METADATA ON HUMAN SETTLEMENT INDICATORS OF SUSTAINABLE DEVELOPMENT GOAL 2030

1   Goals and targets addressed

Target 1.4: By 2030, ensure that all men and women, in particular the poor and the vulnerable, have equal rights to economic resources, as well as access to basic services, ownership and control over land and other forms of property, inheritance, natural resources, appropriate new technology and financial services, including microfinance.

Indicator 1.4.2: Proportion of total adult population with secure tenure rights to land, with legally recognized documentation and who perceive their rights to land as secure, by sex and by type of tenure.

2   Definitions and method of computation

This indicator will focus on documenting the limitations manifested in the secure tenure rights to land as measured through the proportion of adult population with secure tenure rights focusing on documented evidence and perceived protection of land rights to groups such as the poor, vulnerable, men and women. The indicator will also cover different land-uses (residential and agriculture or other land use by households and individuals for livelihood or economic purposes), in both rural and urban areas, and the security of rights held under different land tenure systems – owned, customary rights, leased /rented in etc. Furthermore the measurement of documented land rights and perceptions of tenure security would include people whose rights are secured[1] as

members of communities, indigenous groups, and producer or housing associations that hold land rights in common. The below definitions and concepts are important for reporting on this indicator;

Tenure: How people, communities and others gain access to land and natural resources (incl. fisheries and forests) is defined and regulated by societies through systems of tenure. These tenure systems determine who can use which resources, for how long, and under what conditions. Tenure systems may be based on written policies and laws, as well as on unwritten customs and practices. No tenure right, including private ownership, is absolute. All tenure rights are limited by the rights of others and by the measures taken by States necessary for public purposes. Tenure rights are also balanced by duties.

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[1] Securing tenure rights is especially important for Indigenous Peoples, for whom lands, territories, and other resources may also hold significant spiritual or cultural import and have implications for their right to development. While recognition of indigenous communities' land and territorial rights is central to both their cultural identity and survival, and for their livelihoods, other community groups also assert the need to secure and manage land resources on a group basis. In particular, this is for resources held in common, such as grazing land and community forests, but also for agricultural lands, to which household and individual use rights can be allocated according to customary principles. The principles of universal access to basic rights of shelter, access to productive resources required for subsistence and livelihoods, and indigenous peoples' land-related cultural and territorial rights are also incorporated in a wide range of international declarations and covenants including the UN Declaration on the Rights of Indigenous Peoples (UNDRIP); ILO Convention Number 169 concerning indigenous and tribal peoples in independent countries, the International Covenant on Economic, Social and Cultural Rights (adopted in 1966, in force since 1976); the African Charter on Human and People's Rights (1987), the American Convention on Human Rights, and the European Convention for the protection of Human Rights. Secure rights to tenure in urban areas are also vital. For urban dwellers, the absence of security of tenure over their housing and property can have important implications for economic development, poverty reduction and social inclusion. The importance of women's rights to land in ending poverty, achieving dignity for all and reducing gender based discrimination and violence is reflected in the Convention on the Elimination of All Forms of Discrimination Against Women (CEDAW). Women's land rights are of importance in relation to a number of the proposed SDGs, and there is increasing momentum and commitment globally to providing gender disaggregated data. In discussions of SDG Goal 5, on Gender equality, there has been a clear emphasis on security of women's land and property rights in proposed targets and indicators and in data collection tools being tested. This is because in many contexts women's land rights are established according to marital status, or status and seniority within households and local communities. The ability of women to exercise land rights also often require additional layers of approval due to their sex. Gender also interacts with other factors of difference resulting in multiple exclusions from the realization of land rights. Therefore, sex disaggregation in indicator 1.4.2 along with data from 5a.1 and 5a.2[1], coupled with sample sizes will enable robust statistical analysis on women's land rights.

- *Local Communities* is a group of individuals linked by kinship, familiarity and social and economic networks residing within or in the same vicinity of a particular parcel, property or natural resource. The community members are co-owners that share exclusive rights and duties, and benefits contribute to the community development.
- *Indigenous land rights* - are rights specific to a particular ethnic group, having evolved through interaction of culture and environment and overseen by authorities whose legitimacy is based on occupation and spiritual ties to the locality.
- *Community land rights* - are collective or shared rights of land ownership, access or use held or exercised in common by members of a community. A community may be designated as a village-based or more geographically dispersed community, or a clan or a lineage.
- *Collective rights*- a situation where holders of land rights are clearly defined as a group and have the right to exclude others from the enjoyment of those land rights. Collective ownership of a natural resource refers to a situation where the holders of rights to a given natural resource are clearly defined as a collective group, and where they have the right to exclude third parties from the enjoyment of those rights.

Land governance is defined as the rules, processes and structures through which decisions are made regarding access to and the use [and transfer] of land, the manner in which those decisions are implemented and the way that conflicting interests in land are managed (Palmer et al., 2009).

Legally recognized documentation: States provide legal recognition for legitimate tenure rights through policies, law, and land administration services. States define the categories of rights that are considered legitimate. Documentation refers to the recording and publication of information on the nature and location of land, rights and right holders in a form that is recognized by government, and therefore legal.

Tenure security: All forms of tenure should provide all persons with a degree of tenure security, with states protecting legitimate tenure rights, and ensuring that people are not arbitrarily evicted and that their legitimate tenure rights are not otherwise extinguished or infringed.

Perception of tenure security: This refers to an individual's perception of the likelihood of disagreement of the ownership rights over land and ability to use it, regardless of the formal status and can be more optimistic or pessimistic. Sources of perceived insecurity may include contestation from within households, families, communities etc. or as a result of the actions of governments, companies or other private land claimants. Individuals holding land under customary systems may perceive their rights as secure despite the absence of legal recognition or formal documentation.

Total adult population: Adult population, overall, and by administrative divisions, is measured by census data. An important implication is that, as the indicator refers to a country's adult population, surveys that cover only part of a country or that are conducted without a proper frame so that survey weights to permit derivation of indicators for the entire population are not available, will

have limited value as data sources for the indicator even though reference to them may have to be made in some instances if more robust data are not available.

Secure tenure rights: Secure tenure rights are use or ownership rights to land that are legally recognized, even if not a formal document is not issued, customary rights being the most prominent example and it does not require ownership (i.e. long term leases or short term ones that are routinely renewed as well as group rights qualify). Security implies that an individual cannot be deprived of his or her land rights involuntarily. This normally requires that duration, subject, and object of rights are clearly defined. For the latter, acknowledged boundaries with physical markers, or a map or sketch (not necessarily a high precision survey) that shows the parcel's position relative to others is normally needed.

Legally recognized documentation: The most common type of such documentation are ownership documents (titles or deeds) issued by a government institution. Other types of documents (tax receipts, utility bills, private contracts confer legal recognition in the sense that they can be used as evidence of rights in a court of law. This implies that a continuum of documentary evidence needs to be recognized. For purposes of constructing the indicator, reference will be made to formal and informal documents - the former to be obtained from administrative records and the latter from household surveys that are cross-checked with formal records. Country-specific notes can provide a more detailed explanation on the types of documents.

Perceived security of tenure[2]: We define perceptions of tenure to be secure if individual or households do not feel a threat of being deprived of legitimately acquired use or ownership rights to land or of these rights being disputed by others (either the Government of individuals). Perceived security is important in settings where formal documentation does not exist or where, largely due to gaps in institutional quality or the transparency with which land records are administered, formal documents may not increase tenure security. It is thus an important complement to the above indicator with recognition that methodological study of the extent to which perceptions can be captured will be desirable.

Method of computation- This indicator considers two components to be computed as follows:

Part (A)

$$\left(\frac{People(adult)\ with\ secure\ rights\ over\ land}{Total\ adult\ population\ surveyed}\right) x\ 100$$

Part (B)

$$\left(\frac{People(adult)\ who\ perceive\ their\ land\ rights\ to\ be\ secure}{Total\ adult\ population\ in\ households\ or\ communities\ surveyed}\right) x\ 100$$

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[2] Although those without land rights documentation may frequently perceive their land rights to be under threat, and those with documentation may feel effectively protected, there may be situations where documented land rights alone are insufficient to guarantee tenure security. Conversely, even without legally recognized documentation, individuals may feel themselves to be protected against eviction or dispossession, therefore capturing and analyzing these diverse ranges of situations will enable a more comprehensive understanding of land rights and tenure security in a country.

(A) measures the incidence of people with secure tenure rights over land among the total population; while (B) focuses on the perceived secure rights to land among the population or communities. Part (A) and part (B) provide two complementary pieces of information with the second (B) putting more emphasis on documenting secure tenure rights through the perception of the communities or individuals communally using land. These two parts can be computed using similar data, albeit with varying denominators (due to computation differences of deriving populations affected from communities/households).

The final combined or aggregate figure will be a combination of the numerators of A and B divided by their combined and respective denominators (computed as total number of the adult population surveyed or those in households or communities surveyed).

3   Rationale and interpretation

Increasing demand for pro-poor land reforms, including measuring tenure security at country level, created the need for a core set of land indicators that have national application and globally comparability. This led to a collaboration between the UN- Habitat, the Millennium Challenge Corporation and the World Bank in 2012, facilitated by the Global Land Tool Network, to develop a set of core land indicators to measure tenure security globally and at country level; a process that saw the start of the Global Land Indicators Initiative (GLII), a platform used by the global land community to underscore the need for tenure security, taking into account the continuum of land rights; legal and institutional indicators; and the perception of tenure security while contributing to the SDG process.

The governance of tenure is a crucial element in determining if and how people, communities and others are able to acquire rights, and associated duties, to use and control land, fisheries and forests. Responsible governance of tenure of land is inextricably linked with access to and management of other natural resources, such as forests, water and mineral resources. Tenure systems increasingly face stress as the world's growing population requires food security, and as urbanization, environmental degradation and climate affect land use and productivity. Many tenure problems arise also because of weak governance, and attempts to address tenure problems associated with dualisms to tenure regimes.

The rational of indicator 1.4.2 is to measure the relevant part of target 1.4 (ensure men and women have ownership and control over land). It measures policies that strengthen tenure security and expand the legal recording of the range of existing rights, to protect rights and tenure security for all including women, communities and indigenous people.

The data collected in the context of Doing Business demonstrate the extent of the challenge of tenure security (see table 1 below), even though it depends on the law whether an absence of records or mapping will cause tenure insecurity. Achieving tenure security at scale, and sustaining this, may require adjustments of policy and legal framework and implementation practice for land administration and land information systems. This indicator measures government's progress, both through administrative data and survey data. The legal recognition of the demarcation of communal and indigenous peoples land, for example, will result in significant progress on indicator 1.4.2 as it often concerns large areas of land and numbers of people.

Effective government policy towards enhancing gender responsiveness during planning and recordation of rights and in land administration is also expected to be reflected in enhanced performance for this indicator.

Indicator 1.4.2 focuses on (i) documented evidence, and (ii) perceived protection of land rights are both necessary to provide a full picture of the tenure security. This indicator will inform policy and allow for assessment of specific outcomes and practical priorities for further improvements. Regular reporting on indicator 1.4.2 will inform governments and non-state actors to what extent countries' legal and institutional frameworks recognize and support different land tenure categories, and implementation capacity to protect such rights in practice, as well as progress made (allowing assessment of specific outcomes and practical priorities for further improvements), in order to identify the scope for additional action required at the country level as well as at a subnational level or for certain categories, geographic entities or ecosystems, and provide for equity between men and women in rights to hold, inherit and bequeath land. Regular data reporting will provide incentives for governments to improve land governance performance and also greater readiness to engage with multiple stakeholders in data analysis and in achieving better understanding of the strengths and weaknesses of existing land governance policies and practices.

4   Disaggregation

The scope for disaggregation depends on the data source: all elements of the indicator (i.e. those based on administrative data as well as household surveys) can be disaggregated spatially (e.g. by urban and rural or region). In some cases, administrative data may be disaggregated by sex. Estimates based on household surveys can be disaggregated by age, sex, tenure types[3] in both urban and rural areas), socio-economic profiles, poverty status, or wealth/income category.

Most of the national survey instruments cover household assets, health and education related parameters. The data gathered can be used to compute the progression out of poverty index (PPI) or multi-dimensional poverty index (MPI), and both PPI and MPI can be used to disaggregate findings for different segments of the households sampled. LSMS already contains detailed information on income groups, household profile, health and education status, social protection and inclusion of other aspects of well-being and therefore disaggregation, as defined above, would be eminently possible. Aspects related to land tenure and tenure perception are being included in household surveys. DHS (supported by USAID) covers questions related to a wealth index which can be used as a proxy for income for disaggregated household segments and for analysing tenure security according to different levels of household wealth and poverty.

5   Sources and data collection processes

Use of population-based survey data is complementary to those of the other methods that gather data indirectly, from experts and institutionally held administrative data and information. In most household surveys, the thematic scope (demographic, economic well-being, social status and

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[3] (including those who hold land rights through some form of collective or community based titling or land registration, and those whose rights remain undocumented under customary and informal tenure systems

physical infrastructure) is more or less the same. Inclusion of questions about land holding or tenure security within large scale surveys, periodic national censuses and agricultural censuses is a priority area for development in order to create comparable data sources and enable global-scale monitoring of indicator 1.4.2.

The main sources of data, therefore, are administrative records reported by national land institutions (in most cases land registries), and census and multi-topic household surveys conducted by National Statistical Agencies.

Administrative records. Production of land records and maps is a core function of public registries and reporting on the number of registered parcels or the number and area of parcels mapped is not difficult in principle and, where household surveys are available, can be cross-checked against survey information. The key element of the indicator that is collected in this manner is the *Number of households/individuals with formally documented rights.* Land registry records provide data on the number of individually registered parcels that can, in most cases, be linked to the number of individuals (who may own the land jointly) and is in some cases also disaggregated by gender or type of land use (residential, agric., industry/business). In the case of registered group rights, identifying the number of group members who gain tenures security through formal registration of group rights should equally be possible.

Data on informal documentation can be provided by household surveys, cross-checked with formal records as much as possible. Country-specific notes that elaborate correspondence between the two types of data sets are an additional important data source that ensure consistency of definitions across countries. Engagement of local experts (land administration professionals, statisticians, land experts) is required for meta data preparation.

An existing source of administrative data on the extent to which plots in the main city or the entire country are registered and mapped is available for 189 countries from the World Bank's 'Doing Business' survey. This provides the number of parcels and total area mapped, as in Table 1.

Table 1; Formal rights recognition for private plots

	Tot.	SSA	ECA	LAC	MNA	OECD	SAS	EAP
In city reg'd	0.22	0.04	0.32	0.03	0.14	0.68	0.25	0.24
In city mapped	0.46	0.13	0.60	0.31	0.48	0.97	0.25	0.52
In country reg'd	0.22	0.04	0.32	0.03	0.14	0.68	0.13	0.24
In country mapped	0.24	0.02	0.40	0.03	0.14	0.71	0.13	0.28
No. of countries	189	47	25	32	21	31	8	25

Source: World Bank, Doing business –'Registering Property' Indicator

Nationally representative multi-topic household surveys. These provide information, separately for residential and non-residential land, on (i) the share of individuals with secure tenure rights; and (ii) the share of individuals who perceive their rights to be secure. Secure tenure rights are meant to imply that rights are legally recognized and the subject as well as boundaries clearly identified. Tenure is perceived as secure if the household does not perceive a risk of land use or

ownership being threatened or disputed. National representative household surveys will also provide data on two other key elements, namely (i) reported type of documentation by parcel and boundary demarcation. And (ii) Perception of tenure security by parcel.

The World Bank and UN-Habitat have access to an extensive archive of more than 2,000 nationally representative household surveys (some, such as the Urban Inequities Survey, MICS and DHS are publicly available), mostly for developing countries at multiple points in time. Existing surveys in many countries provide information on land access: 140 countries collect data on buildings, 94 on residential land, 128 on agricultural land ownership. At the same time, existing household surveys provide all of the information only in few countries. For example, 39 countries collect data on legal documentation for buildings, 8 for residential land, 35 for agricultural land and 37 collect data at individual level to allow sex disaggregation.

- For existing household surveys, existing archives of microdata will be used. The World Bank is currently extracting relevant information from these surveys at country level and making calculations to obtain estimates for variables of interest from micro-data. This will not only help to provide evidence on baseline levels but also help with indicator construction. On this basis, a methodology document with data appendix will be developed and discussed with relevant stakeholders. In particular, this will allow cross-checking with urban/rural and city-level data maintained by UN Habitat (see below).

Table 2; Coverage of key variables by household surveys in different regions (number of surveys)

	Tot.	SSA	ECA	LAC	MNA	OECD	SAS	EAP
Dwelling ownership	140	22	22	28	11	3	8	46
… if yes, indiv. Level	28	3	2	3	0	0	5	15
... legal title/document	39	2	6	11	1	1	4	14
Res. land ownership	94	15	14	20	5	1	7	32
… if yes, indiv. Level	25	3	2	2	1	0	3	14
... legal title/document	8	1	2	1	0	0	0	4
Agricultural land data	128	17	21	26	9	2	7	46
Land ownership status	114	12	18	24	7	1	7	45
Legal title/document	35	3	2	13	0	0	0	17
Size of land	119	14	21	25	9	1	7	42
No. of countries covered	143	22	22	29	12	3	8	47
No. of surveys included	1957	218	309	574	103	62	129	562

Note: Figures refer to the no. of countries with at least one survey with information on the variable in question

6   Comments and limitations

Tenure insecurity is partly caused by limited capacities for land management, data collection and monitoring, and inadequate existing land information systems, poorly kept land registries, and limited data on large or densely populated geographical areas. This is the reason for complementarity in data reporting combining administrative and survey data. Regular reporting on indicator 1.4.2 will provide an impetus to improve the availability of data on land tenure form surveys and to improve the regularity of reporting by registries and other line agencies holding administrative data, contributing also to in-country accountability. The expansion of digitization will facilitate the ease of reporting.

A standardized questionnaire for key land tenure issues has been developed and integrated in upcoming household surveys and will improve data comparability across countries: The comparability will improve with standardization of indicator definition while ensuring specific country level customization for terms like ownership, tenure regime, legal documentation, which will be reflected in the metadata. As the momentum on measurement methodologies and data collection on the indicator is expanding, the possibilities of standardized data collection, analysis and reporting are expected to be augmented.

Sub-national estimates: Most of the national household surveys target samples are sufficiently large to provide the statistical power for disaggregation at rural /urban and sub-national levels. Coverage of administrative data may however be geographically skewed e.g. towards urban or specific rural regions where cadastral coverage is concentrated, and therefore sub-national dimensions should be properly considered and conveyed in narrative reporting by countries to accompany the headline data.

The direct and private interviewing of women (e.g. on whether or not they are able to exercise rights independently) is key to obtaining good quality data, which can be cross tabulated against other factors of difference. Sample design is also important, where different members of the household and types of households are included, as the realization of women's land rights is complicated by the interplay of intra-household and community level inequalities, along with different tenure regimes.

While there are existing logistical and cost constraints with the implementation of household surveys, evidence from WEAI suggests minimal extra cost by interviewing additional household members if needed for collecting gender disaggregated data (Alkire and Samman, 2014). The World Bank and UN Habitat, in coordination with FAO, will leverage the work of the EDGE project, which already is the most advanced in using and testing gender sensitive methodologies and approaches, in incorporating a more nuanced understanding of land tenure and security in household survey methodologies. Therefore, we will work to establish common approaches and methodologies for this with FAO and UN EDGE team as the data requirements for indicators 5a.1 and 5a.2 are very similar in these respects.

7   Current data availability/indicator tier

The Population and Housing Census provides information on land tenure (ownership or not), which is a partial information since it does not include possession of proof of land tenure. However, some countries took the initiative to include land tenure documentation in their censuses. Voluntarily or in response to UN-Habitat request, some countries/cities have also included, tenure documentation and perceived eviction on their household surveys such DHS and MICS. Other countries have also conducted full Urban Inequities Survey with an entire survey module on secure tenure. Therefore, it is important to conduct a comprehensive country assessment on what extent tenure has been each censuses and household surveys of each country. This will help to assess needs for capacity development in each country.

UN Habitat has been monitoring security of tenure at urban level for more than 20 years in a sample of 1000 cities worldwide, (as part of Habitat Agenda, Urban Indicators Program (1996-2002) and MDGs/SDGS Slum indicator component 2002-2016). This exercise has been undertaken for data from over 124 countries from the developing regions. The results of this analysis are available in the Urban Indicators database maintained by UN-Habitat. These data were derived from census and survey data that were conducted in the last 10 years. Additional data came from specially designed survey tools (Urban inequities survey) that were implemented in selected countries. UN-Habitat is currently updating this data with other spatial measures, and perceived land rights estimations.

The UN-Habitat and World Bank, in collaboration with international agencies and national level statistical organization and national administrative agencies, will strengthen the initiatives of country level data collection, analysis and reporting processes. Working in a harmonized fashion, UN-Habitat, World Bank, and FAO will ensure maintenance of and coordination amongst global databases for monitoring of land tenure security.

8   Responsible entities

This indicator is the product of work by a coalition of institutions, including FAO, Global Donor working Group on Land, Global Land Indicators Initiative – Global Land Tool Network (GLII/GTN) IFAD, International Land Coalition (ILC), UNEP, UN- Habitat, and World Bank. These institutions, all advocated for inclusion of land tenure security indicators to be included in the SDG and have contributed to defining concepts, rationale and definitions, to meta data and will also support measurement, reporting and policy dialogue at the country level, based on the indicators. Compilation & reporting at the global level will be led by UN-Habitat and World Bank

9   Data collection and data release calendar
Data collection will be the responsibility of national agencies. Data collection for administrative data will be on an annual basis; Survey data will be available every 3 to 5 years depending on the frequency.

UN Habitat and World Bank will work closely with country and regional statistical agencies and global partners; provide capacity development support for country data collection, analysis and

reporting, as part of the national statistical capacity development (NSDS), in coordination with UNSD and initiatives to strengthen statistical capacity.

FAO, the World Bank, IFAD, UN Habitat, the Global Donor Working Group on Land, and other partners collaborating in the GLII platform will support capacity strengthening at regional, and country level for data providers and reporting mechanisms; and promoting understanding of this indicator at all levels.

10   Treatment of missing values

11   Sources of differences between global and national figures

12   Regional and global estimates and data collection for global monitoring

13. References

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Connection to other SDG indicators

Goal 5, to 5.a.1 (agricultural people/land) and 5.a.2 (legal framework Goal 5 (5.1.a) and Goal 11 (indicator 11 1.1 & 1.3)

1. Goals and targets addressed

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

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

Indicator 11.1 – Proportion of urban population living in slums, informal settlements or inadequate housing.

Spatial inequalities are generally expressed as segregation of certain population groups, which may indicate poverty as well as inadequate living conditions. Moreover, rapid urbanization, if not well managed, increases informal settlements/housing and poverty. Therefore, to develop appropriate policies it is necessary to identify and quantify the proportion of the population that live in slums, informal settlements or those living in inadequate housing. A prosperous and inclusive city or nation seeks to reduce spatial inequalities and provide comprehensive responses to the challenge of urban poverty.

2. Definition and method of computation

Methodology – This indicator integrates the component of the slums and 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 and developed regions. The inadequate housing component allows capturing housing informality in more developed countries and wealthier urban contexts.

This indicator will focus on documenting the limitations manifested in the right to adequate housing as measured through the proportion of the population that live in slums or informal settlements or who have inadequate housing. The below definitions and concepts are important for reporting on this indicator;

a. Slums – In the wake of the MDGs' launching, an Expert Group Meeting was convened in 2002 by the United Nations Human Settlements Programme (UN-Habitat), the United Nations Statistics Division and the Cities Alliance to agree on an operational definition for slums to be used for measuring the indicator of MDG 7 Target 7.D, 'to have achieved by 2020 a significant improvement in the lives of at least 100 million slum dwellers'. The agreed definition classified a 'slum household' as one in which the inhabitants suffer one or more of the following 'household deprivations': 1) Lack of access to improved water source, 2) Lack of access to improved sanitation facilities, 3) Lack of sufficient living area, 4) Lack of housing durability and, 5) Lack of security of tenure. By extension, the term 'slum dweller' refers to a person living in a household that lacks any of the above attributes (UN-Habitat, 2003a).

These five components – all derived from the 'adequate housing' definition (see below) – have been used, ever since for reporting and tracking of the MDGs, as the primary or secondary data measured to determine the number of slum dwellers living in developing countries, and they were

also the basis to establish the successful achievement of MDG Target 7.D. For each component, the experts agreed with the following definitions (UN-Habitat, 2003b; United Nations, 2007):

Access to improved water – A household is considered to have access to improved drinking water if it has sufficient amount of water (20 litres/person/day) for family use, at an affordable price (less than 10% of the total household income) and available to household members without being subject to extreme effort (less than one hour a day for the minimum sufficient quantity), especially to women and children. An improved drinking water source is a facility that is protected from outside contamination, in particular from faecal matters' contamination. Improved drinking water sources include: piped water into dwelling, plot or yard; public tap/stand pipe serving no more than 5 households; protected spring; rainwater collection; bottled water (if secondary source is also improved); bore hole/tube well; and, protected dug well.

Access to improved sanitation – A household is considered to have access to improved sanitation if an excreta disposal system, either in the form of a private toilet or a public toilet shared with a reasonable number of people, is available to household members. Such improved sanitation facilities, therefore, hygienically separates human waste from human contact. Improved facilities include: flush/pour-flush toilets or latrines connected to a sewer, septic tank or pit; ventilated improved pit latrine; pit latrine with a slab or platform which covers the pit entirely; and, composting toilets/latrines.

Sufficient living area – A dwelling unit provides sufficient living area for the household members if not more than three people share the same habitable room.[4] Additional indicators of overcrowding have been proposed: area-level indicators such as average in-house living area per person or the number of households per area. Additionally, housing-unit level indicators such as the number of persons per bed or the number of children under five per room may also be viable. However, the number of persons per room has been shown to correlate with adverse health risks and is more commonly collected through household surveys (UN-Habitat, 1998).

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

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

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[4] The original EGM's advice considered a range of less than three to four people per habitable room. When this indicator got operationalized during the MDG 7 Target 7. D's tracking, overcrowding was fixed at a maximum of three people per habitable room.

made to integrate the measurement of this component into the computation of the people living in slums.

b. Informal Settlements – Informal settlements are not only found in the developing world, but they thrive in the developed world, too. Similarly, informal housing units are not poverty's peculiarity, but they belong to all income levels. Therefore, informal settlements can be defined (United Nations, 2015; UN-Habitat, 2015b) as residential areas where: 1) inhabitants have no security of tenure vis-à-vis the land or dwellings they inhabit, with modalities ranging from squatting to informal rental housing, 2) the neighbourhoods usually lack, or are cut off from, basic services and formal city infrastructure and 3) the housing may not comply with current planning and building regulations, is often situated in geographically and environmentally hazardous areas, and may lack a municipal permit. Informal settlements can be a form of real estate speculation for all income levels of urban residents, affluent and poor. Slums are the poorest and most dilapidated form of informal settlements.

Informality should be understood as a technicality more than an income-based denomination that stigmatises the poor, therefore informal settlements' estimates should be based on a technical compliance relevant to all income levels. For example, an approved municipal permit for any given housing unit would be a clear indication of formality. If municipalities lack the capacity to deliver such a permit, this is an administrative gap that this indicator will also point out. Most likely, municipalities will be eager to collect the necessary data, as municipal permits entail municipal revenue.

c. Inadequate Housing – Article 25 of the Universal Declaration of Human Rights includes 'adequate housing' as one of the components of the right to adequate standards of living for all. Adequate housing must provide more than four walls and a roof. The United Nations Committee on Economic, Social and Cultural Rights' general comments No.4 (1991) on the right to adequate housing and No.7 (1997) on forced evictions have underlined that the right to adequate housing should be seen as the right to live somewhere in security, peace and dignity. For housing to be adequate, it must, at a minimum, meet the following criteria: 1) Legal security of tenure, which guarantees legal protection against forced evictions, harassment and other threats; 2) Availability of services, materials, facilities and infrastructure, including safe drinking water, adequate sanitation, energy for cooking, heating, lighting, food storage or refuse disposal; 3) Affordability, as housing is not adequate if its cost threatens or compromises the occupants' enjoyment of other human rights; 4) Habitability, as housing is not adequate if it does not guarantee physical safety or provide adequate space, as well as protection against the cold, damp, heat, rain, wind, other threats to health and structural hazards; 5) Accessibility, as housing is not adequate if the specific needs of disadvantaged and marginalized groups are not taken into account (such as the poor, people facing discrimination; persons with disabilities, victims of natural disasters); 6) Location, as housing is not adequate if it is cut off from employment opportunities, health-care services, schools, childcare centres and other social facilities, or if located in dangerous or polluted sites or in immediate proximity to pollution sources; 7) Cultural adequacy, as housing is not adequate if it does not respect and take into account the expression of cultural identity and ways of life.

The measurement of 'inadequate housing' is meant to complement that of slums, and informal settlements particularly in the developed world where the 'slum household' definition is less applicable, ensuring the universality of Indicator 11.1. Even though countries with available data could measure the full spectrum of the adequate housing components, for the purpose of measurability it is recommended that only one of the elements of the adequate housing definition

is selected for measurement. Affordability is not only a key housing adequacy criterion, but it is the most suitable means of measurement for inadequate housing, as affordability increasingly becomes a global crisis with strong negative impact on the wellbeing of people and on the exacerbation of urban inequality. The underlying principle is that household's financial costs associated with housing should not threaten or compromise the attainment and satisfaction of other basic needs such as, food, education, access to health care, transport, etc. Based on the existing method and data through the Urban Indicators Program (1996-2006), affordability is measured as the net monthly expenditure on housing cost that exceeds 30% of the total monthly income of the household.

Method of computation – This indicator considers three components to be computed as follows:

a) Slum households (SH): $= 100 \left[\dfrac{Number\ of\ people\ living\ in\ slum}{City\ population} \right]$

b) Informal settlements households (ISH):

$$= 100 \left[\dfrac{No.\ of\ people\ living\ in\ informal\ settlements\ households}{City\ population} \right]$$

c) Inadequate housing households (IHH): $= 100 \left[\dfrac{No.\ of\ people\ living\ in\ inadequate\ housing}{City\ population} \right]$

The unit of measurements for all these indicators will be %. At a later stage an index of measurements will be developed that will incorporate all measures and provide one estimate.

The data for this indicator is already being reported in nearly all developing countries on slums indicator. We expect to carry this success, lessons learnt and experiences to the reporting of informal settlements and inadequate housing data for all countries.

3. Rationale and interpretation

As the Millennium Development Goals (MDGs) are turning a page, the unprecedented proliferation of slums and informal settlements, and a chronic lack of adequate housing, continue to be amongst the major challenges of urbanisation. Slums, informal settlements and inadequate housing are the face of poverty and inequality in cities, and no transformative action will be achieved in the world without addressing the challenge of urban poverty represented by them. Therefore, it is necessary to further ensure access for all to adequate housing and basic services and upgrade slums, for the full recognition of the urban poor as rightful urban dwellers, for realising their potential and for enhancing their prosperity, and thus the prosperity of the whole urban environ.

This indicator is extremely relevant since it is partly a continuation of the MDGs (Target 7.D). As per all the agreed goals and targets, to measure the achievement of this indicator will require the mobilisation of the means required to efficiently monitor them, calling up for a revitalised partnership with the participation of all countries, all stakeholders and all communities concerned.

Today, in our world, one in eight people live in slums (UN-Habitat, 2016; UN-Habitat, 2015b).[5] This means that a quarter of the world's urban population are slum dwellers. In several cities, poor families struggle to access adequate housing. Living in central locations often equals to inadequate living conditions, while living in peripheries, where housing can be more affordable, entails deprivation of basic services, urban amenities and access to livelihoods.

Slum upgrading and adequate housing have an equalizing impact in the distribution of prosperity, thus helping urban environs to be inclusive and end urban poverty in the world.

In order to address the wording proposed by Target 11.1 and Indicator 11.1, and to provide a statistical continuity between MDGs and SDGs in what refers to the people living in slums, the five components of the 'slum household' definition (access to water, access to sanitation, structural durability, overcrowding and security of tenure) must form the basis to monitor SDG 11 Target 11.1, complemented by the extra indicators that will allow measurements referring to informal settlements and inadequate housing, respectively.

One extra indicator for inadequate housing and one for informal settlements – totalling seven variables to be measured – could keep the tracking of this target manageable. In the case of informal settlements, the existence of a municipal permit is a workable means of measurement, while inadequate housing could be effectively measured through affordability criteria, as at least 330 million households around the world are financially stretched by housing costs (McKinsey Global Institute, 2014).

4. Disaggregation[6]

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

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[5] 881,080,000 slum dwellers are estimated to be living in developing countries, only.

[6] 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.

• 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 approved municipal permit

• Proportion of households with (in)adequate housing (affordability)

5. Sources and data collection processes

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

UN-Habitat will continue to provide technical support on the estimation of this indicator and its recent integration of spatial and risk analysis and the disaggregation of the information at city level will be further expanded for this indicator. So far, UN-Habitat collects information related to slums and improved shelter as part of the City Prosperity Initiative (CPI) including several other 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 1000 cities around the world. The method of data collection and the use of this information are critical for the understanding of indicator 11.1. The inadequate housing component of the indicator has extensive evidence, studies and analysis that have been undertaken using collected data and some of these documents are listed as part of biographic references.

6. Comments and limitations

Different local characteristics of poor housing units around the world and the under recognition of the slum challenge by some concerned authorities and stakeholders have made it difficult to agree universally on some definitions and characteristics when referring to poor informal housing.

The lack of appropriate tools at national and city levels to measure all the components required to monitor indicator 11.1 has often brought challenges for statistics offices to reliably include all components that measure slums, sometimes resulting in the underestimation of poor housing units or slum households. We have scheduled several technical workshops and EGMs that will help build the capacity for reporting in the first 3 years of the 2030 Agenda for Sustainable Development.

In the case of security of tenure, its complicated relation with land and property makes it a difficult aspect to include in the different related surveys and, therefore, to measure and monitor due to lack of routine data. However, the most recent years, important progress has been made to integrate the measurement of this component into major surveys and censuses in several countries.

Also, Indicator 11.1 does not capture homelessness, as it is not included in household surveys.

Finally, many countries still have limited capacities for data management, data collection and monitoring, and continue to grapple with limited data on large or densely populated geographical areas. This means that complementarity in data reporting will be key to ensure that both national and global figures achieve consistencies in the final reported data.

7. Current data availability/indicator tier

Data on slums is available for all developing countries as it has been reported by UN-Habitat in the Millennium Development Goals' reports in a yearly basis. Recently, UN-Habitat has disaggregated information on this indicator at city level, increasing its suitability for SDG 11, its target and indicators. The people living in slums' 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 proposed the collection of data on this indicator worldwide.

8. Responsible entities

This indicator has largely been successfully due to the collaborations between several organizations and institutions including UN- Habitat, UNEP, Cities Alliance, Slum dwellers International, and World Bank. There are several other experts who have also contributed to the development of the concepts, rationale and definitions, and metadata and will also support measurement, reporting and policy dialogue at the country level, based on the indicators.

For primary reporting, National data provider especially the Statistical agencies will play an important role of generation of the primary day through census and surveys. Final Compilation & reporting at the global level will be led and guided by UN-Habitat and selected partners.

9. Data collection and data release calendar

All major surveys and census data collection process will continue to incorporate the aspects/components necessary for reporting on this indicator. The monitoring of this indicator will be repeated at regular intervals of 3-5 years, allowing for three-five year reporting points until the year 2030.

10. Treatment of missing values

All countries are expected to fully report on this indicator more consistently with few challenges where missing values will be reported at the national/global level. At the national level, it is possible that missing values will be recorded perhaps representing gaps of non-measurements among populations whose status of slum-hood or informality or inadequate housing is not recorded or unknown or where data is unavailable. Because the values will be aggregated at the national levels, missing values will be less observed at these levels, but are likely to affect the estimates. At the survey and data collection level, survey procedures for managing missing values will be applied based on the unit of analysis/ primary sampling units. Global estimates will be adjusted with modelling based on trends to cater for missing information or data.

11. Sources of differences between global and national figures

As national agencies are responsible for data collection, no differences between country produced data and international estimated data on the indicator are expected to arise if standard

methodologies and procedures are followed at all stages of the reporting process. Missing data and other local variables and frequency of data collection usually affects the figures reported at the global and national level. For this indicator, national data will be used to derive global figures. In instances where global values differ from national figures, efforts will be made for harmonization. There are many instances where lack of new data will be replaced with modeled data for the global figures. These figures will be acceptable for reporting at the national and global levels with the relevant notes attached to such figures. This is likely to be the case for countries where they have long intervals of collection of new data, or where countries face unstable situations such post-disaster or post-war years.

12. Regional and global estimates and data collection for global monitoring

Regional and global estimates will be derived from national figures with an appropriate disaggregation level. Specialized tools will be developed and agreed upon with local and international stakeholders. Systems of quality assurance on the use of the tools, analysis and reporting will be deployed regionally, and global to ensure that standards are uniform and that definitions are universally applied.
We expect that investments in improved data collection and monitoring at country level will produce incentives for governments to improve reporting and performance and also greater readiness to engage with multiple stakeholders in data collection and analysis and in achieving better understanding of the strengths and weaknesses of existing slum definitions and their applications.

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Connection to other SDG 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.

1. Goals and targets addressed

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

Indicator 11.2.1 Proportion of the population that has convenient access to public transport disaggregated by age group, sex, and persons with disabilities

2. Definition and method of computations

This indicator aims to successfully monitor the use and access of public transportation system and move towards easing the reliance on the private means of transportation, improving the access to areas with a high proportion of transport disadvantaged groups such as elderly citizens, physically challenged individuals, and low income earners or areas with specific dwelling types such as high occupancy buildings or public housing and reducing the need for mobility by decreasing the number of trips and the distances travelled. The accessibility based urban mobility paradigm also critically needs good, high-capacity public transport systems that are well integrated in a multimodal arrangement with public transport access points located within comfortable walking or cycling distances from homes and jobs for all.

This indicator will be monitored by the proportion of the population that <u>has convenient access to public transport</u>. 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 **convenient** 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:

    a. Public transport accessible to all special-needs customers, including those who are physically, visually, and/or hearing-impaired, as well as those with temporary disabilities, the elderly, children and other people in vulnerable situations.

    b. Public transport with frequent service during peak travel times

    c. Stops present a safe and comfortable station environment

The following definitions are required to ably define what is convenient access: - which 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.

Method of Computation
This indicator is computed based on the following criteria.

a) <u>The identification of service areas</u> 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 we will use the public transport stop as the point of service.

b) <u>The identification of the population served</u>
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, P_{ij} . Hence

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

Where, P_{ij} 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;

$$\%with\ access\ to\ Public\ transport$$

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

Additional methodological comments:
The method to estimate the proportion of the population that has convenient access to public transport is based on **four** steps:
a) Spatial analysis to delimit the built-up area of the urban agglomeration
b) Inventory of the public transport stops in the city or the service area;
c) Estimation of urban area with access to public transport;
d) Estimation of the proportion of the population with convenient access out of the total population of the city.

a. 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 kilometers). Area of delimitation should be aligned with census enumeration areas to match with demographic data.

b. 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 outdated, 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.

c. 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.

d. 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.

Complementary to the above, other parameters of tracking the transport target include the following:

- **Accessibility related to urban planning**: this parameter can be measured using density (people/sq.km) from census surveys, Percentage of street space in cities and No. of Intersections/Square Km from analysis of earth observations/city maps. Density is an important determine for the efficiency of public transport systems. The adequacy of streets and crossings determine urban accessibility to a great extent.
- **Accessibility related to transport planning:** this parameter can be measured using Percentage of population within 500m of mass transit stop from City maps and sample survey data.
- **Affordability:** this can be obtained from Percentage of household income of lowest quintile of population spent on transport from Sample surveys and WTP surveys. Poorest quintile should not spend more than 5% (TBD) on transport.
- **Quality:** this parameter can be measured using travel time, universal access, safety, security, comfort and user information from sample surveys.
- **Modal shift to sustainable transport:** this is also expressed in Modal share (cars, NMT, PT), Passenger KM travelled on EV as percentage of total passenger KM travelled in urban areas from City mobility surveys. This parameter is also important due to transport's contribution to carbon emissions and air quality issues in cities.

3. Rational and interpretation

The ability of residents including persons with disabilities and businesses to access markets, employment opportunities, and service centres such as schools and hospitals is critical to urban economic development. Recognizing this people mobility, the transport system provides access to resources and employment opportunity. Moreover, accessibility allows planners to measure the effects of changes in transport and land use systems. The accessibility of jobs, services and markets also allow policymakers, citizens and businesses to discuss the state of the transport system in the comprehensible way. Transportation system is a critical enabler of economic activities and social inclusion. The access to transport SDG indicator addresses a significant gap that was never addressed by the MDGs i.e. directly addressing transport as a critical enabler of economic activities

and social inclusion. Already, the "externalities" associated with transport in terms of Green House Gas Emissions, traffic congestion and road traffic accidents have been increasing. Emissions from transport are now responsible for 23% of global Green House Gas Emissions and are increasing faster than any other source; outdoor air pollution alone, a major source of which is transport, is responsible for 3.7 million deaths annually, road traffic accidents kill more than 1.2 million people every year and severe traffic congestion is choking cities and impacting on GDPs. Achieving SDG 11 requires a fundamental shift in the thinking on transport- with the focus on the *goal* of transport rather than on its *means.* With *accessibility* to services, goods and opportunities for all as the ultimate goal, priority is given to making cities more compact and walkable through better planning and the integration of land-use planning with transport planning. The means of transport are also important but the SDG's imperative to make the city more inclusive means that cities will have to move away from car-based travel to public transport and active modes of transport such as walking and cycling with good inter-modal connectivity.

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 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 CO_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.

4. Disaggregation
Information can be disaggregated by age and sex, including potential disadvantages such as disability, but it requires strong efforts and changes in mainstream mechanisms of data collection.
- 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** (household's 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.

5. Sources and data collection processes

The actual and recommended data sources for this indicator are the following:

- 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 0.5 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.

6. Comments and 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.

It is also recognized 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.

7. Current data availability/indicator tier

This indicator is categorized under **Tier II** of which the indicator is conceptually clear and an established methodology exists but data is not easily available.

No internationally agreed methodology exists for measuring convenience and service quality of public transport. In addition, global/local on urban transport systems do not exist. Moreover, data is not harmonized and comparable at the global level. Obtaining this data will require collecting it at municipal/city level with serious deficiencies in some areas such as data on mass transit and on transport infrastructure. In addition, an open-source software platform for measuring accessibility, the Open Trip Planner Analyst (OTPA) accessibility tool, will be available to government officials and all urban transport practitioners. This tool was developed by the World Bank in conjunction with Conveyal (http://conveyal.com), this tool leverages the power of the OTPA engine and open standardized data to model block-level accessibility. The added value of the tool (free and user friendly) is its ability to easily calculate the accessibility of various opportunities and transportation scenarios. An Expert group meeting is planned later in 2016 that will harmonize the tools and existing data to ensure a more uniform and standard format for reporting on this indicator.

8. Responsible entities

National Focal points as designated by respective Governments underpins the governance framework for monitoring the Transport Target. Such focal points could be the ministries themselves, NSOs, academic or research institutions, Civil Society Organizations, operators or a combination of these working under an agreement facilitated by the National Government. A secretariat or resource center, comprising UN-Habitat and its partner organizations will work with the National Focal Points, providing capacity building and quality assurance support. The resource center will also ensure the exchange of knowledge and experience between participating countries. Specific agreements will be drawn up with respective countries and cities for collaboration in the monitoring. The monitoring framework will be disseminated in UITP and other transport events. A dedicated team combining UN-Habitat and the International Association of Public Transport (UITP) staff will be set up and these will lead the annual monitoring and reporting. Comprehensive reporting will be undertaken on a biennial basis. Reports will be published in the public domain with data available in the UN-Habitat global databases.

9. Data collection and data release calendar

The monitoring of the indicator can be repeated at an annual interval, allowing several reporting points until the year 2030. Monitoring at 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 monitor 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 within short term intervals. Moreover, the disaggregated monitoring for this indicator will provide increasing attention on the access to transport especially among the vulnerable populations such as women, children, persons with disabilities and older persons.

10. Treatment of missing values

Missing data is anticipated in the first few years of collection of data for this indicator, and this will be largely as a result of the slow adoption of the proposed methodology by the national governments and statistical systems. The spatial nature of the indicator and the variations in the definitions of what is public transport by countries will all affect the availability of data. Hence missing data for selected countries will be scored incrementally based initially on whether an existing public transport system is in place or not. If public transport is in place, then a modelled level of availability will be used to estimate a score instead of reporting zero. This methodology will be further developed and refined at the first technical working group/EGM for this indicator.

11. Sources of differences between global and national figures

For this indicator, national data complemented with internationally available spatial data sources will be used to derive final estimates for reporting at national and global figures. As national agencies are responsible for data collection, no differences between country produced data and international estimated data on the indicator are expected to arise. Where such discrepancies exist, these will be resolved through planned technical meetings and capacity development workshops.

12. Regional and global estimates and data collection for global monitoring
Based on the global SDG monitoring framework, national statistical agencies/national governments will be primarily responsible for data compilation at the national level, and they will manage and resolve the differences observed at that level. At the Global level, all this data will be assembled and compiled for international consumption and comparison by the UN-Habitat and other partners. UN-Habitat and partners will explore several capacity building options to ensure that uniform standards for generation, reporting and analyzing data for this indicator are applied by all countries and regions.

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6. http://www.slocat.net/content-stream/187
7. https://www.jtlu.org/index.php/jtlu/article/view/683/665
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1. Goals and targets addressed

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.

Indicator11.3.1 Ratio of land consumption rate to population growth rate –Land use efficiency

2. Definition and method of computations

This indicator requires defining the two components of population growth and land consumption rate. Computing the population growth rate is more straightforward and more readily available, while land consumption rate is slightly challenging, and requires the use of new techniques. In estimating the land consumption rate, one needs to define what constitutes "consumption" of land since this may cover aspects of "consumed" or "preserved" or available for "development" for cases such as land occupied by wetlands. Secondly, there is not one unequivocal measure of whether land that is being developed is truly "newly-developed" (or vacant) land, or if it is at least partially "redeveloped". As a result, the percentage of current total urban land that was newly developed (consumed) will be used as a measure of the land consumption rate. The fully developed area is also sometimes referred to as built up area.

Population growth rate (PGR) is the increase of a population in a country during a period, usually one year, expressed as a percentage of the population at the start of that period. It reflects the number of births and deaths during a period and the number of people migrating to and from a country.

Land consumption includes: (a) The expansion of built-up area which can be directly measured; (b) the absolute extent of land that is subject to exploitation by agriculture, forestry or other economic activities; and (c) the over-intensive exploitation of land that is used for agriculture and forestry.

Method of Computation
The formula to estimate the land use efficiency will be provided with two stages.

Stage 1: Estimate the population growth rate.
Population Growth rate i.e. $PGR = \frac{LN(Pop_{t+n}/Pop_t)}{(y)}$

Where
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
y   The number of years between the two measurement 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 $LCR = \frac{LN(Urb_{t+n}/Urb_t)}{(y)}$

Where
Urb_t Total areal extent of the urban agglomeration in km^2 for past/initial year
Urb_{t+n} Total areal extent of the urban agglomeration in km^2 for current year
y   The number of years between the two measurement periods

The formula to estimate the ratio of land consumption rate to population growth rate (LCRPGR) is provided as follows:

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

And the overall formula can be summarized as:

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

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

3. Rationale and interpretation

Globally, land cover today is altered principally by direct human use: by agriculture and livestock raising, forest harvesting and management and urban and suburban construction and development. A defining feature of many of the world's cities is an outward expansion far beyond formal administrative boundaries, largely propelled by the use of the automobile, poor urban and regional planning and land speculation. A large proportion of cities both from developed and developing countries have high consuming suburban expansion patterns, which often extend to even further peripheries. A global study on 120 cities shows that urban land cover has, on average, grown more than three times as much as the urban population [1]; in some cases, similar studies at national level showed a difference that was three to five times fold. [3]. In order to effectively monitor land consumption growth, it is not only necessary to have the information on existing land use cover but also the capability to monitor the dynamics of land use resulting out of both changing demands of increasing population and forces of nature acting to shape the landscape.

Cities require an orderly urban expansion that makes the land use more efficient. They need plan for future internal population growth and city growth resulting from migrations. They also need to

accommodate new and thriving urban functions such as transportation routes, etc., as they expand. However, frequently the physical growth of urban areas is disproportionate in relation to population growth, and these results in land use that is less efficient in many forms. This type of growth turns out to violate every premise of sustainability that an urban area could be judged by including impacting on the environment and causing other negative social and economic consequences such as increasing spatial inequalities and lessening of economies of agglomeration. This indicator is connected to many other indicators of the SDGs. It ensures that the SDGs integrate the wider dimensions of space, population and land adequately, providing the framework for the implementation of other goals such as poverty, health, education, energy, inequalities and climate change. The indicator has a multipurpose measurement as it is not only related to the type/form of the urbanization pattern. It is also used to capture various dimensions of land use efficiency: economic (proximity of factors of production); environmental (lower per capita rates of resource use and GHG emissions); social (reduced travel distance and cost expended). Finally, this indicator integrates an important spatial component and is fully in line with the recommendations made by the Data Revolution initiative.

4. Disaggregation

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 amount of urban expansion (km^2)
  Percentage of urban expansion in relation to the urban footprint area

5. Sources and data collection processes

Data for this indicator is available for all cities and countries (UN DESA population data) and satellite images from open sources. Several sources of information are required for this computation: Satellite imagery from open sources or the exact measurements in km squared of the built up areas or the 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. 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.

6. Comments and 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 face this challenge, the baseline/benchmark of population density and its change over time must be taken into consideration. Reducing densities below sustainable levels have impacts on the cities' sustainability.

 In the absence of the GIS layers, this indicator may not be computed as defined. As a result, more alternative measures for using know land that is developed or consumed per year can be adequately used. Alternatively, one can monitor the efficient use of urban land by measuring how well we are achieving the densities in residential zones that any city plans or international guidance call for. Comparing achieved to planned densities is very useful at the city level. However, planned densities vary greatly from country to country, and at times from city to city. At the sub-regional or city levels, it is more appropriate to compare average densities achieved currently to those achieved in the recent past. While building more densely does use land more efficiently, high density neighbourhoods, especially in and around urban centres, have a number of other advantages. They support more frequent public transportation, and more local stores and shops; they encourage pedestrian activity to and from local establishments; and they create lively (and sometimes safer) street life.

7. Current data availability/indicator tier

This indicator is categorized under Tier II of which the indicator is conceptually clear and an established methodology exists but data on many countries is not yet available. The Global Human Settlement Layer (GHSL) technology open framework is proposed for global open spatial baseline data production (built-up and population grids) – global open data is available and will be updated by EU support plus international partnership, the tools will be opened to national Authorities by a new platform and capacity building program that will be soon made available with the support of the EU and Habitat. Every country will soon be able to build their own set of built-up and population grids, or to use the globally-available ones.

8. Responsible entities

UN-Habitat and other partners such as the Global Human Settlement Layer (GHSL) team and ESRI will support various components for reporting on this indicator. The global responsibility of building the capacity of national governments and statistical agencies to report on this indicator will be led by UN-Habitat. National governments/national statistical agencies will have the primary responsibility of reporting on this indicator at national level with the support of UN-Habitat to ensure uniform standards in analysis and reporting.

9. Data collection and data release calendar

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

10. Treatment of missing values

All countries are expected to fully report on this indicator more consistently after a 2-3 years with few challenges where missing values will be reported due to missing base map files. Therefore, any missing values will be representative of populations where either population growth figures are unavailable or land consumption rates are inestimable. Because the values will be aggregated at the national levels from a national sample of cities, missing values will be less observed at national, regional and global levels.

11. Sources of differences between global and national figures

Based on several consultations, we note that in order to calculate the land use efficiency ratio we must stabilize the definition of population and spatial footprint of the city which is literally defined as "urban extension". Unclear spatial definitions and an occasional use of admin boundaries arbitrarily set for population and surface accounting creates more spatially-generated noise than right signals in the final accounting of the indicators. Already some spatial noise is particularly created by the use of ratios. The following data sources will be harmonized to ensure more consistent reporting on this indicator--Satellite data, built-up areas grids, time-standardized census population grids; globally complete classification grids can be aggregated to admin units but may create inconsistencies if they are not available for all cities, allowing to classify them by dominance of the urban/rural surfaces or similar approaches.

12. Regional and global estimates and data collection for global monitoring

Data at the regional levels will be estimated from national figures derived from national sample of cities. Regional estimates will incorporate national representations using a weighting by population sizes. Global monitoring will be led by UN-Habitat with the support of other partners and regional commissions.

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[4] http://unhabitat.org/books/construction-of-more-equitable-cities/
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1. Goals and targets addressed

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.

Indicator11.3.2 Proportion of cities with a direct participation structure of civil society in urban planning and management that operate regularly and democratically.

2. Definition and method of computations

The development of sustainable human settlements calls for the active engagement of civil society organizations, as well as broad-based people's participation. Therefore city governments should strive to; a) facilitate and protect peoples participation and civic engagement through independent CBOS, NGOS that can be from diverse backgrounds-local, national, and international; b) promote civic and human rights education and training programmes to make city residents aware of their civil rights and the changing roles of women and men in the city; c) remove the barriers that block participation of socially marginalized groups and promote non-discrimination and the full and equal participation of women, youth and vulnerable and disadvantaged groups.

To measure participatory planning, a score-card approach representing the level of public participation in urban planning process as perceived by the city residents will be used.

Method of computation

A questionnaire with 5-point Likert scale (very low, low, moderate, high and very high) is used to test the level of participation from objective viewpoint:

1. Level of citizen involvement in urban income and expenditure agreements,
2. Supervision and criticism on the performance of urban management,
3. Membership in social foundations and organizations,
4. level and diversity of cooperation in city planning/budgeting/procurements
5. Participation in urban planning designs and agreements.

Level of citizen involvement in urban income and expenditure agreements. The level of citizen involvement or participatory planning in urban income expenditure can be categorized in the following Likert scale: 1-very low, 2-low, 3- moderate, 4- high, 5- very high

	Very low (1)	Low (2)	Moderate (3)	High (4)	Very high (5)
Level of citizen involvement in urban income and expenditure agreements					

Once each of the 5 categories is evaluated as shown in the table above, the following averaged value gives a final value of the indicator.

	Evaluator (1)	Evaluator (2)	Evaluator (3)	Evaluator (4)	Evaluator (5)	Average respondent score
Level of citizen involvement in urban income and expenditure agreements	X_1	X_2	X_3	X_4	X_5	$Q_x = (X_1 + \ldots + X_5)/5$
Level of participatory planning in supervision and criticism on the performance of urban management	Y_1	Y_2	Y_3	Y_4	Y_5	$Q_Y = (Y_1 + \ldots + Y_5)/5$
Level of participatory planning in membership in social foundations and organizations	Z_1	Z_2	Z_3	Z_4	Z_5	$Q_Z = (Z_1 + \ldots + Z_5)/5$
level and diversity of cooperation in city planning/budgeting/procurements	W_1	W_2	W_3	W_4	W_5	$Q_W = (W_1 + \ldots + W_5)/5$
Level of participation in urban planning designs and agreements	V_1	V_2	V_3	V_4	V_5	$Q_Y = (V_1 + \ldots + V_5)/5$

The final value of the assessment B= $(Q_x + Q_y + Q_z + Q_w + Q_y)/5$

3 Rationale and Interpretation

Due to the inefficiency caused by the top-down approach which give people little or no chance for decision-making in developments and in addressing needs in their settlements. Local Authorities and Governments have recognized the value of residents' participation and strengthening the capacities in the planning processes. This people centered approach is used in planning and implementation of community projects and remains one of the key methodologies being developed to address priority development issues at citywide or at more local levels such as the civic ward. Public participation ensures a positive relationship between government and public by communicating effectively and solving the conflicts in a gentler way. In many cases when people see urban planning decisions made without letting them know, they act radically, which results to potentially explosive situation of the society. Ensuring that a wide variety of opinions are considered assist the decision makers with understanding the interlinked nature of problems facing the city.

Urban planning is a reflection of ideology and national institution. Public participation means agreement it greatly enhances political interaction between citizens and government, and enhances the legitimacy of the planning process and the plan itself. A plan would be more effective if a broad coalition supports the proposal and works together to deliver it.

Public participation also shows respect to participators' opinion and boost their enthusiasm for citizenship and politics, and strengthen their influence in urban planning and public life. When conflicting claims and views are considered, there is a much higher possibility that public trust and passion increases in the final outcome. This has broader implications for building an active civil society.

4. Disaggregation
Potential Disaggregation:
• Disaggregation by **location** (intra-urban),
- Gender-leadership participation

5. Sources and data collection processes
Regular surveys and other city level surveys/score-cards to monitor participation.

6. Comments and limitations
The indicator measures the level of participation based on the perception of the city residents and might not be comparable across all cities

7. Current data availability/indicator tier
No available data

8. Responsible entities
UN-Habitat and other partners will support various components (systems, tools development and capacity strengthening, etc.) for reporting on this indicator. The global responsibility of building the capacity of national governments and statistical agencies to report on this indicator will be led by UN-Habitat. National governments/national statistical agencies will have the primary responsibility of reporting on this indicator at national level with the support of UN-Habitat to ensure uniform standards in analysis and reporting.

9. Data collection and data release calendar
The monitoring of the indicator can be repeated at regular intervals of 3 years, allowing for five reporting points until the year 2030.

10. Treatment of missing values
All countries are expected to fully report on this indicator more consistently after a 2-3 years with few challenges where missing values will be reported.

11. Sources of differences between global and national figures
None expected

12. Regional and global estimates and data collection for global monitoring

Data at the regional levels will be estimated from national figures derived from national sample of cities. Regional estimates will incorporate national representations using a weighting by population sizes. Global monitoring will be led by UN-Habitat with the support of other partners and regional commissions.

13. References

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14. Relation with other indicators

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; 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; 7.1.1 Access to Electricity; 7.2.1 Share of renewable energy;

8.1.1 City Product per Capita; 8.2.1 Growth rate per employment; 8.5.2 Unemployment Rate; 11.6.1 Solid Waste Collection; 11.7.2 Public Space Safety for Women; 11.b.1 Disaster Risk Reduction Strategies.

1. Goals and targets addressed

Target 11.4: Strengthen efforts to protect and safeguard the world cultural and natural heritage.

Indicator 11.4.1: Total expenditure (public and private) per capita spent on the preservation, protection and conservation of all cultural and natural heritage, by type of heritage (cultural, natural, mixed, World Heritage Centre designation), level of government (national, regional, and local/municipal), type of expenditure (operating expenditure/investment) and type of private funding (donations in kind, private non-profit sector, sponsorship)

2. Definition and method of computations

This indicator measures the per capita expenditure (public and private) in the preservation, protection and conservation of cultural and/or natural heritage over time. The following definitions are used for the computation of this indicator

Cultural heritage: The heritage that includes artefacts, monuments, a group of buildings and sites that have a diversity of values including symbolic, historic, artistic, aesthetic, ethnological or anthropological, scientific and social significance.

Natural heritage: The natural features, geological and physiographical formations and delineated areas that constitute the habitat of threatened species of animals and plants and natural sites of value from the point of view of science, conservation or natural beauty. It includes nature parks and reserves, zoos, aquaria and botanical gardens.

Conservation of cultural heritage refers to the measures taken to extend the life of cultural heritage while strengthening transmission of its significant heritage messages and values. In the domain of cultural property, the aim of conservation is to maintain the physical and cultural characteristics of the object to ensure that its value is not diminished and that it will outlive our limited time span.

Conservation of natural heritage refers to the protection, care, management and maintenance of ecosystems, habitats, wildlife species and populations, within or outside of their natural environments, in order to safeguard the natural conditions for their long-term permanence.

Preservation: the aim of preservation is to obviate damage liable to be caused by environmental or accidental factors, which pose a threat in the immediate surroundings of the object to be conserved. Accordingly, preventive methods and measures are not usually applied directly but are designed to control the microclimatic conditions of the environment with the aim of eradicating harmful agents or elements, which may have a temporary or permanent influence on the deterioration of the object.

Protection: The act or process of applying measures designed to affect the physical condition of a property by defending or guarding it from deterioration, loss or attack, or to cover or shield the

property from danger or injury. In the case of buildings and structures, such treatment is generally of a temporary nature and anticipates future historic

Preservation treatment; in the case of archaeological sites, the protective measure may be temporary or permanent.

Public expenditure refers to spending of public authorities at all levels. Expenditure that is not directly related to culture and natural heritage is, in principle not included. Public expenditure in preservation, protection and conservation of national cultural and/or natural heritage covers direct expenditure (including subsidies), transfers and indirect expenditures including tax incentives

Private expenditure refers to privately funded part of expenditure preservation, protection and conservation of national cultural and/or natural heritage and includes, but is not limited to: donations in kind, private non-profit sector, sponsorship.

Method of computation

3. Rationale and Interpretation

This indicator illustrates how financial efforts/actions made by public authorities, both at the local, national and international levels, alone or in partnership with civil society organizations (CSO) and the private sector, to protect and safeguard the world's cultural and natural heritage has a direct impact in making cities and human settlements more sustainable. This means that cultural resources and assets are safeguarded to keep attracting/to attract people (inhabitants, workers, tourists, etc.) and financial investments, to ultimately enhance the total amount of expenditure. This indicator is a proxy to measure the target.

4. Disaggregation
Disaggregation by type of heritage (cultural, natural, mixed), WHC designated
Disaggregation by level of government (national, regional, local/municipal) Disaggregation by type of expenditure: operating expenditure/investment
Disaggregation by type of private funding: donations in kind, private non-profit sector, sponsorship
Quantifiable derivatives (1). Comparison of the relative expenditures in heritage with GDP per capita of countries which will provide a complementary measure of a nation's capacities and levels of development.

5. Sources and Data Collection Process

Information from several different data sources is needed to assess: 1) public expenditure 2) private expenditure
The following data is necessary to estimate this indicator:
- Total public expenditure dedicated to the preservation, protection and conservation of cultural and natural heritage
- Total private expenditure dedicated to preservation, protection and conservation of national cultural natural heritage
- Population data (all individuals)

6. Comments and limitations

The availability of public expenditure in culture will vary between countries.
The availability of private expenditure in culture will vary between countries.
This indicator covers public and private monetary investments in heritage. It does not measure nonmonetary factors such as national regulations or national/local policies for the preservation, protection and conservation of national cultural and/or natural heritage including World Heritage. These policies could take the form of fiscal incentives such as tax benefits for donations or sponsorships.

7. Current data availability/indicator tier
None

8. Responsible entities

A data collection mechanism will need to be developed.
International definitions and concepts that will support the harmonization of the data and indicators for cultural and natural heritage will be defined according to the 2009 UNESCO Framework for cultural statistics.
The use of existing international classifications such as the Classification of the Function of the Government (COFOG) could be used.
The measurement of private expenditure will require more micro-level financial data and will require a new survey. The survey should consider collecting financial information from a wide range of institutions including foundations and other non-for-profit organizations'; corporate sponsorship and philanthropy; private donations (individuals and other legacies).
UNESCO-UIS will monitor the indicator.

9. Data collection and data release calendar
10. Treatment of missing values
11. Sources of differences between global and national figures
12. Regional and global estimates and data collection for global monitoring
13. References
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9. Council of Europe, Ericarts. Monitoring Public Cultural Expenditure in Selected European
10. Countries 2000-2013.
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14. Relation with other indicators

Target 4.7: By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and nonviolence, global citizenship and appreciation of cultural diversity and of culture's contribution to sustainable development.

Target 8.3: Promote development-oriented policies that support productive activities, decent job creation, entrepreneurship, creativity and innovation, and encourage the formalization and growth of micro-, small- and medium-sized enterprises, including through access to financial services

Target 8.9: By 2030, devise and implement policies to promote sustainable tourism that creates jobs and promotes local culture and products

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

1. Goals and targets addressed

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**.**

Indicator 11.5.1: Number of deaths, missing persons and persons affected by disaster per 100,000 people

An open-ended intergovernmental expert working group on indicators and terminology relating to disaster risk reduction established by the UN General Assembly (A/RES/69/284) is developing a set of indicators to measure global progress in the implementation of the Sendai Framework. These indicators will eventually reflect the agreements on the Sendai Framework indicators.

2. Definition and method of computations

Death: The number of people who died during the disaster, or directly after, as a direct result of the hazardous event

Missing: The number of people whose whereabouts is unknown since the hazardous event. It includes people who are presumed dead although there is no physical evidence. The data on number of deaths and number of missing are mutually exclusive.
Affected people: People who are affected by a hazardous event.

Comment: People can be affected directly or indirectly. Affected people may experience short-term or long-term consequences to their lives, livelihoods or health and in the economic, physical, social, cultural and environmental assets.

*Directly affected***:** People who have suffered injury, illness or other health effects; who were evacuated, displaced, relocated; or have suffered direct damage to their livelihoods, economic, physical, social, cultural and environmental assets.

Indirectly affected: People who have suffered consequences, other than or in addition to direct effects, over time due to disruption or changes in economy, critical infrastructures, basic services, commerce, work or social, health and physiological consequences.
In this indicator, given the difficulties in assessing the full range of all affected (directly and indirectly), UNISDR proposes the use of an indicator that would estimate "directly affected" as a proxy for the number of affected. This indicator, while not perfect, comes from data widely available and could be used consistently across countries and over time to measure the achievement of the Target B.

From the perspective of data availability and measurability, it is proposed to build a composite indicator which consists of "**directly affected",** or those who are

- Injured or ill,
- Evacuated,
- Relocated and to measure the number who suffered direct damage to their livelihoods or assets,
- People whose houses were damaged or destroyed
- People who received food relief aid.

Injured or ill: The number of people suffering from physical injuries, trauma or cases of disease requiring immediate medical assistance as a direct result of a hazardous event.

Evacuated: The number of people who temporarily moved from where they were (including their place of residence, work places, schools and hospitals) to safer locations in order to ensure their safety.

Relocated: The number of people who moved permanently from their homes to new sites due to hazardous event. Note: This definition excludes preventive relocation before the event.

People whose houses were damaged or destroyed due to hazardous events: The estimated number of inhabitants previously living in the houses (housing units) damaged or destroyed. All the inhabitants of these houses (housing units) are assumed to be affected being in their dwelling or by direct consequence of the destruction/damage to their housings (housing units). An average number of inhabitants per house (housing unit) in the country can be used to estimate the value.

Houses destroyed: Houses (housing units) levelled, buried, collapsed, washed away or damaged to the extent that they are no longer habitable.

Houses damaged: Houses (housing units) with minor damage, not structural or architectural, which may continue to be habitable, although they may require some repair or cleaning.

People who received food relief aid: The number of persons who received food /nutrition, by government or as humanitarian aid, during or in the aftermath of a hazardous event.

Hazardous event: The occurrence of a natural or human-induced phenomenon in a particular place during a particular period of time due to the existence of a hazard.

Hazard: A potentially damaging physical event, phenomenon or human activity that may cause the loss of life or injury, property damage, social and economic disruption or environmental degradation.

UNISDR recommends setting NO threshold for recording hazardous event in order to monitor *all* hazardous events. Small-scale but frequent hazardous events that are not registered in international disaster loss databases account for an important share of damages and losses when they are combined, and often go unnoticed by the national and international community. These events, when accumulated, are often a source of poverty in developing countries but can be effectively

addressed by well-designed policies. The scope of the Sendai Framework for Disaster Risk Reduction 2015-2030 is "the risk of small-scale and large-scale, frequent and infrequent, sudden and slow-onset disasters, caused by natural or man-made hazards as well as relate environmental, technological and biological hazards and risks".

Regarding the inclusion of biological and environmental hazards in natural hazards category and whether and how to integrate man-made hazards, UNISDR will discuss the issue with WHO and other organizations (for example, WHO would be in a better position in terms of data, knowledge and relationship with Member States and other stakeholders to monitor biological events including epidemics. However, we generally do not expect biological disasters will cause physical damages to facilities.).
Note: Terminology will be discussed and finalized in the Open-ended Intergovernmental Working Group for Sendai Framework for Disaster Risk Reduction.

Method of computation:

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.

The Expert Group recommends not using the indicators related with the people whose houses were damaged/destroyed in the computation. UNISDR and IRDR groups recommend using them as they can be estimated from widely available and verifiable data and reflect vulnerability and livelihood issues. Data on housing damage and destroyed is essential for economic loss, so using these indicators would not impose additional data collection burden.

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.

The data can be disaggregated by hazard type. When applied to proposed target 13.1 and 15.3, hydrological, meteorological and climatological and indirectly biological disasters are monitored.

3. Rationale and Interpretation

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, evacuated, relocated, people whose houses were damaged/destroyed and people who received food relief aid as a direct result of the hazardous events. (mainly based on TST Issue Brief 2, 5, 20 and 23-26)**:**

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. Over half of all coastal areas are urbanized and 21 of the world's 33 mega cities lie in coastal flood zones. SIDS and coastal regions are particularly affected by sea level rise, coastal flooding and erosion, and extreme events (e.g. tsunamis and storm surges) due to undermining natural protective barriers, low levels of development combined with rapid population growth in low lying coastal areas and inadequate capacity to adapt. Poor urban populations must often resort to unsustainable coping strategies and mechanisms.

Large numbers of people remain perilously close to falling into poverty, experiencing shocks that they are unable to cope with. For the poor, a shock of even a relatively short duration can have long term consequences. Several dimensions of poverty are closely related to environment, which is often affected by natural disasters. The poverty reduction agenda could include well-designed social protection scheme to help protecting the poor against sudden shocks and the development of capacities to better predict and prepare for such shocks.

Better management of natural resources can themselves strengthen the resilience of the poor, by both reducing the likelihood of natural hazardous events and offering resources to help cope with them.

Biodiversity provides ecosystem resilience and contributes to the ability to respond to unpredictable global changes and natural disasters. Healthy ecosystems act as buffers against natural hazards, providing valuable yet underutilized approaches for climate change adaptation, enhancing natural resilience and reducing the vulnerability of people, for example to floods and the effects of land degradation. These ecosystem services improve the sustainability and economic efficiency of built infrastructure, and are critical for sustainable and resilient urban areas.

This indicator will track human-related loss. The disaster loss data (particularly mortality) are significantly influenced by large-scale catastrophic event, 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.

The indicator will build bridge between SDGs and the Sendai Framework for Disaster Risk Reduction because 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.

4. 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), by death/missing/injured or ill/evacuated/relocated/people whose houses were damaged/people whose houses were destroyed/people who received food relief aid.
*Integrated Research on Disaster Risk (2014), *Peril Classification and Hazard Glossary (IRDR DATA Publication No.1)*, Beijing: Integrated Research on Disaster Risk
Additionally, the Expert Group recommended 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.

5. Sources and Data Collection Process
National disaster loss database, reported to UNISDR

6. Comments and limitations
This is proposal by UNISDR based on our 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.

The proposed indicators 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.

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.

Gender equality issues: Disaggregated by gender (if agreed by country in the Open-ended Intergovernmental Expert Working Group)

Data for global and regional monitoring: Summation of data from national disaster loss databases

Main linkage with SDG Targets:

This indicator is proposed as "multi-purpose indicator".

Target 1.5:
By 2030, build **the resilience of the poor and those in vulnerable situations** and reduce their **exposure and vulnerability to climate-related extreme events** and other economic, social and environmental shocks and **disasters**
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

Target 13.1:
Strengthen **resilience and adaptive capacity to climate-related hazards and natural disasters** in all countries

Target 1.3:
Implement nationally appropriate **social protection systems and measures** for all, including floors, and by 2030 achieve substantial coverage of the poor and the vulnerable

Target 14.2:
By 2020, sustainably manage and protect **marine and coastal ecosystems** to avoid significant adverse impacts, including by strengthening their resilience, and take action for their restoration in order to achieve healthy and productive oceans

Target 15.3:
By 2030, combat desertification, restore degraded land and soil, including **land affected by desertification, drought and floods**, and strive to achieve a land-degradation-neutral world

Target 3.9:
By 2030, substantially reduce the number of **deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination**

Target 3.6:
By 2020, halve the number of **global deaths and injuries from road traffic accidents**

Target 3.d:
Strengthen the capacity of all countries, in particular developing countries, for **early warning, risk reduction and management of national and global health risks**

Supplementary information:
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 mortalities 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.

Sendai Framework for Disaster Risk Reduction 2015-2030:
(http://www.preventionweb.net/files/43291_sendaiframeworkfordrren.pdf)

1. Goals and targets addressed

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

Indicator 11.5.2: Direct disaster economic loss in relation to global GDP, including disaster damage to critical infrastructure and disruption of basic services

2. Definition and method of computations

Direct economic loss: Direct loss is nearly equivalent to physical damage. *The monetary value of total or partial destruction of physical assets existing in the affected area.* Examples include loss to physical assets such as damaged housings, factories and infrastructure. Direct losses usually happen during the event or within the first few hours after the event and are often assessed soon after the event to estimate recovery cost and claim insurance payments. These are tangible and relatively easy to measure. Direct Economic loss in this indicator framework consists of agriculture loss, damage to industrial and commercial facilities, damage to housings and critical infrastructures.

We limit the economic loss into direct economic loss, excluding indirect loss (e.g. loss due to interrupted production) and macro-economic loss. The reason is that there is not yet universally standardized methodology to measure indirect and macro-economic loss while direct loss data monitoring is relatively simpler and more standardized.

Global gross domestic product: Summation of GDP of Countries. GDP definition according to the World Bank.

Hazardous event: The occurrence of a natural or human-induced phenomenon in a particular place during a particular period of time due to the existence of a hazard.

Hazard: A potentially damaging physical event, phenomenon or human activity that may cause the loss of life or injury, property damage, social and economic disruption or environmental degradation.

UNISDR recommends setting NO threshold for recording hazardous event in order to monitor *all* hazardous events. Small-scale but frequent hazardous events that are not registered in international disaster loss databases account for an important share of damages and losses when they are combined, and often go unnoticed by the national and international community. These events, when accumulated, are often a source of poverty in developing countries but can be effectively

addressed by well-designed policies. The scope of the Sendai Framework for Disaster Risk Reduction 2015-2030 is "the risk of small-scale and large-scale, frequent and infrequent, sudden and slow-onset disasters, caused by natural or man-made hazards as well as relate environmental, technological and biological hazards and risks".

Regarding the inclusion of biological and environmental hazards in natural hazards category and whether and how to integrate man-made hazards, UNISDR will discuss the issue with WHO and other organizations (for example, WHO would be in a better position in terms of data, knowledge and relationship with Member States and other stakeholders to monitor biological events including epidemics. However, we generally do not expect biological disasters will cause physical damages to facilities.)

Note: Terminology will be discussed and finalized in the Open-ended Intergovernmental Working Group for Sendai Framework for Disaster Risk Reduction.

Method of computation:

The original national disaster loss databases usually register physical damage value (housing unit loss, infrastructure loss etc.). Need conversion from physical value to monetary value according to the UNISDR methodology. After converted, divide global direct economic loss by global GDP (inflation adjusted, constant USD) calculated from World Bank Development Indicators.

3. Rationale and interpretation

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. The economic loss indicator would track loss to agricultural, industrial and commercial sectors and damage to housing and critical infrastructure. (mainly based on TST Issue Brief 2, 3, 5, 20 and 23-26)**:**

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. Over half of all coastal areas are urbanized and 21 of the world's 33 mega cities lie in coastal flood zones. SIDS and coastal regions are particularly affected by sea level rise, coastal flooding and erosion, and extreme events (e.g. tsunamis and storm surges) due to undermining natural protective barriers, low levels of development combined with rapid population growth in low lying coastal areas and inadequate capacity to adapt. Poor urban populations must often resort to unsustainable coping strategies and mechanisms.

Large numbers of people remain perilously close to falling into poverty, experiencing shocks that they are unable to cope with. For the poor, a shock of even a relatively short duration can have long term consequences. Several dimensions of poverty are closely related to environment, which is often affected by natural disasters. The poverty reduction agenda could include well-designed

social protection scheme to help protecting the poor against sudden shocks and the development of capacities to better predict and prepare for such shocks. Better management of natural resources can themselves strengthen the resilience of the poor, by both reducing the likelihood of natural hazardous events and offering resources to help cope with them.

The environment for food production is increasingly challenging, particularly for smallholders, due to environmental and climate-related factors. Similar to extreme income poverty, food insecurity continues to be predominantly concentrated in rural areas of developing countries, and disproportionately affects poor farmers, agricultural workers, pastoralists and rural communities. Common conditions for protracted crisis situations include frequent or continued exposure to shocks that undermine livelihoods, food and market systems. Special consideration needs to be given to population living in areas prone to environmental and natural disaster shocks.

Biodiversity provides ecosystem resilience and contributes to the ability to respond to unpredictable global changes and natural disasters. Healthy ecosystems act as buffers against natural hazards, providing valuable yet underutilized approaches for climate change adaptation, enhancing natural resilience and reducing the vulnerability of people, for example to floods and the effects of land degradation. These ecosystem services improve the sustainability and economic efficiency of built infrastructure, and are critical for sustainable and resilient urban areas.

This indicator will track direct physical loss expressed in economic term. The disaster loss data (particularly mortality) are significantly influenced by large-scale catastrophic event, 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.
The indicator will build bridge between SDGs and the Sendai Framework for Disaster Risk Reduction because the reduction of direct economic loss is included in the Sendai Framework global targets and will also be monitored under the Sendai Framework Monitoring Mechanism.

4. 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), by asset loss category.

*Integrated Research on Disaster Risk (2014), *Peril Classification and Hazard Glossary (IRDR DATA Publication No.1)*, Beijing: Integrated Research on Disaster Risk
Ideally, in addition, by sub-national administrative unit.

5. Sources and data collection processes
National disaster loss database, reported to UNISDR

6. Comments and limitations
This is proposal by UNISDR based on our 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.

The proposed indicators 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.

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.

Gender equality issues: Not included.

7. Data for global and regional monitoring:

Summation of data from national disaster loss databases and World Bank Development Indicators

Main linkage with SDG Targets:

This indicator is proposed as "multi-purpose indicator".
Target 1.5:
By 2030, build **the resilience of the poor and those in vulnerable situations** and reduce their **exposure and vulnerability to climate-related extreme events** and other economic, social and environmental shocks and **disasters**
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
Target 13.1: Strengthen **resilience and adaptive capacity to climate-related hazards and natural disasters** in all countries
Target 2.4:
By 2030, ensure sustainable food production systems and implement **resilient agricultural practices** that increase productivity and production, that help maintain ecosystems, that strengthen capacity for **adaptation to climate change, extreme weather, drought, flooding and other disasters** and that progressively improve land and soil quality

Target 14.2:
By 2020, sustainably manage and protect **marine and coastal ecosystems** to avoid significant adverse impacts, including by strengthening their resilience, and take action for their restoration in order to achieve healthy and productive oceans

Target 15.3:
By 2030, combat desertification, restore degraded land and soil, including **land affected by desertification, drought and floods**, and strive to achieve a land-degradation-neutral world

Target 3.d:
Strengthen the capacity of all countries, in particular developing countries, for **early warning, risk reduction and management of national and global health risks**

Target 13.b:
Promote mechanisms for raising capacities for effective **climate change-related planning and management**, in least developed countries, including focusing on women, youth, local and marginalized communities

Supplementary information:
Related targets in the Sendai Framework for Disaster Risk Reduction 2015-2030:
Reduce *direct disaster economic loss* in relation to global gross domestic product (GDP) by 2030.

Sendai Framework for Disaster Risk Reduction 2015-2030:
(http://www.preventionweb.net/files/43291_sendaiframeworkfordrren.pdf)

1. Goals and targets addressed

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

11.6.1 Proportion of urban solid waste regularly collected and with adequate final discharge out of total urban solid waste generated by cities

2. Definition and method of computations

It will be necessary to define the following components to compute the proportion of urban solid waste regularly collected that is adequately discharged out of all the total urban waste generated by the city.

Municipal Solid Waste is waste generated by households, and waste of a similar nature generated by commercial and business establishments, industrial and agricultural premises, institutions such as schools and hospitals, public spaces such as parks and streets and construction sites. Generally, it is non-hazardous wastes composed of food waste, garden waste, paper and cardboard, wood, textiles, nappies (disposable diapers), rubber and leather, plastics, metal, glass, and refuse such as ash, dirt and dust. Sewage sludge and faecal sludge is also included in the category of municipal solid waste but it excludes wastewater.

Other Solid Waste is waste that require special treatment such as hazardous waste from industrial processes, agricultural activities and mining wastes, hospital waste, end of life vehicles, construction and demolition waste and WEEE (Waste Electrical and Electronic Equipment). Cities in developed countries in general have special treatment and disposal system that are designed to collect and handle these separately from municipal solid waste, while it is not uncommon that these are mixed and dumped in an uncontrolled manner in cities in developing countries.

Regularly Collected Waste refers to waste that is routinely collected from specific addresses or designated collection points. Waste collection is conducted directly by municipal authorities or private contractors licensed/commissioned by municipal authorities with a regular schedule of the day of the week and time of collection. In some cases, private waste collection companies have contracts with clients individually and provide collection services.

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

Total Waste Generated by the City is sum of municipal solid waste and other solid waste, or the sum of regularly collected waste and uncollected waste. This excludes some portion that was taken and recycled before the solid waste collection.

Adequate Final Discharge refers to waste that is recycled in regulated recycling facilities, composted or incinerated in regulated composting and incineration facilities and disposed in sanitary landfills in environmentally adequate ways. It excludes waste handled in recycling, composting, incineration facilities that do not have necessary pollution control systems and labour safety standards required by international guidelines or national and local legislations such as waste water treatment and air pollution prevention systems and provision of necessary equipment for workers. It also excludes solid waste that is incinerated and burned openly or disposed to open dumb without leachate facility.

Recycling is defined as the process by which materials otherwise destined for disposal are collected, processed, and remanufactured or reused except reuse as fuel. Direct recycling within industrial plants at the place of generation should be excluded.

Composting is defined as a biological process that involves aerobic biological decomposition of organic materials to produce stable humus-like product. Biodegradation is a natural, ongoing biological process that is a common occurrence in both human-made and natural environments.

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.

Landfilling is the environmentally sound disposal of waste that cannot be reduced, recycled, composted, incinerated or processed in some other manner. A landfill is needed for disposing of residues from recycling, composting, incinerating or other processing facilities and can be used if the alternative facilities break down.

The concept of integrated and sustainable (solid) waste management, known as Integrated solid waste management (ISWM), is designed to improve the performance of solid waste system and to support sound decision-making. It comprises three key physical elements that *all* need to be addressed for an ISWM system to work well and to work sustainably over the long term. These are:

1. **public health:** maintaining healthy conditions in cities, particularly through a good waste collection service;
2. **environment:** protection of the environment throughout the waste chain, especially during treatment and disposal; and
3. **resource management:** 'closing the loop' by returning both materials and nutrients to beneficial use, through preventing waste and striving for high rates of organics recovery, reuse and recycling

These three key physical elements require appropriately designed governance strategies to deliver a well-functioning system. Three interrelated requirements for a "good waste governance" system are to:

1. be **inclusive**, providing transparent spaces for stakeholders to contribute as users, providers and enablers;
2. be **financially sustainable**, which means cost-effective and affordable; and
3. rest on a base of **sound institutions and pro-active policies**.

Method of Computation

In order to calculate the percentage of urban solid waste regularly collected and with adequate final discharge with regards to the total waste generated by the city, we will need to review the common waste stream in a city as shown in the figure below.
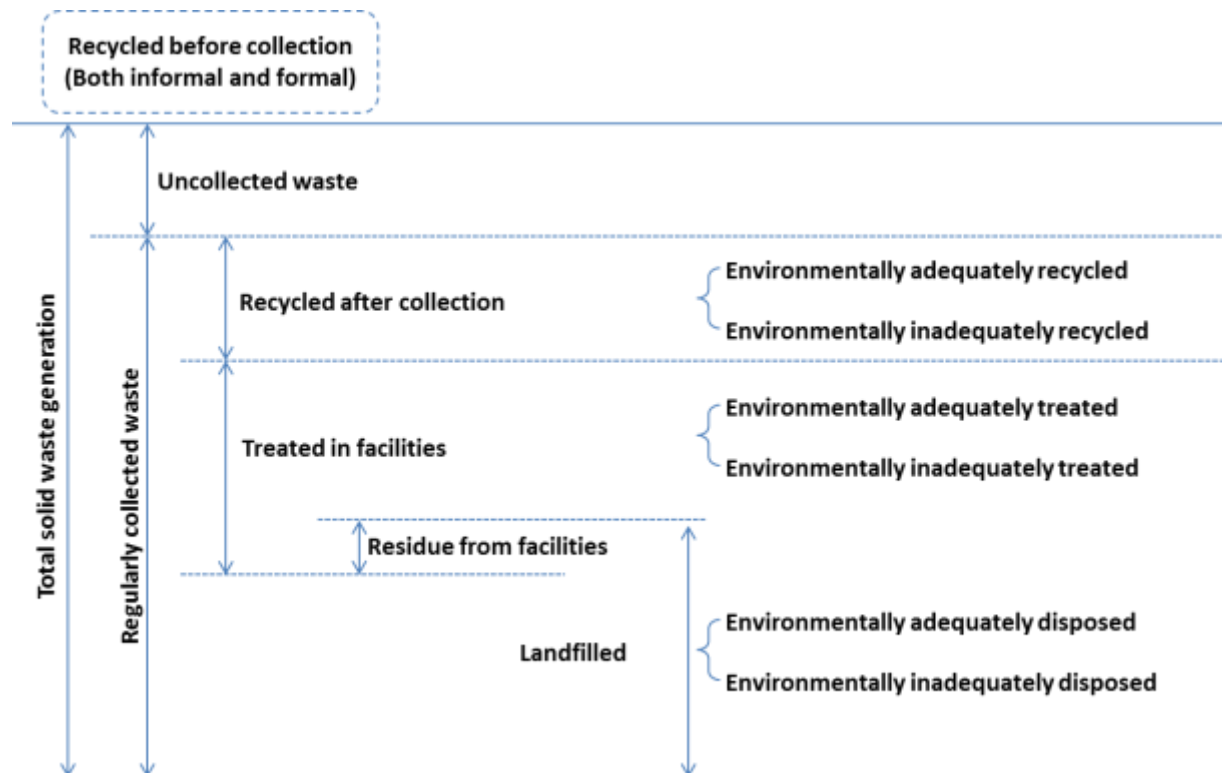
For both municipal and other solid waste, there is some portion that is taken / recycled before collection. This is not counted in the total solid waste generation. Among the total solid waste generation, there will be a portion that is regularly collected and uncollected in the city. In case of municipal solid waste, it is not uncommon that informal settlements areas do not receive waste collection service. Regularly collected waste is transported to recycling/treatment facilities but in some cases facilities do not comply with environmental or labour safety standard. The amount of waste that is treated in environmentally inadequate facilities should be excluded from the amount

of adequately discharged solid waste. Likewise, the amount of waste transported to an uncontrolled landfill sites should be excluded.

The general formula is

$$X = 100 \text{ x } \left[\frac{Rw - (Rin + Tin + Lin)}{T} \right] \qquad \text{or} \qquad X = 100 \text{ x } \left[\frac{Re + Te + Le}{T} \right]$$

X: Percentage of urban solid waste regularly collected and with adequate final discharge with regards to the total waste generated by the city
Rw: Regularly collected solid waste (t)
Rin: Waste recycled in environmentally **inadequate** recycling facilities (t)
Tin: Waste treated in environmentally **inadequate** treatment facilities (t)
Lin: Waste disposed in environmentally **inadequate** landfill sites (t)
Re: Waste recycled in environmentally **adequate** recycling facilities (t)
Te: Waste treated in environmentally **adequate** treatment facilities (t)
Le: Waste disposed in environmentally **adequate** landfill sites (t)
T: Total solid waste generation in the city (t)

It is preferable to apply the formula to different waste types (e.g. municipal solid waste and other wastes) separately and average them out to obtain the final value.
To estimate total solid waste generation in the city, the following formula can be applied.
T= regularly collected waste + uncollected waste
Regularly collected waste = Re + Rin + Te + Tin + Le + Lin –Residue from facilities
To estimate uncollected municipal waste, the following formula can be used.

$$Uncollected\ waste = \frac{Regularly\ collected\ waste}{population\ who\ receive\ regular\ collection\ service} \times \begin{array}{l} population\ who\ do\ not\ receive \\ collection\ service \end{array}$$

3. Rationale and interpretation

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. Sustainable 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.

Regardless of the context, managing solid waste is one of the important challenges of urban areas of all sizes. According to UN-Habitat's Solid Waste Management in the World's Cities, when the current modernization process started in developed countries during the 1970s, solid waste management was seen largely as a technical problem with engineering solutions. That changed during the 1980s and 1990s when it became clear that municipalities could not successfully collect and remove waste without active cooperation from the service users. Cities also learned that technologies depend on institutional, governance and policy frameworks, which are highly varied and complex, and directly related to local conditions. The way in which waste is produced and discarded gives us a key insight into how people live, and the quality of waste management services is a good indicator of a city's governance.

Target 11.6 also has linkages to the health, poverty, and water goals. For instance, there are significant linkages to water targets, including sanitation and hygiene (6.2), water quality and wastewater management (6.3), water-related ecosystems (6.5) and integrated water resources management (6.5). Such links may be relevant to planning and implementation at the country level and it will be important to harness synergies and manage potential conflicts or trade-offs both within and between the targets. This will require collaboration across institutions that are traditionally structured in silos that focus on specific sectors. New ways of collaborative working in partnerships with either informal or formal mechanisms are needed to facilitate collaboration such that policy makers, managers and experts with different responsibilities are able to harness the synergies between goals and targets. This will be a major challenge in implementation of the 2030 Agenda.

Having in place an appropriate monitoring framework that is founded on the key components of the ISWM framework for the SDG 11 target 6.1, enhanced coordination amongst the relevant national and local institutions in the process of implementation, and a full engagement of particularly the national statistical entities and responsible governmental agencies in the process, will go a long way to assist national governments to be able to rationalise their efforts to collect, analyse, validate data and information and report on a regular basis within a context that facilitates comparisons among countries.

An integrated solid waste management system is strongly connected to three dimensions: urban environmental health, the environment 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.

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

4. Disaggregation

Data for this indicator 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.
- 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**

5. Sources and data collection processes

UN-Habitat is collecting information on this indicator in more than 400 cities that are part of the City Prosperity Initiative. 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 can be conducted by a responsible national government agency related environment. 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.

For instance, the responsible national governmental agencies or statistical entities can utilise the following survey format and distribute it to local authorities to collect data. Also a check sheet to inspect environmental appropriateness of different types of facilities (recycling, composting, incineration etc) should be distributed together with the survey format. To further ensure the environmental appropriateness of solid waste management facilities, responsible national government officials can conduct a regular short-notice inspection to facilities together with introduction of this data collection system. Introducing this data collection system also is expected to contribute to enhance the monitoring capacity on solid waste management both at the national and local level in many countries that currently does not have such system.

Population survey sheet

Population served by solid waste collection	
Population unserved by solid waste collection	
Total population in the jurisdiction	

Solid waste management facility data sheet

Facility Name		Technology description	Type of waste received	Environmental appropriateness	Amount of SW received	Amount of faecal sludge received	Amount of residue	Where residue is exported
Recycling facilities	A				(t)	N/A	(t)	
	B				(t)	N/A	(t)	
	C				(t)	N/A	(t)	
Treatment facility	A				(t)	(t)	(t)	
	B				(t)	(t)	(t)	
	C				(t)	(t)	(t)	

Landfill sites data sheet

Landfill sites name	Landfill type	Capacity	Operation start year	Environmental appropriateness	Amount of SW received	Amount of faecal sludge received
A		(t)			(t)	(t)
B		(t)			(t)	(t)
C		(t)			(t)	(t)

Data on formal solid waste collection and management may be available from municipal bodies and/or private contractors. Informal collection data may be available from NGOs and community organizations.

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

6. Comments and limitations

In many countries and sub-national governments, solid waste collection and management data are currently incomplete or not available. Countries have varying policies that define appropriate waste management, with different levels of treatment and data collection. 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 and others may require training and capacity development to enhance their capacities.

Feasibility
Collection of indicators and data cannot be said infeasible but it might require training and capacity development. The data for the indicator such as total solid waste generation is globally available although the precision of data is disputable. This means that many countries have some data collection system but there are rooms for improvement. Also the collection of the data such as amount of waste adequately discharged will be a challenge for many of national and local governments. Introducing this data collection system globally is not only feasible since they usually have basic data collection system but will also contribute to enhance the solid waste monitoring capacity both at the national and local level.

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 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.

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.

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. However, some countries/cities have the data and monitoring systems able to report the indicator here but others may require training and capacity development to enhance their capacities.

7. Current data availability/indicator tier

This indicator is categorized under **Tier II** of which an established methodology exists but data is not easily available. UN-Habitat is collecting information on this indicator in more than 400 cities that are part of the City Prosperity Initiative.
Solid waste management data is available in some cities in developed countries; however, it is highly likely many cities lack the data. The collection of the data is possible through the collaboration of international institutions (UN-Habitat, UNEP, The World Bank, AfDB, IDB, EBRD and ADB) and bilateral donors (JICA, GDZ, etc) by conducting survey and capacity development on data collection system.

8. Responsible entities

UN-Habitat will be responsible for reporting on this indicator. UNHABITAT has been monitoring solid waste generation in 400 cities in the world.

9. Data collection and data release calendar

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

10. Treatment of missing values

Missing values may arise at the reporting of the city level estimates. At the national level, estimates will be derived from the nationally representative sample of cities, in which case then there will be very few missing entries.

11. Sources of differences between global and national figures

Data on formal solid waste collection and management may be available from municipal bodies and/or private contractors. Informal collection data may be available from NGOs and community organizations. It is important that all data sources are used for reporting, otherwise discrepancies are likely to introduce inconsistencies in reported figures

12. Regional and global estimates and data collection for global monitoring

National level estimates and reporting will be done by the national governments/statistical agencies. UN-Habitat and other partners will lead the reporting at the regional and global levels.

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1. Goals and targets addressed

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

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

2. Definition and method of computations

The mean annual concentration of fine suspended particles of less than 2.5 microns in diameters (PM2.5) is a common measure of air pollution. The mean is a population-weighted average for urban population in a country.

Method of Computation

The annual urban mean concentration of PM2.5 is estimated with improved modelling using data integration from satellite remote sensing, population estimates, topography and ground measurements (WHO, 2016 forthcoming)

Regional aggregates: The regional and global aggregates are population -weighted figures of the national estimates.

$$C_{agg}=\sum (C_{nat} * P_{nat})/ \sum(P_{nat})$$

where **Cagg** is the regional/global estimate, **Cnat** is the national estimate, **Pnat** is the country population. The sum is done over the countries in the region (regional aggregate) or all countries (global aggregate).

Sources of discrepancies:
The source of differences between global and national figures: Modelled estimates versus annual mean concentrations obtained from ground measurements.

3. Rationale and interpretation

Air pollution consists of many pollutants, among other particulate matter. These particles are able to penetrate deeply into the respiratory tract and therefore constitute a risk for health by increasing mortality from respiratory infections and diseases, lung cancer, and selected cardiovascular diseases.

4. Disaggregation
The indicator is available by 0.1° x 0.1° grid size for the world.

5. Sources and data collection processes

Data Sources
Sources of data include ground measurements from monitoring networks, collected for 3,000 cities and localities (WHO 2016a) around the world, satellite remote sensing, population estimates, topography, information on local monitoring networks and measures of specific contributors of air pollution.

6. Comments and limitations
Urban/rural data: while the data quality available for urban/rural population is generally good for high income countries, it can be relatively poor for some low- and middle income areas. Furthermore, the definition of urban/rural may greatly vary by country.

7. Current data availability/indicator tier

Data Availability
The indicator is available for 178 countries. Missing countries include mostly small states islands in the Western Pacific and in the Latin American and the Caribbean regions.

8. Responsible entities
World Health Organization (WHO)

9. Data Compilers and data release calendar
Calendar
NA
Data providers
Ministry of Health, Ministry of the Environment

10. Treatment of missing values

Treatment of missing values: At country level - Missing values are left blank.; At regional and global levels - Missing values are excluded from the regional and global averages.

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Related indicators; 3.9.1: Mortality rate attributed to household and ambient air pollution

1. Goals and targets addressed

The goal is to estimate the area of public space based on spatial analysis to delimit the built-up area of the city, estimation of the total open public space and estimate of the total area allocated to streets. The use of this indicator also aims to integrate urban form and spatial analysis in the monitoring of Goal 11 of the Sustainable Development Goals.

The target addressed, **Target 11.7**, is providing universal access to safe, inclusive and accessible, green and public spaces, in particular for women and children, older persons and persons with disabilities.

11.7.1 Average share of the built-up area of cities that is open space for public use for all, by sex, age and persons with disabilities

2. Definition and method of computations

Cities vary considerably in size, history, development patterns, designs, shapes and citizen's attitudes towards public spaces. Measuring how much public space a city has is only one part of measuring whether residents actually benefit from the space.

1. Terminology for the definition:
- The '**Built-up area**' of a city is the contiguous area occupied by **buildings and other impervious surfaces including the urban vacant areas in and around them** but excluding rural areas beyond the urban fringe.[44]
- The '**population**' of a city is defined as the sum of the **population in the set of administrative districts** that together encompass the 'built-up area' of that 'city' in the year that measurements are taken.

2. Methods for Computation the Proposed Indicator:

The method to estimate the area of public space is based on three steps: a) spatial analysis to delimit the built-up area of the city; b) estimation of the total open public space and; c) estimation of the total area allocated to streets.

a. *Spatial analysis to delimit the built-up area*. Delimit the built-up area of the urban agglomeration and calculate the total area (square kilometers). Land use maps, inventories to be locally generated to identify public spaces if possible complemented by fieldwork.

b. *Computation of total area of open public space.* Map and calculate the total areas of open public space within the defined urban boundaries based on the built-up area. The inventory of open public spaces is digitalized and vectorised using GIS software to allow computation of surfaces. The total of open public area is divided by the total built-up area of the city to obtain the proportion of land allocated to public spaces.

c. ***Estimation of the land allocated to streets.*** Calculation of the total area allocated to streets based on sampling techniques with a random sample of 10 hectares' locales is selected out of a complete listing of the all hectares' locales that form the city, using the built-up area definition indicated above.

- The sampling relies on a **Halton Sequence of coordinates** that, when repeated, always selects the same points (see figure 1)

Figure 1: The spatial distribution of randomly selected 10-hectare locales in an area of Addis Ababa, Ethiopia, built between 1990 and 2012 (left); and the analysis of a 10-hectare locale in Paris, France (right).
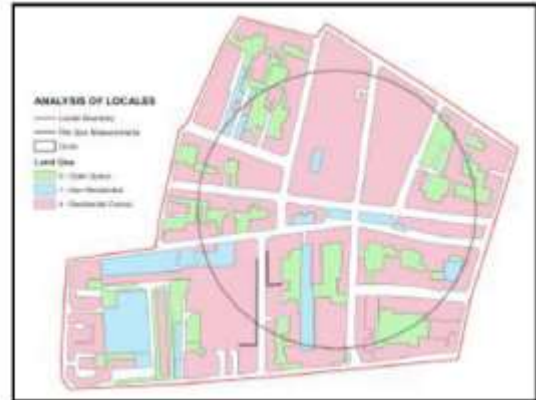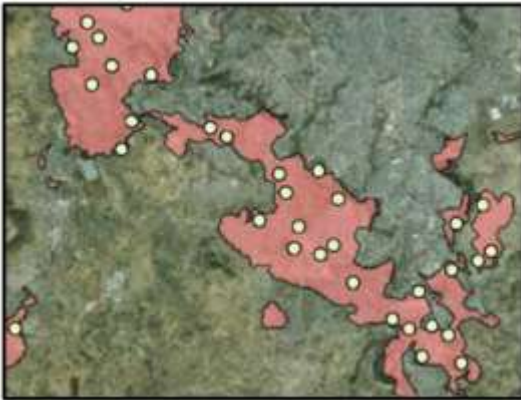
- **Locales** are defined as **a set of city blocks surrounded by streets**, and bounded by the medians of all blocks that intersect the randomly selected 10-hectare circle (see figure 1). Blocks are considered built-up if more than half of the block is built-up.
- The **share of the land in streets** in the locale is then calculated as the **ratio** of the area of the locale in streets and boulevards and the total built-up area in the locale.
- The **share of the land occupied streets** in the locale is then calculated as the **ratio** of the area of the locale occupied by streets and boulevards and the total built-up area in the locale.
- The average share of land in streets in a given city is then calculated by sampling more and more locales until the **variance between the shares of land in streets declines below an agreed-upon value**. Using this stopping rule, it becomes possible to obtain a statistically reliable average value.

Share of the built up area of the city that is open space in public use (%)

$$= \frac{Total\ surface\ of\ open\ public\ space + Total\ surface\ of\ land\ allocated\ to\ sreets}{Total\ surface\ of\ built\ up\ area\ of\ the\ urban\ agglomeration}$$

3. Rationale and interpretation

Many public areas have been gradually forgotten—no longer safe living spaces that move people. In order for cities to be vibrant and safe places, we need to think of them as systems of interdependent parts and complex connections, as interactive and social spaces. Reclaiming urban spaces for people is part of how we can humanize our cities and make our streets more communal. Public spaces are often more than anonymous places that can be replaced with one another: the meetings and exchanges that occur there affect our relationships with each other, giving meaning to our communities and urban landscapes.

This indicator provides information about the amount of open public areas in a city. Cities that improve and sustain the use of public space, including streets, enhance community cohesion, civic identity, and quality of life. Having access to open public spaces does not only improve the quality of life: it is also a first step toward civic empowerment and greater access to institutional and political spaces.

Cities function in an efficient, equitable, and sustainable manner only when private and **public spaces work in a symbiotic relationship** to enhance each other. In optimal conditions, they need to be secured and laid out in advance of urbanization to ensure orderly urban expansion. In existing cities, there is a need to revise and expand the ratio of public space in cities to make them more efficient, prosperous and sustainable. And they are needed in adequate amounts. Uncontrolled rapid urbanization creates disorderly settlement patterns with dangerously low shares of public space. Many cities in developed countries are also experiencing a dramatic reduce of public space. The road network is the integrative tissue that binds cities together. It organizes the geographic space of cities, integrates them both as job markets and as local political spaces.

Cities that are walkable and transit-friendly require a highly connected network of paths and streets around small, permeable blocks. A tight network of paths and streets offering multiple routes to many destinations that also make walking and cycling trips varied and enjoyable. This has clear implications in making cities more energy efficient.

Adequate public spaces in cities contribute to the achievement of other targets of Goal 11 and have positive implications in various Sustainable Development Goals. Notably public spaces increase social cohesion, networks and human exchange.

4. Disaggregation

Disaggregation by location (intra-urban)
- Disaggregation by qualities of the open public space (safe, inclusive, accessible, green)
- Using qualitative data tagged to the public spaces it will be possible to disaggregate information by the share of built-up area is **safe** open space in public use
- The share of built-up area is **green** open space in public use
- The share of built-up area is **universally accessible** open space in public use, particularly for disable persons.

5. Sources and data collection processes

Satellite imagery (open sources), legal documents outlining publicly owned land, community-based maps are the main sources of data.
- **For estimating the total Surface of Built-up area**. Satellite imagery: Use of existing layers of satellite imagery ranging from open sources such as Google Earth and US Geological Survey/NASA imagery Landsat to more sophisticated and higher resolution land cover data sets. Images are to be analyzed for the latest available year.
- **For the Inventory of open public space**. Information can be obtained from legal documents outlining publicly owned land and well-defined land use plans. In some cases, where this information is lacking, incomplete or outdated, open sources, informants in the city and community-based maps, which are increasingly recognized as a valid source of information, can be a viable alternative.
- The share of land in public open spaces cannot be obtained directly from the use of high-resolution satellite imagery, because **it is not possible to determine the ownership or use of open spaces by remote sensing**. But additional meta-data that helps to describe the land use patterns in the locale is additionally required to map out land that is for public and non-public use.

6. Comments and limitations

Gaps in the currently available data for monitoring target 11.7 along with some recommendations of upcoming opportunities for filling such gaps are provided below. As a new and innovative indicator, data availability may be scarce. Many cities do not have an inventory of public space, or have one that is not up-to date. Efforts should be done to expand the availability of data in the developing world. UN-Habitat has developed tools, programmes and guidelines to assist cities in measuring, and expanding the availability of public space in cities. Some cities in the developing world lack of formal recognized public space that are publicly maintain, innovative tools like the use of satellite imagery, and community-based mapping can support the identification of open space in public use.

The indicator quantifies the amount of open space in public use in cities, but does not capture the quality of the space that may impede its proper use. However, it is a precondition that open space is existing, and that its public use is guaranteed, to allow city authorities and other stakeholders to further improve its quality and increase its use.

7. Current data availability/indicator tier

Data for this indicator is already available for 200 cities which are part of the UN-Habitat's city prosperity initiative. More cities are joining this initiative and hence data is expected to be available for over 300 cities by the end of 2016. The indicator is classified as Tier 2, and hence more work in the first year will go into refining the methodology and providing technical support to national statistical agencies to build the capacity to collect, analyze and report on this indicator.

8. Responsible entities

UN-Habitat will take the lead in global reporting which will follow efforts of directly working with national statistical agencies for reporting at national levels. Un-Habitat and other partners including other private and regional commissions will lead the efforts of building national capacities to monitor and report on this indicator.

9. Data collection and data release calendar

The monitoring of the indicator can be repeated at regular intervals of 5 years, allowing for three reporting points until the year 2030. **Monitoring in 5-years intervals** will allow cities to determine whether the shares of open public space in the built-up areas of cities is increasing significantly over time, as well as deriving the share of the global urban population living in cities where the open public space is below the acceptable minimum.

10. Treatment of missing values

All countries are expected to fully report on this indicator more consistently following implementation of several technical workshops where the methodological guide and tools will be introduced. In majority of the cases, missing values will be available to reflect a non-measurement of the indicator for the city. However, because national statistical agencies will report national figures from a sample of cities, we expect fewer missing values at the national level over the years. Global figures will be derived from nationally reported estimates.

11. Sources of differences between global and national figures

Most cities lack a clear protocol or standard guide for how they might measure public spaces, let alone an existing inventory or understanding of the public agencies involved in public space (e.g. cities can have both city-owned parks and national parks). Google maps might have a better inventory of a city's public space than the city itself. These differences in knowledge and understanding are expected to create some inconsistencies in reporting.

Applying the proposed methodology to an entire globe of different cities will be challenging, but there are some basic principles that cities can use to measure public space. Cities can inventory the spectrum of spaces, from natural areas to small neighbourhood parks owned by different government entities. For example, in some cities, cemeteries are publicly available spaces run by the city park and recreation department. The team will work on a basic methodological guide and

tools that will enable national statistical agencies apply these methods with a standard and define and collect information on an inventory of spaces that will be used for reporting on this indicator for all cities.

12. Regional and global estimates and data collection for global monitoring

Regional and global estimates will be derived from national figures with an appropriate disaggregation level. Specialized tools will be developed and agreed upon with local and international stakeholders. Systems of quality assurance on the use of the tools, analysis and reporting will be deployed regionally, and globally to ensure that standards are uniform and that definitions are universally applied.

We expect that investments in improved data collection and monitoring at country level will produce incentives for governments to improve monitoring of the public spaces in cities and also offer more opportunities to engage with multiple stakeholders in data collection and analysis and in achieving better understanding of the strengths and weaknesses of existing public space management policies and practices.

Where applicable appropriate population weighting schemes will be used at the stage of computing regional and global estimates for this indicator. This will include catering for adjustments where public space definitions are different.

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- UN-Habitat (2015) Spatial Capital of Saudi Arabian Cities, Street Connectivity as part of City Prosperity Initiative

1. Goals and targets addressed

Target Indicator 11.7.2: Proportion of person's victim of physical or sexual harassment, by sex, age, disability status and place of occurrence, in the previous 12 months

11.7.2 Proportion of women subjected to physical or sexual harassment, in the last 12 months, by perpetrator and place of occurrence

2. Definition and method of computation

'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

Method of computation

Rate of physical or sexual harassment

$$= \left(\frac{\begin{array}{c} Number\ of\ girls\ and\ women\ aged\ 15 + who\ were\ subjected\ to\ Physical\ or \\ sexual\ harrassment\ in\ the\ last\ 12\ months \end{array}}{All\ women\ and\ girls\ aged\ 15 +} \right) X\ 100$$

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.

3.Rationale and Interpretation

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

4.Disaggregation

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.)

5.Sources and data collection process

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)

6.Comments and limitations

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.

7.Current data availability

Because of the lack of universal definition, data for this indicator are not comparable. Currently, comparable data exist only for the 28 European Union

8.Responsible entities

UNODC will be responsible for reporting on this indicator

9.Data collection and data release calendar

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

10.Related 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

11.References

URL References:

[1] The Advocates for Human Rights (2010). "What is Sexual Harassment in the Workplace?". http://www.stopvaw.org/What_is_Sexual_Harassment.html

[2] United Nations General Assembly. 2006. In-depth study on all forms of violence against women. Report of the Secretary-General.

[3] European Union Agency for Fundamental Rights. Violence Against Women: An EU-Wide Survey. Main Results.

[4] UN Women (2011). Progress of the World's Women: In Pursuit of Justice

1. Goals and targets addressed

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

Indicator 11.a.1: Proportion of population living in cities that implement urban and regional development plans integrating population projections and resource needs, by size of city.

2. Definition and method of computation

Methodology:
Develop a policy evaluation framework that assesses and tracks progress on the extent to which national urban policy or regional development plans are being developed and implemented and satisfy the following criteria as qualifiers:
  a) responds to population dynamics
  b) ensures balanced regional and territorial development
  c) Increase local fiscal space

This process indicator places particular emphasis on the aspect of national and regional development planning that support positive economic, social and environmental links between urban, peri-urban and rural areas.

The method to quantify this indicator is based on policy analysis evaluation that can be supported by adopted policies, conventions, laws, government programs, and other initiatives that comprise a national/regional urban policy.

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

With initial support of UN-Habitat, other UN Agencies and partners, the method to calculate this indicator will be further developed, piloted and rolled out at country level. In order to maintain the objectivity and comparability in the policy analysis, four categories of assessment will be used for each qualifier.

These categories correspond to a progressive evaluation of the extent that national and regional policies and plans integrate positive elements that contribute to the realization of the Target Further refinement of these 5 categories will be undertaken as necessary.

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

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

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

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

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

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

Table 2: final computation of the indicator

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

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

National urban policy;	Evaluation 1	Evaluation 2	Evaluation 3	Evaluation 4	Average experts score (Ranges 0-100 %)
Qualifier (a) "national urban policies or regional development plans respond to population dynamics"	A1	A2	A3	A4	Qa=(A1+A2+A3+A4)/4

Qualifier (b) "national urban policies or regional development plans ensure balanced regional and territorial development'	B1	B2	B3	B4	$Qb=(B1+B2+B3+B4)/4$
Qualifier (c) "national urban policies or regional development plans increase local fiscal space'	C1	C2	C3	C4	$Qc=(C1+CC2+C3+C4)/4$
	Final value of the assessment (Average values from all 3 qualifiers)				$X=(Qa + Qb + Qc)/3$

Countries that fall into categories 2 and 3, which correspond to 1 – 50 percentage points, are not counted as "countries that are developing and implementing a national urban policy or regional developing plans". These countries are encouraged to deploy efforts in order to improve national urban policies or regional development plans.

Countries that fall into categories 4 and 5, which correspond to 51 percentage points or more in the assessment, are considered as "countries that are developing and implementing a national urban policy or regional developing plan" that contribute to the achievement of Target 11.a.
Countries that are counted as having national urban policies or regional developing plans can still make efforts to improve the rating of the 3 qualifiers.

3. Rationale and interpretation

With the majority of mankind currently living in cities, and the number poised to increase further by 2030, the success of SDGs will depend largely on how urbanisation is coordinated and managed. Considering that urbanisation is a tool for development, many countries[7] are now embarking on the development and implementation of national urban policies as tangible instruments to coordinate stakeholders' efforts, harness the benefits of urbanisation while mitigating its externalities. This particular indicator is very relevant for tracking national progress on all other areas in the SDGs and targets where urban policies are mentioned along with the above

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

3 qualifiers. This indicator is one of the key metrics to benchmark and monitor urbanisation and asserts the national leadership and political will of national governments. This indicator is based on the notion that the development and implementation of national urban policies should support participation, partnership, cooperation and coordination of actors and facilitate dialogue.

National Urban Policy (NUP) and Regional Development Plans (RDP) promote coordinated and connected urban development. A coordinated effort from government through a NUP or RDP provides the best opportunity for achieving sustainable urbanization and balanced territorial development by linking sectorial policies, connecting national, regional and local government policies, strengthening urban, peri-urban and rural links through balanced territorial development.

This indicator provides a good barometer on global progress on sustainable national urban policies. It serves as gap analysis to support policy recommendations. The indicator can identify good practices and policies among countries that can promote partnership and cooperation between all stakeholders.

This indicator is both process oriented and aspirational and has the potential to support the validation of Goal 11 and other SDGs indicators with an urban component. The indicator has the ability to be applicable at multi jurisdictions levels, i.e. covering a number of areas while taking care of urban challenges in a more integrated national manner.

The indicator has a strong connection to the target, addressing the fundamental spatial and territorial aspects of national urban policy in the context of urban, peri-urban and rural areas.

This indicator epitomises the universality tenet and spirit of the SDGs. It is clearly suitable for all countries and regions and can be disaggregated and/or aggregated by areas of development as explained in the methodology section of this metadata. The indicator will be suitable to assess commitment to address urban policy related challenges and respond to the opportunities that urbanization brings. It clearly responds to Goal 11 harnessing the power of urbanisation for the common good. The indicator is strongly connected to other SDGs goals and targets.

UN-Habitat had undertaken a comprehensive review of urban policies and the methodology used could form the basis for the Global State of Urban Policy and Scorecard to be published every two years. Based on the baseline developed by UN-Habitat, it would be quite doable to routinely assess the status of national urban policies and ascertain progress made by countries to develop and implement policies based on agreed qualifiers. The work will benefit from various on-going initiatives of policies review and diagnostics undertaken by OECD, UN-Habitat and World Bank. Further methodological work would be needed to identify a list of criteria that have to be satisfied in order to attribute a value to the relevant development-oriented policy (i.e. policies supporting job creation, innovation, land-use efficiency, public space, etc.).

Policy Connections: This Indicator is related to several Goals and Targets, particularly the following:

•Goal1: Poverty Eradication, targets 1.4 and 1.5: land tenure security and resilience

•Goal2: Food Security, Nutrition and Agriculture, targets 2.3 and 2.a: land tenure security and urban-rural linkages

•Goal3: Gender, target 5.2: safety and 5.a ownership and control over land

•Goal6: Water, targets 6.1 and 6.2: access to drinking water and sanitation

•Goal7: Energy, targets 7.2 and 7.3: access to renewable energy and energy efficiency

•Goal8: Economic Growth and Employment, targets 8.3, 8.5 and 8.6: job creation, decent work and youth unemployment

•Goal9: Infrastructure and Industrialization, targets 9.1, 9.4 and 9.a: access to and upgrading and financing infrastructure

•Goal10: Reduce inequality – target 10.4 discriminatory laws

•Goal12: Sustainable Consumption and Production, target 12.5: waste management

•Goal13: Climate Change, target 13.1: resilience and adaptive capacity; 13.b capacity for effective climate change-related planning and management

Goal15: On terrestrial ecosystems; 15.9 By 2020, integrate ecosystem and biodiversity values into national and local planning, development processes,

•Goal16: Peaceful Societies and Inclusive Institutions, targets 16.7 and 16.a: governmental subsidiarity and institutional capacity building, 17.b non-discriminatory laws and policies for sustainable development

Goal17: on means of implementation and partnership for sustainable development; 17.14 Policy coherence for sustainable development; 17.17 Effective public, public-private and civil society partnerships, building on the experience and resourcing strategies of partnerships

4. Disaggregation[8]

Potential Disaggregation: This indicator could be disaggregated by geographic location and other characteristics relevant in national contexts. For example, national level vs local/state level, city and regional levels. This indicator could be further disaggregated by economic sector (GDP) and Human Development Index (HDI).

National data collected through assessment could be also aggregated at the regional and global to measure trends. Additional disaggregation will be provided based on the city population sizes covered by the urban policies.

Quantifiable Derivatives:

The analysis and reporting of the data collected can be presented and assessed based on the qualifiers by region and compared to HDI, GDP, etc. For example:

- Number of countries that are developing and implementing national urban policy or regional development plans that responds to population dynamics;
- Number of countries that are developing and implementing national urban policy or regional development plans that ensures balanced regional and territorial development;

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[8] 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.

- Number of countries that are developing and implementing national urban policy or regional development plans that increase local fiscal space.

5. Sources and data collection processes

Data Sources: There are several data sources that could be used
1. Official documents such as National Urban Plan, Frameworks, Strategies, etc. available in national or regional administrations.
2. Other supporting tools such as: baseline spatial data mapping, benchmarking, point-of-service surveys, performance monitoring and reporting, gap and content analysis.
3. Database of national urban policies by United Nations[9]- and other international organizations, UN-Habitat has developed a National Urban Policy Database as a repository of official urban policies documents and related; UN-Habitat has also developed the UrbanLex, a database of laws and policies on urban matters

6. Comments and limitations

The data for this indicator will be based on the robustness of the assessment framework developed and pilot tested in selected countries Baseline data and benchmarks will build on UN-Habitat work on regional assessments, which need to be validated by key stakeholders. There could be a challenge for consistent and cost-effective data collection and analysis.

As the indicator mainly aims to track progress on the number of countries developing and implementing national urban policies, it will not suppose specific judgements of any individual county's policies. It will not be used to produce any global or regional ranking.

There might be some limitations in correlating and quantifying the contribution and attribution of urban policy to the overall change and outcomes on the ground. Nevertheless, careful design of the baseline and benchmarking would provide clear indications on the possible impact on urban policy implementation on people's quality of life. Content analysis and opinion surveys could further support any evidence and change observed, but similar methodology needs to be applied.

7. Current data availability/indicator tier

The proposed target is MEASURABLE: UN-Habitat has worked for over five years in the areas of national and regional development planning to develop a foundation of evidence that can be adapted to monitor this target and indicator. Numerous tools exist which contain existing data on national urban policy and regional development plans and can act as key elements of a methodological framework to monitor Target 11.a: UN-Habitat has a national urban policy database that offers a global overview of the state of urban policy at the national level. In addition, Un-habitat has undertaken and produced regional assessments and case studies for national urban

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[9] UN-Habitat had developed a National Urban Policy Database as a repository of official urban policies documents and related; UN-Habitat had also developed the UrbanLex, a database of laws and policies on urban matters

policies in several regions including, North America, western and Eastern Europe regions, Latin America, Africa, Arab states, and Asia and Pacific regions.

8. **Responsible entities**

UN-Habitat will take on the technical lead and will be supported by UNFPA. In addition, there are a diverse group of PARTNERS working on National Urban Policy and Regional Development Planning (e, g Cities Alliance, OECD, etc.), which includes government ministries and other regional think tanks and universities. All these will be invited to contribute to the reporting of this indicator.

9. Data collection and data release calendar
Every two years

10. **Treatment of missing values**

Not applicable
11. Sources of differences between global and national figures

Not applicable

12. Regional and global estimates and data collection for global monitoring

Already several relevant publications and review supporting the monitoring of this target and indicator have been completed across regions. This includes regional level and national level publications such as;
1. National Urban Policy: A Guiding Framework
2. National Urban Policy: Framework for a Rapid Diagnostic
3. International Guidelines on Urban and Territorial Planning
4. National Urban Policy Regional Report: Asia and Pacific Region
5. OECD Urban Policy Reviews: Mexico
6. OECD Urban Policy Reviews: Poland
7. OECD Urban Policy Reviews: Chile
8. OECD Urban Policy Reviews: China.

UN-Habitat and other partners including UNFPA will build the capacity for national counterparts to monitor and track the reporting of this indicator. National aggregates will be compiled to produce regional and global performance reports.

13. References

1. OECD (2015), Building Successful Cities: A National Urban Policy Framework
2. OECD (Various years), Urbanisation reviews (various countries: China, Mexico, Poland, Chile, Korea)
3. UN-Habitat and Cities Alliance (2014), The evolution of National Urban Policy: A global Overview
4. UN-Habitat (Forthcoming): Global State of National Urban Policies
5. UN-Habitat, 2015, Assessment Framework for UN-Habitat sub-programme 2
6. UN-Habitat (2015) Guiding Framework for National Urban Policy (Forthcoming)
7. UN-Habitat (2015) Diagnostic Framework for NUP
8. World Bank (Various years) Urbanisation Review (China, Colombia, Ghana, India, Indonesia, Korea, Sri Lanka, Turkey and Vietnam)

URL References:
14. [1]: http://unhabitat.org/initiatives-programmes/national-urban-policies/
15. [2]   http://www.worldbank.org/en/topic/urbandevelopment/publication/urbanization-reviews
16. [3]   http://www.oecd-ilibrary.org/urban-rural-and-regional-development/oecd-urban-policy-reviews_23069341
17. [4] http://www.urbangateway.org/icnup/2015/home

1. Goals and targets addressed

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.

Indicator 11.b.1: Proportion of local governments that adopt and implement local disaster risk reduction strategies in line with the Sendai Framework for Disaster Risk Reduction 2015-2030

2. Definition and method of computation

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.

Note: Terminology will be discussed and finalized in the Open-ended Intergovernmental Working Group for Sendai Framework for Disaster Risk Reduction.

Method of computation

Summation of data from National Progress Report of the Sendai Monitor

3. Rationale and interpretation

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. (mainly based on TST Issue Brief 20, 11, 23, 14 and 12)

Global population is now half urban and expected to be nearly 70% urban by 2050. Increasing resilience of cities is critical to reduce disaster risk and achieve sustainable development. Cities are also very vulnerable to natural disasters, especially climate-related shocks. Over half of all coastal areas are urbanized and 21 of the world's 33 megacities lie in coastal flood zones. Coastal cities are particularly affected by sea level rise, coastal flooding and erosion, and extreme events (e.g. tsunamis and storm surges) due to the undermining natural protective barriers, low levels of development combined with rapid population growth in low lying coastal areas and inadequate

capacity to adapt. In addition to the impact on communities and non-human species, the unplanned urbanization also undermines the ecosystem services that support much hard urban infrastructure. This type of development also exacerbates urban vulnerability to climate change impacts, including hydro-meteorological and geological hazards.

Located mostly in cities where disadvantaged groups are situated and when affordable access is addressed, resilient infrastructures such as health, education, road and other critical infrastructures will have direct impact on reducing inequality and making growth more inclusive and sustainable. The opportunity is that 60% of the area expected to be urban by 2030 remains to be built, indicating that the shape of future cities can be proactively guided into more risk-sensitive development. An increasing number of cities that adopt and implement local DRR strategies will contribute to sustainable development from economic, environmental and social perspectives.

The indicator will build 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.

4. Sources and data collection
National Progress Report of the Sendai Monitor, reported to UNISDR

5. Disaggregation

by country, by city

6. Comments and limitations:

This is proposal by UNISDR based on our 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.

The proposed indicators 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.

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. 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.

Gender equality issues: Not included.

7.Data for global and regional monitoring
Summation of data from National Progress Report of the Sendai Monitor

8. Main linkage with SDG Targets:
This indicator is proposed as "multi-purpose indicator".
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
Target 13.1:
Strengthen **resilience and adaptive capacity to climate-related hazards and natural disasters** in all countries
Target 13.b:
Promote mechanisms for raising capacities for effective **climate change-related planning and management**, in least developed countries, including focusing on women, youth, local and marginalized communities
Target 9.1:
Develop quality, reliable, sustainable and **resilient infrastructure**, including regional and trans border infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all
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
Target 1.5:
By 2030, build **the resilience of the poor and those in vulnerable situations** and reduce their **exposure and vulnerability to climate-related extreme events** and other economic, social and environmental shocks and **disasters**
Target 3.9:
By 2030, substantially reduce the number of **deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination**
Target 14.2:
By 2020, sustainably manage and protect **marine and coastal ecosystems** to avoid significant adverse impacts, including by strengthening their resilience, and take action for their restoration in order to achieve healthy and productive oceans
Target 3.d:

Strengthen the capacity of all countries, in particular developing countries, for **early warning, risk reduction and management of national and global health risks**

1. Goals and targets addressed

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

 Indicator 11.b.2: Number of countries with national and local disaster risk reduction strategies [a]

2. Definition and method of computation

a] An open-ended intergovernmental expert working group on indicators and terminology relating to disaster risk reduction established by the General Assembly (resolution 69/284) is developing a set of indicators to measure global progress in the implementation of the Sendai Framework. These indicators will eventually reflect the agreements on the Sendai Framework indicators.

Computation Method:

Computation methodology for several indicators is very comprehensive, very long (about 180 pages) and probably out of the scope of this Metadata. UNISDR prefers to refer to the outcome of the Open Ended Intergovernmental Working Group, which provides a full detailed methodology for each indicator and sub-indicator.

The latest version of these methodologies can be obtained at:
http://www.preventionweb.net/documents/oiewg/Technical%20Collection%20of%20Concept%2 0Notes %20on%20Indicators.pdf
 A short summary: Summation of data from National Progress Reports of the Sendai Monitor

Regional aggregates:

See under Computation Method.
It will be calculated, at the discretion of the OEIWG, as either a linear average of the index described under Computation Method, or as a weighted average of the index times the population of the country, divided by global population.

3. Rationale and interpretation

The indicator will build bridge between the SDGs and the Sendai Framework for DRR. Increasing number of national governments that adopt and implement national and local DRR strategies, which the Sendai Framework calls for, will contribute to sustainable development from economic, environmental and social perspectives.

4. Sources and data collection

Description: National Progress Report of the Sendai Monitor, reported to UNISDR
Collection process: The official counterpart(s) at the country level will provide National Progress Report of the Sendai Monitor.

5. Disaggregation
By country

By city (applying sub-national administrative units)

Treatment of missing values:

- At country level: In the Sendai Monitor, which will be undertaken as a voluntary self-assessment like the HFA Monitor, missing values and 0 or null will be considered equivalent.
- At regional and global levels: NA

Sources of discrepancies:

There is no global database collecting DRR policy information besides the HFA Monitor and the succeeding Sendai Monitor.

6. Comments and limitations:

The HFA Monitor started in 2007 and over time, the number of countries reporting to UNISDR increased from 60 in 2007 to 140+ countries now undertaking voluntary self-assessment of progress in implementing the HFA. During the four reporting cycles to 2015 the HFA Monitor has generated the world's largest repository of information on national DRR policy inter alia. Its successor, provisionally named the Sendai Monitor, is under development and will be informed by the recommendations of the OEIWG. A baseline as of 2015 is expected to be created in 2016-2017 that will facilitate reporting on progress in achieving the relevant targets of both the Sendai Framework and the SDGs.

Members of both the OEIWG and the IAEG-SDGs have addressed that indicators that simply count the number of countries are not recommended, instead that, indicators to measure progress over time have been promoted. Further to the deliberations of the OEIWG as well as the IAEG, UNISDR has proposed computation methodologies that allow the monitoring of improvement in national and local DRR strategies over time. These methodologies range from a simple quantitative assessment of the number of these strategies to a qualitative measure of alignment with the Sendai Framework, as well as population coverage for local strategies.

7. Current data availability

Description: Around 100 countries

The HFA Monitor started in 2007 and over time, the number of countries reporting to UNISDR increased from 60 in 2007 to 140+ countries now undertaking voluntary self-assessment of progress in implementing the HFA. Given the requirements for disaster risk reduction strategies enshrined in reporting on the SDGs and the targets of the Sendai Framework, it is expected that by

2020, all member states will report their DRR strategies according to the recommendations and guidelines by the OEIWG.

Time series: 2013 and 2015: HFA monitor

Data collection: 2017-2018

Data release: Initial datasets in 2017, a first fairly complete dataset by 2019

8.Responsible entities

The coordinating lead institution chairing the National DRR platform which is comprised of special purpose agencies including national disaster agencies, civil protection agencies, and meteorological agencies.

9. Sources of discrepancies

There is no global database collecting DRR policy information besides the HFA Monitor and the succeeding Sendai Monitor.

10.References

The Open-ended Intergovernmental Expert Working Group on Indicators and Terminology relating to Disaster Risk Reduction (OEIWG) was given the responsibility by the UNGA for the development of a set of indicators to measure global progress in the implementation of the Sendai Framework, against the seven global targets. The work of the OEIWG shall be completed by December 2016 and its report submitted to the General Assembly for consideration. The IAEG-SDGs and the UN Statistical Commission formally recognizes the role of the OEIWG, and has deferred the responsibility for the further refinement and development of the methodology for disaster-related SDGs indicators to this working group. http://www.preventionweb.net/drr-framework/open-ended-working-group/

URL:
http://www.preventionweb.net/documents/oiewg/Technical%20Collection%20of%20Concept%20Notes %20on%20Indicators.pdf

The latest version of documents is located at: http://www.preventionweb.net/drr-framework/open-ended-working-group/sessional-intersessionaldocuments

Related indicators
1.5 11.5; 11.b; 13.1; 2.4; 3.6; 3.9; 3.d;4. a; 6.6; 9.1; 9.a; 11.1; 11.3; 11.c; 13.2; 13.3; 13.a; 13.b; 14.2; 15.1;
15.2; 15.3; 15.9.

1. Goals and targets addressed

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

Indicator 11.c.1: Proportion of financial support to the least developed countries that is allocated to the construction and retrofitting of sustainable, resilient and resource-efficient buildings utilizing local materials

The performance of the construction sector is important for the economic health of a country, and particularly relevant for enhancing resilience, sustainability and inclusiveness in Least Developed Countries. In addition, the use of local building materials can make a substantial contribution to a building's sustainability, both in terms of embodied energy, resource-use and other life-cycle impacts.

Local building materials can be defined as materials of which the entire life cycle (extraction, manufacturing, sale, use and recycling) is tied to the same geographic region. The number of jobs in the manufacture of local building materials can indicate the share of green construction jobs that contribute to sustainable cities and human settlements and, by inference, the sustainability of the building sector as a whole. Often in LDCs, the construction industry is heavily dependent on the informal sector, making-up a substantial proportion of a country's total output; both formal and informal jobs should therefore be taken into consideration.

2. *Definition and method of computation*

Low cost housing can be considered affordable for low- and moderate-income earners if household can acquire a housing unit (owned or rented) for an amount up to 30 percent of its household income (Miles, 2000)[10]. Cost effective housing is a relative concept and has more to do with budgeting and seeks to reduce construction cost through better management, appropriate use of local materials, skills and technology but without sacrificing the performance and structure life (Tiwari et al., 1999)[11]. A low cost house is designed and constructed as any other house with regard to foundation, structure and strength. The reduction in cost is achieved through effective utilization of locally available building materials and techniques that are durable, economical, accepted by users and not requiring costly maintenance. Low cost housing is a new concept which deals with effective budgeting and following of techniques which help reducing construction cost through the use of locally available materials along with improved skills and technologies without sacrificing the strength, performance and life of the structure (Kumar, 1999; Civil Engineering Portal, 2008). Low cost housing technologies aim to cut down construction cost by using alternatives to the

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[10] Miles ME (2000). Real estate development, principles and processes, Washington D.C., Urban Land Institute. [4]
[11] Tiwari P, Parikh K and Parikh J (1999). Structural design considerations in house builder construction model: a multiobjective optimization technique, Journal of Infrastructure System. 5(3), pp. 75-90.

conventional methods and inputs. It is about the usage of local and indigenous building materials, local skills, energy saver and environment-friendly options.

Building materials often constitute the single largest input to housing construction in most developing country cities particularly in Africa, Asia and Latin America. The high cost of materials for building houses is a serious challenge militating against delivery of decent mass housing. Other challenges with building materials arise because most housing developers insist on the use of conventional building materials and technologies. These standards and regulations prevent the use of readily available local building materials and also the use of cost effective and environmentally friendly construction technologies. The costs of imported materials are very expensive when converted to the value of local currency. It is no wonder that most housing units produced through mass housing production partnerships come at prices beyond the affordability limit of the local population. It is estimated that the cost of building materials alone can take up to 70 percent of a standard low income formal housing unit. For example, in many African and Asian countries, despite the fact that they are endowed with abundant natural resources that can meet their need for building materials production, depend largely on imported building materials and technologies. While considerable research is conducted in some countries on local building materials, only few of these research initiatives offer global monitoring initiatives to track the use of local building materials. As a result, no readily available formal definitions have been developed to monitor the "*Proportion of financial support to the least developed countries that is allocated to the construction and retrofitting of sustainable, resilient and resource-efficient buildings utilizing local materials*". Below we offer a few definitions to the key words in this indicator.

- Total net official development assistance (ODA) to the construction (purpose code 32310) and urban development and management (code 43030) subsectors in the Least Developed Countries. Data expressed in US dollars at the average annual exchange rate.
- Other supporting data to be collected on this indicator includes:
  - Resource efficient building: Budgetary allocations for resource efficient building as a share of the total national budget will be extracted form national accounts
  - Local materials: Funds spent on purchases of local materials will be collected from national and local government expenditures/accounts.

3. Rationale and interpretation

The use of local building materials can reduce construction costs by 20-30%, can exhibit greatly reduced embodied energy and thus reduce CO_2 emissions. The informal labour sector often makes up a substantial proportion of a country's total output (50% of non-agricultural Gross Value Added in Sub-Saharan Africa, for instance). For every job in the construction industry it is estimated that an additional 3-5 jobs are generated in the local economy associated to this sector.

Resilient cities will need to be much more localized in their use of materials and products. The increased cost of energy will dramatically increase transportation-related costs of non-local materials. That should in turn create a greater demand for locally produced materials and products for building construction.

We need to design and plan for buildings that can be built efficiently by manual labour and that do not require oil-fueled machines and systems requiring significant quantities of fuel for operation. As the cost of fuel increases as a result of the price pressures of Peak Oil, energy intensive construction techniques could become less economically effective, and the costs of manual labour will potentially be less.

We therefore need to design for use of building systems that can be serviced and maintained with local materials, parts and labour very easily. Climate change and peak oil will more than likely reduce global trade, and reduce easy access to materials, products and systems from other countries. Therefore, building systems should be designed to be serviceable through a local supply of parts and labour.

ODA is the accepted measure of international development co-operation. In this case it captures international concessional financing to least developed countries in construction and urban development.

4. Sources and data collection

Data are compiled by the Development Assistance Committee (DAC) of the Organization for Economic Co-operation and Development from returns submitted by its member countries and other aid providers. Data can be accessed here.

5. Disaggregation

The data are generally obtained on an activity level, and include numerous parameters. They can thus be disaggregated by provider and recipient country; by type of finance, and by type of resources provided. Some data are also available on the policy objectives targeted by individual projects, including through climate adaptation and mitigation markers.

6. Comments and limitations

The data only address international concessional flows provided by governments. Detailed, internationally comparable sectoral information on other support building and construction in developing countries is generally lacking.

Gender equality issues

The data include a "gender equality" marker which identifies individual projects that have a clear gender dimension.

7. Data for global and regional monitoring

Data are available for essentially all high-income countries, and for an increasing number of middle-income aid providers.

Supplementary information

References
OECD, 2014 Aid to Urban Climate Change Adaptation.