and Metadata, UN-Habitat • World Bank (2020). World Development Indicators, http://data.worldbank.org/indicator/SL.UEM.TOTL.ZS , accessed January 19, 2022.

2.2.2. Youth not in Education, Employment or Training (NEET)

Indicator:	**(UMF-28) Proportion of youth (aged 15-24 years) not in education, employment or training**
Source/Origins	**SDG Indicator 8.6.1**
Definition and method of computation:	This indicator conveys the proportion of youth (aged 15-24 years) not in education, employment, or training (also known as "the youth NEET rate"). **Methodology** $$Youth\ NEET\ Rate = \frac{Youth - \left(Youth\ in\ employment + Youth\ not\ in\ employment\ but\ in\ education\ or\ training\right)}{Youth} \times 100$$ It is important to note here that youth simultaneously in employment and education or training should not be double counted when subtracted from the total number of youths. The formula can also be expressed as: $$Youth\ NEET\ rate = \frac{\left(Unemployment\ rate + Youth\ outside\ the\ labour\ force\ \right) - \left(Unemployment\ youth\ in\ education\ or\ training + Youth\ outside\ the\ labour\ force\ in\ education\ or\ training\right)}{Youth} \times 100$$
Rationale and interpretation:	The share of youth not in employment, education or training (youth NEET rate) provides a measure of youth who are outside the educational system, not in training and not in employment, and thus serves as a broader measure of potential youth labour market entrants than youth unemployment. It includes discouraged worker youth as well as those who are outside the labour force due to disability or engagement in household chores, among other reasons. Youth NEET is also a better measure of the current universe of potential youth labour market entrants as compared with the youth inactivity rate, as the latter includes those youth who are outside the labour force and are in education, and thus are furthering their skills and qualifications. **Concepts:** For the purposes of this indicator: • Youth is defined as all persons between the ages of 15 and 24 (inclusive). • According to the International Standard Classification of Education (ISCED), education is defined as organized and sustained communication designed to bring about learning.

	• Formal education is defined in ISCED as education that is institutionalized, intentional, and planned through public organizations and recognized private bodies and, in their totality, make up the formal education system of a country. • Non-formal education, like formal education is defined in ISCED as education that is institutionalized, intentional and planned by an education provider but is considered an addition, alternative and/or a complement to formal education. It may be short in duration and/or low in intensity and it is typically provided in the form of short courses, workshops or seminars. • Informal learning is defined in ISCED as forms of learning that are intentional or deliberate, but not institutionalized. It is thus less organized and less structured than either formal or non-formal education. Informal learning may include learning activities that occur in the family, in the workplace, in the local community, and in daily life, on a self-directed, family-directed, or socially directed basis. • For the purposes of this indicator, persons will be considered in education if they are in formal or non-formal education, as described above, but excluding informal learning. • Employment is defined as all persons of working age who, during a short reference period (one week), were engaged in any activity to produce goods or provide services for pay or profit. • For this indicator, persons are in training if they are in a non-academic learning activity through which they acquire specific skills intended for vocational or technical jobs. • Vocational training prepares trainees for jobs that are based on manual or practical activities, and for skilled operative jobs, both blue and white collar related to a specific trade, occupation, or vocation. Technical training on the other hand imparts learning that can be applied in intermediate-level jobs, in particular those of technicians and middle managers.
Disaggregation:	No disaggregation is specifically required for this indicator, although having it disaggregated by sex is desirable, as is disaggregation by detailed age groups within the youth age band.
Sources and data collection:	City or regional level data may be held by city departments in charge of youth and/or labour. From national data, city level data may be achieved through disaggregation filters. The preferred official national data source for this indicator is a household-based labour force survey. In the absence of a labour force survey, a population census and/or other type of household survey with an appropriate employment module may be used to obtain the required data.
Comments and limitations:	The calculation of this indicator requires to have reliable information on both the labour market status and the participation in education or training of young persons. The quality of such information is heavily dependent on the questionnaire design, the sample size and design and the accuracy of respondents' answers. In terms of the analysis of the indicator, in order to avoid misinterpreting it, it is important to bear in mind that it is composed of two different sub-groups (unemployed youth not in education or training and youth outside the labour force not in education or training). The prevalence and composition of each sub-group would have policy implications, and thus should also be considered when analysing the NEET rate.
References:	• ILOSTAT (2020). Indicator description: Share of youth not in employment, education or training (youth NEET rate). https://ilostat.ilo.org/resources/concepts-and-definitions/description-youth-neet/ • International Labour Organization (2013). Decent Work Indicators: Guidelines for Producers and Users of Statistical and Legal Framework Indicators. https://www.ilo.org/wcmsp5/groups/public/---dgreports/---stat/documents/publication/wcms_223121.pdf

	• International Labour Organization (2013b). Resolution concerning statistics of work, employment and labour underutilization. https://www.ilo.org/global/statistics-and-databases/standards-and-guidelines/resolutions-adopted-by-international-conferences-of-labour-statisticians/WCMS_230304/lang--en/index.htm • International Labour Organization (2015). What does NEETs mean and why is the concept so easily misinterpreted? https://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/documents/publication/wcms_343153.pdf • International Labour Organization (2018). Guidebook - Decent Work and the Sustainable Development Goals: A Guidebook on SDG Labour Market Indicators. https://www.ilo.org/ilostat-files/Documents/Guidebook-SDG-En.pdf • UNESCO (2011). International Standard Classification of Education (ISCED). http://uis.unesco.org/en/topic/international-standard-classification-education-isced • United Nations Statistics Division (2022). SDG Indicator 8.6.1. Metadata. https://unstats.un.org/sdgs/metadata/files/Metadata-08-06-01.pdf

2.2.3. Use of Public Transport

Indicator:	**(UMF-29) Proportion of trips made in Public Transport (PT)**
Source/Origin	**CPI**
Definition and method of computation:	Percentage of trips made in a Public Transport (PT) mode from the total number of motorized trips. **Methodology** Method A: $Use\ of\ PT\ Ratio = 100\left[\frac{Number\ of\ trips\ in\ PT\ modes}{Number\ of\ total\ motorized\ trips}\right]$
Rationale and interpretation:	Over dependence on car use can generate several environmental, economic, and social problems in urban areas such as congestion, pollution and traffic fatalities and continuous reduction of open public spaces. To achieve safer, more affordable, accessible, and sustainable mobility in urban areas, a dual approach based on the improvement of public transit systems and the encouragement of non-motorized modes like walking and cycling and public transit system should be encouraged, particularly paying spatial attention the most vulnerable road users. A prosperous city seeks to reduce car use by improving the quality of other transportation systems based on public and non-motorized transport.
Sources and data collection:	National and Local transport authorities – departments and ministries (acquired from surveys, Apps etc.)., organizations with transit and urban mobility projects, GTFS,
Comments and limitations:	Although this indicator does not capture non-motorized trips, it is highly recommended that it is included and measured in modal share surveys. Non-formal transport or paratransit is very frequent in some cities, but surveys do not always capture this information.
References:	• CERTU (2008). Guide pédagogique : Stratégie de Mobilité durable. Lyon (Francia). p.73 • Resource for the Future (RFF). (2014). Advancing a Healthy Environment and a Thriving Economy. http://www.rff.org/rff/Documents/RFF-RPT-carsenviron.pdf, Accessed August 14, 2014. • UN-Habitat (2012). Measurment of City Prosperity, Methodology and Metadata, UN-Habitat • Winston, H. (2003). Motor vehicles and the environment. Resources for the future RFF Report. Washington.

2.2.4. Internet Use

Indicator:	(UMF-30) Proportion of individuals using the Internet
Source/Origins	**SDG Indicator 17.8.1**
Definition and method of computation:	The indicator proportion of individuals using the Internet is defined as the proportion of individuals who used the Internet from any location in the last three months. **Methodology** For countries that collect data on this indicator through an official survey, this indicator is calculated by dividing the total number of in-scope individuals using the Internet (from any location) in the last 3 months by the total number of in-scope individuals. For countries that have not carried out a survey, data are estimated (by ITU) based on the number of Internet subscriptions and other socioeconomic indicators (GNI per capita) and on the time series data.
Rationale and interpretation:	The Internet has become an increasingly important tool to access public information, which is a relevant means to protect fundamental freedoms. The number of Internet users has increased substantially over the last decade and access to the Internet has changed the way people live, communicate, work and do business. Internet uptake is a key indicator tracked by policy makers and others to measure the development of the information society and the growth of Internet content – including user-generated content – provides access to increasing amounts of information and services. Despite growth in networks, services and applications, information and communication technology (ICT) access and use is still far from equally distributed, and many people cannot yet benefit from the potential of the Internet. This indicator highlights the importance of Internet use as a development enabler and helps to measure the digital divide, which, if not properly addressed, will aggravate inequalities in all development domains. Classificatory variables for individuals using the Internet –such as age, sex, education level or labour force status – can help identify digital divides in individuals using the Internet. This information can contribute to the design of targeted policies to overcome those divides. **Concepts:** The Internet is a worldwide public computer network. It provides access to a number of communication services including the World Wide Web and carries e-mail, news, entertainment and data files, irrespective of the device used (not assumed to be only via a computer - it may also be by mobile telephone, tablet, PDA, games machine, digital TV etc.). Access can be via a fixed or mobile network.
Disaggregation:	Desired level of disaggregation includes by region (sub-urban geographic units), by sex, by age group, by educational level, by labour force status, and by occupation.
Sources and data collection:	City level data may be acquired from city or regional authority departments/ministries. Where data is available at the national level, geographic disaggregation filters may be applied to extract city level data. For national level data, ITU collects data on individuals using the Internet through an annual questionnaire that it sends to national statistical offices (NSO). For most developed and an increasing number of developing countries, percentage of individuals using the Internet data are based on methodologically sound household surveys conducted by national statistical agencies.
Comments and limitations:	Where official household surveys are missing, available data may be based on ITU national estimates, which may not be fully reliable at the city level.
References:	• International Telecommunication Union (ITU) (2014). ITU Manual for Measuring ICT Access and Use by Households and Individuals 2014: http://www.itu.int/en/ITU-D/Statistics/Pages/publications/manual2014.aspx • United Nations Statistics Division (2022). SDG Indicator 17.8.1. https://unstats.un.org/sdgs/metadata/files/Metadata-17-08-01.pdf

2.3. Resilient City Objective

2.3.1. Annual Growth Rate of GDP per Capita

<table>
<tr><th>Indicator:</th><th>(UMF-31) Annual growth rate of real GDP per capita</th></tr>
<tr><td>Source/Origins</td><td>CPI</td></tr>
<tr><td>Definition and method of computation:</td><td>The City Product Per Capita is the sum of the gross value added (wages plus business surplus plus taxes less imports), or the total final demand (consumption plus investment plus exports), relative to the city's total population.
Methodology
The City Product Per Capita is calculated as the sum of the products of the national Gross Domestic Product (GDP) of each economic sector (primary, industrial and service) and the city's share of that sector's total employment, divided by total city population as shown below:
$$City\ product\ per\ capita = \frac{\sum_{j=1}^{J} National\ product_j \times \left(\frac{city\ employment_j}{national\ employment_j} \right)}{Total\ city\ population}$$
Where j represents the industry sector. When city employment information by sector is not available, it is possible to use census information about the employment structure.
The following table should be completed for each sector (using the most detailed categories available).
<table>
<tr><th>Sector</th><th>National Product (1)</th><th>National Employment (2)</th><th>City Employment (3)</th><th>Employment Ratio (4)=(3)÷(2)</th><th>City Sector Product (5)=(4)*(1)</th></tr>
<tr><td>Agriculture and mining</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Manufacturing, utilities, construction</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Wholesale and retail trade, transport and communication</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Finance, insurance, real estate and business services</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Community, personal and other services</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Government</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Other</td><td></td><td></td><td></td><td></td><td></td></tr>
</table>
The total City Product is the sum of all City Sector Products (5) converted to international dollars using the annual Purchasing Power Parity (PPP) exchange rate. This ensures comparable figures across countries</td></tr>
<tr><td>Rationale and interpretation:</td><td>Cities have traditionally served as economic centres and have become the primary providers of services and engines of economic growth and development. Additionally, cities currently generate over half of national economic activity worldwide (UN-Habitat, 2003). Urban production, as measured through the City Product, is an important indicator for the economic development of a city, vis-à-vis national development, and it provides information about income levels and the capacity to generate employment (United Nations, 2001). A prosperous city has to increases its City Product Per Capita in-order to achieve higher levels of economic well-being.</td></tr>
</table>

Sources and data collection:	**Data on National Product by industry:** available from national accounts. City data may be acquired from disaggregated national level data where data is not available at sub-national/city level. **Data on National and city employment:** workforce statistics by economic sector. Data for this indicator are derived from living standards household surveys or labour force censuses. In case these surveys are not available, other credible surveys can be used. **Data on Population:** national population censuses. Exchange rate (PPP): World Bank (2014).
Comments and limitations:	The method to calculate the City Product Per Capita assumes that mean sector labour productivity is the same for workers across regions of the country. Hence, this indicator does not consider the differences in labour productivity by sector across cities in the same country. Moreover, when census data are utilised, the indicator assumes that the sector structure has not changed between the census date and calculation date. Because the City Product Per Capita is based on GDP Per Capita, informal sector production is not considered. Therefore, the CPI will include a variable for median household income
References:	• The World Bank (2014). World Development Indicators 1960 – 2013. [2] • UN-Habitat (2003). The habitat agenda goals and principles, commitments and the global plan of action. • UN-Habitat (2012). Measurment of City Prosperity, Methodology and Metadata, UN-Habitat: https://unhabitat.org/sites/default/files/2019/02/CPI-METADATA.2016.pdf • United Nations (2001). The State of the World's Cities Report 2001. • United Nations (2008). International Standard Industrial Classification of All Economic Activities. Statistical papers. Revision No 4. • United Nations Statistics Division (2022). SDG Indicator 8.1.1. https://unstats.un.org/sdgs/metadata/files/Metadata-08-01-01.pdf • World Bank (2020). Indicators. https://data.worldbank.org/indicator

2.3.2. Youth and Adults in Formal and Non-formal Education and Training

Indicator:	**(UMF-32) Participation rate of youth and adults in formal and non-formal education and training in the previous 12 months, by sex**
Source/Origins	**SDG Indicator 4.3.1**
Definition and method of computation:	The percentage of youth and adults in a given age range (e.g., 15-24 years, 25-64 years, etc.) participating in formal or non-formal education or training in a given time period (e.g. last 12 months). **Methodology** The number of people in selected age groups participating in formal or non-formal education or training is expressed as a percentage of the population of the same age. $PR_{AGi} = E_{AGi} / P_{AGi}$ where: PR_{AGi} = participation rate of the population in age group i in formal and non-formal education and training E_{AGi} = enrolment of the population in age group i in formal and non-formal education and training P_{AGi} = population in age group i i = 15-24, 15 and above, 25-64, etc.

Rationale and interpretation:	To show the level of participation of youth and adults in education and training of all types. A high value indicates a large share of the population in the relevant age group is participating in formal and non-formal education and training. **Concepts:** Formal education and training is defined as education provided by the system of schools, colleges, universities and other formal educational institutions that normally constitutes a continuous 'ladder' of full-time education for children and young people, generally beginning at the age of 5 to 7 and continuing to up to 20 or 25 years old. In some countries, the upper parts of this 'ladder' are organized programmes of joint part-time employment and part-time participation in the regular school and university system. Non-formal education and training is defined as any organized and sustained learning activities that do not correspond exactly to the above definition of formal education. Non-formal education may therefore take place both within and outside educational institutions and cater to people of all ages. Depending on national contexts, it may cover educational programmes to impart adult literacy, life-skills, work-skills, and general culture.
Disaggregation:	Age, sex, location, sub-urban geographies, and income/social classes where possible.
Sources and data collection:	Administrative data from schools and other places of education and training or household survey data on participants in formal and non-formal education and training by single year of age; population censuses and surveys for population estimates by single year of age (if using administrative data on enrolment). Data may be held at the city level by urban authorities or at the national level by government ministries and departments.
Comments and limitations:	Formal and non-formal education and training can be offered in a variety of settings including schools and universities, workplace environments and others and can have a variety of durations. Administrative data often capture only provision in formal settings such as schools and universities. Participation rates do not capture the intensity or quality of the provision nor the outcomes of the education and training on offer.
References:	• Eurostat (2020). European Adult Education Survey (AES): http://www.eui.eu/Research/Library/ResearchGuides/Economics/Statistics/DataPortal/AES.aspx • Eurostat (2021). European Labour Force Survey: http://ec.europa.eu/eurostat/cache/metadata/en/trng_lfs_4w0_esms.htm • UNESCO (2020). Data for the Sustainable Development Goals. http://www.uis.unesco.org/Pages/default.aspx • United Nations Statistics Division (2022). SDG Indicator 4.3.1. https://unstats.un.org/sdgs/metadata/files/Metadata-04-03-01.pdf

2.3.3. Adult Population with a Qualification from a Recognized Tertiary Education Institution

Indicator:	**(UMF-33) Proportion of adult population with a tertiary qualification from a recognized tertiary education institution**
Source/Origins	**OECD**
Definition and method of computation:	The basic units of classification in ISCED (The International Standard Classification of Education) are the national (and subnational) education programme and the related recognized educational qualification. An educational programme is defined as a collection of educational activities which are organized to accomplish a predetermined objective or the completion of a specified set of educational tasks.

	Methodology Educational attainment rate is determined by the distribution of the population or subsets by the highest level of education attained. Educational attainment rate: $$\frac{Population_{Age,\,Gender,\,Education\ level\ attained}}{Population_{Age,\,Gender,\,Total}} \times 100$$ Where is the number of people in a particular age and gender group broken down by highest educational attainment level and is the total population of the same group. Education briefly typically shows data for all educational levels as described by ISCED 2011. Similar to graduation rates, attainment rates require the successful completion of a programme, rather than simply attending that programme. However, educational attainment differs from graduation in referring only to the highest degree of education an individual has successfully completed. For educational attainment, only the recognized successful completion of the highest programme attended is counted. The source for the data for most countries is that country's national labour force survey (LFS).
Rationale and interpretation:	The term "educational activities" has a broader meaning than terms such as "course" or "class". Educational activities can be courses (e.g. the study of individual subjects) organized into programmes or free-standing courses. They can also include a variety of components not normally characterized as courses, for example periods of work experience in enterprises, research projects and the preparation of dissertations. Objectives could include preparation for more advanced study, the achievement of a qualification, preparation for an occupation or range of occupations, or simply an increase in knowledge and understanding. An educational programme could be the study of a single subject leading to a recognized qualification or it can be the study of a collection of subjects, along with perhaps a period of work experience, all of which contribute towards the same qualification aim.
Sources and data collection:	City level data could be obtained from the national, regional or city departments or ministries. For OECD Countries and a few additional countries, country level data is available online in the Education at a Glance database (Link). Data from the national Labour Force Surveys (LFS) are compiled by the LSONetwork (OECD Labour Market, Economic and Social Outcomes of Learning).
Comments and limitations:	From the OECD'S databases, people with unknown level of educational attainment are excluded from the calculation of the indicator. Trends in educational attainment of the population are important for assessing expansion of the education system but are difficult to measure. Changes in the ISCED classification in 1997 and 2011 have created breaks in the series. Another way to measure trends in educational attainment is by looking at the educational attainment across age groups. The difference in the attainment of younger and older cohorts gives a good estimation of the expansion of the education system across generations. Example: "A comparison of educational attainment rate among younger (25-34-year-olds) and older (55-64-year-olds) age groups indicates marked progress in attaining tertiary education in most countries." (OECD, 2017). However, any results from countries reporting high participation in adult learning should be treated with caution.

References:	• EUROSTAT (2016), Montreal, Paris, Luxembourg: http://uis.unesco.org/sites/default/files/documents/uoe-data-collection-manual-2020-en.pdf • OECD (2016), Education at a Glance 2016: OECD Indicators, OECD Publishing, Paris, http://dx.doi.org/10.1787/eag-2016-en. [5] • OECD (2016), Technical Report of the Survey of Adult Skills (PIAAC), 2nd Edition, OECD, Paris, http://www.oecd.org/skills/piaac/PIAAC_Technical_Report_2nd_Edition_Full_Report.pdf. [6] OECD (2015), Taxing Wages • OECD (2017), Education at a Glance 2017: OECD Indicators, OECD Publishing, Paris, http://dx.doi.org/10.1787/eag-2017-en. [3] • OECD (2018), Education at a Glance 2018: OECD Indicators, OECD Publishing, Paris, http://dx.doi.org/10.1787/eag-2018-en. [1] • UNESCO-UIS/OECD/EUROSTAT (2020). UOE Data Collection on Formal Education. Manual on Concepts, Definitions and Classifications:

2.3.4. Fixed Internet Broadband Subscriptions

Indicator:	**(UMF-34) Fixed Internet broadband subscriptions per 100 inhabitants, by speed**
Source/Origins	**SDG Indicator 17.6.1**
Definition and method of computation:	The indicator fixed Internet broadband subscriptions, by speed, refers to the number of fixed-broadband subscriptions to the public Internet, split by advertised download speed. The indicator is currently broken down by the following subscription speeds: • **256 kbit/s to less than 2 Mbit/s subscriptions:** Refers to all fixed broadband Internet subscriptions with advertised downstream speeds equal to, or greater than, 256 kbit/s and less than 2 Mbit/s. • **2 Mbit/s to less than 10 Mbit/s subscriptions:** Refers to all fixed -broadband Internet subscriptions with advertised downstream speeds equal to, or greater than, 2 Mbit/s and less than 10 Mbit/s. • **Equal to or above 10 Mbit/s subscriptions** (4213_G10). Refers to all fixed -broadband Internet subscriptions with advertised downstream speeds equal to, or greater than, 10 Mbit/s. **Methodology** City/regional level data is directly collected from household surveys and/or service providers. The data can be collected by asking each Internet service provider in the country to provide the number of their fixed-broadband subscriptions by the speeds indicated, disaggregated by geography. For national level data, ITU collects data for the indicator through an annual questionnaire from national regulatory authorities or Information and Communication Technology (ICT) Ministries, who collect the data from national Internet service providers.

Rationale and interpretation:	The Internet has become an increasingly important tool to provide access to information and can help foster and enhance regional and international cooperation on, and access to, science, technology, and innovations, and enhance knowledge sharing. High-speed Internet access is important to ensure that Internet users have quality access to the Internet and can take advantage of the growing amount of Internet content – including user-generated content –, services and information. **Concepts:** • **Fixed Internet broadband subscriptions refer to subscriptions** to high-speed access to the public Internet (a TCP/IP connection), at downstream speeds equal to, or greater than, 256 kbit/s. This includes cable modem, DSL, fibre-to-the-home/building, other fixed (wired)-broadband subscriptions, satellite broadband and terrestrial fixed wireless broadband. This total is measured irrespective of the method of payment. It excludes subscriptions that have access to data communications (including the Internet) via mobile-cellular networks. It should include fixed WiMAX and any other fixed wireless technologies. It includes both residential subscriptions and subscriptions for organizations. • **The Internet** is a worldwide public computer network. It provides access to several communication services including the World Wide Web and carries e-mail, news, entertainment and data files.
Disaggregation:	Data should be disaggregated by geographic location and urban/rural where possible.
Sources and data collection:	City/regional level data can be sourced directly from service providers. The data can be collected by asking each Internet service provider in the country to provide the number of their fixed-broadband subscriptions by the speeds indicated, disaggregated by geography. Alternative data sources include household surveys and censuses.
References:	• International Telecommunication Union (ITU) (2020). Handbook for the Collection of Administrative Data on Telecommunications/ICT, 2020 Edition. Link. • United Nations Statistics Division (2022). SDG Indicator 17.6.1. https://unstats.un.org/sdgs/metadata/files/Metadata-17-06-01.pdf

2.3.5. Small-scale Industries in Total Industry Value Added

Indicator:	**(UMF-35) Proportion of small-scale industries in total industry value added**
Origin/Sources	**SDG Indicator 9.3.1**
Definition and method of computation:	Small-scale industrial enterprises, in the SDG framework also called "small-scale industries", defined here for the purpose of statistical data collection and compilation refer to statistical units, generally enterprises, engaged in production of goods and services for market below a designated size class. Proportion of "small-scale industries" in total industry value added represents an indicator calculating the share of manufacturing value added of small-scale manufacturing enterprises in the total manufacturing value added. **Methodology** The proportion of "small-scale industries" in total value added is an indicator calculated as a share of value added for small-scale manufacturing enterprises in total manufacturing value added: $$\frac{Manufacturing\ value\ added\ of\ "small-scale\ industries"}{Total\ manufacturing\ value\ added} \times 100$$

Rationale and interpretation:	Industrial enterprises are classified to small compared to large or medium for their distinct nature of economic organization, production capability, scale of investment and other economic characteristics. "Small-scale industries" can be run with a small amount of capital, relatively unskilled labour and using local materials. Despite their small contribution to total industrial output, their role in job creation, especially in developing countries is recognized to be significant where the scope of absorbing surplus labour force from traditional sectors such as agriculture or fishery is very high. "Small-scale industries" are capable of meeting domestic demand of basic consumer goods such as food, clothes, furniture, etc. **Concepts:** International recommendations for industrial statistics 2008 (IRIS 2008) (United Nations, 2011) define an enterprise as the smallest legal unit that constitutes an organizational unit producing goods or services. The enterprise is the basic statistical unit at which all information relating to its production activities and transactions, including financial and balance-sheet accounts, are maintained. It is also used for institutional sector classification in the 2008 System of National Accounts. An **establishment** is defined as an enterprise or part of an enterprise that is situated in a single location and in which only a single productive activity is carried out or in which the principal productive activity accounts for most of the value added. An establishment can be defined ideally as an economic unit that engages, under single ownership or control, that is, under a single legal entity, in one, or predominantly one, kind of economic activity at a single physical location. Mines, factories and workshops are examples. This ideal concept of an establishment is applicable to many of the situations encountered in industrial inquiries, particularly in manufacturing. Although the definition of an establishment allows for the possibility that there may be one or more secondary activities carried out in it, their magnitude should be small compared with that of the principal activity. If a secondary activity within an establishment is as important, or nearly as important, as the principal activity, then the unit is more like a local unit. It should be subdivided so that the secondary activity is treated as taking place within an establishment separate from the establishment in which the principal activity takes place. In the case of most **small-sized businesses**, the enterprise and the establishment will be identical. Some enterprises are large and complex with different kinds of economic activities undertaken at different locations. Such enterprises should be broken down into one or more establishments, provided that smaller and more homogeneous production units can be identified for which production data may be meaningfully compiled. As introduced in IRIS 2008 (United Nations, 2011), an **economic activity** is understood as referring to a process, that is to say, the combination of actions carried out by a certain entity that uses labor, capital, goods and services to produce specific products (goods and services). In general, industrial statistics reflect the characteristics and economic activities of units engaged in a class of industrial activities that are defined in terms of the International Standard Industrial Classification of All Economic Activities, Revision 4 (ISIC Rev.4) (United Nations, 2008) or International Standard Industrial Classification of All Economic Activities, Revision 3.1 (ISIC Rev. 3) (United Nations, 2002). **Total numbers of persons employed** is defined as the total number of persons who work in or for the statistical unit, whether full-time or part-time, including: • Working proprietors • Active business partners • Unpaid family workers • Paid employees (for more details see United Nations, 2011).

	The size of a statistical unit based on employment should be defined primarily in terms of the average number of persons employed in that unit during the reference period. If the average number of persons employed is not available, the total number of persons employed in a single period may be used as the size criterion. The size classification should consist of the following classes of the average number of persons employed: 1-9, 10-19, 20-49, 50-249, 250 and more. This should be considered a minimum division of the overall range; more detailed classifications, where required, should be developed within this framework. **Value added** cannot be directly observed from the accounting records of the units. It is derived as the difference between gross output or census output and intermediate consumption or census input (United Nations, 2011). The value added at basic prices is calculated as the difference between the gross output at basic prices and the intermediate consumption at purchasers' prices. The valuation of value added closely corresponds to the valuation of gross output. If the output is valued at basic prices, then the valuation of value added is also at basic prices (the valuation of intermediate consumption is always at purchasers' prices). All above mentioned terms are introduced to be in line with IRIS 2008 (United Nations, 2011).
Disaggregation:	Data can be disaggregated by manufacturing sub-sectors
Sources and data collection:	Sources of data include national government departments/ministries; city data may be filtered from the national level data where city departments do not hold this data. The National statistical offices (NSOs) may also have this data. Data may also be acquired from industrial surveys.
Comments and limitations:	The main limitation of existing national, regional and city data is varying size classes by country indicating that data are obtained from different target populations. Data of one country may therefore not comparable to others.
References:	• OECD. (2019). Structural and Demographic Business Statistics (SDBS). Paris : OECD. • United Nations (2002). International Standard Industrial Classification of All Economic Activities (ISIC) Revision 3.1 https://unstats.un.org/unsd/publication/SeriesM/seriesm_4rev3_1e.pdf • United Nations Statistics Division (2022). SDG Indicator 9.3.1. https://unstats.un.org/sdgs/metadata/files/Metadata-09-03-01.pdf • United Nations. (2002). International Standard Industrial Classification of All Economic Activities (ISIC Revision 4). New York: United Nations. • United Nations. (2008). International Standard Industrial Classification of All Economic Activities (ISIC Revision 3.1). New York: United Nations. • United Nations. (2011). International Recommendations for Industrial Statistics 2008 (IRIS 2008), New York: United Nations. http://dx.doi.org/10.18356/677c08dd-en

2.3.6. Days to Start a Business

Indicator:	**(UMF-36) Days to start a business**
Source/Origins	CPI
Definition and method of computation:	One way to identify the ease of starting a business is the number of days it takes a firm to register. Registration must ideally include obtaining all necessary licenses and permits and completing any required notifications, verifications or inscriptions for the company and its employees with the relevant authorities.

	Methodology The indicator captures the days required to start a business recorded in calendar days. The measure captures the median duration that incorporation lawyers indicate as necessary to complete all required registration procedures. A period between 1 and 14 days is considered ideal and may therefore be rated the same. An increase of the number of days from 14 is to be interpreted as reducing ease to start a business.
Rationale and interpretation:	A government should provide a conducive environment in the market it regulates as competition improves quality of goods and services, lowers cost for both producers and consumers, and creates facilities for those who want to enter any market. Excessive business regulation affects economic performance and development as it increases the costs of engaging in the formal economy (Doing Business, 2014). A prosperous city should develop regulatory framework that permits an easy entry of any firms in the market.
Sources and data collection:	Doing Business Indicator and Entrepreneur Surveys
Comments and limitations:	Data is obtained through enterprise surveys made mostly by the World Bank, which makes the data not available for all cities.
References:	• Doing Business (2014). Understanding Regulations for Small and Medium-Size Enterprises. 11th Edition. • The World Bank (2019). Business Enabling Environment (BEE). https://www.worldbank.org/en/programs/business-enabling-environment • UN-Habitat (2012). Measurement of City Prosperity Methodology and Metadata. https://unhabitat.org/programme/city-prosperity-initiative

2.3.7. Patent Application

Indicator:	**(UMF-37) Patent application (PCT) per 1,000,000 people**
Source/Origins	**OECD 9.5**
Rationale and interpretation:	Patents are a key measure of innovation output, as patent indicators reflect the inventive performance of countries, regions, technologies, firms, etc. They are also used to track the level of diffusion of knowledge across technology areas, countries, sectors, firms, etc., and the level of internationalization of innovative activities. Patent indicators can serve to measure the output of R&D, its productivity, structure and the development of a specific technology/industry. Among the few available indicators of technology output, patent indicators are probably the most frequently used. The relationship between patents as an intermediate output resulting from R&D inputs has been investigated extensively. Patents are often interpreted as an output indicator; however, they could also be viewed as an input indicator, as patents are used as a source of information by subsequent inventors. Like any other indicator, patent indicators have many advantages and disadvantages. The advantages of patent indicators are: • patents have a close link to invention. • patents cover a broad range of technologies on which there are sometimes few other sources of data. • the contents of patent documents are a rich source of information (on the applicant, inventor, technology category, claims, etc.); and • patent data are readily available from patent offices.

	However, patents are subject to certain drawbacks: • the value distribution of patents is skewed as many patents have no industrial application (and hence are of little value to society) whereas a few are of substantial value. • many inventions are not patented because they are not patentable or inventors may protect the inventions using other methods, such as secrecy, lead time, etc.; • the propensity to patent differs across countries and industries. • differences in patent regulations make it difficult to compare counts across countries; and changes in patent law over the years make it difficult to analyze trends over time.
Sources and data collection:	The OECD's Directorate for Science, Technology and Industry has developed patent data and indicators that are suitable for statistical analysis and that can help addressing S&T policy issues. To date, the OECD Patent Database fully covers: • Patent applications to the **European Patent Office** (EPO) (from 1978 onwards); • Patents applications to the **US Patent and Trademark Office** (USPTO) (granted patents from 1976 onwards, patent filings as of 2001 only); • Patents filed under the **Patent Co-operation Treaty** (PCT), at international phase, that designate the EPO (from 1978 onwards); • Patents that belong to **Triadic Patent Families** (OECD definition): i.e., sub-set of patents all filed together at the EPO, at the Japanese Patent Office (JPO) and at the USPTO, protecting the same set of inventions. EPO and PCT patent counts are based on data received from the EPO (EPO Bibliographic database, patent published until November 2015). Series on USPTO patents and Triadic patent families are mainly derived from EPO's Worldwide Statistical Patent Database (PATSTAT, Autumn 2015). Regional data are based on OECD, REGPAT database, February 2016. Indicators based on patent families improve the international comparability and the quality of patent's indicators (overcoming the drawbacks of traditional patent-based indicators, such as the "home advantage"). Ongoing work is undertaken to develop further patent indicators based on patents taken at national offices as well as citations of patents.
References:	• OECD (2020). Patent Indicators: https://www.oecd.org/science/inno/33776061.pdf • WIPO (2020). PCT – The International Patent System: www.wipo.int/export/sites/www/pct/en/basic_facts/faqs_about_the_pct.pdf.

2.4. Sustainable City Objective

2.4.1. Sub National Debt

Indicator:	(UMF-38) Sub-national debt
Source/Origins	CPI
Definition and method of computation:	Percentage of subnational debt from local government' total revenue. This is computed as the ratio of the debt aggregates at a given time divided by the local government's revenue. **Methodology** The information required can be extracted from local fiscal accounts. The formula to estimate debt sustainability is the following: $$Subnational\ debt = 100\left[\frac{Total\ existing\ amount\ of\ debt}{Total\ current\ local\ revenue}\right]$$
Rationale and interpretation:	Some cities (local governments) have the option to borrow money from the private sector or international funds. This debt is usually used to finance expensive projects that would be nearly impossible to finance with local or central government revenues alone. Nevertheless, cities must guarantee they will repay their loans (Vulovic, 2011). However, it is possible that a city may be operating way above its debt limits due to its inability to generate enough revenues in a given fiscal period to cover it expenditures and thus may accumulate huge amounts of debts that may be unsustainable in just a single fiscal period. It is accepted to apply limits to the level of debt (usually under a regulatory scheme). The objective of maintaining city debt within the established limits is to guarantee local and national budget future sustainability because in many cases when the local government is unable to pay for its own debt, the central government will have to assume it (Sutherland et al., 2006; Garcia, 2012; Marcel, 2013). A prosperous city seeks to sustainably borrow and manage its debt financing, and effectively utilize loans to facilitate projects that have great impact on the city and its residents.
Sources and data collection:	Local Fiscal Accounts.
Comments and limitations:	Some countries may not allow borrowing at subnational or the local level, therefore caution should be taken in cross-country comparisons.
References:	• García, G. (2012). Reglas fiscales para la estabilidad y sostenibilidad. En: Las Instituciones Fiscales del Mañana. Banco Interamericano de Desarrollo (editor). • International Monetary Fund - IMF (2011). Modernizing the framework for fiscal policy and public debt sustainability analysis. • Jaime, Q. (2009). Public Financing Sustainability in Sub National Governments. Publication No. 12, Debt Relief International Ltd. United Kingdom. • Marcel, M. (2013). Structural fiscal balances: methodological, conceptual and practical alternatives. Inter-American Development Bank: Fiscal and Municipal Management Division. • Sutherland, D.; Price, R. & Joumard, I. (2006). Fiscal rules for subnational governments: Design and impact. OECD Network on Fiscal Relations Across Levels of Government. • UN-Habitat (2012). Measurment of City Prosperity, Methodology and Metadata, UN-Habitat: https://unhabitat.org/sites/default/files/2019/02/CPI-METADATA.2016.pdf • Vulovic, V. (2011). Sub-national borrowing, is it really a danger?. Economics Dissertations, Georgia State University, 77.

2.4.2. Mean Household Income

Indicator:	(UMF-39) Mean household income
Source/Origins	**CPI**
Definition and method of computation:	The mean household income includes the income earned by the average household in a city. It is calculated by dividing the disposable income of all households (according to household surveys) by the number of households of the city. **Methodology** To calculate the mean household income, first the disposable household income distribution of a city must be obtained. The disposable household income is defined as the sum of monetary and non-monetary income from labor, monetary income from capital, monetary social security transfers (including work-related insurance transfers, universal transfers, and assistance transfers), and non-monetary social assistance transfers, as well as monetary and non-monetary private transfers, less the amount of income taxes and social contributions paid (LIS Data Centre). Second, all disposable household incomes must be added and divided by the number of households in the city. Finally, this data must be converted to 2011 PPP in order to have a comparable measure of mean household income across countries.
Rationale and interpretation:	Household income enables consumption, improves access to education, health care, housing and, broadly achieves higher living standards and resistance to economic shocks (Canberra, 2011). A prosper city seeks to build the appropriate foundations to increase mean household income to increase well-being.
Sources and data collection:	City departments/ministries obtain this data from censuses and surveys. Household Income data is sourced from living standard household surveys, income expenditure household surveys. Data for Exchange rate (PPP) may be obtained from The World Bank (2014).
Comments and limitations:	The mean household income does not consider the income distribution of the population. Mean carries with it an assumption that the distribution is symmetrical, but income distributions are usually skewed. This implies that highly unequal cities could have higher mean household income due to high levels of income concentration. Whether this situation indicates a prosperous city is questionable. Moreover, developed countries tend to use equivalence scale measures to calculate disposable total income, while developing countries do not. Therefore, caution should be used when doing cross-country comparisons.
References:	• Canberra Group (2011). Handbook of Household Income Statistics, 2nd Edition. • LIS Data Centre (2014). Disposable Household Income. http://www.lisdatacenter.org/data-access/key-figures/disposable-household-income/, accessed August 18, 2014. • The world Bank (2014). Indicators: http://data.worldbank.org/indicator/PA.NUS.PPP, accessed August 14, 2014. • UN-Habitat (2012). Measurment of City Prosperity, Methodology and Metadata, UN-Habitat: https://unhabitat.org/sites/default/files/2019/02/CPI-METADATA.2016.pdf • World Bank Group (2012). World Development Indicators 2012. World Bank Publications.

Forest cleared for palm oil, Cameroon © Flore de Preneuf / World Bank

Domain 3: Environment

The indicator variables within the environment domain are classified below:

City objectives:

Safe and Peaceful	Inclusive	Resilient	Sustainable
Indicators	**Indicators**	**Indicators**	**Indicators**
3.1.1. Wastewater safely treated	**3.2.1.** Access to Open Public Spaces	**3.3.1.** Renewable energy share	**3.4.1.** Total greenhouse gas emissions per year
3.1.2. Solid Waste Collection and Disposal	**3.2.2.** Education for Sustainable Development	**3.3.2.** Green area per capita	**3.4.2.** Efficient land use
3.1.3. Air quality		**3.3.3.** Change in tree cover	**3.4.3.** Budget on Climate Change Mitigation and Adaption
3.1.4. Hazardous waste		**3.3.4.** Protected Natural Areas	

3.1. Safe and Peaceful City Objective

3.1.1. Wastewater Safely Treated

Indicator:	(UMF-40) Proportion of domestic and industrial wastewater flow safely treated
Source/Origins	**SDG Indicator 6.3.1**
Definition and method of computation:	This indicator measures the volumes of wastewater which are generated through different activities, and the volumes of wastewater which are safely treated before discharge into the environment. Both indicators are measured in units of 1000 m3/day, although some data sources may use other units that require conversion. The ratio of the volume treated to the volume generated is taken as the 'proportion of wastewater flow safely treated'. Wastewater flows will be classified into industrial, services, and domestic flows, with reference to the International Standard Industrial Classification of All Economic Activities Revision 4 (ISIC). To the extent possible, the proportion of each of these waste streams that is safely treated before discharge to the environment will be calculated. **Methodology** The amount of wastewater generated is calculated by summing all of the wastewater generated by different economic activities and households. Wastewater flows are expressed in units of 1000 m3/day, although some data sources may use other units that require conversion. The amount of wastewater safely treated is calculated by summing all of the wastewater flows which receive treatment considered equivalent to secondary treatment or better. This wastewater flow is expressed in units of 1000 m3/day, although some data sources may use other units that require conversion. The proportion of wastewater flows which are safely treated is calculated as a ratio of the amount of wastewater safely treated to the amount of wastewater generated.
Rationale and interpretation:	Wastewater data are crucial to promote strategies for sustainable and safe wastewater use or reuse to the benefit of the world's population health and the global environment, but also to respond to growing water demands, increasing water pollution loads, and climate change impacts on water resources. Sustainable Development Goal 6 (SDG 6) is about ensuring the availability and sustainability of water and sanitation for all by 2030. SDG Target 6.3 sets out to improve ambient water quality, which is essential to protecting both ecosystem and human health, by eliminating, minimizing and significantly reducing different streams of pollution into water bodies. The purpose of monitoring progress using SDG indicator 6.3.1 is to provide necessary and timely information to decision makers and stakeholders to make informed decisions to accelerate progress towards reducing water pollution, minimizing release of hazardous chemicals and increasing wastewater treatment and reuse. The target wording covers wastewater recycling and safe reuse with implication on water use efficiency, although it is not fully addressed by the global indicator and methodology. SDG indicator 6.3.1 tracks the proportion of wastewater flows from households, services and industrial economic activities that are safely treated at the source or through centralized wastewater treatment plants before being discharged into the environment, out of the total volume of wastewater generated. **Concepts:** Total wastewater generation and treatment can be quantified at the national level, and wastewater can also be disaggregated into different types of flows, based on ISIC categories. Domestic wastewater generated by private households, as well as wastewater generated by economic activities covered by ISIC categories, may or may not be pre-treated on premises before discharge to either the sewer for further treatment or directly to the environment, as shown in the Figure shown.

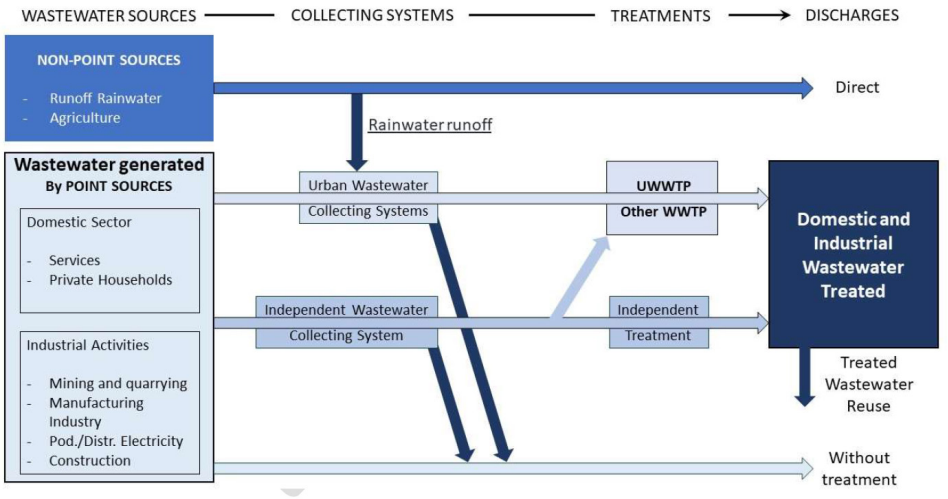


Figure: Schematic Representation of wastewater sources, collecting systems and treatment (modified from wastewater loading diagram, OECD/Eurostat 2018).

The main sources of wastewater include wastewater from households, services and industries, i.e. point sources of one or more pollutant(s) that can be geographically located and represented as a point on a map. Diffused pollution from non-point sources such as runoff from urban and agricultural land can contribute quite significantly to wastewater flows (Figure), and therefore its progressive inclusion in the global monitoring framework will be important. Presently, it cannot be monitored at source and its impact on ambient water quality will be monitored under indicator 6.3.2 “Proportion of bodies of water with good ambient water quality".

Differentiating between the different wastewater streams is important as policy decisions need to be guided by the polluter pays principle. However, wastewater conveyed by combined sewers usually combines both hazardous and non-hazardous substances discharged from different sources, but also runoff and urban stormwater, which cannot be separately tracked and monitored. As a consequence, although the flow of wastewater generated can be disaggregated by sources (domestic, services industrial), the treated wastewater statistics are most commonly disaggregated by type (e.g. urban and industrial) and/or level of treatment (e.g. secondary) rather than by sources.

Total wastewater flows can be classified into three main categories (see ‘disaggregation section’ for details:

- Industrial (ISIC divisions 05-35)
- Services (ISIC divisions 45-96)
- Domestic (private households)

Wastewater treatment can be classified into three main level of treatment source categories (see ‘disaggregation section’ for details:

- Primary
- Secondary
- Tertiary

Where possible, treatment will additionally be classified into either on-premises or off-premises treatment.

Domestic wastewater: Wastewater from residential settlements which originates predominantly from the human metabolism and from household activities.

	Industrial (process) wastewater: Water discharged after being used in, or produced by, industrial production processes and which is of no further immediate value to these processes. Where process water recycling systems have been installed, process wastewater is the final discharge from these circuits. To meet quality standards for eventual discharge into public sewers, this process wastewater is understood to be subjected to ex-process in-plant treatment. Cooling water is not considered here. Sanitary wastewater and surface runoff from industries are also excluded here. **Total wastewater generated** is the total volume of wastewater generated by economic activities (agriculture, forestry and fishing; mining and quarrying; manufacturing; electricity, gas, steam and air conditioning supply; and other economic activities) and households. Cooling water is excluded. **Urban wastewater:** Domestic wastewater or the mixture of domestic wastewater with industrial wastewater and/or runoff rainwater. **Wastewater:** Wastewater is water which is of no further value to the purpose for which it was used because of its quality, quantity or time of occurrence. Cooling water is not considered here. **Wastewater discharge:** The amount of water (in m3) or substance (in kg BOD/d or comparable) added/ leached to a water body (Fresh or non-fresh) from a point source. **Wastewater treatment:** Process to render wastewater fit to meet applicable environmental standards or other quality norms for recycling or reuse.
Disaggregation:	**Wastewater generation (Figure below)** Wastewater can be generated through a variety of economic activities as well as through private households. The following categories of wastewater flows can be distinguished: • **Agricultural (ISIC 01-03)** covers crop and animal production, hunting and related service activities; forestry and logging; and fishing and aquaculture. Wastewater generated from these activities for the most part enters the environment as non-point pollution and will not be monitored as part of indicator 6.3.1. • **Mining and quarrying (ISIC 05-09)** include the extraction of minerals occurring naturally as solids (coal and ores), liquids (petroleum) or gases (natural gas). Extraction can be achieved by different methods such as underground or surface mining, well operation, seabed mining etc. • **Manufacturing (ISIC 10-33)** includes the physical or chemical transformation of materials, substances, or components into new products. The materials, substances, or components transformed are raw materials that are products of agriculture, forestry, fishing, mining or quarrying as well as products of other manufacturing activities. Substantial alteration, renovation or reconstruction of goods is generally considered to be manufacturing. • **Electricity (ISIC 35)** includes electric power generation, transmission and distribution, as well as the manufacture and distribution of gas, and steam and air conditioning supply. Water used for cooling in power generation is explicitly excluded from calculations of wastewater flows. • **Construction (ISIC 41-43)** includes general construction and specialized construction activities for buildings and civil engineering works. It includes new work, repair, additions and alterations, the erection of prefabricated buildings or structures on the site and also construction of a temporary nature. • **Services (ISIC 45-96)** These Divisions are considered service industries and include a wide range of economic activities where water is mainly used for sanitary purposes, washing, cleaning, cooking, etc.

- Wastewater can also be generated by **private households**, originating predominantly from the human metabolism and from household activities. A portion of the water which is brought into private households for domestic purposes (e.g. cooking, drinking, bathing, washing, ISIC division 36) exits the household as wastewater. Domestic wastewater flows are not directly covered by ISIC codes, unless the household generates water in the course of an economic activity. Note that wastewater generated by residents of communal institutions may be covered under ISIC divisions, e.g., 85 (education) or 87 (residential care activities).

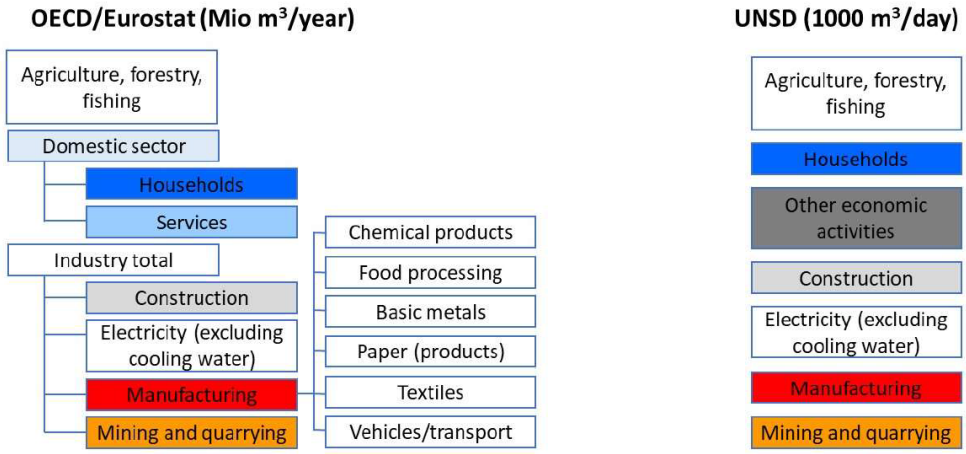


Figure. OECD/Eurostat (left) and UNSD/UNEP (right) variables for the generation of wastewater flow. The variables used to populate the SDG Indicator 6.3.1 are highlighted in colour.

Wastewater treatment (Figure)

OECD/Eurostat databases disaggregate the flow of treated wastewater by type (e.g. urban and industrial discharges), whereas the UNSD database reports the flow of wastewater treated in other treatment plants and in urban wastewater treatment plants (see definitions below) by level of treatment (primary, secondary and tertiary). The variables and terms used for indicator 6.3.1 are listed below.

Urban wastewater treatment is all treatment of wastewater in Urban Wastewater Treatment Plants (UWWTP's). UWWTP's are usually operated by public authorities or by private companies working by order of public authorities. It includes wastewater delivered to treatment plants by trucks. UWWTP's are classified under ISIC 37 (Sewerage).

Independent treatment: Facilities for preliminary treatment, treatment, infiltration or discharge of domestic wastewater from dwellings generally between 1 and 50 population equivalents, not connected to an urban wastewater collecting system. Examples of such systems are septic tanks. Excluded are systems with storage tanks from which the wastewater is transported periodically by trucks to an urban wastewater treatment plant.

Other wastewater treatment corresponds to treatment of wastewater in any non-public treatment plant, i.e., Industrial Wastewater Treatment Plants (IWWTPs). Excluded from "other wastewater treatment" is the treatment in septic tanks. IWWTPs may also be classified under ISIC 37 (Sewerage) or under the main activity class of the industrial establishment they belong to.

Non-treated wastewater is wastewater which doesn't undergo any form of treatment before discharge to the environment.

Primary wastewater treatment: Treatment of wastewater by a physical and/or chemical process involving settlement of suspended solids, or other process in which the Biochemical Oxygen Demand (BOD5) of the incoming wastewater is reduced by at least 20% before discharge and the total suspended solids of the incoming wastewater are reduced by at least 50%. To avoid double counting, water subjected to more than one type of treatment should be reported under the highest level of treatment only.

Secondary wastewater treatment: Post-primary treatment of wastewater by a process generally involving biological treatment with a secondary settlement or other process, resulting in a Biochemical oxygen demand (BOD) removal of at least 70% and a Chemical Oxygen Demand (COD) removal of at least 75%. Natural biological treatment processes are also considered under secondary treatment if the constituents of the effluents from this type of treatment are similar to the conventional secondary treatment. To avoid double counting, water subjected to more than one type of treatment should be reported under the highest level of treatment only.

Tertiary wastewater treatment: Treatment (additional to secondary treatment) of nitrogen and/or phosphorous and/or any other pollutant affecting the quality or a specific use of water: microbiological pollution, colour etc. The different possible treatment efficiencies ('organic pollution removal' of at least 95% for BOD5, 85% for COD, 'nitrogen removal' of at least 70%, 'phosphorous removal' of at least 80% and 'microbiological removal') cannot be added and are exclusive. To avoid double counting, water subjected to more than one type of treatment should be reported under the highest level of treatment only.

For all of these treatment categories, some but not all countries have data available on the compliance of treatment to relevant effluent standards or targets. When available, such data are not routinely reported to UNSD or OECD/Eurostat but may be available in other national data sources (e.g., statistical or wastewater analysis reports). Where available, data on the proportion of flows that meet relevant criteria will be used for indicator 6.3.1. In the absence of such data, treatment nominally classified as secondary or better (or equivalent) will be used as a proxy for safe treatment.

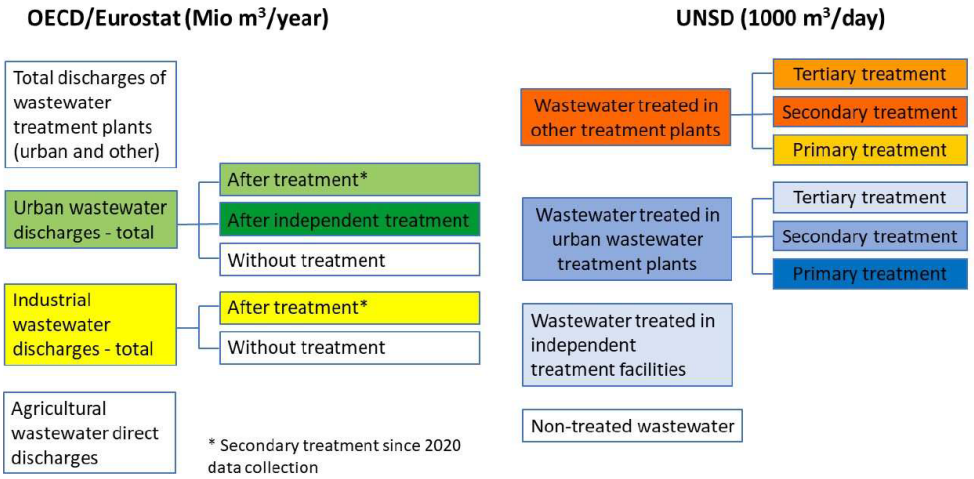


Figure. OECD/Eurostat (left) and UNSD/UNEP (right) variables for the treatment of wastewater flow. The variables to populate the SDG Indicator 6.3.1 are highlighted in colour.

Where it is possible to quantify both generation and treatment by source (industrial, service, or domestic), the proportion of wastewater treated will also be calculated separately by source.

Sources and data collection:	A clear specification of the terminology and methodology for wastewater statistics is essential to contribute to harmonising international data collection practices and SDG 6.3.1 reporting. The objective of indicator 6.3.1 is to cover households and the entire economy, and to build on the existing international methodology for global monitoring wastewater generation and treatment. This approach reduces the monitoring burden that SDG reporting can impose on countries and provides well-defined and internationally comparable variables for global data analysis and use by policymakers and urban/land planners. Data are extracted from several pre-existing sources: • Website of OECD water statistics (https://stats.oecd.org/index.aspx?DataSetCode=water_treat#). • Country files from the WHO/UNICEF Joint Monitoring Programme for Water Supply, Sanitation and Hygiene (JMP) data collection on safely managed sanitation services, and the reports referenced therein (https://washdata.org/) • UNSD/UNEP Questionnaire on Environment Statistics (water section)(https://unstats.un.org/unsd/envstats/questionnaire) (refer to "Inland Water Resources") • The Joint OECD/Eurostat Questionnaire (https://unstats.un.org/unsd/envstats/questionnaire) • Website of Eurostat water statistics (https://ec.europa.eu/eurostat/web/environment/water) **Collection process:** Total flows of wastewater generated and treated are reported by countries to UNSD and OECD/Eurostat databases. Eurostat deals with Member States of the European Union (EU) and the European Free Trade Association (EFTA) as well as the respective candidate countries. OECD works with all its Member States not contacted by Eurostat. UNSD sends the UNSD/UNEP Questionnaire to the rest of the world (approx. 165 countries). However, the response rate for the UNSD/UNEP questionnaire is around 50% and data completeness and quality remain a challenge, especially for developing countries. While efforts will continue to collect data from National Statistical Offices and Ministries of Environment at the national level, it is also critical to improve the availability and accessibility of wastewater statistics and increase training for collection of data and capacity development at the national and sub-national levels. The WHO/UNICEF Joint Monitoring Programme for Water Supply, Sanitation and Hygiene (JMP) collects and compiles national data related to use of sanitation services including wastewater treatment, for calculation of SDG indicator 6.2.1a "proportion of the population using safely managed sanitation services." National data sources are collected from National Statistical Offices, ministries responsible for service delivery, and regulatory authorities, as well as other regional and global initiatives (e.g. the European Protocol on Water and Health). The database is updated every two years following a country consultation process facilitated by WHO and UNICEF regional offices. These databases rely on a comparable harmonized terminology for water statistics. Wastewater data are nonetheless still relatively sparse on a global scale. UN-Habitat and WHO will disseminate information about these data collection processes, and will liaise with their technical focal points in regions and countries, to work with them to produce estimates which could then feed into the official statistical system via the NSOs. It is expected that over time, a better reporting of the wastewater data collected can be made to populate the SDG Indicator 6.3.1.
Comments and limitations:	There is a relative lack of knowledge about the volumes of wastewater generated and treated, because wastewater statistics are in an early stage of development in many countries and not regularly produced or reported. Monitoring is relatively complex, costly, and data are not systematically aggregated to the national level and/or accessible; especially industrial wastewater data which are in general poorly monitored and seldom aggregated at national level.

	To some extent, this may be explained by the fact that a large proportion of the industrial water requirements are covered by the use of private systems using non-public/drinking water supply (groundwater, rivers and wells) which are not systematically included in the national statistics. Diffused pollution from non-point sources such as runoff from urban and agricultural land can contribute significantly to wastewater flows, and therefore its progressive inclusion in the global monitoring framework will be important. Presently, it cannot be monitored at source and its impact on ambient water quality will be monitored indirectly under indicator 6.3.2 on the proportion of bodies of water with good ambient water quality. Different types of wastewaters have different degrees of contamination and pose different levels of threat to the environment and public health. Some data exist on the pollutant loading in terms of BOD5 and COD (kg O2/day), but these are not as widely available as data on volumes and will not be used at present for indicator 6.3.1. It is anticipated that future data drives will include more information on pollutant loadings that could be eventually featured in SDG 6.3.1 reporting. Finally, whether wastewater is classified as safely treated or not depends on the wastewater treatment plant's compliance rate to the effluent standards (i.e., performance). Many wastewater plants produce effluent which does not meet quality standards, due to improper design or loading. Effluent standards rely on both national and local requirements, as well as on specific water uses and potential reuse options, so that this approach may not provide strictly comparable variables between countries. For the purposes of global monitoring, in the absence of data on compliance, technology-based proxies will be used, in which compliance is assumed if the treatment plant provides at least secondary treatment.
Treatment of missing values	**At country level** Outside of the UNSD and OECD/Eurostat databases, data on wastewater generation and treatment are not widely available, and what data do exist may not align with international definitions and classifications (e.g., ISIC codes). For statistics on total wastewater generated and treated, missing values are not imputed. No estimated or modelled data are produced. Some countries do not separately report the volume of wastewater generated by households. In the absence of reported data on domestic wastewater generation, an estimate of the wastewater generated at the household level will be made. It can be estimated that 80% of the water supply which enters private households will subsequently exit the household as wastewater. Therefore, if data are available on per capita water consumption, these can be used to estimate domestic wastewater generation. If data on per capita water consumption are not available, data from household surveys and censuses can be used to indicate the proportion of the population which has water supplies available on premises (e.g., municipal piped water, private boreholes with overhead tanks) and the proportion of the population which collects water from off-premises sources (e.g. communal standposts, community boreholes). In the absence of other data on domestic water consumption, it can be estimated that households with on-premises water supply consume approximately 120 litres per capita per day, and therefore generate 96 litres of wastewater per capita per day; those with off-premises water supply are assumed to consume approximately 20 litres per capita per day, and therefore generate 16 litres of wastewater per capita per day.

	Missing values needed for calculation of the proportion of domestic wastewater which receives appropriate treatment will be handled in a similar way to the calculation of 'safely managed sanitation services' for SDG indicator 6.2.1. Domestic wastewater which enters sewage lines will be assumed to reach centralized wastewater treatment plants unless national data is available about leakage from sewage lines. The volume of domestic wastewater estimated to reach treatment plants will be compared against the volume of wastewater reported to be received at wastewater plants, and the volume reportedly received will be taken as an upper limit to the amount of domestic wastewater which receives off-site treatment. If data are available on the proportion of wastewater flows received by centralized treatment plants which receive secondary treatment or better, this proportion can be assumed to apply equally to the flows generated by households, industries, and services which discharge into public sewers. Domestic wastewater which enters on-site storage and treatment systems such as septic tanks will be assumed to be safely treated if national data on compliance of on-site wastewater treatment systems to relevant standards are available. In the absence of such data, half of the wastewater discharged into on-site storage and treatment systems will be considered to receive safe treatment. Given the data limitations, especially on non-household wastewater, data currently available on compliance with discharge permits could be used to better to estimate the industrial flows treated.
References:	• OECD/Eurostat (2018). Data Collection Manual for the OECD/Eurostat Joint Questionnaire on Inland Waters and Eurostat regional water questionnaire. • United Nations Statistics Division (2018) International Standard Industrial Classification of All Economic Activities, Revision 4. https://unstats.un.org/unsd/publication/seriesm/seriesm_4rev4e.pdf • United Nations Statistics Division (2022). SDG Indicator 6.3.1. https://unstats.un.org/sdgs/metadata/files/Metadata-06-03-01.pdf • UNSD Indicator Tables (inland water resources) (https://unstats.un.org/unsd/envstats/qindicators) • UNSD/UNEP (2020). Questionnaire 2020 on Environment Statistics. https://unstats.un.org/unsd/envstats/questionnaire • WHO and UN Habitat, (2018) Progress on Safe Treatment and Use of Wastewater 2018: Piloting the monitoring methodology and initial findings for SDG indicator 6.3.1. https://www.unwater.org/publications/progress-on-wastewater-treatment-631/

3.1.2. Solid Waste Collection and Disposal

Indicator:	**(UMF-41) Proportion of municipal solid waste collected and managed in controlled facilities out of total municipal solid waste generated by cities**
Sources/Origins	**SDG Indicator 11.6.1**
Definition and method of computation:	SDG 11.6 targets an improved environmental performance of cities and SDG indicator 11.6.1 measures the progress of the performance of a city's municipal solid waste management. It quantifies the parameters listed below, which are essential for planning and implementing sustainable Municipal Solid Waste (MSW). In most cases, these variables are generally compatible with those collected through the UNSD/UNEP Questionnaire on Environment Statistics (waste section). • Total MSW generated in the city (tonnes/day) • Total MSW collected in the city (tonnes/day) • Proportion of population with access to basic MSW collection services in the city (%) • Total MSW managed in controlled facilities in the city (tonnes/day) • MSW composition

It is important to realize that part (b) total MSW collected and (c) proportion of the population with access to basic MSW collection services are two different concepts. While part (b) refers to amounts of waste reaching waste management facilities, part (c) considers the population who receive waste collection services. In some cities it is common to dump waste 'collected' from households into the surrounding areas instead of transporting it to a disposal or recovery facility. In this case the household has waste collection services, but the collected waste is polluting the environment. Therefore, it is possible that a city has a high proportion of population with access to basic waste collection services, but the amount of MSW collected and transported to waste management facilities is low.

Although part (c) is covered by SDG 1 ("End poverty in all its forms everywhere"), under target 1.4 and SDG indicator 1.4.1 which focuses on universal access to basic services, with a particular emphasis on poor and vulnerable groups, this document provides guidelines, quality ladders and household questionnaires to measure the proportion of the population with access to 'basic' MSW collection services. The household questionnaire can be integrated into the national census or global household survey mechanism such as Demographic and Health Survey or UNICEF's Multiple Indicator Cluster Surveys. Due to the lack of standardized concepts and definitions that differentiate these two concepts, many cities report the proportion of collected MSW in their own terms. Therefore, this metadata distinguishes clearly between part (b) and (c) and offers introduction to the approaches to monitor and report on part (c).

Methodology

Formulas

The numerator of this indicator is 'total MSW collected and managed in controlled facilities(tonnes/day)' and the denominator is 'total municipal solid waste generated by the city (tonnes/day').

SDG indicator 11.6.1 is calculated as follows:

$$SDG\ 11.6.1 = \frac{Total\ MSW\ collected\ and\ managed\ in\ controlled\ facilities\left({}^{t}/_{Day}\right)}{Total\ MSW\ generated\ \left({}^{t}/_{Day}\right)} \times 100(\%)$$

The calculation of SDG indicator 11.6.1. provides two important sub-categories with varying policy implications:

$$SDG\ 11.6.1\ category\ a = \frac{Total\ MSW\ collected\left({}^{t}/_{Day}\right)}{Total\ MSW\ generated\ \left({}^{t}/_{Day}\right)} \times 100(\%)$$

$$SDG\ 11.6.1\ category\ b = \frac{Total\ MSW\ managed\ in\ controlled\ facilities\left({}^{t}/_{Day}\right)}{Total\ MSW\ generated\left({}^{t}/_{Day}\right)} \times 100(\%)$$

The Figure: Concept figure of SDG indicator 11.6.1 summarizes the elements measured by SDG indicator 11.6.1. The MSW generated by the city is either collected or uncollected, and the collected MSW is delivered to recovery or disposal facilities. Recovery facilities generate residues that are sent to disposal facilities. In many cities, recyclables are also recovered from disposal facilities and brought back into the recycling value chain. Recovery or disposal facilities can be categorized as either 'controlled' or 'uncontrolled' depending on the operational measures put in place to minimize the environmental, health and safety impacts from the facilities. When both recovery and disposal occur within the same facility, it is necessary to evaluate the control level of the recovery and disposal operations independently of each other.

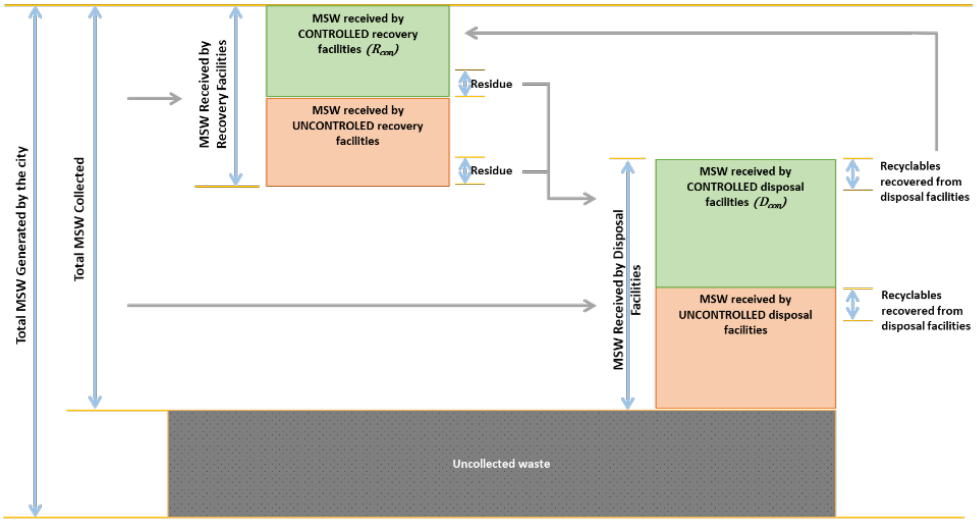


Figure: Concept figure of SDG indicator 11.6.1

Data points

The data points required to calculate SDG indicator 11.6.1 include:

A. Total MSW generated by the city
B. Total MSW collected
C. Total MSW managed in controlled facilities

These data also help cities to identify the proportion of MSW that remains uncollected.

A. Total MSW generated by the city

For cities that do not have reliable data on MSW generation, it can be estimated through the multiplication of the total population and per capita MSW generation from the household. Detailed methodology for this is provided in Steps 1, 2 and 3 in Waste Wise Cities Tool – Step by Step Guide to Assess a City's MSMW Performance through SDG indicator 11.6.1 Monitoring (UN-Habitat, 2020).

Equation 1: Total MSW Generated

B. Total MSW collected

When measuring total MSW collected, there is a risk of double counting, concerning the residue or rejects from recovery facilities and the amount of waste recovered from disposal facilities going to recovery. Therefore, these amounts need to be deducted from the sum of waste received by both recovery and disposal facilities. It is assumed residue of recovery facilities is going to disposal facilities or other recovery facilities.

Steps 4 and 5 in ***Waste Wise Cities Tool – Step by Step Guide to Assess a City's MSMW Performance through SDG indicator 11.6.1*** Monitoring provide detailed methodology on how to collect this data if not available.

Equation 2: Total MSW[17] collected

C. Total MSW managed in controlled facilities

MSW Managed in Controlled Facilities is MSW collected and transported to recovery and disposal facilities with basic control or above according to the control ladder. Steps 4 and 5 in ***Waste Wise Cities Tool – Step by Step Guide to Assess a City's MSMW Performance through SDG indicator 11.6.1*** Monitoring provide detailed methodology on how to collect this data if not available.

Equation 3: Total MSW Managed in Controlled Facilities

Additional data points

The SDG indicator 11.6.1 assessment provides information for the calculation of three more very relevant MSW management data points. Although they are not necessary for the calculation of the SDG indicator, these figures are of interest for city authorities:

D. Per capita MSW generation rate
E. MSW composition
F. Uncollected waste

D. Per capita MSW generation rate

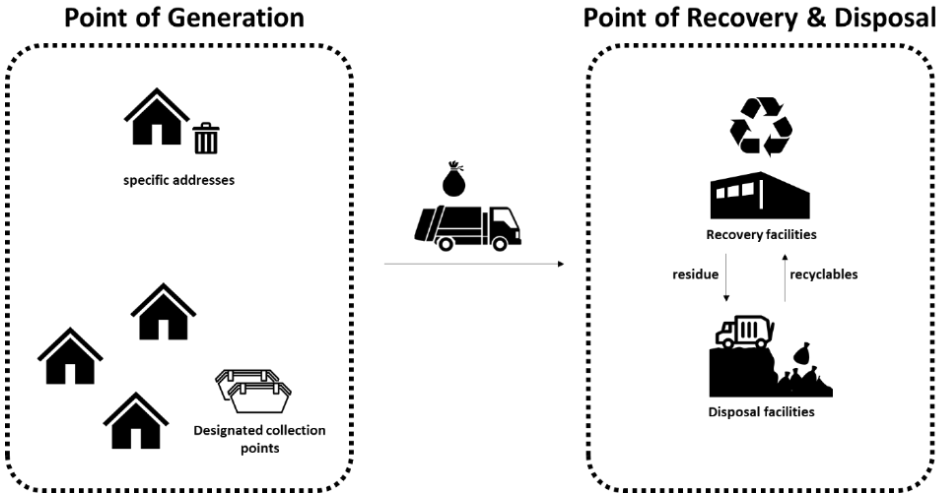
A very relevant parameter that can be derived from the previous formula is the "total per capita MSW generation rate". Steps 2 and 3 in ***Waste Wise Cities Tool – Step by Step Guide to Assess a City's MSMW Performance through SDG indicator 11.6.1*** Monitoring explain how to calculate this through waste sampling from households, if no reliable or updated data is available. Particularly for cities where a large amount of MSW remains uncollected, it is recommended to sample the waste from households, as provided by the Waste Wise Cities Tool.

E. MSW Composition

The SDG indicator 11.6.1 assessment determines the waste composition at the point of generation (i.e. households) and at the point of disposal. Understanding MSW composition at the beginning and end of the MSW service chain is a useful exercise for several reasons; Understanding composition helps identifying how the existing recovery/recycling sector is functioning, it enables further recovery facilities to be identified and planned, and overall assists triangulation (i.e. test validity and reliability) of data collected.

Note that MSW also includes waste from non-household sources. In Step 3 of ***Waste Wise Cities Tool – Step by Step Guide to Assess a City's MSMW Performance through SDG indicator 11.6.1*** Monitoring, the quantities of MSW generated from commercial and institutional sources, as well as from public spaces, is estimated. However, specific composition analysis on MSW from non-household sources is beyond the scope of this tool as it is complex and resource intensive.

17 Note that MSW collected for recovery includes mixed MSW, commingled recyclables or recoverable fractions extracted from MSW

	F. Total uncollected waste Total uncollected MSW can be calculated by subtracting the total MSW regularly collected from the total MSW generated. 
Rationale and interpretation:	Data for this indicator can be disaggregated at various levels in accordance with the country's policy information needs. For instance: • Disaggregation by location (intra-urban) • Disaggregation by source of waste generation e.g., residential, industrial, office, or MSW material received by recovery facilities • Disaggregation by type of final treatment and disposal • MSW generation rate of different income level (high, middle, low) • MSW generation rate in different cities **Concepts:** **Municipal Solid Waste (MSW)** Municipal Solid Waste includes waste generated from: households, commerce and trade, small businesses, office buildings and institutions (schools, hospitals, government buildings). It also includes bulky waste (e.g. white goods, old furniture, mattresses) and waste from selected municipal services, e.g. waste from park and garden maintenance, waste from street cleaning services (street sweepings, the content of litter containers, market cleansing waste), if managed as waste. The definition excludes waste from municipal sewage network and treatment, municipal construction and demolition waste. **Generation** Total MSW Generated is the sum of the amount of municipal waste collected plus the estimated amount of municipal waste from areas not served by a municipal waste collection service. **Collection** Total MSW Collected refers to the amount of municipal waste collected by or on behalf of municipalities, as well as municipal waste collected by the private sector. It includes mixed waste, and fractions collected separately for recovery operations (through door-to-door collection and/or through voluntary deposits).  *Figure: What MSW collected means for SDG indicator 11.6.1*

The proportion of the population with Access to Basic MSW Collection Services is the proportion of the population who receive waste collection services that are either basic, improved or full, defined by the service ladder of MSW collection service. It considers aspects of frequency, regularity and proximity of the collection points. This aspect is measured under the SDG indicator 11.6.1 assessment but it is reported through a different indicator, SDG 1.4.1. on access to basic services.

Service Level	Definition
Full	• Receiving door-to-door MSW collection service with basic frequency and regularity and MSW is collected in three or more separate fractions; or • Having a designated collection point within 200m distance served with basic frequency and regularity and without major littering and MSW is collected in three or more separate fractions
Improved	• Receiving door-to-door MSW collection service with basic frequency and regularity and MSW is collected in a minimum of two, separate fractions (e.g. wet and dry fractions) • Having a designated collection point within 200m distance served with basic frequency and regularity and without major littering and MSW is collected in a minimum of two, separate fractions (e.g., wet and dry fractions)
Basic	• Receiving door-to-door MSW collection service with basic frequency and regularity or • Having designated collection point within 200m distance served with basic frequency and regularity
Limited	• Receiving door-to-door MSW collection service without basic frequency and regularity. • Having a designated collection point within 200m distance but not served with basic frequency and regularity; or • Having designated collection point in further than 200 m distance.
No	• Receiving no waste collection service

Note: Basic frequency and regularity: served at least once a week for one year

Table 1: Ladder of MSW collection service that household receives

Recovery

Recovery means any operation the principal result of which is waste serving a useful purpose by replacing other materials which would otherwise have been used to fulfil a particular function, or waste being prepared to fulfil that function, in the plant or in the wider economy.

Recovery facilities include any facility with recovery activities defined above including recycling, composting, incineration with energy recovery, materials recovery facilities (MRF), mechanical biological treatment (MBT), etc.

Material Recovery Facility (MRF; or materials reclamation facility, materials recycling facility, multi re-use facility) is a specialized recovery facility that receives, separates and prepares recyclable materials for marketing to further processors or end-user manufacturers.

Mechanical Biological Treatment (MBT) facilities are a type of recovery facility that combines an MRF with a form of biological treatment such as composting or anaerobic digestion.

Incineration is the controlled combustion of waste with or without energy recovery.

Incineration with Energy Recovery is the controlled combustion of waste with energy recovery.

Recycling is defined under the UNSD/UNEP Questionnaire and further for the purpose of these indicators as "Any reprocessing of waste material in a production process that diverts it from the waste stream, except reuse as fuel. Both reprocessing as the same type of product, and for different purposes should be included. Recycling within industrial plants i.e., at the place of generation should be excluded." For the purpose of consistency with the Basel Convention reporting and correspondence with EUROSTAT reporting system, Recovery operations R2 to R12 listed in Basel Convention Annex IV, are to be considered as 'Recycling' under the UNSD reporting for hazardous waste.

Recycling value chain usually involves several steps of the private recycling industry which purchase, process and trade materials from the point a recyclable material is extracted from the waste stream until it will be reprocessed into products, materials or substances that have market value. In many low and low-to-middle income countries, this involves informal waste pickers, many middlemen, traders, apex traders and end-of-chain recyclers.

Apex traders collect recyclable materials from different sources and suppliers (in different cities across municipal or even national boundaries) and supply them to different end-of-chain recyclers (sometimes after pre-processing such as sorting, washing and bailing).

End-of-chain recyclers purchase recyclable material from suppliers such as apex traders and reprocess it into products, materials, or substances that have market value.

Disposal

Disposal means any operation whose main purpose is not the recovery of materials or energy even if the operation has as a secondary consequence the reclamation of substances or energy.

Disposal Facilities refer to sites which are regularly used by the public authorities and private collectors, regardless of their level of control and legality, to dispose of waste. Such sites may or may not have an official recognition, a permit or a license. Disposal sites may be managed in either a controlled or uncontrolled manner. The definition excludes other unrecognized places where waste is deposited occasionally in small amounts which public authorities may organise clean ups to remove the waste from these sites.

Landfill is the deposit of waste into or onto land. It includes specially engineered landfill sites and temporary storage of over one year on permanent sites. The definition covers both landfills at internal sites, i.e., where a generator of waste is carrying out its own waste disposal at the place of generation, and at external sites.

Control level of MSW recovery and disposal facilities

MSW Managed in Controlled Facilities refers to MSW collected and transported to recovery and disposal facilities with basic, improved or full control according to the Ladder of waste management facilities' control level (Table 2: Ladder of waste management facilities' control level.). The Ladder can be used as a checklist for assessing the level of control of a particular recovery or disposal facility. The facility has the level of control, where it checks the most boxes. Note that the emphasis is on operational control rather than engineering/design. A facility that is constructed to a high standard, but not operated in compliance with Level 3 (or above) standard is not regarded as a controlled facility.

Table 2: Ladder of waste management facilities' control level.

Control level	Landfill site	Incineration with energy recovery	Other recovery facilities
Full Control	• Waste daily covered • Waste compacted • Site fenced and full 24-hour control of access • Properly sited, designed and functional sanitary landfill • Leachate containment and treatment (naturally consolidated clay on the site or constructed liner) • Landfill gas collection and flaring and/or utilization • Site staffed. • Post closure plan • Weighing and recording conducted • Protection of workers' health and safety	• Built to and operating in compliance with current national laws and standards including stringent stack and GHG emission criteria • Emission controls are con-ducted compliant to envi-ronmental standards and results of tests are accessi-ble and transparent to citi-zens/users • Fly ash managed as a haz-ardous waste using the best appropriate technolo-gy • Weighing and recording conducted • A strong and robust envi-ronmental regulator in-spects and monitors emis-sions • Protection of workers' health and safety	• Built to and operating in compliance with current national laws and standards • Pollution control compliant to environmental standards • Protection of workers' health and safety • The nutrient value of biologically treated materials utilized for separate organic waste (e.g. in agriculture/ horticulture) • Materials are extracted, processed according to market specifications, and sold to recycling markets • Weighing and recording of incoming loads conducted • All outgoing loads registered by weight and type of destination
Improved Control	• Waste periodically covered • Waste compacted • Site fenced and control of access • Leachate containment and treatment • Landfill gas collection (depending on landfill technology) • Site staffed • Weighing and recording conducted • Provisions made for workers' health and safety	N/A	• Engineered facilities with effective process control • Pollution control compliant to environmental standards • Protection of workers' health and safety • Evidence of materials extracted being delivered into recycling or recovery markets. • Weighing and recording of incoming and outgoing loads conducted

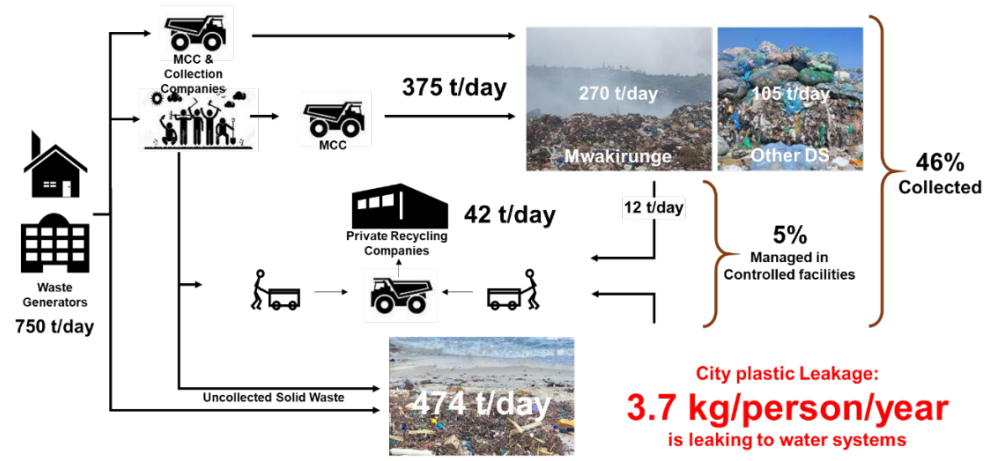
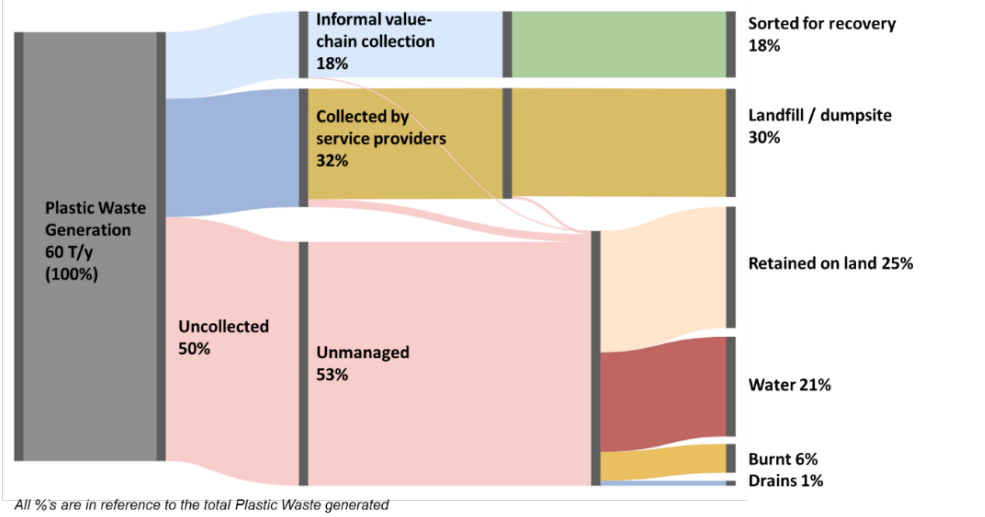
Basic Control	• Some use of cover • Waste compacted • Sufficient equipment for compaction • Site fenced and control of access • No fire/smoke existence • Site staffed • Weighing and recording conducted • The slope of the landfill is stable, landslides not possible • Provisions made for workers' health and safety	• Emission controls to capture particulates • Trained staff follow set operating procedures • Equipment maintained • Ash management carried out • Weighing and recording conducted • Provisions made for workers' health and safety	• Registered facilities with marked boundaries • Some environmental pollution controls • Provisions made for workers' health and safety • Weighing and recording of incoming and outgoing loads conducted
Limited Control	• No cover • Some compaction • Some equipment for compaction • Some level of access control/fencing • No leachate controls • Some fire/smoke existence • Site staffed • Weighing and recording conducted • The slope of the landfill is unstable with high possibility of a landslide	N/A	• Unregistered facilities with distinguishable boundaries • No environmental pollution controls • No provisions made for workers' health and safety • Weighing and recording conducted
No Control	• No cover • No compaction • No/ limited equipment • No fencing • No leachate controls • Fire/smoke existence • No staff • The slope of the landfill is unstable with high possibility of a landslide	• Uncontrolled burning • No air/water pollution control	• Unregistered locations with no distinguishable boundaries • No provisions made for workers' health and safety • No environmental pollution control

Formality of MSWM

The Formality of MSWM activities is an important aspect to take into consideration when conducting the SDG indicator 11.6.1 assessment. MSWM activities are carried out by formal and informal economic units, both public and private, and by generators for the purpose of prevention, collection, transportation, treatment and disposal of waste.

	Formal waste management relates to waste management activities undertaken by units working within the context of the formal governmental or non-state actors regulating and operating waste management; that is, organisations or individuals registered as economic units with government authorities and assumed to generally abide by local laws and regulations related to wastes and their management. **Informal waste management, recycling and recovery** refers to waste management and recovery activities undertaken by individuals, economic units, or enterprises which are not sponsored, financed, recognised, supported, organised or acknowledged by the formal solid waste authorities, or which operate in violation of or in competition with formal authorities (Scheinberg et al., 2010). Informal units are assumed to abide by local waste-related laws and regulations when it is in their interests to do so.
Disaggregation:	Data for this indicator can be disaggregated at various levels in accordance with the country's policy information needs. For instance: • Disaggregation by location (intra-urban) • Disaggregation by source of waste generation e.g., residential, industrial, office, or MSW material received by recovery facilities • Disaggregation by type of final treatment and disposal • MSW generation rate of different income level (high, middle, low) • MSW generation rate in different cities
Sources and data collection:	Countries and cities/municipalities that have the data already are recommended to answer the UNSD/UNEP Questionnaire on Environment Statistics to provide the data related to SDG 11.6.1. For countries and municipalities/cities that do not have the data, it is recommended to apply UN-Habitat's Waste Wise Cities Tool – Step by Step Guide to Assess a City's MSMW Performance through SDG indicator 11.6.1 Monitoring. **Collection process:** It is recommended to establish a system where local or municipal governments collect SDG 11.6.1 data utilizing Waste Wise Cities Tool, then the data aggregated by the ministries and agencies in charge of environmental protection. These collected data should be reported to UNSD/UNEP Questionnaire on Environment Statistics every two years from national statistical offices of countries. Currently the response rate for the UNSD/UNEP Questionnaire is around 50% and data completeness and quality remain a challenge, especially for developing countries. Countries may report their data to UNSD via the UNSD/UNEP Questionnaire on Environment Statistics (waste section) following application of the methods specified in this metadata template. UNSD engages in an extensive data validation process including automated checks, and liaisons with the country's NSO or Ministry of Environment.
Comments and limitations:	Collection of data for the indicator is very much possible as demonstrated by pilot data collection using UN-Habitat's Waste Wise Cities Tool in Mombasa (see flow diagram), but continuous training and capacity development for tool application at city level will be required to strengthen the global waste statistics and improve its data quality. In general, developed countries have good Municipal solid waste data collection systems. Some of the best available data for middle- and low-income countries is available from UNSD, though it is relatively sporadic.[18] In countries and cities where data availability is particularly challenging, household surveys and other complimentary surveys are being conducted for the estimation of municipal waste generation per capita.

18 UNSD, UNSD Environmental Indicators. Refer specifically to: "Municipal waste collection at city level in selected cities (latest year)"; "Municipal waste treatment at city level in selected cities (latest year)"; and "Total population served by Municipal Waste Collection". Available at: https://unstats.un.org/unsd/envstats/qindicators

	Also, the collection of the data, such as the amount of waste managed in controlled facilities, remains a challenge for many national and local governments. The judgement on the adequacy of treatment and disposal of all the waste management facilities, including composting, recycling, incineration facilities in a city, requires high level of technical capacity and large investment in human resources.
	Municipal Solid Waste Flow in Mombasa, Kenya  ***Plastic Waste Flow Diagram for Mombasa, Kenya***  *All %'s are in reference to the total Plastic Waste generated*
References:	• GIZ, University of Leeds, Eawag-Sandec, Wasteaware (2020). User Manual: Waste Flow Diagram (WFD): A rapid assessment tool for mapping waste flows and quantifying plastic leakage. Version 1.0. Principal Investigator: Velis C.A. Research team: Cottom J., Zabaleta I., Zurbruegg C., Stretz J. and Blume S. Eschborn, Germany. Obtain from: http://plasticpollution.leeds.ac.uk • Jambeck et al (2015) Plastic waste inputs from land into the ocean. Science 13 Feb 2015: Vol. 347, Issue 6223, pp. 768-771 • Manual on the Basic Set of Environment Statistics (https://unstats.un.org/unsd/envstats/fdes/manual_bses.cshtml): Generation and Management of Waste (https://unstats.un.org/unsd/environment/FDES/MS_3.3.1_3.3.2_Waste.pdf)

	• UN Environment (2015) Global Waste management Outlook • UN-DESA (2013). Framework for the Development of Environment Statistics (FDES) (https://unstats.un.org/unsd/environment/FDES/FDES-2015-supporting-tools/FDES.pdf) • UN-Habitat (2010) Solid Waste Management in World Cities • United Nations Statistics Division (2022). SDG Indicator 11.6.1. https://unstats.un.org/sdgs/metadata/files/Metadata-11-06-01.pdf • UNSD Indicator Tables (waste) (https://unstats.un.org/unsd/envstats/qindicators) • UNSD/UNEP Questionnaire on Environment Statistics (waste section) (https://unstats.un.org/unsd/envstats/questionnaire) • Wilson et al (2014) User Manual for Wasteaware ISWM Benchmark Indicators Supporting Information to: Wilson et al., 2014 – doi: 10.1016/j.wasman.2014.10.006 • Wilson et al. (2015) 'Wasteaware' benchmark indicators for integrated sustainable Waste management in cities. Waste Management 35, 329–342. • World Bank (2018) What a Waste 2.0: A Global Snapshot of Solid Waste Management to 2050 • Jambeck et al (2015) Plastic waste inputs from land into the ocean. Science

3.1.3. Air Quality

Indicator:	**(UMF-42) Annual mean levels of fine particulate matter (e.g. PM2.5 and PM10) in cities (population weighted)**
Sources/Origins	**SDG indicator 11.6.2**
Definition and method of computation:	The mean annual concentration of fine suspended particles of less than 2.5 microns in diameters (PM2.5) is a common measure of air pollution. The mean is a population-weighted average for urban population in a country and is expressed in micrograms per cubic meter [µg/m3]. **Methodology** The annual urban mean concentration of PM2.5 is estimated with improved modelling using data integration from satellite remote sensing, population estimates, topography, and ground measurements (WHO, 2016a; Shaddick et al, 2016)
Rationale and interpretation:	Air pollution consists of many pollutants, among other particulate matter. These particles can penetrate deeply into the respiratory tract and therefore constitute a risk for health by increasing mortality from respiratory infections and diseases, lung cancer, and selected cardiovascular diseases.
Disaggregation:	The indicator is available by 0.1° x 0.1° grid size for the world.
Sources and data collection:	Sources of data include ground measurements from monitoring networks, collected for 3,000 cities and localities (WHO 2016) around the world, satellite remote sensing, population estimates, topography, information on local monitoring networks and measures of specific contributors of air pollution (WHO, 2016b). **Collection process:** Data collection process for ground measurements include official reporting from countries to WHO (after request), and web searches. Measurements of PM10 or PM2.5 from official national/sub-national reports and websites or reported by regional networks such as Clean Air Asia for Asia and the European Environment Agency for Europe or data from UN agencies, development agencies, articles from peer reviewed journals and ground measurements compiled in the framework of the Global Burden of Disease Project.

Comments and limitations:	Urban/rural data: while the data quality available for urban/rural population is generally good for high-income countries, it can be relatively poor for some low- and middle-income areas. Furthermore, the definition of urban/rural may greatly vary by country.
References:	• Shaddick G et al (2016). Data Integration Model for Air Quality: A Hierarchical Approach to the Global Estimation of Exposures to Ambient Air Pollution. Royal Statistical Society, arXiv:1609.0014. • United Nations Statistics Division (2022). SDG Indicator 11.6.2. https://unstats.un.org/sdgs/metadata/files/Metadata-11-06-02.pdf • UNSD (2018). Manual on the Basic Set of Environment Statistics, chapter on Air Quality: https://unstats.un.org/unsd/environment/FDES/MS%201.3.1%20Air%20Quality%20Statistics.pdf • WHO (2016a). Ambient air pollution: a global assessment of exposure and burden of disease, WHO Geneva. • WHO (2016b). WHO Urban ambient air quality database, WHO Geneva.

3.1.4. Hazardous Waste

Indicator:	**(UMF-43) Hazardous waste generated per capita; and proportion of hazardous waste treated, by type of treatment**
Source/Origins	**SDG Indictor 12.4.2**
Definition and method of computation:	The indicator includes hazardous generated, hazardous waste generated by type (including e-waste as a sub-indicator) and the proportion of hazardous waste treated. For the e-waste sub-category, United Nations University is a co-custodian. **Hazardous waste generated (in tonnes, per km sq of land area and per capita):** Hazardous waste collected + Hazardous waste given by generator to treatment or disposal facilities + Estimation of Unaccounted for hazardous waste **Hazardous waste generated by type, including e-waste:** A breakdown of hazardous waste generated by key type of waste, including e-waste **Proportion of hazardous waste treated:** Quantity of hazardous waste treated during reporting year/ quantity of hazardous waste generated x 100 A full methodology for this indicator is available in the document entitled, "Global Chemicals and Waste Indicator Review Document (UNEP, forthcoming)". **Methodology** A full methodology for this indicator is available in the document entitled, "Global Chemicals and Waste Indicator Review Document (UNEP, forthcoming)". For this indicator, Hazardous waste generated should include collected hazardous waste (either by specialized companies or by municipal services), hazardous waste which is given by the generator directly to the treatment or disposal facility, as well as an estimation of the hazardous waste which is unaccounted for. Generated hazardous waste includes exported hazardous waste and excludes imports of hazardous waste. $\textbf{\textit{Hazardous waste generated}} = \textit{hazardous waste collected through municipal services or private companies} + \textit{hazardous waste given by generator to treatment or disposal facilities} + \textit{estimation of hazardous waste unaccounted for}$ The estimation of hazardous waste unaccounted for is the most difficult aspect of this methodology as it requires local-level knowledge and estimation. This aspect of the indicator is particularly important as hazardous waste that is unaccounted for is typically also untreated and has a high potential to impact the environment.

	The proportion of hazardous waste treated is presented below. Note that the total quantity of hazardous waste treated during the reported year in the reporting country is calculated by adding quantities of hazardous waste treated, per each type of treatment (recycling, incineration with/without energy recovery, landfilling or other), including exports and excluding imports. This matches with the definition of recycling in 12.5.1. $$Proportion\ of\ hazardous\ waste\ treated(\%) = \frac{Quantity\ of\ hazardous\ waste\ treated\ during\ the\ reporting\ year}{Total\ quantity\ of\ hazardous\ waste\ generated\ during\ the\ reporting\ year} \times 100$$ ** Hazardous waste treated in the country plus materials exported for treatment minus the materials imported for treatment.*
Rationale and interpretation:	Chemicals are part of everyday life. There are over 140,000 different substances used in all economic sectors globally. Their benefits are many and so too are their potential to adversely impact human health and the environment if not properly managed. All countries, but especially developing countries and economies in transition, are facing the complex challenge of managing hazardous waste according to international standards of good practice. The situation is complicated by limited human, financial and/or technical resources. As such, action is needed to support the sustainable use of chemicals and environmentally sound management of hazardous waste. There is also a rapid increase in the generation of hazardous waste. Where most of the conventional hazardous wastes are produced in industrial and manufacturing operations, significant amounts are generated in non-industrial sectors, including sludge from the healthcare sector; waste-water treatment plants, waste oils, and waste batteries. There is also an increase in the complexity of products and unidentified hazardous components like coatings, and/or items which are not hazardous (laminates and multi-layer packaging), but present hazardousness in a variety of ways when improperly discarded and end up in air, water or are burned. **Concepts:** Hazardous waste is waste with properties that make it hazardous or capable of having a harmful effect on human health or the environment. Hazardous waste is generated from many sources, ranging from industrial manufacturing process waste to domestic items such as batteries and may come in many forms, including liquids, solids, gases and sludge. They can be discarded as commercial products, like cleaning fluids or pesticides or the by-products of manufacturing processes, from Basel Convention (Article 1, paragraph 1(a)). Waste listed in Annex VIII of the Basel Convention is presumed to be hazardous, while waste listed in Annex IX is presumed not to be hazardous. For the purpose of this indicator, due to comparability reasons, additional waste considered hazardous as per national definitions, as provided by the Basel Convention under Article 1, paragraph 1 (b), are excluded. Hazardous waste generated refers to the quantity of hazardous waste (as per the definition above) that is generated within the country during the reported year, prior to any activity such as collection, preparation for reuse, treatment, recovery, including recycling, or export, no matter the destination of this waste. In case waste that are not covered under the above definition, but are defined as, or are considered to be hazardous waste by national definitions are included in the "hazardous waste generated" amount, a specific note should be added specifying the additional types/streams of hazardous waste included as well as their quantities.

	The hazardous waste generated should be reported as a total amount generated during the year, as well as by its distribution among wide categories of economic activities and by households. The economic included in the scope of hazardous waste: • Agriculture, forestry and fishing (ISIC 01-03) • Mining and quarrying (ISIC 05-09) • Manufacturing (ISIC 10-33) • Electricity, gas, steam and air conditioning supply (ISIC 35) • Construction (ISIC 41-43) • Other economic activities excluding ISIC 38 As not all hazardous waste generated is immediately treated or disposed of, the stock of hazardous waste should also be reported, as per the categories and indications in Table R2 of the UNSD/UNEP Questionnaire (waste section). Related questionnaire statistics • R2.2 Hazardous waste generated • R2.5 Hazardous waste treated or disposed of during the year (R2.2 + Imports – Exports) • R2.6-10 Amounts going to the different types of treatment: – Recycling – Incineration – Incineration with energy recovery – Landfilling – Other
Disaggregation:	• Disaggregation by ISIC codes. Information on the generation and treatment of hazardous waste could be collected from industry or municipal level and treatment/disposal facilities. • Disaggregation by type of landfilling. As there is a significant difference between landfilling in controlled and uncontrolled landfills, further disaggregation on this type of treatment could be analysed. • Disaggregation by type of treatment per each generating sector; • Disaggregation by type of recycling operation (R2 to R12 from Basel convention Annex IV). • Disaggregation by territorial division. Information on the hazardous waste generated can significantly vary throughout the territory of a country as there might be hotspots of hazardous waste generation, concentrated around industry intensive areas.
Sources and data collection:	Data provided by national governments, including NSOs and Ministries of Environment **Collection process:** The custodian agencies collect national data through the UNSD/UNEP Questionnaire on Environment Statistics (waste section). UNSD carries out extensive data validation procedures that include built-in automated procedures, manual checks and cross-references to national sources of data. Communication is carried out with countries for clarification and validation of data. Only data that are considered accurate or those confirmed by countries during the validation process are included in UNSD's environment statistics database and disseminated on UNSD's website. Additionally, data from the Basel Convention reporting may also be sent to countries for their consideration for SDG reporting. Data for OECD and European Union countries are collected through the biennial OECD/Eurostat Joint Questionnaire on the State of the Environment that is consistent with the UNSD/UNEP Questionnaire, so data are comparable.

Comments and limitations:	Data on hazardous waste generation and treatment may be scarce in some countries, due to a series of factors, such as lack of, or insufficient, policies and regulations on management and/or reporting; limited human, financial and technical resources within government agencies, lack of clear disclosure and reporting rules and requirements, and unwillingness of generators and public officials in certain countries to disclose the quantities of hazardous waste generated. Some countries may have the data and monitoring systems needed to report, while for others there is a need for training and capacity development to enhance data collection, validation and reporting capacity. Limitations in terms of usable data for calculating the indicator(s) may arise due to differences in the way of understanding the terminology used in the indicator or differences between these definitions and the definitions included in national legislation. This can lead to differences in reported values and difficulties in cross-checking of reported data. For example, by national legislation, countries may define additional types of waste to be considered as hazardous beyond the waste streams defined in the Basel Convention.
References:	• UNEP (2021). Global Chemicals and Waste Indicator Review Document: https://wedocs.unep.org/bitstream/handle/20.500.11822/36753/GCWIR.pdf?sequence=3&isAllowed=y • United Nations Statistics Division (2022). SDG Indicator 12.4.2. https://unstats.un.org/sdgs/metadata/files/Metadata-12-04-02.pdf

3.2. Inclusive City Objective

3.2.1. Access to Open Public Spaces

Indicator:	(UMF-44) Average share of the built-up area of cities that is open space for public use for all, by sex, age and persons with disabilities
Source/Origins	SDG Indicator 11.7.1
Definition and method of computation:	SDG Indicator 11.7.1 has several interesting concepts that required global consultations and consensus. These include; built-up area, cities, open spaces for public use, etc. As a custodian agency, UN-Habitat has worked on these concepts along with several other partners. **a. City:** A range of accepted definitions of the "city" exist, from those based on population data and extent of the built-up area to those that are based solely on administrative boundaries. These definitions vary within and between nations, complicating the task of international reporting for the SDGs. Definitions of cities, metropolitan areas and urban agglomerations also vary depending on legal, administrative, political, economic or cultural criteria in the respective countries and regions. Since 2016 UN-Habitat and partners organized global consultations and discussions to narrow down the set of meaningful definitions that would be helpful for the global monitoring and reporting process. Following consultations with 86 member states, the United Nations Statistical Commission, in its 51st Session (March 2020) endorsed the Degree of Urbanisation (DEGURBA) as a workable method to delineate cities, urban and rural areas for international statistical comparisons.[19] This definition combines population size and population density thresholds to classify the entire territory of a country along the urban-rural continuum, and captures the full extent of a city, including the dense neighbourhoods beyond the boundary of the central municipality. DEGURBA is applied in a two-step process: First, 1 km^2 grid cells are classified based on population density, contiguity and population size. Subsequently, local units are classified as urban or rural based on the type of grid cells in which majority of their population resides. For the computation of indicator 11.7.1, countries are encouraged to adopt the degree of urbanisation to define the analysis area (city or urban area). **b. Built-up area of cities:** Conventionally, built up areas of cities are areas occupied by buildings and other artificial surfaces. For indicator 11.7.1, built up areas, as the indicator denominator has the same meaning as "city" (see definition of city above). **Public space:** The Global Public Space toolkit defines Public Space as all places that are publicly owned or of public use, accessible and enjoyable by all, for free and without a profit motive, categorized into streets, open spaces and public facilities. Public space in general is defined as the meeting or gathering places that exist outside the home and workplace that are generally accessible by members of the public, and which foster resident interaction and opportunities for contact and proximity. This definition implies a higher level of community interaction and places a focus on public involvement rather than public ownership or stewardship. For the purpose of monitoring and reporting on indicator 11.7.1, public space is defined as all places of public use, accessible by all, and comprises open public space and streets. **c. Open public space:** is any open piece of land that is undeveloped or land with no buildings (or other built structures) that is accessible to the public without charge, and provides recreational areas for residents and helps to enhance the beauty and environmental quality of neighbourhoods. UN-Habitat recognizes that different cities have different types of open public spaces, which vary in both size and typology. Based on the size of both soft and hard surfaces, open public spaces are broadly classified into six categories: national/metropolitan open spaces, regional/larger city open spaces, district/city open spaces, neighbourhood open spaces, local/pocket open spaces and linear open spaces. Classification of open public space by typology is described by the function of the space and can include: green public areas, riparian reserves, parks and urban forests, playground, square, plazas, waterfronts, sports field, community gardens, parklets and pocket parks.

19 A recommendation on the method to delineate cities, urban and rural areas for international statistical comparisons. https://unstats.un.org/unsd/statcom/51st-session/documents/BG-Item3j-Recommendation-E.pdf

d. **Potential open public space:** the identification of open public spaces across cities can be implemented through, among other sources, analysis of high to very high-resolution satellite imagery, from base-maps provided by different organizations (e.g. OpenStreetMap, Esri, etc) or as crowd-sourced and volunteered data. While these sources provide important baseline data for indicator 11.7.1, some of the identifiable spaces may not meet the criteria of being "accessible to the public without charge". The term "potential open public space" is thus used to refer to open public spaces which are extracted from the above-mentioned sources (based on their spatial character), but which are not yet validated to confirm if they are accessible to the public without charge.

e. **Streets** are defined thoroughfares that are based inside urban areas, towns, cities and neighbourhoods most commonly lined with houses or buildings used by pedestrians or vehicles in order to go from one place to another in the city, interact and to earn a livelihood. The main purpose of a street is facilitating movement and enabling public interaction. The following elements are considered as streets space: Streets, avenues and boulevards, pavements, passages and galleries, Bicycle paths, sidewalks, traffic island, tramways and roundabouts. Elements excluded from street space include plots (either built-up), open space blocks, railways, paved space within parking lots and airports and individual industries.

f. **Land allocated to streets** refers to the total area of the city/urban area that is occupied by all forms of streets (as defined above). This indicator only includes streets available at the time of data collection and excludes proposed networks.

For more details and illustrations on the definition of the different types of open spaces considered for indicator 11.7.1 see SDG 11.7.1 step by step training module (https://unhabitat.org/sites/default/files/2020/07/indicator_11.7.1_training_module_public_space.pdf).

Methodology

The method to estimate the area of public space has been globally piloted in over 600 cities and this follows a series of methodological developments that go back to the last 7 years. The finalized methodology is a three-step process:

a. Spatial analysis to delimit the city/urban area which will act as the geographical scope for the spatial analysis and indicator computation.

b. Spatial analysis to identify potential open public spaces, field work to validate data and assess the quality of spaces and calculation of the total area occupied by the verified open public spaces.

c. Estimation of the total area allocated to streets.

d. Estimation of share of population with access to open public spaces within 400 meters walking distance out of the total population in the city/ urban area and disaggregation of the population with access by sex, age and persons with disabilities

a. Spatial analysis to delimit the city/urban area

Following consultations with 86 member states, the United Nations Statistical Commission in its 51st Session (March 2020) endorsed the Degree of Urbanisation (DEGURBA) as a workable method to delineate cities, urban and rural areas for international statistical comparisons. Countries are thus encouraged to adopt this approach, which will help them produce data that is comparable across urban areas within their territories, as well as with urban areas and cities in other countries. More details on DEGURBA and its application are available here: https://unstats.un.org/unsd/statcom/51st-session/documents/BG-Item3j-Recommendation-E.pdf

b. Spatial analysis to identify potential open public spaces, ground verification and estimating their total area

This step involves mapping of potential open public spaces within the urban boundaries defined in step one above and estimation of their area. Identification of potential open public spaces is based on the spatial character of each space and is also informed by existing country/ city land use maps and open space inventories. To compute this component of the indicator, follow these steps:

1. An inventory of Open Public Spaces should be the initial source of information. Additional legal documents, land use plans and other official sources of information can be used to complement the data from the inventory. If the focus urban area or city has a detailed and up-to-date database of its open public spaces, use the information to plot such spaces in GIS software and compute their areas. Where necessary, clean data to remove components which are not applicable in the computation of this sub-indicator (e.g. recreation areas which attract a fee such as golf courses, etc).
2. Since many cities and countries do not have an open public spaces inventory, satellite imagery can be used to extract information on potential open public spaces. The identification of such spaces from imagery should be based on careful evaluation of the character of each space against the known forms of open public spaces within that city / country. High resolution satellite imagery or Google Earth imagery can be used in this analysis. Open data sources such as OpenStreetMap (OSM) have some polygon data on open spaces in many cities. While this data may not be comprehensive for all cities, it can contribute to the data collection efforts and can be explored.
3. Using the data extracted from step 2 above, undertake validation to remove spaces which are not open for public use (e.g. private non-built up land within the urban area), or to add new spaces that might have been omitted during the extraction stage. This can be achieved through analysing the character of spaces (e.g. size, shape, land cover, etc), comparison of identified spaces with known recreational areas within the city or with data from OpenStreetMap, or consultations with city leaders, local civil society groups, community representatives among others. UN-Habitat, in consultation with partners, experts and data producers have developed a detailed tool to facilitate the verification of each space and collection of additional data on the space quality and accessibility. This tool is freely available and allows for on-site definition/ editing of the space's boundaries. It also contains standard and extended questions which collect data relevant to the indicator, including location of the spaces, their ownership and management, safety, inclusivity and accessibility. This data provides basic information about each space, as well as information relevant for disaggregation - such as access issues linked to age, gender and disabilities, as requested for by the indicator. The tool is dynamic and allows cities to include extra questions which generate information that is useful for their decision making (Tool is available at https://ee.kobotoolbox.org/x/#IGFf6ubq). It should however be noted that the validation approaches which require primary data collection are capital intensive and may not be feasible for most countries in the short term. Validation based on existing city-level data and continuous stakeholder engagement should thus be adopted since they have been shown to produce reliable results at lower costs.
4. Calculate the total area covered by the verified open public spaces. Once all open public spaces have been verified, calculate their area in GIS or other database management software. The share of land occupied by these spaces is then calculated using the formula

$$Share\ of\ occupied\ land\ by\ OPS(\%) = \left[\frac{Total\ area\ covered\ by\ OPS}{Total\ area\ of\ the\ city}\right]$$

c. Computation of land allocated to streets (LAS)

Where street data by width and length fields is available/specified, the following methodology could be used:

1. Select only the streets included in the city / urban area (or clip streets to the city/urban boundary)
2. From GIS (or alternative software), calculate the total area occupied by each street by multiplying its length with width. Add up all individual street areas to attain the total amount of land occupied all streets within the defined urban area.

Where detailed data on streets is not available, there is need to map out each street line (or the entire area covered by the streets), measure its length and width, which are required for the area computation. For small urban areas, it is possible to manually digitize all streets, but this is more complex for large urban areas and cities. For these large urban areas, an alternative technique for computing land allocated to the streets is one that adopts sampling principles. An approach that uses the Halton sampling sequence is recommended, specifically because the sequence generates equidistant points, increasing the degree of sample representativeness. To compute LAS using this method, follow the following steps:

1. Using the urban extent boundary identified earlier, generate a Halton sequence of sample points (Halton sequence refers to quasi-random sequence used to generate points in space that are ex-post evenly spread i.e. Equidistant). The number of points used for each city varies based on its area. In large study areas of more than 20 km2, a density of one circle per hectare is used while in small study areas of less than 20 km2 a density of 0.5 circle per hectare is used.
2. Buffer the points to get sample areas with an area of 10 hectares each.
3. Within each 10-hectare sample area, digitize all streets in GIS software and compute the total amount of land they occupy.
4. Calculate the average land allocated to streets for all sample areas using the following formula:

$$The\ land\ allocated\ to\ streets = \left[\frac{Sum\ of\ LAS\ from\ all\ sampling\ points}{Number\ of\ sampling\ points}\right]$$

Open source datasets such as OpenStreetMap (OSM) have a good amount of street data on many cities, which is increasingly being updated and extended to cover new areas. This data can also be used as a starting point to understand the pattern of streets in a city. Upon verification of the OSM street categorization for each city, sampling can be used to estimate the average width of each street category, which can in turn help compute the share of land allocated to streets.

The final computation of the indicator is done using the formula:

$$Share\ of\ built\_up\ area\ of\ the\ city\ that\ is\ open\ space\ for\ public\ use = \frac{Total\ surface\ of\ open\ public\ space + Total\ surface\ of\ land\ allocated\ to\ streets}{Total\ area\ of\ the\ city}$$

d. Estimation of share of population with access to open public spaces and disaggregation by population group

To help define an "acceptable walking distance" to open public spaces", UN-Habitat organized a series of consultations with national statistical officers, civil society and community groups, experts in diverse fields, representatives from academia, think tanks, other UN-agencies, and regional commissions among other partners.

These consultations, which were held between 2016 and 2018 concluded that a walking distance of 400 meters - equivalent to 5 minutes' walk was a practical and realistic threshold. Based on this, a street network-based service area is drawn around each public open space, using the 400 meters access threshold. All populations living within the service areas are in turn identified as having access to the public open spaces, based on the following key assumptions:

- Equal access to each space by all groups of people – i.e. children, the disabled, women, elderly can walk a distance of 400 meters (for 5 minutes) to access the spaces (in actual sense, these will vary significantly by group).
- All streets are walkable – where existing barriers are known (e.g. un-walkable streets, lack of pedestrian crossings, etc), these can be defined in the delimitation of the space service area.
- All public open spaces have equal area of influence – which is measured as 400 meters along street networks. In real life situations, bigger spaces have a much larger area of influence.
- All buildings within the service area are habitable, and that the population is equally distributed in all buildings/built up areas

The estimation of total population with access to open public spaces is achieved using the two broad steps described below:

1. Create 400 meters walking distance service area from each open public along the street network. This requires use of the network analyst tool in GIS software and street data (such as that from City Authorities or from Open Sources such as OpenStreetMap). A network service area is a region that encompasses all accessible areas via the streets network within a specified impedance/distance. The distance in each direction (and in turn the shape of the surface area) varies depending on, among other things, existence of streets, presence of barriers along each route (e.g. lack of foot bridges and turns) and walkability or availability of pedestrian walkways along each street section. In the absence of detailed information on barriers and walkability along each street network, the major assumption in creating the service areas is that all streets are walkable. Since the analysis is done at the city level, local knowledge can be used to exclude streets which are not walkable. The recommendation is to run the service area analysis for each OPS separately then merge all individual service areas to create a continuous service area polygon. Step by step guidance on how to create the service area is provided in the detailed SDG 11.7.1 training module (https://unhabitat.org/sites/default/files/2020/07/indicator_11.7.1_training_module_public_space.pdf)
2. In GIS, overlay the created service area with high resolution demographic data, which should be disaggregated by age, gender, and disability. The best source of population data for the analysis is individual dwelling or block level total population which is collected by National Statistical Offices through censuses and other surveys. Where this level of population data is not available, or where data is released at large population units, countries are encouraged to create population grids, which can help disaggregate the data from large and different sized census/ population data release units to smaller uniform sized grids. For more details on the available methods for creation of population grids explore the links provided under the references section on "Some population gridding approaches". A generic description of the different sources of population data for the indicator computation is also provided in the detailed Indicator 11.7.1 training module (https://unhabitat.org/sites/default/files/2020/07/indicator_11.7.1_training_module_public_space.pdf). Once the appropriate source of population data is acquired, the total population with access to open public spaces in the city/urban area will be equal to the population encompassed within the combined service area for all open public spaces, calculated using the formula below.

$$Share\ of\ population\ with\ access\ to\ open\ space\ in\ public\ spaces = \frac{Total\ population\ within\ 400m\ service\ areas}{Total\ population\ within\ the\ citi/urban\ extent}$$

Rationale and interpretation:	The value of public spaces is often overlooked or underestimated by policy makers, leaders, citizens and urban developers. There are several reasons for this, such as the lack of resources, or understanding or capacity to use public space as a complete, multi-functional urban system. Often the lack of appropriate enabling frameworks, weak political will and the absence of the means of public engagement compound the situation. Nevertheless, fundamentally, the lack of a global measurement indicator has hindered the local and global appreciation of the value of the public spaces. The SDGs have for the first time provided a platform where public spaces can be globally monitored. Indicator 11.7.1 measures the share of land allocated to public spaces and the total population with access of these spaces by age, gender and disability. The share of land that a city allocates to streets and open public spaces is not only critical to its productivity, but also contributes significantly to the social dimensions and health of its population. The size, distribution and quality of a city's overall public space act as a good indicator of shared prosperity. Cities that improve and sustain the use of public space, including streets, enhance community cohesion, civic identity, and quality of life. A prosperous city develops policies and actions for sustainable use of, and equitable access to public space. In cities, due to a neglect of public space both in quality and quality, there is a need to revise and expand the ratio of land allocated to public spaces to make them more efficient, prosperous and sustainable. Uncontrolled rapid urbanization has created disorderly settlement patterns with alarmingly low shares of public space. Many cities in developed countries are also experiencing a dramatic reduction of public space. Reclaiming urban spaces for people is part of how we can humanize our cities and make our streets and public areas more communal. A well developed and properly designed network of streets increases connectivity, promotes walking and social interactions but also encourages development of other street activities that bring life to a city. Equally, a well distributed and hierarchical system of open public spaces that can be accessed by all regardless of income, gender, race or disability status and one that promotes multiple activities not only encourages their use, but also contributes to the urban character and quality of urban life.
Disaggregation:	Based on availability of high-resolution population data, population with access to open public spaces should be disaggregated by age, gender and disability. Data should include statistics on access to open public spaces by children and elderly. Wherever possible, it would also be useful to have information disaggregated by: • Location of public spaces (intra-urban) • Quality of the open public space by safety, inclusivity, accessibility, greenness, and comfort • Type of open space as a share of the city area • The share of open spaces in public use which are universally accessible, particularly for persons with disabilities. • Type of human settlements
Sources and data collection:	Satellite imagery (open sources), documentation outlining publicly owned land and community-based maps are the main sources of data. • For definition of the city as the unit of analysis, data on the built up areas is required, which can be extracted from existing layers of satellite imagery ranging from open sources such as Google Earth, US Geological Survey/NASA Landsat imagery and Sentinel Imagery to higher resolution land cover data sets and commercial imagery. Images are to be analyzed for the latest available year. • Population data will be sourced from national censuses or other demographic surveys, which can be disaggregated to the smallest units possible through household information aggregation or through population modelling/gridding approaches.

	• For the Inventory of open public space - Information can be obtained from legal documents outlining publicly owned land and well-defined land use plans. In some cases, where this information is lacking, incomplete or outdated, open sources, key informants in the city and community-based maps, which are increasingly recognized as a valid source of information, can be a viable alternative. • The share of land occupied by public open spaces cannot be obtained directly from the use of high-resolution satellite imagery because it is not possible to determine the ownership or use of open spaces through remote sensing. However, fieldwork to validate and verify the open spaces derived from satellite imagery helps to map out land that is for public and non-public use. **Collection process:** Data collection is supposed to be done at the local city/urban level, with national aggregates made from all cities in the country, or from a sample of representative cities (selected using the National Sample of Cities Approach developed by UN-Habitat: https://unhabitat.org/sites/default/files/2020/06/national_sample_of_cities_english.pdf). At the Global level, data will be assembled and compiled for international consumption and comparison by UN-Habitat and other partners. UN-Habitat and partners will explore several capacity buildings options to ensure that uniform standards for generation, reporting and analysing data for this indicator are applied by all countries and regions. Validation of data on potential open public spaces, which are mapped from high resolution imagery or compiled from open sources (see method of computation section) requires ground truthing. UN-Habitat has developed a set of questions, which can be administered through mobile device-based applications such as Kobo Toolbox. The questions are available on this tool: https://ee.kobotoolbox.org/x/#IGFf6ubq
Comments and limitations:	A major challenge for local monitoring of this indicator is the maintenance and the application/ consistency of use of universal definition, which broadly does not consider existing operational/functional administrative demarcations. While urbanization has over the past decade resulted in big urbanized patches/regions which extend beyond existing urban area boundaries, the local operationalization and management of urban systems remain within defined authorities. These authorities are often in charge of governing the urban systems, ensuring effective and efficient functioning through such actions as provision of basic services, development control among others. While some countries have adopted dynamic administrative structures for their urban areas (which shift with expansions in built-up areas), others have maintained confined boundaries. Some of the most common types of boundaries include city, municipality, local authority, metropolitan, mega and meta region demarcations; all of which are set and defined based on prevailing operational dynamics (e.g. governance and service delivery structures). UN-Habitat has developed tools, programmes and guidelines to assist cities in measuring, and accounting for the available public space in cities. Some cities in the developing world lack formally recognized public spaces, that are publicly maintained. Understanding of the prevailing local contexts and primary data collection in collaboration with city authorities and local communities contribute significantly to collecting accurate and relevant data in these contexts. Similarly, the types of open public space vary across cities. The types of spaces listed in this indicator are however the most common and accepted variations of the open public space. Data collection processes using the methodology described in this metadata, which has been conducted by UN-Habitat in partnership with cities, as well as by other partners has revealed that there are no major overlaps or omissions in the described broad categories of open public spaces. Beyond quantifying the amount of open space in public use in cities, this indicator also attempts in minimal ways to capture the quality of the space that may impede its proper use. The qualitative data collected on this indicator strengthens the evidence that an open space exists, and that its public use is guaranteed, to allow city authorities and other stakeholders to further improve its quality and increase its use.

Treatment of missing values	**At regional and global levels** All qualifying cities/countries are expected to fully report on this indicator more consistently following implementation and full roll out of this methodology. In the early years of this indicator, we had data gaps due to no data being collected at the time, as opposed to missing data. In most of the cases, missing values to-date reflect a non-measurement of the indicator for the city. However, because national statistical agencies will report national figures from a complete coverage of all their cities, some cities may take longer to be measured or monitored. As a result, UN-habitat has worked with partners to develop a concept of applying a National Sample of Cities. With this approach, countries will be able to select a nationally representative sample of cities from their system of cities, and these will be used for global monitoring and reporting purposes for the period of the SDGs. The fully developed methodology on this concept has been rolled out and countries that are unable to cover the full spectrum of their cities are already applying this approach.
References:	• EO-Toolkit (2021). Open Spaces: https://eotoolkit.unhabitat.org/pages/open-spaces • Kaw, Jon Kher, Hyunji Lee, and Sameh Wahba, editors. (2020). The Hidden Wealth of Cities: Creating, Financing, and Managing Public Spaces. Washington, DC: World Bank. doi:10.1596/978-1-4648-1449-5. License: Creative Commons Attribution CC BY 3.0 IGO • Mehaffy M, Haas T, Elmulund P. (2019). Public Space in the New Urban Agenda: Research into Implementation. Urban Planning (ISSN 2183-7635), 2019. Volume 4, Issue 2, Page 134-137. DOI. 10.17645/up.v4i2.2293 • UN-Habitat (2013) Streets as Public Spaces and Drivers of Urban Prosperity, Nairobi • UN-Habitat (2014) Methodology for Measuring Street Connectivity Index • UN-Habitat (2015) Global Public Space Toolkit from Global Principles to Local Policies and Practice • UN-Habitat (2015) Spatial Capital of Saudi Arabian Cities, Street Connectivity as part of City Prosperity Initiative • UN-Habitat (2018). SDG Indicator 11.7.1 Training Module: Public Space. United Nations Human Settlement Programme (UN-Habitat), Nairobi. https://unhabitat.org/sites/default/files/2020/07/indicator_11.7.1_training_module_public_space.pdf • United Nations Statistics Division (2022). SDG Indicator 11.7.1. https://unstats.un.org/sdgs/metadata/files/Metadata-11-07-01.pdf

3.2.2. Education for Sustainable Development

Indicator:	**(UMF-45) Extent to which (i) global citizenship education and (ii) education for sustainable development are mainstreamed in (a) education policies; (b) curricula; (c) teacher education; and (d) student assessment**
Sources/Origins	SDG Indicator 4.7.1/12.8.1/13.3.1/UNESCO 2030 Indicator No. 13
Definition and method of computation:	The indicator measures the extent to which cities and regions mainstream Global Citizenship Education (GCED) and Education for Sustainable Development (ESD) in their education systems. This is an indicator of characteristics of different aspects of education systems: education policies, curricula, teacher training and student assessment as reported by government officials, ideally following consultation with other government ministries, national human rights institutes, the education sector and civil society organizations. It measures what governments intend and not what is implemented in practice in schools and classrooms.

	For each of the four components of the indicator (policies, curricula, teacher education, and student assessment), a number of criteria are measured, which are then combined to give a single score between zero and one for each component. For each component, response categories are no = 0, yes = 1, and unknown, which is treated as zero. Blanks are also treated as zeros. If more than half of responses are unknown or blank, the question score is not calculated (see SDG 4.7.1./12.8.1/13.3.1 for detailed methodology. Link SDG Indicator 4.7.1. Metadata).
Rationale and interpretation:	Students will not achieve the desired learning outcomes if Education for Sustainable Development (ESD) and Global Citizenship Education (GCED) have not been identified as priorities in education policies or laws, if curricula do not specifically include the themes and sub-themes of ESD and GCED, and if teachers are not trained to teach these topics across the curriculum. This indicator aims to give a simple assessment of whether the basic infrastructure exists that would allow countries to deliver quality ESD and GCED to learners, to ensure their populations have adequate information on sustainable development and lifestyles in harmony with nature.
Disaggregation:	None
Sources and data collection:	Cities and regions may conduct surveys to generate the information on the checklist. Where national level statistics match city level statistics, national level data may be acquired from relevant government ministries, UNESCO data sites, SDGs databases and other trusted sources.
References:	UNSECO (2022). Data for Sustainable Development: http://uis.unesco.org/ United Nations Statistics Division (2022). SDG Indicator 12.8.1. https://unstats.un.org/sdgs/metadata/files/Metadata-12-08-01.pdf

3.3. Resilient City Objective

3.3.1. Renewable Energy Share

Indicator:	(UMF-46) Renewable energy share in the total final energy consumption
Source/Origins	**SDG Indicator 7.2.1**
Definition and method of computation:	The renewable energy share in total final consumption is the percentage of final consumption of energy that is derived from renewable resources. **Methodology** This indicator is based on the development of comprehensive energy statistics across supply and demand for all energy sources – statistics used to produce the energy balance. Internationally agreed methodologies for energy statistics are described in the "International Recommendations for Energy Statistics" (IRES), adopted by the UN Statistical Commission, available at: unstats.un.org/unsd/energystats/methodology/ires. Once an energy balance is developed, the indicator can be calculated by dividing final energy consumption from all renewable sources by total final energy consumption. Renewable energy consumption is derived as the sum of direct final consumption of renewable sources plus the components of electricity and heat consumption estimated to be derived from renewable sources based on generation shares. For instance, if total final consumption is 150 TJ for biogas energy, while total final consumption of electricity is 400 TJ and heat 100 TJ, and the share of biogas is 10 percent in electricity output and 5 percent in heat output, the total reported number for biogas consumption will be 195 TJ (150 TJ+400TJ*10%+100TJ*5%). The Global Tracking Framework Report (IEA and World Bank, 2013) provides more details on the suggested methodology for defining and measuring renewable energy (Chapter 4, Section 1, page 201-202).
Rationale and interpretation:	The target "By 2030, increase substantially the share of renewable energy in the global energy mix" impacts all three dimensions of sustainable development. Renewable energy technologies represent a major element in strategies for greening economies everywhere in the world and for tackling the critical global problem of climate change. A number of definitions of renewable energy exist; what they have in common is highlighting as renewable all forms of energy that their consumption does not deplete their availability in the future. These include solar, wind, ocean, hydropower, geothermal sources, and bioenergy (in the case of bioenergy, which can be depleted, sources of bioenergy can be replaced within a short to medium-term frame). Importantly, this indicator focuses on the amount of renewable energy actually consumed rather than the capacity for renewable energy production, which cannot always be fully utilized. By focusing on consumption by the end user, it avoids the distortions caused by the fact that conventional energy sources are subject to significant energy losses along the production chain. **Concepts:** Renewable energy consumption includes consumption of energy derived from: hydro, wind, solar, solid biofuels, liquid biofuels, biogas, geothermal, marine and renewable waste. Total final energy consumption is calculated from balances as total final consumption minus non-energy use. • Comments regarding specific renewable energy sources: • Solar energy includes solar PV and solar thermal. • Liquid biofuels include bio gasoline, biodiesels and other liquid biofuels. • Solid biofuels include fuelwood, animal waste, vegetable waste, black liquor, bagasse and charcoal. • Renewable waste energy covers energy from renewable municipal waste.
Disaggregation:	Disaggregation of the data on consumption of renewable energy, e.g. by resource and end-use sector, could provide insights into other dimensions of the goal, such as affordability and reliability. For solar energy, it may also be of interest to disaggregate between on grid and off-grid capacity.

Sources and data collection:	Data on renewable energy consumption are available through national energy balances compiled based on data collected by the International Energy Agency (for around 150 countries) and the United Nations Statistics Division (UNSD) for all countries. The energy balances make it possible to trace all the different sources and uses of energy at the national level. Some technical assistance may be needed to improve these statistics, particularly in the case of renewable energy sources. Specialized industry surveys (e.g. on bioenergy use) or household surveys (in combination with the measurement of other indicators) would be feasible approaches to filling in data gaps (e.g. for use of firewood, off-grid solar energy). **Collection process:** The IEA collects energy data at the national level according to harmonised international definitions and questionnaires, as described in the UN International Recommendations for Energy Statistics (unstats.un.org/unsd/energystats/methodology/ires/). UNSD also collects energy statistics from countries according to the same harmonised methodology.
Comments and limitations:	• A limitation with existing renewable energy statistics is that they are not able to distinguish whether renewable energy is being sustainably produced. For example, a substantial share of today's renewable energy consumption comes from the use of wood and charcoal by households in the developing world, which sometimes may be associated with unsustainable forestry practices. There are efforts underway to improve the ability to measure the sustainability of bioenergy, although this remains a significant challenge. • Off-grid renewables data are limited and not sufficiently captured in national and international energy statistics. • The method of allocation of renewable energy consumption from electricity and heat output assumes that the share of transmission and distribution losses are the same among all technologies. However, this is not always true; for example, when renewables are usually located in more remote areas and may incur larger losses. • Likewise, imports and exports of electricity and heat are assumed to follow the renewable share of electricity and heat generation, respectively. This is a simplification that in many cases will not affect the indicator too much, but that might do so in some cases, for example, when a country only generates electricity from fossil fuels but imports a great share of the electricity it uses from a neighbouring country's hydroelectric power plant. • Methodological challenges associated with defining and measuring renewable energy are more fully described in the Global Tracking Framework (IEA and World Bank, 2013) Chapter 4, Section 1, pages 194-200. Data for traditional use of solid biofuels are generally scarce globally, and developing capacity in tracking such energy use, including developing national-level surveys, is essential for sound global energy tracking.
Treatment of missing values	**At country level** The IEA has attempted to provide all the elements of energy balances down to the level of final consumption, for over 150 countries. Providing all the elements of supply, as well as all inputs and outputs of the main transformation activities and final consumption has often required estimations. Estimations have been generally made after consultation with national statistical offices, energy companies, utilities and national energy experts. Likewise, UNSD attempts to provide full energy balances for the 225 countries and areas it covers, including the 75 or so it covers for SDG reporting. This may require searching for national official publications, data from other international organizations and expert estimation based on reputable sources and other publicly available information. Generally speaking, data on the supply side is more widely available than transformation activities and final consumption.

	At regional and global levels In addition to estimates at a country level, adjustments addressing differences in definitions alongside estimations for informal and/or confidential trade, production or consumption of energy products are sometimes required to complete major aggregates, when key statistics are missing. Such estimations and adjustments implemented by IEA have been generally made after consultation with national statistical offices, energy companies, utilities and national energy experts
References:	• IEA (2021). World Energy Balances and Statistics http://www.iea.org/statistics/ • International Energy Agency (IEA) and the World Bank. (2013). "Global Tracking Framework 2013". webstore.iea.org/global-tracking-framework-2013 • International Energy Agency (IEA) and the World Bank. (2015). "Global Tracking Framework 2015—Progress Toward Sustainable Energy", World Bank, Washington, DC. Doi: 10.1596/978-1-4648 -0690-2 License: Creative Commons Attribution CC BY 3.0 IGO. seforall.org/sites/default/files/GTF-2105-Full-Report.pdf • International Energy Agency (IEA) and the World Bank. (2017). "Global Tracking Framework 2017—Progress toward Sustainable Energy". World Bank, Washington, DC. License: Creative Commons Attribution CC BY 3.0 IGO. seforall.org/sites/default/files/eegp17-01_gtf_full_report_final_for_web_posting_0402.pdf • International Energy Agency (IEA), International Renewable Energy Agency (IRENA), United Nations Statistics Division (UNSD), the World Bank, World Health Organization (WHO). (2019). "Tracking SDG7: The Energy Progress Report 2019". trackingsdg7.esmap.org/ • International Energy Agency (IEA), International Renewable Energy Agency (IRENA), United Nations Statistics Division (UNSD), the World Bank, World Health Organization (WHO). (2018). "Tracking SDG7: The Energy Progress Report 2018". trackingsdg7.esmap.org/ • IRENA (2021). Renewable Energy Database https://www.irena.org/statistics. • United Nations Statistics Division (2022). SDG Indicator 7.2.1. https://unstats.un.org/sdgs/metadata/files/Metadata-07-02-01.pdf • United Nations. (2016). "Energy Statistics Compilers Manual" (whitecover) • United Nations. (2018). "International Recommendations for Energy Statistics". unstats.un.org/unsd/energystats/methodology/ires • UNSD (2020). Energy Statistics Database unstats.un.org/unsd/energystats/data (description) and data.un.org/Explorer.aspx?d=EDATA (data)

3.3.2. Green Area per Capita

Indicator:	**(UMF-47) Green area per capita**
Source/Origins	**CPI**
Definition and method of computation:	Green areas are defined as public and private areas that have flora such as plants, trees and grass (e.g. forests, parks, gardens). These areas are also a way to compensate for CO2 emissions as green spaces generally generate environmental sustainability. **Methodology** $$Green\ area\ per\ capita = \frac{Total\ green\ area\ within\ the\ city}{city\ population}$$
Rationale and interpretation:	This indicator provides information about the amount of geographical space that the city dedicates to green space. A prosperous city seeks to increase the green areas per capita to have a better air quality and improve the quality of life of its population.

Sources and data collection:	• Local urban planning authorities. • Remote sensing imagery can be used to identify intra-urban green areas when no other information is available.
Comments and limitations:	Cities located in deserted areas have a natural disadvantage; However, it is a duty of the city to guarantee a minimum amount of green space to its population.
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3.3.3. Change in Tree Cover

Indicator:	**(UMF-48) Change in tree cover (% change every 5 years)**
Source/Origins	**OECD 15.1**
Definition and method of computation:	Land cover and land use change are the leading contributors to terrestrial biodiversity loss (CBD 2010). Detrimental changes in land cover led to habitat fragmentation and loss and are associated with a decline in the populations of many species and with reduced biodiversity. Against this background, in 2012 changes in land cover have been proposed as an OECD Green Growth headline indicator. Deleterious changes in land cover due to human activities such as conversions of land from a more natural state to a more artificial state, typically reflect more intense uses of land, degrade natural habitats and ecosystems, affect biodiversity, and erode natural capital.
Rationale and interpretation:	Changes in the biophysical characteristics of natural habitats – that can be measured using data on land cover – are considered as the best proxy to monitor pressures on ecosystems and biodiversity. Prominent examples of the use of land cover measures to assess pressures on biodiversity and ecosystem services can be found in the work of the EEA (2015a; 2010), the US EPA (2017), the Millennium Ecosystem Assessment, as well as by Venter et al. (2016) and Lawler et al. (2014). Data on land cover are also of use for the implementation of environmental-economic accounting (UN et al. 2014a; 2014b). Monitoring landscape-scale effects is a useful complement to species-level indicators such as extinction risk because biodiversity loss is so intense that assessing the health of all potentially at-risk species (or species groups) is not feasible (Rodríguez et al. 2007).
Sources and data collection:	Three research outputs have been identified as candidates for supplying datasets for OECD's land cover indicators. The datasets used to support the indicators about land cover change between classes are products of the Climate Change Initiative Land Cover project (ESA/UCL 2017a). The datasets that provide richer information for a single landcover type are both outputs from the Joint Research Centre: The Global Human Settlement Layer (Pesaresi et al. 2015) and Global Surface Water (Pekel et al. 2016).

Comments and limitations:	The OECD Working Party on Environmental Information (WPEI) has requested a continued monitoring of developments in global land cover data availability, with a view to updating and improving indicators. Land cover change indicators will be improved as new datasets become available in the future. Land, and consequently habitat, fragmentation by transport infrastructure, urban development and intensive agriculture are an equally important and closely related land cover change phenomenon that threatens biodiversity in many countries. Insights into the extent and changes in land fragmentation could be developed. Established methodologies to measure fragmentation exist (see e.g., EEA 2015b) but it is not clear whether available data could support a global fragmentation indicator. The underlying assumption of the headline indicator, that natural and semi-natural vegetated land cover better promotes and conserves biodiversity and provides higher value ecosystem services is generally reasonable. However, the indicator is a high-level proxy which comes with several caveats: • Certain types of conversion, such as permanent deforestation for agricultural land and urbanisation are typically detrimental and therefore broadly fair proxies for pressures on biodiversity and ecosystem services. However, there are examples where the opposite is true. For example, some types of traditional farmland provide essential habitats for farmland birds in Europe and may have higher biodiversity (or be rarer or more difficult to replace) than tree-covered areas. Conversely, orchard crops like olive trees planted on cropland may be recorded as a gain in (semi-)natural land (conversion to tree cover), but the biodiversity value of the land may remain largely unchanged. • This indicator measures quantity (the area or share of land cover converted to another type) without characterizing value or quality. Therefore, it cannot distinguish between the loss of habitats with high biodiversity value (e.g. rare habitats with high levels of endemism, primary tropical forests) and areas of the same land cover category but of lower value (e.g. some commercial forestry or plantations). • The aggregation of tree cover, grasslands, wetland, shrubland and sparse vegetation into the natural and semi-natural vegetated land category can conceal important land cover conversions between these categories. These may be very significant (like forest clearing for grazing mentioned earlier). Value judgements about transitions are contestable and should be evaluated and adjusted according to the local context in order to better understand land cover change dynamics in an area. • Degradation within (semi-)natural vegetated land cover, where the productivity, biodiversity or other ecosystem services provided by the land are reduced, but where the land cover does not transition from one class to another, is not captured at all. • Related to all of the above, the ability to reliably identify changes between or degradation within more richly described land cover classes (e.g. wooded wetlands) would provide a better proxy for biodiversity or ecosystem services value in many cases. **Dataset limitations** The underlying datasets are relatively new, and some geographic areas and some dimensions of the datasets, most importantly the accuracy with which they characterized changes, have not all received detailed scrutiny among the user community. The main limitations are the following: • All Earth observation-derived information is scale-dependent. The areal statistics produced from land cover datasets are very sensitive to the resolution used. Results can disagree simply because a different resolution has been used. • Relatedly, the pixels of land cover datasets are rarely homogenous even when they purport to be so. They may contain a mix of (for example) built-up land, grassland and tree cover. Therefore, calculating areas based on these datasets is inherently only approximate. This is particularly relevant when aggregating broader classes like tree cover from datasets like CCI-LC where many of the constituent land cover classes are explicitly mosaic landscapes.

	• As noted in Section 4.2, users should generally not expect results from different land cover datasets to agree. This includes results calculated from national and regional datasets not mentioned here. This can be partly because of the resolution issue discussed above, and also because although different datasets might share ostensibly similar land cover classes (e.g. urban land), the definitions actually pursued are often rather different. Similarly, seemingly minor differences in how ambiguous classes like mosaic tree cover are defined (for example to customize the classification for a specific location or context) could have a significant impact on the final product. • As noted in Section 4.2, users should generally not expect results from different land cover datasets to agree. This includes results calculated from national and regional datasets not mentioned here. This can be partly because of the resolution issue discussed above, and also because although different datasets might share ostensibly similar land cover classes (e.g. urban land), the definitions actually pursued are often rather different. Similarly, seemingly minor differences in how ambiguous classes like mosaic tree cover are defined (for example to customize the classification for a specific location or context) could have a significant impact on the final product. • The three datasets use data from multiple satellite missions in order to achieve the long (23-40 year) time series necessary to observe relatively slow-moving land cover change phenomenon. In all cases, sensor characteristics differ between the beginning and the end of the time series because new and improved satellites are commissioned and old ones obsolete. For example, there is a considerable difference in quality between the lower resolution pre-2000 data from the AVHRR sensor compared to data from later sensors used as inputs in the CCI-LC project. Data producers make efforts to mitigate this effect; however, the quality and completeness of these datasets vary over time, and in some cases observed land cover phenomena may be a result of these changing inputs. • Some 'land' cover like mangroves, some islands, tidal islands/reefs and some estuarine water bodies lie outside of the political and administrative boundaries used in this paper to calculate results at national and sub-national scales so changes in these environments (and their 'snapshot' shares) will not be reflected in the indicator. • CCI-LC mosaic classes of natural vegetation (class values 100, 110), lichens and mosses (class value 140), sparse vegetation (class value 150) and flooded forest with fresh water (class value 160) are notably inaccurate as in other datasets as these are ambiguous classes. Regional accuracy is poorer in the western part of the Amazon basin, Chile, southern Argentina, the western Congo basin, the Gulf of Guinea, eastern Russia, the eastern coast of China and Indonesia due to poorer MERIS coverage in these areas. Cloudier areas are likely to be less accurate than dryer areas. Abrupt changes are better detected than gradual ones because slower changes generally transition through several more ambiguous mosaic land cover classes that are not easily discriminated and detected (ESA/UCL Geomatics, 2017b). The CCI-LC dataset does not show features with a minimum dimension smaller than approximately 150 m (e.g. linear features like road and rail networks) and changes smaller than approximately 500m2 because of its land cover and land cover change detection resolutions. Because of this limitation, some types of land cover change may be completely missed: for example, routine forestry operations where modestly sized forest stands (hectares to tens of hectares) are clear-cut.

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3.3.4. Protected Natural Areas

Indicator:	**(UMF-49) Proportion of land under protected natural areas**
Sources/Origins	**NUA Monitoring Framework, Indicator No. 48**
Definition and method of computation:	This indicator measures land under protected natural areas as a proportion of the area of a city. Protected natural areas are nature reserves that are legally protected under the laws of a country. Measure the areas occupied by each of seven categories of protected areas. Express each as well as the total protected area as a percentage of area occupied by the city.
Concepts	Protected areas, as defined by the International Union for Conservation of Nature (IUCN; Dudley 2008), are clearly defined geographical spaces, recognized, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values. Importantly, a variety of specific management objectives are recognized within this definition, spanning conservation, restoration, and sustainable use: • Category Ia: Strict nature reserve • Category Ib: Wilderness area • Category II: National Park • Category III: Natural monument or feature • Category IV: Habitat/species management area • Category V: Protected landscape/seascape • Category VI: Protected area with sustainable use of natural resources The status "designated" is attributed to a protected area when the corresponding authority, according to national legislation or common practice (e.g., by means of an executive decree or the like), officially endorses a document of designation. The designation must be made for the purpose of biodiversity conservation, not de facto protection arising because of some other activity (e.g., military).

Rationale and interpretation:	Protected areas are the critical tool to conserve biodiversity in the face of the global crisis of species extinction and the loss of the world's natural capacity to support all life and human existence. A sound environment with a full complement of species underpins economic stability and human livelihoods over time. At the same time, the protected resources are often essential to assuring healthy communities. Protected areas provide for life's essentials and are economic engines. They provide for life's jobs and livelihoods as a traditional destination for the global tourism industry. Outdoor equipment industries have sprung up and are critical to regional economies. Significant employment is dependent on parks and protected areas. At the same time these areas protect resources of immense economic value such as water and fisheries (CBD; UNEP, 2008).
Disaggregation:	Desired disaggregation includes by categories of protected areas and geography.
Sources and data collection:	Data on protected areas at the city level is available from most local authority departments/ministries in charge of environment and/or heritage. At the national level, data is available for protected areas and Key Biodiversity Areas in most of the world's countries. Protected area data are compiled by ministries of environment and other ministries responsible for the designation and maintenance of protected areas. Protected Areas data for sites designated under the Ramsar Convention and the UNESCO World Heritage Convention are collected through the relevant convention international secretariats. Protected area data are aggregated globally into the World Database on Protected Areas by the UN Environment World Conservation Monitoring Centre, according to the mandate for production of the United Nations List of Protected Areas.
References:	• Convention on Biodiversity (CBD); UNEP (2008). Protected Areas in Today's World: Their Values and Benefits for the Welfare of the Planet. https://www.cbd.int/doc/publications/cbd-ts-36-en.pdf • United Nation Statistics Division (2022). Metadata for SDG Indicator 14.5.1. https://unstats.un.org/sdgs/metadata/files/Metadata-14-05-01.pdf • United Nations. (2020) NUA Monitoring Framework and related indicators. https://unhabitat.org/sites/default/files/2020/10/nua-monitoring-framework-and-related-indicators_1.pdf

3.4. Sustainable City Objective

3.4.1. Greenhouse Gas Emissions

Indicator:	(UMF-50) Total greenhouse gas emissions per year per capita
Source/Origins	**SDG Indicator 13.2.2.**
Definition and method of computation:	The ultimate objective of the Climate Change Convention (UNFCCC) is to achieve the stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. Estimating the levels of greenhouse gas (GHG) emissions and removals is an important element of the efforts to achieve this objective. **Methodology** Total GHG emissions are calculated as the per capita sum of emissions of direct GHGs: carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), perfluorocarbons (PFCs), hydrofluorocarbons (HFCs), sulphur hexafluoride (SF6) and nitrogen trifluoride (NF3), measured in units of CO2-equivalent, by using a common weighting factor, the so-called Global Warming Potentials (GWP). In accordance with the latest reporting guidelines for Annex I Parties under the UNFCCC, the GWP values to be used are those for the 100-year time horizon listed in Table 2.14 of the IPCC Fourth Assessment Report (https://www.ipcc.ch/report/ar4/wg1/). However, non-Annex I Parties should use the GWP provided in the IPCC Second Assessment Report (https://www.ipcc.ch/report/ipcc-second-assessment-full-report/) based on the effects of GHGs over a 100-year time.
Rationale and interpretation:	In accordance with Articles 4 and 12 of the Climate Change Convention and the relevant decisions of the Conference of the Parties, countries that are Parties to the Convention submit national GHG inventories to the Climate Change secretariat. These submissions are made in accordance with the reporting requirements adopted under the Convention, such as the revised "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual greenhouse gas inventories" (decision 24/CP.19) for Annex I Parties and "Guidelines for the preparation of national communications for non-Annex I Parties" (decision 17/CP.8). The inventory data are provided in the annual GHG inventory submissions by Annex I Parties and in the national communications and biennial update reports by non-Annex I Parties. The Paris Agreement adopted in 2015 marks the latest step in the evolution of the UN climate change regime and builds on the work undertaken under the Convention. Its central aim is to strengthen the global response to the threat of climate change by keeping a global temperature rise this century well below 2 degrees Celsius above pre-industrial levels and to pursue efforts to limit the temperature increase even further to 1.5 degrees Celsius. The Agreement also aims to strengthen the ability of countries to deal with the impacts of climate change.
Disaggregation:	Data is disaggregated by Annex I (Link) and Non-Annex I Parties to the UNFCCC
Sources and data collection:	• Annual GHG inventory submissions from Annex I Parties • National communications (NC) and/or Biennial update reports (BUR) from non-Annex I Parties **Collection process:** • Annex I GHG inventories are submitted through the CRF Reporter application. Information are automatically imported in the UNFCCC Data Warehouse. • Information for non-Annex I Parties are manually extracted from their NC and/or BUR and stored in the UNFCCC Data Warehouse using Excel import sheets.
Comments and limitations:	Data is limited to Parties that submit their GHG inventories. As the reporting requirements for non-Annex I Parties are not as rigid as those for Annex I Parties, information for these Parties are available usually only for selected years. The annual timing of submission of updated inventory reports is very close to publication date of annual SDG progress reports.

Limitations	• Availability of data depends only on what is received from Parties at the country level. • City level data may not be widely available.
References:	• UNFCC (2020). Resource Guide Module 3: National Greenhouse Gas Inventories For Preparing The National Communications Of Non-Annex I Parties: https://unfccc.int/resource/docs/publications/09_resource_guide3.pdf • United Nations Statistics Division (2022). SDG Indicator 13.2.2. https://unstats.un.org/sdgs/metadata/files/Metadata-13-02-02.pdf • UNSD (2020). Manual on the Basic Set of Environment Statistics, chapter on GHG statistics: https://unstats.un.org/unsd/envstats/fdes/MS1.3.1_GHGemissions.pdf

3.4.2. Efficient Land Use

Indicator:	**(UMF-51) Ratio of land consumption rate to population growth rate**
Source/Origins	**SDG Indicator 11.3.1**
Definition and method of computation:	The indicator is defined as the ratio of land consumption rate to population growth rate. This indicator requires defining the two components of population growth and land consumption rate. Computing the population growth rate is more straightforward and more readily available, while land consumption rate is slightly challenging, and requires the use of new techniques. In estimating the land consumption rate, one needs to define what constitutes "consumption" of land since this may cover aspects of "consumed" or "preserved" or available for "development" for cases such as land occupied by wetlands. Secondly, there is not one unequivocal measure of whether land that is being developed is truly "newly-developed" (or vacant) land, or if it is at least partially "redeveloped". As a result, the percentage of current total urban land that was newly developed (consumed) will be used as a measure of the land consumption rate. The fully developed area is also sometimes referred to as built up area. **Methodology** The method to compute ratio of land consumption rate to population growth rate follows five broad steps: a. Deciding on the analysis period/years b. Delimitation of the urban area or city which will act as the geographical scope for the analysis c. Spatial analysis and computation of the land consumption rate d. Spatial analysis and computation of the population growth rate e. Computation of the ratio of land consumption rate to population growth rate f. Computation of recommended secondary indicators **a. Deciding on the analysis period/years** This step involves selecting the time period during which the measurement of the indicator will be undertaken. Since this indicator considers historical growth of urban areas, analysis can be done annually, in 5-year cycles or 10-year cycles. Cycles of 5 or 10 years are commended, especially where use of mid-to-high resolution satellite imagery is used to extract data on built up areas, which is used to compute the land consumption rate component of the indicator. UN-Habitat and partners have been creating a repository of some data on this indicator using 1990 as the baseline year. Countries can however compute the indicator as far as back as satellite imagery is available (1975 for Landsat free imagery) and can maintain the current/most recent year as the final reporting year.

b. Delimitation of the urban area or city which will act as the spatial analysis scope

Urban areas and cities grow in different ways, the most common of which include infill (new developments within existing urban areas resulting in densification), extension (new developments at the edge of existing urban areas), leapfrogging (new urban threshold developments which are not attached to the urban area but which are functionally linked) and inclusion (engulfing of outlying urban clusters or leapfrog developments into the urban area, often forming urban conurbations). Key to note also is that growth of urban areas is not always positive. Sometimes, negative growth can be recorded, such as where disasters (e.gs floods, earthquakes) result in collapse of buildings and/or reduction in the built-up area mass.

Understanding the spatial growth of urban areas requires two important pre-requisites: a) delimitation of an appropriate spatial analysis scope which captures the entire urban fabric (as opposed to just the administratively defined boundaries), and b) use of a growth tracking measurement that helps understand when both positive and negative growth happen. For the former, a harmonized urban area/ city definition approach which allows for consistent analysis is recommended, while the use of built up areas is recommended for the latter since it allows for measurement of both positive and negative urban growth.

Following consultations with 86 member states, the United Nations Statistical Commission in its 51st Session (March 2020) endorsed the Degree of Urbanisation (DEGURBA) as a workable method to delineate cities, urban and rural areas for international statistical comparisons. Countries are thus encouraged to adopt this approach, which will help them produce data that is comparable across urban areas within their territories, as well as with urban areas and cities in other countries. More details on DEGURBA are available here: https://unstats.un.org/unsd/statcom/51st-session/documents/BG-Item3j-Recommendation-E.pdf

c. Spatial analysis and computation of the land consumption rate

Using the urban boundaries defined in step (b), spatial analysis is undertaken to determine the land consumption rate. To implement this, the three steps below are followed:

1. From satellite imagery, extract data on built up areas for each analysis year
2. Calculate the total area covered by the built-up areas for each of the analysis years
3. Compute the (annual) land consumption rate using the formula:

$$Land\ Consuption\ Rate\ (LCR) = \frac{V_{Present} - V_{Past}}{V_{Past}} \times \frac{1}{(t)}$$

Where:

$V_{Present}$ is total built-up area in current year

V_{Past} is total built-up area in past year

t is the number of years between $V_{Present}$ and V_{Past} (or length in years of the period considered)

d. Spatial analysis and computation of the population growth rate

Using the urban boundaries defined in step (b), calculate the total population within the urban area in each of the analysis years where the land consumption rate is computed. Population data collected by National Statistical Offices through censuses and other surveys should be used for this analysis. Where this type of population data is not available, or where data is released at large population units which exceed the defined urban area, countries are encouraged to create population grids, which can help disaggregate the data from large and different sized census/ population data release units to smaller uniform sized grids.

The (annual) population growth rate is calculated using the total population within the urban area for the analysis period using the formula below:

$$Population\ Growth\ Rate\ (PGR) = \frac{LN\left(\frac{Pop_{t+n}}{Pop_t}\right)}{(y)}$$

Where;

LN is the natural logarithm value

Pop_t is the total population within the urban area/city in the past/initial year

Pop_{t+n} is the total population within the urban area/city in the current/final year

y is the number of years between the two measurement periods

e. Computation of the ratio of land consumption rate to population growth rate

The ratio of land consumption rate (LCRPGR) to population growth rate is calculated using the formula:

$$LCRPGR = \left(\frac{Land\ consuption\ rate}{Population\ growth\ rate}\right)$$

The overall formula can be summarized as:

$$LCRPGR = \left(\frac{V_{Present} - V_{Past}}{V_{Past}} \times \frac{1}{T}\right) \Big/ \left(\frac{LN\left(\frac{Pop_{t+n}}{Pop_t}\right)}{y}\right)$$

The analysis years for both the land consumption rate and the population growth rate should be the same.

f. Computation of recommended secondary indicators

There are two important secondary indicators which help interpret the value of the main indicator - LGRPGR, thus helping in better understanding the nature of urban growth in each urban area. Both indicators use the same input data as the LCRPGR and will thus not require additional work by countries. These are:

1. **Built-up area per capita** – which is a measure of the average amount of built-up area available to each person in an urban area during each analysis year. This indicator can help identify when urban areas become too dense and/or when they become too sparsely populated. It is computed by dividing the total built-up area by the total urban population within the urban area/city at a given year, using the formula below:

$$Built-up\ area\ per\ capita\left(\frac{m^2}{person}\right) = \left(\frac{UrBU_t}{Pop_t}\right)$$

Where;

$UrBU_t$ is the total built-up area/city in the urban area in time t (in square meters)

Pop_t is the population in the urban area in time t

	2. **Total change in built up area** – which is a measure of the total increase in built up areas within the urban area over time. When applied to a small part of an urban area, such as the core city (or old part of the urban area), this indicator can be used to understand densification trends in urban areas. It is measured using the same inputs as the land consumption rate for the different analysis years, based on the below formula: $$Total\ change\ in\ built-up\ area\ (\%) = \frac{(UrBU_{t+n} - UrBU_t)}{UrBU_t}$$ Where; $UrBU_{t+n}$ is the total built-up area in the urban area/city in time the current/final year $UrBU_t$ is the total built-up area in the urban area/city in time the past/initial year Detailed steps for computation of the core indicator and the secondary indicators are available in the detailed training module for indicator 11.3.1: https://unhabitat.org/sites/default/files/2020/07/indicator_11.3.1_training_module_land_use_efficiency_french.pdf
Rationale and interpretation:	Globally, land cover today is altered principally by direct human use: by agriculture and livestock raising, forest harvesting and management and urban and suburban construction and development. A defining feature of many of the world's cities is an outward expansion far beyond formal administrative boundaries, largely propelled using the automobile, poor urban and regional planning and land speculation. A large proportion of cities both from developed and developing countries have high consuming suburban expansion patterns, which often extend to even further peripheries. A global study on 120 cities shows that urban land cover has, on average, grown more than three times as much as the urban population [1]; in some cases similar studies at national level showed a difference that was three to five times fold. [3]. In order to effectively monitor land consumption growth, it is not only necessary to have the information on existing land use cover but also the capability to monitor the dynamics of land use resulting out of both changing demands of increasing population and forces of nature acting to shape the landscape. Cities require an orderly urban expansion that makes the land use more efficient. They need to plan for future internal population growth and city growth resulting from migrations. They also need to accommodate new and thriving urban functions such as transportation routes, etc., as they expand. However, frequently the physical growth of urban areas is disproportionate in relation to population growth, and these results in land use that is less efficient in many forms. This type of growth turns out to violate every premise of sustainability that an urban area could be judged by including impacting on the environment and causing other negative social and economic consequences such as increasing spatial inequalities and lessening of economies of agglomeration. This indicator is connected to many other indicators of the SDGs. It ensures that the SDGs integrate the wider dimensions of space, population, and land adequately, providing the framework for the implementation of other goals such as poverty, health, education, energy, inequalities and climate change. The indicator has a multipurpose measurement as it is not only related to the type/form of the urbanization pattern. It is also used to capture various dimensions of land use efficiency: economic (proximity of factors of production); environmental (lower per capita rates of resource use and GHG emissions); social (reduced travel distance and cost expended). Finally, this indicator integrates an important spatial component and is fully in line with the recommendations made by the Data Revolution initiative.

	Concept **City or urban area:** Since 2016 UN-Habitat and partners organized global consultations and discussions to narrow down the set of meaningful definitions that would be helpful for the global monitoring and reporting process. Following consultations with 86 member states, the United Nations Statistical Commission, in its 51st Session (March 2020) endorsed the Degree of Urbanisation (DEGURBA) as a workable method to delineate cities, urban and rural areas for international statistical comparisons.20 This definition combines population size and population density thresholds to classify the entire territory of a country along the urban-rural continuum, and captures the full extent of a city, including the dense neighbourhoods beyond the boundary of the central municipality. DEGURBA is applied in a two-step process: First, 1 km^2 grid cells are classified based on population density, contiguity, and population size. Subsequently, local units are classified as urban or rural based on the type of grid cells in which majority of their population resides. For the computation of indicator 11.3.1, countries are encouraged to adopt the degree of urbanisation to define the analysis area (city or urban area). **Population growth rate (PGR)** is the change of a population in a defined area (country, city, etc) during a period, usually one year, expressed as a percentage of the population at the start of that period. It reflects the number of births and deaths during a period and the number of people migrating to and from the focus area. In SDG 11.3.1, this is computed at the area defined as urban/city. **Land consumption** within the context of indicator 11.3.1 is defined as the uptake of land by urbanized land uses, which often involves conversion of land from non-urban to urban functions. **Land consumption rate** is the rate at which urbanized land or land occupied by a city/urban area changes during a period of time (usually one year), expressed as a percentage of the land occupied by the city/urban area at the start of that time. **Built up area** within the context of indicator 11.3.1 is defined as all areas occupied by buildings.
Sources and data collection:	Population data required for this indicator is available from National Statistical Offices, UNDESA as well as through newly emerging multi-temporal gridded population datasets for the world. Historical built-up area data can also be generated for most countries and cities using mid-to-high resolution satellite imagery from the Landsat and Sentinel missions. Higher resolution data is available for several countries which have a rich repository of earth observation missions or partnerships with commercial providers of high to very high-resolution imagery. Other sources of data for this indicator include urban planning authorities and multi-temporal analytical databases on built-up area at the global level produced by organizations working in the earth observation field. The production of data for this indicator requires some level of understanding of geospatial analysis techniques at the country level. Several tools have been developed to help with the indicator computation, including systems that allow for on-the-cloud analysis, but users still require some good level of understanding of the process and geospatial analysis to efficiently utilize these tools. Equally, access to internet is needed either to 'download the free satellite imagery or undertake analysis using existing cloud-based architecture. National level capacity building initiatives will aim to balance the knowledge and understanding of the analysis, compilation and reporting of this indicator. Global reporting will rely on the estimates that come from the national statistical agencies, who should work collaboratively with mapping agencies and city data producers. With uniform standards in computation at the national level, few errors of omission or bias will be observed at the global/regional level. A rigorous analysis routine will be used to re-assess the quality and accuracy of the data at the regional and global levels. This will involve cross-comparisons with expected ranges of the values reported for cities.

20 A recommendation on the method to delineate cities, urban and rural areas for international statistical comparisons. https://unstats.un.org/unsd/statcom/51st-session/documents/BG-Item3j-Recommendation-E.pdf

	UN-Habitat has developed a simple reporting template that allows countries to input data on the intermediate products (built-up area and population) then get the computed values for each analysis city and period. The template, which will be send to countries every year to report any new data is appended to this metadata and can also be accessed HERE.
Comments and limitations:	The major limitation for this indicator lies in its interpretation. In each human settlement structure, there are many factors at play, that make it more difficult to generalize the implication of a single LCRPGR value to sustainable urbanization. For example, while a value less than 1 could be a good indicator of urban compactness and its associated benefits, intra-city analysis may reveal high levels of congestion and poor living environments, which is against the principles of sustainable development. On the other hand, a value of one may not mean an optimal balance between spatial growth of urban areas and their populations, since it would imply new developments with every unit increase in population. To help explain the values of the indicator, two secondary indicators have been proposed, which use the same inputs as the core indicator: built up area per capita and total change in built up area. Another limitation in the indicator is where zero or negative growth get reported, such as where population over the analysis period decreases or a natural disaster results in loss of the built-up area mass. Without looking at the land consumption and population growth rates separately, it is difficult to correctly interpret the indicator and its meaning. To address this, it is recommended to understand the individual rates, and use the proposed secondary indicators to explain the trends. Aggregating the indicator values for more than one city may also make the interpretation ambiguous. For example, an average value for a country with two cities might be between 0 and 1 if both cities are record values within this range, or if one has a value above 1 and the other a value below 0. The use of the national sample of cities approach, which produces a representative sample for each country will help resolve this challenge. In some cases, it is difficult to measure the urban expansion by conurbations of two or more urban areas that are in close proximity; to whom to attribute the urban growth and how to include it as one metric usually becomes a challenge. At the same time, data would not always coincide to administrative levels, boundaries and built-up areas. To resolve this, the use of a harmonized approach to defining urban areas and cities has been identified as helping to resolve this challenge. In the absence of the GIS layers, this indicator may not be computed as defined. As a result, more alternative measures for land that is developed or consumed per year can be adequately used. Alternatively, one can monitor the efficient use of urban land by measuring how well we are achieving the densities in residential zones that any city plans, or international guidance call for. Comparing achieved to planned densities is very useful at the city level. However, planned densities vary greatly from country to country, and at times from city to city. At the sub-regional or city levels, it is more appropriate to compare average densities achieved currently to those achieved in the recent past. While building more densely does use land more efficiently, high density neighborhoods, especially in and around urban centers, have several other advantages. They support more frequent public transportation, and more local stores and shops; they encourage pedestrian activity to and from local establishments; and they create lively (and sometimes safer) street life.
References:	• Blais, P. (2011). Perverse cities: hidden subsidies, wonky policy, and urban sprawl. UBC Press. • Dijkstra, L., H. Poelman, 2014. A harmonized definition of cities and rural areas: the new degree of urbanisation. Directorate General for Regional and Urban Policy, Regional working paper 2014; • Ewing, R., Pendall, R, and Chen, D. (2002). Measuring Sprawl and its Impact. Smart Growth America. [6] • Florczyk, A.J., Melchiorri, M., Corbane, C., Schiavina, M., Maffenini, M., Pesaresi, M., Politis, P., Sabo, S., Freire, S., Ehrlich, D., Kemper, T., Tommasi, P., Airaghi, D. and L. Zanchetta, Description of the GHS Urban Centre Database 2015, Public Release 2019, Version 1.0, Publications Office of the European Union, Luxembourg, 2019, ISBN 978-92-79- 99753-2, doi:10.2760/037310, JRC115586.;

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3.4.3. Budget on Climate Change Mitigation and Adaptation

Indicator:	**(UMF-52) Proportion of subnational/local government budget dedicated to climate change mitigation and adaptation actions**
Sources/Origins	**Adapted from NUA Monitoring Framework, Indicator No. 50**
Definition and method of computation:	This indicator measures the proportion of subnational/local governments' budgets dedicated to climate change mitigation and adaptation actions. Mitigation actions reduce greenhouse gases emissions while the adaptation actions address impacts of climate change. $$\%\ of\ local\ governments\ with\ dedicated\ budgets\ for\ CCM\ and\ CCA\ actions = 100 \times \left(\frac{Loccal\ governments\ with\ dedicated\ budgets\ for\ CCM\ and\ CCA\ actions}{Total\ number\ of\ local\ governments} \right)$$
Rationale and interpretation:	Climate change interventions help develop capacity of communities and improve their livelihoods, empowering them to become more resilient to severe climate events and variability. Financial resources and sound investments are needed to address climate change, to both reduce emissions, promote adaptation to the impacts that are already occurring, and to build resilience. Under the New Urban Agenda, Members States agreed to cooperate with subnational and local financial institutions, as necessary to develop climate finance infrastructure solutions and to create appropriate mechanisms for identifying catalytic financial instruments, consistent with any national framework in place to ensure fiscal and debt sustainability at all levels of government (NUA §143).

Concepts	**Climate change adaptation (CCA):** Increased ability to adapt to the adverse impacts of climate change, foster climate resilience and lower greenhouse gas emissions development, in a manner that does not threaten food production [Source: UNEP]. In the context of this indicator, CCA refers to measures that a local government takes to improve its resilience to observed and anticipated impacts of climate change. CCA activities to decrease vulnerability can be programs of work covering water, agriculture, infrastructure, health, etc., as well as capacity building and climate policy direct budgetary support in relation to addressing climate change vulnerability. **Climate change mitigation (CCM):** Holding the increase in the global average temperature to well below 2°C above preindustrial levels and to pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels, recognizing that this would significantly reduce the risks and impact of climate change. [SOURCE: UNFCCC]. CCM includes any strategy or action taken to remove Green House Gas (GHG) emissions released into the atmosphere, or to reduce their amount. Thus, CCM activities cover renewable energy projects, energy efficiency and fuel switch, forestry and land use, sustainable urban transport and sequestration projects, and technical assistance, capacity building and policy support in relation to reducing GHG emissions.
Disaggregation:	May be disaggregated by CCA and CCM budgets and associated actions where data allows.
Sources and data collection:	Data may be acquired from cities departments budgets and expenditure reports. City budgets may also be available at some national level data repositories.
References:	• United Nations Framework for Convention on Climate Chagange (2019). Forum of the Standing Committee on Finance: Climate Finance and Sustainable Cities. https://unfccc.int/sites/default/files/resource/SCF%20Forum%202019%20report_final.pdf • United Nations. (2020) NUA Monitoring Framework and related indicators. https://unhabitat.org/sites/default/files/2020/10/nua-monitoring-framework-and-related-indicators_1.pdf

Traditional dancers in Dakar, Senegal © Julius Mwelu / UN-Habitat

Domain 4: Culture

The indicator variables within the culture domain are classified below:

City Objectives:

Safe and Peaceful	Inclusive	Resilient	Sustainable
Indicators	**Indicators**	**Indicators**	**Indicators**
4.1.1 Culture for social cohesion	**4.2.1** Access to culture	**4.3.1** Cultural employment	**4.4.1** Sustainable management of heritage
4.1.2 Cultural Knowledge	**4.2.2** Cultural participation	**4.3.2** Expenditure on heritage	**4.4.2** Climate adaptation and resilience
			4.4.3 Open space for culture

4.1. Safe and Peaceful City Objective

4.1.1. Culture for Social Cohesion

Indicator:	(UMF-53) Culture for social cohesion
Source/ Origins	Culture 2030 – Indicator 18
Definition and method of computation:	This indicator of social cohesion is an aggregate of three main indicators: • **Intercultural tolerance:** Percentage of people who do not object to having a neighbour from another culture. • **Interpersonal trust:** Percentage of people reporting that other people can be trusted. • **Perception of gender equality:** Degree of positive assessment of gender equality (subjective output). **Methodology** **FOR INTERCULTURAL TRUST** The calculation method will differ depending on the data source available. The calculation methods are organized in order of preference of data source. $DoC = \sum_{i=1}^{k} \frac{f_i}{N} \quad / k$ **1. World Values Survey:** Where: f_i is the number of people who trust item i N is the population of reference, and k the number of items considered (e.g. three using the WVS). Using V35, V37 and V39 (in the V43MD_MDI section): "People that responded that they would not like to have as neighbours", calculate the percentage of people who do not mention that having the following groups as a neighbour is undesirable: a. People of a different race b. Immigrants/foreign workers c. People of different religion **2. Official national or regional surveys:** Using appropriate questions included in the most recent official national or regional survey, measure the levels of trust towards: a. People of a different race b. Immigrants/foreign workers c. People of different religion **FOR INTERPERSONAL TRUST** This indicator can be constructed using the most recent data for your country included in the three following data sources, listed below by preference: **1. Official national or regional surveys**, implementing the following Rosenberg question: "Generally speaking, would you say that most people can be trusted or that you need to be very careful in dealing with people? a. Most people can be trusted. b. Need to be very careful." **2. World Values Survey:** The Rosenberg question has been included in the WVS since 1981 to measure interpersonal trust: "V23.- Generally speaking, would you say that most people can be trusted or that you need to be very careful in dealing with people?

	a. Most people can be trusted. b. Need to be very careful." The indicator will be the percentage of people that reply "most people can be trusted" to the Rosenberg question (see below). **FOR PERCEPTION OF GENDER EQUALITY** The calculation method will differ depending on the data source available. **1. World Values Survey** For constructing the indicator, please refer to the following questions: a. (V44) When Jobs are scarce: men should have more right to a job than women b. (V61) Men make better political leaders than women do c. (V62) University is more important for a boy than for a girl Look up results for V44, V61 and V62 using the online data analysis of the World Values Survey. a. For V44, there are three possible answers for this question: "Agree", "Disagree", and "Neither". Note in the relevant cells of the Data Table only the results for "Disagree", obtainable by clicking on the tab "Marginals". b. For V61, there are numerous possible answers for this question: 1 Agree strongly; 2 Agree; 3 Disagree; 4 Strongly disagree; -1 Don´t know; -2 No answer; -3 Not applicable; -4 Not asked in survey; -5 Missing- Unknown. Note in the relevant cells of the Data Table only the results for "Disagree" and "Strongly disagree", obtainable by clicking on the tab "Marginals". c. For V62, there are numerous possible answers for this question: 1 Agree strongly; 2 Agree; 3 Disagree; 4 Strongly disagree; -1 Don´t know; -2 No answer; -3 Not applicable; -4 Not asked in survey; -5 Missing- Unknown. Note in the relevant cells of the Data Table only the results for "Disagree" and "Strongly disagree", obtainable by clicking on the tab "Marginals."
Rationale and interpretation:	This indicator aims to assess the degree of inter-cultural understanding, to measure the degree of personal acceptance of people from other cultures and to measure the gaps between women and men in respect to their opportunities and rights to take part in the cultural, social, economic and political life of their country.
Sources and data collection:	• National and local sources: Administrative data, Specific national surveys (including the Rosenberg question) and Information systems for culture when available. • World Values Survey (WVS); Latino Barometer: Interpersonal Trust (A60112); Asian Barometer: Most people can be trusted (Q024); Afro Barometer: Most people can be trusted, or Trust others. **IMPORTANT NOTE:** actual questions and variable numbers in these surveys may change. It is important to look through the actual questions asked for each country to determine the 'best fit' for this topic.
Comments and limitations:	**ABOUT INTERCULTURAL TRUST** This indicator mirrors that used in CDIS. It measures the degree of tolerance of other cultures and like the following indicator, can be regarded as a form of measuring 'trust'. Statistical analysis of all the three World Value Survey measures included here suggests that all three measure the same 'dimension' of trust (2017; 41-2, Box 2.1). The indicator has not been chosen as a core indicator for two principal reasons. Firstly, it is a subjective indicator. Survey results may be influenced by short-term opinion trends. Secondly, whilst the sample size of the most common source, the World Values Survey, may be reliable at national level, the results of such opinion surveys may vary depending on local conditions within a country.

	Anyone interpreting surveys of 'trust' at the national or international level should consult OECD's Guidelines on Measuring Trust (OECD 2017) which provides wide ranging information on evaluating survey methods and interpreting results. **ABOUT INTERPERSONAL TRUST** This indicator mirrors the one used in CDIS. Interpersonal trust is a common proxy for social capital, and therefore a building block for development. OECD (2017; 51) has emphasized the centrality of 'trust' to monitoring of the SDGs and social capital. The precise measure for 'trust' has been subject to considerable academic debate, and methods are used. Anyone interpreting surveys of 'trust' at the national or international level should consult the OECD Guidelines on Measuring Trust (2017) which provides wide ranging information on evaluating survey methods and interpreting results. The indicator has not been chosen as a core indicator for two principal reasons. Firstly, it is a subjective indicator. Survey results may be influenced by short-term opinion trends. Secondly, whilst the sample size of the most common source, the World Values Survey, may be reliable at national level, the results of such opinion surveys may vary depending on local conditions within a country. **ABOUT PERCEPTION OF GENDER** Cultural practices, values, attitudes and traditions shape and underlie the nature and quality of gender relations at the individual and community levels and are key determinants of the extent to which women and men are able to choose the lives they wish to lead, and to contribute to and benefit from their country's cultural, political, economic and social development. This is a descriptive indicator measuring the extent to which gender equality is positively perceived and supported amongst members of a society. The final score will range from 0% to 100%. 100% is an ideal result indicating that gender equality holds an important position within a society and is strongly supported by individuals. Such an ideal result should be considered a goal or benchmark against which a country's progress should be measured. When analyzing and contextualizing the results, it may be useful to refer to the recommended disaggregation of the final score by gender and age group (as well as by any additional key variables available such as rural/urban or income quintiles groups) as they can furnish interesting insights into how gender equality is perceived across different social and demographic groups and help to pinpoint the factors that either undermine or encourage the valorization of gender equality. Moreover, as the subjective indicators complement the areas covered by the objective indicators of this dimension (labour force participation, political participation and education), it may be interesting to correlate the results obtained for each of these particular areas.
References	• UNESCO (2019). Culture 2030 Indicators: http://uis.unesco.org/sites/default/files/documents/publication_culture_2020_indicators_en.pdf

4.1.2. Cultural Knowledge

Indicator:	(UMF-54) Cultural knowledge
Sources/Origins	**UNESCO Culture 2030, Indicator No. 14**
Definition and method of computation:	The indicator measures aspects of cultural education and capacity building, including intangible cultural heritage (ICH) for sustainable development, diversity in curriculum for heritage, capacity building programmes and mechanisms, and education and awareness raising, Data collection involves a checklist with responses including either Yes/No or figures, with supporting evidence
	Access checklist at UNESCO Culture 2030 Indicators, Table 7: Checklist for Cultural Knowledge, pg. 71-72. Link: http://uis.unesco.org/sites/default/files/documents/publication_culture_2020_indicators_en.pdf
Rationale and interpretation:	The preservation of cultures is linked to economic development, and cultural diversity is a mainspring for sustainable development for individuals, communities and countries. Building an effective global approach to sustainable development and education for sustainable development (ESD) needs to address respecting, protecting and maintaining the cultural diversity of the world now and in the future. All ESD must be locally relevant and culturally appropriate, and ESD requires intercultural understanding if people are to live together peacefully, tolerating and accepting differences amongst cultural and ethnic groups. From this background, this indicator assesses the avenues for creating/ boosting cultural knowledge in cities through capacity development, ICH, diversity in curriculum, and awareness creation.
Disaggregation:	Respondents should consider the gender aspects of the various curricula and programmes covered by this checklist with the guiding question: Does the curriculum content reflect the interests of both men and women? Reporting should include the sex ratios of, for e.g., student enrolment, graduates, teachers.
Sources and data collection:	City level data may be acquired through surveys guided by the UNESCO checklist if not available in local governments departments. Other sources include UNESCO's periodic reports, and International Bureau of Education.
References:	• UNESCO (2019). Culture 2030 Indicators: http://uis.unesco.org/sites/default/files/documents/publication_culture_2020_indicators_en.pdf

4.2. Inclusive City Objective

4.2.1. Access to Cultural Infrastructure

Indicator:	(UMF-55) Proportion of population with access to Cultural Infrastructure
Source/Origins	**Adapted from Culture 2030 - Indicator 20**
Definition and method of computation:	The indicator measures access to cultural infrastructure within a travel distance of 15 minutes. The different cultural facilities to be included in this indicator computation include: • Libraries • Museum • Gallery • Cinema • Traditional cultural space • Creative Hubs • Education Institutions • Cultural Internet Sites Ref: UNESCO 2030, Indicator 4 for more details. **Methodology** $$Population\ with\ access\ to\ cultural\ infrastructure = \frac{City\ population\ living\ within\ 15\ minutes\ travel\ distance\ to\ cultural\ infrastructure}{Total\ city\ population}$$
Rationale and interpretation:	Cultural infrastructure is crucial in creating environments conducive to the emergence of dynamic cultural sectors and clusters. It is a source of cultural, social and economic vitality in areas where facilities are located. Cultural operators face severe difficulties in establishing viable cultural ventures when there is a lack of basic infrastructure, such as access to capital, facilities for creation, production, distribution and dissemination, and training. The indicator's threshold is based on the "15-minute city" which recommends that everyone living in a city should have access to essential urban services within 15 minutes of walk or cycling (CNU, 2021).
Disaggregation:	Desirable disaggregation: Age, sex, persons with disability.
Sources and data collection:	Data for this indicator may be collected through surveys, mapping of cultural facilities and undertaking geo-spatial analytics. Data on location of cultural infrastructure may be acquired from city departments in charge of education and culture, national government ministries or related organizations.
Comments and limitations:	The indicator does not consider the relative size of different venues nor the quality of the service they provide. In several studies (e.g. Azerbaijan, Georgia), as a result the capital city emerges as under-provisioned. However, the venues in the capital are much larger and better quality than those of small towns.
References	• UNESCO (2019). Culture 2030 Indicators: http://uis.unesco.org/sites/default/files/documents/publication_culture_2020_indicators_en.pdf • Congress for the New Urbanism (CNU). (2021). The 15-Minute City. https://www.cnu.org/publicsquare/2021/02/08/defining-15-minute-city

4.2.2. Cultural Participation

Indicator:	(UMF-56) Cultural participation
Source/Origins	**Adapted from Culture 2030 - Indicator 21**
Definition and method of computation:	The three sub-indicators measure: 1. **Cultural site visits:** Trends in the number of visits to selected cultural sites or performances. 2. **Cultural attendance:** Percentage of the population who have participated at least once in a going-out cultural activity in the last 12 months. 3. **Individual cultural activities:** Percentage of households reporting practicing cultural activities at home in the last 12 months (including: Using the internet for cultural purposes (Eurostat method)). **Methodology** **FOR CULTURAL SITE VISITS** Trends in annual numbers of tickets sold or visits to formal cultural facilities; cinema, theatre, concerts, and other cultural events held in large public venues. Such data is commonly shown per 1,000 population, but this is not an appropriate denominator since many people are counted twice or more (see comment below). **FOR CULTURAL ATTENDANCE** Percentage of people who report attending one of the following activities in the last 12 months: • movies/cinema/film festivals. • theatre or dance show. • live musical performances. • historical/cultural parks or heritage sites. • museums, art galleries or crafts exhibitions. • might be possible to extend to other activities where other such data exist. **IMPORTANT NOTE:** Wherever possible, these figures should be broken down by sex, age group, disability, ethnicity, income, level of education and other variables **FOR INDIVIDUAL CULTURAL ACTIVITIES** Calculation of percentage of people who report they engaged in one of the following activities in the last 12 months: • performing/studying e.g. music, dance. • practicing visual arts and craft activities (e.g. painting, sculpture, pottery). Precise categories here are likely to depend on availability of data
Rationale and interpretation:	This indicator has three main purposes: • To assess the overall number of visits to cultural sites or facilities. Trends data will suggest whether interest/visits to particular types of facility are increasing or declining. • To assess the proportion of the population who attend a cultural event or facility. Trends data will identify whether the proportion of the population attending cultural events outside the home is increasing or decreasing. • To assess the extent to which people engage in cultural activities or skills at home (excluding daily practices such as cooking or clothing) and to monitor the role of cultural activities on-line.
Sources and data collection:	• National and local sources: Administrative data, Specific national surveys and Information systems for culture when available. Data from Internet service providers. • Regional surveys such as Eurobarometer and Latino barometer.

Comments and limitations:	**ABOUT CULTURAL SITE VISITS** Administrative data on the number of visits to cultural sites or performances (e.g. festivals) are often available whenever entrance is closed and/or ticketed. A change in these numbers can reflect changes in the attractiveness or demand for cultural activities. While the following 'participation' indicators are to be preferred, since they count people rather than visits, this indicator can be more commonly available in developing countries. These figures are likely to be available for a different set of facilities depending on the national context, but usually including public museums, galleries, and libraries, as well as theatres and performing arts centres. This indicator is more aligned with tracking visitor trends to a consistent set of such venues than about achieving international comparability. When used in this way it can thus suggest whether interest in a facility is rising and whether cultural events are fully subscribed. While this indicator may be regarded as a 'participation' indicator – it does give some understanding of the level of interest in cultural events –, it is important to identify it as 'visits' since, as stated above, it represents numbers of seats filled or tickets sold and not numbers of people. For example, under this indicator a person going to the cinema four times a month is likely to be counted four times. It is well known that increasing numbers of 'visits' (e.g. ticket sales) can reflect repeat visits by the 'cultural class' rather than visits from a broader base of people23. Moreover, such administrative data are not usually compiled by age, sex or other characteristic. By contrast, the next 'participation' indicators measure numbers of people and can be used to measure the degree to which all social and cultural groups in society are inclusively involved in cultural activities. It is also important to note that this indicator moreover does not often distinguish where the visitors come from, whereas indicators that are based on household surveys can be used to distinguish participation associated with a particular area. The current indicator may include tourists alongside local people and people from other parts of the country, but under subsequent indicators, tourists and cultural participation from different parts of the country can be distinguished. Sometimes, though rarely, tallies of tickets sales or visits may be associated with direct surveys of attendance that may identify the proportion of visits by foreigners, for example. The facilities covered in this indicator may well be included amongst those visited in the following indicators, but in this case they are counted at the institutional level. The size of the 'overlap' between 'visits' and 'attendance' cannot be determined, making it impossible to compare them. **ABOUT CULTURAL ATTENDANCE** This is usually taken as the 'core' cultural participation indicator, assessing the degree to which household members are engaged in going to performances, exhibitions and other cultural events. The preceding indicator is based on administrative data; number of 'entrances' collected, tickets sold, or seats filled. Such data are not often broken down by age, sex, or socio-demographic groups. By contrast this and the following 'participation' indicators are based on survey data. The surveys concerned usually collect a substantial data on a substantial number of socio-demographic variables; sex and age especially, but often other important variables such as disability, ethnicity, or income. All such dimensions are important for countries seeking to ensure participation by a diversity of groups in an equally diverse set of cultural activities. The detailed analysis of these activities is thus extremely important and can reflect many aspects of cultural diversity. It can also reflect many different types of cultural activity which may have varying importance to various communities, cities, provinces, etc. Because of this, many countries conduct dedicated Cultural Participation Surveys24. It is nonetheless understood that many countries do not have the resources to conduct such surveys and if questions on cultural participation surveys cannot be included in existing surveys it is suggested that administrative data are used as outlined in the previous indicator.

	National surveys that include cultural participation questions may not have large enough samples to allow estimates for city populations. Cities should consider carrying their own cultural participation surveys, especially as part of the evaluation process for major policies and programmes such as introduction of a new tourism strategy or evaluation of a major festival. In some cases, it may be possible for cities to 'boost' the sample of national surveys by supporting enough local interviews to create a reliable sample. If a city boosts national surveys rather than conducting its own study, this has the advantage of allowing comparison with other parts of the country, as well as the overall national context. **ABOUT INDIVIDUAL CULTURAL ACTIVITIES** Apart from 'going out' there are many cultural activities which are a part of peoples' regular activities. They include reading literature, performing/studying music or dance, as well as visual arts and craft activities such as painting, sculpture, and pottery. For many countries expanding the number of people involved in such activity is an important policy target The distinction between this and the previous indicator is that the previous indicator assesses the percentage of individuals (by sex, age, or disability) who have participated as an audience in cultural events/activities. This indicator measures the degree to which people have participated as an audience in cultural events/activities. This indicator measures the degree to which people have actively performed cultural activities. While paid activity may be included under this indicator, the intention is to monitor the degree to which the population practices/performs for their own pleasure, say, for example, by learning to play a musical instrument at home. An audience for such 'performance' is unlikely outside the immediate household. Thus, for example, an actor (professional or amateur) might well rehearse at home, but the home is rarely (but not 'never') used as a venue for performing in front of a wider, paying, audience. Countries and cities may have policies which seek to increase the numbers of people able to, or learning to, perform cultural activities. Sometimes taking part in cultural activities by being in the audience is classed as passive cultural participation whereas activity included under the current indicator is described as active cultural participation. It may not always be possible to distinguish between the two. In community celebrations and traditional practices, musical instruments, or performance, may circulate round the attendees. For example, each person may have to dance in front of the group. In these cases, one person may be audience at one time and performer at another time at one event. Such a distinction can also serve to differentiate formal attendance at major 'venues' from informal intangible cultural practices. This indicator thus requires careful interpretation along with the preceding indicator. In the urban environment of a capital city, for example, those with a higher income may attend major arts venues as an audience, while local communities may pursue more informal cultural activity in which they are both performer and audience, active and passive, transmitter and receiver of cultural activity.
References:	• UNESCO (2019). Culture 2030 Indicators: http://uis.unesco.org/sites/default/files/documents/publication_culture_2020_indicators_en.pdf

4.3. Resilient City Objective

4.3.1. Cultural Employment

<table>
<tr><th>Indicator:</th><th>(UMF-57) Cultural employment</th></tr>
<tr><td>Origin/Source</td><td>Culture 2030 - Indicator 7</td></tr>
<tr><td>Definition and method of computation:</td><td>Number of people employed in the cultural and creative sectors and cultural occupations as a percentage of overall employment for the latest year.
Methodology
Cultural employment is normally understood as including three groups of workers (CDIS p. 28, FCS p. 40[21])
A. People who have a cultural occupation and who work in businesses with a cultural activity (e.g. an actor in a theatre)
B. People who have a cultural occupation but who work in a business which is not engaged in cultural activity (e.g. a designer in the motor industry)
C. People who work in cultural businesses but who do not have a cultural occupation (e.g. an accountant working in a theatre)
The indicator is calculated as the sum of all these three groups as a percentage of all employed persons.
<table>
<tr><th></th><th>Cultural Establishment</th><th>Non-Cultural Establishments</th></tr>
<tr><td>Cultural occupations</td><td>A</td><td>B</td></tr>
<tr><td>Non-cultural occupations</td><td>C</td><td></td></tr>
</table>
$$CEP_0 = \frac{CEP = \sum_i^n CE_{isco\ codes}}{EP}$$
CEP_0 is the percentage of people engaged in cultural occupations;
$CE_{isco\ codes}$ codes is the total number of people employed in cultural occupations according to the selected International Standard Classification of Occupations (ISCO) codes; (or ISIC codes – see below – where occupation data is not available).
EP is the total number of the employed population.</td></tr>
<tr><td>Rationale and interpretation:</td><td>This indicator aims to assess the role of culture as an “employer” at the national and local level as well, as the vitality and dynamism of the culture sector and its potential in improving the material welfare of those employed in it.</td></tr>
<tr><td>Sources and data collection:</td><td>• UNESCO data: UIS
• National and local sources: National Accounts, Population Census, Labour Force surveys (LFS), Administrative records (e.g. social security registers), Professional associations.</td></tr>
<tr><td>Comments and limitations:</td><td>A framework for measuring faecal waste flows and safety factors has been developed and piloted in 12 countries (in 2017.</td></tr>
<tr><td>References:</td><td>• UNESCO (2019). Culture 2030 Indicators: http://uis.unesco.org/sites/default/files/documents/publication_culture_2020_indicators_en.pdf</td></tr>
</table>

21 UNESCO-UIS 2009, pp. 74-7

4.3.2. Expenditure on Heritage

Indicator:	(UMF-58) Expenditure on heritage (on safeguarding cultural and natural heritage)
Source/Origins	**Culture 2030 - Indicator 1**
Definition and method of computation:	Global SDG 11.4 Indicator: "Total expenditure (public and private) per capita spent on the preservation, protection and conservation of all cultural and natural heritage, by type of heritage (cultural, natural, mixed, World Heritage Centre designation), level of government (national, regional, and local/municipal), type of expenditure (operating expenditure/investment) and type of private funding (donations in kind, private non-profit sector, sponsorship)." (Methodology provided by UIS). **Methodology** The following disaggregation would be required: • By type of heritage: cultural, natural, mixed, World Heritage properties • Public expenditure by level of government (national, regional, local/municipal) • Type of public expenditure (capital expenditure, operating expenditure) • Private funding: donations in kind, private non-profit sector, sponsorship $= \frac{\sum Exp_{pu} + \sum Exp_{pr}}{Population}$ PPC Expenditure = Preservation, Protection and Conservation of all cultural and/or natural heritage = Sum of public expenditure by all levels of government on the preservation, protection and conservation of cultural and/or natural heritage = Sum of all types of private expenditure on the preservation, protection and conservation of cultural and/or natural heritage
Rationale and interpretation:	This indicator illustrates how financial action by public authorities, at the local, national and international levels, alone or in partnership with civil society organisations (CSO) and the private sector, to protect and safeguard cultural and natural heritage has a direct impact on safeguarding heritage and in making cities and human settlements more sustainable. This indicator is a proxy to measure the Target.
Sources and data collection:	• UNESCO data: UIS • National and local sources: National Statistical Institutes, Administrative data, • Specific national surveys and Information systems for culture when available.
Comments and limitations:	This indicator can be difficult to calculate for several reasons: • Countries' national accounting frameworks may not clearly separate cultural natural, and other activities • Financial transactions may be rechanneled for different uses • Financial transactions may be double counted at different levels of public administration This indicator covers public and private monetary investments in heritage. It does not measure non-monetary factors such as national regulations or national/local policies for the preservation, protection and conservation of national cultural and/ or natural heritage including World Heritage. These policies could take the form of fiscal incentives such as tax benefits for donations or sponsorships.
Reference	• UNESCO (2019). Culture 2030 Indicators: http://uis.unesco.org/sites/default/files/documents/publication_culture_2020_indicators_en.pdf

4.4. Sustainable City Objective

4.4.1. Sustainable Management of Heritage

Indicator:	(UMF-59) Sustainable management of heritage
Source/Origins	**Culture 2030 – Indicator 2**
Definition and method of computation:	The indicator computation involves a checklist with components on sustainable management framework to safeguard and manage cultural and natural heritage, practices, knowledge, and movable historical artefacts. Access checklist at UNESCO Culture 2030 Indicators, Table 2(A) Checklist for Sustainable Management of Heritage – NATIONAL & URBAN and (B) Checklist for Sustainable Management of Heritage – URBAN ONLY :pg. 41. Link: http://uis.unesco.org/sites/default/files/documents/publication_culture_2020_indicators_en.pdf **Methodology** The checklist contains both numeric and Yes/No items
Rationale and interpretation:	This indicator offers a general picture of the strengths and shortcomings of public action to protect and promote heritage sustainability through the analysis of three components: 1. National and international registers and inventories. 2. Action to protect, safeguard and manage heritage involving all stakeholders and fostering sustainability. 3. The level of support mobilized to safeguard and revitalize heritage.
Sources and data collection:	• UNESCO data: periodic reports of the 1972, 1970, and 2003 Conventions as well as the survey data from the 2011 and 2015 Recommendations • National and local sources: administrative data, specific national surveys and information systems for culture when available
Comments and limitations:	The indicators are based on those used for reporting on the UNESCO conventions including the UNESCO World Heritage Sustainable Development Policy (2015), which they supplement by: • Covering all heritage elements in the country/town not just those recognized by UNESCO • Providing context to heritage in the community • Adding some numeric reference points for examining annual trends in the development of heritage policy in the community **URBAN LEVEL** This indicator is to be applied at both urban and national level. Some items may exist at national rather than the urban level. Respondents should note this in submissions. A basic checklist of expected processes/safeguards that ensure protection and proper management and safeguarding of the urban heritage. The qualifiers below form the basis for that basic checklist. The indicator is presented as a checklist requiring Yes or No answers and appropriate supporting evidence. In some cities, the data might also be assessed spatially e.g. the overall area (m^2) protected, as a percentage of overall urban area. It should be noted that 'protection' does not only cover sites under UNESCO listings but includes any sites which are covered by national or local listings.
References:	• UNESCO (2019). Culture 2030 Indicators: http://uis.unesco.org/sites/default/files/documents/publication_culture_2020_indicators_en.pdf

4.4.2. Climate Adaptation and Resilience

Indicator:	(UMF-60) Climate adaptation and resilience
Source/Origins:	**Culture 2030 – Indicator 3**
Definition and method of computation:	Checklist for the climate adaptation framework, particularly including traditional practices for resilience. Access checklist at UNESCO Culture 2030 Indicators: Table 3(B). Checklist of Climate Adaptation and Resilience – URBAN ONLY, pg. 45. Link: http://uis.unesco.org/sites/default/files/documents/publication_culture_2020_indicators_en.pdf **Methodology** The checklist contains both numeric and Yes/No items.
Rationale and interpretation:	This indicator aims to assess measures taken to foster climate change mitigation and adaptation and enhance resilience through sustainable safeguarding and management of tangible and intangible cultural heritage as well as natural heritage.
Sources and data collection:	• UNESCO data: periodic reports of the 1972 and 2003 Conventions. • National and local sources: administrative data, specific national surveys and Information systems for culture when available
Comments and limitations:	The indicators are based on those used for reporting on the UNESCO conventions including the UNESCO World Heritage Sustainable Development Policy (2015), which they supplement by: • Covering all heritage elements in the country/town not just those recognized by UNESCO • Providing context to heritage in the community • Adding numeric reference points for examining annual trends in the development of heritage policy in the community **URBAN LEVEL** This indicator is to be applied at both urban and national level. Some items may exist at national rather than the urban level. Respondents should note this in submissions. The checklist consists of a section on the institutional framework for climate adaptation and resilience and another section on traditional knowledge and how it can lead to resilience. It measures the degree to which new construction in historic areas is based on the use of sustainable, natural, and traditional building techniques and materials. Data is derived from municipal Planning Departments; planning policy guidance, planning registers, and monitoring of development in designated historic districts. In terms of urban construction, the SDGs seek to encourage the use of sustainable building materials. These tend to be defined in terms of 'sustainable building' or 'natural building' (see Glossary). Both terms suggest building materials which are 'green' with a low energy cost and that do not involve man-made materials such as concrete. Low environmental impact can be associated with both processing and local sourcing to reduce transport costs. When related to culture and historic districts of cities it is also important that construction materials, building techniques and architectural styles are aligned with those of historic buildings in the area in question. Historic buildings will also tend to use locally sourced materials (though use of architectural material made in distant lands could also be a sign of status). Such techniques are most often applied to construction of housing in local or 'vernacular' styles, but can also be applied to other buildings, as, for example, in the use of 'modern' adobe techniques for public facilities in cities of south-west USA. New construction will require a certain level of 'modern' fittings, such as electric cabling and kitchen/bathroom facilities as well as some energy conservation measures with are not 'traditional' in appearance e.g., solar panels. Under these circumstances, it will be necessary to decide if the overall appearance/construction of a building indicates sustainable construction in keeping with the character of the historic district.
References:	• UNESCO (2019). Culture 2030 Indicators: http://uis.unesco.org/sites/default/files/documents/publication_culture_2020_indicators_en.pdf

4.4.3. Open Space for Culture

Indicator:	(UMF-61) Open space for culture
Source/Origins:	**Culture 2030 – Indicator 5**
Definition and method of computation:	Number and size of open spaces used for cultural purposes by type of use **Methodology** Several potential metrics can be used here: • The area (m², ha) of 'cultural open space' as a percentage of all public open space • Number of 'cultural open spaces' as a percentage of all open spaces • Percentage distribution of cultural events in open space by FCS domain
Rationale and interpretation:	This indicator aims to assess the extent of public open spaces, the nature of the spaces and the degree of public use (including traditional markets).
Sources and data collection:	• UNESCO data: UN-Habitat – Public open space strategies SDG 11.7.1 • National/Local sources: administrative data
Comments and limitations:	**URBAN LEVEL ONLY** This indicator closely follows SDG 11 and UN-Habitat monitoring proposals. The objective will be that while UN-Habitat will monitor the overall number, area and diversity of open spaces, this indicator will assess the degree to which they are available, accessible and in practice used for cultural activities. • Accessible open space in cities is often the basis for cultural activities including: • Formal and informal cultural meetings of various ethnic or other minority groups (e.g. maids from the Philippines in Hong Kong) • Festivals including domestic workers, music concerts, open air theatre, celebrations on national/local holidays • Markets including by rural communities, members of which have come into town to sell their produce, articles of which may also reflect their particular cultural expressions • Such spaces may contain formal structures for performances, e.g., bandstands. • Heritage activities including natural heritage (landscapes, wildlife), built heritage, and intangible heritage (festivals, community meals and meetings) Defining open space. Planning policies usually define open space in several ways. In terms of use it may be described as recreational or it may be 'protected' for conservation purposes. These two uses may conflict. The range of heritage and cultural activities which UNESCO might seek to measure under this indicator could be in conflict between each other. It will be important to breakdown 'cultural events' by the type of event. Initially it is proposed that the UNESCO FCS domains be used. However, many events will fall under the single 'Performance and Celebration' domain. These could be broken down further according to the major artistic disciplines: music, dance, theatre, and other, as appropriate. Many major festivals and events collect detailed information on types of performance, visitor profiles and numbers. These data will be important in the analysis and interpretation of this indicator. The role of tourism and visitor numbers will be of great importance to policy makers and citizens Markets which have a 'cultural' aspect could include those at which items defined as 'cultural products' by FCS are sold, or involving cultural activities as defined under FCS take place. Measurement issues. It is understood that UN-Habitat is likely to monitor this goal through GIS measures of area. Using a spatial assessment would allow benchmarking of cultural use against the overall indicators for the goal, suggesting the degree to which cultural activities contributed to achieving the goal. To establish the types of cultural activities taking place in open space a street survey would be necessary9.

	Currently UN Habitat provides two global measures for this indicator, one including streets and one excluding streets from the analysis10. The indicator on markets can be complete with the ratio of traditional markets vs supermarkets in selected urban areas (count of registered traditional markets / count of registered non-traditional markets). Traditional markets in urban areas offer an environment for different cultural groups, especially minorities and rural communities, to offer their produce for purchase through direct sales to consumers. They are thus an important vehicle for promoting cultural diversity as well as contributing a strong cultural element to the urban environment and economy. In many developing countries, sales take place throughout the city. Such activities can only be monitored with great difficulty. Thus, this indicator will only be applied to registered markets taking place within a defined location. Traditional markets are defined as listed in the Glossary. All other markets taking place in the city which are registered and take place in a defined space are regarded as 'non-traditional'. The indicator records the ratio between the two groups.
References:	• UNESCO (2019). Culture 2030 Indicators: http://uis.unesco.org/sites/default/files/documents/publication_culture_2020_indicators_en.pdf

UN-Habitat Deputy Executive Director Mr. Victor Kisob with the Nairobi county Governor Mike Mbuvi Sonko during inspection of the ongoing reconstruction of Tom Mboya Street. Luthuli Avenue into a one-way street in a bid to decongest the CBD, in Nairobi, Kenya 2019 © Julius Mwelu / UN-Habitat

The opening plenary of the Twenty Forth Session of Governing Council for UN-Habitat in Nairobi, Kenya © Julius Mwelu / UN-Habitat

Domain 5: Governance and Implementation

The indicator variables within the Governance and implementation domain are presented below:

City objectives:

Safe and Peaceful	Inclusive	Resilient	Sustainable
Indicators	**Indicators**	**Indicators**	**Indicators**
5.1.1 Victims of Intentional Homicide	**5.2.1** Participation in Urban planning and Management	**5.3.1** Own Revenue Collection	**5.4.1** Registered births
5.1.2 Victims of Physical and Sexual Violence	**5.2.2** Utilization of E-Governance and Digital Governance Tools	**5.3.2** Financial autonomy	**5.4.2** National urban policies/ regional development plans
5.1.3 Intimate partner violence	**5.2.3** Proportion of seats held by women in sub-national/ local governments	**5.3.3** Local disaster risk reduction strategies	**5.4.3** Governance of culture
5.1.4 Reporting of Violence	**5.2.4** Legal frameworks for equality		
5.1.5 Bribery	**5.2.5** Efficiency in urban governance		

5.1. Safe and Peaceful City Objective

5.1.1. Victims of Intentional Homicide

Indicator:	(UMF-62) Number of victims of intentional homicide per 100,000 population, by sex and age
Source/Origins	**SDG Indicator 16.1.1**
Definition and method of computation:	The indicator is calculated as the total number of victims of intentional homicide recorded in a given year divided by the total resident population in the same year, multiplied by 100,000.
Rationale and interpretation:	Security from violence is a pre-requisite for individuals to enjoy a safe and active life and for societies and economies to develop freely. Intentional homicides occur in all countries of the world and this indicator has a global applicability. Monitoring intentional homicides is necessary to better assess their causes, drivers, and consequences and, in the longer term, to develop effective preventive measures. If data are properly disaggregated (as suggested in the ICCS), the indicator can identify the different type of violence associated with homicide: inter-personal (including partner and family-related violence), crime (including organized crime and other forms of criminal activities) and socio-political (including terrorism, hate crime).
Concepts:	**Concepts:** In the ICCS intentional homicide is defined as the "Unlawful death inflicted upon a person with the intent to cause death or serious injury". This definition contains three elements characterizing the killing of a person as intentional homicide: 1. The killing of a person by another person (objective element); 2. The intent of the perpetrator to kill or seriously injure the victim (subjective element); 3. The unlawfulness of the killing, which means that the law considers the perpetrator liable for the unlawful death (legal element). This definition states that, for statistical purposes, all killings corresponding to the three criteria above should be considered as intentional homicides, irrespective of definitions provided by national legislations or practices.
Disaggregation:	Recommended disaggregation for this indicator are: • Sex and age of the victim and the perpetrator (suspected offender) • Relationship between victim and perpetrator (intimate partner, other family member, acquaintance, etc.) • Means of perpetration (firearm, blunt object, etc.) • Situational context/motivation (organized crime, intimate partner violence, etc.)
Sources and data collection:	Data at the city/sub-national levels can be acquired from the city authority departments in charge of security/criminal justice and civil registration. Data may also be filtered from national level statistics. At the national level, two separate sources exist: a) criminal justice system; b) public health/civil registration. UNODC collects and publishes data from criminal justice systems through its long-lasting annual data collection mandated by the UN General Assembly (UN Crime Trends Survey, UN-CTS); WHO collects and publishes data produced by public health/civil registration. The data collection through the UN-CTS is facilitated by a network of over 130 national Focal Points appointed by responsible authorities. Currently, when national data on homicide are not available from neither of the two types of source above, estimates produced by WHO are used.
Comments and limitations:	The ICCS provides important clarifications on the definition of intentional homicide. In particular, it states that the following killings are included in the count of homicide: • Murder • Honor killing • Serious assault leading to death • Death as a result of terrorist activities • Dowry-related killings • Femicide

	• Infanticide • Voluntary manslaughter • Extrajudicial killings • Killings caused by excessive force by law enforcement/state officials Furthermore, the ICCS provides indications on how to distinguish between intentional homicides, killings directly related to war/conflict and other killings that amount to war crimes. Data on homicides produced by public health authorities are guided by the international classification of diseases (ICD-10), which provides a definition of 'Death by assault' that is very close to the definition of intentional homicide of the ICCS.
References:	• UNODC (2015). Homicide Database (https://data.unodc.org/), UNODC, Global Study on Homicide 2013; WHO-UNDP-UNODC, Global Status Report on Violence Prevention 2014); UNODC, International Classification of Crime for Statistical Purposes - ICCS, 2015 • United Nations Statistics Division (2022). SDG Indicator 16.1.3. https://unstats.un.org/sdgs/metadata/files/Metadata-16-01-03.pdf

5.1.2. Victims of Physical and Sexual Violence

Indicator:	**(UMF-63) Proportion of population subjected to (a) physical violence, (b) psychological violence and (c) sexual violence in the previous 12 months**
Source/Origins	**SDG Indicator 16.1.3**
Definition and method of computation:	The total number of persons who have been victim of physical, psychological or sexual violence in the previous 12 months, as a share of the total population. **Methodology** Number of survey respondents who have been victim of physical, psychological or sexual violence in the previous 12 months, divided by the total number of survey respondents.
Rationale and interpretation:	This indicator measures the prevalence of victimization from physical, sexual (and, possibly, psychological) violence. It is globally relevant as violence in various forms occurs in all regions and countries of the world. Given that acts of violence are heavily underreported to the authorities, this indicator needs to be based on data collected through sample surveys of the adult population.
	Concepts: This indicator measures the prevalence of victimization from physical, psychological or sexual violence **Physical violence:** This concept is equivalent to the concept of physical assault, as defined in the International Classification of Crime for Statistical Purposes (ICCS): the intentional or reckless application of physical force inflicted upon the body of a person. This includes serious and minor bodily injuries and serious and minor physical force. According to the ICCS, these are defined as: • Serious bodily injury, at minimum, includes gunshot or bullet wounds; knife or stab wounds; severed limbs; broken bones or teeth knocked out; internal injuries; being knocked unconscious; and other severe or critical injuries. • Serious physical force, at minimum, includes being shot; stabbed or cut; hit by an object; hit by a thrown object; poisoning and other applications of force with the potential to cause serious bodily injury.

Concepts:	• Minor bodily injury, at minimum, includes bruises, cuts, scratches, chipped teeth, swelling, black eye and other minor injuries. • Minor physical force, at minimum, includes hitting, slapping, pushing, tripping, knocking down and other applications of force with the potential to cause minor bodily injury. **Sexual violence (ICCS):** Unwanted sexual act, attempt to obtain a sexual act, or contact or communication with unwanted sexual attention without valid consent or with consent as a result of intimidation, force, fraud, coercion, threat, deception, use of drugs or alcohol, or abuse of power or of a position of vulnerability. This includes rape and other forms of sexual assault. **Psychological violence:** There is as yet no consensus at the international level of the precise definition of psychological violence and there is as yet no generally well-established methodology to measure psychological violence.
Disaggregation:	Recommended disaggregation: By sex and age, income level, education, citizenship, ethnicity where data allows
Sources and data collection:	This indicator is derived from surveys on crime victimization or from other household surveys with a module on crime victimization. The indicator refers to individual experience of the respondent, who is randomly selected among the household members, while experience of other members is not to be included. Experience of violent victimization is collected through a series of questions on concrete acts of violence suffered by the respondent. At the national and global level, UNODC collects data on the prevalence of physical and sexual assault through its annual data collection (UN-CTS). The data collection through the UN-CTS is facilitated by a network of over 130 national Focal Points appointed by responsible authorities.
Comments and limitations:	Crime victimization surveys are able to capture experience of violence suffered by adult population of both sexes; however, due to the complexity of collecting information on experiences of violence, it is likely that not all experiences of violence are duly covered by these surveys, which aim to cover several types of crime experience. Other dedicated surveys on violence usually focus on selected population groups (typically women, children or the elderly) or in specific contexts (domestic violence, schools, prisons, etc.), but they are not able to portray levels and trends of violence in the entire population. While there are already international standards on measuring physical and sexual violence through survey instruments, there is currently no international standard on the measurement of psychological violence. One practical option could be to limit psychological violence to threatening behaviour, which does have an established methodology of measurement in victimization surveys. Threatening behaviour, at minimum, is an intentional behaviour that causes fear of injury or harm.
References:	• European Union (2014). Fundamental Rights Agency, Violence against women: an EU-wide survey. Main results report • European Union Agency for Fundamental Rights (2014). Violence against women: an EU-wide survey. Main results reporthttps://fra.europa.eu/en/publication/2014/violence-against-women-eu-wide-survey-main-results-report • United Nations Statistics Division (2022). SDG Indicator 16.1.3. https://unstats.un.org/sdgs/metadata/files/Metadata-16-01-03.pdf • UNODC-UNECE, Manual on Victimization Surveys (2010): https://www.unodc.org/documents/data-and-analysis/Crime-statistics/Manual_on_Victimization_surveys_2009_web.pdf

5.1.3. Intimate Partner Violence

Indicator:	**(UMF-64) Proportion of ever-partnered women and girls aged 15 years and older subjected to physical, sexual or psychological violence by a current or former intimate partner in the previous 12 months, by form of violence and by age**
Source/Origins	**SDG Indicator 5.2.1**
Definition and method of computation:	This indicator measures the percentage of ever-partnered women and girls aged 15 years and older who have experienced physical, sexual or psychological violence by a current or former intimate partner, in the previous 12 months. Definition of violence against women and girls and of the forms of violence specified under this indicator are presented in the next section. NOTE: We refer to "violence against women" throughout, and this also includes adolescent girls (15-19 years old). **Methodology** This indicator calls for breakdown by form of violence and by age group. Countries and regions are encouraged to compute prevalence data for each form of violence as detailed below to assist comparability at the regional and global levels: **1. Physical intimate partner violence:** Number of ever-partnered women (aged 15 years and above) who experience physical violence by a current or former intimate partner in the previous 12 months divided by the number of ever-partnered women and girls (aged 15 years and above) in the population multiplied by 100. **2. Sexual intimate partner violence:** Number of ever-partnered women (aged 15 years and above) who experience sexual violence by a current or former intimate partner in the previous 12 months divided by the number of ever-partnered women (aged 15 years and above) in the population multiplied by 100. **3. Psychological intimate partner violence:** Number of ever-partnered women (aged 15 years and above) who experience psychological violence by a current or former intimate partner in the previous 12 months divided by the number of ever-partnered women (aged 15 years and above) multiplied by 100. **4. Any form of physical and/or sexual intimate partner violence:** Number of ever-partnered women (aged 15 years and above) who experience physical and/or sexual violence by a current or former intimate partner in the previous 12 months divided by the number of ever-partnered women (aged 15 years and above) multiplied by 100. **5. Any form of physical, sexual and/or psychological intimate partner violence:** Number of ever-partnered women (aged 15 years and above) who experience physical, sexual and/or psychological violence by a current or former intimate partner in the previous 12 months divided by the number of ever-partnered women (aged 15 years and above) multiplied by 100. NOTE: To assist comparability at the regional and global level, and due to more comparable data available, countries are encouraged to additionally compute the above figures for ever-partnered women aged 15 to 49. Regional and global reporting on this indicator currently only includes data computed by countries for #4 above (i.e., any form of physical and/or sexual partner violence), and for both the 15-49 and the 15 years and older age groups). For further details, see Feasibility section above.

Rationale and interpretation:	Intimate partner violence is the most common form of violence that women face globally. Given prevailing social norms that sanction male dominance over women, male violence towards their female intimate partners is often perceived as an ordinary/normal element of relationships in the context of marriage or other unions. Violence against women is an extreme manifestation of gender inequality. Prevalence data are required to measure the magnitude of the problem; understand the various forms of violence and their consequences; identify groups at high risk; and explore the barriers to seeking help in order to inform that the appropriate responses are being provided. These data are the starting point for informing laws, policies, and developing effective responses and programmes. They also allow countries to monitor change over time and optimally target resources to maximise the effectiveness of interventions (especially in resource-constrained setting). **Concepts:** According to the UN Declaration on the Elimination of Violence against Women (1993), violence against women is "Any act of gender-based violence that results in, or is likely to result in, physical, sexual or psychological harm or suffering to women, including threats of such acts, coercion or arbitrary deprivation of liberty, whether occurring in public or in private life. Violence against women shall be understood to encompass, but not be limited to, the following: Physical, sexual and psychological violence occurring in the family [...]". See here for full definition: https://undocs.org/en/A/RES/48/104 Intimate partner violence against women includes any abuse perpetrated by a current or former partner within the context of marriage, cohabitation or any other formal or informal union. The different forms of violence included in the indicator are defined as follows: 1. Physical violence consists of acts aimed at physically hurting the victim and include, but are not limited to, acts like pushing, grabbing, twisting the arm, pulling hair, slapping, kicking, biting or hitting with a fist or object, trying to strangle or suffocate, burning or scalding on purpose, or threatening or attacking with some sort of weapon, gun or knife. 2. Sexual violence is defined as any sort of harmful or unwanted sexual behavior that is imposed on someone, whether by use of physical force, intimidation or coercion. It includes acts of abusive sexual contact, forced sexual acts, attempted or completed sexual acts (intercourse) without consent (rape or attempted rape), non-contact acts such as being forced to watch or participate in pornography, etc. In intimate partner relationships, sexual violence is commonly operationally defined in surveys as: being physically forced to have sexual intercourse, having sexual intercourse out of fear for what the partner might do or through coercion, and/or being forced to so something sexual that the woman considers humiliating or degrading. 3. Psychological violence consists of any act that induces fear or emotional distress . It includes a range of behaviors that encompass acts of emotional abuse such as being frequently humiliated in public, intimidated or having things you care for destroyed, etc. These often coexist with acts of physical and sexual violence by intimate partners. In addition, surveys often measure controlling behaviours (e.g., being kept from seeing family or friends, or from seeking health care without permission). These are also considered acts of psychological abuse. For a more detailed definition of physical, sexual and psychological violence against women see Guidelines for Producing Statistics on Violence against Women- Statistical Surveys (UN, 2014), and the International Classification of Crime for Statistical Purposes ICCS (UNODC, 2015), and Violence against Women Prevalence Estimates, 2018. Global, regional and national prevalence estimates for intimate partner violence against women and global and regional prevalence estimates for non-partner sexual violence against women (WHO, 2021).

Sources and data collection:	The SDG 5.2.1 Indicator Database comprises data from population-based household surveys representative at the national and/or sub-national level and implementing a methodology that uses act-based questions. All sources date from 2000 onwards. A significant proportion of data, especially for low- and middle-income countries are obtained from the Domestic Violence Module Demographic and Health Surveys (DHS). Some data come from dedicated surveys on violence against women in countries that have implemented, for example, WHO's violence against women survey methodology or other methodologies consistent with international guidelines and best practice. In the case of some higher-income countries, data were also obtained from Crime Victimisation Surveys (CVS).
Comments and limitations:	**Comparability:** The availability of comparable data remains a challenge in this area as many data collection efforts have relied on different survey methodologies, used different definitions of partner or spousal violence e.g. definitions based on severity of acts or type of violence) and recall periods (i.e. lifetime versus past year/12 months – and different definitions of "lifetime"); lack of disaggregation by different forms of intimate partner violence (physical, sexual, psychological) and by different forms of violence and different survey question formulations, used diverse age groups, or used different denominators (e.g. all women [various age ranges], or only ever-married/partnered or currently married/partnered women). The quality of interviewer training also likely varies although this is difficult to quantify. Willingness to discuss experiences of violence and understanding of relevant concepts may also differ according to how the survey is implemented, and the cultural context and this can affect reported prevalence levels. Given the wide variations in methodologies, measurement and quality across studies from different countries statistically adjusted estimates are currently needed to ensure comparability across countries and regions. However, generating estimates are an interim solution and it is important for individual countries to collect robust, internationally comparable, high-quality data that reflect the relevant socioeconomic, political and cultural risk and protective factors associated with the prevalence of violence against women in order to inform appropriate policy responses and programmatic decision-making. As more countries adopt international recommendations and guidelines, including the key elements described in this document, the need for adjustments for estimates for global monitoring will be greatly reduced. **Regularity of data production:** Since 2000, only about 78 countries have conducted more than one survey on violence against women. Obtaining data on violence against women is a costly and time-consuming exercise, whether they are obtained through stand-alone dedicated surveys or through modules in other surveys. Demographic and Health Surveys (DHS), the main source of data for LMICs, are conducted every 5 years or so and dedicated surveys, if repeated, are conducted usually with less periodicity than this. Monitoring this indicator with certain periodicity may be a challenge if sustained capacities are not built and financial resources are not available for regular surveys. At the same time prevalence is unlikely to change from year to year so every 3-5 years is recommended. **Feasibility:** This indicator calls for global reporting on three types of intimate partner violence: physical, sexual, and psychological. While there is global consensus on how physical and sexual intimate partner violence are generally defined and measured, psychological partner violence—which may be conceptualised differently across cultures and in different contexts. This indicator therefore currently reports on physical and/or sexual intimate partner violence only. Efforts are underway by custodian agencies to develop a global standard for measuring and reporting on psychological intimate partner violence. This will enable reporting on the three stipulated types of partner violence in the future.

	Similarly, this indicator calls for global reporting of violence experienced by ever-partnered women aged 15 years and above. A majority of data come from DHS, which typically sample only women aged 15-49, and there is a lack of consistency in the age range of sample populations across other country surveys. For those surveys that interview a sample of women from a different age group, the prevalence for the 15-49 age group is often published or can be calculated from available data. The global indicator therefore currently reports on both violence experienced by ever-partnered women 15-49 years of age and 15 years and older. Given the existing limited availability on violence against women aged 50 years and older, efforts are underway by the custodian agencies to improve the measurement and encourage increased availability of data on violence against women aged 50 years and older. This will enable a better estimating the extent of this problem and understanding the experiences of partner violence for this older age group.
References:	• UN Women (2016). Global Database on Violence against Women. Available at: http://evaw-global-database.unwomen.org/en • United Nations (2014). Guidelines for Producing Statistics on Violence against Women- Statistical Surveys. • United Nations (2015). The World's Women 2015, Trends and Statistics. • United Nations Statistics Division (2022). SDG Indicator 5.2.1. https://unstats.un.org/sdgs/metadata/files/Metadata-05-02-01.pdf • UNODC (2015). International Classification of Crime for Statistical Purposes. • UNSD (2020). Gender Statistics - Dedicated portal for data and metadata on violence against women: http://unstats.un.org/unsd/gender/vaw/ • UNSD (2020). Portal on the minimum set of gender indicators https://gender-data-hub-2-undesa.hub.arcgis.com/ • World Health Organization (2021) Violence against Women Prevalence Estimates, 2018. Global, regional and national prevalence estimates for intimate partner violence against women and global and regional prevalence estimates for non-partner sexual violence against women. Available at: https://www.who.int/publications/i/item/violence-against-women-prevalence-estimates • World Health Organization, Department of Reproductive Health and Research, London School of Hygiene and Tropical Medicine, South African Medical Research Council (2013). Global and regional estimates of violence against women: prevalence and health effects of intimate partner violence and non-partner sexual violence.

5.1.4. Reporting of Violence

Indicator:	**(UMF-65) Proportion of victims of violence in the previous 12 months who reported their victimization to competent authorities or other officially recognized conflict resolution mechanisms**
Source/Origins	**SDG Indicator 16.3.1.**
Definition and method of computation:	Number of victims of violent crime in the previous 12 months who reported their victimization to competent authorities or other officially recognized conflict resolution mechanisms, as a percentage of all victims of violent crime in the previous 12 months **Methodology** Number of victims of violent crime in the previous 12 months who reported their victimization to competent authorities or other officially recognized conflict resolution mechanisms, divided by the number of all victims of violent crime in the previous 12 months (also called the 'crime reporting rate') Both the number of victims of violent crime as well as the number of all victims of violent crime are measured through sample surveys of the general population, most often dedicated crime victimization surveys.

Rationale and interpretation:	Reporting to competent authorities is the first step for crime victims to seek justice: if competent authorities are not alerted, they are not in a condition to conduct proper investigations and administer justice. However, lack of trust and confidence in the ability of the police or other authorities to provide effective redress, or objective and subjective difficulties in accessing them, can negatively influence the reporting behaviour of crime victims. As such, reporting rates provide a direct measure of the confidence of victims of crime in the ability of the police or other authorities to aid and bring perpetrators to justice. Reporting rates also provide a measure of the 'dark figure' of crime, that is the proportion of crimes not reported to the police. Trends in reporting rates of violent crime can be used to monitor public trust and confidence in competent authorities based on actual behaviours and not perceptions. **Concepts:** Competent authorities include police, prosecutors or other authorities with competencies to investigate relevant crimes, while 'other officially recognized conflict resolution mechanisms´ may include a variety of institutions with a role in the informal justice or dispute resolution process (e.g. tribal or religious leaders, village elders, community leaders), provided their role is officially recognized by state authorities
Disaggregation:	Sex, type of crime, ethnicity, migration background and citizenship
Sources and data collection:	Victimisation surveys provide direct information on this indicator, as they collect information on the experience of violent crime and on whether the victim has reported it to competent authorities. Some Member States conduct national crime victimization surveys annually, producing estimate at the city level. UNODC collects data on reporting rates for violent crime through its annual data collection (UN-CTS). The data collection through the UN-CTS is facilitated by a network of over 130 national Focal Points appointed by responsible authorities. **Collection process:** There is a consolidated system of annual data collection on crime and criminal justice (UN- Crime Trends Survey, UN-CTS) which represents the basis of data on intentional homicide, criminal justice outputs, penitentiary statistics and prevalence of victimization. The UN-CTS data collection is largely based on the network of national Focal Points, which are institutions/officials appointed by countries and have the technical capacity and role to produce data on crime and criminal justice (around 130 appointed Focal Points as of 2016). The UN-CTS collects data on reporting rate by victims respectively of "physical assault" and "sexual assault". The current data collection is currently reviewed to collect data on this indicator. Data for SDG monitoring will be sent to countries for consultation prior to publication
Comments and limitations:	The target relates to the multidimensional concepts of rule of law and access to justice and at least two indicators are required to cover the main elements of access to justice and efficiency of the justice system. The indicator 16.3.1 covers an important aspect of victim's access to criminal justice, while it doesn´t cover civil or administrative disputes. The indicator as formulated is a standard indicator widely published when a victimization survey is undertaken, but further work is required to enhance a consistent interpretation and application of this indicator. In particular, some important elements of this indicator needs methodological guidance, such as the type of violent crime to include beyond physical assault; counting rules regarding reporting rates (e.g. prevalence-based, incidence-based, based on last victimization experience) and the type of competent authorities to consider.
References:	• United Nations Statistics Division (2022). SDG Indicator 16.3.1. https://unstats.un.org/sdgs/metadata/files/Metadata-16-03-01.pdf • UNODC (2015). International Classification of Crime for Statistical Purposes • UNODC-UNECE (2010). Manual on Victimization Surveys: https://www.unodc.org/documents/data-and-analysis/Crime-statistics/Manual_on_Victimization_surveys_2009_web.pdf

5.1.5. Bribery

Indicator:	**(UMF-66) Proportion of persons who had at least one contact with a public official and who paid a bribe to a public official, or were asked for a bribe by those public officials, during the previous 12 months**
Source/Origins	**SDG Indicator 16.5.1**
Definition and method of computation:	This indicator is defined as the percentage of persons who paid at least one bribe (gave a public official money, a gift or counter favour) to a public official or were asked for a bribe by these public officials, in the last 12 months, as a percentage of persons who had at least one contact with a public official in the same period. **Methodology** The indicator is calculated as the total number of persons who paid at least one bribe to a public official in the last 12 months, or were asked for a bribe in the same period, over the total number of persons who had at least one contact with a public official in the same period, multiplied by 100.
Rationale and interpretation:	Corruption is an antonym of equal accessibility to public services and of correct functioning of the economy; as such, it has a negative impact on fair distribution of resources and development opportunities. Besides, corruption erodes public trust in authorities and the rule of law; when administrative bribery becomes a recurrent experience of large sectors of the population and businesses, its negative effects have an enduring negative impact on the rule of law, democratic processes and justice. By providing a direct measure of the experience of bribery, this indicator provides an objective metric of corruption, a yardstick to monitor progress in the fight against corruption. **Concepts:** In the International Classification of Crime for Statistical Purposes (ICCS), bribery is defined as: 'Promising, offering, giving, soliciting, or accepting an undue advantage to or from a public official or a person who directs or works in a private sector entity, directly or indirectly, in order that the person act or refrain from acting in the exercise of his or her official duties'. This definition is based on definitions of bribery of national public officials, bribery of foreign public officials and official of international organisations and bribery in the private sector that are contained in the United Nations Convention against Corruption (articles 15, 16, and 21). While the concept of bribery is broader, as it includes also actions such as promising or offering, and it covers both public and private sector, this indicator focuses on specific forms of bribery that are more measurable (the giving and/or requesting of bribes) and it limits the scope to the public sector. The concept of undue advantage is operationalized by reference to giving of money, gifts or provision of a service requested/offered by/to a public official in exchange for a special treatment. This indicator captures the often called 'administrative bribery', which is often intended as the type of bribery affecting citizens in their dealings with public administrations and/or civil servants. For this indicator, public official refers to persons holding a legislative, executive, administrative or judicial office. In the operationalization of the indicator, a list of selected officials and civil servants is used.
Disaggregation:	Recommended disaggregation for this indicator are: age and sex of bribe-givers, type of official, income level of bribe-givers and education attainment of bribe-giver

Sources and data collection:	Data on bribery are sent to UNODC by member states, usually through national UN-CTS Focal Points which in most cases are national institutions responsible for data production in the area of crime and criminal justice (National Statistical Offices, Ministry of Interior, Ministry of Justice, etc.). The primary source of data on the indicator of bribery experience is usually the institution responsible for surveys on corruption/victimisation surveys (National Statistical Office, Anti-Corruption Agency, etc.)
Comments and limitations:	In the experience of several surveys conducted at national and international level, the so-called bribery prevalence rate is defined as the percentage of persons who paid at least one bribe (gave a public official money, a gift or counter favour) to a public official in the last 12 months, as a percentage of persons who had at least one contact with a public official in the same period. In this formulation the share of population who was asked a bribe but did not give it is not included. Available data at national and international level usually refers to this formulation, while the collection of data according to the formulation included in the SDG framework will depend on the adaptation of relevant survey tools and the calculation by national authorities. It is expected that data according to the current definition will become available gradually. On a more general level, it should be noted that this indicator provides solid information on the experience of bribery occurring in the interaction between citizens and the public sector in the context of service delivery/transactions, while it does not cover other forms of corruption, such as ´grand corruption´, trading in influence or abuse of power.
References:	• United Nations Statistics Division (2022). SDG Indicator 16.5.1. https://unstats.un.org/sdgs/metadata/files/Metadata-16-05-01.pdf

5.2. Inclusive City Objective

5.2.1. Direct Participation Structure of Civil Society in Urban Planning and Management

Indicator:	**(UMF-67) Presence of direct participation structure of civil society in urban planning and management that operate regularly and democratically**
Sources/Origins	**Adapted from SDG Indicator 11.3.2.**
Definition and method of computation:	The indicator measures existence of direct participation structures of civil society in urban planning and management at the city level, a scorecard approach will be used to evaluate the available structures for civil society participation in urban planning and management, as evaluated by local experts from government, academia, civil society, and international organizations. The identifications and selection of the local evaluators/experts is to be guided by local urban observatories teams or their equivalents that may be available in many cities. The survey involves a questionnaire with a 4-point Likert scale (strongly disagree, disagree, agree, and strongly agree) issued to measure and test the existence of structures for civil society participation in urban governance and management. The structures are examined through four core elements, in the form of questions: 1. Are there structures for civil society participation in **urban planning**, including design and agreements, that are direct, regular and democratic? 2. Are there structures for civil society participation in local **urban budget decision**-making, that are direct, regular and democratic? 3. Are there structures for civil society **evaluation and feedback on the performance of urban management**, that are direct, regular and democratic? 4. Do these structures promote the **participation of women, young men and women, and/or other marginalized groups?** The evaluators score each of the questions on the Likert Scale, as below: 1 - Strongly disagree, 2 - Disagree, 3 - Agree, 4 - Strongly agree The Likert Scale use the following guidance for grading: • **Strongly Disagree:** There are no structures in place or available structures do not allow civil society participation that is direct, regular or democratic. • **Disagree:** Structures exist that allow civil society participation, but they are only partially direct, regular and democratic; or they are only one of direct, regular or democratic. • **Agree:** Structures exist that allow and encourage civil society participation that is direct and/or regular and/or democratic, but not all three. • **Strongly Agree:** Structures exist that allow and encourage civil society participation that is fully direct, regular and democratic. The value for each of the four elements is computed by averaging the evaluators' score. The overall value for the city involves averaging the scores for the four dimensions.
Concepts	**Democratic participation:** Structures allow and encourage participation of civil society representing across-section of society that allows for equal representation of all members of the community with equal rights for participation and voting. **Direct participation:** Structures allow and encourage civil society accessing and actively engaging in decision-making, without intermediaries, at every stage of the urban planning and management process. **Regular participation:** Structures allow and encourage civil society participation in urban planning and management processes at every stage, and at least every six months.

	Marginalized groups: Groups of people that are not traditionally given equal voice in governance processes. These include, but are not limited to, women, young men and women, low-income communities, ethnic minorities, religious minorities, people with disabilities, the elderly, and sexual and gender identity minorities and migrants. **Structures:** Any formal structure that allows for participation of civil society. This can include, but is not limited to national or local legislation, policy, town council meetings, websites, elections, suggestion boxes, appeals processes, notice period for planning proposals etc. **Civil Society:** The combination of non-governmental organizations, community groups, community-based organizations, regional representative groups, unions, research institutes, think tanks, professional bodies, non-profit sports and cultural groups, and any other groups that represent the interests and wills of the members and wider community. **Urban Management:** The officials, including elected officials and public servants, that are responsible for city-management, across all sectors, such as roads, water, sanitation, energy, public space, land title etc. **Urban Budget decision making:** The process by which money is allocated to various sectors of urban management, including roads, roads, water, sanitation, energy, public space, land title etc. **Urban Planning, including Design and Agreements:** The technical and political process that concerns the development and use of land, how the natural environment is used etc. Design includes over-arching and specific design of public space, as well as zoning and land use definitions. Agreements refer to specific contract/arrangements made with various groups in regard to their land, e.g. Indigenous groups, protected natural environments etc.
Rationale and interpretation:	Civil society and public participation foster a positive relationship between government and the public by communicating effectively and solving the conflicts in a cooperative manner. In many cases when urban planning decisions are made without consultation, the desired results are not achieved and there is a negative impact on society, due to inefficient allocation and use of resources. Ensuring that wide varieties of opinions are considered assists the decision makers with understanding the interlinkages and nature of problems and potential solutions facing different urban settings. Urban development is a reflection of ideology and national institutions. Public participation means a broader consensus is built and this greatly enhances political interaction between citizens and government and enhances the legitimacy of the planning process and the plan itself. A plan is more effective if a broad coalition supports the proposal and works together to deliver it. Civil society and public participation in urban management and governance also shows respect to participants' opinion, needs, aspirations and assets. It can boost their enthusiasm for citizenship and politics and strengthens their influence in urban planning and public life. When conflicting claims and views are considered, there is a much higher possibility that public trust and buy-in increases in the outcome. This has broader implications for building an active, inclusive and equitable society and more inclusive and sustainable urban environments.
Disaggregation:	Potential Disaggregation include: • Disaggregation by city characteristics • By regularity of participation • By nature, and typology of existing structures
Sources and data collection:	The data points for this indicator are easy to populate for cities; as such, surveys are preferred. Cities reporting or preparing to report on this SDG indicator may have this data in the offices supporting SDGs and NUA reporting.

Comments and limitations:	The fact that informed evaluators conduct the evaluation can introduce biases. These biases and discrepancies have been examined in the pilot phases and so far the experiences is that the marginal differences are not as large as we were expecting. Overall, the evaluators' assessments sometimes do not reflect a full analysis of the effectiveness or accessibility of these structures in its totality but gives a local idea of how these evaluators view the inclusiveness and openness on these structures to accommodate the participation of citizens and civil society.
References:	• United Nations Statistics Division (2022). SDG Indicator 11.3.2. https://unstats.un.org/sdgs/metadata/files/Metadata-11-03-02.pdf

5.2.2. Utilization of E-Governance and Digital Governance Tools

Indicator:	**(UMF-68) Utilizing e-governance and citizen-centric digital governance tools by city/Local authority**
Sources/Origins	**Adapted from NUA Monitoring Framework, Indicator No. 75**
Definition and method of computation:	**Rationale** E-governance deals with the relationship and networks within government regarding the usage and application of Information and Communication Technologies (ICTs). It facilitates more efficient, more accountable government and inclusive democracy. In this context, government services can be grouped into: Government-to-Citizen (G2C); Government-to-business (G2B); Government-to-NGO (G2N); Government-to-Government (G2G) and Government-to-Employee (G2E) E-governance (Electronic governance) utilizes information and communication technology (ICT) to deliver government services efficiently and effectively online to citizens, businesses, and other organizations, thus improving government services **Method** It includes a survey with a question and checklist: **Question:** Does your city have self-service portal(s) (official e-government portal) for residents to make payments to the city/local government? Please list all **Checklist:**

If the city has online self-service portals, does it over the following services:	If yes, type 1, if No type 0
Portal authentication	
Personal Data updating	
e-Procurement service	
Address change notification	
e-Payment	
e-Participatory budgeting	
Total score	

The city score is achieved by averaging the checklist scores.

Rationale and interpretation:	E-governance can improve the speed of delivery and transparency of government services, it is beneficial to city governments, city residents, businesses, city employees and non-government organizations. Fast service delivery allows residents and businesses to have more time for productive work. E-governance tools can ensure that government services are delivered transparently. It much easier to hold governments accountable since the speed of delivery of services, including wait times, can be analyzed and action taken to speed up delivery.
Disaggregation:	Required disaggregation for this indicator includes category of services.
Sources and data collection:	City data can be acquired from city portals, and interviews with key informants.
Comments and limitations:	The challenges of e-governance include cyber-crimes such as: denial of service; spoofing, tampering, repudiation, disclosure. Service may therefore be available but with extended downtime; key informants should guide on the efficiency of the offered services.
References:	Department of Economic and Social Affairs. (2018). "United Nations E-Government Survey 2018, Chapter 7: Improve Cities Resilience and Sustainability through e-Government Assessment" United Nations. (2020) NUA Monitoring Framework and related indicators. https://unhabitat.org/sites/default/files/2020/10/nua-monitoring-framework-and-related-indicators_1.pdf

5.2.3. Proportion of Seats Held by Women in Sub-national/Local Governments

Indicator:	**(UMF-69) Proportion of seats held by women in sub-national/local governments**
Source/Origins	**SDG Indicator 5.5.1b**
Definition and method of computation:	Indicator 5.5.1(b) measures the proportion of positions held by women in local government. It is expressed as a percentage of elected positions held by women in legislative/ deliberative bodies of local government. **Methodology** The method of computation is as follows: $$Indicator\ 5.5.1(b) = \frac{(Number\ of\ seats\ held\ by\ women)}{Total\ number\ of\ seats\ held\ by\ women\ and\ men} \times 100$$ **Unit:** %
Rationale and interpretation:	Women's and men's right to exercise their political rights on an equal basis, and at all levels of decision-making, is recognized in the SDGs and enshrined in many human and political rights declarations, conventions and resolutions agreed to by most countries in the world. Indicator 5.5.1(b) measures the degree to which gender balance has been achieved in, and women have equal access to, political decision-making in local government. Indicator 5.5.1(b) complements the Indicator 5.5.1(a) on women in national parliaments, and accounts for the representation of women among the millions of members of local governments that influence (or have the potential to influence) the lives of local communities around the world. All tiers of local government are covered by the indicator, consistent with national legal frameworks defining local government. **Concepts:** **Local government** is one of the sub-national spheres of government and a result of decentralization, a process of transferring political, fiscal, and administrative powers from the central government to sub-national units of government distributed across the territory of a country to regulate and/or run certain government functions or public services on their own.

	The definition of local government follows the 2008 System of National Accounts (SNA) distinction between central, state, and local government (para 4.129). Local government consists of local government units, defined in the SNA as "institutional units whose fiscal, legislative and executive authority extends over the smallest geographical areas distinguished for administrative and political purposes" (para 4.145). What constitutes local government of a given country is defined by that country's national legal framework, including national constitutions and local government acts or equivalent legislation. Each local government unit typically includes a legislative/ deliberative body and an executive body. **Legislative/ deliberative bodies**, such as councils or assemblies, are formal entities with a prescribed number of members as per national or state legislation. They are usually elected by universal suffrage and have decision-making power, including the ability to issue by-laws, on a range of local aspects of public affairs. Executive bodies, consisting of an executive committee or a mayor, may be elected, appointed or nominated and they prepare and execute decisions made by the legislative/ deliberative body. **Elected positions** are the most common manner of selection of local government members. They are selected in local elections, based on a system of choosing political office holders in which the voters cast ballots for the person, persons or political party that they desire to see elected. The category of elected positions includes both elected persons who competed on openly contested seats and persons selected during the electoral processes on reserved seats or through a candidate quota. By comparison, members selected on appointed positions (the least common manner of selection of local government members) are nominated, typically by government officials from higher-ranking tiers of government. Appointed members of local government are more frequent among the leadership positions, such as the heads of the executive body, representatives of specific groups (e.g., women, disadvantaged groups, youth); and temporary committees/delegations/caretakers appointed by government officials when a council has been dissolved.
Disaggregation:	Data on elected positions in legislative/deliberative bodies of local government have to be disaggregated by sex to enable the calculation of the indicator. No additional disaggregation is required for SDG reporting.
Sources and data collection:	**Administrative data based on electoral records** are the main source of data on elected members of local government, and the recommended data source for Indicator 5.5.1(b). Electoral records are produced and upheld by Electoral Management Bodies (EMBs) or equivalent bodies tasked with organizing elections at local level. EMBs are part of the National Statistical System, and often specifically mentioned in the national statistics acts as producers of official statistics. The use of electoral records to measure women's representation in local government and monitoring of Indicator 5.5.1(b) is cost-effective, straightforward and timely. No adjustments or estimates are necessary to transform the administrative information into statistics for monitoring the indicator. The conceptual framework at the basis of Indicator 5.5.1(b) is consistent with the conceptual framework at the basis of local elections, as both are provided by national legal framework. The data used to calculate Indicator 5.5.1(b) refer to information on election winners, disaggregated by sex, and the coverage of the reference population (in this case, the elected officials) should be complete. In countries where the electoral records are electronic and centralized, information on numbers of women and men in elected positions can be made available as soon as the official results of elections are released.

	Two other types of sources of data may be used in the few instances where electoral records are not electronic or not centralized. One additional type of source is also administrative and refers to public administration data available to line ministries overseeing local government. However, its use for statistics may be less straightforward compared to centralized electoral records. The scope of public administration records is beyond the elected positions, and information on women and men in elected positions of local government may be mixed with information on public administration employees, which are not covered by this indicator. Therefore, additional data processing and resources may be required to carefully extract the information needed. In some cases, the forms used as the basis for administrative records may need to be modified to ensure recording of the positions as being elected, in legislative/deliberative bodies, as well as the sex of persons in those positions. In other cases, some elected positions may not be covered in the records maintained, for example, if the administrative records are restricted to only those positions that are on the government payroll. Another type of data source that may provide information on women and men in local government in the absence of centralized electronic election records, refers to existing surveys or censuses using local government units as units of observation. These surveys or censuses may be undertaken by National Statistical Offices and/or line ministries and may take the form of (a) local government censuses or surveys; (b) establishment survey; and (c) municipality surveys. These surveys/census may already include, in the data collection tool dedicated to their main purpose, a few questions on the number of members of local legislative/deliberative and executive bodies by sex and other individual characteristics such as age and education; or may require the integration of such questions. Similar to other censuses and surveys, a low response rate can result in bias of the statistics obtained. Sampling errors may also add to the bias, in ways that cannot be assessed in the absence of a good understanding of distribution of women's and men's representation across different local government units across the territory of a country. **Collection process:** The compilation of data, coordinated by UN Women and undertaken with the support of UN Regional Commissions, uses two mechanisms: • data request forms sent to EMBs and NSOs directly or through UN Regional Commissions • on-line dissemination of data by NSS entities who are the primary source of data or in charge with coordination of SDGs, including EMBs and/or NSOs. This process will be done in a transparent manner, based on communication with NSS focal points, so that the NSS has a chance to validate or dismiss a country's compiled data.
Comments and limitations:	Indicator 5.5.1(b) refers to the representation of women among elected positions of legislative/deliberative bodies of local government. This is a strength, because it ensures comparability across countries, at low cost, and mirrors the SDG indicator measuring women's representation at national level, in parliament. This is also a limitation in that the indicator does not consider other positions in local government. Local government officials holding executive positions who are not simultaneously holding a position within the legislative/deliberative body, or who are appointed and not elected, are not considered in this indicator. It is recommended that women's representation in executive positions, particularly at the level of the head of the executive (such as mayor), is monitored separately at national and global levels, but not as a headline SDG indicator. Importantly, the indicator refers to representation among members of local government and not the quality of their participation. Countries may therefore consider assessing political participation through national or subnational studies involving qualitative and/or quantitative methods of research. Additional indicators of political participation may also be monitored at national level, such as women's share among voters and candidates in local elections, to monitor the closing of other gaps on women's political participation.

	Finally, aspects of local governance beyond the formal institutions of local government, such as public administration staff, are not included in the indicator 5.5.1(b), and may be covered by other indicators in the SDG framework, particularly within the Goal 16 on inclusive societies.
References:	• ECLAC (2016). CEPALSTAT: Databases and statistical publications. http://interwp.cepal.org/sisgen/ConsultaIntegrada.asp?idAplicacion=11&idioma=e (accessed January-April 2016) • European Commission (2016). Database on women and men in decision-making (WMID). http://ec.europa.eu/justice/gender-equality/gender-decision-making/database/index_en.htm (accessed January-April 2016) • European Commission, International Monetary Fund, Organization for Economic Co-operation and Development, United Nations and the World Bank (2009). The 2008 System of National Accounts. • UN Women (2017). Review of National Constitutions and Local Government Acts. Unpublished. • UN Women and UNDP (2015).. Inclusive Electoral Processes: A guide for Electoral Management Bodies on Promoting Gender Equality and Women's Participation. • UNDP (2014). Gender Equality: Women's participation and leadership in governments at the local level. Asia and the Pacific 2013. Bangkok, UNDP. • UNECE, (2016). Public life and decision-making database. http://w3.unece.org/PXWeb2015/pxweb/en/STAT/STAT__30-GE__05-PublicAnddecision (accessed January-April 2016). • United Nations Statistics Division (2022). SDG Indicator 5.5.1b. https://unstats.un.org/sdgs/metadata/files/Metadata-05-05-01b.pdf • United Nations, (2011). Using Administrative and Secondary Sources for Official Statistics: A Handbook of Principles and Practices. UNECE. • UNPAN (United Nations Public Administration Network), (2016). UN Public Administration Glossary. http://www.unpan.org/Directories/Glossary/tabid/1398/language/en-US/Default.aspx (March 2016)

5.2.4. Legal Frameworks for Equality

Indicator:	**(UMF-70) Existence of legal frameworks to promote, enforce and monitor equality and non-discrimination on the basis of sex**
Source/Origins	**SDG Indicator 5.1.1**
Definition and method of computation:	Indicator 5.1.1 measures Government efforts to put in place legal frameworks that promote, enforce and monitor gender equality. The indicator is based on an assessment of legal frameworks that promote, enforce and monitor gender equality. The assessment is carried out by national counterparts, including National Statistical Offices (NSOs) and/or National Women's Machinery (NWMs), and legal practitioners/researchers on gender equality, using a questionnaire comprising 45 yes/no questions under four areas of law: (i) overarching legal frameworks and public life; (ii) violence against women; (iii) employment and economic benefits; and (iv) marriage and family[22]. The areas of law and questions are drawn from the international legal and policy framework on gender equality, in particular the Convention on the Elimination of All Forms of Discrimination against Women (CEDAW), which has 189 States parties, and the Beijing Platform for Action. As such, no new internationally agreed standard on equality and non-discrimination on the basis of sex was needed. The primary sources of information relevant for indicator 5.1.1 are legislation and policy/action plans.

22 The areas of law were agreed at the expert workshop, held on 14 and 15 June 2016, to discuss the methodological development of SDG indicator 5.1.1.

	Methodology The indicator is based on an assessment of legal frameworks that promote, enforce and monitor gender equality using a questionnaire comprising 45 Yes/No questions under four areas of law drawn from the international legal and policy framework on gender equality, in particular, CEDAW and the Beijing Platform for Action. The answers to the questions are coded with simple "Yes/No" answers with "1" for "Yes" and "0" for "No". For questions 1 and 2 only, they may be scored "N/A" in which case they are not included as part of the overall score calculation for the area.[23] The scoring methodology is the unweighted average of the questions under each area of law calculated by: $A_i = \frac{q_1 + \cdots + q_{m_i}}{m_i}$ Where A_i refers the area of law i; m_i refers to the total number of questions under the area of law i;[24] $q_1 + \cdots + q_{m_i}$ refers to the sum of the coded questions under the area of law and where $q_i = "1"$ if the answer is "Yes" and $q_i = "0"$ if the answer is "No". Results of the four areas are reported as percentages as a dashboard: $\langle A_1, A_2, A_3, A_4 \rangle$ The score for each area (a number between 0 and 100) therefore represents the percentage of achievement of that country in that area, with 100 being best practice met on all questions in the area. The choice of presenting all four area scores without further aggregation is the result of adopting the posture that high values in one area in a given country need not compensate in any way the country having low values in some other area, and that a comprehensive examination of the value of those four numbers for each country is potentially more informative than trying to summarize all four numbers into a single index.
Rationale and interpretation:	Equality and non-discrimination on the basis of sex are core principles under the international legal and policy framework, including the Convention on the Elimination of All Forms of Discrimination against Women (CEDAW), which has 189 States parties, and the Beijing Platform for Action. This framework sets out the commitments of States to eliminate discrimination against women and promote gender equality, including in the area of legal frameworks. In the Beijing Platform for Action, States pledged to revoke any remaining laws that discriminate on the basis of sex. The five-year review and appraisal of the Beijing Platform for Action (Beijing + 5) established 2005 as the target date for the repeal of laws that discriminate against women. This deadline has come and gone. While there has been progress in reforming laws to promote gender equality, discrimination against women in the law continues in many countries. Even where legal reforms have taken place, gaps in implementation persist. Removing discriminatory laws and putting in place legal frameworks that advance gender equality are prerequisites to ending discrimination against women and achieving gender equality (Goal 5, Target 5.1). Indicator 5.1.1 will be crucial in accelerating progress on the implementation of SDG 5 and all other gender-related commitments in the 2030 Agenda for Sustainable Development.

23 For questions 1 and 2, the methodology does not attribute a score (positive or negative) to the existence of customary or personal law but does score whether they are subject to constitutional principles of equality or nondiscrimination. Therefore, in countries where customary or personal law does not apply, these questions are scored as "N/A" and are not included as part of the overall score calculation for the area 'overarching legal frameworks and public life'.

24 If a question is coded as "N/A", it will not be counted in the total number of questions in an area of the law.

	Concepts: Article 1 of CEDAW provides a comprehensive definition of discrimination against women covering direct and indirect discrimination and article 2 sets out general obligations for States, in particular on required legal frameworks, to eliminate discrimination against women. Article 1 of CEDAW states: "... the term "discrimination against women" shall mean any distinction, exclusion or restriction made on the basis of sex which has the effect or purpose of impairing or nullifying the recognition, enjoyment or exercise by women, irrespective of their marital status, on a basis of equality of men and women, of human rights and fundamental freedoms in the political, economic, social, cultural, civil or any other field". The term "legal frameworks" is defined broadly to encompass laws, mechanisms and policies/plans to 'promote, enforce and monitor' gender equality. Legal frameworks that "promote" are those that establish women's equal rights with men and enshrine non-discrimination on the basis of sex. Legal frameworks that "enforce and monitor' are directed to the realization of equality and non-discrimination and implementation of laws, such as policies/plans, establishment of enforcement and monitoring mechanisms, and allocation of financial resources.
Sources and data collection:	The data for the indicator are derived from an assessment of legal frameworks using primary sources/ official government documents, in particular laws, policies/action plans. The assessment is carried out by national counterparts, including National Statistical Offices (NSOs) and/or National Women's Machinery (NWMs), and legal practitioners/researchers on gender equality, using a questionnaire comprising 46 yes/ no questions under four areas of law: (i) overarching legal frameworks and public life; (ii) violence against women; (iii) employment and economic benefits; and (iv) marriage and family. The areas of law and questions are drawn from the international legal and policy framework on gender equality, in particular the Convention on the Elimination of All Forms of Discrimination against Women (CEDAW), which has 189 States parties, and the Beijing Platform for Action. • Methodology used by countries for the compilation of the data at the national level: The questionnaires provided to countries include guidance, definitions and instructions. • International recommendations and guidelines: The areas of law and questions are drawn from the international legal and policy framework on gender equality, in particular the Convention on the Elimination of All Forms of Discrimination against Women (CEDAW), which has 189 States parties, (http://www.ohchr.org/EN/HRBodies/CEDAW/Pages/CEDAWIndex.aspx), and the Beijing Platform for Action (http://www.unwomen.org/en/how-we-work/intergovernmental-support/world-conferences-on-women). The attached Methodological Note sets out the international standards supporting the areas of law and questions and also attaches the background paper for the expert workshop which provides a useful summary of the international legal and policy framework on equality and non-discrimination on the basis of sex and the relevance for SDG indicator 5.1.1.
Comments and limitations:	To avoid duplication, the indicator does not cover areas of law that are addressed under indicator 5.a.2, 'Proportion of countries where the legal framework (including customary law) guarantees women's equal rights to land ownership and/or control', and indicator 5.6.2, 'Number of countries with laws and regulations that guarantee full and equal access to women and men aged 15 years and older to sexual and reproductive health care, information and education'. Indicator 5.1.1 complements these other indicators.
References:	• OECD Development Centre (2020): Social Institution and Gender Index: SIGI Dimensions; http://www.genderindex.org/. • United Nations Statistics Division (2022). SDG Indicator 5.1.1. https://unstats.un.org/sdgs/metadata/files/Metadata-05-01-01.pdf

5.2.5. Efficiency in Urban Governance

Indicator:	(UMF-71) Presence of urban governance enhancement frameworks
Origin/Sources	**CPI/Urban Governance Index**
Definition and method of computation:	The availability of urban governance enhancement frameworks measured by 10 sub-indicators. **Methodology** The indicator is measured by assessing the following 1. Presence of a long-term city/urban development plan 2. Presence of a public fund oversight mechanisms 3. Presence of open city/municipal budget and planning data access mechanisms 4. If the city/urban authority has mandate to develop and implement urban plans 5. If the city/urban authority has autonomy and mandate to manage major urban functions, including public transport, social services, utilities, and general urban services 6. If the city/urban authority is engaged in inter-city/municipal engagements 7. If city executive and top decision makers are elected by constituents 8. Right to form civil association. Data for sub-indicator measurements is collected through fact-checking, interviews with key informants, city leaders and residents. For each sub-indicator, the responses are ticked under one of the three categories: 1. Yes 2. Partly 3. No Presentation of the sub-indicators is done on a dashboard and aggregated for indexing.
Rationale and interpretation:	At the core of sustainable urban governance are the principles of subsidiarity, equality, efficiency, transparency, accountability, popular participation and security. Applying these principles means governing and managing cities in a way that enables citizens to exercise their rights and perform their duties, while providing them with an attractive environment in which to live and work. Effective and inclusive urban governance ensures that all urban residents reap the benefits of urbanization, is outcome-oriented and promotes the rights of all people. It reduces poor administration practices, and frameworks ensure that the views and voices of minorities are considered and heard within the decision-making process. These elements are recognized by UN-Habitat Strategic Plan, which notes that that weak institutions and poor governance mechanisms increase the risk of low performance, wasted resources, inefficient sectoral interventions, human rights violations and an overall lack of progress. **Concepts** Urban governance is the sum of the many ways individuals and institutions, public and private, plan and manage the common affairs of the city. There are numerous dimensions of efficient urban governance, and this indicator borrows from different governance frameworks, including the CPI and draft Urban Governance Index, and UN-Habitat's PLGS's proposed governance indicators.
Sources and data collection:	Urban authorities, key informants, city leaders and urban residents
References:	• Connective Cities (2020). (https://www.connective-cities.net/en/topics/good-urban-governance) • UN-Habitat (2004), Urban Governance Index (2004), Global Campaign on Urban Governance, Global Urban Observatory • UN-Habitat (2012). Measurment of City Prosperity, Methodology and Metadata, UN-Habitat: https://unhabitat.org/sites/default/files/2019/02/CPI-METADATA.2016.pdf • UN-Habitat (2020). Policy, Legislation and Governance Section, Annual Report

5.3. Resilient City Objective

5.3.1. Own Source Revenue Collection

Indicator:	(UMF-72) Own source revenue collection
Source/Origins	**CPI**
Definition and method of computation:	Own source revenue as percentage of the total city revenue. **Methodology** The information required can be extracted from local fiscal accounts. It is important to obtain information about the sources of the local revenue. With this information the following proportion has to be calculated: $Own\ Source\ Revenue\ Collection = 100\left[\frac{Own\ source\ revenue}{Total\ local\ revenue}\right]$
Rationale and interpretation:	Decentralization increases the responsibilities of subnational governments in city development. As part of this process, subnational governments, such as cities, must mobilize resources to finance the expenditure needs of their regions (Canavire-Bacarreza et al., 2012). These resources generally comprise own revenue collection, shared revenue and government transfers. Revenue sources must be balanced and controlled, but a large proportion of government transfers generates dependence on these resources and causes most shortages of city's own source revenue. (Bird & Smart, 2002; Bird, 2011). A prosperous city seeks to generate its own source revenue and reduce dependence on government transfers. Greater fiscal autonomy guarantees more expenditure efficiency and can be used as local fiscal performance indicator.
Sources and data collection:	Where, Total Local Revenue includes all revenue collected locally and that which is provided to the local authorities from external sources e.g., central government or external loans or grants (from private sector or international funds) etc. Local Fiscal Accounts.
Comments and limitations:	In some countries, the definition of "own revenue" could be difficult to specify. Nevertheless, this indicator allows for deeper analysis of the meaning of own revenue. It provides information about the capacity of local government to manage and collect its resources (the main own revenue sources at city level are property and vehicle taxes as well as charges and fees – Tax Policy Center).
References:	• Bird, R. & Smart, M. (2002). Intergovernmental fiscal transfers: Lessons from international experience. World Development, 30(6), 899–912 • Bird, R. (2011). Subnational taxation in developing countries: A review of the literature. Journal of International Commerce, Economics and Policy, 2(1), 139-161. • Canavire-Bacarreza, G.; Martínez-Vázquez, J. & Sepúlveda, C. (2012). Sub-national revenue mobilization in Peru. IDB Bank Working Papers Series, 299. • Tax Policy Center (2014). The tax policy briefing book: http://www.taxpolicycenter.org/briefing-book/state-local/revenues/local_revenue.cfm, Accessed August 19, 2014. • UN-Habitat (2012). Measurment of City Prosperity, Methodology and Metadata, UN-Habitat: https://unhabitat.org/sites/default/files/2019/02/CPI-METADATA.2016.pdf

5.3.2. Financial Autonomy

Indicator:	(UMF-73) Financial autonomy
Source/Origins	**NUA – 58**
Definition and method of computation:	Financial decentralization can serve as an effective policy tool for improving the quality and provision of public services, government accountability, and the efficient use of local financial resources. However, to achieve successful financial decentralization, central and local governments must be strategic in how they decentralize financial responsibilities to local governments both in terms of revenue generation and expenditures.

	Moreover, the decentralization of financial authority to subnational governments must consider both the local capacity of municipal governments and the legal and regulatory framework in which they will assume these responsibilities. Delegating local expenditure and revenue generation responsibilities to municipal governments connects the consumers of public goods and services directly with local government officials who determine how public funds are allocated and what tax policies are implemented. If strong institutions, good governance and a supportive legal and regulatory framework are in place, fiscal decentralization can support and enhance municipal finance. (UN-Habitat, 2017). **Methodology** $$\%\ of\ total\ budget\ that\ the\ local\ governments\ have\ discretion\ over\ to\ decide\ on\ priorities = 100\left[\frac{Total\ budget\ that\ the\ local\ governments\ have\ discretion\ over\ to\ decide\ on\ priorities}{Total\ local\ government\ finances}\right]$$ Total local finances = Own source revenue + central government transfers to the local authority + grants and loans from donors, banks etc. + other sources of financial resources Data to be provided at city level and other sub-national levels as appropriate.
Rationale and interpretation:	In the New Urban Agenda (NUA), Member States committed themselves to: support subnational and local governments in their efforts to implement transparent and accountable expenditure control instruments for assessing the necessity and impact of local investment and projects, based on legislative control and public participation, as appropriate, in support of open and fair tendering processes, procurement mechanisms and reliable budget execution, as well as preventive anti-corruption measures to promote integrity, accountability, effective management and access to public property and land, in line with national policies (NUA 138). **Concepts:** A sub-national government, being closer to the people, is, in theory, more capable compared than national governments to meet citizens' preferences and demands in public goods and services. Research generally supports that fiscal decentralization has been linked to a variety of outcomes (World Bank, 2008). Among those are: • Economic growth • Size of government • Changes in public expenditure patterns • Fiscal imbalances • Governance and • Service delivery Financial responsibility is a core component of decentralization. If local governments and private organizations are to carry out decentralized functions effectively, they must have an adequate level of revenues – raised locally or transferred from the central government – as well as the authority to make decisions about expenditures (World Bank, 2001).
Sources and data collection:	Municipal authorities, metropolitan authorities, county governments, district governments. At the national level, all this data from local governments will be aggregated by national focal point nominated by respective governments. The monitoring of the indicator can be annual until 2036.
References:	• UN-Habitat (2017). Finance for City Leaders Handbook -2nd Edition: https://unhabitat.org/books/finance-for-city-leaders-handbook-2nd-edition/ • UN-Habitat (2020). NUA Monitoring Framework and Related Indicators. https://unhabitat.org/sites/default/files/2020/10/nua-monitoring-framework-and-related-indicators_1.pdf

	• World Bank (2001). Intergovernmental Fiscal Relations, http://www1.worldbank.org/publicsector/decentralization/fiscal.htm • World Bank (2008). Fiscal Decentralization, http://web.worldbank.org/archive/website01061/WEB/0__CO-11.HTM

5.3.3. Local Disaster Risk Reduction Strategies

Indicator:	**(UMF-74) City or local authority adoption or implementation of local disaster risk reduction strategies in line with national disaster risk reduction strategies**
Source/Origins	**SDG Indicator 11.b.2**
Definition and method of computation:	The Sendai Framework for Disaster Risk Reduction 2015-2030 was adopted by UN Member States in March 2015 as a global policy of disaster risk reduction. One of the targets is: "Substantially increase the number of countries with national and local disaster risk reduction strategies by 2020". In line with the Sendai Framework for Disaster Risk Reduction 2015-2030, disaster risk reduction strategies and policies should mainstream and integrate disaster risk reduction within and across all sectors, across different timescales and with targets, indicators and time frames. These strategies should be aimed at preventing the creation of disaster risk, the reduction of existing risk and the strengthening of economic, social, health and environmental resilience. The open-ended intergovernmental expert working group on indicators and terminology relating to disaster risk reduction (OIEWG) established by the General Assembly (resolution 69/284) has developed a set of indicators to measure global progress in the implementation of the Sendai Framework, which was endorsed by the UNGA (OIEWG report A/71/644). The relevant SDG indicators reflect the Sendai Framework indicators. **Methodology** A survey is done involving Yes/No responses, investigating whether DRR strategies frameworks exist or are adopted at the city/local level. Reporting may be disaggregated by SEDAI Framework for DRR priorities.
Rationale and interpretation:	Increasing the proportion of local governments that adopt and implement local disaster risk reduction strategies, which the Sendai Framework calls for, will contribute to sustainable development and strengthen economic, social, health and environmental resilience. Their economic, environmental and social perspectives would include poverty eradication, urban resilience, and climate change adaptation.
Sources and data collection:	Sendai Framework Monitor, reported to UNISDR **Collection process:** The national Sendai Framework Focal Points will compile all inputs from their line ministries, NSO, and other entities, if appropriate, and report through the Sendai Framework Monitoring System.
Comments and limitations:	The Hyogo Framework for Action Monitor (HFA Monitor) started in 2007 and over time, the number of countries reporting to UNISDR increased from 60 in 2007 to approximately 100 countries in 2015 undertaking voluntary self-assessment of progress in implementing the HFA. During the four reporting cycles the HFA Monitor has generated the world's largest repository of information on national disaster risk reduction policy inter alia. In 2018 the Sendai Framework Monitor system will launch, and all Member States are expected to report data of the previous year(s).

References:	• PreventionWeb (2020). Hyogo Framework for Action Progress Reports • UNDRR (2017). Report of the Open-Ended Intergovernmental Expert Working Group On Indicators And Terminology Relating To Disaster Risk Reduction [A/71/644] • UNISDR (2017). Technical Guidance for Monitoring and Reporting on Progress in Achieving the Global Targets of the Sendai Framework for Disaster Risk Reduction • United Nations (2016). Report of the open-ended intergovernmental expert working group on indicators and terminology relating to disaster risk reduction • United Nations Statistics Division (2022). SDG Indicator 11.b.2. https://unstats.un.org/sdgs/metadata/files/Metadata-11-0b-02.pdf

5.4. Sustainable City Objective

5.4.1. Registered Births

Indicator:	(UMF-75) Proportion of children under 5 years of age whose births have been registered with a civil authority, by age
Source/Origins	SDG Indicator 16.9.1
Definition and method of computation:	Proportion of children under 5 years of age whose births have been registered with a civil authority. **Methodology** Number of children under the age of five whose births are reported as being registered with the relevant national civil authorities divided by the total number of children under the age of five in the population multiplied by 100
Rationale and interpretation:	Registering children at birth is the first step in securing their recognition before the law, safeguarding their rights, and ensuring that any violation of these rights does not go unnoticed. Children without official identification documents may be denied health care or education. Later in life, the lack of such documentation can mean that a child may enter marriage or the labor market, or be conscripted into the armed forces, before the legal age. In adulthood, birth certificates may be required to obtain social assistance or a job in the formal sector, to buy or prove the right to inherit property, to vote and to obtain a passport. Children's right to a name and nationality is enshrined in the Convention on the Rights of the Child (CRC) under Article 7. **Concepts:** Birth registration: Birth registration is defined as 'the continuous, permanent and universal recording, within the civil registry, of the occurrence and characteristics of births in accordance with the legal requirements of a country'. • Birth certificate: A birth certificate is a vital record that documents the birth of a child. The term 'birth certificate' can refer either to the original document certifying the circumstances of the birth, or to a certified copy or representation of the registration of that birth, depending on the practices of the country issuing the certificate. • Civil authority: Official authorized to register the occurrence of a vital event and to record the required details
Disaggregation:	By sex and age
Sources and data collection:	UNICEF undertakes a wide consultative process of compiling and assessing data from national sources for the purposes of updating its global databases about children. Up until 2017, the mechanism UNICEF used to collaborate with national authorities on ensuring data quality and international comparability on key indicators of relevance to children was known as Country Data Reporting on the Indicators for the Goals (CRING). As of 2018, UNICEF launched a new country consultation process with national authorities on selected child-related global SDG indicators it is custodian or co-custodian to meet emerging standards and guidelines on data flows for global reporting of SDG indicators, which place strong emphasis on technical rigor, country ownership and use of official data and statistics. The consultation process solicited feedback directly from National Statistical Offices, as well as other government agencies responsible for official statistics, on the compilation of the indicators, including the data sources used, and the application of internationally agreed definitions, classification and methodologies to the data from that source. Once reviewed, feedback is made available to countries on whether specific data points are accepted, and if not, the reasons why.

Comments and limitations:	The number of children who have acquired their right to a legal identity is collected mainly through censuses, civil registration systems and household surveys. Civil registration systems that are functioning effectively compile vital statistics that are used to compare the estimated total number of births in a country with the absolute number of registered births during a given period. However, the systematic recording of births in many countries remains a serious challenge. In the absence of reliable administrative data, household surveys have become a key source of data to monitor levels and trends in birth registration. In most low- and middle-income countries, such surveys represent the sole source of this information. Data from household surveys like MICS or DHS sometimes refer only to children with a birth certificate. UNICEF methodically notes this difference when publishing country-level estimates for global SDG monitoring.
References:	**Bibliographic references** • UNICEF (2021). A generation to protect. https://data.unicef.org/resources/a-generation-to-protect/ • UNICEF (2021). Birth Registration. http://data.unicef.org/child-protection/birth-registration.html • United Nations Statistics Division (2022). SDG Indicator 16.9.1. https://unstats.un.org/sdgs/metadata/files/Metadata-16-09-01.pdf

5.4.2. National Urban Policies/ Regional Development Plans

Indicator:	**(UMF-76) Presence of urban policies or regional development plans that: (a) respond to population dynamics, (b) ensure balanced territorial development, (c) increase local fiscal space.**
Source/Origins	**SDG Indicator 11.a.1**
Definition and method of computation:	**National Urban Policies and regional development plans:** A National Urban Policy (NUP) is defined as a coherent set of decisions or principle of actions derived through a deliberate government led process of coordinating and rallying various actors for a common vision and goal that will promote more transformative, productive, inclusive, and resilient urban development for the long term[25]. This standard definition is extended and adapted to country contexts and may include, where applicable terms such as National Urban Plan, Framework, or Strategy as long as they are aligned with the above qualifiers. **Methodology** Develop a policy evaluation framework that assesses and tracks progress on the extent to which national urban policy or regional development plans are being developed and implemented and satisfy the following criteria as qualifiers: a. responds to population dynamics b. ensures balanced regional and territorial development c. increase local fiscal space This process indicator places particular emphasis on the aspect of national and regional development planning that support positive economic, social and environmental links between urban, peri-urban and rural areas. The method to quantify this indicator is based on policy analysis evaluation that can be supported by adopted policies, conventions, laws, government programs, and other initiatives that comprise a national/ regional urban policy.

25 UN-Habitat and Cities Alliance, 2014., The Evolution of National Urban Policy: A global overview

A National /Regional Urban Policy is broadly defined as a coherent set of decisions derived through a deliberate government-led process of coordinating and rallying various actors for a common vision and goal that will promote more transformative, productive, inclusive and resilient urban development for the long term. This standard definition will be extended and adapted to country context and may include where applicable terms such as National Urban Plan, Frameworks, Strategies, etc. as long as they are aligned with the above qualifiers. The policy analysis evaluation will consider the following tools: baseline spatial data mapping, benchmarking, surveys, scorecard, performance monitoring and reporting, gap and content analysis.

With initial support of UN-Habitat, other UN Agencies and partners, the method to calculate this indicator will be further developed, piloted and rolled out at country level. In order to maintain the objectivity and comparability in the policy analysis, four categories of assessment will be used for each qualifier. These categories correspond to a progressive evaluation of the extent that national and regional policies and plans integrate positive elements that contribute to the realization of the Target Further refinement of these 5 categories will be undertaken as necessary.

- **Category 1:** policy document does not make any reference to the qualifier or the country is not developing or implementing a policy.
- **Category 2:** policy document make some reference to the specific qualifier, but this qualifier is not integrated in the diagnosis and recommendations of the policy.
- **Category 3:** policy document integrates the specific qualifier, but this qualifier is poorly understood or misinterpreted.
- **Category 4:** policy document integrates in a cross-cutting perspective the specific qualifier without clear policy recommendations.
- **Category 5:** policy document integrates and mainstreams the specific qualifier with clear policy recommendations derived from the qualifier.

The policy analysis evaluation for each one of these 3 qualifiers (a, b and c) is classified and assessed into one of the five categories described above. Due to the progressive nature of the categories, the score obtained for each of them is as follows:

- **Category 1:** 0 per cent
- **Category 2:** 1-25 per cent
- **Category 3:** 26-50 per cent
- **Category 4:** 51-75 per cent
- **Category 5:** 76-100 per cent

For example (Table 1, the evaluator provides a numeric value based on the category that corresponds to the qualifier analyzed, understanding that only one category per qualifier is selected):

For example (Table 1, the evaluator provides a numeric value based on the category that corresponds to the qualifier analyzed, understanding that only one category per qualifier is selected):

Qualifier	Category 1 0%	Category 2 (1-25%)	Category 3 (26-50%)	Category 4 (51-75%)	Category 5 (76-100%)	Total (max 100 per qualifier)
Qualifier (a) "national urban policies or regional development plans respond to population dynamics"	0	0	40%	0	0	40%

Once that each one of the 3 qualifiers are evaluated as shown in table 1. A summary table gives a final averaged value for the indicator 11.a.1, as the following computation:

Table 2: final computation of the indicator

Qualifier	Category 1 0%	Category 2 (1-25%)	Category 3 (26-50%)	Category 4 (51-75%)	Category 5 (76-100%)	Total (max 100 per qualifier)
Qualifier (a) "national urban policies or regional development plans respond to population dynamics"	0	0	40%	0	0	a = 40 %
Qualifier (b) "national urban policies or regional development plans ensure balanced regional and territorial development'	0	20 %	0	0	0	b = 20 %
Qualifier (c) "national urban policies or regional development plans increase local fiscal space'	0	0	0	75 %	0	c= 75 %

To reduce the bias of subjectivity in the overall assessment, independent policy evaluation will be undertaken by several evaluators. The table below provides a summary of the procedures for computation of the final values.

National urban policy;	Evaluation 1	Evaluation 2	Evaluation 3	Evaluation 4	Average experts score (Ranges 0-100 %)
Qualifier (a) "national urban policies or regional development plans respond to population dynamics"	A1	A2	A3	A4	Qa=(A1+A2+A3+A4)/4
Qualifier (b) "national urban policies or regional development plans ensure balanced regional and territorial development'	B1	B2	B3	B4	Qb=(B1+B2+B3+B4)/4

Qualifier (c) "national urban policies or regional development plans increase local fiscal space'	C1	C2	C3	C4	Qc=(C1+CC2+C3+C4)/4
	Final value of the assessment (Average values from all 3 qualifiers)				**X=(Qa+Qb+Qc)/3**

Countries that fall into categories 2 and 3, which correspond to 1 – 50 percentage points, are not counted as "countries that are developing and implementing a national urban policy or regional developing plans". These countries are encouraged to deploy efforts to improve national urban policies or regional development plans. Countries that fall into categories 4 and 5, which correspond to 51 percentage points or more in the assessment, are considered as "countries that are developing and implementing a national urban policy or regional developing plan" that contribute to the achievement of Target 11.a. Countries that are counted as having national urban policies or regional developing plans can still make efforts to improve the rating of the 3 qualifiers.

Rationale and interpretation:

With most of the mankind currently living in cities, and the number poised to increase further by 2030, the success of SDGs will depend largely on how urbanisation is coordinated and managed. Considering that urbanisation is a tool for development1, many countries are now embarking on the development and implementation of national urban policies as tangible instruments to coordinate stakeholders' efforts, harness the benefits of urbanisation while mitigating its externalities. This particular indicator is very relevant for tracking national progress on all other areas in the SDGs and targets where urban policies are mentioned along with the above 3 qualifiers. This indicator is one of the key metrics to benchmark and monitor urbanisation and asserts the national leadership and political will of national governments. This indicator is based on the notion that the development and implementation of national urban policies should support participation, partnership, cooperation and coordination of actors and facilitate dialogue. National Urban Policy (NUP) and Regional Development Plans (RDP) promote coordinated and connected urban development. A coordinated effort from government through a NUP or RDP provides the best opportunity for achieving sustainable urbanization and balanced territorial development by linking sectorial policies, connecting national, regional and local government policies, strengthening urban, peri-urban and rural links through balanced territorial development. This indicator provides a good barometer on global progress on sustainable national urban policies. It serves as gap analysis to support policy recommendations. The indicator can identify good practices and policies among countries that can promote partnership and cooperation between all stakeholders. This indicator is both process oriented and aspirational and has the potential to support the validation of Goal 11 and other SDGs indicators with an urban component. The indicator has the ability to be applicable at multi jurisdictions levels, i.e covering a number of areas while taking care of urban challenges in a more integrated national manner.

1 UN-Habitat had undertaken assessment of the status of National urban policies in in each country in the following regions: Africa, Asia, Arab States, Latin America, Europe and North America, and the Pacific. The report estimates that less than 50 countries have explicit national urban policy to coordinate the efforts on urban affairs.

The indicator has a strong connection to the target, addressing the fundamental spatial and territorial aspects of national urban policy in the context of urban, peri-urban and rural areas. This indicator epitomises the universality tenet and spirit of the SDGs. It is clearly suitable for all countries and regions and can be disaggregated and/or aggregated by areas of development as explained in the methodology section of this metadata.

	The indicator will be suitable to assess commitment to address urban policy related challenges and respond to the opportunities that urbanization brings. It clearly responds to Goal 11 harnessing the power of urbanisation for the common good. The indicator is strongly connected to other SDGs goals and targets. UN-Habitat had undertaken a comprehensive review of urban policies and the methodology used could form the basis for the Global State of Urban Policy and Scorecard to be published every two years. Based on the baseline developed by UN-Habitat, it would be quite doable to routinely assess the status of national urban policies and ascertain progress made by countries to develop and implement policies based on agreed qualifiers. The work will benefit from various on-going initiatives of policies review and diagnostics undertaken by OECD, UN-Habitat and World Bank. Further methodological work would be needed to identify a list of criteria that have to be satisfied in order to attribute a value to the relevant development-oriented policy (i.e. policies supporting job creation, innovation, land-use efficiency, public space, etc.). **Policy Connections:** This Indicator is related to several Goals and Targets, particularly the following: • **Goal 1:** Poverty Eradication, targets 1.4 and 1.5: land tenure security and resilience • **Goal 2:** Food Security, Nutrition and Agriculture, targets 2.3 and 2.a: land tenure security and urban-rural linkages • **Goal 3:** Gender, target 5.2: safety and 5.a ownership and control over land • **Goal 6:** Water, targets 6.1 and 6.2: access to drinking water and sanitation • **Goal 7:** Energy, targets 7.2 and 7.3: access to renewable energy and energy efficiency • **Goal 8:** Economic Growth and Employment, targets 8.3, 8.5 and 8.6: job creation, decent work and youth unemployment • **Goal 9:** Infrastructure and Industrialization, targets 9.1, 9.4 and 9.a: access to and upgrading and financing infrastructure • **Goal 10:** Reduce inequality – target 10.4 discriminatory laws • **Goal 12:** Sustainable Consumption and Production, target 12.5: waste management • **Goal 13:** Climate Change, target 13.1: resilience and adaptive capacity; 13.b capacity for effective climate change-related planning and management • **Goal 15:** On terrestrial ecosystems; 15.9 By 2020, integrate ecosystem and biodiversity values into national and local planning, development processes, • **Goal 16:** Peaceful Societies and Inclusive Institutions, targets 16.7 and 16.a: governmental subsidiarity and institutional capacity building, 17.b non-discriminatory laws and policies for sustainable development • **Goal 17:** on means of implementation and partnership for sustainable development; 17.14 Policy coherence for sustainable development; 17.17 Effective public, public-private and civil society partnerships, building on the experience and resourcing strategies of partnerships
Disaggregation:	Potential Disaggregation: This indicator could be disaggregated by geographic location and other characteristics relevant in national contexts. For example, national level vs local/state level, city and regional levels. This indicator could be further disaggregated by economic sector (GDP) and Human development Index (HDI). National data collected through assessment could be also aggregated at the regional and global to measure trends. Additional disaggregation will be provided based on the city population sizes covered by the urban policies.

	2 The proposed framework for potential disaggregation should consider that disaggregation has a cost. It is recommended that the level of development and the statistical capacity of countries is taken into consideration. As countries progress in their institutional capacities, further level of disaggregation can be undertaken.
Sources and data collection:	Data Sources: There are several data sources that could be used 1. Official documents such as National Urban Plan, Frameworks, Strategies, etc. available in national or regional administrations. 2. Other supporting tools such as: baseline spatial data mapping, benchmarking, point-of-service surveys, performance monitoring and reporting, gap and content analysis. 3. Database of national urban policies by United Nations3 - and other international organizations, UN-Habitat has developed a National Urban Policy Database as a repository of official urban policies documents and related; UN-Habitat has also developed the UrbanLex, a database of laws and policies on urban matters.
Comments and limitations:	The data for this indicator will be based on the robustness of the assessment framework developed and pilot tested in selected countries Baseline data and benchmarks will build on UN-Habitat work on regional assessments, which need to be validated by key stakeholders. There could be a challenge for consistent and cost-effective data collection and analysis. As the indicator mainly aims to track progress on the number of countries developing and implementing national urban policies, it will not suppose specific judgements of any individual county's policies. It will not be used to produce any global or regional ranking. There might be some limitations in correlating and quantifying the contribution and attribution of urban policy to the overall change and outcomes on the ground. Nevertheless, careful design of the baseline and benchmarking would provide clear indications on the possible impact on urban policy implementation on people's quality of life. Content analysis and opinion surveys could further support any evidence and change observed, but similar methodology needs to be applied.
References:	• OECD (2020). Urban policy and metropolitan reviews: http://www.oecd.org/cfe/regional-policy/urbanmetroreviews.htm • Programme: Nairobi. • UN Habitat (2015), National Urban Policy: A Guiding Framework, United Nations Human Settlements Programme: Nairobi: https://unhabitat.org/national-urban-policy-framework-for-a-rapid-diagnostic/ • UN Habitat (2015), National Urban Policy: Framework for a Rapid Diagnostic, United Nations Human Settlements Programme: Nairobi: https://unhabitat.org/national-urban-policy-framework-for-a-rapid-diagnostic/ • UN Habitat (2017a), National Urban Policy, Arab States Report, United Nations Human Settlements Programme: Nairobi. • UN Habitat (2017b), National Urban Policy, Africa Report, United Nations Human Settlements • UN Habitat (2017c), National Urban Policy, Europe and North America Report, United Nations Human Settlements Programme: Nairobi. • UN Habitat (2018a), National Urban Policy Database, United Nations Human Settlements Programme: Nairobi. Available at: http://urbanpolicyplatform.org/wp-content/uploads/2018/09/13092018NUP-database.pdf • UN Habitat (2018b), National Urban Policy, Latin America and the Caribbean Report, forthcoming, United Nations Human Settlements Programme: Nairobi. • UN Habitat (2018c), National Urban Policy, Asia and the Pacific Report, forthcoming, United Nations Human Settlements Programme: Nairobi.

	• UN-Habitat and OECD (2018), Global State of National Urban Policy, United Nations Human Settlements Programme, Nairobi. Available at: https://unhabitat.org/books/global-state-of-national-urban-policy/ • United Nations Statistics Division (2022). SDG Indicator 11.a.1. https://unstats.un.org/sdgs/metadata/files/Metadata-11-0a-01.pdf

5.4.3. Governance of Culture

Indicator:	(UMF-77) Governance of culture
Source/Origins	**Culture 2030, Indicator 12**
Definition and method of computation:	Checklist of the governance framework to support culture and creativity. Access checklist at UNESCO Culture 2030 Indicators, Table 6(B) Checklist for Governance of Culture – NATIONAL AND URBAN LEVEL, pg. 64. Link: http://uis.unesco.org/sites/default/files/documents/publication_culture_2020_indicators_en.pdf **Methodology** The checklist contains both numeric and Yes/No items.
Rationale and interpretation:	This indicator offers an overall picture of the government policies and regulatory frameworks in place to support a variety of activities in the culture sector, intended to ensure and foster its contribution for economic and social development as well as the decision-making processes in cultural domains. This indicator aims to assess the regulation of the Culture sector and to promote better working and trade conditions for better livelihoods. This indicator aims to assess the degree of development of the governance framework at national/local level for culture in general and by cultural domains specifically (see UNESCO-UIS FCS). A number of basic components have been selected and are classified in 3 major levels: • Institutional and regulatory framework at national/local level. • Management, technical and financial assistance framework. • Mobilization of support.
Sources and data collection:	• UNESCO data: Periodic reports of the 1954, 1970, 1972, 2003, and 2005 Conventions. • National and local sources: Administrative data, Specific national surveys and Information systems for governance culture when available.
Comments and limitations:	Wherever possible, each component (row) should be evaluated for each domain (column) as defined by UIS/FCS. It is clearly understood that this will not be possible for all aspects of the table. For example, certain elements only apply at national rather than urban level. Please note that in each case, 'evidence' in the form of supporting documentation is required. Cultural and natural heritage are inextricably linked; wherever the checklist below considers cultural heritage it should be understood to include natural heritage, as well as considering the impact of cultural activity on the natural environment. Even in urban settings, elements of natural heritage may rely on built heritage for their sustainability.
References:	• UNESCO (2019). Culture 2030 Indicators: http://uis.unesco.org/sites/default/files/documents/publication_culture_2020_indicators_en.pdf

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