HOW TO USE THE MANUAL?
Read this manual before use. Read each module again for clarity before you begin. The manual provides the following information for each module:

1. Objectives: This describes what participants should learn by going through the module. Introduce every module to the participants by informing them of the key points in the module and what is to be covered in it.

2. Duration: This is how long training on the module should take, based on experience. This duration is however not fixed and may need to be adjusted in view of the target participants undertaking the training programme.

3. Facilitator’s notes: These notes will assist the facilitator to facilitate the module better by identifying and highlighting key points to focus on and prepare for. The facilitator reads these notes before embarking on facilitation. This manual contains a few legal concepts, words and terminologies that the facilitator may not use often. It is vital to know the meaning of the concepts and terminologies when facilitating the modules in this manual. A legal dictionary is an important resource for interpretation of legal terms.

TRAINING MODULE LAYOUT:
Each module begins with an overview, followed by the learning objectives, the session and the time needed for each session, the method to be used or process to be followed step-by-step. Time allocated for the modules is estimated and can be shortened or lengthened depending on the mode and pace of facilitation.
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**ON SELECTED HUMAN SETTLEMENTS INDICATORS OF THE SDG**
TARGET 11.1
By 2030, ensure access for all to adequate, safe and affordable housing and basic services and upgrade slums.

*Indicator 11.1.1: Proportion of urban population living in slums, informal settlements or inadequate housing*
MODULE OVERVIEW

OBJECTIVES

At the end of the module, participants will be able to:

- Understand the essential concepts and definitions of the indicator.
- Understand how to develop strategies for collecting, validating, and analysing data based on the data collected and the methodology given.
- Understand the monitoring and reporting timelines.
- Understand the general limitations of the indicator in terms of data collection, monitoring and reporting.

NOTES FOR THE FACILITATOR

- Allow participants to share observations about the tenure rights to land.
- Introduce the session by informing the participants that this session is designed to deepen their understanding of slums, informal settlements and inadequate housing.

DURATION

This module will be taught in Two (2) hours.

- This module aims at providing practical guidance to information tools, data collection procedures and analysis for the computation of indicator 11.1.1 of Goal 11.
- As you begin, you will need to know the essentials about data collection including selecting the most appropriate and reliable types and sources of data, data collection and analysis methods. This module addresses these issues, with particular focus on statistics and spatial data collection (where applicable), analysis.
- Through a series of presentations, examples and exercises, this module will provide you with a number of tools and techniques necessary to complete the data collection and analysis.

TARGET GROUP:

- Local government authorities
- City leaders,
- Civil societies,
- National Statistical officers
- Urban experts
UNIT ONE: INTRODUCTION

OBJECTIVES

- Understand the concepts and definitions of slums, informal settlements and inadequate housing.
- Allow for safe discussion and exploration of participants' own views on slums, informal settlements and inadequate housing.

1. RATIONALE OF THE MODULE

More than half of the world’s population lives in cities today. It is anticipated that 95% of the growth in urban areas in the next two decades will result in cities becoming home to more than 4 billion people that translates to about 80% of future urban population. This rapid urbanization when not monitored effectively or controlled may lead to the rise of informal settlements as well as inadequate housing that is a manifestation of signs of urban poverty. With increased urban growth, various inequalities will develop if the appropriate policies are not designed effectively to counter the resulting effects of the externalities because of this growth.

Inequalities in urban areas can be captured and explained through various means, they can be economic, gender or spatial. Spatial inequalities are usually expressed as segregations of groups within society. This is indicated in the housing conditions of the urban inhabitants and commonly expressed as the existence of inadequate living conditions or in the emergence of slum households that provide inadequate living conditions. In order to develop adequate policies, it is important to identify and quantify the proportion of the population that lives in slums and as well as the total number of inhabitants within the urban area those lives in informal settlements or have inadequate housing.

A range of interrelated factors usually causes both slums and inadequate housing. These may vary from the consequence of weaknesses in housing policies, poor planning and land management, urban migration related to urban densification, disasters, conflicts, long-term poverty as well as the lack of affordable housing. All these factors point to the fact that the measurement of the indicator in respective aspect will provide a broad field for spectrum analysis of the urban related issues towards the achievement of the Agenda 2030.

ACTIVITIES

In the plenary, ask the participants to identify the difference between slums, informal settlements and inadequate housing.
Concepts and Definitions

a. Slums

Slum household defined as as one in which the inhabitants are suffer one or more of the following: 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.

Access to improved water: A household is considered to have access to improved drinking water if it has sufficient amount of water (20 litres/person/day) for family use, at an affordable price (less than 10% of the total household income) as well as available to all household members without being subjected to extreme efforts (less than one hour a day for the minimum sufficient quantity).

In addition, the facility (source of drinking water) is protected from outside contamination, in particular faecal matter. Improved drinking water sources include: piped in water into dwelling, plot or yard; public tap/stand pipe service with no more than 5 households; protected spring; rain water collection; bottled water if secondary source is also improved; bore hole/tube well; and protected dug well.

Access to improved sanitation: households have access to improved sanitation if either an excreta disposal system is available to household members, in the form of a private toilet or a public toilet shared with a reasonable number of people. Such improved sanitation facilities, thus, hygienically separate human waste from human contact.

The improved facilities include; flush/pour-flush toilets or latrines connected to a sewer, septic tank or pit; ventilated improved pit latrine; pit latrine with a slab or platform that covers the pit entirely; and, composting toilets/latrines.

Sufficient living area: - A household dwelling unit provides sufficient living area for the household members if not more than three people share the same habitable room.

Structural quality/durability of dwellings: A housing structure 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. In order to determine the household durability, consider the following elements:

1. 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

2. Location of house (The house is not located on or near toxic waste, in a flood plain, not located on a steep slope, not located in a dangerous right of way of rail, highway, airport, and power lines).

Security of tenure: A housing structure should have security of tenure. This means that the members of the household should have legal status against arbitrary unlawful eviction, harassment as well as any other threats. The housing structure should have statutory or customary law or informal or hybrid arrangements that safeguard the house members against forced evictions.
Discussion (15 minutes)

From the pictures above. Ask the participants to identify the various components of a slum
b) Informal Settlements: Informal residents 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,

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

c) Inadequate Housing: A housing unit is considered if at a minimum:

1. Has a legal security of tenure, such that all the members of the household have guaranteed legal protection against forced evictions, harassment and other threats.

2. Has adequate and available services, materials, facilities and infrastructure, such as safe drinking water, adequate sanitation, and energy for cooking, heating, lighting, food storage or refuse disposal.

3. Affordability, as housing is not adequate if its cost threatens or compromises the occupants' enjoyment of other human rights.

4. Guarantee physical safety, provide adequate space, and give protection against cold, damp, heat, rain, wind and 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 who face all forms of discrimination, persons with disabilities and victims of natural disasters).

6. Location, as housing is not adequate if it is not easy access to employment opportunities, health-care services, schools, childcare centres and other social facilities. It should not be located in dangerous or polluted sites or in areas that are in close proximity to pollution sources.
7. Cultural adequacy, as housing is not adequate if it does not respect to take into account the expression of cultural identity and the members ways of life.

NOTES:
UNIT TWO: METHODOLOGY

OBJECTIVES

- Understand how to develop the essentials for collecting and validating data
- Demonstrate how to compute the indicator based on the data collected and the methodology defined concepts and definitions of the indicator.

DATA SOURCES

- Domestic Household Surveys (DHS)
- Multiple Indicator Cluster Survey (MICS)
- Census
- EU statistics on income and living conditions

SOFTWARE

- SPSS Version 12 onwards
- Stata Version 10 onwards
- R+

IN THIS SECTION, YOU WILL LEARN HOW TO

1. Collect and validate data
2. Compute the indicator based on the data collected and methodology provided

THIS INDICATOR IS COMPOSED OF THREE MAIN COMPONENTS.

a. Slum Households
b. Informal settlements households
c. Inadequate housing households

ACTIVITY ONE: COMPUTATION OF SLUM HOUSEHOLDS

Demo Data: Ecuador Census data for 2012

Step one: Collect all primary data sources for the country. Household survey data are preferred whenever they are available.

The Demographic and Health Surveys (DHS), Multiple Indicator Cluster Surveys (MICS) or other household data (Surveys or census) are the primary data sources preferred.
Step two: Open the data set and review primary data sources for the country.

Step Three: Select the correct household population that you need to examine. This can be broken down by regions, urban-rural or even by cities. Using the respective variable of interest.

Step Four: Open the data set and review primary data sources for the country.

Example: Floor material

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Width</th>
<th>Decimals</th>
<th>Label</th>
</tr>
</thead>
<tbody>
<tr>
<td>kitchen</td>
<td>Numeric</td>
<td>2</td>
<td>0</td>
<td>Kitchen or cooking facilities</td>
</tr>
<tr>
<td>toilet</td>
<td>Numeric</td>
<td>2</td>
<td>0</td>
<td>Toilet</td>
</tr>
<tr>
<td>floor</td>
<td>Numeric</td>
<td>3</td>
<td>0</td>
<td>Floor material</td>
</tr>
<tr>
<td>ncoupl</td>
<td>Numeric</td>
<td>1</td>
<td>0</td>
<td>Number of married couples in household</td>
</tr>
<tr>
<td>ec01a_dwnum</td>
<td>Numeric</td>
<td>7</td>
<td>0</td>
<td>Dwelling number</td>
</tr>
<tr>
<td>ec01a_hnum</td>
<td>Numeric</td>
<td>1</td>
<td>0</td>
<td>Household number</td>
</tr>
<tr>
<td>ec01a_per</td>
<td>Numeric</td>
<td>2</td>
<td>0</td>
<td>Person number</td>
</tr>
<tr>
<td>ec01a_hnth</td>
<td>Numeric</td>
<td>1</td>
<td>0</td>
<td>Number of households</td>
</tr>
<tr>
<td>ec01a_pemnd</td>
<td>Numeric</td>
<td>2</td>
<td>0</td>
<td>Number of persons in dwelling</td>
</tr>
<tr>
<td>ec01a_omp</td>
<td>Numeric</td>
<td>2</td>
<td>0</td>
<td>Number of persons in household</td>
</tr>
<tr>
<td>ec01a_fhig</td>
<td>Numeric</td>
<td>1</td>
<td>0</td>
<td>Household created by splitting apart a large dwelling</td>
</tr>
<tr>
<td>ec01a_mign</td>
<td>Numeric</td>
<td>1</td>
<td>0</td>
<td>Number of migrant records in the input data file for entire province</td>
</tr>
<tr>
<td>ec01a_province</td>
<td>Numeric</td>
<td>2</td>
<td>0</td>
<td>Province</td>
</tr>
<tr>
<td>ec01a_dwtyp</td>
<td>Numeric</td>
<td>2</td>
<td>0</td>
<td>Type of dwelling</td>
</tr>
<tr>
<td>ec01a_vacc</td>
<td>Numeric</td>
<td>1</td>
<td>0</td>
<td>Occupation status of the dwelling</td>
</tr>
</tbody>
</table>

Review the response categories for the questions on housing durability

Click on this button to preview the response categories for the questions
Example of a preview window for the responses under floor material

![Image of a preview window for responses under floor material]

*Where possible the various responses categories are grouped and interpreted according to the definitions for informal settlements. (Not all surveys or census data use the same categories to define ownership of the dwelling)*

The categories grouped for Security of tenure can use the following criteria. Example on Ownership of dwelling

<table>
<thead>
<tr>
<th>HOUSING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Original Variable Name: EC10A_FLOOR</td>
</tr>
<tr>
<td>Variable Label: Predominant materials of the floor</td>
</tr>
<tr>
<td>Selected Value labels For Improved Housing</td>
</tr>
<tr>
<td>1 Fitted-groove wood, parquet, boards, or finished wood</td>
</tr>
<tr>
<td>3 Ceramic, tile, vinyl, or marble</td>
</tr>
<tr>
<td>4 Brick or cement</td>
</tr>
</tbody>
</table>

To group the question responses, we use the following syntax to develop the new indicator. Floor

```plaintext
***************durable floor**********************.
116 fre EC10A_FLOOR.
118 recode EC10A_FLOOR (1,3,4=1)(else=0) into floor1.
120 val lab floor1 "durable house".
121 val lab floor1 1."Improved Housing" 0."Unimproved Housing".
122 fre floor1.
124
code
```

This will tabulate the frequencies into tables as shown below.
DURABLE HOUSING

Original Indicator

<table>
<thead>
<tr>
<th>Valid</th>
<th>Fitted-groove wood, parquet, boards, or finished wood</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>738630</td>
<td>16.1</td>
<td>16.1</td>
<td>16.1</td>
</tr>
<tr>
<td></td>
<td>2 Unfinished boards</td>
<td>356370</td>
<td>7.8</td>
<td>7.8</td>
<td>23.9</td>
</tr>
<tr>
<td></td>
<td>3 Ceramic, tile, vinyl, or marble</td>
<td>1692950</td>
<td>36.9</td>
<td>36.9</td>
<td>60.8</td>
</tr>
<tr>
<td></td>
<td>4 Brick or cement</td>
<td>1596820</td>
<td>34.8</td>
<td>34.8</td>
<td>95.5</td>
</tr>
<tr>
<td></td>
<td>5 Cane</td>
<td>10580</td>
<td>.2</td>
<td>.2</td>
<td>95.8</td>
</tr>
<tr>
<td></td>
<td>6 Dirt</td>
<td>137370</td>
<td>3.0</td>
<td>3.0</td>
<td>98.8</td>
</tr>
<tr>
<td></td>
<td>7 Other materials</td>
<td>40010</td>
<td>.9</td>
<td>.9</td>
<td>99.6</td>
</tr>
<tr>
<td></td>
<td>9 NIU (not in universe)</td>
<td>16460</td>
<td>.4</td>
<td>.4</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>4589190</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

New Indicator

<table>
<thead>
<tr>
<th>Valid</th>
<th>Unimproved Housing</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.00 Improved Housing</td>
<td>4028400</td>
<td>87.8</td>
<td>87.8</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>4589190</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

This should be done for the response categories for the questions on access to improved water, improved sanitation, sufficient living area, improved housing and lack of security of tenure for slums need to be reviewed to ensure that they meet the defined criteria.

Step Five: Repeat ‘step four’ for all the elements of slums and obtain the respective new indicators. The new indicators should be coded as follows.

Indicator codes:

- Water1 = 1: Improved water  2: Unimproved water
- Toilet1 = 1: Improved sanitation  2: Unimproved sanitation
- Living1 = 1: Sufficient Living Area  2: Overcrowding
- Floor1 = 1: Durable Housing  2: Non-Durable Housing
- Secure1= 1: Secure Tenure  2: Unsecure Tenure

* In this example, the slum computation will only rely on the first four only for demonstration purposes.

Step Six: Using the new variables with, focus only on urban households, identified in ‘step four’ we compute the slum household by the respective deprivation (These form part of the quantifiable derivatives for the measurement of target 11.1) as shown below.
Shelter Deprivation measures how many components a household does not have i.e.
1: One Shelter Deprivation - household has 3 components and is only missing 1 other component.
2: Two Shelter Deprivation - household has 2 components and is only missing 2 other components.
3: Three Shelter Deprivation - household has 1 component and is only missing 3 other components.
4: Four Shelter Deprivation - household has NONE of the required components

Slum = One Shelter Deprivation + Two Shelter Deprivation + Three Shelter Deprivation + Four Shelter Deprivation

```java
*the urban.
do if (urban=2).
    compute slumc4=0.
    if (water1=0 and toilet1=0 and living1=0 and floor1=0) slumc4=1.

    compute slumc3a=0.
    if (water1=0 and toilet1=0 and living1=0 and floor1=1) slumc3a=1.
    compute slumc3b=0.
    if (water1=0 and toilet1=0 and floor1=0 and living1=1) slumc3b=1.
    compute slumc3c=0.
    if (water1=0 and toilet1=0 and floor1=1 and living1=1) slumc3c=1.
    compute slumc3d=0.
    if (toilet1=0 and living1=0 and floor1=0 and water1=1) slumc3d=1.
    compute slumc3=0.
    if (slumc3a=1 or slumc3b=1 or slumc3c=1 or slumc3d=1) slumc3=1.
```

The shelter deprivation is computed is using three steps.

**First step:** First, is to compute the various combinations of the respective variables as shown

This should be done to ensure that all possible combinations are considered and have been computed. Such that no combination is forgotten to ensure that all aspects have been combined.

From this we compute the slums total as follows

```java
compute slumtot=0.
if (water1=0 or toilet1=0 or living1=0 or floor1=0) slumtot=1.
compute slumc=0.
if (slumtot=1) slumc=2.
if (slumtot=1 and water1=1 and living1=1 and floor1=1) slumc=1
if (slumc2=1) slumc=3.
if (slumc3=1) slumc=4.
if (slumc4=1) slumc=5.
```
And these are labelled as indicated below

```
var lab slumc "Slum conditions".
val lab slumc 0 "Non-slum" 1 "Sanitation only" 2 "Other only one condition of slum" 3 "Satisfy two conditions of slum" 4 "Satisfy three conditions of slum" 6 "Satisfy four conditions of slum".
```

**Second Step:** The different combinations are computed into the different classes and then we proceed to label the classes for the slums stratification as follows.

```
var lab class "Slum stratification".
val lab class
  0 "Non-slum household"
  1 "Lack sanitation only"
  2 "Lack water only"
  3 "Lack housing only"
  4 "Lack living area only"
  5 "Water and sanitation only"
  6 "Water and living area" 
  7 "Water and housing"
  8 "Sanitation and living area"
  9 "Sanitation and housing"
  10 "Living area and housing"
  11 "Water and sanitation and living area"
  12 "Water and sanitation and housing"
  13 "Water and living area and housing"
  14 "Sanitation and living area and housing"
  15 "Water and sanitation and living area and housing".
```

**Step Three:** The slum stratifications are then grouped together as follows.

```
recode class (0=0(1 thru 4=1)(5 thru 10=2)(11 thru 14=3)(15=4)) into classgrp.
var lab classgrp "Slum stratification grouped".
val lab classgrp
  0 "Non-slum household"
  1 "One shelter deprivation"
  2 "Two shelter deprivations"
  3 "Three shelter deprivations"
  4 "Four shelter deprivations".
recode classgrp (0=0)(1,2,3,4=1) into slumthr.
var lab slumthr "Slum".
val lab slumthr 0 "Non-slum" 1 "Slum".
```
If this is done properly and the results are cross-tabulated for the urban areas, we obtain the data for slums in the various disaggregation’s as shown in the compiled table below.

**SLUM STRATIFICATION (URBAN POPULATION ONLY)**

<table>
<thead>
<tr>
<th></th>
<th>Country one</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Count</td>
</tr>
<tr>
<td>Slum</td>
<td></td>
</tr>
<tr>
<td>Non-slum</td>
<td>420,110</td>
</tr>
<tr>
<td>Slum</td>
<td>187,040</td>
</tr>
<tr>
<td>Total</td>
<td>607,150</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Slum stratification grouped</td>
<td></td>
</tr>
<tr>
<td>Non-slum household</td>
<td>420,110</td>
</tr>
<tr>
<td>One shelter deprivation</td>
<td>100,470</td>
</tr>
<tr>
<td>Two shelter deprivations</td>
<td>46,510</td>
</tr>
<tr>
<td>Three shelter deprivations</td>
<td>35,120</td>
</tr>
<tr>
<td>Four shelter deprivations</td>
<td>4,940</td>
</tr>
<tr>
<td>Total</td>
<td>607,150</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Slum stratification</td>
<td></td>
</tr>
<tr>
<td>Non-slum household</td>
<td>420,110</td>
</tr>
<tr>
<td>Lack sanitation only</td>
<td>12,370</td>
</tr>
<tr>
<td>Lack water only</td>
<td>23,740</td>
</tr>
<tr>
<td>Lack housing only</td>
<td>33,070</td>
</tr>
<tr>
<td>Lack living area only</td>
<td>31,290</td>
</tr>
<tr>
<td>Water and sanitation only</td>
<td>6,280</td>
</tr>
<tr>
<td>Water and living area</td>
<td>4,500</td>
</tr>
<tr>
<td>water and housing</td>
<td>17,540</td>
</tr>
<tr>
<td>sanitation and living area</td>
<td>2,460</td>
</tr>
<tr>
<td>sanitation and housing</td>
<td>7,390</td>
</tr>
<tr>
<td>living area and housing</td>
<td>8,340</td>
</tr>
<tr>
<td>Water and sanitation and living area</td>
<td>1,700</td>
</tr>
<tr>
<td>Water and sanitation and housing</td>
<td>24,080</td>
</tr>
<tr>
<td>Water and living area and housing</td>
<td>6,690</td>
</tr>
<tr>
<td>Sanitation and living area and housing</td>
<td>2,650</td>
</tr>
<tr>
<td>Water and sanitation and living area and housing</td>
<td>4,940</td>
</tr>
<tr>
<td>Total</td>
<td>607,150</td>
</tr>
</tbody>
</table>

Slum households (SH) = 100 \( \frac{\text{Number of people living in slum}}{\text{City population}} \)

Slum households (SH) = 100 \( \frac{187,040}{607,150} \)

Slum households (SH) = 30.81%

**ACTIVITY TWO:**

**COMPUTATION INFORMAL SETTLEMENT HOUSEHOLDS**

Demo data: Ecuador Census data for 2012

*The computation of informal settlements is similar to the computation of slum household and follows similar steps with a differentiation on the type of indicators being examined.

**Step one:** Collect all primary data sources for the country. Household survey data are preferred whenever they are available.

The Demographic and Health Surveys (DHS), Multiple Indicator Cluster Surveys (MICS) or other household data (Surveys or census) are the primary data sources preferred.
Example:

**Step Two:** Open the data set and review primary data sources for the country.

**Step Three:** Select the correct household population that you need to examine. This can be broken down by regions, urban-rural or even by cities. Using the respective variable of interest.

**Step Four:** Open the data set and review primary data sources for the country.

Example: Ownership of dwelling

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Width</th>
<th>Decimals</th>
<th>Label</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>prov</td>
<td>Numeric</td>
<td>2</td>
<td>0</td>
<td>Province, Ecuador</td>
<td>(1. Azuay)...</td>
</tr>
<tr>
<td>cant</td>
<td>Numeric</td>
<td>4</td>
<td>0</td>
<td>Canton, Ecuador</td>
<td>(101. Cuenca)...</td>
</tr>
<tr>
<td>ownt</td>
<td>Numeric</td>
<td>1</td>
<td>0</td>
<td>Ownership of dwelling [general version]</td>
<td>[0, NIU]...</td>
</tr>
<tr>
<td>owntd</td>
<td>Numeric</td>
<td>3</td>
<td>0</td>
<td>Ownership of dwelling [detailed version]</td>
<td>[0, NIU]...</td>
</tr>
<tr>
<td>intmig</td>
<td>Numeric</td>
<td>1</td>
<td>0</td>
<td>Number of international migrants, Ecuador</td>
<td>[0, No migrants]...</td>
</tr>
<tr>
<td>elect</td>
<td>Numeric</td>
<td>1</td>
<td>0</td>
<td>Electricity</td>
<td>[0, NIU]...</td>
</tr>
<tr>
<td>watss</td>
<td>Numeric</td>
<td>2</td>
<td>0</td>
<td>Water supply</td>
<td>[0, NIU]...</td>
</tr>
<tr>
<td>sewag</td>
<td>Numeric</td>
<td>2</td>
<td>0</td>
<td>Sewage</td>
<td>[0, NIU]...</td>
</tr>
<tr>
<td>phone</td>
<td>Numeric</td>
<td>1</td>
<td>0</td>
<td>Telephone availability</td>
<td>[0, NIU]...</td>
</tr>
<tr>
<td>room</td>
<td>Numeric</td>
<td>2</td>
<td>0</td>
<td>Number of rooms</td>
<td>[0, Part of a room]...</td>
</tr>
<tr>
<td>kitc</td>
<td>Numeric</td>
<td>2</td>
<td>0</td>
<td>Kitchen or cooking facilities</td>
<td>[0, NIU]...</td>
</tr>
<tr>
<td>toilet</td>
<td>Numeric</td>
<td>2</td>
<td>0</td>
<td>Toilet</td>
<td>[0, NIU]...</td>
</tr>
<tr>
<td>floor</td>
<td>Numeric</td>
<td>3</td>
<td>0</td>
<td>Floor material</td>
<td>[0, NIU]...</td>
</tr>
<tr>
<td>mcou</td>
<td>Numeric</td>
<td>1</td>
<td>0</td>
<td>Number of married couples in household</td>
<td>[0, No married couples in household]...</td>
</tr>
<tr>
<td>ec01_a_dwnm</td>
<td>Numeric</td>
<td>7</td>
<td>0</td>
<td>Dwelling number</td>
<td>None</td>
</tr>
<tr>
<td>ec01_a_hshnm</td>
<td>Numeric</td>
<td>1</td>
<td>0</td>
<td>Household number</td>
<td>(1, 1)</td>
</tr>
<tr>
<td>ec01_a_pnsn</td>
<td>Numeric</td>
<td>2</td>
<td>0</td>
<td>Person number</td>
<td>(0, 0)</td>
</tr>
<tr>
<td>ec01_a_hshn</td>
<td>Numeric</td>
<td>1</td>
<td>0</td>
<td>Number of households</td>
<td>(1, 1)</td>
</tr>
<tr>
<td>ec01_a_pnnd</td>
<td>Numeric</td>
<td>2</td>
<td>0</td>
<td>Number of persons in dwelling</td>
<td>(0, 0)</td>
</tr>
</tbody>
</table>

Review the response categories for the questions on housing durability.
Example of a preview window for the responses under ownership of dwelling

*Where possible the various responses categories are grouped and interpreted according to the definitions for informal settlements. (Not all surveys or census data use the same categories to define ownership of the dwelling)*

The categories grouped for Security of tenure can use the following criteria. Example on Ownership of dwelling

<table>
<thead>
<tr>
<th>SECURITY OF TENURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Original Variable Name</td>
</tr>
<tr>
<td>Variable Label</td>
</tr>
<tr>
<td>Selected Value labels For Improved Housing</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

Group the question responses, and develop the new indicators as shown below:

```
fre OWNERSHIP

recode EC 21A_OWNERSHIP (1,3,4=1)(else=0) into tenure1.
var lab floor1 "Secure Tenure",
val lab floor1 1"Security of Tenure" 0"No Security of Tenure".
fre tenure1.
```
Security of Tenure

<table>
<thead>
<tr>
<th>Ownership of the dwelling</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Owned</td>
<td>8476240</td>
<td>69.8</td>
<td>69.8</td>
<td>69.8</td>
</tr>
<tr>
<td>2 Rented</td>
<td>2482850</td>
<td>20.5</td>
<td>20.5</td>
<td>90.3</td>
</tr>
<tr>
<td>3 Sharecropping</td>
<td>48450</td>
<td>4</td>
<td>.4</td>
<td>90.7</td>
</tr>
<tr>
<td>3 Free</td>
<td>637640</td>
<td>5.3</td>
<td>5.3</td>
<td>95.9</td>
</tr>
<tr>
<td>4 For services</td>
<td>322690</td>
<td>2.7</td>
<td>2.7</td>
<td>98.6</td>
</tr>
<tr>
<td>5 Other</td>
<td>83570</td>
<td>.7</td>
<td>.7</td>
<td>99.3</td>
</tr>
<tr>
<td>6 NIU (Not in Universe)</td>
<td>85810</td>
<td>.7</td>
<td>.7</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>12137250</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

New Indicator

<table>
<thead>
<tr>
<th>Security of tenure 1</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>.00 No Security of Tenure</td>
<td>2700680</td>
<td>22.3</td>
<td>22.3</td>
<td>22.3</td>
</tr>
<tr>
<td>1.00 Security of Tenure</td>
<td>9436570</td>
<td>77.7</td>
<td>77.7</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>12137250</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

- This should be done for the response categories for the questions on Lack of basic services and formal city infrastructure, Noncompliance with current planning regulations, and location on non-hazardous location for informal settlements need to be reviewed to ensure that they meet the defined criteria.

Step Five: Repeat ‘step four’ for all the elements of informal settlements and obtain the respective new indicators. The new indicators can be coded i to reflect the new indicator computed.

Tenure1 = 1: Secure Tenure 2: Insecure Tenure
Compliance1 = 1: Compliance to regulations 2: Non Compliance to regulation
Location1 = 1: Non-Hazardous locale 2: Hazardous Locale

Step Six: Using the new variables with, focus only on urban households, identified in ‘step five’ we compute the informal household by the respective deprivation (These form part of the quantifiable derivatives for the measurement of target 11.1) as shown below.

Shelter Deprivation measures how many components a household does not have i.e.

1: One Shelter Deprivation - household has 3 components and is only missing 1 other component.
2: Two Shelter Deprivation - household has 2 components and is only missing 2 other components.
3: Three Shelter Deprivation - household has 1 component and is only missing 3 other components.
4: Four Shelter Deprivation - household has NONE of the required components

Informal settlement = One Shelter Deprivation + Two Shelter Deprivation + Three Shelter Deprivation + Four Shelter Deprivation

*For informal shelter the deprivation is computed on the basis of the elements of informal shelter that are different for the ones in slums.
The computation of disaggregation by deprivation is done using the following steps.

**First step:** Compute the combinations for the different possible deprivations using the respective variables as shown.

```plaintext
# for urban
if (urban=2).
compute informalc4=0.
if (tenure1=0 and services1=0 and compliance1=0 and location1=0) informalc4=1.

compute informalc3a=0.
if (tenure1=0 and services1=0 and compliance1=0 and location1=1) informalc3a=1.
compute informalc3b=0.
if (tenure1=0 and services1=0 and compliance1=1 and location1=0) informalc3b=1.
compute informalc3c=0.
if (tenure1=0 and compliance1=0 and location1=0 and services1=1) informalc3c=1.
compute slumc3d=0.
if (services1=0 and compliance1=0 and location1=0 and tenure1=1) informalc3d=1.

compute informalc3=0.
if (informalc3a=1 or informalc3b=1 or informalc3c=1 or informalc3d=1) informalc3=1.
```

This should be done to ensure that all possible combinations are considered and have been computed. Assigning numbers, 2, and 1.

From this we then proceed to compute the total informal settlements as shown below.

```plaintext
compute informaltot=0.
if (tenure1=0 or services1=0 or compliance1=0 or location1=0) informaltot=1.

compute informalc=0.
if (informalot=1) informalc=2.
if (informalot=1 and tenure1=1 and compliance1=1 and location1=1) informalc=1.
if (informalc2=1) informalc=3.
if (informalc3=1) informalc=4.
if (informalc4=1) informalc=5.
```

From this we label the informal settlements conditions as shown for the various labels.

```plaintext
# set informalc
label informalc "Informal conditions".
label informalc 1 "Informal" 2 "Services only" 3 "Other only one condition of informal" 4 "Satisfy two conditions of informal" 5 "Satisfy three conditions of informal" 6 "Satisfy four conditions of informal".
```
Second Step: The different combinations are computed into the different classes and then labelled as follows then we proceed to label the classes for the various informal settlement stratification as follows.

Third Step: The informal settlement stratifications are then grouped into the different stratification groups as shown below.

```plaintext
recode class (0=0)(1 thru 4=1)(5 thru 10=2)(11 thru 14=3)(15=4) into classgrp.
var lab classgrp "Informal stratification grouped".
val lab classgrp 0 "Formal household"
  1 "One shelter deprivation"
  2 "Two shelter deprivations"
  3 "Three shelter deprivations"
  4 "Four shelter deprivations".

recode classgrp (0=0)(1,2,3,4=1) into slumthre.
var lab slumthre "Slum".
val lab slumthre 0 "Formal" 1 "Informal".
```

If this is done properly and the results are cross-tabulated for the urban areas, we obtain the data for informal settlements in the various disaggregations as shown in the compiled table below.
<table>
<thead>
<tr>
<th>Country A</th>
<th>Count</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formal settlements</td>
<td>405890</td>
<td>86.5%</td>
</tr>
<tr>
<td>Informal Settlements</td>
<td>63280</td>
<td>13.5%</td>
</tr>
<tr>
<td>Total</td>
<td>469170</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

**Informal settlements stratification grouped**

<table>
<thead>
<tr>
<th></th>
<th>Count</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formal Settlements</td>
<td>405890</td>
<td>86.5%</td>
</tr>
<tr>
<td>One shelter deprivation</td>
<td>54980</td>
<td>11.7%</td>
</tr>
<tr>
<td>Two shelter deprivations</td>
<td>6570</td>
<td>1.4%</td>
</tr>
<tr>
<td>Three shelter deprivations</td>
<td>1670</td>
<td>.4%</td>
</tr>
<tr>
<td>Four shelter deprivations</td>
<td>60</td>
<td>.0%</td>
</tr>
<tr>
<td>Total</td>
<td>469170</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

**Informal stratification**

<table>
<thead>
<tr>
<th></th>
<th>Count</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formal Settlements</td>
<td>405890</td>
<td>86.5%</td>
</tr>
<tr>
<td>Lack Services only</td>
<td>4530</td>
<td>1.0%</td>
</tr>
<tr>
<td>Lack tenure only</td>
<td>4710</td>
<td>1.0%</td>
</tr>
<tr>
<td>Lack location only</td>
<td>32230</td>
<td>6.9%</td>
</tr>
<tr>
<td>Lack compliance only</td>
<td>13510</td>
<td>2.9%</td>
</tr>
<tr>
<td>Tenure and Services only</td>
<td>920</td>
<td>.2%</td>
</tr>
<tr>
<td>Tenure and Compliance</td>
<td>450</td>
<td>.1%</td>
</tr>
<tr>
<td>Tenure and Location</td>
<td>680</td>
<td>.1%</td>
</tr>
<tr>
<td>Services and Compliance</td>
<td>490</td>
<td>.1%</td>
</tr>
<tr>
<td>Services and Location</td>
<td>1040</td>
<td>.2%</td>
</tr>
<tr>
<td>Compliance and Location</td>
<td>2990</td>
<td>.6%</td>
</tr>
<tr>
<td>Tenure and Services and Compliance</td>
<td>140</td>
<td>.0%</td>
</tr>
<tr>
<td>Tenure and Services and Location</td>
<td>1120</td>
<td>.2%</td>
</tr>
<tr>
<td>Tenure and Compliance and Location</td>
<td>150</td>
<td>.0%</td>
</tr>
<tr>
<td>Services and Compliance and Location</td>
<td>260</td>
<td>.1%</td>
</tr>
<tr>
<td>Tenure and Services and Compliance and Location</td>
<td>60</td>
<td>.0%</td>
</tr>
<tr>
<td>Total</td>
<td>469170</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

\[
\text{Informal settlements households (ISH): } = 100 \left(\frac{\text{No. of people living in informal settlements households}}{\text{City population}}\right)
\]

\[
\text{Informal settlements households (ISH): } 100 \left(\frac{63280}{469170}\right)
\]

Informal settlements households (ISH): 13.5%
**ACTIVITY THREE:**

**INADEQUATE HOUSING HOUSEHOLDS**

Data Required EU statistics on income and living conditions

Reference Population: all private households and their current members (persons living in collective households are excluded from the target population)

**SECONDARY DATA SOURCES**

This information is regularly collected by the European Union Statistical Office and reported periodically under housing statistics. This covers majority of the aspects of living conditions. The results are usually reported in publications. These are some of the secondary sources where the information can be obtained for those already published. This will be updated periodically as data becomes available

1. Database: Income and Living Conditions
   Link: (http://ec.europa.eu/eurostat/web/income-and-living-conditions/data/main-tables)

2. Statistical Books and Publications

**METHODOLOGY FOR COMPUTING THE INDICATOR OF INADEQUATE HOUSING**

The European statistical office permanently collects information on Housing and living Conditions for the entire European Union. This is guided by the Europeans Union ten-year growth plan 'Europe 2020'. This is a strategy for smart, sustainable and inclusive growth and focusses on the importance of monitoring the importance of income and living conditions. The information provides guidance towards the keeping up with the target of lifting at least 20 million people in the EU from the risk of poverty or social exclusion by 2020. The main statistical findings for the recent housing statistics can be summarized as follows:

<table>
<thead>
<tr>
<th>HOUSING STATISTICS</th>
<th>MEASUREMENT (EU STATISTICS)</th>
<th>DEFINITION</th>
<th>RESULTS FROM EU MEMBERS POPULATION (2014)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Tenure Status</td>
<td>Ownership of dwelling</td>
<td>The financial arrangements under which someone has the right to live in a house, dwelling or apartment</td>
<td>70.1 % - owner-occupied dwellings accommodation</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>19.1 % - Tenants with a market price rent</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>10.8 % - Tenants in reduced-rent or free</td>
</tr>
<tr>
<td>2. Housing Quality</td>
<td>overcrowding rate</td>
<td>The overcrowding rate is defined as the percentage of the population living in an overcrowded household.</td>
<td>17.1 % population lived in overcrowded dwellings</td>
</tr>
<tr>
<td></td>
<td>at risk of poverty</td>
<td>Share of people with an equivalised disposable income (after social transfer) below the at-risk-of-poverty threshold, which is set at 60 % of the national median equivalised disposable income after social transfers.</td>
<td>Within the population at risk of poverty, overcrowding rate in the EU-28 was 30.3 % in 2014 within</td>
</tr>
<tr>
<td></td>
<td>severe housing deprivation rate</td>
<td>Severe housing deprivation rate is defined as the percentage of population living in the dwelling which is considered as overcrowded, while also exhibiting at least one of the housing deprivation measures. Housing deprivation is a measure of poor amenities and is calculated by referring to those households with a leaking roof, no bath/shower and no indoor toilet, or a dwelling considered too dark</td>
<td>5.1 % of the population suffered from severe housing deprivation</td>
</tr>
</tbody>
</table>
3. Housing Affordability

<table>
<thead>
<tr>
<th>HOUSING STATISTICS</th>
<th>MEASUREMENT (EU STATISTICS)</th>
<th>DEFINITION</th>
<th>RESULTS FROM EU MEMBERS POPULATION (2014)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3. Housing</td>
<td>housing cost overburden rate</td>
<td>The housing cost overburden rate is the percentage of the population living in households where the total housing costs ('net' of housing allowances) represent more than 40 % of disposable income ('net' of housing allowances).</td>
<td>11.4 % - population lived in households that spent 40 % or more of their equivalised disposable income on housing. highest for tenants with market price rents (27.1 %) and lowest for persons in owner-occupied dwellings without a loan or mortgage (6.8 %).</td>
</tr>
</tbody>
</table>

The results capture 95% of the aspects of inadequate housing as defined by the SDGs. (See table below) Countries within the EU region already have data available. The methodology for collecting the indicator for inadequate housing will be for the countries that are not part of the EU have no collected the data.

Criteria for measuring inadequate housing check list for EU Statistics and SDGs

<table>
<thead>
<tr>
<th>CONDITIONS FOR INADEQUATE HOUSING</th>
<th>SDGS</th>
<th>EU HOUSING STATISTICS</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Legal security of tenure</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>b. Has adequate and available basic services</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>c. The housing unit should be affordable.</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>d. Guaranteed physical safety</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>e. Not disadvantage to disadvantaged and marginalized groups.</td>
<td>X</td>
<td>--</td>
</tr>
<tr>
<td>f. Located in areas of easy access to opportunities.</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>g. Take into account the expression of cultural identity and the members ways of life</td>
<td>X</td>
<td>--</td>
</tr>
</tbody>
</table>

The EU statistics methodology fails to incorporate the seven criteria for determining inadequate housing. The method for collecting the indicator is still thus under consideration and formulation.

Inadequate housing households (IHH): 100 \[ \frac{\text{No. of people living in inadequate housing}}{\text{City population}} \]
UNIT THREE: RATIONALE FOR MONITORING

DATA COLLECTION
The National agencies are responsible for data collection, no difference between country-produced data and international estimated data on the indicator are expected to arise if standard methodologies and procedures are followed at all stages of the reporting process.

CAPACITY DEVELOPMENT
This indicator has largely been successful due to the collaborations between several organizations and institutions including UN-Habitat, UNEP, Cities Alliance, Slum dwellers International, and World Bank.

Final Compilation and reporting at the global level will be led and guided by UN-Habitat, and selected partners.

DATA RELEASE
The monitoring of this indicator will be repeated at regular intervals of 3-5 years, allowing for three-five-year reporting points until the year 2030.

GENERAL LIMITATIONS OF THE DATA

<table>
<thead>
<tr>
<th>DATA LIMITATIONS</th>
<th>POSSIBLE SOLUTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>The lack of appropriate tools at national and city levels to measure all the components required to monitor indicator 11.1 has often brought challenges for statistics offices to reliably include all components that measure slums, sometimes resulting in the underestimation of poor housing units or slum households.</td>
<td>Several technical workshops and EGMs scheduled that will help build the capacity for reporting in the first 3 years of the 2030 Agenda for Sustainable Development.</td>
</tr>
<tr>
<td>Indicator 11.1.1 does not capture homelessness, as it is not included in household surveys.</td>
<td></td>
</tr>
<tr>
<td>Many countries still have limited capacities for data management, data collection and monitoring, and continue to grapple with limited data on large or densely populated geographical areas</td>
<td>This means that complementarity in data reporting will be key to ensure that both national and global figures achieve consistencies in the final reported data.</td>
</tr>
<tr>
<td>In the case of security of tenure, its complicated relation with land and property makes it a difficult aspect to include in the different related surveys and, therefore, to measure and monitor due to lack of routine data.</td>
<td>In most recent years, important progress has been made to integrate the measurement of this component into major surveys and censuses in several countries</td>
</tr>
</tbody>
</table>
Additional Limitations

Slums:

a. The MICS, Census and DHS surveys that are part of the primary data sources for the computation of the indicator for improved water access at times fails to indicate whether wells and springs are protected or unprotected. For this case, the proportion of proportion of protected and unprotected is computed, if possible, by using other surveys for the same country.

b. Surveys do not always indicate whether latrines are traditional or improved, covered or uncovered. For these cases, the proportion of improved or covered is estimated, if possible, by using other surveys for the same country.

c. For countries with DHS surveys, (Africa, Asia and Latin America), the construction material of floor, wall or roof is collected and used to estimate the durability of the dwelling.

Inadequate Housing

a. Measurement of housing quality not only depends on the quality of the dwelling itself, but also on the wider residential area. The indicator thus relies heavily on the subjective opinions of the respondents.

d. The indicator does not measure or account for homelessness. Thus there is an underestimation of the computation of the indicator.

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- UN-Habitat (1998). Crowding and Health in Low Income Settlements of Guinea Bissau, SIEP Occasional Series No.1
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- Urban Indicators Programme, World Bank and UN-Habitat, Guidelines
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- Habitat for Humanity, Housing Indicators for the Sustainable Development Goals, 2015

URL References:
[1]: http://www.un.org/esa/sustdev/natinfo/indicators/methodology_sheets.pdf,
[2]: http://unhabitat.org/urban-indicators-guidelines/
[3]: http://mdgs.un.org/unsd/mdg/Metadata.aspx?IndicatorId=0&SeriesId=710,
[4]: http://unhabitat.org/urban-initiatives/initiatives-programmes/participatory-slum-upgrading/
[6]: http://wcr.unhabitat.org/
TARGET 11.2:
By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, and children, persons with disabilities and older persons.

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

OBJECTIVES

At the end of the module, participants will be able to:

- Understand the essential concepts and definitions of the indicator.
- Understand how to develop strategies for collecting, validating, and analysing data based on the data collected and the methodology given.
- Understand the monitoring and reporting timelines.
- Understand the general limitations of the indicator in terms of data collection, monitoring and reporting.

NOTES FOR THE FACILITATOR

- Allow participants to openly share observations about Public transport.
- Introduce the session by informing the participants that this session is designed to deepen their understanding about accessibility to public transport.

DURATION

This module will be taught in two (2) hours.

- This module aims at providing practical guidance to information tools, data collection procedures and analysis for the computation of indicator 11.2.1 of Goal 11.
- As you begin, you will need to know the essentials about data collection including selecting the most appropriate and reliable types and sources of data, data collection and analysis methods. This module addresses these issues, with particular focus on statistics and spatial data collection (where applicable), analysis.
- Through a series of presentations, examples and exercises, this module will provide you with a number of tools and techniques necessary to complete the data collection and analysis.

TARGET GROUP:

- Local government authorities
- City leaders,
- Civil societies,
- National Statistical officers
- Urban experts
UNIT ONE: INTRODUCTION

OBJECTIVES

- Understand the essential concepts and the definitions of the indicator.
- The module will allow for safe discussion and exploration of participants' own views on public transport and accessibility.

1. BACKGROUND

Accessibility-based urban mobility paradigm critically needs good, high-capacity public transport systems that are well integrated in a multimodal arrangement with public transport access points located within comfortable walking or cycling distances from homes and jobs for all.

Achieving SDG 11.2 requires a fundamental shift in the thinking on transport with the focus on the goal of transport rather than on its means. With accessibility to services, goods, and opportunities for all as the ultimate goal, priority is given to make cities more compact and walkable through better planning and integration of land-use planning with transport planning. The means of transport are also important but the SDG's imperative to make the city more inclusive means that cities will have to move away from car-based travel to public transport and active modes of transport such as walking and cycling with good inter-modal connectivity. This indicator is empirically proven that public transport makes cities more inclusive, safer, and sustainable. Effective and low-cost transportation is critical for reducing urban poverty and inequalities and enhancing economic development because it provides access to jobs, health care, education services, and other public goods.

CONCEPTS AND DEFINITIONS

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

First, select the kind of transport you had a problem with

Choose from one of the four options below:

- BUS / COACH
- TRAIN
- TRAM / METRO UNDERGROUND
- FERRY
a. Convenient access to public transport: refers to a distance of 0.5 km (500m) from an officially/formally recognized transport stop. Additional criteria for defining convenient include: Public transport accessible to all special-needs customers, including those who are physically, visually, and/or hearing-impaired, as well as those with temporary disabilities, the elderly, children and other people in vulnerable situations;

b. Public transport with frequent service during peak travel times.

c. Stops present a safe and comfortable station environment.

d.

Discussion

Sharing experiences about the use of Public transport (30 minutes). Ask the participants/groups to use their experiences to give examples of/or stories about each of the following elements:
- Convenient access
- Inclusivity
- Safety and Comfortability
- Frequency of service
NOTES
UNIT TWO: METHODOLOGY

OBJECTIVES

- Understand how to develop the essentials for collecting and validating data
- Demonstrate how to compute the indicator based on the data collected and the methodology defined concepts and definitions of the indicator.

ACTIVITIES

*In the plenary, ask the participants to identify how, where and ways of collecting data related to accessibility of public transport systems.*

DATA SOURCES

- Satellite Imagery: USGS, GLCF and Geo-rectified Google Earth Imagery
- City administration,
- National Transport agencies
- Household surveys,
- Census data

SOFTWARE

- ArcMap provided by ESRI
- QGIS open source software
- OPTA accessibility tool provided by World Bank

IN THIS SECTION, YOU WILL LEARN HOW TO;

1. Identify the service areas (convenient access)
2. Identify the population served by public transport stops
3. Calculate the population with access to public transport
ACTIVITY ONE:
IDENTIFICATION OF SERVICE AREA

Data required:

Public transport stops (point shapes),
Urban footprint (Pre-requisite for all spatial indicators).

Demo Data: Census tracts for the State of Georgia, USA
(The example provided is based on the use of the ArcMap program)

Step One: In ArcMap, add the public transport stops. The public stop will be the point of reference to creating the buffer.

The first thing you will need to do add a buffer distance field of 500 meter for each of the stops.

Step Two: Right click the Stops layer and select open attribute table. Once the attribute table is open, click the icon on the top left corner and a dialogue box open, scroll to Add field (this opens a dialogue box to add a new field to the table), write Buffer Distance on the Name field,. Click ok. A new column is added on the attributed.
The next thing is to create a 500-meter buffer around the stops.

**Step Three:** Click the Search tab and enter Buffer. Click Buffer to open the buffer dialog box.
**Step Four:** In the buffer dialog box, click the drop down for input features and select the Stops layers. To set the distance value or field, select field (buffer is created from the distance field specified). If there’s no distance field specified in the attribute table, select linear and set the distance to 500, ArcMap default unit is meters. When your dialog box matches the image. Click Ok.

![Buffer dialog box](image1.png)

**Step Five:** A buffer feature is created around the Stops. The buffer tool buffers the edge of the input feature, so the resulting feature takes on the shape of the original feature. This is the desired result, but it can be made prettier for the map.

![Buffered Stops](image2.png)
Step Six: Right click the Buffer layer and open the properties. Go to Display Tab. Set the Transparent value to 60%. Click OK to close the properties dialog box.

**ACTIVITY TWO:**

**IDENTIFICATION OF POPULATION SERVED.**

Data Required

- Public transport stops (point shapes),
- Urban footprint, Service areas (500m buffer),
- Population data (census tracts with population figures, and any other socio-demographic data).

Demo Data: Census tracts for the State of Georgia, USA

Once the service areas area constructed, the next step is to overlay the socio-demographic data.
Step One: Add the socio-demographic data to the workspace. The socio-demographic data becomes the analysis zones.

Step Two: Right click the socio-demographic layer (Census Tract Georgia) and Select, Open attribute table to view the data contained in the layer. The selected column contains the total population for each census tract. The other columns have data disaggregated using various variables such as, sex, age, race etc.

The next step is to label the census tract layer to ease identification of population figures.

Step Three: Right click the socio-demographic layer (Census Tract Georgia) open the properties. Go to Labels Tab. Check the label features in this layer box. Set the Label field to field that contains the data required (DP00100001). Click OK to close the properties dialog box.
**Step Four:** To identify the population served by the public transport service, the following should be noted. A service buffer (denoted as $i$) intersects, either fully or partially, with more than one analysis zone $j$ ($j=1...1$). The population served by the public transport buffer $i$, $P_i$, is thus equal to the sum of the population in each of the intersecting area, $P_{ij}$. Hence

$$P_i = \sum_{j=1}^{J} P_{ij}$$

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

**Step Five:** Hence, to calculate the population served, Select the individual service area (Buffer) and record the total population served. In the figure, the service area (with a purple boundary) serves two census tracts (in blue boundary).

The total population for served by Union Bus terminal buffer is

- $i =$ Union Bus terminal
- $P_{ij} = 5795 + 3648$
- Total = 5647709.1108

Repeat the process for all the service areas and analysis zones.

**Tip:** Label the buffers for easy identification.
Step Six: Finally, the population with access to public transport out of the entire city population is will be computed as follows:

Examples of Usage

DeKalb County of Georgia

<table>
<thead>
<tr>
<th>SERVICE BUFFER</th>
<th>INTERSECT 1</th>
<th>INTERSECT 2</th>
<th>INTERSECT 3</th>
<th>INTERSECT 4</th>
<th>INTERSECT 5</th>
<th>INTERSECT 6</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2376</td>
<td>3574</td>
<td>2000</td>
<td>2802</td>
<td></td>
<td></td>
<td>10,752</td>
</tr>
<tr>
<td></td>
<td>3574</td>
<td>4052</td>
<td>5361</td>
<td>4433</td>
<td>2444</td>
<td></td>
<td>19,864</td>
</tr>
<tr>
<td></td>
<td>1590</td>
<td>3991</td>
<td>3228</td>
<td>2434</td>
<td></td>
<td></td>
<td>11,243</td>
</tr>
<tr>
<td></td>
<td>3176</td>
<td>3187</td>
<td>3228</td>
<td>3991</td>
<td></td>
<td></td>
<td>13,582</td>
</tr>
<tr>
<td></td>
<td>5795</td>
<td>3648</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>9,443</td>
</tr>
<tr>
<td></td>
<td>5361</td>
<td>5795</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>11,156</td>
</tr>
<tr>
<td></td>
<td>5795</td>
<td>2275</td>
<td>3552</td>
<td>3648</td>
<td></td>
<td></td>
<td>15,270</td>
</tr>
<tr>
<td></td>
<td>4774</td>
<td>3007</td>
<td>4232</td>
<td></td>
<td></td>
<td></td>
<td>12,013</td>
</tr>
<tr>
<td></td>
<td>3975</td>
<td>4379</td>
<td>5051</td>
<td></td>
<td></td>
<td></td>
<td>13,405</td>
</tr>
<tr>
<td></td>
<td>3200</td>
<td>4561</td>
<td>3486</td>
<td></td>
<td></td>
<td></td>
<td>11,247</td>
</tr>
<tr>
<td></td>
<td>5177</td>
<td>3932</td>
<td>3975</td>
<td></td>
<td></td>
<td></td>
<td>13,084</td>
</tr>
<tr>
<td></td>
<td>5022</td>
<td>5371</td>
<td>7712</td>
<td></td>
<td></td>
<td></td>
<td>18,105</td>
</tr>
<tr>
<td>TOTAL POPULATION WITH CONVENIENT ACCESS TO PUBLIC TRANSPORT</td>
<td>159,164</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total Population with convenient access to public transport = 159,164/km²
County Population = 691,893/km²

% with access to public transport = \[
\frac{63280}{469170} \times 100 = 23%\]
ENHANCING AND PROMOTING ACCESSIBILITY OF PUBLIC TRANSPORT.

Characteristics of the quality, universal accessibility for people with disabilities, safety and frequency of the service can be assigned to the public stops inventory. This section includes a brief summary of a multi-criteria index for tracking the transport target. The multi-criteria index promotes a modal shift to sustainable and greener forms of transport.

<table>
<thead>
<tr>
<th>NO.</th>
<th>PARAMETER</th>
<th>INDICATOR</th>
<th>WEIGHT (%)</th>
<th>METHOD OF MEASUREMENT/SOURCE OF INFORMATION</th>
<th>REMARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Accessibility related to urban planning</td>
<td>Density (people/ sq. km)</td>
<td>10%</td>
<td>Census surveys</td>
<td>Density is an important determinant for the efficiency of public transport systems.</td>
</tr>
<tr>
<td>2.</td>
<td>Accessibility related to urban planning</td>
<td>Percentage of street space in cities</td>
<td>10%</td>
<td>Analysis of earth observations/city maps</td>
<td>The adequacy of streets and crossings determine urban accessibility to a great extent. Cities with 36% of land area dedicated to streets (score 20/100; Below 20% cities score 0 between 36% and 20% adjusted proportionately.</td>
</tr>
<tr>
<td>3.</td>
<td>Accessibility related to urban planning</td>
<td>No. of Intersections/Sq. Km</td>
<td>10%</td>
<td>Analysis of earth observations/city maps</td>
<td>Cities with more than 110/Sq. Km score 20/100; Proportionately reduced to 0 with cities less than 50 intersections/sq km</td>
</tr>
<tr>
<td>4.</td>
<td>Accessibility related to transport planning</td>
<td>Percentage of population within 500 m of mass transit stop</td>
<td>20%</td>
<td>City maps/Sample surveys</td>
<td>100% of city population</td>
</tr>
<tr>
<td>5.</td>
<td>Affordability</td>
<td>Percentage household income of lowest quintile of population spent on transport</td>
<td>10%</td>
<td>Sample surveys/WTP surveys</td>
<td>Poorest quintile should not spend more than 5% (TBD) on transport</td>
</tr>
<tr>
<td>5</td>
<td>Quality</td>
<td>Travel time, universal access, safety, security, comfort and user information</td>
<td>30%</td>
<td>Sample Surveys</td>
<td>Detailed indicators to be developed</td>
</tr>
<tr>
<td>6.</td>
<td>Modal shift to sustainable transport</td>
<td>(i) Modal share (cars, NMT, PT) (ii) Passenger KM travelled on EV as percentage of total passenger KM travelled in urban areas;</td>
<td>10%</td>
<td>City mobility surveys</td>
<td>Detailed indicators to be developed; this parameter is also important due to transport's contribution to carbon emissions and air-quality issues in cities.</td>
</tr>
</tbody>
</table>

TOTAL 100
UNIT THREE: RATIONALE FOR MONITORING

DATA COLLECTION
Responsibility of national agencies.

Survey data will be available every 2 to 5 years depending on the frequency.

Open Trip Planner Analyst (OPTA) accessibility tool will be available to government officials and all urban transport infrastructure.

CAPACITY DEVELOPMENT
UN Habitat and its partner organizations and National Focal points will work closely to provide capacity building and quality assurance support.

UN-Habitat, International Association of Public Transport will support lead the annual monitoring and reporting.

DATA RELEASE
Monitoring of the indicator will be repeated at annual intervals, allowing several reporting points until the year 2030. Comprehensive reporting will be undertaken on a biennial basis.

Monitoring at annual intervals will allow determining whether the proportion of the population with convenient public transport is increasing significantly over time, as well monitor the share of the global urban population living in cities where the convenient access to public transport is below the acceptable minimum.
UNIT FOUR: GENERAL LIMITATIONS

<table>
<thead>
<tr>
<th>DATA LIMITATIONS</th>
<th>POSSIBLE SOLUTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>The methodology described above covers public transport service solely based on proximity analysis to transport stops. It does not incorporate temporal dimension associated with the availability of public transport. Factors such as affordability, safety and universal accessibility may influence the usage of public means of transport.</td>
<td>The temporal aspect is important in measures of accessibility as a service within walking distance is not necessarily considered as available if waiting time goes beyond a certain threshold level that is required.</td>
</tr>
<tr>
<td>Harmonized global/local data on urban transport does not exist, nor are they comparable at the world level</td>
<td>An open source software platform for measuring accessibility, the Open Trip Planner Analyst (OPTA) accessibility tool, will be available to government officials and all urban transport practitioners. Expert Group Meeting to harmonize the tools and existing data to ensure a more uniform and standard format for reporting on this indicator.</td>
</tr>
<tr>
<td>The road segments should include attributes allowing for a selection of streets accessible to pedestrians, however road network is not incorporated in the measurement of the target.</td>
<td>To be able to access the ease of access stops, a comprehensive road network is needed.</td>
</tr>
</tbody>
</table>
NOTES
REFERENCES

- http://unhabitat.org/urban-themes/mobility/
- http://www.digitalmatatus.com/
- http://www.slocat.net/content-stream/187
- https://www.census.gov/geo/maps-data/data/tiger.html
- Tracking the SDG Targets: An Issue Based Alliance for Transport.

FREQUENTLY ASKED QUESTIONS

1. How important are good public transport systems to urban and social development?
   Answer: Good public transport systems are an essential part of safe, clean and affordable transport for development. Public transport is often the only means of transport for the poor, without it, they would be able to look opportunities only within walking distance of their homes, so public transport improves their livelihood opportunities. Public transport is also the main means of mobility for the elderly, people with disabilities and children. It gives greater access to education, health and recreation facilities.

2. What are key elements of sustainable public systems?
   Answer: A good transport system must be easy and convenient to use, fast, safe, clean and affordable. A key feature is that they integrate multiple technologies such as metro rail, light rail, BRT making it easy for passengers to transfer from one mode to another

3. Can you give examples of cities that have elements of sustainable public transport system?
   Answer: Seoul, Singapore, Hong Kong.

4. What are the barriers to sustainable public transport?
   Answer: Having a large number of small operators that allows for low-cost services yet the quality is poor. While single publicly owned entities may offer higher quality of services but costs tend to be high and the quantity service is often inadequate.

5. What are the main obstacles associated with this particular methodology?
   Answer: The methodology described above covers public transport service solely based on proximity analysis to transport stops. It does not incorporate temporal dimension associated with the availability of public transport as well as the road network that shows the access of stops.