11 SUSTAINABLE CITIES AND COMMUNITIES

SDG GOAL 11
MONITORING FRAMEWORK

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A GUIDE TO ASSIST NATIONAL AND LOCAL GOVERNMENTS TO MONITOR AND REPORT ON SDG GOAL 11 INDICATORS

MONITORING FRAMEWORK - DEFINITIONS - METADATA - UN-HABITAT TECHNICAL SUPPORT

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GOAL 11
TARGETS AND INDICATORS

In September 2015, the United Nations Sustainable Development Summit adopted a new framework to guide development efforts between 2015 and 2030, entitled "Transforming our world: the 2030 Agenda for sustainable development".[1]

The 2030 Agenda contains 17 Sustainable Development Goals (SDGs) and 169 targets[2]. The SDGs address, in an integrated manner, the social, economic and environmental dimensions of development, their interrelations, aspects related to peaceful societies and effective institutions, as well as means of implementation (finance, technology, capacity development etc.).[3]

Heads of State and Government also committed to engage in the systematic follow-up and review of the implementation of the 2030 Agenda for Sustainable Development. The follow-up and review will be based on regular, voluntary and inclusive country-led progress reviews at the national level feeding into reviews at the regional and global levels. [4]

By endorsing a stand-alone goal on cities (Goal 11), known as the 'urban SDG', – *make cities and human settlements inclusive, safe, resilient and sustainable* – the international community recognized urbanization and city growth as a transformative force for development. This first-ever international agreement on urban-specific development acknowledges sustainable urban development as a fundamental precondition for sustainable development.

UN-Habitat has prepared this "Monitoring Framework" as a guide to assist national and local governments in their efforts to collect, analyze, validate data and information in view of the preparation of country-based reports. This "Monitoring Framework" provides the use of necessary definitions, method of computation and metadata of indicators, including spatial indicators. It also includes global, national and local monitoring to support the implementation of SDG Goal 11 targets.

The implementation, monitoring and reporting of the SDG Goal 11 will enhance the coordination mechanisms of national and local authorities and in some cases it will represent a drastic change of governance with higher participation of local authorities in this process. National Statistical Systems will be further reinforced to increase their capacity to measure local, national, regional and global targets and indicators in an accurate, reliable and timely manner. These national systems will need to use both conventional and modern forms of data collection, including spatial indicators, to increase the capacity of national and local governments to produce accurate information for evidence-based decision-making.

[1] Critical Milestones towards a coherent, efficient and inclusive follow-up and review of the 2030 Development Agenda for SDGs, United Nations, 12 October 2015.

[2] [http://www.un.org/ga/search/view_doc.asp?symbol=A/69/L.85&Lang=E]

[3] Critical Milestones SDGs, op cit.

[4] Critical Milestones SDGs, op cit.

Goal 11: Make cities and human settlements inclusive, safe, resilient and sustainable

Targets		Proposed indicator
11.1	By 2030, ensure access for all to adequate, safe and affordable housing and basic services and upgrade slums.	Proportion of urban population living in slums, informal settlements, or inadequate housing (*)
11.2	By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons.	Proportion of the population that has convenient access to public transport disaggregated by age group, sex and persons with disabilities (*)
11.3	By 2030, enhance inclusive and sustainable urbanization and capacity for participatory, integrated and sustainable human settlement planning and management in all countries.	Ratio of land consumption rate to population growth rate (*)
		Percentage of cities with a direct participation structure of civil society in urban planning and management which operate regularly and democratically
11.4	Strengthen efforts to protect and safeguard the world's cultural and natural heritage.	Share of national (or municipal) budget which is dedicated to preservation, protection and conservation of national cultural heritage including World Heritage sites (**)
11.5	By 2030, significantly reduce the number of deaths and the number of people affected and substantially decrease the direct economic losses relative to global gross domestic product caused by disasters, including water-related disasters, with a focus on protecting the poor and people in vulnerable situations.	Number of deaths, missing people, injured, relocated or evacuated due to disasters per 100,000 people (**)
11.6	By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management.	Percentage of urban solid waste regularly collected and with adequate final discharge with regards to the total waste generated by the city (*)
		Annual mean levels of fine particulate matter (i.e. PM2.5 and PM10) in cities (population weighted) (*)
11.7	By 2030, provide universal access to safe, inclusive and accessible, green and public spaces, in particular for women and children, older persons and persons with disabilities.	The average share of the built-up area of cities that is open space in public use for all disaggregated by age group, sex and persons with disabilities (*)
		Proportion of women subjected to physical or sexual harassment by perpetrator and place of occurrence (last 12 months) (**)
11.a	Support positive economic, social and environmental links between urban, peri-urban and rural areas by strengthening national and regional development planning.	Number of countries that are developing and implementing a National Urban Policy or Regional Development Plans that (a) respond to population dynamics, (b) ensure balanced territorial development, and (c) increase local fiscal space (**)

11.b	By 2020, substantially increase the number of cities and human settlements adopting and implementing integrated policies and plans towards inclusion, resource efficiency, mitigation and adaptation to climate change, resilience to disasters, and develop and implement, in line with the Sendai Framework for Disaster Risk Reduction 2015-2030, holistic disaster risk management at all levels.	Percentage of cities that are implementing risk reduction and resilience strategies aligned with accepted international frameworks (such as the successor to the Hyogo Framework for Action on Disaster Risk Reduction) that include vulnerable and marginalized groups in their design, implementation and monitoring (**)(****)
11.c	Support least developed countries, including through financial and technical assistance, in building sustainable and resilient buildings utilizing local materials.	Number of jobs in the construction industry of LDCs involved in the manufacture of local building materials, out of the total number of jobs in the construction industry (**)(***)

(*) Shaded Indicators have been classified as 'green' in the second meeting of the Inter-Agency Expert Meeting of the SDGs Indicators held in Bangkok, Thailand, in October 2015. The colour code 'green' means that there are no serious concerns expressed by the member states and there is sufficient clarity on the way they will be implemented.

(**) Some indicators classified as 'grey' denote that they are subject to other ongoing intergovernmental processes (for example, the work of the Open-Ended Intergovernmental Expert Working Group in follow-up to the Sendai Framework for Disaster Risk Reduction), or it means that, whereas members have agreed, in principle to include them, several methodological and conceptual issues need to be clarified and the exact formulation will be finalized after further research in consultation with the relevant international agencies.

(***) Indicators proposed by UN-Habitat and partners, discussed during the December online global consultations

(****) While Target 11.b calls for cities to adopt integrated plans for resource efficiency and mitigation and adaptation to climate change, the indicator as written refers to only part of this equation: risk reduction and resilience strategies. During the 9-15 December 2015 open consultation, a number of stakeholders raised concerns about this indicator as currently formulated. One stakeholder, for example, commented: "It would be important to broaden the focus of this indicator to include mitigation issues...." Other member-States may also share this concern. Likewise we note that, following the 2nd meeting of the IAEG-SDGs in October 2015, UNISDR requested that this indicator remain grey until after the COP-21 Paris Climate Summit. And indeed the Paris Climate Package calls on cities and subnational authorities to "scale up their efforts", even while recognizing "the importance of integrated, holistic and balanced approaches...to... mitigation and adaptation...".

Therefore we propose that this indicator be reformulated, e.g., by adding the following new language (underlined): "Percentage of cities that are implementing integrated plans for mitigation and adaptation to climate change, and/or risk reduction and resilience strategies aligned with accepted international frameworks...."

NEED OF A ROBUST MONITORING FRAMEWORK FOR SDG GOAL 11

A global monitoring framework for Goal 11 – The UN Sustainable Development Solutions Network (SDSN) recognizes that 'data and metrics are essential for development goals to be met'[5]. Data and metrics enable cites to make correct decisions on the best policies and means to track changes and systematically document performance at the outcome level. Cities in developed and developing countries require monitoring systems with clear indicators, baseline data, targets and goals if they are to successfully implement long-term sustainable development plans. Such monitoring systems must be able to track progress and identify setbacks with new approaches and techniques, supporting the formulation of better-informed policies.[6] They must also provide a global monitoring framework that allows cities, countries, and the international community to measure progress and identify possible constraints simultaneously as they adapt to national and local contexts.[7]

Besides monitoring development outcomes, this Monitoring Framework Guide promotes accountability of different actors against agreed targets; stimulates inclusive dialogue on improving the effectiveness of development co-operation; and promotes further agreements on actions.[8]

The **Monitoring Framework** proposes an innovative mechanism to avoid an excessive sectorial approach to development that a linear relationship of one specific indicator and its target may create. Implementing isolated targets without a comprehensive approach to the city may undermine the very basic principle of sustainability. This occurs for example when designing sustainable urban mobility solutions without integrating urban planning and land use regulations. The collection of indicators and information analysis will benefit from the articulation of these variables and indicators.[9] In addition to the presentation of definitions and metadata on specific indicators, this Monitoring Framework proposes a platform with better-integrated information contained in each indicator. This enhances the understanding of the interactions and synergy of all thematic indicators respectively, in order to adopt a citywide approach.[10]

The role of cities and human settlements

The world is becoming increasingly urban. The level of urbanization is rapidly changing with 60 per cent of the world's population expected to live in cities by 2030 and nearly 70 per cent by 2050.[11]

The rapidly increasing dominance of urban areas places the process of urbanization among the most significant global trends of the 21st century. However urbanization is not only a demographic or spatial phenomenon. Rather, it is a force, which, if effectively steered and deployed, can help the world to overcome some of its major global challenges, including poverty, inequality, environmental degradation, climate change, fragility and conflict, which are all critical elements of the 2030 Development Agenda.[12]

The transformative force of urbanization and the role that cities can play have far reaching implications beyond demographic change. While urbanization includes rural-urban migration, proportional increases in the urban population, and the spatial expansion of cities, it also has other very important social, behavioural, political, economic, and environmental dimensions. Urban life influences consumption and production patterns, as well as levels and rates of urban socio-economic activities, growth and development. Furthermore, urban life refers to cognitive processes; the changing of mind-sets in ways that profoundly influence social development and innovation.[13]

[5] Sustainable Development Solutions Network (2014), *Indicators and a monitoring framework for SDGs: Launching a data revolution.*
[6] City Prosperity Initiative, UN-Habitat, brochure.
[7] UN-Habitat (2014), *Urbanization and Sustainable Development: Towards a New Urban Agenda*
[8] Global Partnership for Effective Development Co-operation, *Global Monitoring Framework,* http://www.effectivecooperation.org/about-monitoringframework.html
[9] For example, it is widely recognize and accepted that the planning and implementing of sustainable urban mobility requires sound urban planning mechanism and this entails some form of connection of indicators and targets. Refer to the City Prosperity Initiative framework.
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[10] Refer to UN-Habitat City Prosperity Initiative
[11] United Nations (2014), Urbanization and Sustainable Development: Towards a New United Nations Urban Agenda. (CEB/2014/HLCP-28/CRP.5)
[12] Ibid.
[13] Ibid.

Cities have emerged as the locus for change and the venue where policies are realised. Cities can forge new linkages and pacts among actors, offering innovative solutions that have the potential to influence development agendas at national, regional and global levels.[14] Cities have been catalysts of productivity, technology and infrastructure development, including institutional arrangements that contribute to the enhancement of equity, social inclusion and quality of life.

The outcome document of the United Nations Conference on Sustainable Development, entitled "*The future we want",* recognizes that if well planned and developed, cities can promote economically, socially and environmentally sustainable societies.[15]

Cities can forge new partnerships and local social pacts that can contribute towards strengthening national governments in the face of country and global challenges. The achievement of SDG Goal 11 and other targets heavily depends on local governments and other local stakeholders.

The effective implementation of the 2030 Development Agenda requires better coordination of different levels of government, including national commitment to provide an appropriate legal framework, plus institutional and financial capacity to local governments.[16]

Need to disaggregate information

In many parts of the world, good quality, relevant, accessible and timely data on cities is missing. This is a key element impeding progress in monitoring and reporting, but also in formulating policies that respond to urban dynamics. Not only can data help to track progress towards the SDGs, but it can also help governments, during implementation.[17]

"Data needs improving" – stresses the report *A World that Counts,* prepared as part of the Data Revolution efforts of the UN system.[18] Despite considerable progress in recent years, whole groups of people are not being counted and important aspects of people's lives and city conditions are still not measured.[19] For people, this can lead to the denial of basic rights, and for the city, the likelihood that inhabitants are not taking full advantage of the transformative potential which urbanization offers.

Too often, existing city data is not adequately detailed, documented and harmonized, or worse, it simply is not available for a whole host of critical issues relating to urban growth and development. This obviously greatly impacts the quality of decision-making.

Many governments have already made commitments to 'leave no one behind", thus, data needs to be disaggregated along key dimensions, including age, sex, disability status, social groups, income levels, migratory status, and locations, among others.[20] In this manner, decision makers will be able to reach the most vulnerable, the poor and other excluded people, including places where disadvantages concentrate.

However, disaggregation is expensive and requires additional capacity and the use of adequate technology and manpower. It also requires also the joint efforts of local and national governments to reinforce conventional and modern forms of data collection and analysis.

This Monitoring Framework presents the data disaggregation needs for each indicator in the respective metadata chapters for each Goal 11 indicator.

[14] UN-Habitat (2012), *State of the World's Cities Report 2012: Prosperity of Cities.*
[15] United Nations (2012), *The Future We Want.*
[16] United Nations Development Group (2015) *Localizing the Post 2015 Development Agenda*
[17] Stuart E. Samman E. et all (2014) *The Data Revolution: Finding the Missing Millions,* Development Progress, Research Report 13
[18] UN (2014) *A World that Counts: Mobilizing the data revolution for sustainable development,* www.undatarevolution.org
[19] Text adjusted from the same report.
[20] Note to the Secretary General. Second meeting of the Inter-agency and Expert Group on Sustainable Development Goals Indicators held from 26-28 October 2015 in Bangkok, Thailand. [DESA-15/01237]

Defining urban and the city

SDG Goal 11 – the urban goal – requires a clear definition of what constitutes 'cities', 'urban' and 'human settlements'. Currently governments use definitions that are nationally decided. Despite numerous efforts, however, it is not envisaged that countries would agree on a harmonized, universal, definition of 'urban' in the short term. Instead, when monitoring and reporting on this goal and related indicators, it is very possible that countries will continue to utilize national definitions. These definitions are based on criteria such as population size, population density, proportion of population in non-agricultural occupations, etc.[21]

Having no agreed definition on what constitutes 'urban' and 'cities' will continue to pose methodological problems in terms of comparability and aggregation of values at the regional and global levels. It will certainly distort the measurement of indicators.[22] In order to remedy this, UN-Habitat proposes to measure the 'built-up area of the urban agglomeration', in order to standardize the definition and unit of measurement constituting 'urban areas'. Such as standard definition will prevent inconsistencies arising from the use of different urban definitions, when collecting and analysing information at city and sub-city level. The "urban agglomeration" scale has been widely used as part of the Urban Indicators Programme by UN-Habitat from 2002 to 2010 with very positive results.

According to this definition, the "built-up area of the urban agglomeration" comprises of the city centre and the suburbs, thus forming a continuous urban settlement. However, the following definitions are being used when referring to different scales:

- The **city proper** is the single political jurisdiction, which contains the historical city centre. Working at the **city proper** level provides information that allows for intra-city disaggregation of data and for sub-city analysis.

- The **metropolitan area** is the set of formal local government areas, which typically comprise of the urban area as a whole and its primary commuter areas. In many cases (typical: Paris - region Ile de France), the metropolitan area can be larger than the **built-up settlement** and include rural parts with very low density settlements that cannot be qualified as part of an urban settlement; in other cases (typical: Australian cities), the metropolitan area can be smaller than the actual urban agglomeration. Traditionally, this was the administrative definition, however, the urban settlement has since spread beyond the metropolitan border.

- The **urban agglomeration**[23] is defined as the built-up or densely populated area containing the city proper; suburbs, and continuously settled commuter areas. This may be smaller or larger than the metropolitan area. A single large urban agglomeration may comprise of several cities or towns and their suburban fringes.[24] The delimitation of the **urban agglomeration** refers to the total area occupied by the built-up area and its urbanized open space.

- The **human settlements** term largely corresponds to the locality, as defined in population and housing censuses. It refers to a distinct population cluster (also designated as inhabited place, populated centre and so forth) in which the inhabitants live in neighboring sets of living quarters and that has a name or locally recognized status. It includes fishing hamlets, mining camps, ranches, farms, market towns, villages, towns, cities and many other population clusters that meet the criteria specified above.[25]

The 'built-up area of the urban agglomeration' is used in all indicators that require a physical demarcation or that have a spatial component. For example, Indicator 11.2 on public transport; Indicator 11.3 on efficient land use, measuring the ratio of land consumption rate; Indicator 11.7 about open Public Space. The area of reference for these indicators cannot be replaced with the 'Metropolitan Area' as it would change the scale of analysis, distorting the measurement and eliminating the comparability.

For other urban indicators, when data for the 'Urban Agglomeration' is not available, the recommended scale of analysis is the 'Metropolitan Area'. The change of scale and definition should be indicated in a technical note and attached to the results. As mentioned before, the 'city proper' may be used preferably when conducting sub-city analysis, understanding that this scale and measurement does not constitute the total built-up area of the city.

[21] UN-Habitat (2009) *Urban Indicators Programme Guidelines*, Nairobi.
[22] Comment by the World Bank during the Open consultation to the indicators. 4-7 Nov. 2015

[23] UN-Habitat (2009) *Urban Indicators Programme Guidelines*, Nairobi.
[24] United Nations (1998) *Principles and Recommendations for Population and Housing Censuses*, New York.
[25] http://unstats.un.org/unsd/demographic/sconcerns/housing/publications/Series_N6.pdf

Working with spatial indicators and data

In order to provide 'the right information on the right things and at the right time', there is a need of geospatial data, adequate technology and management systems to complement high-quality official statistics. Spatially disaggregated data provides relevant information for policy makers to decide on local-level allocation of resources and the monitoring of equitable outcomes across and within cities and human settlements. Geospatial information needs to be available quickly enough to ensure that the data cycle matches the decision cycle.

Criterion on the delimitation of urban boundaries and the use of adequate definitions for spatial analysis are needed. This Monitoring Framework provides some of the basic principles and definitions:

- **Delimitation of built-up densities.** In order to delimitate the urban agglomeration, special attention should be paid to the identification of urban, suburban and rural areas based on the built-up densities. The urban agglomeration includes urban (built-up density above 50 percent) and suburban areas (built-up density between 50 to 10 percent). The urban agglomeration should exclude areas below a minimum built-up density of 10 percent that are considered as rural areas.

- **Definition of urban, taking into account size and distance.** The minimum size of the urban land and distance between urban lands are considered as part of the same continuous settlement. In this sense, a rule recommended by the United Nations and used by a number of members states is that areas of urban land of 20 or more hectares that are less than 200 metres apart are linked to form a continuous urban area;[26]

- **Minimum functional relations of the urban land to the city.** Some free-standing settlements may be lying outside the urban area together with tracts of surrounding rural land. However, functionally, they may depend on the urban areas in terms of employment and services. Also, they may be well connected by good road and transportation system to the main urban areas because of that functional relation. These types of land should be integrated to the built-up area of the city.

- **Methodological challenges.** Problems of delimitation and collection of data for the urban agglomeration include deriving urban agglomeration data from different sources such as various municipalities or districts and the non-relational administrative boundaries. Additional methodological problems arise when interpolating or extrapolating city data from various sources and scales of analysis.

In order to work with the urban agglomeration as the reference, there is a need to link the demographic survey information with spatial data. For this, the enumeration areas or higher level subdivisions used for the Census which, together, form the urban agglomeration area (UAA) must be selected. This will be used to aggregate all selected data for the UAA.

[26] UN-Habitat (2009) *Urban Indicators Programme Guidelines*, Nairobi..

MONITORING THE SDG:

UN-HABITAT SUPPORT FOR A COHERENT, EFFICIENT AND INCLUSIVE FOLLOW-UP OF THE URBAN SDGs

Based on the general principles to inform a follow-up and review framework of the 2030 Development Agenda and taking into account discussion papers on this topic[27], UN-Habitat's support and contribution towards the Goal 11 indicators and other SDGs indicators with an urban basis could be as follows:

National Level

A. At the policy and institutional level

1. Assist in the definition of national targets, connecting to global targets, including specific benchmarks and standards at country level.
2. Assist in the strengthening and alignment of institutions and policies to respond to urban SDGs.
3. Assist in the definition and reinforcement of 'means of implementation', supporting the creation of country implementation plans.
4. Advice on the mechanisms integrating national and local planning processes to the urban SDGs, both for implementation and monitoring.
5. Provide technical advisory services on implementation strategies and the localization of indicators at city/urban level, considering:
   a. Identifying key local/territorial stakeholders;
   b. Analyzing and defining roles and functions of local governments and stakeholders
   c. Defining mechanisms and processes for facilitating the implementation process
   d. Analyzing participation and inclusiveness for the implementation process including the definition of local accountability mechanisms;
   e. Involving communities in non-conventional forms of data collection and reporting;
   f. Review short- and long-term outcomes and lesson learned from the process, using a similar framework (City Prosperity Initiative).

B. At the technical and statistical level

6. Reinforce national statistical systems to produce country reports with coherent mechanisms to integrate city data.
7. Provide technical support towards the preparation of national reports including data collection, analysis and compilation, with a special focus on new indicators and spatial data.
8. Assist in the disaggregation of data at sub-regional, city and sub-city level, including other forms of disaggregation as indicated in SDGs documents (by age, sex, disabilities, migrants, etc.)
9. Assist countries in improving periodicity in the national/local review process
10. Assist countries in designing national sample of cities for national reporting, supported by harmonized framework of indicators analysis and monitoring (City Prosperity Initiative)

C. At the training and capacity development level

11. Identify the capacity gaps of relevant institutions, partners and stakeholders at national and local levels, in monitoring SDGs indicators.
12. Provide specialized training and capacity development, including the creation of tools, guidelines and handbooks on data and methods.
13. Assist in the development of strategies of dissemination, including the development of portals online webpage and systems, as well as the visualization of data and information.

D. At the partnership level

14. Support national and local governments in the coordination of national/local actors and stakeholders to ensure the process is inclusive and transparent.
15. Coordinate with the UN system and external partners on leveraging existing statistical programmes and forge partnerships in support of government initiative
16. Collaborate with partners in the execution of the Programme at the local/national level in the area of statistics as per SDG indicators in Goal 11.

Global Level

1. Coordinate the aggregation of data and information for the global monitoring of SDGs, Goal 11 and other indicators with an urban basis, when this is relevant and possible.
2. Assist in the preparation of the "Global Sustainable Development Report" with urban data and information.
3. Assist in the preparation of the "Global Thematic Reports" with urban data and information.
4. Prepare global level reviews.
5. Prepare recommendations for data and the use of data and information for policy formulation.

[27] UN Development Account 10th Tranch, proposal of UN-Habitat – data submissions; Global Task Force of Local and Regional Governments (2015) *Localizing the Post-2015 Development Agenda.*

6. Assist in the preparation of the global component of knowledge sharing for SDGs.
7. Enhance partnership and collaboration with the UN and other partners for the preparation of global reports.
8. Assist in the preparation of lessons learned and policy recommendations based on regional and global reports findings.

Monitoring and reporting at national and local level

Member States are encouraged to measure, monitor and report on the targets of SDG Goal 11 using a proposed framework that will entail enhancing their statistical capacities, and tapping into new and non-traditional data sources for spatial analysis.

While monitoring this indicator, it is recommended that national governments define a national sample of cities based on their own system of cities that is proportionally representative of all sub-regions, sizes of urban settlements and functionality. This will enable countries to report on a nationally representative sample, in order to keep trend analysis, and undertake the longitudinal analysis of urban changes. In addition to this sample, cities are also encouraged to monitor and report on the targets that have an urban dimension in close collaboration with national governments.

Bringing together development and climate change, the SDGs offer the possibility to tackle problems facing local public goods that are key for sustainable urban development, such as: housing, public transport, waste management and air quality, and the provision of public spaces, among others. Moreover, SDGs offer also a great opportunity to connect local and national initiatives in order to address common obstacles and challenges, as well as harness the transformative power that urbanization represents.

The implementation and reporting of the SDGs will require a paradigm shift in governance with renewed participation and involvement of local government. It is estimated that 23 percent of all SDGs indicators have a local or urban component. This represents a great opportunity to advance the urban agenda, but also an immense challenge. Cities cannot and should not act alone. The successful implementation of the SDGs requires promoting the empowerment of civil society, including different economic, social and political actors. It also requires expanding participation and reinforcing collaboration between different levels of government.

Cities need to be ready for this challenge. UN-Habitat has been supporting more than 300 cities across the world to monitor urban development including the proposed indicators and targets of Goal 11 through the **City Prosperity Initiative.**

Global monitoring of SDG 11

Currently, all goals (17) and targets (169) have been already defined and endorsed by Members States.

Indicators of these targets are being discussed and they will be agreed upon in the forthcoming United Nations Statistical Commission (March 2016), as proposed by the technical discussions coordinated by the Inter Agency Expert Group (IA-EG SDGs). The final agreed indicators will constitute the platform for local, national and global monitoring.

Using standardized methods for measurement, it will be possible to compare results across cities and countries. It will also be possible to aggregate them for regional and global monitoring and reporting.

At this stage, it is not clear how national governments will integrate cities in a systematic manner towards the preparation of national reports. Additionally, it is uncertain how reports will create consistency and times series analysis, to ensure uniformity in reporting of same cities over time. Finally, further discussions are warranted on how missing values will be handled in national, regional and global aggregations and progress reports if cities and countries do not collect particular indicators, or they do so in sporadic manner.28

Countries and cities have been presented with the possibility to monitor progress towards targets that are not necessarily global indicators. This would allow them to customize monitoring to a city or country context, as part of the local and national strategic planning and dialogue process.29

The countries that are planning to monitor and report on a consistent set of cities that are representative of their territories, geographies and history can request UN-Habitat to assist them to draw a **National Sample of Cities**.

This sample will be drawn using a stratified technique based on the size of cities, functionality, location and other attributes that reflect a national system of cities. Monitoring and reporting using this sample will allow for better comparability, time series analysis and the possibility to connect data and information to national urban policies. When creating a National Sample of Cities it will be possible to calculate an **un-weighted national average** as well as a **weighted national average** of the overall SDGs Goal 11 indicators on a regular basis.

Using appropriate statistical tools, the results from the sample can then be generalized nationally, for all SDGs indicators with an urban component. They can also be aggregated at national or sub-national level for the refinement of the analysis and the formulation of more appropriated policies.

City Prosperity Initiative: a tool supporting the SDG Goal 11 Monitoring

In 2012, UN-Habitat created a new global monitoring tool to measure sustainability at urban level. The City Prosperity Index was designed based on a holistic, integrated and systemic view of the city. In 2013, the index was transformed into a global initiative that aims to enable local and central governments to make use of data relating to spatial, demographic, economic, social and environmental challenges, including governance issues. It enables city authorities and local stakeholders to identify opportunities and potential areas of intervention in order to formulate better-informed policies.

The City Prosperity Initiative is a composite index made of six dimensions: infrastructure, productivity, quality of life, equity, environmental sustainability and governance. These dimensions and related indicators can be adjusted to specific requests for global and local monitoring.

The CPI has the potential to be a global framework for indicators and targets of Goal 11 – The CPI framework is built based on a sound statistical approach that integrates various indicators to the different dimensions of shared prosperity and sustainability.

The CPI has already been proven in more than 400 cities across the world and as a monitoring framework it has the potential to become the global architecture platform for the monitoring of SDG Goal 11.

Once that the final indicators of the SDGs will be agreed, UN-Habitat and partners can initiate an exercise to adjust the CPI to the SDGs structure. This new CPI framework can integrate all indicators of Goal 11 and a selected number of other SDG indicators that have an urban component. The convergence is already very high and the exercise will be relatively simple.

The CPI will offer the possibility to adopt a city-wide approach to development beyond the sectorial nature of the SDG indicators and, at the same time, it will also offer the possibility of individual disaggregation of indicators. It will also offer the possibility of computing city and country aggregated values.

This Monitoring Framework document will be revised to adjust to the final set of indicators, preparing the definitions and metadata, including a reformulated CPI structure. This will enhance monitoring capacities and will increase the prospects of higher accountability in the implementation of the 2030 development agenda.

Countries that decide to use the CPI will be able to identify, quantify, evaluate, monitor and report on progress made by cities and countries, towards SDG Goal 11 in a more structure manner. UN-Habitat will provide technical assistance as needed. The adoption of this global framework has several advantages:

1. **Adopt a systemic approach of the city.** The CPI offers a holistic view of sustainable urban development. It allows the establishment and understanding of the interrelations of the different dimensions of city development. By using this global framework it is possible to ensure that different SDGs targets and indicators can have a mutually reinforcing effect.

2. **Provide a single value of the state of the city.** As a composite index, the CPI allows the understanding of the state of the city's development in a more integrated manner. This helps local and national governments to visualize how inclusive, safe, resilient and sustainable cities and human settlements are. At the same time, SDGs targets and indicators can be separated in specific metrics and values.

3. **Establish benchmarks for local, national and global monitoring.** The CPI methodology has created specific benchmarks with sound techniques of standardization that enable comparisons among different indicators. This is crucial for the creation of a global monitoring mechanism. National governments can adjust them to specific needs and requirements.

4. **Create baseline data and information.** The adoption of the CPI enables cities to create baseline data and information, which is extremely important to (re) define local targets, propose strategies for improvement, identify setbacks and monitor progress over time.

5. **Establish a global platform for comparability.** The CPI offers a global platform for the comparability of cities from developed and developing countries. This is achieved through the use of indicators that are homologated and grouped by targets.

6. **Identify priorities of sustainable urban development.** The CPI allows disaggregating of the different components of sustainable urban development, making it possible to identify progress or lack of it in the different components of the Goal (inclusion, safety, resilience and sustainability). By isolating targets and components or grouping them, it is possible to adopt appropriate policies and corrective measures.

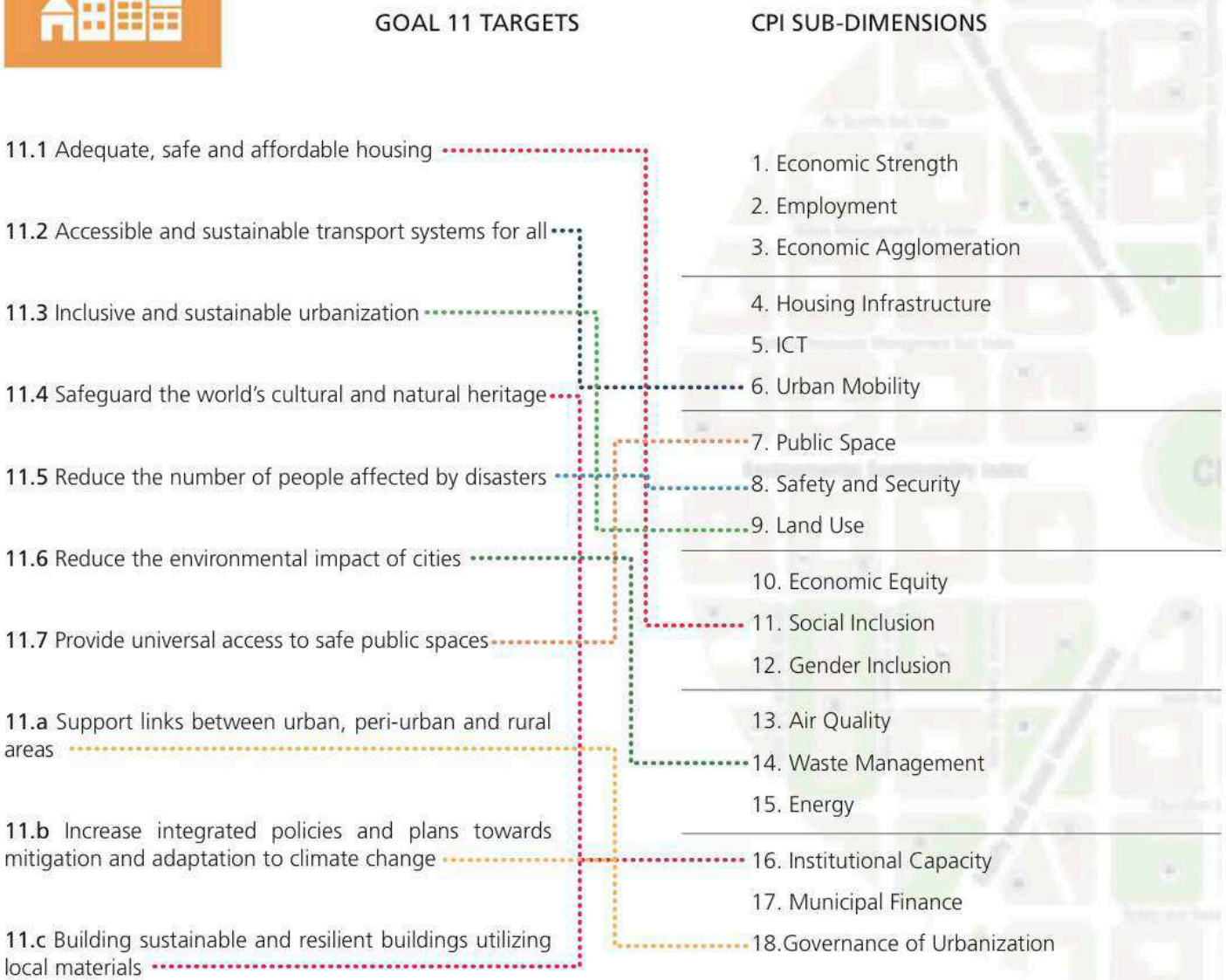
7. **Provides evidence-based for policy-making and accountability.** The CPI is not only a metric; it is also a policy dialogue that is key to support the formulation of better-informed policies and actions, based on accurate data and diagnostics.

8. **Create local/national monitoring mechanisms.** The CPI framework offers the possibility for local and national governments to establish their own monitoring mechanisms, empowering them to monitor and report in a more systematic manner. At the same time, the CPI remains a global monitoring mechanism that allows aggregate data for regional and global reporting.

The CPI is a monitoring framework firmly grounded on established principles and sound statistical practices that enables the tracking of progress and ensures accountability towards the implementation of the 2030 development agenda.

The proposed monitoring framework for Goal 11 of the SDGs using as a basis the CPI as a basis is presented below. Table 1 shows a summary of targets and the proposed indicators.

GOAL 11 and The City Prosperity Initiative



- All 10 targets and indicators of SDG Goal 11 are integrated in the CPI;

UN HABITAT
FOR A BETTER URBAN FUTURE

The SDGs and The City Prosperity Initiative

CPI DIMENSIONS	SDG WITH URBAN BASED TARGETS
PRODUCTIVITY	8.1.1 City product per capita 8.2.1 Growth rate per employment 8.3.1 Informal employment 8.5.2 Unemployment rate 9.2.1 Manifacturing employment
INFRASTRUCTURE	3.6.1 Traffic fatalities 6.1.1 Access to improved water 6.2.1 Access to improved sanitation 7.1.1 Access to electricity 9.c.1 Mobile network coverage 17.8.1 Internet access
QUALITY OF LIFE	15.1.2 Forest (green areas) as a percentage of total land area 16.1.1 Homicide rate 16.1.3 Population subjected to violence
EQUITY AND SOCIAL INCLUSION	1.1.1 Poverty rate 5.5.1 Women in local government 8.5.1 Gender wage gap 8.6.1 Youth unemployment 10.1.1 Growth rate 40%
ENVIRONMENTAL SUSTAINABILITY	3.9.1 Population exposed to outdoor air pollution 6.3.1 Waste water treatment 7.2.1 Share of renewable energy 12.5.1 Solid waste recycling share
GOVERNANCE AND LEGISLATION	9.a.1 Investement capacity 16.6.1 Local expenditure efficiency 17.17.1 Public-private partenrship

- 23% of all SDGs targets that can be measured at the local level are covered by the CPI

METADATA SDG GOAL 11

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

Proposed Indicator 11.1.1

Proportion of urban population living in slums, informal settlements, or inadequate housing

Type of Indicator: Outcome indicator

Methodology:
This indicator integrates the component of the slums/informal settlements that has been monitored for the last 15 years by UN-Habitat in mostly developing countries with a new component - inadequate housing - that applies largely to the developed countries. By integrating these two components, the indicator is now universal and can be monitored in both developing regions.

a) Slum households: Slums households are defined as those that lack one or more of the following: durable housing, sufficient living space, easy access to safe water, access to adequate sanitation and security of tenure[28]. The United Nations (2007) proposed the following definitions.

Access to improved water: A household is considered to have access to improved drinking water if it has sufficient amount of water for family use, which is at least 20 litres per person per day. The following criteria are used to determine the access to improved water:

- Piped connection to house or plot
- Public stand pipe serving no more than 5 households
- Protected spring
- Rain water collection
- Bottle water (new)
- Bore hole
- Protected dug well

Access to improved sanitation: A household is considered to have access to improved sanitation if they have access to:

- Direct connection to public sewer
- Proper flush latrine
- Pit latrine with slab, (this condition has a weight of 50% on total of the criterion)
- Ventilated improved pit latrine
- Direct connection to septic tank

Sufficient living space: A dwelling unit provides sufficient living area for a household if there are fewer than four people per 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 used.

Structural quality/durability of dwellings: A house is considered 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. The following criteria are used to determine the structural quality/durability of dwellings:

- Permanency of Structure
- Compliance with building codes
- The dwelling is not in need of major repair
- The dwelling is not located on or near toxic waste
- The dwelling is not located in a flood plain
- The dwelling is not located in a dangerous right of way (rail, highway, airport, power lines).
- Permanent building material for the walls, roof and floor
- The dwelling is not in a dilapidated state
- The dwelling is not located on a steep slope

[28] Due to lack of comparable data availability, security of tenure has not been yet included in the measurement

- Location of house (hazardous)

Security of tenure: 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.[29] Regardless of the type of tenure, all persons with security of tenure have the legal status against forced eviction, harassment and other threats. Important progress has been made to integrate the measurement of this component into the computation of slums or informal settlements.

b) Adequate housing: In many developed countries, the definition of slums as provided above is less applicable, and hence a component of adequate housing that is more suitable for other regions will be integrated in the measurement framework for this indicator to ensure that the indicator is universal. According to the OHCHR, the definition of adequate housing[30] includes elements of security of tenure, affordability, habitability, availability of services, accessibility, location and cultural adequacy. Several elements that define inadequate housing are integral to the slum conditions as this already includes overcrowding, access to quality sanitation, access to quality water, living in semi-permanent structures, etc.

Legal security of tenure: Regardless of the type of tenure, all persons should possess a degree of security of tenure, which guarantees legal protection against forced eviction, harassment and other threats.
Affordability: Personal or household financial costs associated with housing should not threaten or compromise the attainment and satisfaction of other basic needs (for example, food, education, access to health care).
Habitability: Adequate housing should provide for elements such as adequate space, protection from cold, damp, heat, rain, wind or other threats to health, structural hazards, and disease vectors.
Availability of services, materials, facilities and infrastructure: Housing is not adequate if its occupants do not have safe drinking water, adequate sanitation, energy for cooking, heating and lighting, sanitation and washing facilities, means of food storage, refuse disposal, etc.
Accessibility: 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).
Location: Adequate housing must allow access to employment options, health-care services, schools, child-care centres and other social facilities and should not be built on polluted sites nor in immediate proximity to pollution sources.
Cultural adequacy: Adequate housing should respect and take into account the expression of cultural identity and ways of life.

For the purpose of the measurability of this component, it is recommended that only one of these elements is selected for measurement. Countries with data on all the above elements could measure the full spectrum of the adequate housing as defined above. For measurement purposes, inadequate housing will be measured using affordability only. With the underlying principle being that households' 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. A household will be considered as having inadequate housing if the net monthly expenditure on housing costs exceeds 30% of the total monthly income of the household.

a) Slum households (SH) will be computed as follows

$$SH = 100\left[\frac{Number\ of\ people\ living\ in\ slum}{City\ population}\right]$$

b) Inadequate housing (IH) will be computed as follows:

$$IH = 100\left[\frac{Number\ of\ people\ living\ in\ inadequate\ housing}{City\ population}\right]$$

Unit:
%

Data Sources:
Data can be computed from Census and national household surveys, including DHS and MICS for slum component of the indicator. Data for the inadequate housing can be computed by using income and expenditure household surveys that capture household expenditures.

Scope:
Globally comparable. Reported in nearly all developing countries (slums) and all countries in the world (inadequate housing).

[29] (A/HRC/25/54)
[30] **Legal security**

Frequency:
The monitoring of the indicator can be repeated at regular intervals of 3 years, allowing for five (5) reporting points until the year 2030.

Potential Disaggregation or Quantifiable Derivatives:[31]

Potential Disaggregation:

- Disaggregation by **location** (intra-urban)
- Disaggregation by **income group**
- Disaggregation by **sex, race, ethnicity, religion, migration status** (head of household)
- Disaggregation by **age** (household members)
- Disaggregation by **disability** (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 (3 or more) housing deprivations**
- Proportion of households with (in)**adequate housing (affordability)**

Related SDG Targets / Indicators:

Direct relation

1.1.1	Poverty rate
1.1.2	Poverty rate, national
6.1.1	Access to Improved Water
6.2.1	Access to Improved Sanitation
7.1.1	Access to Electricity
8.3.1	Informal Employment
8.5.2	Unemployment Rate
8.6.1	Youth Unemployment
10.2.1	Population below Median Income
10.1.1	Grow rates of the poorest 40%
11.2.1	Public Transit Stop Coverage
11.5.1	Population Affected by Hazardous Events
11.6.1	Solid Waste Collection
11.7.1	Accessibility to Open Public Area
11.7.2	Public Space Safety for Women
16.1.1	Homicide rate
16.1.3	Population subjected to Violence

Indirect relation

3.1.1	Maternal Mortality
3.2.1	Under-Five Mortality Rate
3.8.1	Vaccination Coverage
3.9.1	Population Exposed to Outdoor Air Pollution
4.2.1	Early Childhood Education Programme
4.3.1	Participation in formal/non-formal education
4.5.1	Parity in Education
4.6.1	Literacy Rate
9.c.1	Mobile Network Coverage
17.8.1	Internet Access

Relevance:
This indicator is extremely relevant since it is partly a continuation of the MDGs. Despite the fact that the target was achieved, the indicator is appropriate since today more than 820 million urban dwellers live in slum-like conditions or informal settlements and the absolute numbers are increasing every year. Slums represent physical deprivation in poor neighbourhoods in developing countries. The indicator is also relevant for developed countries since the 'inadequate housing' was added to the definition to measure other forms of poor housing conditions and different forms of housing deprivation. The indicator is also part of the UN system preparations of the United Nations Housing and Sustainable Urban Development Conference (Habitat III) in view of the preparation of an Issue Paper number 22 on housing.

[31]. 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.

Suitability:
Data on slums is available for all developing countries as it has been reported by UN-Habitat in the SG Reports *The Millennium Development Goals Reports* in a yearly basis. The definition of this indicator and its methodology and metadata was negotiated by Member States as part of the MDGs in various EGMs and endorsed by the UNSC in 2002. [2]

Recently, UN-Habitat has disaggregated information on this indicator at city level, increasing its suitability for the SDGs, Goal 11. This indicator is currently measured in more than 320 cities across the world as part of UN-Habitat City Prosperity Initiative. It is also a key element of the resilience profiling currently underway.

Data on inadequate housing, measured through housing affordability, is available in many countries. UN-Habitat and World Bank computed this indicator for many years (1996-2006) as part of the Urban Indicators Programme. Recently, the Global Housing Indicators Working Group, a collaborative effort of Cities Alliance, Habitat for Humanity International, the Inter-American Development Bank, UN-Habitat and the World Bank, proposed the collection of data on this indicator worldwide.

Feasibility:
The slums component of the indicators was part of MDG 7 "Ensure Environmental Sustainability" that belonged to Target 4 of the MDGs. "Achieve significant improvement in lives of at least 100 million slum dwellers, by 2020".
The indicator has been estimated for the past 15 years as part of the MDG reporting, and its feasibility has been already proven.

UN-Habitat can continue to provide technical support on the estimation of this indicator and its recent use integrating spatial and risk analysis and the disaggregation of the information at city level that is now available.

UN-Habitat collects information related to slums and improved shelter as part of the City Prosperity Initiative (CPI) for various related indicators, such as: i) improved shelter; ii) access to improved water; iii) access to improved sanitation; and iv) overcrowding. Data is being collected for nearly 400 cities around the world. The method of data collection and the use of this information is critical for the understanding of indicator 11.1.1

The inadequate housing component of the indicator has extensive metadata, studies and analysis that can be found in the biographic references.

Limitations:
Gaps in the currently available data for monitoring target 11.1 along with some recommendations of upcoming opportunities for filling such gaps are provided below.

- **Security of Tenure** is not yet fully incorporated in the measurement of slums in all countries due to lack of routine data. Important progress has been made to integrate the measurement of this component into major surveys and censuses in several countries.
- **Adequate housing.** Elements of the right to adequate housing, which include security of tenure, affordability, habitability, availability of services, accessibility, location and cultural adequacy are already included in the measurement of slums. It is recommended that as countries progress in their statistical capacities, more components of the inadequate housing will be measured and reported. In the meantime inadequate housing will be measured using affordability since this data is largely available is several income and expenditure surveys conducted globally. Tools will need to be developed and re-adjusted to capture the other components of inadequate housing.
- The indicator does not capture homelessness, as it cannot be captured by household surveys[32]

Policy Connections:
Slums or informal settlements and inadequate housing are caused by a range of interrelated factors including weak governance – particularly in the area of policy, planning and land management, migration and the movement of people related to urban densification, disaster, conflict and economic vulnerability, climate change, long term poverty and the lack of affordable housing, which is the central aspect of Target 11.1. In this sense, Indicator 11.1.1 has a multipurpose role.

Since 2008, UN-Habitat – in a joint effort with the African, Caribbean and Pacific (ACP) Group of States, the European Commission (EC) have implemented the Participatory Slum Upgrading Programme (PSUP). To date, the programme has reached out to 38 ACP countries and 160 cities, and has provided the necessary enabling framework for improving the lives of at least 2 million slum dwellers.[4]

[32] The indicator should include explicitly homeless persons and capture the multiple dimensions of homelessness.

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[2]: http://unhabitat.org/urban-indicators-guidelines/
[3]: http://mdgs.un.org/unsd/mdg/Metadata.aspx?IndicatorId=0&SeriesId=710,
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Target 11.2
By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons

Proposed Indicator 11.2.1

Proportion of the population that has convenient access to public transport disaggregated by age group, sex and persons with disabilities.

Type of Indicator: Outcome indicator with spatial component

Methodology:

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. Cities that have convenient access to public transport, *including access by persons with disabilities* are more preferred as these are more likely to offer lower transportation costs while improving on the environment, congestion and travel times within the city. At the same time, 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 also helps increase the efficiency and the sustainability of the public transport system. Public transport is a very important equalizer of income, consumption and spatial inequalities.

This indicator will be monitored by the proportion of the population that has convenient access to public transport.

Because most public transport users walk from their trip origins to public transport stops and from public transport stops to their trip destination, local spatial availability and accessibility is sometimes evaluated in terms of pedestrian (walk) access, as opposed to park and ride or transfers.

Hence, the access to public transport is considered **convenien**t when an officially recognized stop is accessible within a distance of 0.5 km from a reference point such as a home, school, work place, market, etc.

Additional criteria for defining public transport that is **convenient** include:

1. 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.
2. Public transport with frequent service during peak travel times
3. Stops presents a safe and comfortable station environment

The following definitions are required for this Convenient access: refers to a distance of 0.5 km from an officially/formally-recognized transport stop.

Public transport is defined as a shared passenger transport service that is available to the general public. It includes cars, buses, trolleys, trams, trains, subways, and ferries that are shared by strangers without prior arrangement. However, it excludes taxis, car pools, and hired buses, which are not shared by strangers without prior arrangement. It also excludes informal, unregulated modes of transport (para-transit), motorcycle taxis, three-wheelers, etc.

Public transport refers to a public service that is considered as a public good that has well designed 'stops' for passengers to embark and disembark in a safe manner and demarcated 'routes' that are both officially and/or formally recognized.

Methodology

a) The identification of service areas is typically achieved using the buffering operation (using GIS) by constructing lines of equal proximity around each public transport stop or each public transport route. The buffering operation clearly involves at least two decisions. The first decision is whether routes or stops should be used as the reference of measurement. The two approaches may lead to very different values of spatial availability. But generally, public transport stops offer a more appropriate basis than routes for estimating service area coverage because stops are the actual locations where public transport users access the system. The other decision involved in the buffering operation is the buffer size. A common practice in public transport planning is to assume that people are served by public transport if they are within 0.5km (or 500 m) of either a public transport route or stop. Once a distance threshold is defined, buffers are created around the public transport features. Some studies measure the distance based on air, or Euclidean, distance, while others use network distance (that is, the walk distance computed using the street network to reach a public transport feature. Since the network distance between two locations in space is greater than, or equal to, the corresponding air distance, the size of a coverage area defined by the network distance will be smaller than, or

equal to, that defined by air distance. Network distance measures are likely to be more realistic because they reflect the configuration of the street network and recognize the presence of any man-made barriers preventing direct access to public transport features. 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. Using travel time is preferable to distance as a measure of proximity because travel time measures account for such 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 rarely used in practice. For this indicator the public transport stop as the point of service will be used.

b) The identification of the population served

Once a service buffer is constructed, the next step is to overlay the buffer onto other polygons, such as census tracts, for which socio-demographic data (such as population figures, disabled persons, type of residence area, etc) is available. We will refer to these polygons as the analysis zones. Typically, a service buffer (denoted as i) intersects, either fully or partially, with more than one analysis zone j (j=1…..J). The population served by the public transport service in buffer i, P_i, is thus equal to the sum of the population in each of the intersecting areas, Pij. Hence

$$P_i=\sum_{j=1}^{J} Pij$$

Where, Pij is estimated based on the amount of interaction between service buffer i and analysis zone j.
In estimating P_{ij} we will assume that the population is uniformly distributed within the analysis zones.

c) 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.

d) Finally, the population with access to public transport out of the entire city population will be computed as;

$$\%\ with\ access\ to\ Public\ transport = 100\ x \frac{population\ with\ convenient\ access\ to\ Public\ transport}{City\ population}$$

Additional methodological comments:
The method to estimate the proportion of the population that has convenient access to public transport is based on **four** steps: 1) spatial analysis to delimit the built-up area of the urban agglomeration 2) inventory of the public transport stops in the city or the service area; 3) estimation of urban area with access to public transport; 4) estimation of the proportion of the population with convenient access out of the total population of the city.

1. **Spatial analysis to delimit the built-up area of the urban agglomeration**. Delimit the built-up area of the urban agglomeration and calculate the total area (square kilometres). Area of delimitation should be aligned with census enumeration areas to match with demographic data.

2. **Inventory of public transport stops**. Information can be obtained from city administration or service providers. In some cases where this information is lacking, incomplete or out-dated, open sources and community-based maps, which are increasingly recognized as a valid source of information, can be a viable alternative.
   2.1 When information is available, characteristics of the quality, universal accessibility for people with disabilities, safety, and frequency of the service can be 'assigned' to the public transport stops' inventory for detailed analysis and further disaggregation according to the statistical capacities of countries and cities.

3. **Estimation of urban area with access to Public Transport.** To calculate the indicator it is necessary to use a map with the inventory of officially-recognized public transport stops and create a buffer area of 500m radius for each stop. Merge and clip with boundary of the boundary built-up area of the urban agglomeration.

4. **Estimation of the proportion of the population with convenient access to public transport out of the total population of the city.** Overlay GIS demographic data on the number of dwellings within the area with access to public

transport stop. Calculate the population within those dwellings. Estimate the proportion of population out of the total population of the city.

Unit:
%

Data Sources:
Data on location of public transport stops in city: city administration or service providers, GIS data
Dwelling units within 500m of public transport stops, Census, GIS data
Number of residents per dwellings unit, Census/household survey
Household surveys that collect information on the proportion of households that declare they have access to public means of transport within o.5 km. These surveys can also collect information about the quality of the service.
Due to its spatial nature, the use of the urban agglomeration is a precondition for the measurement and comparability of this indicator.

Scope:
Measurement for public transport information is currently available for high- and upper-middle- income countries. Although there is a paucity of data from low income countries, the level of data availability for monitoring this indicator is increasingly growing.

Frequency:
The monitoring of the indicator can be repeated at an annual interval, allowing several reporting points until the year 2030.

Monitoring in annual intervals will allow us to determine whether the proportion of the population with **convenient public transport** is increasing significantly over time, as well as what is the share of the global urban population living in cities where the convenient access to public transport is below the acceptable minimum.

The proposed indicator has the potential to measure improvement in short term of time. Moreover, the disaggregated monitoring for this indicator will inform of increasing attention on the access to transport those in vulnerable situations, women, children, persons with disabilities and older persons.

Potential Disaggregation or Quantifiable Derivatives: [33]

Potential Disaggregation:
- Disaggregation by **location** (intra-urban)
- Disaggregation by **income group**
- Disaggregation by **sex** (female-headed household)
- Disaggregation by **race** (head of household)
- Disaggregation by **ethnicity** (head of household)
- Disaggregation by **migratory status** (head of household)
- Disaggregation by **age** (households inhabitants)
- Disaggregation by **mode of public transport**

Quantifiable Derivatives:
- Proportion of **urban area** that has convenient access to public transport.
- 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 urban **central/suburban** area that has convenient access to public transport.

[33] 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.

Related SDG Targets / Indicators:

Direct Direction

1.1.1	Poverty rate	10.2.1	Population below Median Income
1.1.2	Poverty rate, national	11.1.1	Slum Household
3.6.1	Traffic Fatalities	11.3.1	Efficient Land Use
3.9.1	Population Exposed to Outdoor Air Pollution	11.7.1	Accessibility to Open Public Area
		11.7.2	Public Space Safety for Women
4.3.1	Participation in formal/non-formal education	11.6.2	PM2.5 Concentration
		16.1.1	Homicide rate
8.3.1	Informal Employment	16.1.3	Population subjected to Violence
8.5.2	Unemployment Rate		
8.6.1	Youth Unemployment		

Relevance:
Public transport connects and integrates distant parts of the city. Although various forms of mass transit support urban transport needs in the city, organized, high-capacity public transit allows for highly efficient and equitable urban mobility, and supports dense and compact development patterns. An inclusive city seeks to cover most parts of its territory through an adequate public transport network system based on optimal technologies, quality and performance to ensure a more efficient, inclusive, accessible and sustainable system.

This is a very relevant indicator. It is empirically proven that public transport makes cities more inclusive, safe and sustainable. Effective and low-cost transportation is critical for reducing urban poverty and inequalities and enhancing economic development because it provides access to jobs, health care, education services and other public goods.
Clean public transport is a very efficient mean for the reduction of $C0^2$ emissions and therefore it contributes to climate change and lower levels of energy consumption. Most importantly public transport need to be easily accessible to the elderly and disabled citizens.

Suitability:
The indicator is suitable, particularly in the countries/cities where information on transport related services exists. The Target is too broad to measure multiple aspects of urban mobility. The indicator covers three critical aspects of this target: accessible in distance, energy-efficient and the expansion of public transport, with an emphasis on the disaggregation for people with disabilities and other categories. Moreover, in case there is no spatial information on the population location and density, the indicator can measure the proportion of the surface that has access to a public transit stop.

When data is available, potential disaggregation or quantifiable derivatives can cover the different aspects of the target.

As cities/countries evolve in their data collection systems, the indicator could be harmonized to include the elements indicated such as proximity using the street network, frequency and quality of the transport.

Feasibility:
The indicator proposes an innovative mechanism of data collection and analysis. The necessary data for measuring it can be obtained in many cities/countries: (1) geo-coded public transport stops and the number of departures at each stop, and (2) a high resolution GIS layer with population (for example census enumeration areas or a population grid). This data will require collecting it at city level with serious limitations in some places such as data availability on public transit and on transport infrastructure.

The European Commission, on the contrary, considers that “this is a good indicator which can be collected in a relatively straightforward way” (DG REGIO, 2015). The EC document highlights that the indicator was calculated for 80 European cities.

UN-Habitat collects information related to public transport as part of the City Prosperity Initiative (CPI) for 4 related indicators: i) use of public transport; ii) average travel time; iii) length of mass transport network; and iv) traffic fatalities. Data is being collected for nearly 400 cities around the world. The method of data collection and the use of this information is critical for the understanding and the operationalization of indicator 11.2.1

Increasingly, efforts have been made to incorporate initiatives for collaborative mapping for public transit in developing countries, making use of state-of-the-art technology, data collection tools and open data that are aligned with the principles of the Data Revolution. A good example of new collection methods includes Nairobi’s *Digital Matatus initiative*. [3]

Limitations:
As the Outcome Document 2nd Meeting of the Urban SDGs Campaign in Bangalore (12-14 February 2015) recognizes: no internationally agreed methodology exists for measuring convenience and service quality of public transport. Harmonized global/local data on urban transport systems do not exist, nor are they comparable at the world level.

It is recognized that convenience measured as distance does not categorize the quality of the public transport which will vary from country to country. Nevertheless, the proposed indicator is a comparable and objective measurement that can be assessed in cities across regions.
Other factors of this indicator such as affordability, safety, and universal accessibility may influence the usage of public means of mobility beyond proximity to the transport stop. Yet, the provision of widely accessible public transport is a precondition for its usage.
Finally, high –capacity public transport, such as trains, allows for a larger capture area, beyond the 0.5km of the proposed indicator.
We also recognize the various forms of public transport in the member countries that are not fully defined or captured in this methodology. In particular many developing countries have access to public transport that is available anywhere on the streets and not necessarily at designated public transport stops. The creation of designated stops is a precondition of measurement in these countries.

Policy Connection
Despite the increasing level of urban mobility worldwide, access to places, activities and services has become increasingly difficult. Owing to urban sprawl – the horizontal, low-density growth of cities over vast areas – distances between functional destinations such as workplaces, schools, hospitals, administration offices, or shopping amenities have become longer, leading to a growing dependency on private motorized transport and other car-centered mobility. Consequently, widespread congestion and traffic gridlock have now become the norm in many cities, impacting urban life through negative externalities such as pollution, noise stress, and accidents.[2]

In some cities, the physical separation of residential areas from places of employment, markets, schools, and health services force many urban residents to spend increasing amounts of time, and as much as a third of their income, on transportation. Due to transport poverty, many residents cannot afford to travel to the city centres or to areas where businesses and institutions are located, depriving them of the full benefits offered by urbanization.

Addressing the mobility challenge calls for a paradigm shift in urban planning, encouraging compact cities and mixed-land use as a way to increase accessibility and to reduce the need for transportation altogether. Understanding that the purpose of mobility is to gain access to destinations, activities, services and goods, urban planning should therefore be resident-centered, so that functional endpoints – the reasons for travel – are as close as possible to each other, in effect reducing distances and transportation needs.

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[2] http://unhabitat.org/urban-themes/mobility/
[3] http://www.digitalmatatus.com/
[4] http://www.slocat.net/content-stream/187
[5] https://www.jtlu.org/index.php/jtlu/article/view/683/665
[6] http://data.london.gov.uk/dataset/public-transport-accessibility-levels/resource/86bbffe1-8af1-49ba-ac9b-b3eacaf68137/proxy

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

Proposed Indicator 11.3.1
Ratio of land consumption rate to population growth rate – Land use efficiency

Type of Indicator: Outcome indicator with spatial component

Methodology:
The indicator of land-use efficiency measures, and monitors the relationship between land consumption and population growth to enable decision-makers to track and manage urban growth at multiple scales in order to promote orderly urban expansion. Ratio of land consumption rate to population growth rate is a good indicator for measuring land use efficiency and is intended to answer the question of whether the remaining undeveloped urban land is being developed at a rate that is less than, or greater than, the prevailing rate of population growth. With a primary aim of achieving optimal urban land use, a rate of land consumption lower than or equal to the rate of population growth would be desirable. 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, it is necessary 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.

The formula to estimate the land use efficiency will be provide with two stages.
Stage 1: Estimate the population growth rate.

Population Growth rate i.e $PGR = \frac{Pop_{t+n} - Pop_t}{Pop_t} * 100$

Where

t	The initial year under consideration
t+n	The final year under consideration
Pop_t	Total population within the city in the past/initial year
Pop_{t+n}	Total population within the city in the current/final year

The annual percentage growth rate is simply the percent growth divided by Y (the number of years between the two measurements periods).

Stage 2: Estimating the land consumption rate
This rate gives us a measure of compactness, which indicates a progressive spatial expansion of a city.

Land consumption rate i.e $LCR = \frac{Urb_{t+n} - Urb_t}{Urb_t} * 100$

Where

Urb_t Areal extent of the city in Km for past/initial year or if available the exact land area that was developed in past/initial year or the built-up area in square kilometres in the past/initial year

Urb_{t+n} Areal extent of the city in Km for current year or if available the exact land area that is developed in current year or the built-up area in square kilometres in the current year

Where A1= areal extent of the city in Km for past year or if available the exact land area that was developed in past year
A2= areal extent of the city in Km for current year or if available the exact land area in Km that is now fully developed in the current year.

The annual percentage land consumption rate is simply the percent consumption divided by Y (the number of years between the two measurements periods).
The formula to estimate the ratio of land consumption rate to population growth rate (LCRPGR) is provided as follows:

$$LCRPGR = \left(\frac{Land\ Consumption\ rate}{\text{Annual } Populationgrowth\ rate}\right)$$

And the overall formula can be summarized as:

$$LCRPGR = \left(\frac{\left(\frac{Urb_{t+n} - Urb_t}{Urb_t}\right)^{1/y}}{\left(\frac{Pop_{t+n} - Pop_t}{Pop_t}\right)^{1/y}}\right)$$

Where:

t	The initial year under consideration
t+n	The final year under consideration
y	number of years of consideration between the initial and final year
Urb_t	The built-up area in square kilometres in the initial year
Urb_{t+n}	The built-up area in square kilometres in the final year
Pop_t	Total population within the built up area in the initial year
Pop_{t+n}	Total population within the built up area in the final year

The periods for both urban expansion and population growth rates should be at comparable scale.

Unit:
Dimensionless [0-∞]

Data Sources:
Several sources of information are required for this computation: satellite imagery from open sources or exact measurements in km squared of the built up areas or land that is fully developed in Km squared, annual urban population data for the reference years of analysis.

Data for the size of the city land that is currently considered as developed is usually available from the urban planning units of the cities. New options using remote sensing techniques have also been developed to estimate the land that is currently developed or considered as built up areas out of the total city land. This option also accurately extracts land that is considered as wetlands and hence unlikely to be occupied now or in the future.

When the spatial measurement option is used, the use of the urban agglomeration (built-up area) is a precondition for the measurement and comparability of this indicator.

Scope:
Local and global

Frequency:
The monitoring of the indicator can be repeated at regular intervals of 5 years, allowing for three reporting points until the year 2030.

Potential Disaggregation or Quantifiable Derivatives: [34]

Potential Disaggregation:

- Disaggregation by **location** (intra-urban)
- Disaggregation by **income level**
- Disaggregation by **urban typology**

Quantifiable Derivatives

- Population density
- Population density **growth/reduction rate**
- Annual mount of urban expansion (km^2)
- Percentage of urban expansion in relation to the urban footprint area

[34]. 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.

- Percentage of total urban expansion over **agricultural land**
- Percentage of total urban expansion over **forest area**

Related SDG Targets / Indicators:

Direct relation

11.2.1	Public Transit Stop Coverage
11.6.2	PM2.5 Concentration
11.7.1	Accessibility to Open Public Area
11.a.1	Regional Development Plans
15.1.2	Forest area as a percentage of total land area

Indirect relation

3.9.1	Population Exposed to Outdoor Air Pollution	8.5.2	Unemployment Rate
		9.c.1	Mobile Network Coverage
6.1.1	Access to Improved Water	10.1.1	Grow rates of the poorest 40%
6.2.1	Access to Improved Sanitation	10.2.1	Population below Median Income
6.3.1	Waste water treatment	11.1.1	Slum Household
7.1.1	Access to Electricity	11.6.1	Solid Waste Collection
7.2.1	Share of renewable energy	11.7.2	Public Space Safety for Women
8.1.1	City Product per Capita	11.b.1	Disaster Risk Reduction Strategies
8.2.1	Growth rate per employment		

Relevance:

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 by the use of the vehicles, 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 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 this 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. Finally, this indicator integrates an important spatial component and is fully in line with the recommendations made by the Data Revolution initiative.

Suitability:

Data for this indicator is available for all cities and countries (UN DESA population data) and satellite images from open sources. The methodology of this indicator has been extensively applied by several countries and cities as well as other international organizations dealing with land consumption measurements and monitoring.

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).

Feasibility:

Data for this indicator can be easily availed using global and local sources. The indicator has been collected and analyzed since 2000 by several municipalities and countries. Various governments (Mexico, Colombia Brazil, India, Ethiopia, etc., and most European countries) have collected data on this indicator recently.

Eurostat collects data on this indicator using other comparable techniques. World Bank and Lincoln Institute collected data

for 120 cities and published it in the Atlas of Urban Expansion. [02]. Currently UN-Habitat, Lincoln Institute and New York University prepared a similar study for another 200 cities.

UN-Habitat City Prosperity Initiative is collecting data on this indicator for nearly 300 cities as part of the Agency's efforts to integrate spatial analysis in the SDGs.

Limitations:

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. However, the European Commission highlights some possible drawbacks of this indicator that can be technically addressed. Efforts to use the area of reference at the level of the built-up area of the urban agglomeration should be taken into consideration. The delimitation of city boundaries may be another methodological problem that a clear agreed definition can solve.

The indicator may experience difficulties in capturing cities with negative or zero population growth; or cities that due to severe disaster have lost part of their territories. To make face to this challenge, the baseline/benchmark of population density and its change over time must be taken in consideration. Reducing densities below sustainable levels have impacts on the cities' sustainability

In the absence of the GIS data, this indicator may not be computed as defined. As a result, alternative measures for knowing land development or consumption efficiency can be used. In order to monitor the indicator at city level, It is possible to compare average population densities against those achieved in the past; thus, measuring the effective change of densities of the urban agglomeration. However, this method of measurement has the disadvantage of being spatially blind.

Dense cities use land more efficiently. Moreover, high-density neighborhoods - especially in and around urban centres - have a number of other advantages, including leveraging the economies of agglomeration. 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.

Policy Connections:

The indicator of land-use efficiency measures, benchmarks and monitors the relationship between land consumption and population growth to enable decision-makers to track and manage urban growth at multiple scales to promote orderly urban expansion.

When cities grow in endless peripheries with discontinuous forms, high degree of fragmentation and vast interstitial open spaces, residential densities tend to dramatically reduce. This reduction diminishes the capacity of the city to generate economies of scale and agglomeration and prevent the realization of the potential that urbanization offers. Inefficient land use patterns present a major challenge for "making cities inclusive, safe, resilient and sustainable". Often they contribute to the proliferation of cars, the increase in distance travelled and in the length of paved roads, as well in the levels of energy consumption. Inefficient land use result in the leap-frogging of vast areas that leave agricultural enclaves inside the city, placing unnecessary strains on urban service and infrastructure provision. It also alters ecological structures and accelerates the conversion of rural land into urban uses – all of which are environmentally unsustainable.

Empirical studies suggest that when cities spread out of their territories or city limits in a ratio that is higher than the population growth rate (2 to 3 or more times), they tend to increase travel distance, generating various negative externalities such as pollution, traffic congestion and depletion of the protected environment and affecting biodiversity. Poor regulation, lack of control over peri-urban areas, weak planning mechanisms and different forms of land speculation are important factors that explain the excessive spatial expansion of cities that in turn generates high costs of infrastructure provision, higher consumption of energy and more CO^2 emissions; all detrimental for the quality of life in cities.

Dispersed urbanization or urban sprawl increases transport costs. UN-Habitat/CAF study on income and consumption inequalities in more than 300 cities in Latin America proves with compelling evidence that transport for poor communities in distant neighbourhoods, increase on average by 15 per cent. Often these distant neighbourhoods do not have the necessary public goods and amenities that along with the increase in transport costs end up by directly affecting the quality of life of city residents [04]. Sprawling areas both in developed and developing countries are characterized by low-density developments, residential and commercial areas that are spatially separated, overstretched blocks with poor access in the network roads, and lack of well-defined, thriving activity hubs such as 'downtown areas' all detrimental for the quality of life of the city residents and the city as a whole [05].

Finally, in most countries, urban sprawl generates a configuration of the city with contrasting developments: gated rich communities and poor neighbourhoods. This configuration tends to further increase inequalities, with urban areas that concentrate different forms of disadvantages that directly affect quality of life.

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- UN-Habitat (2012) *State of the World's Cities Report: Bridging the Urban Divide*, 2012. Nairobi [5]
- UN-Habitat, CAF (2014) *Construction of More Equitable Cities.* Nairobi [4]
  Smart Growth America, *Measuring Sprawl 2014* [9]
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[3] http://ciczac.org/sistema/docpdf/capacitacion/foro%20sedatu/02.-%20LA%20EXPANSION%20DE%20LAS%20CIUDADES%201980-2010.pdf
[4] http://unhabitat.org/books/construction-of-more-equitable-cities/
[5] http://unhabitat.org/books/state-of-the-worlds-cities-20102011-cities-for-all-bridging-the-urban-divide/)
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Target 11.3
By 2030, enhance inclusive and sustainable urbanization and capacity for participatory, integrated and sustainable human settlement planning and management in all countries

Proposed Indicator 11.3.2 Percentage of cities with a direct participation structure of civil society in urban planning and management which operate regularly and democratically. (**)

Type of Indicator: Outcome indicator

Methodology:

Unit:

Data Sources:

Scope:

Frequency:

Potential Disaggregation or Quantifiable Derivatives:[35]

Potential Disaggregation:
Quantifiable Derivatives:

Related SDG Targets / Indicators:

Relevance:

Suitability:

Feasibility:

Limitations:

Policy Connections:

Bibliographic References:

URL References:
[1]:

[35]. 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.

(**) Indicator classified as 'grey', currently under open consultations

Target 11.4
By 2030, Strengthen efforts to protect and safeguard the world's cultural and natural heritage

Proposed Indicator 11.4.1 Share of national (or municipal) budget which is dedicated to preservation, protection and conservation of national cultural heritage including World Heritage sites (**)

Type of Indicator: Outcome indicator

Methodology:

Unit:

Data Sources:

Scope:

Frequency:

Potential Disaggregation or Quantifiable Derivatives:[36]

Potential Disaggregation:
Quantifiable Derivatives:

Related SDG Targets / Indicators:

Relevance:

Suitability:

Feasibility:

Limitations:

Policy Connections:

Bibliographic References:

URL References:
[1]:

[36]. 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.

(**) Indicator classified as 'grey', currently under open consultations

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

Proposed Indicator 11.5.1

Number of deaths, missing people, injured, relocated or evacuated due to disasters per 100,000 people

Type of Indicator: Outcome indicator

Methodology:[37]
Summation of data on related indicators from national disaster loss databases. Make the sum a relative figure by using global population data (World Bank or UN Statistics information). Relativity is important because population growth (expected to be 9 billion in 2050) may translate into increased hazard exposure of population.

Unit:
#

Data Sources:
National disaster loss database, reported to UNISDR

Scope:
Local - National - Global

Frequency:
Annual. The monitoring of the indicator can be repeated at an annual interval, allowing for several (fifteen) reporting points until the year 2030.

Potential Disaggregation or Quantifiable Derivatives:[38]

Potential Disaggregation:

- Disaggregation by country, by event, by hazard type (e.g. disaggregation by climatological, hydrological, meteorological, geophysical, biological and extra-terrestrial for natural hazards is possible following IRDR classification);
- Disaggregation by age, sex, location of residence and other characteristics (e.g. disability) as relevant and possible. Aggregation of "location of residence": ideally by sub-national administrative unit similar to municipality;
- Disaggregation by death/missing/injured or ill/evacuated/relocated/people whose houses were damaged/people whose houses were destroyed/people who received food relief aid.

Related SDG Targets / Indicators:

Direct relation

1.3 Social Protection Systems
1.5 Resilience of the poor and vulnerable
3.6 Traffic Fatalities
3.9.1 Population Exposed to Outdoor Air Pollution
3d Early warning and risk reduction capacity
15.3.1 Degraded land
13.1 Resilience and Adaptive capacity
14.2 Marine and coastal ecosystems

Related targets in the Sendai Framework for Disaster Risk Reduction 2015-2030:

- Substantially reduce global disaster ***mortality*** by 2030, aiming to lower average per 100,000 global mortality between 2020-2030 compared to 2005-2015.

- Substantially reduce the number of ***affected people*** globally by 2030, aiming to lower the average global figure per 100,000 between 2020-2030 compared to 2005-2015.

Relevance:
Cities around the world, as well as rural populations, witness growing disaster risks. Impacts of climate change on sustainable development are observed through both slow-onset events (e.g. sea level rise, increasing temperatures, ocean acidification, glacial retreat and related impacts, salinization, land and forest degradation, loss of biodiversity and desertification) and extreme weather events. Human loss can be measured by the number of deaths, missing, injured or ill,

[37] Metadata proposed by UNISDR, to be further revised

[38]. 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.

evacuated, relocated, people whose houses were damaged/destroyed and people who received food relief aid as a direct result of the hazardous events.

Cities are some of the most vulnerable areas to natural disasters. Unplanned urban development (e.g. informal settlements, overcrowding, inadequate infrastructures) exacerbates urban vulnerability to climate change impacts and hydro-meteorological and geological hazards.

Suitability:
The indicator will build a bridge between SDGs and the Sendai Framework for Disaster Risk Reduction as the reduction of human related loss is included in the Sendai Framework global targets and will also be monitored under the Sendai Framework Monitoring Mechanism.

This indicator will track human-related loss. The disaster loss data (particularly mortality) is significantly influenced by large-scale catastrophic events, which represent important outliers. UNISDR recommends countries to report the data by event, so complementary analysis can be done by both including and excluding such catastrophic events.

Feasibility:
The proposed indicator will be also used to monitor Sendai Framework global targets and therefore the detailed definitions shall be discussed and agreed in Open-ended Intergovernmental Expert Working Group on Indicators and Terminology on Disaster Risk Reduction, as outlined in Sendai Framework for Disaster Reduction 2015-2030. The Working Group is likely to finalize the discussion and submit the final report to the GA in December 2016.

Limitations:
Double-counting: From practical perspective, double counting of affected people is unavoidable (for example, injured and relocated) in many countries. Minimum double counting is summing "number of injured" and Number of people whose housings were damaged or destroyed. Relocated is sub-set of number of people whose housings were destroyed.

Not every country has a comparable national disaster loss database that is consistent with the UNISDR guidelines (current coverage is 85 countries. Additional 32 countries are expected to be covered in 2015-16). Therefore, by 2020, it is expected that all countries will build/adjust the database according to the UNISDR guidelines and report the data to UNISDR.

Policy Connections:
This proposal is by UNISDR based on experience and knowledge built in the period under the Hyogo Framework for Action (2005-2015). The proposed indicator was further reviewed and examined by other UN agencies including FAO, GFDRR, IOM, UNCCD, UNDP, UNESCAP, UNESCO, UNFPA, UNHCR, UNOCHA, UNOOSA, UNOPS, UNU, UNWOMEN, WHO and WMO (though not all organizations listed here provided comments for this indicator) and submitted to the IAEG process in early-July 2015, then again reviewed by the Technical Expert Group consisting of more than 60 experts from UN system, academic and research, civil sector and private sector in 27-29 July 2015 and submitted and examined by the Member States in the 1st Open-ended Intergovernmental Expert Working Group on Indicators and Terminology on Disaster Risk Reduction held in 29-30 September 2015. The suggested indicator is currently under review by the Member States and UNISDR is receiving written inputs from the Member States.

URL References:

[1]: Sendai Framework for Disaster Risk Reduction 2015-2030:
(http://www.preventionweb.net/files/43291_sendaiframeworkfordrren.pdf)
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Target 11.6
By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management

Proposed Indicator 11.6.1
Percentage of urban solid waste regularly collected and with adequate final discharge with regards to the total waste generated by the city

Type of Indicator:
Outcome Indicator

Methodology:
In order to generate the percentage of urban solid waste regularly collected and that is adequately discharge out of all the total urban waste generated by the city, it will be necessary to define the two components that are core to this indicator i.e. what constitutes urban waste and appropriate final discharge.

A two stage process is proposed for computing this indicator. First cities will have to monitor the total waste generated by the city. Out of this tonnage, they will have to compute the proportion of the waste that was regularly collected from the various sources that generate city waste.

Solid waste regularly collected = Summation in tonnes of all regularly collected waste for all sources

Total solid waste collected = Sum of all waste generated by the city or urban area including collected and uncollected solid waste

At the second stage, cities will have to estimate the proportion of all waste that was regularly collected and was adequately discharged

Adequately discharged solid waste = *Regularly collected Solid waste that is reported as adequately discharged*

$$Solid\ waste\ regularly\ collected\ and\ with\ adequate\ final\ discharge = 100\left[\frac{Adequatelydischarged\ urban\ solid\ waste}{total\ tonnage\ of\ waste\ generated\ by\ the\ city}\right]$$

The following definitions are required for this indicator:

Urban Solid waste or municipal solid waste- is generally composed of waste from households, offices, shops, schools and industries. These include food waste, garden (yard) and park waste, paper and cardboard, wood, textiles, nappies (disposable diapers), rubber and leather, plastics, metal, glass (and pottery and china), health-care waste, electronic waste (such as discarded computers, printers, mobile phones, TVs and refrigerators) and refuse such as ash, dirt, dust, soil construction and demolition waste. It excludes waste water [1]. The aggregate tonnes of all the solid waste from all the sources mentioned above give us the total solid waste generated by the city.

Regularly collected waste refers to waste that is routinely collected from specific addresses or central locations that could be either households/housing units, offices, industrial sites, or designated garbage collection points that serve a given location. Collection of waste is sometimes done by municipal authorities or private contractors with a regular schedule of the day of the week and time of collection.

Adequate final discharge: refers to waste that is composted or disposed either in sanitary landfills, incineration sites or in regulated recycling facilities. It excludes solid waste that is incinerated and burned openly or disposed to open dumb. Adequate final discharge may also include the key procedures of identifying the type and nature of the waste, evaluating the appropriate discharge mechanism for such waste e.g. radioactive materials, and managing the waste according to applicable international or locally adopted guidance.

Recycling is defined as any reprocessing of 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. Direct recycling within industrial plants at the place of generation should be excluded. [5]

Composting is defined as a biological process that submits biodegradable waste to anaerobic or aerobic decomposition, resulting in a product (compost) that is added to soil to improve fertility [5].

Incinerating is thermal treatment of waste during which chemically fixed energy of combusted matters is transformed into thermal energy. Combustible compounds are transformed into combustion gases leaving the system as flue gases. Incombustible inorganic matters remain in the form of slag and fly ash. Incinerating includes incinerating with or without energy recovery [5].

Landfilling is defined as depositing waste into or onto land, in a controlled manner. It includes specially engineered landfill and temporary storage of over one year on permanent sites. The definition covers both landfill in internal sites (i.e. where a generator of waste disposes of its own waste at the place of generation) and in external sites. Landfill waste includes all amounts going to landfill either directly or after sorting and/or treatment. Controlled landfilling requires submission to a permit system and technical control procedures in compliance with the national legislation in force [5].

Unit:
%

Data Sources:
The following data is necessary to estimate this indicator:

- Solid Waste generated by households or offices or industrial sites within the cities with regular waste collection service
- Volume or tonnage of waste collected that has adequate final discharge
- Total solid waste generated by the city and/or estimated per capita waste generation

Scope:
Local solid waste management plans, local authorities.

Frequency:
Annual. The monitoring of the indicator can be repeated at an annual interval, allowing for several (fifteen) reporting points until the year 2030.

Potential disaggregation or Quantifiable Derivatives: [39]

- Disaggregation by **location** (intra-urban)
- Disaggregation by **Income group**
- Disaggregation by **source of waste generation e.g. residential, industrial, office, etc.**
- Disaggregation by type of **final discharge**

Quantifiable Derivatives:

- Percentage of households with regular waste collection service
- Percentage of waste collected that has adequate final discharge
- Total solid waste generated by the city
- Waste generation per capita

Related SDG Targets / Indicators:

Direct Relation

2.2.2	Prevalence of Wasting
3.2.1	Under-Five Mortality Rate
3.9.1	Population Exposed To Outdoor Air Pollution
6.1.1	Access to Improved Water
6.2.1	Access to Improved Sanitation
6.3.1	Waste Water Treatment
6.3.2	Water Bodies with Good Ambient Water Quality
6.6.1	Fresh Water Ecosystem Change
11.1.1	Slum Household
11.5.1	Population Affected By Hazardous Events
11.7.1	Accessibility to Open Public Area
11.b.1	Disaster Risk Reduction Strategies
12.3.1	Global Food Loss Index
12.5.1	Solid Waste Recycling Share

Indirect Relation

8.3.1	Informal Employment
6.b.1	Participation in Water and Sanitation Management
8.5.2	Unemployment Rate
9.2.1	Manufacturing Employment
14.3.4	Marine Acidity

[39] 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.

Relevance:
Waste collection is the collection and transportation of waste to the place of treatment or discharge by municipal services or similar institutions, or by public or private corporations, specialized enterprises or general government (United Nations, 1997).
A prosperous city seeks to collect and manage appropriately all its solid waste and improve standards of living, cleanliness and hence decrease the chances of having disease outbreaks related to the improper management of waste.

Urban households and businesses produce substantial amounts of solid waste, including industrial, construction and hazardous waste that must be collected regularly and disposed-off properly in order to maintain healthy and sanitary living conditions. Such waste collection is available through formal or informal means. Uncollected and improperly managed solid waste can end up in drains and dumps leading to blocked drainages and cause unsanitary conditions. Vectors such as mosquitos usually breed in blocked drainages and dumps that are not well managed. In summary, waste collection management is intended to reduce adverse effects of waste on health, the environment or aesthetics, and the entire ecosystems that support the city or urban area.

Suitability:
Many cities generate more solid waste than they can dispose of. Even when municipal budgets are adequate for collection, the safe disposal of collected wastes often remains a problem. Dumping and uncollected landfills are sometimes the main disposal methods in many developing countries; sanitary landfills are the norm in only a handful of cities [2]. While, regular solid waste collection is a clear indicator of the effectiveness of a municipal administration, appropriate waste management is an excellent mechanism to reduce the adverse per capita environmental impact of cities and in this sense, the indicator is very suitable.

This indicator is used in many countries and can also be easily tracked and monitored in many local governments or cities globally. Solid waste management is essential for the sustainability of cities especially if it includes: waste reduction, reuse, recycling and composting, incineration, and disposal in landfills. Within a waste management hierarchy, waste prevention and reuse are the most preferred methods and should be promoted, as they reduce the demand on scarce environmental resources, reduce energy use, and minimize the quantity of waste that must eventually be recycled, incinerated or disposed in landfills.

Feasibility:
Data for this indicator is available and can be disaggregated at the city and town levels. Information from municipal records, service providers, community profiles and household surveys allow collecting the information. However, in many cities, solid waste collection and recycling data are currently incomplete or not available. The development of adequate data collection systems may require a significant effort in some jurisdictions.

UN-Habitat is collecting information on this indicator in more than 400 cities that are part of the City Prosperity Initiative.

Limitations:
Countries have varying policies that define appropriate waste management, with different levels of treatment and data collection. To ensure comparability the indicator should limit to the methodology and definitions presented above. Cities and countries that have more advanced systems should report other aspects of waste management such as recycling that can be disaggregated by different components.
Since this indicator has two points of reporting, (i.e the source for establishing if waste is collected regularly or not regularly, and the final discharge point and its level of adequacy), there is a need to integrate them in the monitoring. Some countries/cities have the data and monitoring systems needed to report, while others may require training and capacity development to enhance their capacities.

Policy Connections:
Rapid urban population growth has resulted in a number of challenges including basic service, infrastructure and public goods provision, and municipal solid-waste management. For many cities, solid-waste management is the single largest item in their budget [4]. National and municipal governments often have insufficient capacity or funding to meet the growing demand for solid-waste management services [7].

An integrated solid waste management system is strongly connected to three dimensions: urban environmental health, the environmental sustainability and resource management. Moreover, a regular solid waste management strategy is clear indicator of the effectiveness of a municipal administration [2]. Good waste governance that is inclusive, financially sustainable and based on sound institutions is one of the key challenges of the 21st century, and one of the key responsibilities of a city government.

Moving towards modern disposal has generally followed a step-by-step process: first phasing out uncontrolled disposal, then introducing, and gradually increasing, environmental standards for a disposal facility. In the process, controlling water

pollution and methane emissions from sanitary landfills, and air pollution from incinerators, receive increasing attention [5].

Many developing and transitional country cities still have an active informal sector and micro-enterprise recycling, reuse and repair; often achieve recycling and recovery rates comparable to those in the west, resulting in savings to the waste management budget of the cities. There is a major opportunity for the city to build on these existing recycling systems, reducing some unsustainable practices and enhancing them to protect and develop people's livelihoods, and to reduce still further the costs to the city of managing the residual wastes. The formal and informal sectors need to work together, for the benefit of both. [5]

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[3] http://www.atlas.d-waste.com/
[4]http://mirror.unhabitat.org/downloads/docs/Recycling%20and%20disposal%20of%20solid%20waste%20in%20low%20and%20middle-income%20countries.pdf
[5]http://www.un.org/esa/sustdev/natlinfo/indicators/methodology_sheets/consumption_production/waste_treatment_disposal.pdf
[6]http://siteresources.worldbank.org/INTURBANDEVELOPMENT/Resources/336387-1334852610766/What_a_Waste2012_Final.pdf
[7] http://www.unep.org/pdf/UNEP_GEAS_oct_2013.pdf
[8] http://unhabitat.org/urban-indicators-guidelines-monitoring-the-habitat-agenda-and-the-millennium-development-goals/

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

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

Type of Indicator:
Outcome Indicator

Methodology:
Annual mean levels of fine particulate matter (i.e. $PM_{2.5}$) air pollution in cities (population weighted)
PM10 and PM2.5 data will come from well-established monitoring stations that are located and spread all across the cities.

***Mean or average*:** Levels of air pollution can vary drastically from day to day based on local weather conditions, geography, economic output, environmental controls, etc. Articulating the indicator as annual mean is a more specific indicator for monitoring the health and environmental impacts of sustainable growth and development in cities over time. WHO air quality guidelines provide specific recommendations on the mean levels of fine particulate matter which can support measuring the per capita health impacts related to any improvements or degradation in air quality in cities. Incidents of high air pollution levels also have health impacts, but these are less important than longer term exposures, and related statistics are less reliable in view of greater variability due to external factors. UN-Habitat therefore recommends a measurement of the indicator as annual means.

Fine particulate matter: Fine particulate matter (i.e. $PM_{2.5}$) can be directly linked to estimates of health risks. Coarse particulate matter (i.e. PM_{10}) measurements can be converted to $PM_{2.5}$, but will inherently introduce additional uncertainty to estimates of impacts (e.g. health). Articulating this indicator to fine particulate matter increases its specificity and its relevance for monitoring the health impacts of sustainable development policies. For cities with PM_{10} reported as the only monitored PM parameter, $PM_{2.5}$ concentration can be calculated from PM_{10} using national conversion factors ($PM_{2.5}$ / PM_{10} ratio) estimated as population-weighted averages of city-specific conversion factors for the country. City-specific conversion factors can be estimated as the mean ratio of $PM_{2.5}$ to PM_{10} of stations for the same year and alternatively as the ratio of city values if the values by station are not provided. If national conversion factors are not available, regional ones can be used, which are obtained by averaging country-specific conversion factors.

***Population weighted*:** It is important that this indicator is weighted for population sizes within cities. The population size of cities along with their respective air pollution levels vary within a country and globally. Weighting annual mean air quality measurements of fine PM by the city population size relative to other cities in a country or globally increase the suitability and measurability of this indicator at a national and global scale. Furthermore it makes estimating the related impacts on health and other sustainable development issues (e.g. improvements in energy efficiency from sustainable transport) more feasible and accurate for monitoring progress.

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

Data Sources:
WHO Global Health Observatory and the WHO Ambient Air Pollution in Cities Database: [1] The WHO Global Health Observatory (GHO) houses information on both the exposure (i.e. ambient air quality measurements of fine particulate matter) and associated disease burden. In addition, the GHO provides graphs, tables and interactive tools to depict air pollution levels across regions and countries which can support countries in visualizing their situation and in monitoring progress towards SDG11 more readily.

The *WHO's Ambient air pollution database* provides annual mean concentrations of particulate matter based on daily air measurements of particulate matter (PM_{10} or $PM_{2.5}$) or data which could be aggregated into annual means. In a few exceptional cases, where annual means could not be calculated, measurements covering a more limited part of the year were should be used.

The primary sources of data are official national/sub-national reports, national/sub-national web sites containing measurements of PM_{10} or $PM_{2.5}$ and the relevant national agencies. Furthermore, measurements reported by the following regional networks are used: the Asian Clean Air Initiative for Asia [2], and Airbase [3] for Europe. In the absence of data from the previous sources, data from (a) UN Agencies, (b) Development agencies and (c) articles from peer-reviewed journals are used.

In order to present air quality that is largely representative for human exposure, only measurements characterized as urban background, residential areas, commercial and mixed areas are used. Stations characterized as particular "hot spots" or exclusively industrial areas should be excluded, unless they are contained in reported city means and could not be dissociated.

Scope:

WHO keeps a global database which contains results of ambient (outdoor) air pollution monitoring form almost 1600 cities in 91 countries. The database covers the period from 2008 to 2013, with the majority of values for the years 2011 and 2012. The WHO Ambient air pollution database includes information on cities with populations of 100,000 or more. In general, the inclusion of cities with less than 100,000 inhabitants did usually not significantly modify the country mean as compared to considering only cities larger than 100,000 inhabitants. Although there is paucity of data from low- and middle-income countries, the level of monitoring and reporting in these areas is rapidly increasing each year.

Frequency:

Annual. This database is updated on a regular basis can be released annually to support monitoring of this SDG target (15 reports).

Potential Disaggregation or Quantifiable Derivatives:

- Population-weighted national/city average
- Disaggregated by location (urban and intra-urban)

Quantifiable Derivatives:

- Annual mean levels of **coarse particulate matter (PM10)**
- **24-hour mean** levels of fine particulate matter.(PM2.5)

Related SDG Targets / Indicators:

Direct Relation

3.9.1	Population Exposed to Outdoor Air Pollution
7.1.1	Electricity Access
7.1.2	Primary Reliance on Clean fuels
7.2.1	Share of renewable energy
7.3.1	Energy Intensity
9.4.1	Carbon emission per value added unit
11.2.1	Public Transit Stop Coverage
11.3.1	Efficient Land Use
11.6.1	Solid Waste Collection
11.7.1	Accessibility to Open Public Area
12.c.1	Fossil fuel subsidies
14.3.4	Marine acidity
15.1.2	Forest area as a percentage of total land area
15.2.1	Permanent forest loss
15.3.1	Degraded land

Indirect Relation

3.2.1	Under-Five Mortality Rate
8.1.1	City Product per Capita
9.1.1	Access to all season road in rural areas
9.2.1	Manufacturing Employment
11.c.1	Sustainable Buildings' Assistance
12.5.1	Solid waste recycling share

Suitability:

Measuring air pollution exposure and its impact on health is an important measurable and effective indicator for monitoring progress on several sustainable development goals and their associated targets. More specifically, targets on the goals for health, energy and cities can be measured and monitored using indicators on air pollution sources (e.g. cooking with polluting fuels, inefficient energy production) or exposure.

Feasibility:

Statistics on air pollution levels, trends and geographical distribution are available through a number of sources. These are regularly compiled and update by international organizations and reported in terms of short-term peaks and annual means at the global, national and municipal level.

WHO, in close collaboration with other international organizations and researchers, is strengthening the global tracking capacity for air quality and health by establishing a Global Platform on Air Quality and Health, containing data and information which will be accessible to everyone through the Internet. The Platform's purpose is to facilitate access to evidence on human exposures to outdoor (ambient) air pollution, on the health impacts of the pollutants and on effective

interventions for their reduction. This will work as a useful source for annual monitoring and will provide a large source of the initial baseline data for this indicator. Using WHO database and city monitoring of air quality, UN-Habitat measures this indicator in various cities that are part of the City Prosperity Initiative, looking at the interactions and mutual relations of air quality with other urban development variables.

Limitations:

The true effects and measurements of PM10 and PM2.5 exposure should be quantified using several years of data for annual concentrations of PM10 and PM2.5. The monitors also need to be located throughout the metropolitan areas of the city population, and data collected throughout the year, for several years, in order to reduce the bias owing to seasonal fluctuations or to a non-representative year. High quality measurements of PM concentrations from all of the monitors in the city area should be averaged to develop a single estimate. Care should be taken to ensure that the monitors used are not unduly influenced by a single large source of pollution e.g a factory, but instead monitors should be used to reflect exposures over a wide area. Also it is likely and sometimes the norm that PM data is only available for larger cities, though residents of smaller cities are also exposed to PM from biomass fuels or other open burning processes. Efforts should be done to expand monitoring stations to smaller cities. There will be cases where there is no data available for cities. However it is possible to use model estimates for annual PM10 and PM2.5 concentrations derived from models developed by international organizations such as WHO or World Bank. These models predict PM concentrations for urban areas as functions of factors such as fuel mix, level of economic development, demographics, and geographical and meteorological variables that impact transport related pollutions. When analysing the impact on public health of air quality the population weighted is less relevant and specific analysis such be conducted.

Measurements of fine particulate matter:

In high-income countries, $PM_{2.5}$ measurements are already being widely undertaken. In low- and middle-income countries, however, while $PM_{2.5}$ measures are increasingly being developed, they are not yet available in many countries. In low-and middle-income countries, annual mean $PM_{2.5}$ measurements could be accessed in 69 cities, but PM_{10} in 512 cities.

Policy Connection:

The greatest single environmental risk for health, climate and sustainable development is air pollution. Outdoor (ambient) and household (indoor) air pollution are responsible for about 7 million premature deaths annually – making air pollution one of the largest single causes of premature mortality and morbidity worldwide. Inefficient energy production, use and distribution of energy services, along with energy inefficient industry, transportation, and housing, as well solid waste management systems are some of the major sources of air pollution emissions. Air pollution sources and exposure are thus closely linked to sustainable development, particularly in relation to the way we produce and use energy at household, community and urban level with direct consequences to health and climate.

Quantifying the pollution levels provides a measure of the health related risks associated with these pollutants and thereby help to guide the policy makers. This indicator will provide a magnitude of the problem and the necessary knowledge and understanding so that air pollution control can be prioritised in cities relative to other interventions that improve the overall public health. Since many policy makers are not aware of the array of the health effects associated with the exposure to outdoor air pollution, this quantification at city level will be an effective educational and policy tool. Creating an awareness of the health risks associated with air pollution is a crucial first step in developing successful control strategies. Governments are likely to use this global city evidence to start promoting the use of clean, renewable energy sources such as solar and wind powered energy and encourage movement away from the use of less clean energy generating sources.

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

Proposed Indicator 11.7.2

Proportion of women subjected to physical or sexual harassment by perpetrator and place of occurrence (last 12 months) (**)[40]

Type of Indicator: Outcome indicator

Methodology:

1. Terminology for the definition:

'Physical or sexual harassment' refers to a wide range of acts or behaviors, often of a sexual nature, which are unwanted and offensive to the recipient. Many international bodies, national legislatures and courts have prohibited sexual harassment but there is no agreed universal definition of the term.[1] Most existing studies about sexual harassment focus on working life or educational environments and measure unwelcome and unwanted sexual acts.[1,2]

In 2014, the European Union Fundamental Rights Agency (FRA) conducted the first comprehensive survey on violence against women in 28 EU countries. The survey covered 11 possible acts of sexual harassment which were unwanted and offensive according to respondents. The categories include:

- Unwelcome touching, hugging or kissing
- Sexually suggestive comments or jokes that made [the respondent] feel offended
- Inappropriate invitations to go out on dates
- Intrusive questions about [the respondent's] private life that made her feel offended
- Intrusive comments about [the respondent's] physical appearance that made her feel offended
- Inappropriate staring or leering that made [the respondent] feel intimidated
- Somebody sending or showing [the respondent] sexually explicit pictures, photos or gifts that made her feel offended
- Somebody indecently exposing themselves to [the respondent]
- Somebody made [the respondent] watch or look at pornographic material against her wishes
- Unwanted sexually explicit emails or SMS messages that offended [the respondent]
- Inappropriate advances that offended [the respondent] on social networking websites such as Facebook, or in internet chat rooms

2. Methods for Measuring the Proposed Indicator:

Calculating rate of physical or sexual harassment:

$$\left(\frac{\text{Number of girls and women aged 15+ who were subjected to physical or sexual harassment in the last 12 months}}{\text{All women and girls aged 15+}}\right) \times 100$$

Sub-classifications can be made for specific categories of perpetrators and by place of occurrence of latest episode, for example sexual harassment occurring at work versus public spaces.

Unit:

%

Data Sources:

Data for this indicator can be collected through specialized violence against women surveys, crime victimization surveys or through modules in multipurpose surveys such as DHS and MICS (in the case of MICS and DHS samples are currently limited to women aged 15-49)

Scope:

This is a Tier III indicator, which means internationally agreed methodology has not yet been developed. Because of the lack of universal definition, data for this indicator are not comparable. Currently, comparable data exist only for the 28 European Union countries. Efforts would be required to develop a common definition and increase country coverage.

(**) Indicator classified as 'grey', currently under open consultations

Frequency:
The monitoring of the indicator can be repeated at regular intervals of 5 years, allowing for three reporting points until the year.

Potential Disaggregation or Quantifiable Derivatives:

Potential Disaggregation:

- Disaggregation by age
- Disaggregation by race/ethnicity
- Disaggregation by perpetrator
- Disaggregation by place of occurrence (e.g. street, public parks, public transportation, school, work etc.)

Related SDG Targets / Indicators:

Direct relation
11.7.1 Accessibility to Open Public Area

Indirect relation
4.a: Build and upgrade education facilities that are child, disability and gender-sensitive and provide safe, non-violent, inclusive and effective learning environments for all
5.2 Eliminate all forms of violence against all women and girls in public and private spheres, including trafficking and sexual and other types of exploitation
8.8 Protect labour rights and promote safe and secure working environments of all workers, including migrant workers, particularly women migrants, and those in precarious employment
16.2 End abuse, exploitation, trafficking and all forms of violence and torture against

Relevance:
Sexual harassment is a violation of women's human rights and a prohibited form of violence against women in many countries.[4] The experience of sexual harassment causes devastating physical and psychological injuries to a large percentage of women. In urban and rural areas, developed or developing countries, women and girls are constantly subjected to these forms of violence on streets, on public transport, in shopping centres and in public parks, in and around schools and workplaces, in public sanitation facilities and water and food distribution sites, or in their own neighborhoods. Such harassment reinforces the subordination of women to men in society, violates women's dignity and creates a health and safety hazard in public spaces.

Suitability:
Access to safe public spaces is a basic human rights, however women and girls are often exposed to harassment and other forms of violence, which inhibit their right to public spaces. This indicator would enable proper tracking of these barriers to women's access to public spaces.

Feasibility:
This data has been successfully collected in the context of the EU and can be adapted and replicated across a wider number of countries.

Limitations:
Due to the lack of agreed definition and comparable data, this indicator is currently classified as Tier III. Methodological work and testing is required but could build from the experience of the FRA survey.

Policy Connections:
The FRA survey revealed that in the EU, 55% of all women have at least once been victims of sexual harassment and stalking during their lifetime and 21% have been victimized over the last 12 months.[3] If women and girls are to enjoy a life free from violence, policymakers need to ensure that public spaces are free from any form of violence, including sexual harassment.

URL References:

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

Proposed Indicator 11.a.1

Type of Indicator:

Methodology:

Unit:

Data Sources:

Scope:

Frequency:

Potential Disaggregation or Quantifiable Derivatives:

Related SDG Targets / Indicators:

Relevance:

Suitability:

Feasibility:

Limitations:

Policy Connections:

Bibliographic References:

URL References:

Target 11.b

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

Proposed Indicator 11.b.1

Percentage of cities that are implementing risk reduction and resilience strategies aligned with accepted international frameworks (such as the successor to the Hyogo Framework for Action on Disaster Risk Reduction) that include vulnerable and marginalized groups in their design, implementation and monitoring.

Suggested Indicator: Percentage of local governments that adopt and implement local DRR strategies in line with the Sendai Framework for Disaster Risk Reduction 2015-2030

Type of Indicator: Process indicator

Methodology:[41]

***Local DRR Strategies in line with the Sendai Framework for Disaster Risk Reduction 2015-2030*:** local disaster risk reduction strategies and plans, across different timescales with targets, indicators and time frames, aimed at preventing the creation of risk, the reduction of existing risk and the strengthening of economic, social, health and environmental resilience (Sendai Framework, para27 (b)). Note: the DRR strategies need to be based on risk information and assessments.

Local Government: Form of public administration at the lowest tier of administration within a given state, which generally acts within powers delegated to them by legislation or directives of the higher level of government.

Summation of data from National Progress Report of the Sendai Monitor.

Several computation methods to measure quality progress of local DRR strategy is proposed by UNISDR and to be discussed by inter-governmental process. Please see the reference (3).

Unit:

% or index

Data Sources:

National Progress Report of the Sendai Monitor, reported to UNISDR
(Can be complemented by Local Progress Reports of the Sendai Monitor, reported to UNISDR)

Scope:

Local - National - Global

Frequency:

Annual. The monitoring of the indicator can be repeated at an annual interval, allowing for several (fifteen) reporting points until the year 2030 and beyond.

Potential Disaggregation or Quantifiable Derivatives: [42]

Potential Disaggregation:

- Disaggregation by country
- Disaggregation by local government

Related SDG Targets / Indicators:

Direct relation

1.5 Resilience of the poor and vulnerable

Related targets in the Sendai Framework for Disaster Risk Reduction 2015-2030:

[41] Metadata proposed by UNISDR, to be further revised

[42] 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.

3.9.1 Population Exposed to Outdoor Air Pollution 3d Early warning and risk reduction capacity 11.5.1 Population Affected by Hazardous Events 13.1 Resilience and Adaptive capacity 13.b Climate change planning and management 14.2 Marine and coastal ecosystems	Substantially increase the number of countries with *national and local disaster risk reduction strategies* by 2020.

Relevance:
The Sendai Framework for Disaster Risk Reduction 2015-2030 calls for local governments to adopt and implement local DRR strategies with their own targets, indicators and timeframes.

This indicator is closely linked to 11.5.1 above and is a critical means of measuring progress against resilience targets to develop more resilient cities and human settlements. Focusing on the pre-crisis urban resilience-based planning, development and management and monitoring positive gain over time, is a clear indication of growing resilience.

Suitability:
The indicator will build a bridge between the SDGs and the Sendai Framework for DRR because the adoption of local DRR strategies is one of Sendai Framework global targets and will be also monitored under the Sendai Framework Monitoring System.

11.b.1 as reformulated is suitable as it reflects clearly a city level commitment to both addressing the resilience of the city as a whole and with a focus on vulnerable and marginal groups.

Feasibility:
The proposed indicator will be used to monitor the Sendai Framework global targets and therefore the detailed definitions shall be discussed and agreed in Open-ended Intergovernmental Expert Working Group on Indicators and Terminology on Disaster Risk Reduction, as outlined in Sendai Framework for Disaster Reduction 2015-2030. The Working Group is likely to finalize the discussion and submit the final report to the GA in December 2016.

Additionally, to complement the global monitoring, Through UNISDR's Making Resilient Campaign and its programme, almost 700 local governments have already used the previous reporting tools. This is also supported by a growing network of organizations under the Medellin Collaboration on Urban Resilience are already tracking these and developing standard means of accumulation and validation of city-based resilience policy implementation.

Limitations:
Reporting of the HFA Monitor and the succeeding Sendai Monitor under development is not mandatory but it is only global database collecting DRR policy information. The HFA Monitor started in 2007 and over time, the number of countries reporting to UNISDR increased from 60 in 2007 to 133 in 2013 at the same time number of local governments reporting increased from 121 in 2012 to 700 in 2014. Because there is no specific data addressing this indicator at this moment, a baseline as of 2015 should be created through a questionnaire to all countries in order to monitor both the Sendai Framework and the SDGs.

Policy Connections:
This is proposed by UNISDR based on experience and knowledge built in the period under the Hyogo Framework for Action (2005-2015). The proposed indicator was further reviewed and examined by other UN agencies including FAO, GFDRR, IOM, UNCCD, UNDP, UNESCAP, UNESCO, UNFPA, UNHCR, UNOCHA, UNOOSA, UNOPS, UNU, UNWOMEN, WHO and WMO (though not all organizations listed here provided comments for this indicator) and submitted to the IAEG process in early-July 2015, then again reviewed by the Technical Expert Group consisting of more than 60 experts from UN system, academic and research, civil sector and private sector in 27-29 July 2015 and submitted and examined by the Member States in the 1st Open-ended Intergovernmental Expert Working Group on Indicators and Terminology on Disaster Risk Reduction held in 29-30 September 2015. The suggested indicator is currently under review by the Member States and UNISDR is receiving written inputs from the Member States.

URL References:
[1] Sendai Framework or Disaster Risk Reduction 2015-2030
(http://www.preventionweb.net/files/43291_sendaiframeworkfordrren.pdf)
[2] UNISDR (2015), "Background Paper: Indicators to monitor global targets of the Sendai Framework for Disaster Risk Reduction 2015-2030 - a technical review" submitted to the first session of the Open-Ended Intergovernmental Expert Working Group on Indicators and Terminology relating to Disaster Risk Reduction, held in Geneva on 29-30 September 2015
http://www.preventionweb.net/files/45466_indicatorspaperaugust2015final.pdf

[3] UNISR (2015): Concept Note on Methodology to Estimate Progress of National and Local DRR Strategy to Measure the Achievement of Target E of the Sendai Framework for Disaster Risk Reduction: A Technical Review (released at 17 November, 2015) http://www.preventionweb.net/documents/framework/Concept%20Note%20on%20Target%20E.pdf

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

Proposed Indicator 11.c.1

Number of jobs in the construction industry of LDCs involved in the manufacture of local building materials, out of the total number of jobs in the construction industry. (**)

Type of Indicator: Process indicator

Methodology:
Monitoring the number of jobs in the construction industry of LDCs involved in the manufacture of local sustainable building materials that promote a positive impact in the local economy, out of the total jobs in the construction industry, and in relation with the amount of financial and technical support provided to LDCs.

Definitions:

Manufacture of locally available building materials:
Indicator 11.c.1 measures the increase in the utilization of local building materials in LDCs by computing the increase of jobs in the construction industry involved in the manufacture of local building materials. The term 'locally available building materials' is used to refer to ***materials of which the entire lifecycle*** (including all steps of the production chain: 1. extraction of raw materials, 2. manufacturing into building products, 3. sale and 4. use of building products, 5. recycling/end-of-life) ***takes place within the same region***. The manufacturing process of these materials provides economic benefits predominantly to the region in which the raw materials were sourced. Indicator 11.c.1 presents the proportion of manufacturing jobs within local production chains in comparison to total number of jobs in the construction industry of the country in question.

Positive impact on local economy:
Indicator 11.c.1 is formulated in a way that promotes a positive impact on local economies. The close link with employment is one of the most important economic functions of housing. For example, residential construction makes up between 7% and 10% of the total labour force in developing economies [2]. Therefore, the relative use of local building materials and resources in the construction industry has a substantial effect in the way in which the ***construction industry can be harnessed to enable growth in the local economies of LDCs***. The development of local sustainable building materials and technologies may also boost the associated retail and consulting industries.

Sustainable and resilient buildings:
The environmental and economic impacts of the chosen construction materials forms one of the most significant parts of a building's overall sustainability [3], this is why indicator 11.c.1 places its focus on the ***choice of building materials in measuring the increase in sustainability and resilience of buildings in LDCs***. Use of locally available building materials with low embodied energy provides substantial benefits in decreasing the carbon footprint of buildings, especially in rapidly urbanizing regions where most of the building stock is yet to be built. The use of local materials can also contribute to the resiliency of settlements, as these materials tend to be well suited to the local climate, and can be conveniently altered and replaced using locally available resources. However, a conscious choice of sustainable building materials in various global contexts can only be made if adequate information on the carbon footprint and environmental impacts for different materials is available for said location. The creation of national life-cycle inventory (LCI) databases of various construction materials is thus an effective way to define the sustainability of different materials.

Construction industry of LDCs:
Indicator 11.c.1 aims to recognize the significance of the informal construction industry, which forms a large part of construction activities in LDCs. Recognition of the informal sector adds to the reliability and accuracy of the indicator.

$$x = 100\left[\frac{number\ of\ jobs\ involved\ in\ the\ manufacture\ of\ local\ building\ materials}{total\ number\ of\ jobs\ in\ the\ construction\ industry}\right]$$

Unit:
%

Data Sources:
Suitable data sources for indicator 11.c.1 include national labour statistics and national data on manufacturing industry. Labour statistics on jobs will need to acknowledge the jobs along the entire life cycle related to processing of local materials

as opposed to imported materials. LDCs already have an understanding of capturing informal employment and data are available. This element should be supported to strengthen it.

Scope:
Globally comparable according to level of financial and technical support provided to LDCs, leading to the increase in the number of jobs.

Frequency:
The monitoring of this indicator can be repeated at a bi-annual interval, allowing several reporting points until the year 2030.

Potential Disaggregation or Quantifiable Derivatives:[43]

Potential Disaggregation:
- Disaggregation by **location** (major cities)
- Disaggregation by step in the material life cycle
- Disaggregation by **gender** for the workers
- Disaggregation by **age** for the workers

Related SDG Targets / Indicators:

Direct relation
1.1 Eradication of extreme poverty
1.2 Population living in poverty
1.5 Building resilience of the poor
4.4 Skilled adults and youth
6.4 Water-use efficiency
8.1 Economic growth
8.2 Economic productivity
8.4 Resource efficiency
8.5 Full and productive employment
8.6 Reduce Youth Unemployment
9.2 Inclusive and sustainable industrialization
9.3 Support Small-scale industries
10.1 Income growth of the bottom 40 per cent of the population
11.1 Adequate housing for all
11.3 Sustainable urbanization
11.4 Protection of cultural and natural heritage
11.5 People affected by local disasters
11.a Positive rural—urban links
11.b Risk reduction and resilience
12.1 SCP national action plans
12.2 Material footprint
13.1 Resilience towards climate-related hazards
15.2 Sustainable forest management
17.3 Mobilize additional financial resources

Relevance:
Target 11.c and indicator 11.c.1 are particularly relevant as they are the first of their kind, connecting to other critical dimensions of development, and have not been previously incorporated in the Millennium Development Goals (MDGs) as such. Indicator 11.c.1 covers several important topics under the three pillars of sustainability in a cross cutting manner, contributing to several other targets beyond Goal 11.

The following features related to use of local materials are examples of how indicator 11.c.1 is ***relevant in terms of ecologically sustainable development and resilience*** by supporting decreased ecological impact of housing construction:
- sustainable extraction of resources
- short supply chains: avoiding emissions caused by transportation of materials over long distances
- potential use of local vegetative materials with low embodied energy
- using local building material proven to be adequate in local climate circumstances and events

The following features related to use of local materials are examples of how indicator 11.c.1 is ***relevant in terms of economically sustainable development*** in terms of supporting growth in the local economies of LDCs:
- Promote growth of local economies, placing “Housing at the Center” of policies and urban areas.
- local job creation in LDCs, professional skills development

[43]. 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.

(**) Indicator classified as ‘grey’, currently under open consultations

- Multiplier effects in the economy associated to the local construction industry

Finally, the following features related to use of local materials are examples of how indicator 11.c.1 is ***relevant in terms of socio-culturally sustainable development*** by supporting increased global access to adequate housing:

- increased affordability of housing due to decreased use of cost-defective imported construction materials
- use of healthy construction materials
- cultural adequacy of housing through the use of traditional local materials in the production of building products

The indicator is relevant since it connects financial and technical assistance from developed and middle-income countries to LDCs to promote the generation of jobs in the construction industry to build sustainable and resilient buildings utilizing local materials.

Suitability:
The indicator is suitable to Target 11.c. by responding to all three categories of sustainability as outlined above.

In addition the indicator supports one of the main SGD targets on eradicating poverty and to the core elements of the SDGs of: people, planet, prosperity, peace and partnership.

The indicator was chosen over others as it can build on already existing data such as labour statistics while at the same time allowing progress on the capturing of labour including highlighting the contribution of the informal sector to local economic development.

Feasibility:
Being measurable and realistic, the indicator is also feasible as it relies on official census data as well as estimates of informal employment in construction following established ILO methodology [1]. It also lends itself to disaggregation by gender, age, location and other criteria.

UN-Habitat is able to provide technical support and guidance on the monitoring of the indicator. For example, the agency is prepared to support member states in setting up national definitions of sustainable building materials through assisting the creation of national life-cycle inventory (LCI) databases. UN-Habitat has long-standing experience in co-operating with national and local governments in various contexts on the topic of sustainable construction through the creation and reinforcement of housing policies and regulation of local construction industries.

Limitations:
Gaps in the currently available data for monitoring target 11.c along with some recommendations of upcoming opportunities for filling such gaps are provided below.

- The indicator does not capture sustainability and resiliency aspects of buildings that are non-related to construction materials.
- Baseline data for the indicator may not exist in all countries and thus needs to be created.
- Monitoring of informal construction and self-construction activities need to be enhanced.[44]
- The indicator focuses on local building materials, disregarding imported sustainable building material and its work chain (sale/building)

Policy Connections:
Indicator 11.c.1 has a multipurpose value in relation to policies on sustainable construction, adequate housing, job creation, economic growth, and climate change. UN-Habitat has the capacity to support member states in the implementation of target 11.c through the provision of policy advise on for example the introduction of green building codes. UN-Habitat is currently running global initiatives such as the Global Housing Strategy and Housing at the Center Initiative as well as country programs, which are aimed at supporting the provision of adequate and sustainable housing in LDCs through policies, strategies and implementation on the ground.

[44] The indicator has a limit regarding the job counts as main housing construction in LDCs are taking place as self-construction (between 60% and 90%) which currently would fall out of this measure. It could be included if stakeholders feel this is measurable.

Bibliographic References:

URL References:

[1]: ILO (2013) Measuring informality: a statistical manual on the informal sector and informal employment.
[2]: Tibaijuka, A. K. (2009). Building Prosperity: Housing and Economic Development. London: Earthscan.
[3]: Stephan, A., Crawford, R. H. (2012). A holistic building life cycle energy analysis model. 46th Architectural Science Association conference, Gold Coast, Australia.

SUSTAINABLE DEVELOPMENT GOAL 11:

Make cities and human settlements inclusive, safe, resilient and sustainable

Outcome-oriented targets and indicators

11.1 Housing and slum upgrading

UN-HABITAT FOR A BETTER URBAN FUTURE

11.2 Accessible transport system for all

UN-HABITAT FOR A BETTER URBAN FUTURE

UNDP

UNEP

11.3 Partecipatory and inclusive urbanization

UN-HABITAT FOR A BETTER URBAN FUTURE

UNDP

11.4 World's cultural and natural heritage protection

UNESCO

UN-HABITAT FOR A BETTER URBAN FUTURE

11.5 Protection of the poor and people in vulnerable situation

UNISDR The United Nations Office for Disaster Risk Reduction

UN-HABITAT FOR A BETTER URBAN FUTURE

UNEP

UNDP

UNESCO

11.6 Capital enviromental impact of cities reduction

World Health Organization

UN-HABITAT FOR A BETTER URBAN FUTURE

UNEP

11.7 Access to safe and inclusive public space

UN-HABITAT FOR A BETTER URBAN FUTURE

UN WOMEN

UNEP

UNDP

UNESCO

SUSTAINABLE DEVELOPMENT GOAL 11:

Make cities and human settlements inclusive, safe, resilient and sustainable

Process-oriented targets and indicators

11.a Urban-rural linkages

11.b Implementation of mitigation and adaptation plans and policies

11.c Sustainable and resilient buildings

The UN agencies that are part of Goal 11 initiative and participate in this Monitoring Framework, which is coordinated by UN-Habitat, recognize that indicators 11.4.1, 11.5.1, 11.7.2, 11.a.1 and 11.c.1, coded as 'grey', are still in process of revision and eventually can change or be drastically modified. They also recognize that metadata for the other indicators 11.1.1, 11.2.1, 11.3.1, 11.6.1, 11.6.2, 11.7.1 and 11.b.1, coded as 'green', is an initial draft for discussion and can be changed and/or adapted in the near future to fit better the indicators. The agencies part of this document, and other partners, will participate in expert group meetings and other technical discussions to refine the metadata.

The need of disaggregation of the information may bring further modifications of some of the methods and approaches of data collection for some of the indicators. This work will also be done in close cooperation of the same UN agencies. It is also possible that the search of more convergence between Goal 11 indicators and other SDGs indicators will bring additional changes and modifications. In this sense, this is a 'living document' that will be collectively enriched by all participants.

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