Manual on the Basic Set of Environment Statistics of the FDES 2013

Human Settlements Statistics

(Sub-component 5.1: Human settlements of the Basic Set of Environment Statistics of the FDES 2013)

Elaborated by the Environment Statistics Section
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in collaboration with the
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Methodology sheet of the Basic Set of Environment Statistics of the FDES

https://unstats.un.org/unsd/envstats/fdes/manual_bses.cshtml
https://unstats.un.org/unsd/envstats/fdes.cshtml

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2. Introduction/Relevance

The increasing concentrations of humans in modern urban settlements is a reality: this is evident in the increased urbanization of the world with 60 per cent of the world's population expected to live in cities by 2030 and nearly 70 per cent by 2050.[1] The challenges this poses for the environment, is recognized in the UN-Habitat's New Urban Agenda,[2] the most recent recommendations for the development of cities and human settlements, arising out of the Habitat III Conference in Quito, Ecuador 2016, which addresses the need to develop environmentally sustainable and resilient urban development.

The New Urban Agenda recognizes the impact of cities and other human settlements on the environment and the need to achieve sustainable development. These pressures arise due to unsustainable consumption and production patterns, loss of biodiversity, pressure on ecosystems, pollution, natural and human-made disasters, and climate change and its related risks. It also recognizes the vulnerability of populations to the adverse impacts of climate change and other natural and human-made hazards, which particularly affect coastal areas, delta regions and small island developing states, among others. Therefore, the capacity or the resilience of the environment to cope with the impacts caused by human habitation can influence both the health of human settlements and of the natural environment with which it is associated.[3]

The most pressing issues reflected in the FDES are also those tackled under the Sustainable Development Goals (SDGs). The SDGs tackle issues relating to unprecedented urban growth which has created pressure on cities and the environment. For example, growth in the absolute number of urban residents who live in slums, owing in part to accelerating urbanization, population growth and lack of appropriate land and housing policies. This has been partly driven by the movement of people to urban areas which has resulted in expansion of geographic boundaries to accommodate new inhabitants. The numbers of people in urban areas without proper access to the basic services of water supply and sanitation as well as safe domestic energy and public transport is increasing, partly as a result of rapid urban population growth and partly as a result of increasing urban poverty and growing financial resource constraints. Air pollution is also a major environmental health risk.[4]

Tackling these challenges improves the social and ecological functioning of human settlements, and the well-being and health of humans. To do so requires appropriate measures including provision of safe drinking water while ensuring its conservation and sustainable; the provision of environmentally sound sanitation; reduction of waste generation and ensuring adequate waste disposal; development of quality infrastructure and spatial planning; provision of clean and safe transportation with increasing use of innovative technologies to provide environmentally sound services; safe building design and other measures of good housing; and ecosystem health through sustainable land use and consideration of environmentally sensitive areas.[5]

The agenda for human settlements is vast therefore the statistics of the FDES focus on aspects in line with the data needed for the SDGs. These are statistics needed to understand:

- The demographic aspects of cities;

[1] Sustainable Development Goal 11 Monitoring Framework, https://unhabitat.org/sdg-goal-11-monitoring-framework/ (accessed 10 October 2017)

[2] UN-Habitat (2017) *New Urban Agenda*, United Nations Conference on Housing and Sustainable Urban Development, Habitat III Conference, Quito, Ecuador 17-20 October 2016, http://habitat3.org/wp-content/uploads/NUA-English.pdf (accessed 10 October 2017)

[3] UN-Habitat (2017) *New Urban Agenda*, United Nations Conference on Housing and Sustainable Urban Development, Habitat III Conference, Quito, Ecuador 17-20 October 2016, http://habitat3.org/wp-content/uploads/NUA-English.pdf (accessed 10 October 2017)

[4] United Nations (2017) *Progress towards the Sustainable Development Goals: Report of the Secretary General*, E/2017/66, 11 May 2017, http://www.un.org/ga/search/view_doc.asp?symbol=E/2017/66&Lang=E (accessed 10 October 2017)

[5] United Nations Statistics Division (2017) *Framework for the Development of Environment Statistics (FDES 2013),* https://unstats.un.org/unsd/environment/fdes/FDES-2015-supporting-tools/FDES.pdf (accessed 10 October 2017)

- The fabric of human settlements namely the physical components comprising shelter and infrastructure;
- Provision of basic services, of which the FDES covers some, such as open space, air quality, but not all of the services required by a community for the fulfilment of its functions as a social body: education, health, culture, welfare, recreation and nutrition; and
- Air pollution, as well as the risk of human and natural disasters.[6] [7]

The methodology sheet covers sub-component 5.1 human settlements which includes statistics for monitoring these goals.

[6] UN (1976) *Conference on Human Settlements: The Vancouver Action Plan*. Section C. Shelter, infrastructure and services, http://www.un-documents.net/vp-c.htm (accessed 10 October 2017)

[7] UN-Habitat (1992) *Multilingual Glossary of Human Settlements Terms*, Nairobi, UN-Habitat, https://digitallibrary.un.org/record/830503?ln=en (accessed 10 October 2017)

3. Definitions and description of the statistics

3A. Concepts

3A1. Human settlements

The term human settlements is often used alongside specific terms referring to types of settlements such as cities, urban areas, urban agglomerations, etc. Even where the term human settlement is not used it should be understood that this is the same concept. For example, the New Urban Agenda refers to "cities and human settlements" or "urbanization and human settlements". The UN-Habitat provides the following definition of human settlements in its 1992 Glossary: "A human settlement is the settlement of a group of persons in a specified place. A national system of settlements includes metropolitan areas, towns, villages, plantation estates, mining camps and recreation areas. The structural areas of human settlements include industries, transport facilities, storage, housing, community facilities, parks and recreation."[8]

3A2. Urban and Rural

There is no international standard definition of urban (and conversely rural) which is partly due to the varying nature of what is considered urban in countries around the world. Statistics on urban/rural distinctions are therefore not fully comparable; it should be recognized that this also reflects the reality of the differing characteristics of urban areas between countries.[9] The international recommendations for defining urban/rural statistics from the population and housing census and vital statistics are listed below. Following, are recommended criteria for defining urban/rural, as well as additional information contained in those guidelines when an urban-rural continuum is used, rather than the traditional urban/rural dichotomy.

It should be noted that the administrative boundaries of the cities may not necessarily coincide with the extent of the urbanized territory as delimited by other standards. Examples of such territorial areas are urban agglomerations, which refer to population contained within the contours of contiguous territory inhabited at urban levels of residential density; and metropolitan regions which include both the contiguous territory inhabited at urban levels of residential density and additional surrounding areas of lower settlement density that are under the direct influence of the city.[10]

International recommendations – Population and Housing Census and Vital Statistics

The Principles and Recommendations for Population and Housing Censuses[11] provides advice on defining urban areas. It is noted that the Principles and Recommendations for a Vital Statistics System [12] define urban, however this is also based on the Population and Housing Census recommendations. The recommendation is that "Because of national differences in the characteristics that distinguish urban from rural areas, the distinction between the

[8] UN-Habitat (1992) *Multilingual Glossary of Human Settlements Terms*, Nairobi, UN-Habitat, https://digitallibrary.un.org/record/830503?ln=en, (accessed 10 October 2017)

[9] United Nations Statistics Division (2014) *World Urbanization Prospects: The 2014 Revision, Methodology*, http://esa.un.org/unpd/wup/Methodology/WUP2014-Methodology.pdf (accessed 10 October 2017)

[10] United Nations Statistics Division (2014) *World Urbanization Prospects: The 2014 Revision, Methodology,* http://esa.un.org/unpd/wup/Methodology/WUP2014-Methodology.pdf (accessed 10 October 2017)

[11] United Nations Statistics Division (2015) *Principles and Recommendations for Population and Housing Censuses, Rev. 3*, http://unstats.un.org/unsd/publication/seriesM/Series_M67rev3en.pdf (accessed 10 October 2017)

[12] United Nations Statistics Division (2014) *Principles and Recommendations for a Vital Statistics System*, http://unstats.un.org/unsd/demographic/standmeth/principles/M19Rev3en.pdf (accessed 10 October 2017)

urban and the rural population is not yet amendable to a single definition that would be applicable to all countries or even, for the most part, to the countries within a region. Where there are no regional recommendations on the matter, countries must establish their own definitions in accordance with their needs."[13]

The UN Demographic Yearbook provides a listing of country definitions of urban. It will be seen from an examination of the definitions that they fall roughly into three major types: (1) classification of localities as urban based on size; (2) classification of administrative centres of minor civil divisions as urban and the remainder of the division as rural; and (3) classification of minor civil divisions on a set of criteria, which may include type of local government, number of inhabitants or proportion of population engaged in agriculture. The list of definitions used by countries can be found in the notes for Table 6 of the publication.[14]

The recommendations also discuss the criteria for defining or classifying urban areas which go beyond the urban-rural dichotomy. An urban-rural differentiation may oversimplify the reality on the ground, therefore the continuum of size and function from urban to rural areas should be recognized.

These criteria are:

Population density – the Recommendations state that "a classification of areas as urban or rural should be done at the smallest administrative unit of the country. … The classification should be made, first and foremost, on a measure of population density. The distinction between urban and rural population density depends on the average area of the spatial units being assessed. Smaller spatial units may need a higher population density threshold and larger spatial units a lower population density."[15]

Functional criteria - Population density may not, however, be a sufficient criterion in many countries, particularly where there are large localities that are still characterized by a truly rural way of life. In this case, additional criteria may be needed in developing classifications that are more distinctive than a simple urban-rural differentiation. Useful criteria may be the percentage of the population engaged in agriculture, the general availability of electricity or piped water in living quarters and the ease of access to medical care, schools, recreation facilities and transportation; other additional criteria could be added according to the national situation. For certain countries where such facilities are available in some areas that are still rural (where agriculture is the predominant source of employment), it might even be necessary to adopt different criteria in different parts of the country.[16]

Size of locality – The split between urban and rural areas has traditionally been based on difference in ways of life and standard of living. However, this distinction is often blurred, hence, "The traditional rural-urban dichotomy is still needed but a classification by size of locality, can usefully supplement the dichotomy or even replace it when the concern is with characteristics related to density."[17]

Territorial approach - UN-Habitat

The UN-Habitat has similarly recognized the importance of recognizing a rural-urban continuum, although international guidelines and definitions are not yet available. It states that the urban reality is not an urban-rural split, and that many smaller settlements may face similar challenges to urban areas, thus recognizing the continuum between rural to urban. It has called for "a conceptual shift to a more territorial approach, focusing on metropolitan regions, including the cities, towns, peripheral areas and villages that they contain." The urban

[13] United Nations Statistics Division (2015) *Principles and Recommendations for Population and Housing Censuses, Rev. 3*, http://unstats.un.org/unsd/publication/seriesM/Series_M67rev3en.pdf (accessed 10 October 2017)

[14] United Nations Statistics Division (2015) *UN Demographic Yearbook*, https://unstats.un.org/unsd/demographic/products/dyb/dyb2015.htm, (accessed 10 October 2017)

[15] United Nations Statistics Division (2015) *Principles and Recommendations for Population and Housing Censuses, Rev. 3*, http://unstats.un.org/unsd/publication/seriesM/Series_M67rev3en.pdf (accessed 10 October 2017)

[16] United Nations Statistics Division (2015) *Principles and Recommendations for Population and Housing Censuses, Rev. 3,* http://unstats.un.org/unsd/publication/seriesM/Series_M67rev3en.pdf (accessed 10 October 2017)

[17] United Nations Statistics Division (2015) *Principles and Recommendations for Population and Housing Censuses, Rev. 3*, http://unstats.un.org/unsd/publication/seriesM/Series_M67rev3en.pdf (accessed 10 October 2017)

reality should recognize small towns where rapid growth is occurring, along with rural-urban links, to focus more broadly on human settlements. This territorial frame avoids the over-simplification of the rural-urban dichotomy and the risk of positioning cities and rural areas in opposition to one another.[18]

3B. Urban and rural population (Topic 5.1.1)

Population living in urban areas (FDES 5.1.1.a)
Number of persons that reside in the urban areas of the country. As per the population census guidelines, the population would include those persons who are usual residents as defined by the country.[19]

Remark:

- Urban and rural areas are defined and classified by the national statistical offices or geographical authorities.

Population living in rural areas (FDES 5.1.1.b)
Number of persons that reside in rural areas of the country.

Remark:

- Urban and rural areas are defined and classified by the national statistical offices or geographical authorities.

Total urban area (FDES 5.1.1.c)
The total area of the country that is defined as urban.

Remark:

- Urban and rural areas are defined and classified by the national statistical offices or geographical authorities.

Total rural area (FDES 5.1.1.d)
The total area of the country that is defined as rural.

Remark:

- Urban and rural areas are defined and classified by the national statistical offices or geographical authorities.

Population living in coastal areas (FDES 5.1.1.e)
The number of persons living in coastal areas. While the terms, coastal areas, coastal zones and coastal regions are often used interchangeably, for the purposes of the FDES population in coastal areas refers to the population living within 100 kilometres of the coastline.[20] A country might also consider the population in the low elevation coastal zone (<10 metres elevation) or population living in river deltas.

[18] United Nations (2017) *Report of the High Level Independent Panel to Assess and Enhance Effectiveness of UN-Habitat Note by the Secretary General A/71/1006*, http://www.un.org/News/dh/infocus/HLP/UN-Habitat-Assessment-Report-3%20August-2017.pdf (accessed 10 October 2017)

[19] United Nations Statistics Division (2015) *Principles and Recommendations for Population and Housing Censuses, Rev.3,* http://unstats.un.org/unsd/publication/seriesM/Series_M67rev3en.pdf (accessed 10 October 2017)

[20] United Nations*, Indicators of Sustainable Development: Guidelines and Methodologies*, 3rd edition, http://www.un.org/esa/sustdev/natlinfo/indicators/methodology_sheets/oceans_seas_coasts/pop_coastal_areas.pdf (accessed 7 October 2017)

3C. Access to selected basic services (Topic 5.1.2)

Population using an improved drinking water source (FDES 5.1.2.a)
The definition of the FDES statistic is based on Millennium Development Goals (MDG) indicator 7.8 Proportion of population using an improved drinking water source. The corresponding SDG indicator is 6.1.1 Proportion of population using safely managed drinking water services (defined in Section 6). The definition is also in line with the International Recommendations for Water Statistics data item "main source of drinking water" which was aligned to MDG 7.8.[21]

The population using an improved drinking water source, total, urban and rural, is the number of persons who use any of the following types of water supply for drinking: piped water into dwelling, plot or yard; public tap/standpipe; borehole/tube well; protected dug well; protected spring; rainwater collection and bottled water (if a secondary available source is also improved). It excludes unprotected wells or springs, water provided by carts with small tanks/drums, tanker truck-provided water and bottled water (if secondary source is not an improved source) or surface water taken directly from rivers, ponds, streams, lakes, dams or irrigation channels.[22]

"Improved" sources of drinking water include: [23]

- Piped water into dwelling, also called a household connection, is defined as a water service pipe connected with in-house plumbing to one or more taps (e.g., in the kitchen and bathroom).
- Piped water to yard/plot, also called a yard connection, is defined as a piped water connection to a tap placed in the yard or plot outside the house.
- Public tap or standpipe is a public water point from which people can collect water. A standpipe is also known as a public fountain or public tap. Public standpipes can have one or more taps and are typically made of brickwork, masonry or concrete.
- Tubewell or borehole is a deep hole that has been driven, bored or drilled, with the purpose of reaching groundwater supplies. Boreholes/tubewells are constructed with casing, or pipes, which prevent the small diameter hole from caving in and protects the water source from infiltration by run-off water. Water is delivered from a tubewell or borehole through a pump, which may be powered by human, animal, wind, electric, diesel or solar means. Boreholes/tubewells are usually protected by a platform around the well, which leads spilled water away from the borehole and prevents infiltration of run-off water at the well head.
- Protected dug well is a dug well that is protected from runoff water by a well lining or casing that is raised above ground level and a platform that diverts spilled water away from the well. A protected dug well is also covered, so that bird droppings and animals cannot fall into the well.
- Protected spring: The spring is typically protected from runoff, bird droppings and animals by a "spring box", which is constructed of brick, masonry, or concrete and is built around the spring so that water flows directly out of the box into a pipe or cistern, without being exposed to outside pollution.
- Rainwater refers to rain that is collected or harvested from surfaces (by roof or ground catchment) and stored in a container, tank or cistern until used.

"Unimproved" sources of drinking water include: [24]

- Unprotected spring: This is a spring that is subject to runoff, bird droppings, or the entry of animals. Unprotected springs typically do not have a "spring box".

[21] United Nations Statistics Division (2012) *International Recommendations for Water Statistics*. Series M No.91, http://unstats.un.org/unsd/envaccounting/irws/irwswebversion.pdf (accessed 10 October 2017)
[22] WHO/UNICEF (2015) *Improved and unimproved water sources and sanitation facilities*, http://www.wssinfo.org/definitions-methods/watsan-categories/ (accessed 10 October 2015) Note: The terminology improved and unimproved has since been replaced by the SDGs which cover a more detailed ladder of sanitation and hygiene, https://washdata.org/ (accessed 10 October 2017)
[23] WHO/UNICEF (2015) *Improved and unimproved water sources and sanitation facilities*, http://www.wssinfo.org/definitions-methods/watsan-categories/ (accessed 10 October 2015) Note: The terminology improved and unimproved has since been replaced by the SDGs which cover a more detailed ladder of sanitation and hygiene, https://washdata.org/ (accessed 10 October 2017)
[24] WHO/UNICEF (2015) *Improved and unimproved water sources and sanitation facilities*, http://www.wssinfo.org/definitions-methods/watsan-categories/ (accessed 10 October 2015) Note: The terminology improved and unimproved has since been replaced by the SDGs which cover a more detailed ladder of sanitation and hygiene, https://washdata.org/ (accessed 10 October 2017)

- Unprotected dug well: This is a dug well for which one of the following conditions is true: 1) the well is not protected from runoff water; or 2) the well is not protected from bird droppings and animals. If at least one of these conditions is true, the well is unprotected.
- Cart with small tank/drum: This refers to water sold by a provider who transports water into a community. The types of transportation used include donkey carts, motorized vehicles and other means.
- Tanker-truck: The water is trucked into a community and sold from the water truck.
- Rivers or ponds: Surface water is water located above ground and includes rivers, dams, lakes, ponds, streams, canals, and irrigation channels.
- Bottled water is considered to be improved only when the household uses drinking-water from an improved source for cooking and personal hygiene; where this information is not available, bottled water is classified on a case-by-case basis.

Remark:

- The definition and description above is consistent with World Health Organization (WHO) and United Nations Children's Fund (UNICEF) definitions and detailed descriptions of improved drinking water source as one that, "by the nature of its construction or through active intervention, is protected from outside contamination, in particular from contamination with faecal matter."[25]

Population using an improved sanitation facility (FDES 5.1.2.b)

The definition of the FDES statistic is based on MDG indicator 7.9 Proportion of population using an improved sanitation facility. The corresponding SDG indicator is 6.2.1: Proportion of population using safely managed sanitation services, including a hand-washing facility with soap and water (defined in Section 6). The definition is also in line with the International Recommendations for Water Statistics data item "main sanitation facilities" which was aligned to MDG 7.9.[26]

The population using an improved sanitation facility, total, urban, rural, is the population with access to facilities that hygienically separate human excreta from human contact. Improved facilities include flush/pour flush toilets or latrines connected to a sewer, septic tank or pit; ventilated improved pit latrines; pit latrines with a slab or platform of any material which covers the pit entirely, except for the drop hole; and composting toilets/latrines. Unimproved facilities include public or shared facilities of an otherwise acceptable type: flush/pour-flush toilets or latrines which discharge directly into an open sewer or ditch; pit latrines without a slab; bucket latrines; hanging toilets; or latrines which directly discharge in water bodies or in the open; and the practice of open defecation in the bush, field or bodies or water.[27]

"Improved" sanitation includes:

- Flush toilet uses a cistern or holding tank for flushing water, and a water seal (which is a U-shaped pipe below the seat or squatting pan) that prevents the passage of flies and odours. A pour flush toilet uses a water seal, but unlike a flush toilet, a pour flush toilet uses water poured by hand for flushing (no cistern is used).
- Piped sewer system is a system of sewer pipes, also called sewerage, that is designed to collect human excreta (faeces and urine) and wastewater and remove them from the household environment. Sewerage systems consist of facilities for collection, pumping, treating and disposing of human excreta and wastewater.
- Septic tank is an excreta collection device consisting of a water-tight settling tank, which is normally located underground, away from the house or toilet. The treated effluent of a septic tank usually seeps into the ground through a leaching pit. It can also be discharged into a sewerage system.

[25] WHO/UNICEF Joint Monitoring Programme for Water Supply and Sanitation – JMP (2015), http://www.wssinfo.org (accessed 10 October 2015) Note: The terminology improved and unimproved has since been replaced by the SDGs which cover a more detailed ladder of sanitation and hygiene, https://washdata.org/ (accessed 10 October 2017)

[26] United Nations Statistics Division (2012) *International Recommendations for Water Statistics*. Series M No.91, http://unstats.un.org/unsd/envaccounting/irws/irwswebversion.pdf (accessed 10 October 2017)

[27] WHO/UNICEF Joint Monitoring Programme for Water Supply and Sanitation – JMP (2015), http://www.wssinfo.org (accessed 1 December 2015) Note: The terminology improved and unimproved has since been replaced by the SDGs which cover a more detailed ladder of sanitation and hygiene, https://washdata.org/ (accessed 10 October 2017)

- Flush/pour flush to pit latrine refers to a system that flushes excreta to a hole in the ground or leaching pit (protected, covered).
- Ventilated improved pit latrine (VIP) is a dry pit latrine ventilated by a pipe that extends above the latrine roof. The open end of the vent pipe is covered with gauze mesh or fly-proof netting and the inside of the superstructure is kept dark.
- Pit latrine with slab is a dry pit latrine whereby the pit is fully covered by a slab or platform that is fitted either with a squatting hole or seat. The platform should be solid and can be made of any type of material (concrete, logs with earth or mud, cement, etc.) as long as it adequately covers the pit without exposing the pit content other than through the squatting hole or seat.
- Composting toilet is a dry toilet into which carbon-rich material (vegetable wastes, straw, grass, sawdust, ash) are added to the excreta and special conditions maintained to produce inoffensive compost. A composting latrine may or may not have a urine separation device.
- Special case. A response of "flush/pour flush to unknown place/not sure/DK where" is taken to indicate that the household sanitation facility is improved, as respondents might not know if their toilet is connected to a sewer or septic tank.[28]

"Unimproved" sanitation includes:

- Flush/pour flush to elsewhere refers to excreta being deposited in or nearby the household environment (not into a pit, septic tank, or sewer). Excreta may be flushed to the street, yard/plot, open sewer, a ditch, a drainage way or other location.
- Pit latrine without slab uses a hole in the ground for excreta collection and does not have a squatting slab, platform or seat. An open pit is a rudimentary hole.
- Bucket refers to the use of a bucket or other container for the retention of faeces (and sometimes urine and anal cleaning material), which are periodically removed for treatment, disposal or use as fertiliser.
- Hanging toilet or hanging latrine is a toilet built over the sea, a river, or other body of water, into which excreta drops directly.[29]

Remark:

- The collection of data on the proportion of the population using shared or public sanitation facilities, unimproved sanitation facilities and those practising open defecation, is also important to track behavioural changes in sanitation practices.[30]

Population served by municipal waste collection (FDES 5.1.2.c.)

The resident population covered by regular municipal waste removal service, of the country or the city.[31]

Population connected to wastewater collecting system (FDES 5.1.2.d.)

Number of persons connected to wastewater collecting systems (sewerage). Wastewater collecting systems may deliver wastewater to treatment plants or may discharge it without treatment to the environment.[32]

Remark:

- The contents of septic tanks that are emptied and brought to the treatment plant should be included.

[28] WHO/UNICEF Joint Monitoring Programme for Water Supply and Sanitation – JMP (2015), http://www.wssinfo.org (accessed 1 December 2015) Note: The terminology improved and unimproved has since been replaced by the SDGs which cover a more detailed ladder of sanitation and hygiene, https://washdata.org/ (accessed 10 October 2017)

[29] WHO/UNICEF Joint Monitoring Programme for Water Supply and Sanitation – JMP (2015), http://www.wssinfo.org (accessed 1 December 2015) Note: The terminology improved and unimproved has since been replaced by the SDGs which cover a more detailed ladder of sanitation and hygiene, https://washdata.org/ (accessed 10 October 2017)

[30] United Nations (2015) *Millennium Development Goals Indicators - Indicator 7.9 Proportion of population using an improved sanitation facility*, http://mdgs.un.org/unsd/mdg/Metadata.aspx (accessed 10 October 2017)

[31] United Nations Statistics Division (2016) *UNSD and UN Environment Questionnaire 2016 on Environment Statistics*, http://unstats.un.org/unsd/environment/questionnaire2016.html (accessed 10 October 2017)

[32] United Nations Statistics Division (2016) *UNSD and UN Environment Questionnaire 2016 on Environment Statistics*, http://unstats.un.org/unsd/environment/questionnaire2016.html (accessed 10 October 2017)

Population connected to wastewater treatment (FDES 5.1.2.e.)
Number of persons of the resident population whose wastewater is treated at wastewater treatment plants.[33]

Remark:

- Treatment plants can be categorised by treatment type, i.e. primary, secondary and tertiary.[34] These types of treatment are also referred to as mechanical (primary), biological (secondary) or advanced (tertiary).

Population supplied by water supply industry (FDES 5.1.2.f.)
Number of persons using water supplied by the water supply industry.[35]

Water supply industry corresponds to ISIC Rev. 4, Section E, Division 36[36]: Water collection, treatment and supply includes water collection, treatment and distribution activities for domestic and industrial needs. This includes collection of water from rivers, lakes, wells etc; collection of rain water, purification of water for water supply purposes, treatment of water for industrial and other purposes, desalting of sea or ground water to produce water as the principal product of interest, distribution of water through mains, by trucks or other means. The operation of irrigation canals is included. However, the operation of irrigation equipment for agricultural purposes, is not included.

Remarks:

- Population collecting for own use (self-abstracting) for domestic and industrial needs is included. Water supplied for industry is not included.
- Population collecting, treating and distributing water solely for agriculture sector (ISIC 01-03) is not included in ISIC 36.

Price of water (FDES 5.1.2.g)[37]
There are many possible tariffs and charges related to water and wastewater treatment services. The main statistics are:

- Fixed charges for water supply - the prices of fixed levies, flat rates and other charges that are charged regardless of the volume of water supplied, per connection.
- Volumetric tariffs and charges for water supply – the prices charged to users (i.e., economic units) per unit of water supplied, per connection.

Remarks:

- Bottled water is not included in this statistic.
- Each category of tariffs and charges above should be presented as a list or schedule of tariffs and charges disaggregated by administrative area, river basin, industry and household, and any other major characteristics that is used to distinguish tariffs and charges for different users.[38]
- In many countries, tariffs and charges vary from one national area to another. Tariffs and charges should be presented as a list of tariffs and charges for each area.[39]

[33] United Nations Statistics Division (2016) *UNSD and UN Environment Questionnaire 2016 on Environment Statistics*, http://unstats.un.org/unsd/environment/questionnaire2016.html (accessed 10 October 2017)
[34] United Nations Statistics Division (2016) *UNSD and UN Environment Questionnaire 2016 on Environment Statistics*, http://unstats.un.org/unsd/environment/questionnaire2016.html (accessed 10 October 2017)
[35] United Nations Statistics Division (2016) *UNSD and UN Environment Questionnaire 2016 on Environment Statistics*, http://unstats.un.org/unsd/environment/questionnaire2016.html (accessed 10 October 2017)
[36] United Nations Statistics Division (2008) *International Standard Industrial Classification of All Economic Activities Revision 4. Series M No. 4/Rev.4*, http://unstats.un.org/unsd/cr/registry/isic-4.asp (accessed 10 October 2017)
[37] United Nations Statistics Division (2012) *International Recommendations for Water Statistics*. Series M No.91, http://unstats.un.org/unsd/envaccounting/irws/irwswebversion.pdf (accessed 07 October 2017)
[38] United Nations Statistics Division (2012) *International Recommendations for Water Statistics*. Series M No.91, http://unstats.un.org/unsd/envaccounting/irws/irwswebversion.pdf (accessed 07 October 2017)
[39] United Nations Statistics Division (2012) *International Recommendations for Water Statistics*. Series M No.91,

- Examples of charges include connection charges, transportation charges.
- Examples of other major characteristics are seasonal variations in tariffs and charges. Statistics can be disaggregated seasonally where this occurs.
- The statistic does not cover the economic cost of water. The SEEA-Water Central Framework covers the price of water transactions and the economic value of water. More information is available in Chapter VIII of the System of Environmental-Economic Accounting for Water.[40]

Population with access to electricity (FDES 5.1.2.h)
The FDES definition of the statistic is based on SDG indicator 7.1.1 Proportion of population with access to electricity.

The number of persons with access to electricity.[41]

Remark:

- Other disaggregations can be considered, such as type of electricity supply (grid or off-grid), the capacity of electricity supply provided (in watts), the duration of service (daily hours and evening hours), the reliability of service (in terms of number and length of unplanned service interruptions), the quality of service (in terms of voltage fluctuations), as well as affordability and legality of service.[42]

Price of electricity (FDES 5.1.2.i)
Consumer prices/purchasers (end-use) price of electricity by sector (with and without tax/subsidy). This is the actual market price paid for electricity.[43]

Remarks:

- The statistic can be disaggregated by type of supply (renewable, non-renewable etc.), capacity of electricity supply provided etc.[44]
- Further disaggregation can be reflected where prices vary, for example, domestic and industrial users, or by volume used.

3D. Housing conditions (Topic 5.1.3)

Urban population living in slums (FDES 5.1.3.a)
The definition of the FDES statistic is based on MDG indicator 7.10 Proportion of urban population living in slums and SDG indicator 11.1.1 Proportion of urban population living in slums, informal settlements or inadequate housing (see Section 6). The definition of slums remains the same in SDG 11.1.1 as in MDG 7.10.

Number of persons living in slums in the urban areas of a country.

For statistical purposes, a slum household is[45] [46] a group of individuals living under the same roof lacking one or more of the following conditions:

- Access to improved water

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http://unstats.un.org/unsd/envaccounting/irws/irwswebversion.pdf (accessed 07 October 2017)
[40] United Nations Statistics Division (2012) *SEEA-Water System of Environmental-Economic Accounting for Water*, ST/ESA/STAT/SER.F/100, http://unstats.un.org/unsd/envaccounting/seeaw/seeawaterwebversion.pdf (accessed 07 October 2017)
[41] SDG indicators metadata, https://unstats.un.org/sdgs/metadata/files/Metadata-07-01-01.pdf (accessed 07 October 2017)
[42] SDG indicators metadata, https://unstats.un.org/sdgs/metadata/files/Metadata-07-01-01.pdf (accessed 07 October 2017)
[43] United Nations (2016) *International Recommendations for Energy Statistics*. ST/ESA/STAT/SER.M/93, https://unstats.un.org/unsd/energy/ires/IRES_edited2.pdf (accessed 07 October 2017)
[44] United Nations (2016) *International Recommendations for Energy Statistics*. ST/ESA/STAT/SER.M/93, https://unstats.un.org/unsd/energy/ires/IRES_edited2.pdf (accessed 07 October 2017)
[45] MDG metadata, http://mdgs.un.org/unsd/mdg/Metadata.aspx?IndicatorId=0&SeriesId=711 (accessed 07 October 2017)
[46] SDG Metadata 11.1.1, https://unstats.un.org/sdgs/metadata/files/Metadata-11-01-01.pdf (accessed 07 October 2017)

- Access to improved sanitation
- Sufficient-living area
- Durability of housing
- Security of tenure

However, since information on secure tenure is not available for most of the countries, only the first four characteristics are used to define slum household, and then to estimate the proportion of urban population living in slums. The characteristics are defined as:

- Access to improved water: Improved drinking water technologies are more likely to provide safe drinking water than those characterized as unimproved. A household is considered to have access to an improved water supply if it uses improved drinking water sources or delivery points (listed below).
  Improved drinking water sources include: piped water into dwelling, plot or yard; public tap/standpipe; tube well/borehole; protected dug well; protected spring; and rainwater collection.
  Unimproved drinking water sources include: unprotected dug well; unprotected spring; cart with small tank/drum; bottled water;[47] tanker-truck; and surface water (river, dam, lake, pond, stream, canal, irrigation channels).

- Access to improved sanitation: Improved sanitation facilities are more likely to prevent human contact with human excreta than unimproved facilities. A household is considered to have access to improved sanitation if it uses improved sanitation facilities (listed below).
  Improved sanitation facilities[48] include: flush or pour-flush to piped sewer system, septic tank or pit latrine; ventilated improved pit latrine; pit latrine with slab; and composting toilet.
  Unimproved sanitation facilities include: flush or pour-flush to elsewhere;[49] pit latrine without slab or open pit; bucket; hanging toilet or hanging latrine; no facilities or bush or field.

- Durability of housing: A house is considered "durable" if it is built on a non-hazardous location and has a structure permanent and adequate enough to protect its inhabitants from the extremes of climatic conditions, such as rain, heat, cold and humidity.

- Sufficient living area: A house is considered to provide a sufficient living area for the household members if not more than three people share the same habitable (minimum of four square metres) room.

- Secure tenure: Secure tenure is the right of all individuals and groups to effective protection by the State against arbitrary unlawful evictions. People have secure tenure when there is evidence of documentation that can be used as proof of secure tenure status or when there is either de facto or perceived protection against forced evictions.

Area of slums (FDES 5.1.3.b)
The area of slums in urban areas.

Remarks:

- The statistic focuses on the *population* of slums. However, the geographical area also needs to be identified for sampling purposes,[50] therefore, a map of the location and spatial extent of the slums is a useful complement.

[47] Bottled water is considered improved only when the household uses water from an improved source for cooking and personal hygiene. MDG metadata, http://mdgs.un.org/unsd/mdg/Metadata.aspx?IndicatorId=0&SeriesId=711 (accessed 07 October 2017)
[48] Only facilities, which are not shared or are not public are considered improved. MDG metadata, http://mdgs.un.org/unsd/mdg/Metadata.aspx?IndicatorId=0&SeriesId=711 (accessed 07 October 2017)
[48] Excreta are flushed to the street, yard or plot, open sewer, a ditch, a drainage way or other location. MDG metadata, http://mdgs.un.org/unsd/mdg/Metadata.aspx?IndicatorId=0&SeriesId=711 (accessed 07 October 2017)
[49] Excreta are flushed to the street, yard or plot, open sewer, a ditch, a drainage way or other location. MDG metadata, http://mdgs.un.org/unsd/mdg/Metadata.aspx?IndicatorId=0&SeriesId=711 (accessed 07 October 2017)

- The areas identified should overlap with the location of the population living in slums. Cities may already have identified as slums and in other cases special slum census and mapping is carried out.

Population living in hazard-prone areas (FDES 5.1.3.c)

The number of persons living in areas subject to hazards. A hazard is a process, phenomenon or human activity that may cause loss of life, injury or other health impacts, property damage, social and economic disruption or environmental degradation. Hazards may be natural, anthropogenic or socionatural in origin.[51]

Remark:

- Poor people, women, children and the elderly are also often reported to be more vulnerable to environmental changes and hazards.[52] Consideration can therefore be given to disaggregation of the statistic by age, sex and where possible by socio-economic status.

Hazard-prone areas (FDES 5.1.3.d)

These are areas subject to hazards as defined in FDES 5.1.3.c.

Remark:

- The geographic location and spatial area should be identified and mapped.

Population living in informal settlements (FDES 5.1.3.e)

The definition of this statistic is based on SDG 11.1.1 Proportion of urban population living in slums, informal settlements or inadequate housing.[53]

The number of persons living in informal settlements.

Informal settlements are residential areas where:[54]

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 city infrastructure; and
3. The housing may not comply with current planning and building regulations, and is often situated in geographically and environmentally hazardous areas, and may lack a municipal permit.

FDES 5.1.3a and FDES 5.1.3e are related in that slums are the poorest and most dilapidated form of informal settlements.[55]

Homeless population (FDES 5.1.3.f)

The number of persons who are homeless.

The definition of the homeless can vary from country to country because homelessness is essentially a cultural definition based on concepts such as “adequate housing”, “minimum community housing standard”, or “security of tenure” which can be perceived in different ways by different communities. The following two categories or degrees of homelessness can be considered: (a) Primary homelessness (or rooflessness). This category includes

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[50] UN-Habitat (2002*) Expert Group Meeting on Urban Indicators*: *Secure Tenure, Slums and Global Sample of Cities*, Nairobi, Kenya, http://www.citiesalliance.org/sites/citiesalliance.org/files/expert-group-meeting-urban-indicators[1].pdf (accessed 07 October 2017)

[51] United Nations, General Assembly (2016) *Report of the open-ended intergovernmental expert working group on indicators and terminology relating to disaster risk reduction*, Note by the Secretary-General A/71/644, https://www.unisdr.org/we/inform/publications/51748 (accessed 07 October 2017)

[52] United Nations (2015) *Sendai Framework for Disaster Risk Reduction 2015-2030*, http://www.unisdr.org/files/43291_sendaiframeworkfordrren.pdf (accessed 07 October 2017)

[53] SDG Metadata 11.1.1 https://unstats.un.org/sdgs/metadata/files/Metadata-11-01-01.pdf (accessed 07 October 2017)

[54] SDG Metadata 11.1.1 https://unstats.un.org/sdgs/metadata/files/Metadata-11-01-01.pdf (accessed 07 October 2017)

[55] SDG Metadata 11.1.1 https://unstats.un.org/sdgs/metadata/files/Metadata-11-01-01.pdf (accessed 07 October 2017)

persons living in streets or without a shelter that would fall within the scope of living quarters; (b) Secondary homelessness. This category may include the following groups: (i) Persons with no place of usual residence who move frequently between various types of accommodation (including dwellings, shelters or other living quarters); (ii) Persons usually resident in long-term (also called "transitional") shelters or similar arrangements for the homeless.[56]

Number of dwellings with adequacy of building materials defined by national or local standards (FDES 5.1.3.g)
The SDG 11.1.1 Proportion of urban population living in slums, informal settlements or inadequate housing covers access to improved water, access to improved sanitation, sufficient living area, structural quality/durability of dwellings and security of tenure, therefore it is a broad concept which goes beyond FDES 5.1.3.g.[57] However the aspect of structural quality/durability is relevant and is used for the definition.

Structural quality/durability – 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 [not covered by FDES 5.1.3.g].[58]

Remarks:

- Under FDES 5.1.3.g the location of the house should ensure that the dwelling is not in a 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.
- In many countries local building codes provide the measure for formal sector housing. However, in slums and informal settlements dwellings rarely meet formal standards. Consideration can be given to identifying slum upgrading where it has occurred.[59]
- In certain regions such as those susceptible to hazards, such as earthquakes or hurricanes, landslides or floods, the statistic can be disaggregated to identify dwellings which are designed and built to the relevant building codes or engineering standards sufficient to withstand the relevant hazards and intensities of hazard.[60]

3E. Exposure to ambient pollution (Topic 5.1.4)

Population exposed to air pollution in main cities (FDES 5.1.4.a)
The definition of this statistic is based on SDG 11.6.2 Annual mean levels of fine particulate matter (e.g. $PM_{2.5}$ and PM_{10}) in cities.

The number of persons exposed to mean annual concentration of fine suspended particles of less than 2.5 microns in diameters ($PM_{2.5}$ and PM_{10}) is a common measure of air pollution.[61] However, other pollutants that affect health include ozone, nitrogen dioxide (NO_2) and sulphur dioxide (SO_2).

Remarks:

- What level constitutes air pollution and levels of pollution may be set by local legislation.

[56] United Nations (2015) *Principles and Recommendations for Population and Housing Censuses, Rev. 3*, http://unstats.un.org/unsd/publication/seriesM/seriesm_67Rev2e.pdf (accessed 07 October 2017)
[57] SDG Metadata 11.1.1 https://unstats.un.org/sdgs/metadata/files/Metadata-11-01-01.pdf (accessed 07 October 2017)
[58] SDG Metadata 11.1.1, https://unstats.un.org/sdgs/metadata/files/Metadata-11-01-01.pdf (accessed 07 October 2017)
[59] UN-Habitat Participatory Slum Upgrading Program https://unhabitat.org/urban-themes/housing-slum-upgrading/ (accessed 07 October 2017)
[60] UNEP Sustainable Buildings and Climate Initiative (2012) *Sustainable Reconstruction in Disaster-Affected Countries: Practical Guidelines*, http://www.unep.org/sbci/pdfs/PracticalGuidelines_SustainableReconstruction.pdf (accessed 07 October 2017)
[61] SDG Metadata 11.6.2 https://unstats.un.org/sdgs/metadata/files/Metadata-11-06-02.pdf (accessed 07 October 2017)

- The statistic requires estimation of the population exposed to air pollution. An alternative is to report the concentrations of fine particulate matter at the individual air pollution monitoring sites with their location or create pollution maps or report the annual mean levels as for the SDG. An alternative is also to report percentages of population at different levels of concentrations.
- Also relevant are statistics on use of solid fuel or clean fuels and technologies for cooking, heating and lighting, to measure indoor air pollution. This is related to SDG 7.1.2: Proportion of population with primary reliance on clean fuels and technology.

Population exposed to noise pollution in main cities (FDES 5.1.4.b)
The number of persons exposed to sound at excessive levels that may be detrimental to human health.

Remarks:

- The statistic requires estimation of the population exposed to noise pollution. An alternative is to report the noise levels at the individual monitoring sites with their location or noise exposure maps.
- What constitutes noise pollution may be set by local legislation or regional recommendations: For example, WHO/Europe guidelines for community noise recommend less than 30-A weighted decibels (dB(A)) in bedrooms during the night; and less than 50-A weighted decibels (dB(A)) in outdoor living areas. The full reference for specific environments can be found in the WHO Guidelines for Community Noise.[62]

3F. Environmental concerns specific to urban settlements (Topic 5.1.5)

Extent of urban sprawl (FDES 5.1.5.a)
The area subjected to urban sprawl. Urban sprawl is a multidimensional concept associated with suburbanization (residential zones for high- and middle-income groups) and peripherization (the growth of large peri-urban areas with informal and illegal patterns of land use on the edge of cities. Sprawl is characterized by four dimensions: a population that is widely scattered in low-density developments; residential and commercial areas that are spatially separate; a network of roads characterized by overstretched blocks and poor access; and a lack of well-defined, thriving activity hubs.[63] The exact form and densities constituting sprawl vary by country.

Remark:

- SDG 11.3.1: Ratio of land consumption rate to population growth rate can be used as one type of measure of urban sprawl. Many indicators of sprawl exist but there is no single set of recommended measures.

Available green spaces (FDES 5.1.5.b)
The statistic should identify the location of the green public spaces, examples include parks, public gardens, playgrounds, public beaches and riverbanks and waterfronts. (Urban) green space includes everything in cities that has vegetation. Collectively it is sometimes referred to as "green infrastructure" encompassing the entire working landscape in cities that serve roles such as improving air quality, flood protection and pollution control. This includes green networks to regenerate ecological systems and restore environmental connectivity.[64]

Remarks:

- A complementary statistic is based on the definition of SDG 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[65] and identifies areas of open space for public use. Defined as all places publicly owned or of public use, accessible and

[62] WHO (1995) *Guidelines for Community Noise*, http://whqlibdoc.who.int/hq/1999/a68672.pdf?ua=1 (accessed 07 October 2017)
[63] UN-Habitat (2010) *State of the World's Cities 2010/2011* https://unhabitat.org/?mbt_book=state-of-the-worlds-cities-20102011-cities-for-all-bridging-the-urban-divide (accessed 07 October 2017)
[64] UN-Habitat (2015) *Global Public Space Toolkit: from Global Principles to Local Policies and Practice*, https://unhabitat.org/wp-content/uploads/2015/10/Global%20Public%20Space%20Toolkit.pdf (accessed 07 October 2017)
[65] SDG Metadata https://unstats.un.org/sdgs/metadata/files/Metadata-11-07-01.pdf (accessed 07 October 2017)

enjoyable by all for free and without profit motive. This includes streets, open spaces (including squares, playgrounds, piazzas, marketplaces) and public facilities.[66]

- The UN-Habitat Global Public Space Toolkit contains examples of innovative urban green public spaces useful in identifying such spaces for enumeration.

Number of private and public vehicles (FDES 5.1.5.c)

The number of private, public and commercial vehicles.[67]

Remarks:

- Vehicle statistics are reported by vehicle/body type (e.g., passenger cars, motorcycle, light goods vehicles, heavy goods vehicles, bus, etc.) and for passenger cars by fuel type. Data can be obtained from the vehicle licensing authority.
- IPCC guidelines for estimating GHG emissions from transport require data on vehicle type and fuel type, as well as other data including use of emission control technology, which can be deduced from the age of vehicle.[68]

Population using public modes of transportation (FDES 5.1.5.d)

The number of persons using public modes of transportation. UN-Habitat has defined public transport as large-scale transport of people on all modes of transport for which a fare is charged.[69]

However, it should be noted that in many countries public transport includes not only government-sponsored formal mass transit public transportation, but that a substantial portion of public transport in developing countries is provided by the informal transport sector.[70] It is important to report on government sponsored large-scale transport but it can be decided by countries whether to report on the informal sector.

Remarks:

- Public transport's impact on the environment varies based on whether public transport is high-capacity – metro, train, light rail, ferries or bus rapid transit – or other, such as mini-vans, shared taxis, motorcycle taxis, tuk-tuks, river taxis etc., usually found in the informal sector. The informal sector may also vary with some operators being unlicensed/ unregistered, and others licensed/registered but generally operating low-capacity vehicles. To account for these variations, data should therefore be reported by mode/type of transport, with informal transport reported separately where applicable.
- Statistics are often reported as passenger journeys or passenger kilometres which can be obtained from ridership figures of the public transport bodies.
- In understanding neighbourhood access to public transport, in line with SDG 11.2.1, useful complementary information would be maps of stops or routes (where available stops are considered to be a more appropriate basis than routes as stops are the actual locations where public transport users access the system) and frequencies of service.[71]

Population using hybrid and electric modes of transportation (FDES 5.1.5.e)

The number of persons using a vehicle that uses two or more distinct power sources to move the vehicle; or the proportion of the population using electric vehicles. Hybrid electric vehicles (HEVs) combine an internal

[66] UN-Habitat (2015) *Habitat III Issue Papers, 11-Public Space*, presented at United Nations Conference on Housing and Sustainable Urban Development, Habitat III, Quito, October 2016, New York http://habitat3.org/wp-content/uploads/Habitat-III-Issue-Paper-11_Public-Space-2.0.compressed.pdf (accessed 07 October 2017)

[67] United Nations Environment Programme (UNEP), Transport Unit (2015), http://www.unep.org/transport/ (accessed 07 October 2017)

[68] IPCC (2006) *IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2 Energy*, http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_3_Ch3_Mobile_Combustion.pdf (accessed 10 October 2017)

[69] UN-Habitat (1992) *Multilingual Glossary of Human Settlements Terms*, Nairobi, UN-Habitat, https://digitallibrary.un.org/record/830503?ln=en (accessed 10 October 2017)

[70] UN-Habitat, Urban Theme Mobility, https://unhabitat.org/urban-themes/mobility/ (accessed 07 October 2017)

[71] SDG indicator 11.2.1 under UN-Habitat, https://unstats.un.org/sdgs/metadata/files/Metadata-11-02-01.pdf (accessed 07 October 2017)

combustion engine and one or more electric motors. However, other mechanisms to capture and utilize energy are included.[72]

Remark:

- Alternatively, statistics can be reported on number of private and commercial vehicles and share of public transport fleet using hybrid and electric power.

Extent of roadways (FDES 5.1.5.f)

The length of the combined national road network of both local and central government in a country. That is, the length of a set of roads maintained by local authorities and those in custody of the central government.[73]

Remark:

- The statistic can be complemented by road mapping with differentiation by type of road: primary, secondary etc.

Existence of urban planning and zoning regulations and instruments in main cities (FDES 5.1.5.g)

The statistic lists existing governance instruments for spatial planning at city level. It covers a broad range of governance instruments including the existence of legal and institutional frameworks, urban spatial strategies and policies, zoning regulations, and other implementation instruments:[74] [75]

Remarks:

Examples of such governance instruments are:

- Planning law establishing the legal basis for planning functions.
- Spatial planning strategies including strategic plans, master plans, land use plans, neighbourhood plans, sector plans (e.g. spatial economic development, spatial industrial planning, transportation and major infrastructure planning, utility infrastructure planning, housing planning, green infrastructures plans, green spaces plans, etc.).
- Spatial planning implementation instruments such as planning permissions, zoning or land use regulations, density regulations, surfaces regulations, road construction permissions.
- Building level: Building codes, standards, regulations and bye-laws or design standards regulating and controlling the construction and erection of buildings.
- Financial spatial instruments such as land tax.
- Metropolitan and regional level spatial planning instruments covering urban forms of megacities, urban corridors, urban regions, metropolises etc. can also be included.[76]

Effectiveness of urban planning and zoning regulations and instruments in main cities (FDES 5.1.5.h)

Measuring effectiveness can include evaluation of the performance indicators and monitoring and evaluation systems designed to monitor the planning objectives of the spatial planning strategies. Also useful are trends in planning enforcement notices served, violations to building codes, etc.[77]

The measures of effectiveness can include those defined by SDG 11.a.1: Proportion of population living in cities that implement urban and regional development plans integrating population projections and resource needs, by

[72] United Nations Environment Programme (UNEP), Transport Unit (2015), http://www.unep.org/transport/ (accessed 07 October 2017)
[73] United Nations Environment Programme (UNEP), Transport Unit (2015), http://www.unep.org/transport/ (accessed 07 October 2017)
[74] UN-Habitat (1992) *Multilingual Glossary of Human Settlements Terms,* Nairobi, UN-Habitat, https://digitallibrary.un.org/record/830503?ln=en (accessed 07 October 2017)
[75] UN-Habitat, Governance website https://unhabitat.org/governance/ (accessed 07 October 2017)
[76] United Nations (2016) *Policy paper 4: Urban governance, capacity and institutional development, Note by the secretariat*, A/CONF.226/PC.3/17, for Preparatory Committee for the United Nations Conference on Housing and Sustainable Urban Development (Habitat III), Third session 2016, http://undocs.org/A/CONF.226/PC.3/17 (accessed 07 October 2017)
[77] United Nations (2016) *Policy paper 4: Urban¬ governance, capacity and institutional development, Note by the secretariat*, A/CONF.226/PC.3/17, for Preparatory Committee for the United Nations Conference on Housing and Sustainable Urban Development (Habitat III), Third session 2016, http://undocs.org/A/CONF.226/PC.3/17 (accessed 07 October 2017)

size of city and, SDG 11.3.2: Proportion of cities with a direct participation structure of civil society in urban planning and management that operate regularly and democratically.

4. International sources and recommendations

4A. Classifications and groupings

4A.1 Urban and rural areas

Definitions and means of classifying urban and rural areas are listed in Section 3. Countries may have their own classifications of cities and other human settlements, for example, urban-rural typology, degree of urbanisation, city size classes, metropolitan regions, etc. Classifications of European cities are available.[78]

4A2. Housing classifications

The Principles and Recommendations for Population and Housing Censuses Revision 3. ST/ESA/STAT/SER.M/67/Rev.3 contain several classifications related to human settlements.[79] These are related to but do not directly cover the FDES statistics. Namely:

- Categories of main source of drinking water
- Classification of buildings according to the state of repair
- Classification of buildings by type
- Classification of households by tenure
- Classification of housing unit by toilet facilities
- Classification of housing unit by water supply system
- Classification of housing units by availability and type of bathing facilities
- Classification of housing units by availability of a kitchen or other space reserved for cooking
- Classification of housing units by type of ownership
- Classification of housing units by type of solid waste disposal
- Classification of living quarters
- Classification of occupancy status for conventional dwellings
- Classification of use of housing unit

4B. Reference to international statistical recommendations, frameworks and standards

Population and Housing Statistics

- The UNSD Principles and Recommendations for Population and Housing Censuses - Revision 3, are the internationally recommended concepts and methodologies for population and housing censuses, covering standards and methods for population and housing statistics. Also covered are recommendations for the

[78] Eurostat Statistics Explained webpage: Urban Europe – Statistics on cities, towns and suburbs – introduction, http://ec.europa.eu/eurostat/statistics-explained/index.php/Urban_Europe_%E2%80%94_statistics_on_cities,_towns_and_suburbs_%E2%80%94_introduction (accessed 10 October 2017)

[79] United Nations Statistics Division (2015) *Principles and Recommendations for Population and Housing Censuses, Rev. 3*, http://unstats.un.org/unsd/publication/seriesM/Series_M67rev3en.pdf (accessed 10 October 2017)

statistics listed in section 4A, including type of water, fuel used for cooking and waste disposal of household.[80]

- The United Nations Population Fund (UNFPA) consistently supports countries in conducting population and housing censuses. Information from censuses provides the data necessary for developing urban-rural statistics: the numbers of people in a country, their distribution, living conditions (including FDES statistics on the state of housing, access to safe water and sanitation, source of energy, etc.).[81]

Other international recommendations, frameworks and standards under this topic can be found at:

- United Nations Statistics Division (1969) Methodology and Evaluation of Population Registers and Similar Systems, http://unstats.un.org/unsd/publication/SeriesF/Seriesf_15e.pdf
- Sustainable Development Goals (SDGs) metadata from the Inter-agency Expert Group on SDG Indicators, http://unstats.un.org/sdgs/iaeg-sdgs/metadata-compilation. Goals relevant to human settlement statistics are Goals: 1, 6, 7, 11 and 13.

Water Statistics

- The International Recommendations for Water Statistics (IRWS 2012) provides a framework for data collection on environment concerns related to human settlements. Data items in the IRWS refer to the main source of drinking water used by the population as well as the main type of toilet and sewage disposal, targets in Goal 7 of the MDGs and Goal 6 of the SDGs and to price of water: http://unstats.un.org/unsd/envaccounting/irws/irwswebversion.pdf
- UNSD (2016): Sustainable Development Goal 6: Clean Water and Sanitation, http://unstats.un.org/unsd/environment/Questionnaires/q2016Water_English.pdf
- UN Water: The United Nations Inter-Agency mechanism reports on all freshwater-related issues including sanitation. The scope of UN-Water covers access to and use of sanitation by populations and the interactions between sanitation and freshwater, http://www.unwater.org/home/en/
- WHO (2011), Guidelines for Drinking-water Quality, 4th edition: http://whqlibdoc.who.int/publications/2011/9789241548151_eng.pdf

Waste Statistics

- UNSD (2016): Sustainable Development Goal 6: Clean Water and Sanitation: http://unstats.un.org/unsd/environment/Questionnaires/q2016Water_English.pdf

Regional sources include:

- Eurostat: Guidance on municipal waste data collection: http://ec.europa.eu/eurostat/statistics-explained/index.php/Municipal_waste_statistics
- Eurostat: Manual on waste statistics: http://ec.europa.eu/eurostat/en/web/products-manuals-and-guidelines/-/KS-RA-13-015

Air Quality

- WHO produces air quality guidelines for particulate matter, ozone, nitrogen dioxide and sulphur dioxide: http://www.who.int/phe/health_topics/outdoorair/outdoorair_aqg.

Exposure to hazards

- The Sendai Framework is the successor to the Hyogo Framework for Action 2005-2015 and sets out to achieve the substantial reduction of disaster risk and losses in lives, livelihoods and health and in the economic, physical, social, cultural and environmental assets of persons, businesses, communities and countries: http://www.unisdr.org/files/43291_sendaiframeworkfordrren.pdf

[80] United Nations Statistics Division (2015) *Principles and Recommendations for Population and Housing Censuses*, *Rev.3*, http://unstats.un.org/unsd/publication/seriesM/Series_M67rev3en.pdf (accessed 10 October 2017)

[81] United Nations Population Fund, Census support: resources webpage, www.unfpa.org/census (accessed 10 October 2017)]

- Its accompanying indicators are found in United Nations, General Assembly (2016) *Report of the open-ended intergovernmental expert working group on indicators and terminology relating to disaster risk reduction*, Note by the Secretary-General A/71/644, https://www.unisdr.org/we/inform/publications/51748 (accessed 07 October 2017).

4C. Sources of global and regional environment statistics and indicators series

International Sources

General

- SDG Database: https://unstats.un.org/sdgs/indicators/database/
- UN-Habitat Urban Indicators: statistics on slum dwellers, population, transport, city land area http://urbandata.unhabitat.org/explore-data/?indicators=hiv_prevalence_15_to_49_year,slum_proportion_living_urban,urban_population_cities,population

Urban and Rural Population

- The UN Population and Vital Statistics Report presents data on population size (total, male and female) from the latest available census of the population, national official population estimates and the number and rate (births, deaths and infant deaths) for the latest available year within the past 15 years. It also presents UN estimates of the mid-year population of the world, and its major areas and regions, http://unstats.un.org/unsd/demographic/products/vitstats/Sets/Series_A_2015.pdf

Basic Services

- Human settlements and water supply and sanitation: UNSD, Social Indicators: http://unstats.un.org/unsd/demographic/products/socind/default.htm
- Water and Waste Statistics: *UNSD/UN Environment Questionnaire 2016 on Environment Statistics*: https://unstats.un.org/unsd/envstats/questionnaire
- Electricity Price statistics: International Energy Agency (IEA), Electricity Information 2012: http://www.iea.org/media/training/presentations/statisticsmarch/electricityinformation.pdf

Housing Conditions

- Slum population and urban population: UN-Habitat: World Cities Report 2016: http://mirror.unhabitat.org/pmss/listItemDetails.aspx?publicationID=3387

Environmental concerns of human settlements

- Urban population, improved water and sanitation, slum population, green area: UN-Habitat: State of the World Cities 2012/13 is available at: http://mirror.unhabitat.org/pmss/listItemDetails.aspx?publicationID=3387

Exposure to hazards

- The United Nations Development Programme (UNDP) 'Disaster Risk Index', which is used to assess global patterns of natural disasters and their relationship to development. The Disaster Risk Index calculates the relative vulnerability of a country to a given hazard., http://www.grid.unep.ch/activities/earlywarning/DRI/.

Regional Sources

Urban and Rural Population

- CARICOM Environment Statistics Metadata: http://www.caricomstats.org/Files/Methodologies/Environment%20Statistics/Environment%20Statistics%20Metadata.pdf

- Eurostat Urban and Rural population. http://ec.europa.eu/eurostat/statistics-explained/index.php/Urban_Europe_%E2%80%94_statistics_on_cities,_towns_and_suburbs_%E2%80%94i_introduction

Basic services, ambient pollution, environmental concerns specific to urban settlements

- Eurostat Electricity Price Statistics: http://ec.europa.eu/eurostat/statistics-explained/index.php/Energy_price_statistics
- Eurostat Public transport, ozone statistics for cities and urban areas: Statistics on European Cities: Urban Audit: http://ec.europa.eu/eurostat/web/cities/data/database
- Eurostat NUTS 2 regions, wastewater: http://ec.europa.eu/eurostat/statistics-explained/index.php/Water_statistics

5. Data collection and sources of data

Scope

The scope of statistics on urban and rural population and housing related statistics cover population, including the homeless population, and dwelling units in urban, rural and coastal areas. The scope for transport statistics are all vehicles and public transport. The scope also includes the areas of cities, urban areas, and other human settlements; and specific areas within these such as slums, informal settlements, green areas and the road network.

Statistical unit

Due to the variety of datasets involved in human settlements statistics, there are different types of statistical units used in their compilation. The FDES human settlement statistics cover persons, households and dwellings/housing units. The geographic location/georeference of each dwelling unit can also be captured, and persons and households linked to the dwelling unit. Other units used are spatial areas and vehicles.

Sources and institutions

Types of sources of data can include the following:

- Population and housing censuses;
- Household surveys;
- Administrative records: e.g., vehicle registration, price monitoring, city government infrastructure records, utility records (water supply and wastewater treatment);
- Remote sensing and GIS;
- Urban government plans and policies.

Institutional partners of NSO

- Housing and urban planning authorities;
- Transport authorities;
- Health authorities;
- Civil registration agencies;
- Civil protection agencies such as those concerned with disasters and extreme events;
- Research institutions and agencies responsible for cartographic and GIS data; and
- Other partners may be utility providers, waste collection and removal and water provision agencies.

Population and housing censuses

Most countries conduct population and housing censuses which are the primary source of data on the number of people and the characteristics of the population in a country as well as the housing stock. Other surveys may be conducted and, in some instances, countries maintain population registers which are augmented by sample surveys at timely intervals. A registration of vital statistics (births, death and migration) will support a census in arriving at a count of the population in the intercensal period.

There are two types of population count from a census; the *de facto* and the *de jure*. A de facto population count comprises all persons present in a given area at a particular time. The de jure counts all persons who are usually resident in a given area at a given time. The Principles and Recommendations for Population and Housing

Censuses, Rev. 3[82] provides guidance on how to treat groups for which uncertainty may arise for a de jure census, such as seasonal or transient workers and military personnel.

Population counts are usually conducted by National Statistics Offices (NSOs), some with the assistance of a vital registration office. Estimates of the population between censuses and often population projections are carried out by the NSO. The population count may or may not be disaggregated by urban/rural in the intercensal count according to the usability of the vital statistics.

Population statistics are usually compiled and disseminated annually but can also be made available on a monthly or biannual basis. Where countries have a registration system, the count may be available more frequently (daily or weekly). While a population census is taken every ten or five years, estimates of the population are produced annually in most countries. Some countries also produce estimates of the population twice yearly while others with population registers can give more frequent counts of the population.

Household surveys

Surveys of households and the inhabitants are used to collect information on a wide variety of topics and are useful for statistics on the housing stock and housing conditions, among others and are often used to evaluate indicators in the intercensal period. Another use for a survey is to determine the amount of error in a population census; in order to assess the quality and coverage of a census, a post-enumeration survey is often conducted.

Administrative records

Administrative data available from government agencies and non-governmental organisations are often used for statistical purposes. Records of births, deaths and migration can be used to estimate the population of a country between censuses. Data from other administrative records, such as building and planning permits, vehicle registrations, city government infrastructure records etc. can also be used.

For example, while data on total housing stock is usually available from the population census, countries may update these records in the inter-censal period by a combination of field survey, aerial photography, and building permissions. Data from planning authorities can also be used to compile statistics on the existence and effectiveness of urban planning and zoning regulations in main cities, on extent of urban green spaces and on slums and informal settlements. Transport authorities and vehicle licensing authorities may also use their administrative data on number of motor vehicles in a country. Water boards can provide information on wastewater and water supply; and utilities can provide information on access to electricity.

Remote sensing

Remote sensing can be used to obtain data for several of the statistics such as urban sprawl, slum mapping, green spaces, etc. For example, when analysed together with other geographical data, using geographic information systems, human settlements in hazard-prone areas can be located and assessed for hazards. Remote sensing systems can also track natural events, erosion and flooding. The data obtained can be used to assess the impacts of a natural disaster. Monitoring of land use can also help to minimise the damage of urban growth to the environment.

Changes to the physical infrastructure of a country should be obtained from the lands and surveys department, which may use remote sensing data for updates, for example, updates to the road network or the extent of urban growth.

Spatial issues

Several of the statistics are geographical and would benefit from a mapped representation and use of GIS techniques. The proposed GIS techniques are described further in the SDG metadata for these indicators (see Section 6). These are particularly:

[82] United Nations Statistics Division (2015) *Principles and Recommendations for Population and Housing Censuses, Rev. 3*, http://unstats.un.org/unsd/publication/seriesM/Series_M67rev3en.pdf (accessed 10 October 2017)

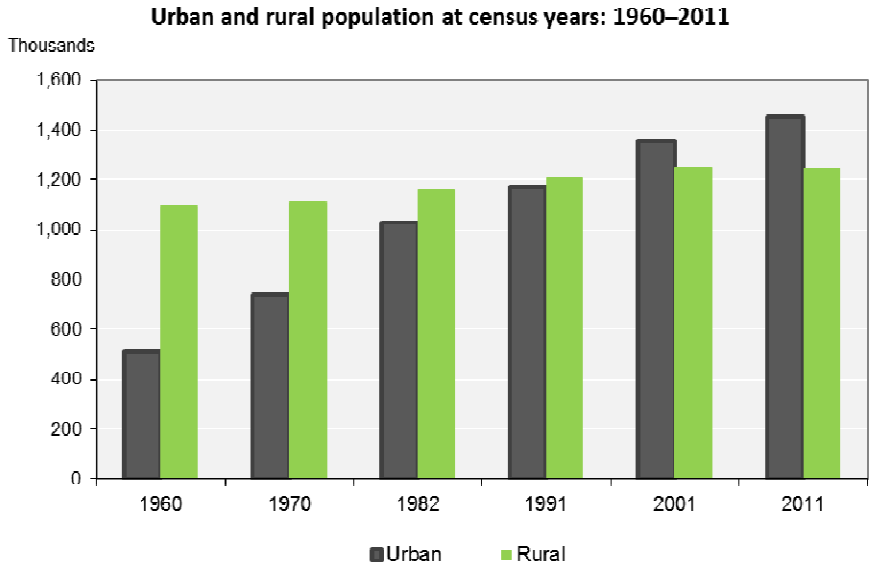
- Mapping of urban and rural areas,
- Area of slums,
- Hazard prone areas,
- Air pollution exposure,
- Noise pollution exposure,
- Extent of urban sprawl,
- Available green spaces,
- Extent of roadways,
- Public transport stops.

6. Uses and dissemination

6A. Potential presentation/dissemination formats

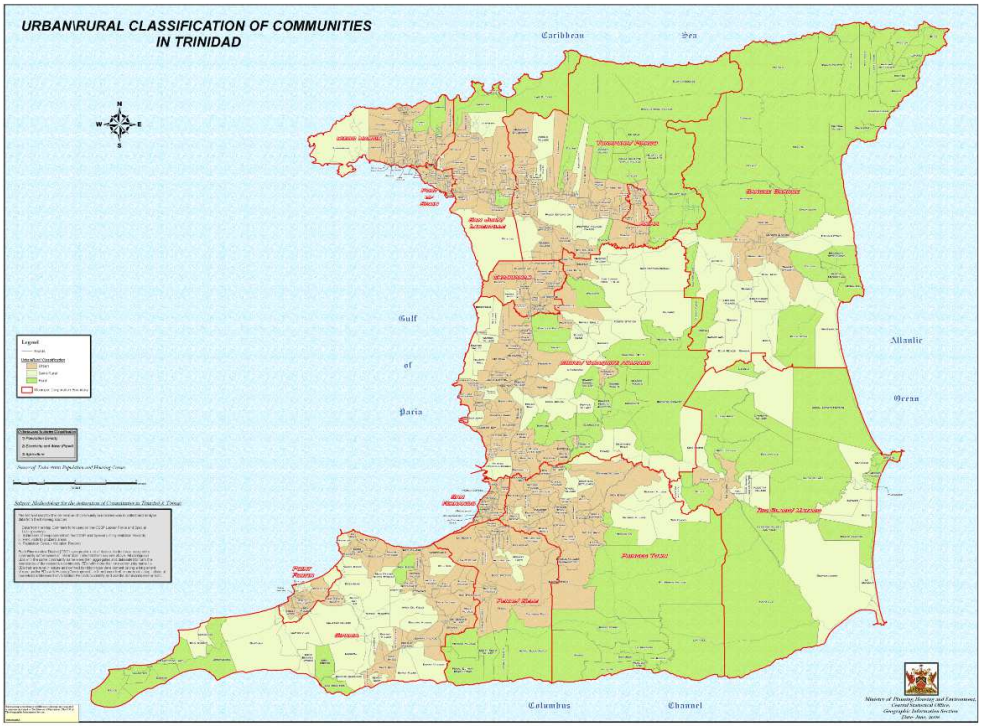
The following images illustrate some of the potential dissemination formats for these statistics.

Figure 6.1: Urban and rural population at census years 1960-2011, Jamaica



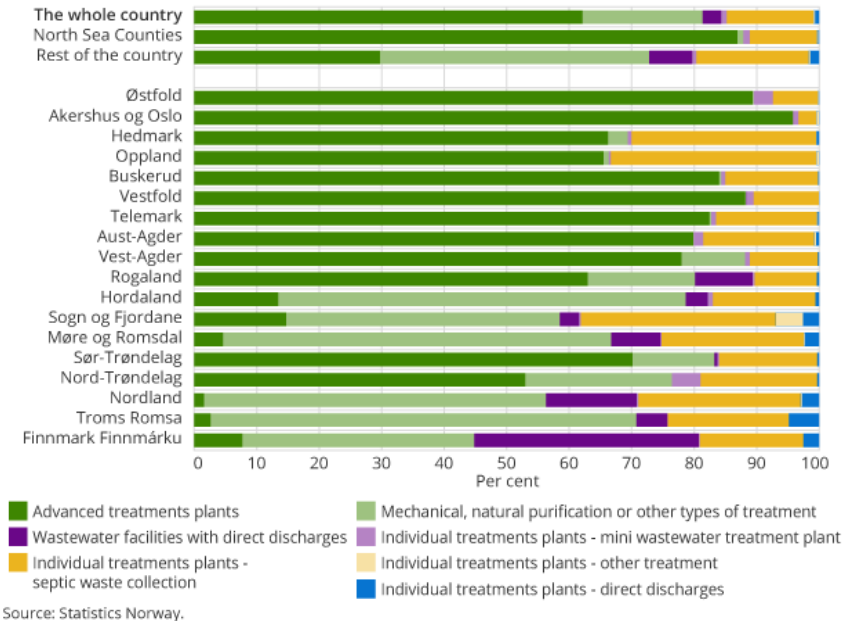
Source: Statistical Institute of Jamaica, Population and Housing Census Reports, various years.

Figure 6.2: Urban and rural areas, Trinidad and Tobago 2010 Population Census



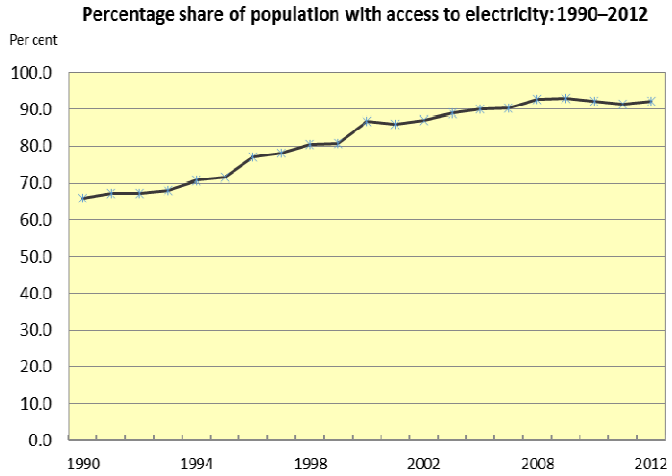
Source: Central Statistical Office, Maps, http://cso.planning.gov.tt/tt-today/Maps.html#urc (accessed 10 October 2017)

Figure 6.3: Share of the population connected to various types of treatment plants by county 2014, Norway



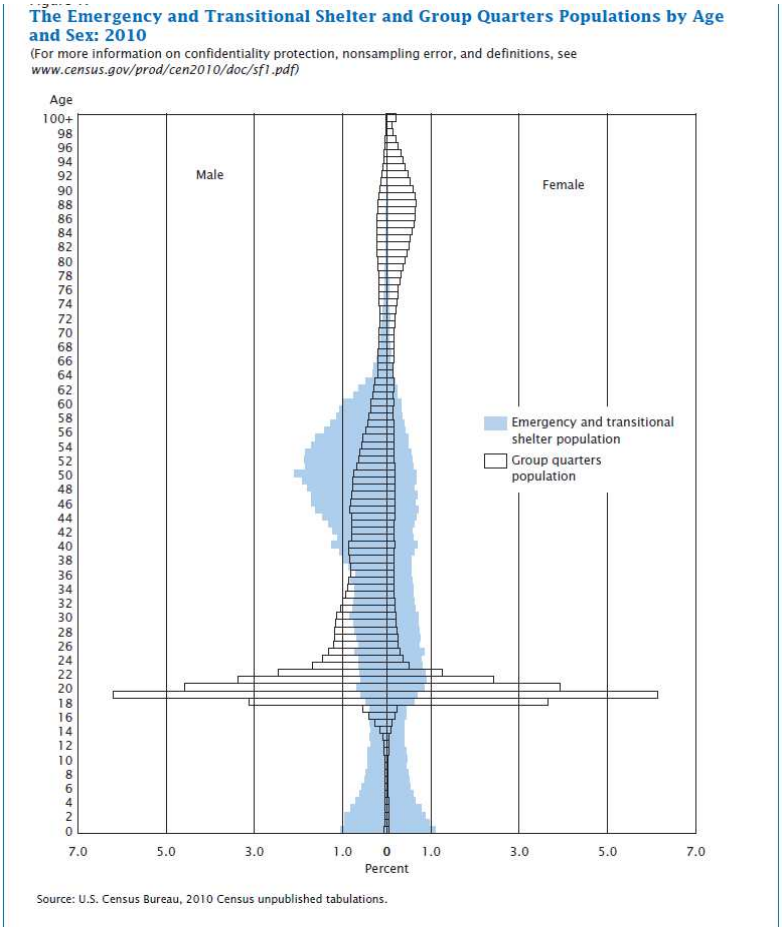
Source: Statistics Norway, discharges and treatment of municipal waste water, 2014, https://www.ssb.no/en/natur-og-miljo/statistikker/avlut/aar/2015-12-16 (accessed 10 October 2017)

Figure 6.4: Percentage share of population with access to electricity



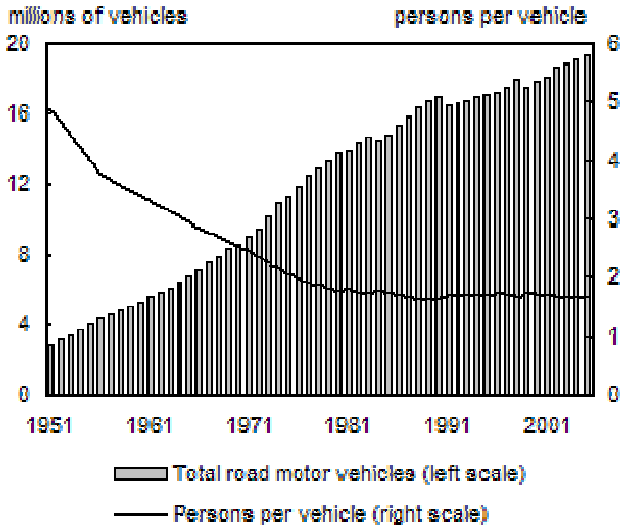
Source: Statistical Institute of Jamaica, data from Jamaica Survey of Living Conditions, various years

Figure 6.5: Homeless population United States of America 2010



Source: United States Census Bureau (2012) *The Emergency and Transitional Shelter Population: 2010, 2010 Census Special Reports*, https://www.census.gov/prod/cen2010/reports/c2010sr-02.pdf (accessed 10 October 2017)

Figure 6.6: Road Motor Vehicles Canada, 1951-2001



Notes: In 1999, Statistics Canada changed the data collection methodology for road motor vehicles. Some of the difference in the vehicle trend after 1999 may be attributable to this methodological change
Source: http://www.statcan.gc.ca/pub/16-201-x/2007000/5212596-eng.htm Canadian Political Science Association and Social Science Research Council of Canada, 1965, Historical Statistics of Canada, M.C. Urquhart, catalogue no. HA746 U7, Toronto; 1983, Historical Statistics of Canada, Second Edition, F.H. Leacy (edition), catalogue no. 11-516-X and CANSIM tables 051-0001, 405-0001 and 405-0004.

Source: Human Activity and the Environment: Annual Statistics 2007 and 2008, Statistics Canada, http://www.statcan.gc.ca/pub/16-201-x/2007000/5212596-eng.htm (accessed 10 October 2017)

Figure 6.7: Road network Canada 2011, by province and territory

	Length (two–lane equivalent thousand km)				Percentage distribution	
	Paved	Unpaved	Total	Provinces/territories share of total (per cent)	Paved	Unpaved
Newfoundland and Labrador	10.6	8.6	19.3	1.8	55.2	44.8
Prince Edward Island	4.3	1.8	6.0	0.6	70.8	29.2
Nova Scotia	18.1	9.0	27.1	2.6	66.8	33.2
New Brunswick	19.5	12.0	31.5	3.0	61.9	38.1
Quebec	81.5	63.2	144.7	13.9	56.3	43.7
Ontario	119.8	71.1	191.0	18.3	62.8	37.2
Manitoba	19.3	67.3	86.6	8.3	22.3	77.7
Saskatchewan	29.5	198.7	228.2	21.9	12.9	87.1
Alberta	61.7	164.6	226.3	21.7	27.3	72.7
British Columbia	48.2	22.9	71.1	6.8	67.8	32.2
Yukon	2.2	3.5	5.8	0.6	38.5	61.5
Northwest Territories	0.9	3.6	4.5	0.4	19.2	80.8
Nunavut	0.0	0.3	0.3	0.0	0.0	100.0
Total	**415.6**	**626.7**	**1042.3**	**100.0**	**39.9**	**60.1**

Source: National Road Network (NRN), edition 1.0

Source: Statistics Canada, Annual Report Transportation in Canada, Statistical Addendum https://www.tc.gc.ca/eng/policy/anre-menu-3042.htm (accessed 10 October 2017)

Figure 6.8: Population three years and over by usual mode of transportation

Mode of Transport	Age Group in Years				
	Total	Under 15	15–29	30–64	65 & over
Public bus	465,255	87,075	171,246	179,203	27,731
Robot Taxi	189,569	37,413	63,363	72,959	15,834
Route Taxi	998,990	196,638	341,261	377,990	83,101
Chartered Vehicle	28,250	14,418	3,307	4,433	6,092
Hackney Carriage Taxi	5,316	671	1,571	1,966	1,108
Walk	312,842	163,410	57,133	76,298	16,001
Private Vehicle	431,363	64,107	78,267	244,410	44,579
Company Vehicle	14,401	445	4,557	9,035	364
Bicycle	42,562	1,653	9,138	27,854	3,917
Motorcycle	12,728	1,025	3,779	7,378	546
Other	2,851	689	599	1,255	308
Never Went Out	26,934	3,137	2,885	6,925	13,987
Not Stated	23,250	5,120	6,618	9,478	2,034
Total	**2,554,311**	**575,801**	**743,724**	**1,019,184**	**215,602**

Source: Statistical Institute of Jamaica, *Population and Housing Census 2011, Jamaica*. Volume 12: Information and Communication Technology & Mode of Road Transportation, Kingston: Jamaica

6B. SEEA accounts/tables that use these statistics

The environment statistics organized under this FDES sub-component, with the exception of water statistics, are not present in the SEEA-Central Framework. Information on water statistics can be found in the Methodology Sheet on Water Resources Statistics.

6C. Commonly used indicators that incorporate these statistics

This section highlights urban indicators which use the FDES statistics or closely related statistics which are described in Section 3 Definitions.

The UN-Habitat Urban Indicators Guidelines https://unhabitat.org/urban-indicators-guidelines-monitoring-the-habitat-agenda-and-the-millennium-development-goals/ contains guidance for several of the indicators mentioned in the methodology sheet, including (also relevant to the SDGs):

- Indicator 1 Durable structures: proportion of households living in a housing unit considered as 'durable', i.e. built on a non-hazardous location and has a structure permanent and adequate enough to protect its inhabitants from the extremes of climatic conditions such as rain, heat, cold, humidity. Uses FDES statistic *5.1.3.g Number of dwellings with adequacy of building materials defined by national or local standards.* Additional data is needed.

- Indicator 4 Access to safe water: proportion of the population with sustainable access to an improved water source, urban, is the percentage of the urban population who use any of the following types of water supply for drinking: piped water, public tap, borehole or pump, protected well, protected spring or rainwater. The water should be affordable and at a sufficient quantity that is available without excessive physical effort and time. Uses FDES statistic *5.1.2.a Population using an improved drinking water source*. Additional data is needed.

- Indicator 5 Access to improved sanitation: proportion of the population with access to improved sanitation or percentage of the population with access to facilities that hygienically separate human excreta from human, animal and insect contact. Facilities such as sewers or septic tanks, pour-flush latrines and ventilated improved pit latrines are assumed to be improved, provided that they are not public. To be effective, facilities must be correctly constructed and properly maintained, and not shared by more than two households. Uses FDES statistic *5.1.2.b Population using an improved sanitation facility*.

- Indicator 6 Connection to services: percentage of households which, within their housing unit, are connected to: a) piped water; b) sewerage; c) electricity; and d) telephone. Uses FDES statistics *5.1.2.d Population connected to wastewater collecting system; 5.1.2.e Population connected to wastewater treatment; 5.1.2.f Population supplied by water supply industry;* and *5.1.2.h Population with access to electricity*. Additional data is needed.

- Indicator 11 Urban population growth: average annual growth rate of population in the urban agglomeration or in national urban areas during the last five years. Uses FDES statistic *5.1.1.a Population living in urban areas.*

- Extensive indicator 2 Authorized housing: percentage of the total housing stock in compliance with current land and building regulations and indicator 12: planned settlements: level at which urban land is planned in order to cater to needs of populations. Can be used as some measures for FDES statistic *5.1.5.h Effectiveness of urban planning and zoning regulations and instruments in main cities.*

- Indicator 13 Price of water: median price paid per 1000 litres of water in US dollars, at the time of year when water is most expensive. Uses FDES statistic *5.1.2.g Price of water.*

- Indicator 14 Wastewater treated: percentage of all wastewater undergoing some form of treatment (primary, secondary and tertiary). Related to FDES statistic *5.1.2.e Population connected to wastewater treatment.*

- Indicator 15 Solid waste disposal: Percentage of solid waste: a) disposed to sanitary landfill; b) incinerated and burned openly; c) disposed to open dump; d) recycled; e) other. Related to FDES statistic 5*.1.2.c Population served by municipal waste collection.*

- Extensive indicator 9 Regular solid waste collection: Proportion of households enjoying weekly solid waste collection. Uses FDES statistic *5.1.2.c Population served by municipal waste collection.*

- Check-list 5 Disaster prevention and mitigation instruments: level at which disaster prevention is ensured and mitigation instruments in place. 1. Existence of building codes to prevent the effects of natural disasters? 2. Existence of hazard mapping. Relates to FDES statistics *5.1.3.d Hazard-prone areas* and *5.1.3.g Number of dwellings with adequacy of building materials defined by national or local standards*.

- Extensive indicator 10: houses in hazardous locations: Proportion of housing units built on hazardous locations (per 100,000 housing units). Relates to FDES statistic *5.1.3.c Population living in hazard-prone areas*.

- Extensive indicator 11 Transport modes. Percentage of total work trips undertaken by: a) private car; b) train, tram or ferry; c) bus or minibus; d) motorcycle; e) bicycle; f) foot; g) other modes. Related to FDES statistic *5.1.5.d Population using public modes of transportation.*

- Check-list 6 Local environmental plans: Level of achievement and implementation of local environmental plans. Uses FDES statistics *5.1.5.g Existence of urban planning and zoning regulations and instruments in*

main cities and *5.1.5.h Effectiveness of urban planning and zoning regulations and instruments in main cities.*

Indicators of the European Foundation for the Improvement of Living and Working Conditions[83] [84] contain urban sustainability indicators which measure sustainability and impact of cities on the environment:

- Air quality – number of days exceedance. Applicable to FDES statistic *5.1.4.a Population exposed to air pollution in main cities.*
- Urban mobility – use of environment-friendly means of transport. Applicable to FDES statistic *5.1.5.e Population using hybrid and electric modes of transportation.*
- Waste management – total volume of waste disposed of. Related to FDES statistic *5.1.2.c Population served by municipal waste collection.*
- Nuisance indicator – nuisances created by noise, odour or visual pollution. Applicable to FDES statistic *5.1.4.b Population exposed to noise pollution in main cities.*
- Housing Quality – percentage of people affected by lack of housing or poor housing environments. Applicable to FDES statistics *5.1.3.f homeless population* and *5.1.3.g Number of dwellings with adequacy of building materials defined by national or local standards.*
- Green, public space and heritage indicator – surface of green spaces per inhabitant. Applicable to FDES statistic *5.1.5.b Available green spaces* and *5.1.1.a Population living in urban areas.*
- Water consumption per inhabitant per year – which is related to statistics in Topic *2.6.2.a Total water abstraction disaggregated by cities* described in the methodology sheet on water resources.

Other indicators for human settlements are:

- Population density (which shows proximity of people living together). – FDES statistics *5.1.1.a Population living in urban areas/5.1.1.c Total urban area* or *5.1.1.b Population living in rural areas / 5.1.1.d Total rural area.*
- Population growth rate – the higher the growth rate over the same area, the higher the population density.
- Percentage of total population living in coastal zones: Uses FDES statistic *5.1.1.e Population living in coastal areas*.
- Proportion of households that live in slums or precarious dwellings. Uses FDES statistic *5.1.3.a Urban population living in slums / 5.1.1.a. Population living in urban areas*.
- Housing access and conditions (which are important for the well-being and health of a population as poverty is often related to limited access to adequate housing).

[83] European Foundation (1998) *Urban Sustainability Indicators,* https://www.eurofound.europa.eu/sites/default/files/ef_files/pubdocs/1998/07/en/1/ef9807en.pdf
[84] European Commission (2015) *In-Depth Report: Indicators for Sustainable Cities,* http://ec.europa.eu/environment/integration/research/newsalert/pdf/indicators_for_sustainable_cities_IR12_en.pdf

- Road motor vehicle registration growth rate. Rate of change of FDES statistic *5.1.5.c Number of public and private vehicles*.

6D. SDG indicators that incorporate these statistics

SDG indicators applicable to this methodology sheet are from SDGs 1, 6, 7, 11 and 13. These are defined according to SDG metadata https://unstats.un.org/sdgs/metadata/. Many of the indicators contain qualitative dimensions, however where statistics are also used these are indicated.

1.4.1: Proportion of population living in households with access to basic services.
The indicator is Tier III and under development. However, basic services includes water and sanitation, solid waste collection and management, mobility and transportation and energy; social services, including housing, and quality life services, including urban planning.

6.1.1: Proportion of population using safely managed drinking water services
Population using a basic drinking water source ('improved' sources of drinking water used for MDG monitoring i.e. piped water into dwelling, yard or plot; public taps or standpipes; boreholes or tubewells; protected dug wells; protected springs and rainwater) which is located on premises and available when needed and free of faecal (and priority chemical) contamination. Includes FDES statistic *5.1.2.a Population using an improved drinking water source.*

6.2.1: Proportion of population using safely-managed sanitation services, including a hand-washing facility with soap and water
Population using a basic sanitation facility at the household level ('improved sanitation facilities used for MDG monitoring i.e. flush or pour flush toilets to sewer systems, septic tanks or pit latrines, ventilated improved pit latrines, pit latrines with a slab, and composting toilets, the same categories as improved sources of drinking water used for MDG monitoring) which is not shared with other households and where excreta is safely disposed in situ or treated off-site. This is therefore a multipurpose indicator also serving the household element of the wastewater treatment indicator (SDG 6.3.1). Includes FDES statistic *5.1.2.b Population using an improved sanitation facility.*

6.3.1: Proportion of wastewater safely treated
The SDG indicator covers volume of wastewater rather than population connected to waste water treatment (FDES statistic 5.1.2.e).

7.1.1: Percentage of population with access to electricity
Percentage of the population with access to electricity is the percentage of population with access to electricity. Includes FDES *5.1.2.h Population with access to electricity.*

11.1.1: Proportion of urban population living in slums, informal settlements or inadequate housing
Slum households are ones 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.

Informal settlements are 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.

Inadequate housing – 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 and 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; and 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.

Includes FDES statistics *5.1.3.a Urban population living in slums* and *5.1.3.e Population living in informal settlements*

11.2.1: Proportion of population that has convenient access to public transport, by sex, age and persons with disabilities

The proportion of the population that has convenient access to public transport. 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 safe and comfortable station environment.

FDES statistic *5.1.5.d Population using public modes of transportation* applies, however, the indicator includes other qualitative dimensions.

11.3.1: Ratio of land consumption rate to population growth rate

The ratio of land consumption rate to population growth rate. Population growth rate 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 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. It may include land which is used but also which is preserved or otherwise available for development but not yet developed. The percentage of current total urban land that was newly developed (consumed) is used as a measure of the land consumption rate.

11.3.2: Proportion of cities with a direct participation structure of civil society in urban planning and management that operate regularly and democratically

Methodology has not been identified for this indicator. It can be used as a measure relevant to FDES statistic *5.1.5.h Effectiveness of urban planning and zoning regulations and instruments in main cities.*

11.6.2: Annual mean levels of fine particulate matter (e.g. $PM_{2.5}$ and PM_{10}) in cities

The mean annual concentration of fine suspended particles of less than 2.5 microns or 10 in diameter ($PM_{2.5}$) and PM_{10} is a common measure of air pollution. The mean is a population-weighted average for urban population in a country, and is expressed in micrograms per cubic meter [$\mu g/m^3$]. This is the same as FDES statistic *5.1.4.a Population exposed to air pollution in main cities.*

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

Methodology has not been identified for this indicator. FDES statistic *5.1.5.h Effectiveness of urban planning and zoning regulations and instruments in main cities.*

Other SDG indicators relevant to human settlements but not using the FDES statistics of sub-component 5.1 are:

7.1.2: Proportion of population with primary reliance on clean fuels and technology

11.5.1: Number of deaths, missing persons and persons affected by disaster per 100,000 people (also 1.5.1 and 13.1.1)

This is described in the methodology sheet on extreme events and disasters.

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

The indicator is defined as proportion of urban solid waste regularly collected and with adequate final discharge out of total urban solid waste generated. The FDES statistics in subcomponent 5.1 relates to populating served by municipal waste collection. The statistics relevant to this indicator can be found in the methodology sheet on waste.

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

The indicator is Tier III and currently under development. It requires spatial analysis to delimit the built-up area; computation of total area of open public space; estimation of the land allocated to streets, locales, share of land in streets. The FDES statistic *5.1.5.b Available green spaces* is a related statistic for sustainable urban areas.

F D E S

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