



**UN HABITAT**  
FOR A BETTER URBAN FUTURE

# TRAINING MANUAL

ON SELECTED HUMAN SETTLEMENTS  
INDICATORS OF THE SDG



## 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.

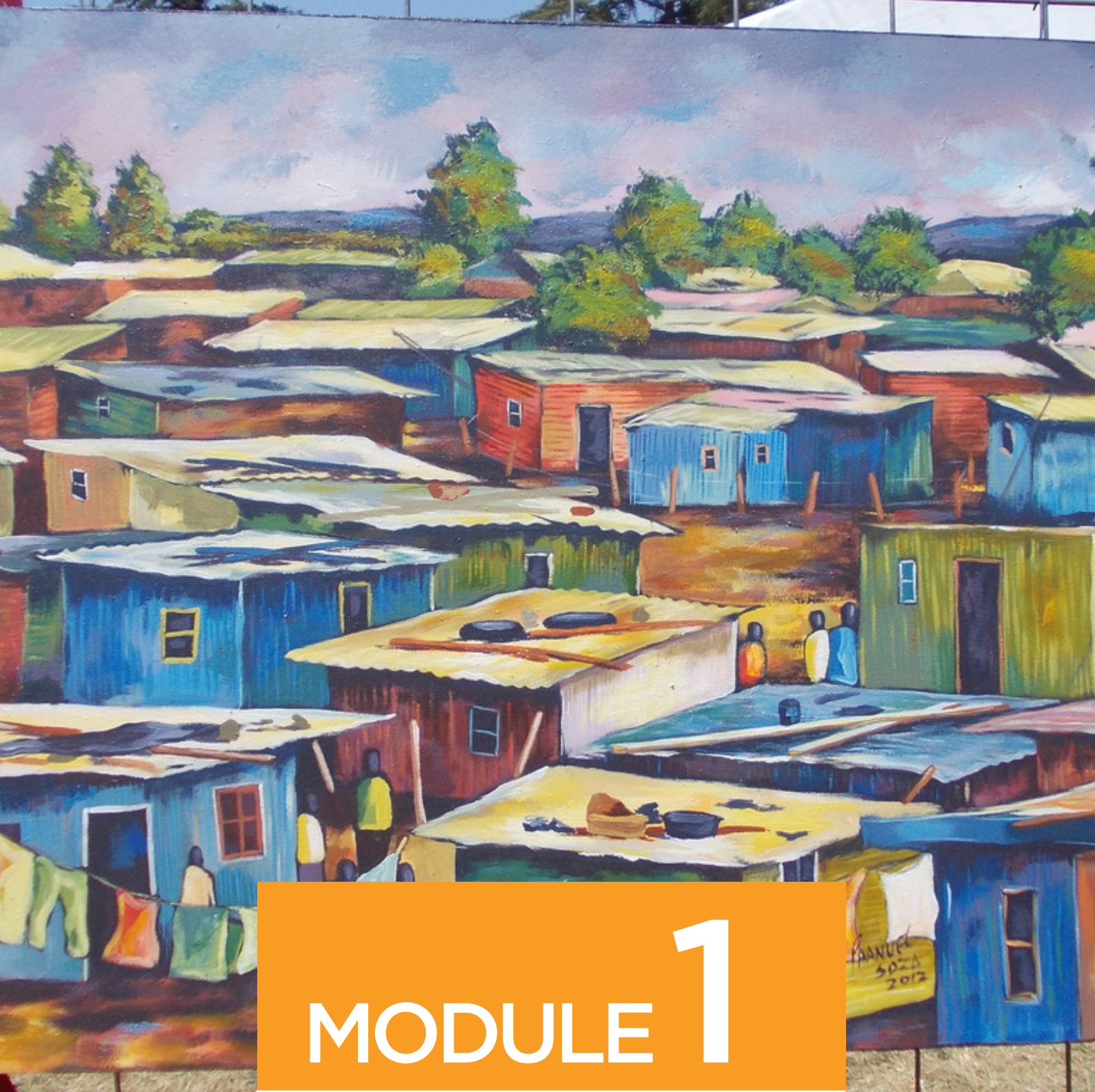
## TRAINING MODULE LAYOUT:

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 module is estimated and can be shortened or lengthened depending on the mode and pace of facilitation.

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# MODULE 1

## **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 slums, informal settlements and inadequate housing.

## DURATION

This module will be taught in Two (2) hours

- This module aims at providing practical guide 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 the 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 segregation of groups within the 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 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 one in which the inhabitants 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 a 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.





# 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 provide

## THIS INDICATOR IS COMPOSED OF THREE MAIN COMPONENTS.

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

## ACTIVITIES

In the plenary, ask the participants to identify how, where and ways of collecting data related to land tenure rights.



### 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.

Name	Date modified	Type	Size
 ecuador_01_census_13022013	2/12/2013 11:38 PM	SPSS Statistics Data Document	398,642 KB
 ecuador_01_census_households	2/12/2013 1:23 AM	SPSS Statistics Data Document	96,300 KB

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: Floor material

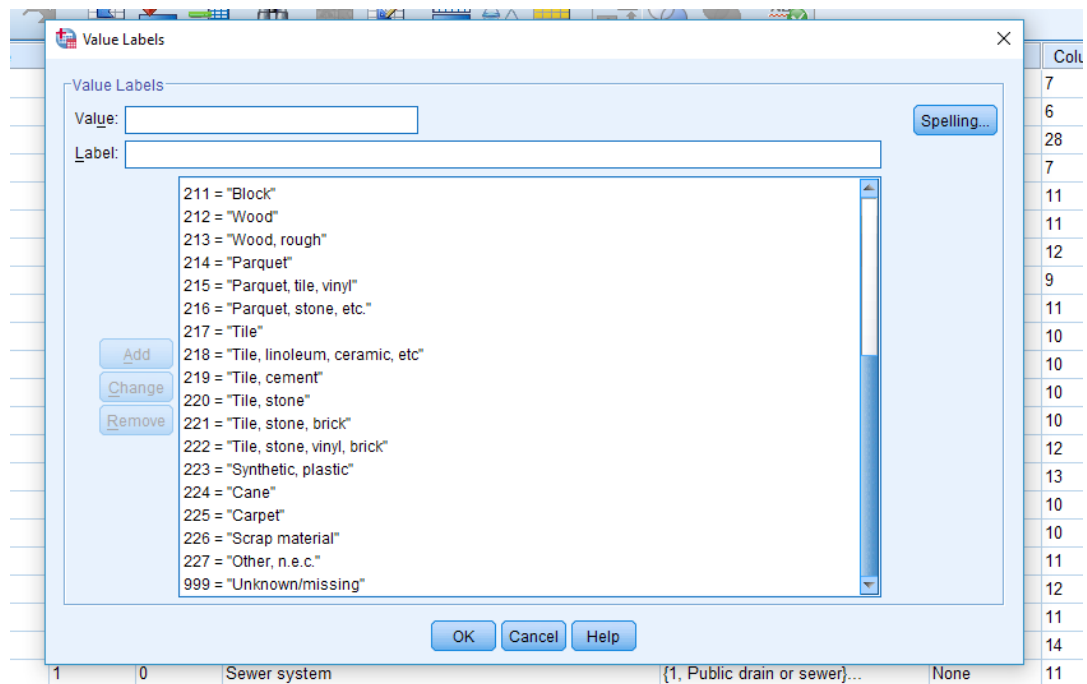
	Name	Type	Width	Decimals	Label
20	kitchen	Numeric	2	0	Kitchen or cooking facilities
21	toilet	Numeric	2	0	Toilet
22	floor	Numeric	3	0	Floor material
23	ncoupls	Numeric	1	0	Number of married couples in household
24	ec01a_dwnum	Numeric	7	0	Dwelling number
25	ec01a_hhnum	Numeric	1	0	Household number
26	ec01a_perm...	Numeric	2	0	Person number
27	ec01a_hhn	Numeric	1	0	Number of households
28	ec01a_pernd	Numeric	2	0	Number of persons in dwelling
29	ec01a_perm	Numeric	2	0	Number of persons in household
30	ec01a_fbig	Numeric	1	0	Household created by splitting apart a large dwelling
31	ec01a_mign	Numeric	1	0	Number of migrant records in the input data file (for entire
32	ec01a_prov	Numeric	2	0	Province
33	ec01a_dwtype	Numeric	2	0	Type of dwelling
34	ec01a_vacc...	Numeric	1	0	Occupation status of the dwelling

Review the response categories for the questions on housing durability

	Name	Type	Width	Decimals	Label	Values
20	kitchen	Numeric	2	0	Kitchen or cooking facilities	{0, NIU}...
21	toilet	Numeric	2	0	Toilet	{0, NIU}...
22	floor	Numeric	3	0	Floor material	{0, NIU}...
23	ncoupls	Numeric	1	0	Number of married couples in household	{0, No married couples in househ...
24	ec01a_dwnum	Numeric	7	0	Dwelling number	None
25	ec01a_hhnum	Numeric	1	0	Household number	{1, 1}...
26	ec01a_perm...	Numeric	2	0	Person number	{0, 0}...
27	ec01a_hhn	Numeric	1	0	Number of households	{1, 1}...
28	ec01a_pernd	Numeric	2	0	Number of persons in dwelling	{0, 0}...

Click on this button to preview the response categories for the questions

Example of a preview window for the 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)

## HOUSING

Original Variable Name	EC10A_FLOOR
Variable Label	Predominant materials of the floor
Selected Value labels For Improved Housing	1 Fitted-groove wood, parquet, boards, or finished wood
	3 Ceramic, tile, vinyl, or marble
	4 Brick or cement

To group the question responses, we use the following syntax to develop the new indicator. Floor This will tabulate the frequencies into tables as shown below.

```

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

```

## DURABLE HOUSING

### Original Indicator

#### EC10A\_FLOOR Predominant materials of the floor

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

### New Indicator

#### floor1 durable house

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	.00 Unimproved Housing	560790	12.2	12.2	12.2
	1.00 Improved Housing	4028400	87.8	87.8	100.0
	Total	4589190	100.0	100.0	

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

```
*fre 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 living1=0 and floor1=0 and toilet1=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

```
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" 5"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 "Wter and living area and housing"
14 "Sanitation and living area and housing"
15 "Water and sanitation and living area and housing".

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" 5"Sa"

select if (slumc!=1)

compute class=1
if (slumc1=1) class=1
if (slumc1=1) class=2
if (slumc1=1) class=3
if (slumc1=1) class=4
if (slumc2=1) class=5
if (slumc2=1) class=6
if (slumc2=1) class=7
if (slumc2=1) class=8
if (slumc2=1) class=9
if (slumc2=1) class=10
if (slumc2=1) class=11
if (slumc2=1) class=12
if (slumc2=1) class=13
if (slumc2=1) class=14
if (slumc2=1) class=15
```



**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 slumthre.
var lab slumthre "Slum".
val lab slumthre 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)**

	Country one	
	Count	%
<b>Slum</b>		
Non-slum	420,110	69.2%
Slum	187,040	30.8%
<b>Total</b>	<b>607,150</b>	<b>100.0%</b>
<b>Slum stratification grouped</b>		
Non-slum household	420,110	69.2%
One shelter deprivation	100,470	16.5%
Two shelter deprivations	46,510	7.7%
Three shelter deprivations	35,120	5.8%
Four shelter deprivations	4,940	.8%
<b>Total</b>	<b>607,150</b>	<b>100.0%</b>
<b>Slum stratification</b>		
Non-slum household	420,110	69.2%
Lack sanitation only	12,370	2.0%
Lack water only	23,740	3.9%
Lack housing only	33,070	5.4%
Lack Living area only	31,290	5.2%
Water and sanitation only	6,280	1.0%
Water and living area	4,500	.7%
water and housing	17,540	2.9%
sanitation and living area	2,460	.4%
sanitation and housing	7,390	1.2%
living area and housing	8,340	1.4%
Water and sanitation and living area	1,700	.3%
Water and sanitation and housing	24,080	4.0%
Water and living area and housing	6,690	1.1%
Sanitation and living area and housing	2,650	.4%
Water and sanitation and living area and housing	4,940	.8%
<b>Total</b>	<b>607,150</b>	<b>100.0%</b>

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

$$\text{Slum households (SH)} = 100 \left[ \frac{187,040}{607,150} \right]$$

$$\text{Slum households (SH)} = 30.81\%$$

**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.

Name	Date modified	Type	Size
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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.

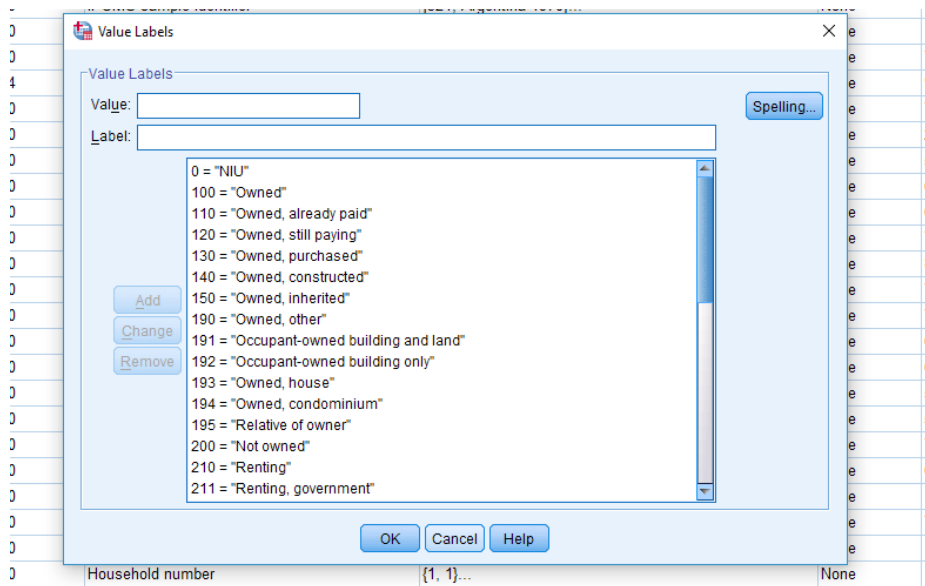
Example: Ownership of dwelling

	Name	Type	Width	Decimals	Label	Values
10	provec	Numeric	2	0	Province, Ecuador	{1, Azuay}...
11	cantec	Numeric	4	0	Canton, Ecuador	{101, Cuenca}...
12	ownrshp	Numeric	1	0	Ownership of dwelling [general version]	{0, NIU}...
13	ownrshpd	Numeric	3	0	Ownership of dwelling [detailed version]	{0, NIU}...
14	intmig2	Numeric	1	0	Number of international migrants, Ecuador	{0, No migrants}...
15	electrc	Numeric	1	0	Electricity	{0, NIU}...
16	watsup	Numeric	2	0	Water supply	{0, NIU}...
17	sewage	Numeric	2	0	Sewage	{0, NIU}...
18	phone	Numeric	1	0	Telephone availability	{0, NIU}...
19	rooms	Numeric	2	0	Number of rooms	{0, Part of a room}...
20	kitchen	Numeric	2	0	Kitchen or cooking facilities	{0, NIU}...
21	toilet	Numeric	2	0	Toilet	{0, NIU}...
22	floor	Numeric	3	0	Floor material	{0, NIU}...
23	ncoupls	Numeric	1	0	Number of married couples in household	{0, No married couples in household}...
24	ec01a_dwnum	Numeric	7	0	Dwelling number	None
25	ec01a_hhnum	Numeric	1	0	Household number	{1, 1}...
26	ec01a_perm...	Numeric	2	0	Person number	{0, 0}...
27	ec01a_hhn	Numeric	1	0	Number of households	{1, 1}...
28	ec01a_permd	Numeric	2	0	Number of persons in dwelling	{0, 0}...

Review the response categories for the questions on housing durability

Name	Type	Width	Decimals	Label	Values	Missing	Columns
provec	Numeric	2	0	Province, Ecuador	{1, Azuay}...	None	6
cantec	Numeric	4	0	Canton, Ecuador	{101, Cuenca}...	None	6
ownrshp	Numeric	1	0	Ownership of dwelling [general version]	{0, NIU}...	None	7
ownrshpd	Numeric	3	0	Ownership of dwelling [detailed version]	{0, NIU}...	None	8
intmig2	Numeric	1	0	Number of international migrants, Ecuador	{0, No migrants}...	None	7
electrc	Numeric	1	0	Electricity	{0, NIU}...	None	7
watsup	Numeric	2	0	Water supply	{0, NIU}...	None	6
sewage	Numeric	2	0	Sewage	{0, NIU}...	None	6
phone	Numeric	1	0	Telephone availability	{0, NIU}...	None	5
rooms	Numeric	2	0	Number of rooms	{0, Part of a room}...	None	5
kitchen	Numeric	2	0	Kitchen or cooking facilities	{0, NIU}...	None	7
toilet	Numeric	2	0	Toilet	{0, NIU}...	None	6
floor	Numeric	3	0	Floor material	{0, NIU}...	None	17
ncoupls	Numeric	1	0	Number of married couples in household	{0, No married couples in household}...	None	7
ec01a_dwnum	Numeric	7	0	Dwelling number	None	None	11
ec01a_hhnum	Numeric	1	0	Household number	{1, 1}...	None	11

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)

SECURITY OF TENURE	
Original Variable Name	EC10A_OWNERSHIP OF DWELLING
Variable Label	Status of ownership of dwelling
Selected Value labels For Improved Housing	1.Owned, owned building and land, owned house, owned purchased, Owned house, owned condominium Occupant owned building and land, occupant owned building only
	3.Free
	4.Free for Service

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

```
*****Secure Tenure*****
*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**

Original Indicator

Ownership of the dwelling

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 Owned	8476240	69.8	69.8	69.8
	2 Rented	2482850	20.5	20.5	90.3
	3 Sharecropping	48450	.4	.4	90.7
	3 Free	637640	5.3	5.3	95.9
	4 For services	322690	2.7	2.7	98.6
	5 Other	83570	.7	.7	99.3
	6 NIU (Not in Universe)	85810	.7	.7	100.0
	Total	12137250	100.0	100.0	

New Indicator

Security of tenure 1

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	.00 No Security of Tenure	2700680	22.3	22.3	22.3
	1.00 Security of Tenure	9436570	77.7	77.7	100.0
	Total	12137250	100.0	100.0	

- 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 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

```
*****informal settlements*****
*fre urban.
do 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 location1=0 and compliance1=1) 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

```
compute informaltot=0.

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

compute informalc=0.
if (informaltot=1) informalc=2.
if (informaltot=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

```
var lab informal "Informal conditions".
val lab informal 0 "formal" 1 "Services only" 2 "Other only one condition of informal" 3 "Satisfy two conditions of informal" 4 "Satisfy three conditions of informal" 5 "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.

```

compute class=0.
if (slumc1a=1) class=1.
if (slumc1b=1) class=2.
if (slumc1c=1) class=3.
if (slumc1d=1) class=4.
if (slumc2a=1) class=5.
if (slumc2b=1) class=6.
if (slumc2c=1) class=7.
if (slumc2d=1) class=8.
if (slumc2e=1) class=9.
if (slumc2f=1) class=10.
if (slumc3a=1) class=11.
if (slumc3b=1) class=12.
if (slumc3c=1) class=13.
if (slumc3d=1) class=14.
if (slumc4=1) class=15.
    
```



```

var lab class "Informal stratification".
val lab class
0 "Formal household"
1 "Lack Services only"
2 "Lack tenure only"
3 "Lack location only"
4 "Lack compliance only"
5 "Tenure and Services only"
6 "Tenure and Compliance"
7 "Tenure and Location"
8 "Services and Compliance"
9 "Services and Location"
10 "Compliance and Location"
11 "Tenure and Services and Compliance"
12 "Tenure and Services and Location"
13 "Tenure and Compliance and Location"
14 "Services and Compliance and Location"
15 "Tenure and Services and Compliance and Location".
    
```

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

```

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 disaggregation's as shown in the compiled table below.

	Country A Count	%
Formal settlements	405890	86.5%
Informal Settlements	63280	13.5%
<b>Total</b>	<b>469170</b>	<b>100.0%</b>
<b>Informal settlements stratification grouped</b>		
Formal Settlements	405890	86.5%
One shelter deprivation	54980	11.7%
Two shelter deprivations	6570	1.4%
Three shelter deprivations	1670	.4%
Four shelter deprivations	60	.0%
<b>Total</b>	<b>469170</b>	<b>100.0%</b>
<b>Informal stratification</b>		
Formal Settlements	405890	86.5%
Lack Services only	4530	1.0%
Lack tenure only	4710	1.0%
Lack location only	32230	6.9%
Lack compliance only	13510	2.9%
Tenure and Services only	920	.2%
Tenure and Compliance	450	.1%
Tenure and Location	680	.1%
Services and Compliance	490	.1%
Services and Location	1040	.2%
Compliance and Location	2990	.6%
Tenure and Services and Compliance	140	.0%
Tenure and Services and Location	1120	.2%
Tenure and Compliance and Location	150	.0%
Services and Compliance and Location	260	.1%
Tenure and Services and Compliance and Location	60	.0%
<b>Total</b>	<b>469170</b>	<b>100.0%</b>

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

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

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
  - a. <http://ec.europa.eu/eurostat/publications/recently-published>
  - b. <http://ec.europa.eu/eurostat/en/web/products-statistical-books/-/KS-DZ-14-001>
  - c. <http://ec.europa.eu/eurostat/en/web/products-pocketbooks/-/KS-FP-13-001>
  - d. <http://ec.europa.eu/eurostat/en/web/products-statistics-in-focus/-/KS-SF-11-004>

#### 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 collected 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:

HOUSING STATISTICS	MEASUREMENT (EU STATISTICS)	DEFINITION	RESULTS FROM EU MEMBERS POPULATION (2014)
1. Tenure Status	Ownership of dwelling	The financial arrangements under which someone has the right to live in a house, dwelling or apartment	70.1 %- owner-occupied dwellings accommodation
			19.1 % - Tenants with a market price rent
			10.8 % - Tenants in reduced-rent or free
2. Housing Quality	overcrowding rate	The overcrowding rate is defined as the percentage of the population living in an overcrowded household.	17.1 % population lived in overcrowded dwellings
	at risk of poverty	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.	Within the population at risk of poverty, overcrowding rate in the EU-28 was 30.3 % in 2014 within
	severe housing deprivation rate	Severe housing deprivation rate is defined as the percentage of population living in the dwelling <b>which</b> 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	5.1 % of the population suffered from severe housing deprivation

HOUSING STATISTICS	MEASUREMENT (EU STATISTICS)	DEFINITION	RESULTS FROM EU MEMBERS POPULATION (2014)
3. Housing Affordability	housing cost overburden rate	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).	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 %).

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

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

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.

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



# 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 institution 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

DATA LIMITATIONS	POSSIBLE SOLUTIONS
<p>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.</p> <p>Indicator 11.1.1 does not capture homelessness, as it is not included in household surveys.</p>	<p>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.</p>
<p>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</p>	<p>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.</p>
<p>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.</p>	<p>In most recent years, important progress has been made to integrate the measurement of this component into major surveys and censuses in several countries</p>

## 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 county.
- 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. depends on the subjective opinion of the respondents, the measurement of housing quality
- b. The indicator does not measure or account for homelessness. Thus there is an underestimation of the computation of the indicator.

## REFERENCES

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### URL References:

- [1]: [http://www.un.org/esa/sustdev/natlinfo/indicators/methodology\\_sheets.pdf](http://www.un.org/esa/sustdev/natlinfo/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/>
- [5]: <http://unhabitat.org/slum-almanac-2015-2016/>
- [6]: <http://wcr.unhabitat.org/>
- [7]: [http://www.unhabitat.org/programmes/guo/documents/EGM final report 4 Dec 02.pdf](http://www.unhabitat.org/programmes/guo/documents/EGM_final_report_4_Dec_02.pdf)



# MODULE 2

## **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 guide 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.

### ACTIVITIES

In the plenary, ask the participants to identify what is public transport and write them down on a flip chart and discuss the

### 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.

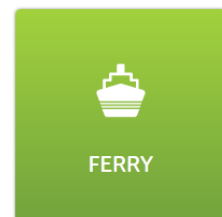
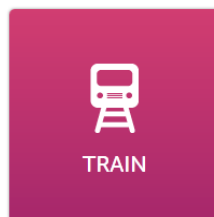
Achieving SDG 11.2 requires a fundamental shift in the thinking on transport with the focus on the goal of transport rather than on its means. With accessibility to services, goods and opportunities for all as the ultimate goal, priority is given to make cities more compact and walkable through better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

### 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





- 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.



Public transport accessible to all



### 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



# 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 provide 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

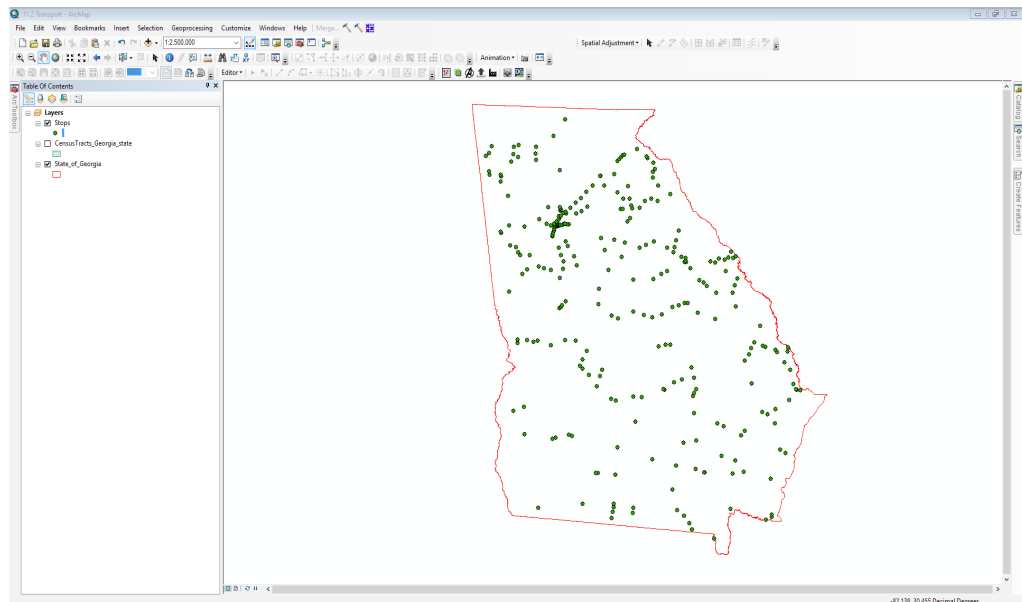
Data required:

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)

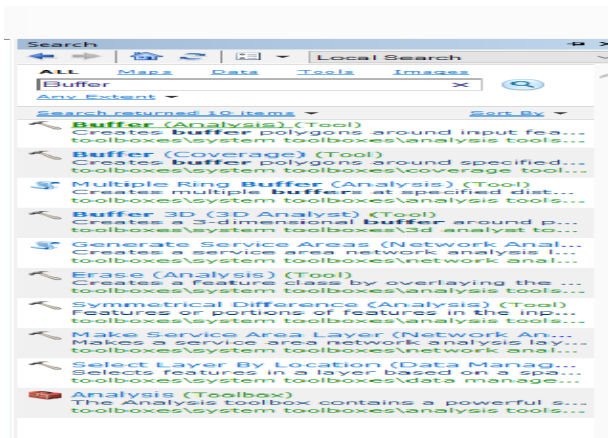
**Step One:** In ArcMap, add the public transport stops. The public stop will be the point of reference to creating the buffer.



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.

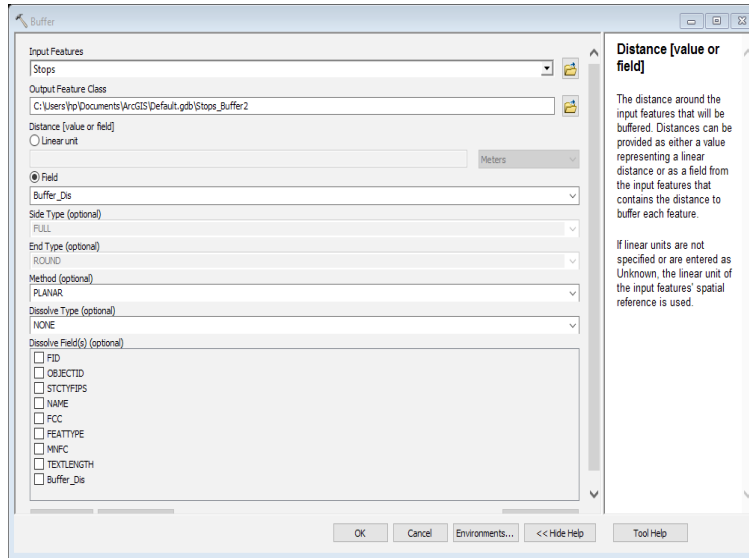
FID	Shape *	OBJECTID	STCTYP	NAME	FCC	FEATTYPE	MNFC	TEXTLENGTH	Buffer_Dis
0	Point	1	13049	Moniac	D52	Railway Station	7380	6	0
1	Point	2	13065	Council	D52	Railway Station	7380	7	0
2	Point	3	13065	Edith	D52	Railway Station	7380	5	0
3	Point	4	13027	Baden	D52	Railway Station	7380	5	0
4	Point	5	13039	St Marys - Cumberland Island	D54	Ferry Terminal	7352	28	0
5	Point	6	13039	Cumberland Island - St Marys	D54	Ferry Terminal	7352	28	0
6	Point	7	13065	Colon	D52	Railway Station	7380	5	0
7	Point	8	13185	South Valdosta	D52	Railway Station	7380	14	0
8	Point	9	13039	Fernandina Beach - Cumberland Island	D54	Ferry Terminal	7352	36	0
9	Point	10	13027	Ico	D52	Railway Station	7380	4	0
10	Point	11	13067	Bower	D52	Railway Station	7380	5	0
11	Point	12	13065	Headlight	D52	Railway Station	7380	9	0
12	Point	13	13027	Shiver	D52	Railway Station	7380	6	0
13	Point	14	13185	Greyhound Bus Station	D53	Public Transport Stop	9942	21	0
14	Point	15	13049	Folkston	D52	Railway Station	7380	8	0
15	Point	16	13275	Greyhound Bus Station	D53	Public Transport Stop	9942	21	0
16	Point	17	13027	Spain	D52	Railway Station	7380	5	0
17	Point	18	13065	Vogel	D52	Railway Station	7380	5	0
18	Point	19	13127	Greyhound Bus Station	D53	Public Transport Stop	9942	21	0
19	Point	20	13075	Burney Hill	D52	Railway Station	7380	11	0
20	Point	21	13071	Kirwood	D52	Railway Station	7380	7	0
21	Point	22	13071	Greyhound Bus Station	D53	Public Transport Stop	9942	21	0
22	Point	23	13025	Nahunta	D52	Railway Station	7380	7	0
23	Point	24	13299	Waycross	D52	Railway Station	7380	8	0
24	Point	25	13299	Greyhound Bus Terminal	D53	Public Transport Stop	9942	22	0
25	Point	26	13025	Alkison	D52	Railway Station	7380	9	0
26	Point	27	13299	Wareboro	D52	Railway Station	7380	9	0
27	Point	28	13003	Axon	D52	Railway Station	7380	5	0
28	Point	29	13003	Willacoochee	D52	Railway Station	7380	12	0
29	Point	30	13025	Hortense	D52	Railway Station	7380	8	0
30	Point	31	13229	Patterson	D52	Railway Station	7380	9	0
31	Point	32	13277	Greyhound Bus Station	D53	Public Transport Stop	9942	21	0
32	Point	33	13069	Nicholls	D52	Railway Station	7380	8	0
33	Point	34	13095	Ducker	D52	Railway Station	7380	6	0
34	Point	35	13095	Walker	D52	Railway Station	7380	6	0
35	Point	36	13005	Alma	D52	Railway Station	7380	4	0
36	Point	37	13095	Dosaga	D52	Railway Station	7380	6	0
37	Point	38	13037	Edison	D52	Railway Station	7380	6	0
38	Point	39	13095	Greyhound Bus Terminal	D53	Public Transport Stop	9942	22	0
39	Point	40	13305	Jesup Amtrak Station	D52	Railway Station	7380	20	0
40	Point	41	13305	Doctortown	D52	Railway Station	7380	10	0
41	Point	42	13305	Brentwood	D52	Railway Station	7380	9	0
42	Point	43	13001	Surrency	D52	Railway Station	7380	8	0
43	Point	44	13017	Westwood	D52	Railway Station	7380	8	0
44	Point	45	13179	Riceboro	D52	Railway Station	7380	8	0
45	Point	46	13243	Springvale	D52	Railway Station	7380	10	0
46	Point	47	13179	McIntosh	D52	Railway Station	7380	8	0
47	Point	48	13001	Graham	D52	Railway Station	7380	6	0
48	Point	49	13243	Wades	D52	Railway Station	7380	5	0
49	Point	50	13179	Greyhound Bus Station	D53	Public Transport Stop	9942	21	0
50	Point	51	13179	Fleming	D52	Railway Station	7380	7	0
51	Point	52	13315	Pitts	D52	Railway Station	7380	5	0
52	Point	53	13315	Seville	D52	Railway Station	7380	7	0
53	Point	54	13315	Abbeville	D52	Railway Station	7380	9	0
54	Point	55	13091	Rhne	D52	Railway Station	7380	5	0
55	Point	56	13209	Charlottesville	D52	Railway Station	7380	14	0
56	Point	57	13209	Uvalde	D52	Railway Station	7380	6	0
57	Point	58	13271	McRae	D52	Railway Station	7380	5	0
58	Point	59	13271	Helena	D52	Railway Station	7380	6	0



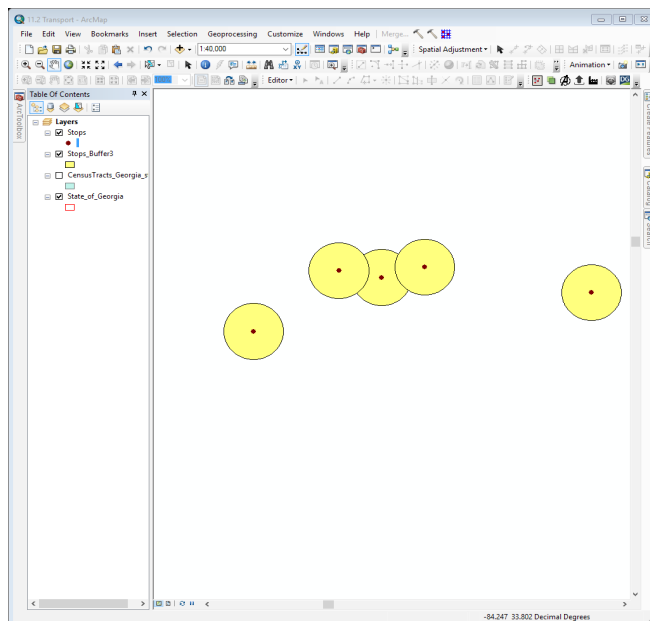
The next thing is to create a 500-meter buffer around the stops.

**Step Three:** Click the Search tab and enter Buffer. Click Buffer to open the buffer dialog box

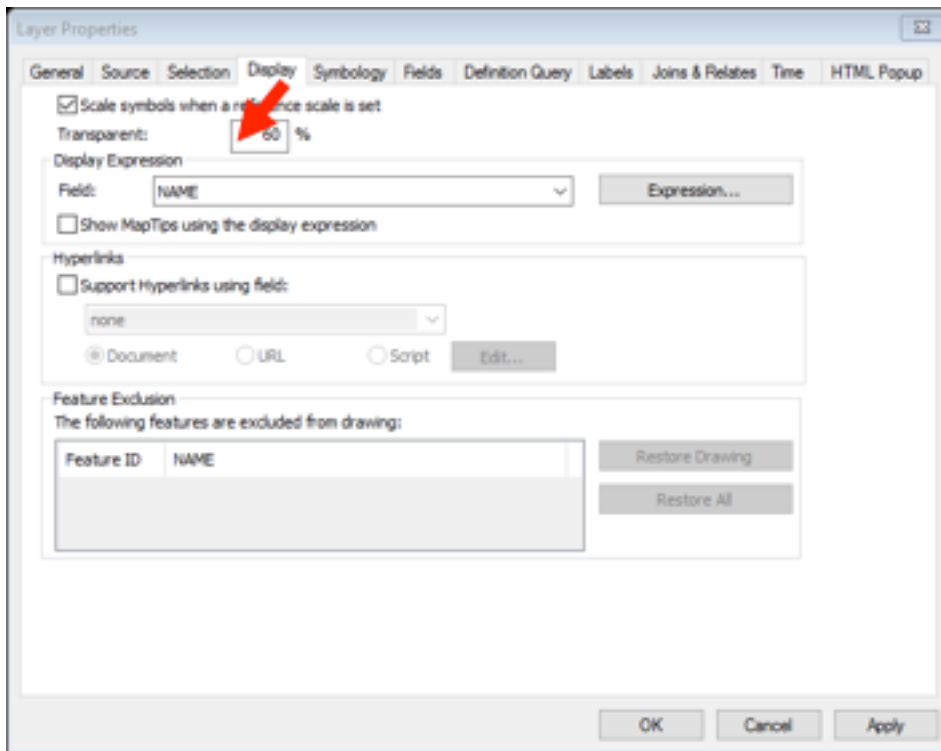
**Step Four:** In the buffer dialog box, click the drop down for input features and select the Stops layers. To set the distance value or field, select field (buffer is created from the distance field specified). If there's no distance filed specified in the attribute table, select linear and set the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



**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.



**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.



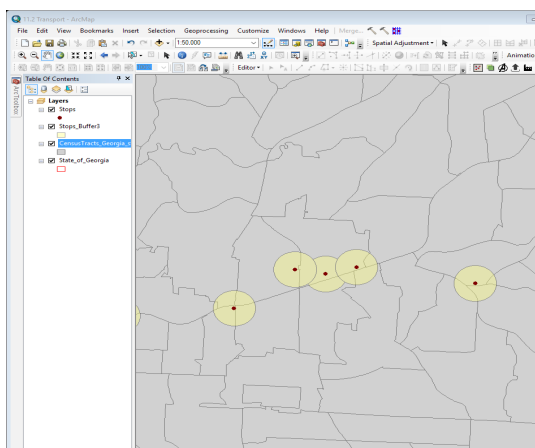
**ACTIVITY TWO:**  
**IDENTIFICATION OF POPULATION SERVED.**

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.

GEODID	NAMEL_SAD10	ALAND10	AWATER10	HITPLAT10	HITPLOH10	DP0010001	DP0010002	DP0010003	DP0010004	DP0010005
13059000100	Census Tract 1	481145	22400	+33.9601684	-083.3742174	1596	17	7	16	218
13105000100	Census Tract 1	139480361	1468876	+34.1850214	-083.0181145	3527	216	218	238	54
13051000100	Census Tract 1	1151163	93741	+32.0823432	-081.1039901	1611	317	160	54	151
13245000100	Census Tract 1	4821020	37998	+33.4885980	-082.0202144	3753	180	155	151	259
13121000100	Census Tract 1	3346916	15686	+33.7997992	-084.3549254	4413	354	355	259	594
13095000100	Census Tract 1	6189748	48416	+31.8729385	-084.0896777	5844	588	640	594	129
13193000100	Census Tract 1	202013998	2163728	+32.4446573	-083.9443233	2083	119	135	129	315
13115000100	Census Tract 1	102082415	1274244	+34.3495311	-085.0655120	4589	268	285	242	242
13137000100	Census Tract 1	144665688	1441497	+34.8721337	-081.4203125	3834	229	220	242	147
13127000101	Census Tract 1.01	3214907	8434777	+31.1531271	-081.3585638	1189	41	45	28	44
13281000101	Census Tract 1.01	74889277	7213015	+34.805516	-084.1110959	2693	123	141	147	404
13139000101	Census Tract 1.01	92593619	1714485	+34.4131912	-083.6765549	5436	444	453	404	276
13131000101	Census Tract 1.01	136129095	460009	+34.9355048	-084.8842676	4067	242	299	276	153
13132700102	Census Tract 1.02	8026298	220795	+31.1468038	-081.4022945	3137	122	132	153	292
13281000102	Census Tract 1.02	124352208	8182096	+34.9415564	-084.0140724	5088	235	275	292	259
13139000102	Census Tract 1.02	79420924	1013014	+34.3155904	-083.6980085	3946	263	272	259	724
13313000102	Census Tract 1.02	72596416	135432	+34.8068376	-084.9731608	8441	570	674	724	722
13127001000	Census Tract 10	525849289	68485563	+31.1947971	-081.6077759	10030	567	757	722	86
13345001000	Census Tract 10	1988277	0	+33.4710161	-082.0099004	2941	148	115	86	195
13215001000	Census Tract 10	4905841	4895	+32.4977562	-084.9347312	4364	184	207	195	139
13095001000	Census Tract 10	4147815	8488	+31.5777735	-084.2120745	2106	140	145	139	291
13213001000	Census Tract 10	4068318	0	+34.7118390	-084.9401831	3794	428	382	291	6
13121001001	Census Tract 10.01	935252	0	+33.7828223	-084.3902405	2272	26	5	6	414
13139001002	Census Tract 10.02	16054867	6496545	+34.2706685	-083.9135867	6013	549	507	414	8
13121001002	Census Tract 10.02	1774577	0	+33.783249	-084.3905394	6315	14	11	8	550
13139001003	Census Tract 10.03	5634317	3320	+34.2865249	-083.8537311	6539	819	721	550	143
13139001004	Census Tract 10.04	5094810	2494725	+34.3021113	-083.8708668	3959	241	178	143	279
13121010001	Census Tract 100.01	4642846	40882	+33.8638108	-084.3730790	4467	329	329	240	458
13121010002	Census Tract 100.02	6266983	77322	+33.8680492	-084.3577716	7001	424	492	458	711
13217100100	Census Tract 1001	120040089	4820345	+33.8660889	-083.8756566	11250	605	750	711	498
13217100201	Census Tract 1002.01	136537585	3134791	+33.5122915	-083.7720387	5950	371	454	498	424
13217100202	Census Tract 1002.02	96952864	2299303	+33.5909078	-083.7368002	5335	289	364	424	620
13217100300	Census Tract 1003	33767294	1089018	+33.5768950	-083.6290025	6377	732	696	620	199
13217100400	Census Tract 1004	10864348	33192	+33.6143350	-083.8725864	3548	190	186	199	1377
13217100501	Census Tract 1005.01	18939834	195084	+33.5973475	-083.9504958	13840	1136	1226	1377	699
13217100502	Census Tract 1005.02	22199415	343390	+33.5923015	-083.9185754	7810	549	699	692	475
13217100600	Census Tract 1006	29106939	624539	+33.5514224	-083.8899947	6912	492	502	475	434
13217100700	Census Tract 1007	15319239	31485	+33.5604021	-083.8953357	5924	538	458	434	814
13217100800	Census Tract 1008	125985667	5218852	+33.4607699	-083.8782739	9687	787	893	814	907
13217100901	Census Tract 1009.01	63111134	509792	+33.5203743	-083.9742143	10390	873	890	907	471
13217100902	Census Tract 1009.02	12038875	65662	+33.5563285	-083.9591544	5470	423	479	471	587
13217100903	Census Tract 1009.03	17212345	58293	+33.5855329	-083.9993000	6365	468	518	587	148
13233010100	Census Tract 101	155215471	1076424	+34.0538175	-085.0437095	5868	415	463	448	185
13038010100	Census Tract 101	657684210	68243938	+31.0380968	-081.7224754	3114	160	185	185	191
13211010100	Census Tract 101	178220038	1884576	+33.7211630	-083.4880223	2717	148	201	191	291

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 (DP0010001). Click OK to close the properties dialog box.

Layer Properties

General Source Selection Display Symbolology Fields Definition Query Labels Joins & Relates Time HTML Popup

Label features in this layer

Method: Label all the features the same way.

All features will be labeled using the options specified.

Text String  
Label Field: DP0010001

Text Symbol  
AaBbYyZz

Other Options  
Placement Properties... Scale Range... Pre-defined Label Style Label Styles...

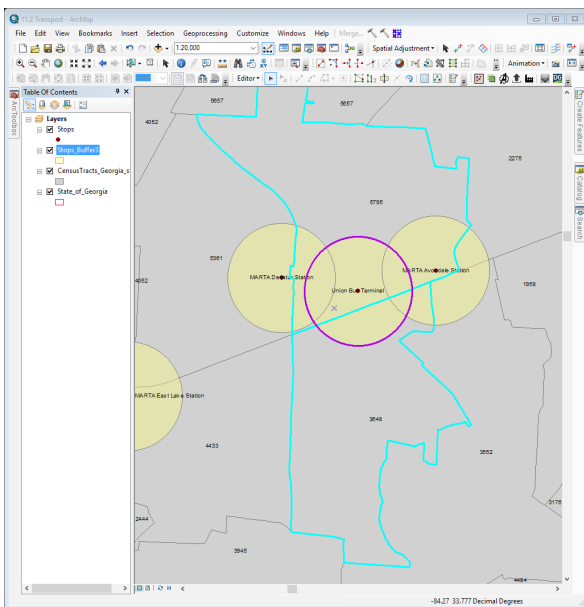
OK Cancel Apply



**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  $j$  ( $j=1 \dots 1$ ). 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

SERVICE BUFFER	POPULATION SERVED						TOTAL
	INTERSECT 1	INTERSECT 2	INTERSECT 3	INTERSECT 4	INTERSECT 5	INTERSECT 6	
1	2376	3574	2000	2802			10,752
2	3574	4052	5361	4433	2444		19,864
3	1590	3991	3228	2434			11,243
4	3176	3187	3228	3991			13,582
5	5795	3648					9,443
6	5361	5795					11,156
7	5795	2275	3552	3648			15,270
8	4774	3007	4232				12,013
9	3975	4379	5051				13,405
10	3200	4561	3486				11,247
11	5177	3932	3975				13,084
12	5022	5371	7712				18,105
TOTAL POPULATION WITH CONVENIENT ACCESS TO PUBLIC TRANSPORT							159,164

Total Population with convenient access to public transport= 159, 164/km<sup>2</sup>  
 County Population= 691,893/km<sup>2</sup>

$$\% \text{ with access to public transport} = 100 \left[ \frac{63280}{469170} \right]$$

% with access to public transport = 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.

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

DATA LIMITATIONS	POSSIBLE SOLUTIONS
<p>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.</p> <p>Factors such as affordability, safety and universal accessibility may influence the usage of public means of transport.</p>	<p>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.</p>
<p>Harmonized global/local data on urban transport does not exist, nor are they comparable at the world level</p>	<p>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.</p> <p>Expert Group Meeting to harmonize the tools and existing data to ensure a more uniform and standard format for reporting on this indicator.</p>
<p>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.</p>	<p>To be able to access the ease of access stops, a comprehensive road network is needed.</p>



## REFERENCES

- Alain Bertaud, Cities as Labor Markets, February 2014, [http:// marroninstitute.nyu.edu/uploads/content/Cities\\_as\\_Labor\\_Markets.pdf](http://marroninstitute.nyu.edu/uploads/content/Cities_as_Labor_Markets.pdf).
- <http://data.london.gov.uk/dataset/public-transport>.
- [http://ec.europa.eu/regional\\_policy/sources/docgener/work/2015\\_01\\_publ\\_transp.pdf](http://ec.europa.eu/regional_policy/sources/docgener/work/2015_01_publ_transp.pdf)
- <http://unhabitat.org/planning-and-design-for-sustainable-urban-mobility-global-report-on-humansettlements-2013/>
- <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>
- <https://www.jtlu.org/index.php/jtlu/article/view/683/665>
- 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.

