



# APPLICATION OF GEOSPATIAL TECHNOLOGY IN SAMPLING FRAMES



# OUTLINE

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- 1. Background on Somalia's Statistical System**
- 2. Population Estimation Survey of Somalia (PESS) Sampling Frame**
- 3. Somali Health and Demographic Survey (SHDS) Sampling Frame**
- 4. Applications of the Sampling Frame**

# 1. Background on Somalia's Statistical System

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- The first population and housing census for Somalia was conducted in 1975, which published limited results; the findings from a second population census conducted in 1986/87 were not published officially.
- The lack of data for planning necessitated development partners to organize the Population Estimation Survey of Somalia (PESS) to assist in coming up with some reliable parameters to estimate population.

# 1. PESS Frame

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- One of the objectives of the PESS was to establish a sample frame for future household based surveys.

## Sample Frame Strata

### Urban

1986 district capitals delineated into Enumeration Areas (EAs) of 50 to 149 HHs

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### Rural

Updated list of settlements from 2005 Somalia community census with EAs of 50 to 149 HHs

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### Nomadic

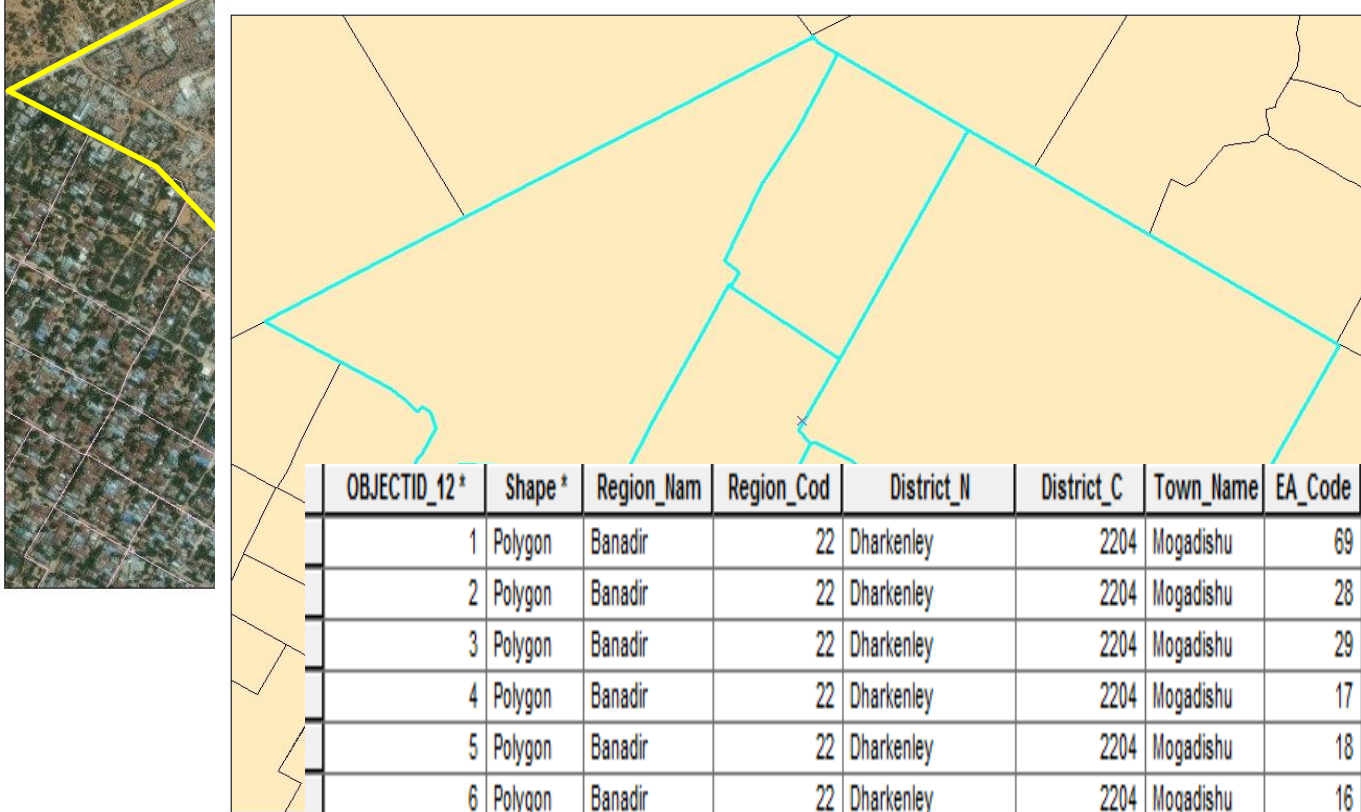
List of water points

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### IDP

IDPs living among sedentary and nomadic population & IDPs living in camps

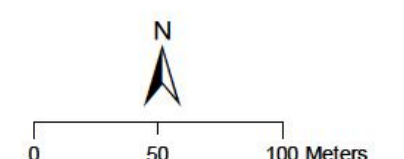
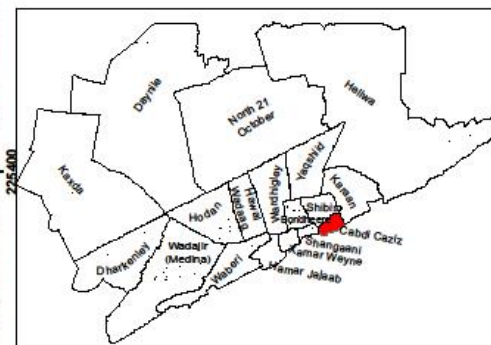
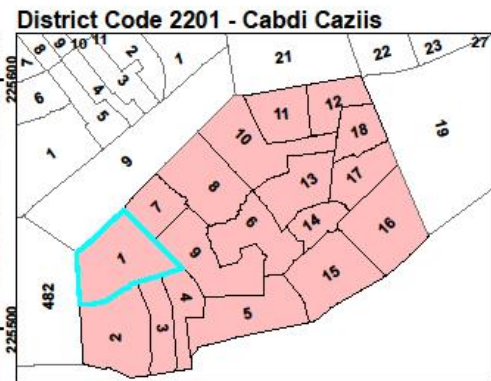
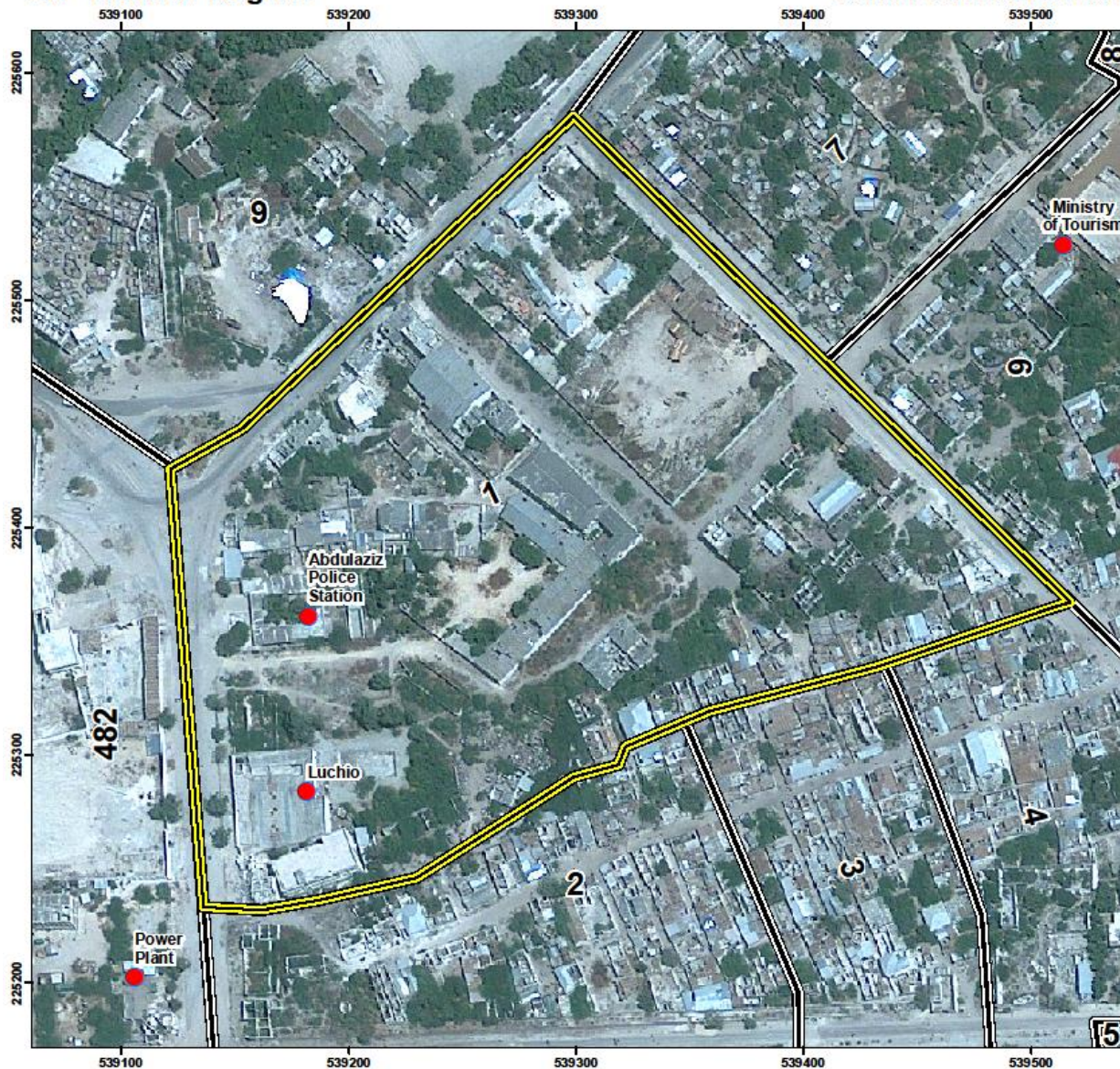
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OBJECTID_12*	Shape*	Region_Nam	Region_Cod	District_N	District_C	Town_Name	EA_Code	SampleEA	Sub_Distri	Blk_No	HH_No
1	Polygon	Banadir	22	Dharkenley	2204	Mogadishu	69	Y	Dharkenley	78	149
2	Polygon	Banadir	22	Dharkenley	2204	Mogadishu	28		Dharkenley	131	75
3	Polygon	Banadir	22	Dharkenley	2204	Mogadishu	29		Dharkenley	132	106
4	Polygon	Banadir	22	Dharkenley	2204	Mogadishu	17	Y	Dharkenley	133	89
5	Polygon	Banadir	22	Dharkenley	2204	Mogadishu	18		Dharkenley	134	97
6	Polygon	Banadir	22	Dharkenley	2204	Mogadishu	16		Dharkenley	135	88
7	Polygon	Banadir	22	Dharkenley	2204	Mogadishu	14		Dharkenley	138	63
8	Polygon	Banadir	22	Dharkenley	2204	Mogadishu	13		Dharkenley	139	56
9	Polygon	Banadir	22	Dharkenley	2204	Mogadishu	6		Dharkenley	140	64
10	Polygon	Banadir	22	Dharkenley	2204	Mogadishu	125	Y	Dharkenley	143	123

## 22 - Banadir Region

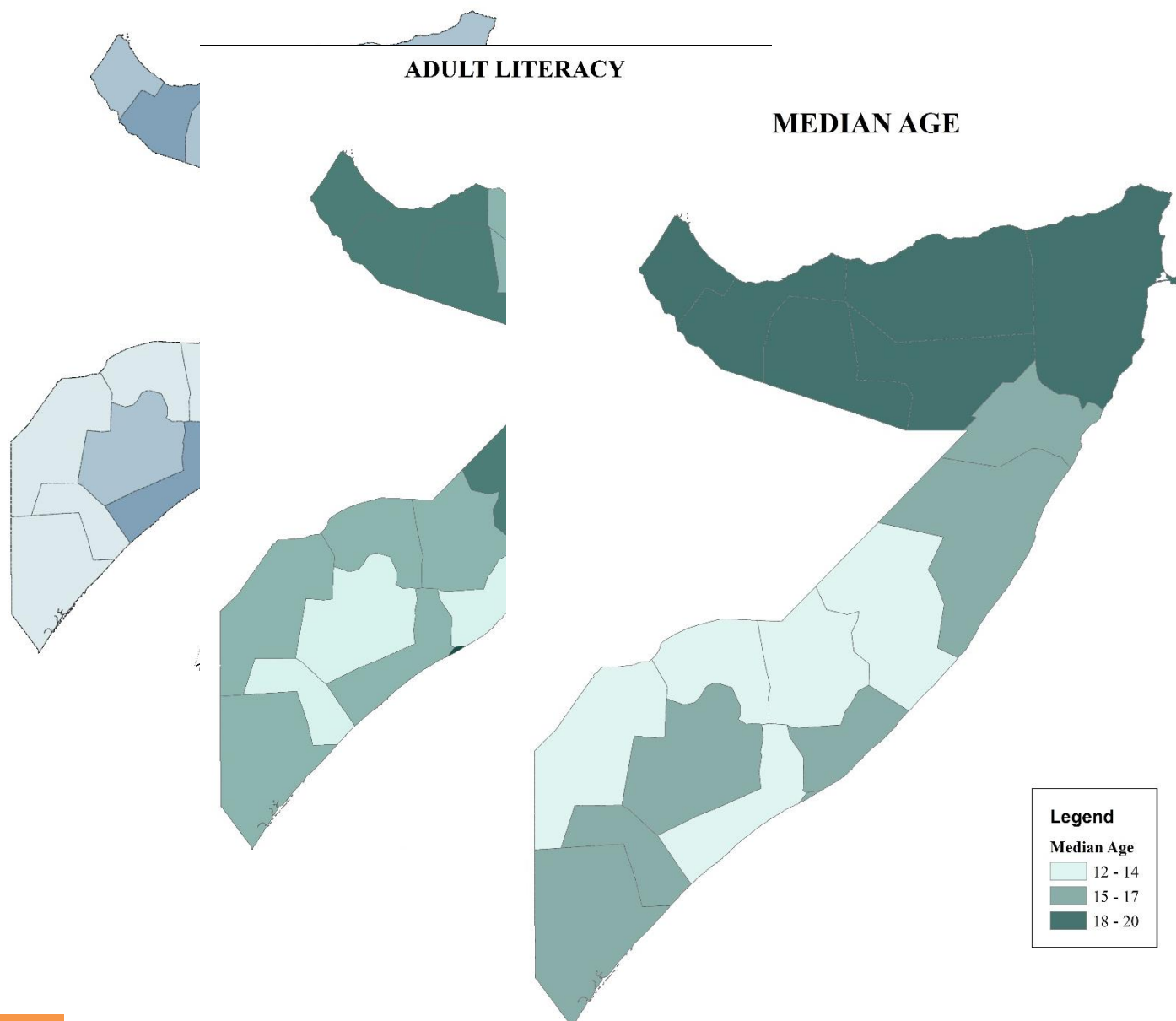
## Cabdi Caziis: EA 001



Source: UNFPA PESS, UNSOA, Digi-Globe  
UNFPA: GIS Section - Nov-2014



# POPULATION DISTRIBUTION



## 2. SHDS Frame

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Objective of the SHDS is to fill data gaps on health and demographic issues, for better planning, policy formulation and informed decision-making.

### Sample Frame Strata

#### Urban/IDP

1988 district capitals delineated into Enumeration Areas (EAs) of 80 to 149 dwelling structures

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#### Rural/IDP

Updated list of settlements from PESS with EAs of 80 to 149 dwelling structures

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#### Nomadic

List of water points or TNS

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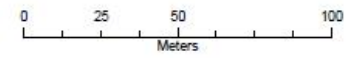
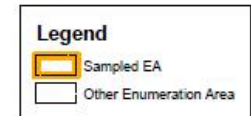


Type 1 – Dwelling structure  
 Type 2 – Non dwelling structure  
 Type 3 – IDP shelter

Join Count	Region	Region C	District	District C	Town N	Town C	New EA C	Combined C	EA Type
122	Bay	24	Baidoa	2401	Baidoa	2401001	0639	240100120639	2
128	Bay	24	Baidoa	2401	Baidoa	2401001	0247	240100120247	2
147	Bay	24	Baidoa	2401	Baidoa	2401001	0698	240100120698	2
145	Bay	24	Baidoa	2401	Baidoa	2401001	0728	240100120728	2
120	Bay	24	Baidoa	2401	Baidoa	2401001	0707	240100120707	2
128	Bay	24	Baidoa	2401	Baidoa	2401001	0683	240100120683	2
125	Bay	24	Baidoa	2401	Baidoa	2401001	0660	240100120660	2
127	Bay	24	Baidoa	2401	Baidoa	2401001	0661	240100120661	2
106	Bay	24	Baidoa	2401	Baidoa	2401001	0271	240100120271	2
149	Bay	24	Baidoa	2401	Baidoa	2401001	0653	240100120653	2
114	Bay	24	Baidoa	2401	Baidoa	2401001	0657	240100120657	2
149	Bay	24	Baidoa	2401	Baidoa	2401001	0673	240100120673	2
147	Bay	24	Baidoa	2401	Baidoa	2401001	0664	240100120664	2
144	Bay	24	Baidoa	2401	Baidoa	2401001	0669	240100120669	2
127	Bay	24	Baidoa	2401	Baidoa	2401001	0620	240100120620	2
138	Bay	24	Baidoa	2401	Baidoa	2401001	0689	240100120689	2
145	Bay	24	Baidoa	2401	Baidoa	2401001	0750	240100120750	2

# CABDI CAZIIZ: EA 0003

Region Code: 22  
 District Code: 11  
 Town Code: 001



Data Sources:  
 Satellite imagery: UNSOS  
 Date of Acquisition - 01/2017  
 Enumeration Areas: SHDS 2018

File Code: UNFPA SO240418A3L386\_3  
 Prepared by: GIS, UNFPA Somalia  
 Datum: WGS 1984

The boundaries and names used on this map do not imply any official endorsement or acceptance by the United Nations Population Fund.

This map is for SHDS purposes and is not an authority on Administrative Boundaries.

# APPLICATIONS OF SAMPLING FRAME

# Investigating Population Movements in Baidoa, Somalia

# INTRODUCTION

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- Population movements in Somalia are not a new phenomenon. People are known to move for various reasons including conflict, drought or as part of their lifestyle as nomads.
- The objective of the study was to demonstrate the patterns in population movement in Baidoa town through a comparison of enumeration areas, number of households and number of structures using **satellite imagery** and **geospatial techniques**

# BACKGROUND

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- **The combined effect of famine and the conflict caused a negative impact on the town's economic stability and livelihoods leading to a dire humanitarian situation and major displacements of population.**
- **Over the years, it has also become clear that persons living in nearby districts in Baidoa gravitate to the town to seek basic services such as shelter, food, health care etc. during any humanitarian crisis.**

# METHODOLOGY

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The study analysed Enumeration Area data collected from:

1. The field mapping exercise for the PESS survey in 2013.
2. Household listing exercise carried out in 2016 for a sample survey conducted in Somalia.
3. Desk update of the sampling frame for the Somali Health and Demographic Survey in 2017 and 2018.

# FINDINGS



**2013**

ENUMERATION AREAS:

**66**

HOUSEHOLDS:

**7,976**



**2016**

ENUMERATION AREAS:

**119**

HOUSEHOLDS:

**13,990**



**2017**

ENUMERATION AREAS:

**300+**

HOUSEHOLDS:

**32,447**



Based on dwelling structure counts from high resolution imagery

**2018\***

\* Based on dwelling structure counts from high resolution imagery in February 2018.  
More than half of these are IDPs

ENUMERATION AREAS:

**600+**

HOUSEHOLDS:

**60,000+**



ENUMERATION AREAS:

**448**

HOUSEHOLDS:

**51,380**

\*\* Based on selected EA field verification in July 2018  
More than half of these are IDPs

# FINDINGS

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- **The comparisons of previous and current enumeration areas, number of households and number of structures proved to be useful in understanding the population patterns in Baidoa town.**
- **The findings of the spatial analysis show that the population of Baidoa town and it's environs has risen 7 fold since 2013. This is mainly attributed to the influx of internally displaced persons.**

# Flood Response in Beletweyne, Somalia

# Background on Beletweyne Frame

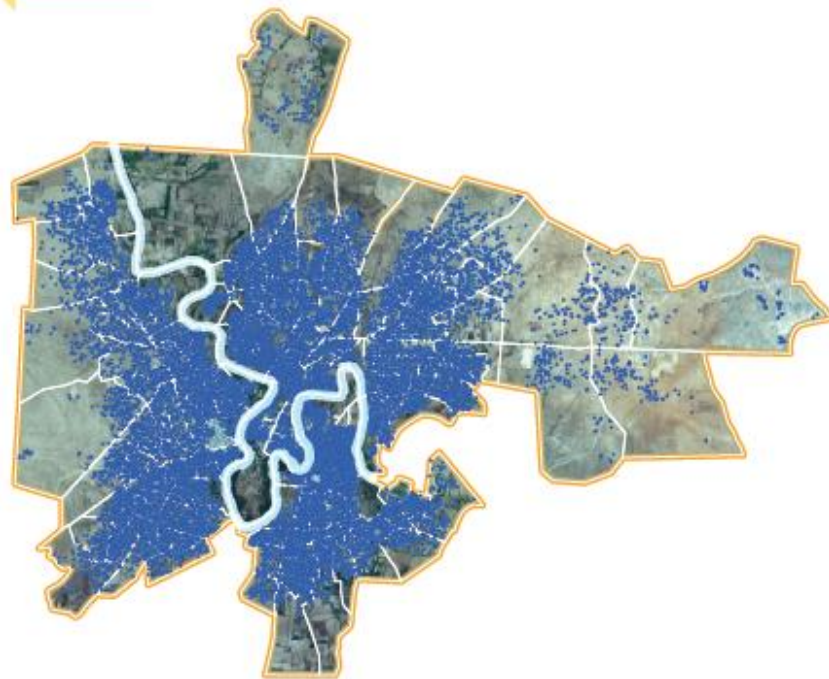
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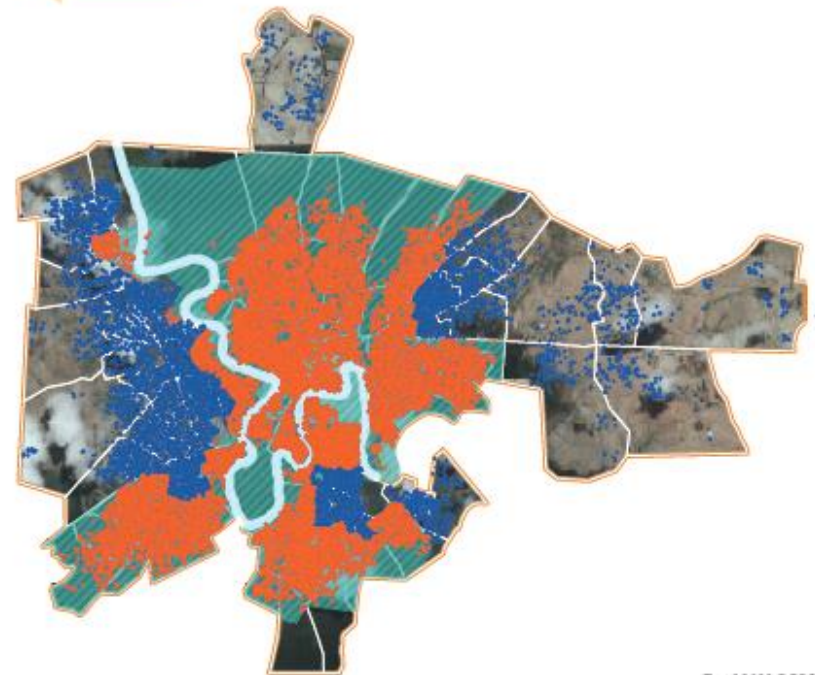
- The number of dwelling structures digitized in the flood affected areas were selected to provide estimates of the affected population.
- This data was verified using field collected data in 2016 during a births and deaths survey carried out by UNFPA and the MOPIED which showed that the number of households per dwelling structure in the town was on average 1.

# CASE STUDY OF BELETWEYNE

2017



2018



5<sup>TH</sup> MAY 2018

## LEGEND

 Dwelling Structures/  
Households in Belet  
Weyne Town

 Severely Flood Affected  
Dwelling Structures/  
Households

 Severely  
Flooded Area

# CASE STUDY OF BELETWEYNE FLOODING



## BELETWEYNE - DEMOGRAPHICS OF FLOOD DISPLACED PERSONS



**17,545**  
Total Estimated  
Households

2017

**107,025**  
Total population

2017

**69,522**  
Population affected  
by floods

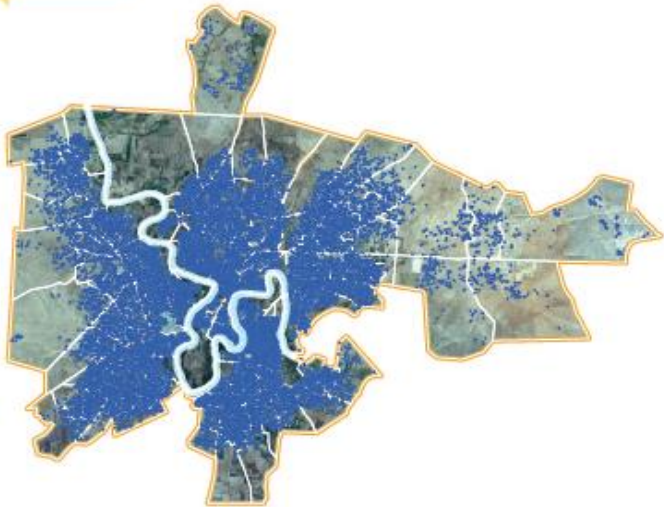
MAY 2018

**11,397**  
About two thirds of the  
households (65%) in  
Beletweyne are affected by  
floods due to ongoing rainfall

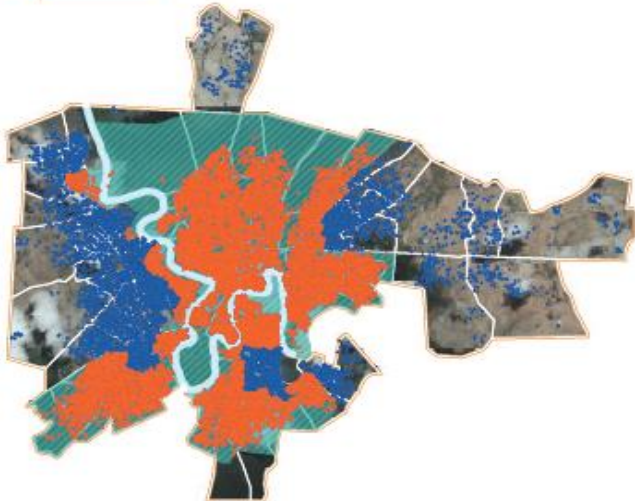
MAY 2018

Average size of households	6.1
Population density: total population per km <sup>2</sup>	4,214
Key demographic indicators	
Total males (%)	53.4
Total females (%)	46.6
Total women aged 15-49 years (age in complete years) = women of reproductive age (%)	20.3
Total women aged 10-19 years (age in complete years) = adolescent women (%)	11.6
Total young women aged 15-24 years (age in complete years) = young women (%)	7.3
Total population under 15 (aged 0-14 years in complete years) = children (%)	53.7
Total population aged 10-19 years (age in complete years) = adolescents (%)	24.4
Total population aged 15-24 years (age in complete years) = youth (%)	15.6
Total population under 1 (%)	1.6
Total population under 5 (%)	17.6
Total population aged 10 years and over (%)	62.3
Total population aged 65 years and over (age in complete years) = seniors (%)	0.8
Total female heads of household (%)	17.5
Total children (population under 18) heads of household (%)	0.2

2017



2018



5<sup>TH</sup> MAY 2018

### LEGEND



Dwelling Structures/  
Households in Belet  
Weyne Town



Severely Flood Affected  
Dwelling Structures/  
Households



Severely  
Flooded Area

Prepared by: Satellite Imagery:  
UNSDS  
Dwelling Structures/Household Counts  
Ministry of Planning, Federal Government of  
Somalia with support from UNFPA  
The PSD Technical Team from UNFPA

The demographic analysis is based on  
Beletweyne urban births and deaths data  
collected in 2016-2017, 2018 field mapping &  
verification, and lower level estimates from  
spatial data mapping in 2017 and 2018





**THANK  
YOU**

