# Mobile Phone Data for Dynamic Population Mapping

## Ghana's Experience

UNBig Data Regional Hub for Africa

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**First Segment**

# Our Journey so far

- Capacity building
- Data Sharing Agreement
- Establishing Steering Committee
- Project Visibility
- Exploring uses cases

**Second Segment**

# Excerpts from Routine Mobility Report

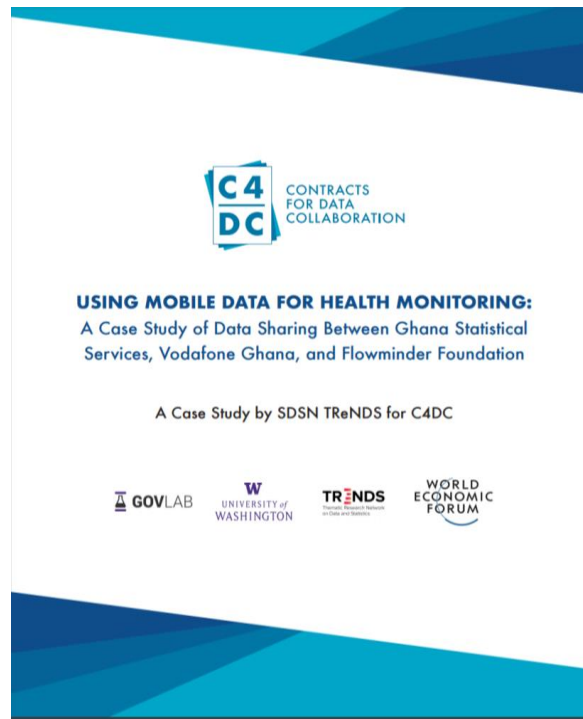vodafone | STATISTICAL SERVICE GHANA | FLOWMINDER.ORG

# How did we get there?

A long-term partner collaboration:

- Capacity strengthening with GSS
  - Trained 8 staff in the CDR data analysis
  - *CDR data, Python programming, data analysis, standard mobility report creation…*

- Code to automate product creation
  - *From CDR data to final metrics and visualisations, while preserving the privacy of subscribers and ensure the security of data processing.*

- Discussions, feedback and collaboration
  - *Improve the final report with Vodafone, and ensure the outputs are approved by the steering committee*

# Data Sharing Agreement

- Overseen by the Data Protection Commission

- Defines the legal scope of the project and established (Phase I – January 2022)

- Currently only using some of the CDR data fields available to us in the agreement to demonstrate the value that can be provided first with these simply CDRs





CONTRACTS FOR DATA COLLABORATION

**USING MOBILE DATA FOR HEALTH MONITORING:**
A Case Study of Data Sharing Between Ghana Statistical Services, Vodafone Ghana, and Flowminder Foundation

A Case Study by SDSN TReNDS for C4DC

GOVLAB     UNIVERSITY of WASHINGTON     TReNDS     WORLD ECONOMIC FORUM

# PROCESS FOR EXTERNAL DATA REQUESTS

**1 — SUBMIT DATA REQUEST**

This involves completing a data request form, study outline and initial agreement to abide by conditions for data release

**2 — STEERING COMMITTEE EVALUATE REQUEST**

A subcommittee evaluate the request against preset criteria (available to applicant) and make a recommendation to Steering Committee. They decide and applicant is informed

**3 — DATA SHARING AGREEMENT**

Once a study is approved, the applicant will sign a NDA and Data Sharing agreement with Vodafone Ghana. The frequency and scope of what will be made available will be well defined.

# Exploring use cases

## GSS' engagements with Ghana Health Service



Immunization programs

Vaccination targets

Antenatal care coverage

Disease control surveillance

Responding to Storm surge

Tuberculosis incidence

Responding to tidal waves victims

Optimizing Energy supply

Responding to Flood victims

Out-patient department attendance

Poverty mapping

Sanitation planning

Malaria incidence

Traffic management

Responding to fire

Hypertension Incidence



GSS' engagements with NADMO

# Visibility



GSS Data Science Trainee at Data Fair for Parliamentarians, Ghana



GSS Data Science Trainee at Migration Conference, Berlin

# Usability

Approval of Data Request: STEERING COMMITTEE

- **London School of Hygiene and Tropical Medicine** (LSHTM),

- **World Bank:** Create an interactive dashboard using **SEIR** and **ABM** epidemiological modelling to predict the spread of the virus and to inform response to COVID-19

- **Noguchi Memorial Institute for Medical Research** at the University of Ghana,

- **University of Sheffield**, and FLS in Spain



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First Segment

Our Journey so far

Second Segment

Excerpts from Routine Mobility Report

RATIONALE

Support routine social and humanitarian response programs

CONTENT

- Resident population at district level
- Relocation within Ghana and between regions
- Analysis focused on 4 major regions

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# LONG TERM MOBILITY-Residents

- About half of the districts either experienced a decrease (30.2%) or an increase (23.0%) in population
- Several regions in the south-west of Ghana (Western, Western North, Bono, Bono East, and Ahafo) broadly experienced decline in population,

- A rather increasing population was experienced in districts along the east-banks of the Volta Lake, the coast and north-west side.

- Population in the Tolon, Sunyani West, and Effutu districts, and Akuapim South fluctuated over the period
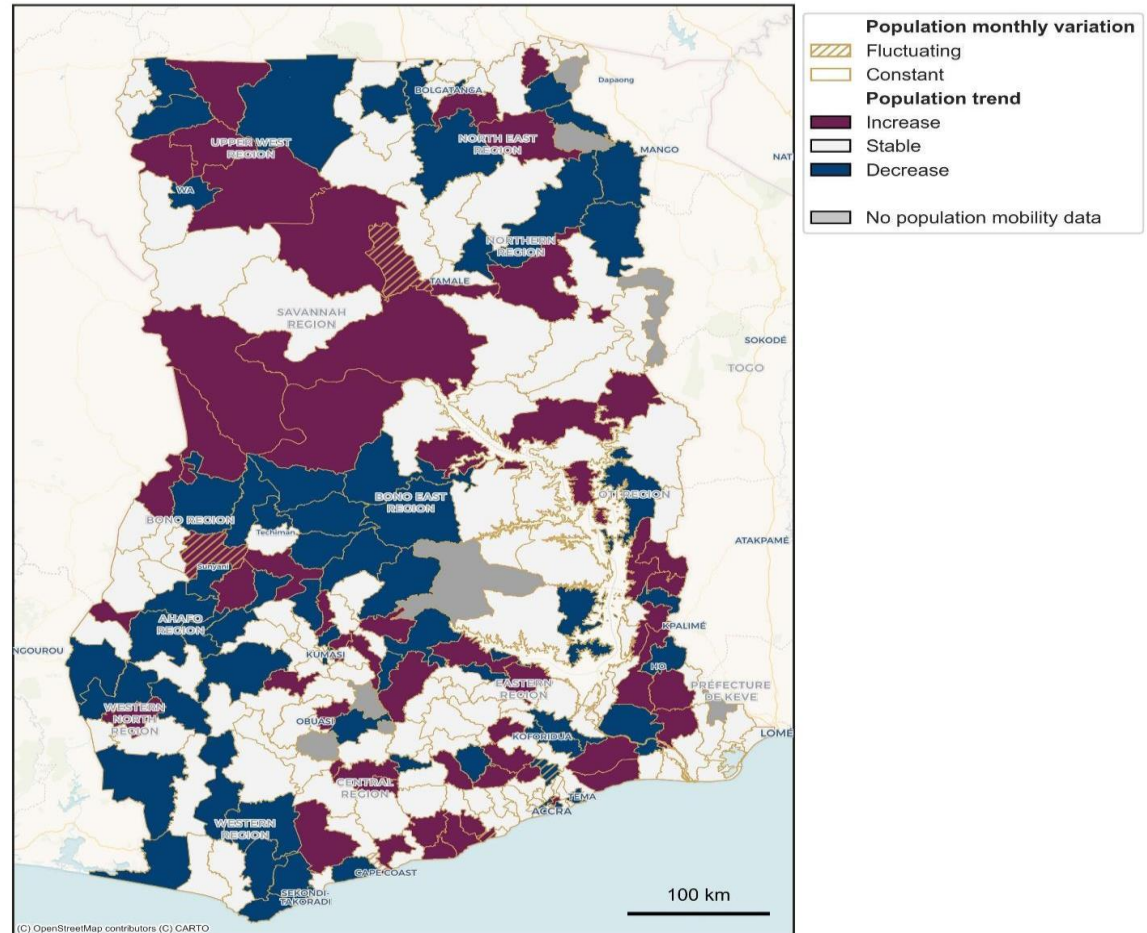
# RELOCATION FLOWS WITHIN GHANA

- Majority of top(30) relocation flows occurred in the middle-south belt of the country

- Most visible flows between Ashanti to Greater Accra, Central to Greater Accra, Volta to Greater Accra, and Central to Greater Accra, each constituting 5.0 – 6.5% of the total flows.

- About 1.0% or less each of the flows were between Western and Ashanti; Bono East and Ashanti; and Western and Central regions
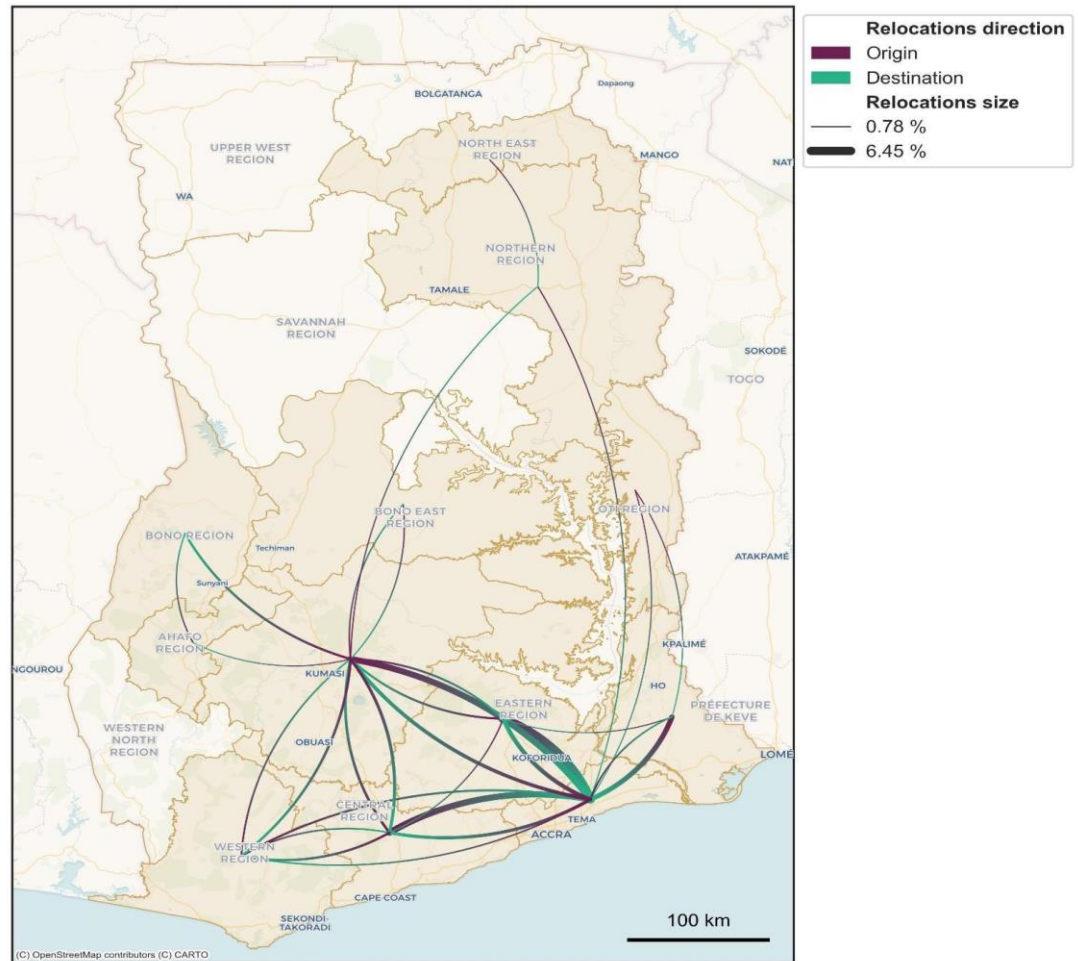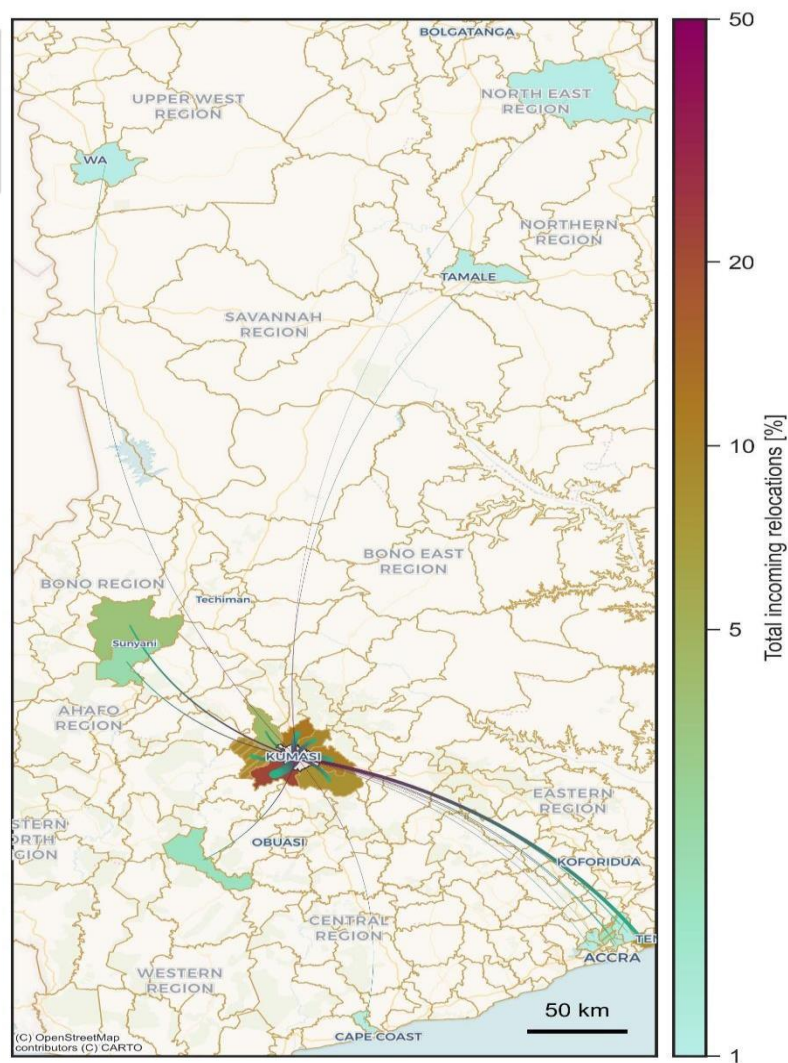
## RELOCATION FLOWS FROM GREATER ACCRA

- Close to half of the Greater Accra's outflows ended up in either Gomoa East, Awutu Senya East, Awutu Senya West, or Effutu districts.

- With 5.0 – 10.0%, in long distant destination i.e Ho municipal and Tamale metro;

- and similar proportions experienced in neighbouring district ie Akuapim South
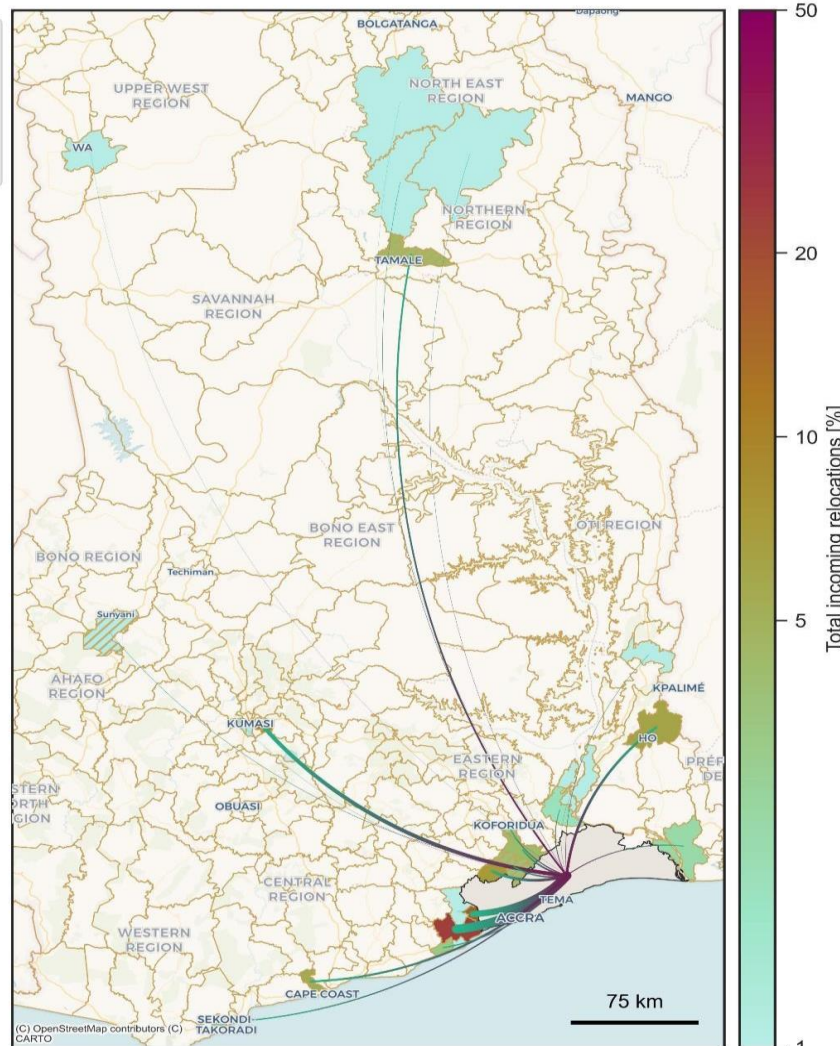
# RELOCATION FLOWS FROM KUMASI METRO

- Atwima-Kwanwoma, Afigya-Kwabre South, Atwima-Nwabiagya or Ejisu Juaben were the destinations for most of the large relocations flows from Kumasi (10.0 – 20.0%)

- Major among the long distant relocation flows from Kumasi metro ended up in Sunyani West and Tema metro (~5.0%)

# RELOCATION FLOWS FROM SEKONDI-TAKORADI METRO

- Ahanta West, Tarkwa-Nsuaem and Effia Kwesimintsim districts were the most preferred nearby destinations to close to half of the relocations flows from Sekondi-Takoradi

- Recognizable interactions between Sekondi-Takoradi and long-distant districts i.e. Ellembelle, and Prestea Huni Valley, each attracting 5.0 - 10.0%
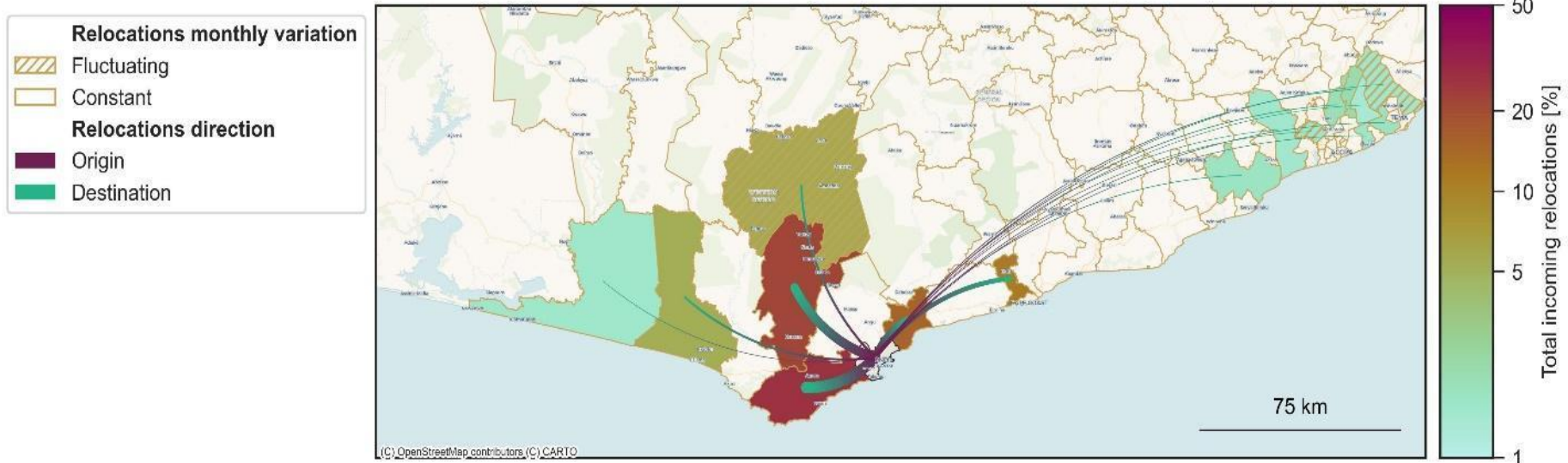
# RELOCATION FLOWS FROM TAMALE METRO

- Larger flows fell in between northeast and northwest of Tamale, i.e., Tolon, Wa, and East Mamprusi districts (between 10.0% - 20.0% of the Tamale outflows).

- Savelugu and Yendi districts follow closely with 5.0 - 10.0% of the flows

- A relatively lower traffic flows southward of Tamale; to Central Gonja, and East Gonja, representing 4.0 – 6.0% of the flows each.
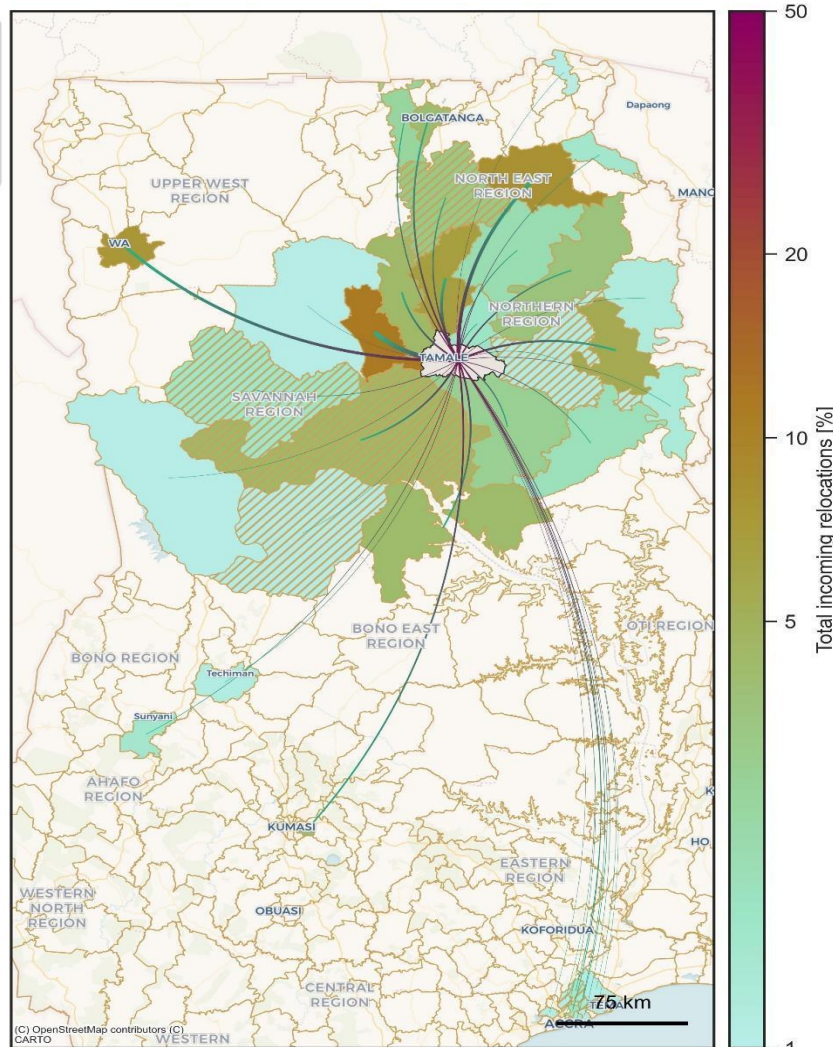
## Conclusion

- Mobility trends reveal strengthens and weakness in social connections among regions; suggesting areas government needs to provide social amenities or encourage economic development.

## Recommendations

- Technical infrastructure and capacity are paramount to the sustainability of the partnership

- Data privacy issues and other legal requirements must be satisfied and adhered to

- Stakeholder engagements is critical for leveraging CDR data to improve official statistics

- limited cell towers in rural settlements is peculiar to LMICs , aggravating the level of the bias with CDR estimates at lower granular.

-  CDR data analysts must acknowledge the biasness and limitations associated with estimates and offer a more transparent methodology and application to users

- Explore mutual benefits of the partnership projects