

An aerial photograph of a large crowd of people, primarily children, gathered on a dirt ground. They are wearing various colorful clothing, including yellow, blue, and red. The crowd is dense and appears to be at an outdoor event or market.

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Estimating population mobility
from mobile phone usage data

15 June 2022

Flowminder Foundation
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Flowminder Foundation

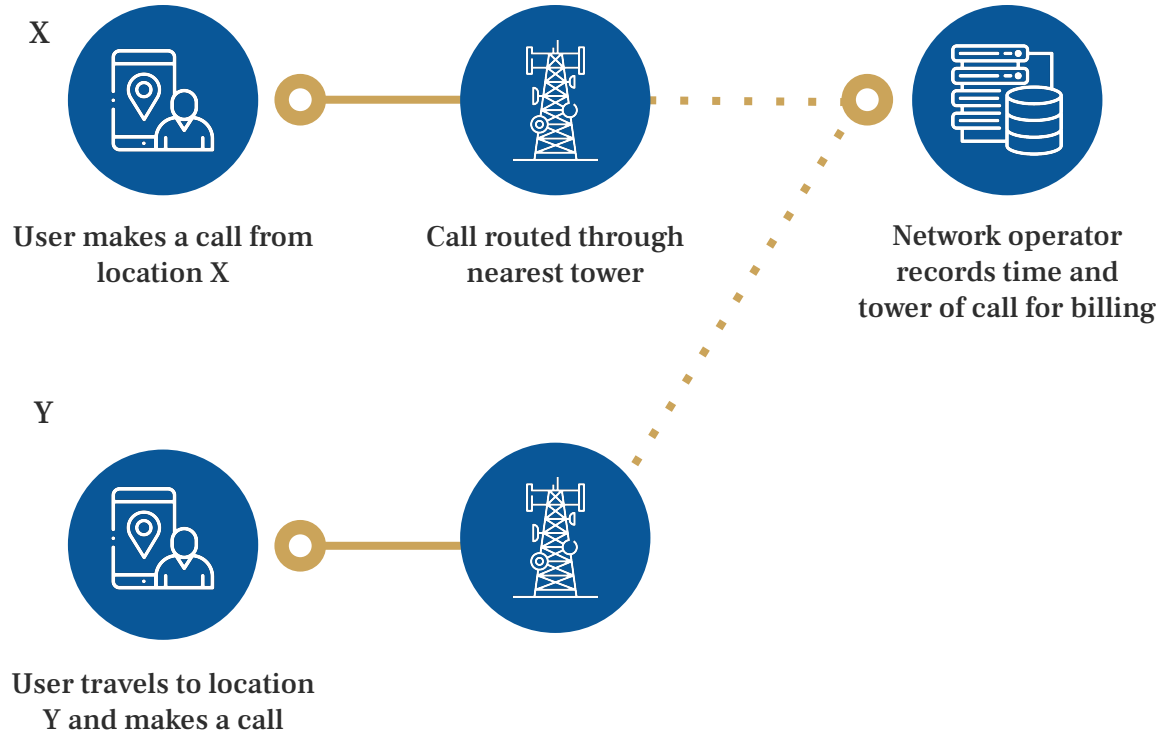
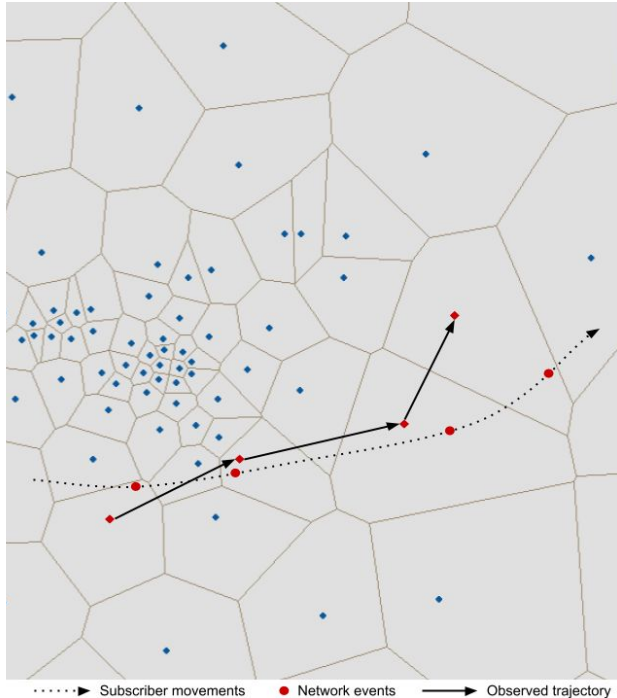
Our Mission: Enabling decision makers to access the data they need to transform the lives of vulnerable people at scale

- Non-profit organisation with 30 multidisciplinary staff
- Pioneered the use of mobile operator data for humanitarian and development use (Haiti earthquake 2010 and onwards)
- Initial focus only on operational work and research on use of mobile data for hum./dev. sectors...
- ... expanded to capacity and tool development for governments and the ecosystem
- Working closely with MNOs, governments and intergovernmental agencies. Implementing partner of GRID3

A photograph of a woman and three children in a rural setting, overlaid with a blue tint. The woman on the left is holding a mobile phone. The children are standing behind her. The background shows a landscape with trees and hills.

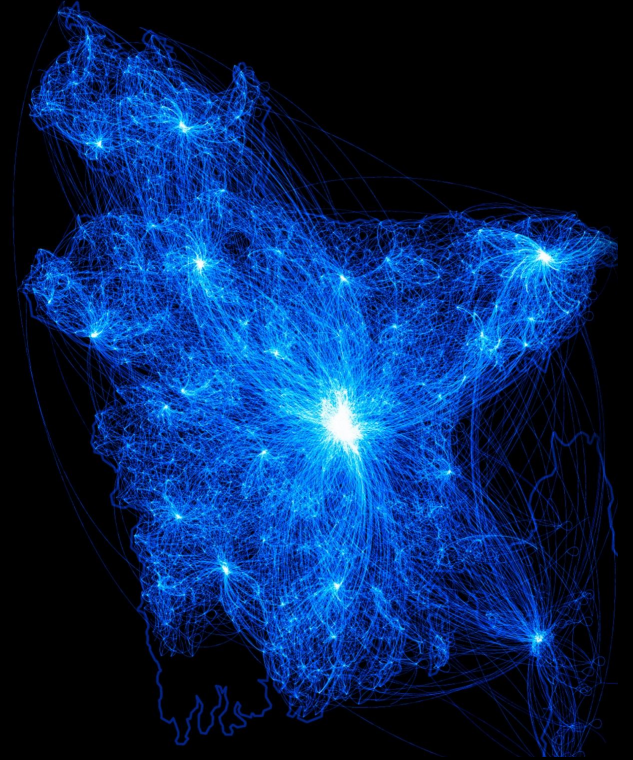
What are Call Detail Records (CDRs)?

CDRs can provide near-real time estimates of **population movements** & changes in **population density**



Benefits of using CDRs

- The data are automatically generated.
- Used routinely by MNOs
- The dataset contains **billions of data points from millions of people** – large geographic and time scales covered.
- There is a continuous stream of data – **near real-time**



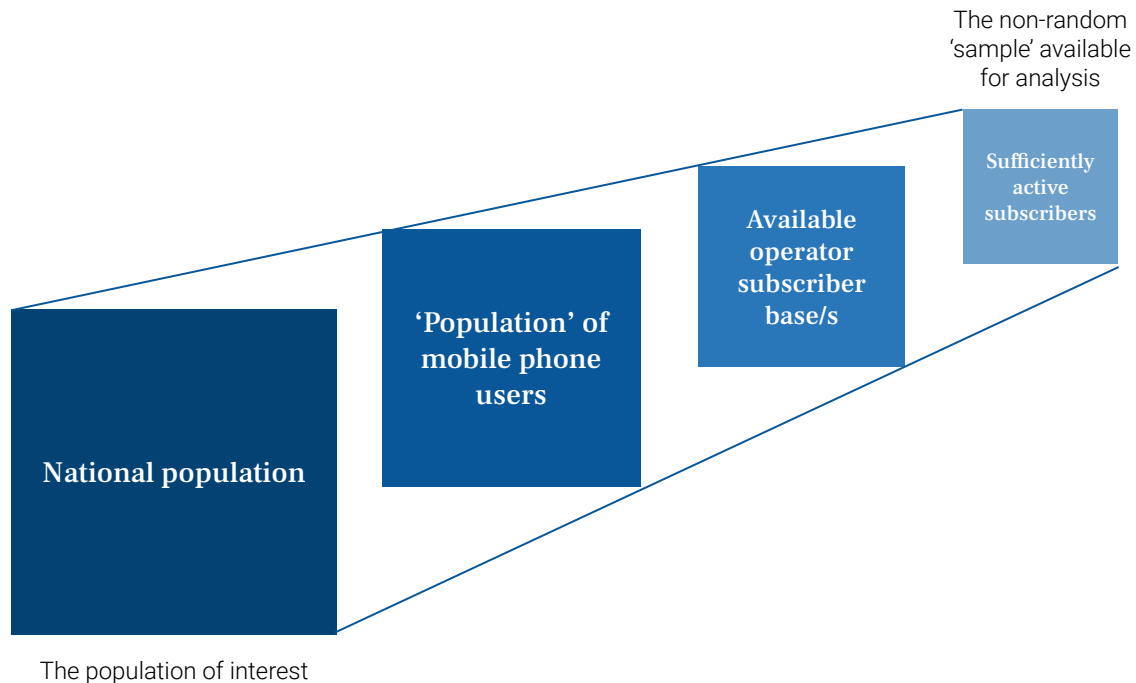
A broad range of mobility indicators can be derived from CDRs

- Subscriber presence
- Home locations
- Crowdedness
- Population mixing
- Intra-regional travel
- Inter-regional travel
- Locations of interest
- Trajectories and mobility patterns

Other indicators: social connectivity, mobile phone usage and top-up expenses...



Addressing potential sampling biases



Additional data on demographics, phone use and mobility from field and phone surveys can help to address biases and therefore to get the most out of CDR data.

CDR-derived
insights should
never permit the
identification of
individual
subscribers.

Ensuring privacy and transparency

Key principles

- GDPR compliance throughout
- Transparency and peer review:
 - Detailed and open method descriptions
 - Open algorithms
 - Publications in peer-reviewed academic journals



Implementation and real impact necessitates collaboration

- The use of CDR data often involves many stakeholders e.g.:
 - MNOs
 - Government end users
 - Regulators
 - IGOs
- Ghana as a good model of government partnership:
 - Ghana Statistical Services
 - Vodafone Ghana
 - Flowminder

“If we want to achieve the SDGs, we need to invest in data systems, and we are confident that our **successful partnership with Vodafone Ghana & Flowminder** is the way forward to leverage data for good.

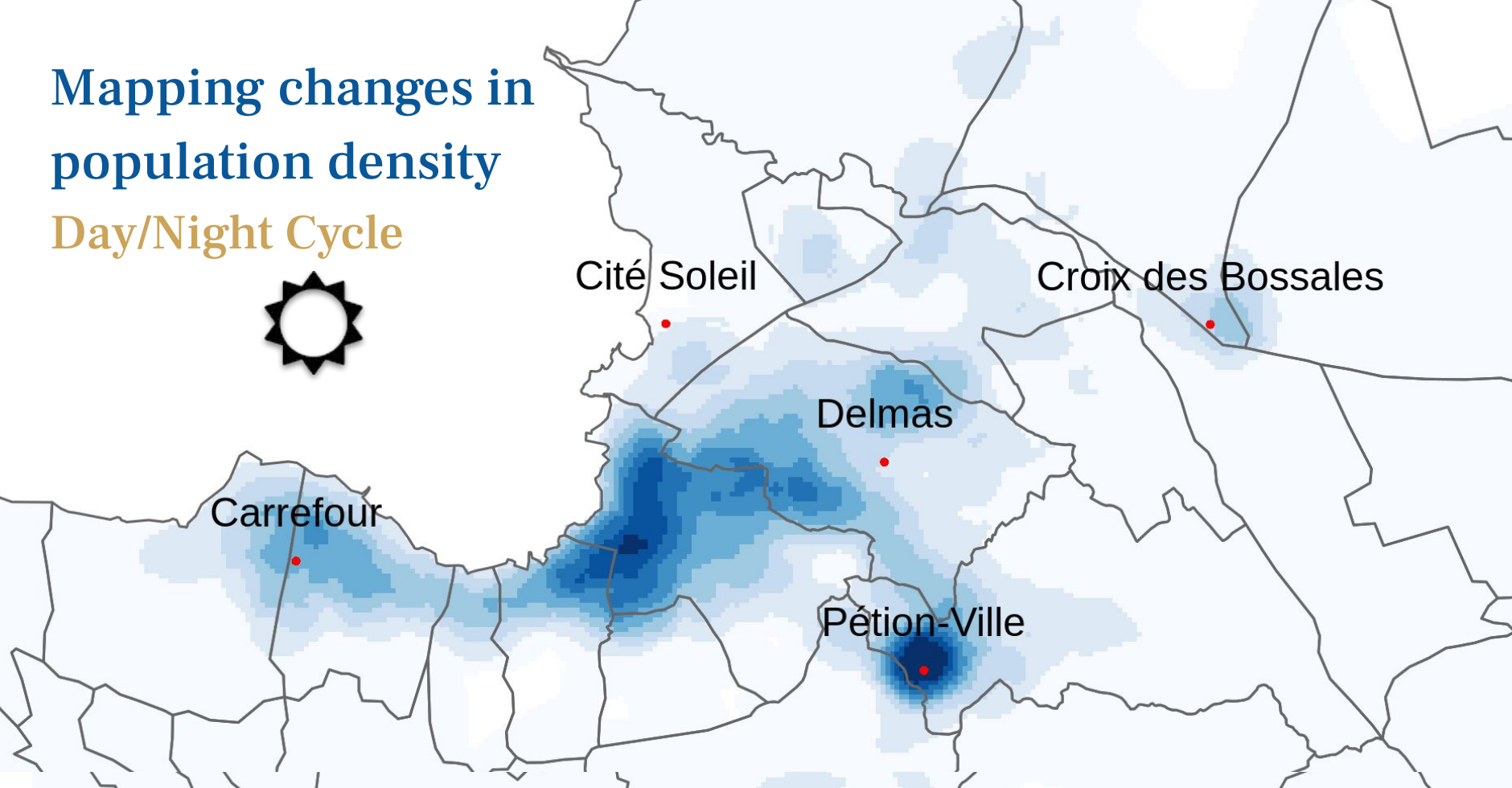
— Omar Seidu, Head of Demographic Statistics and SDGs Coordinator at Ghana Statistical Service



Applications

Mapping changes in population density

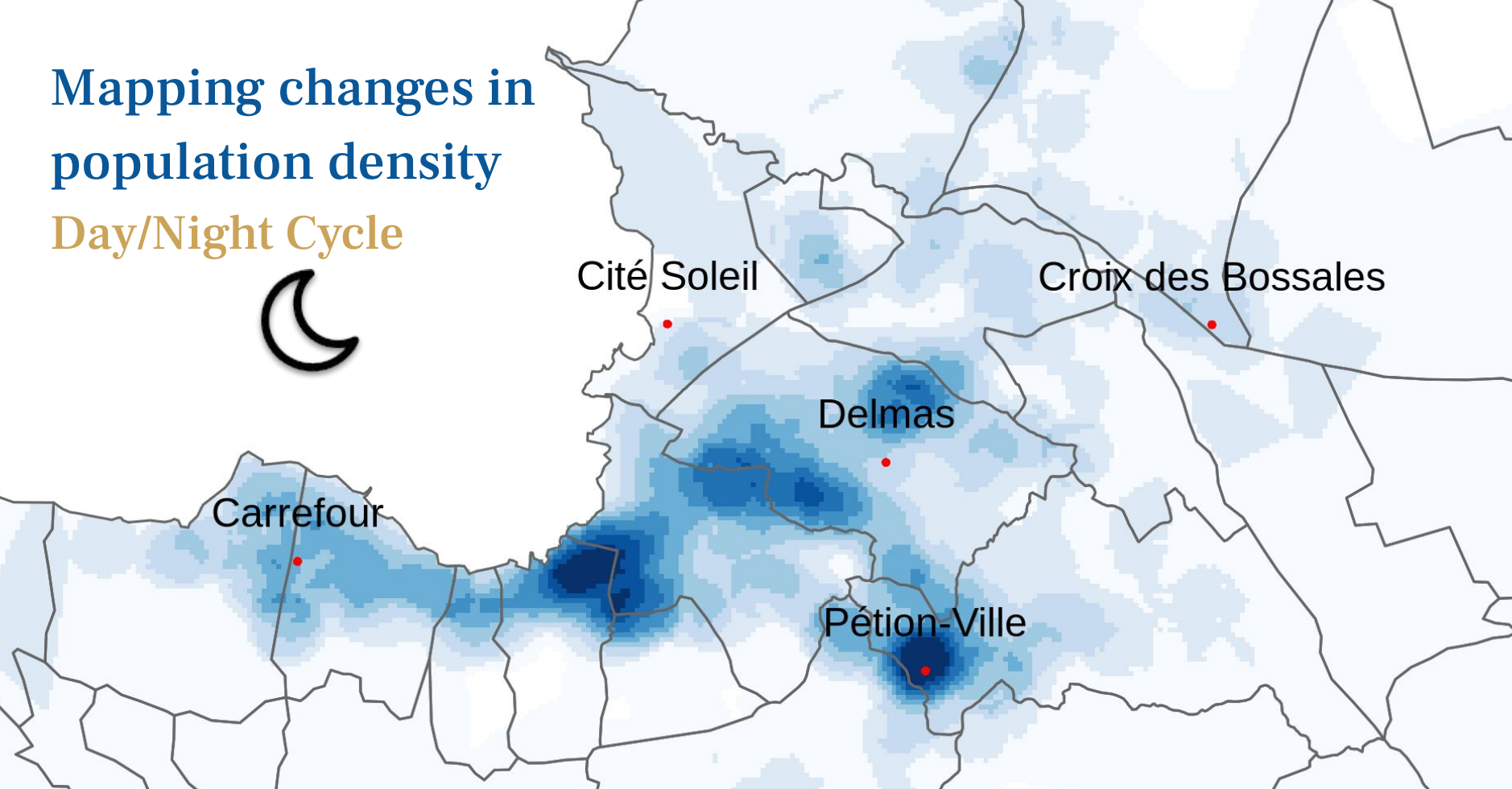
Day/Night Cycle



Locations of phone users during the day

Mapping changes in population density

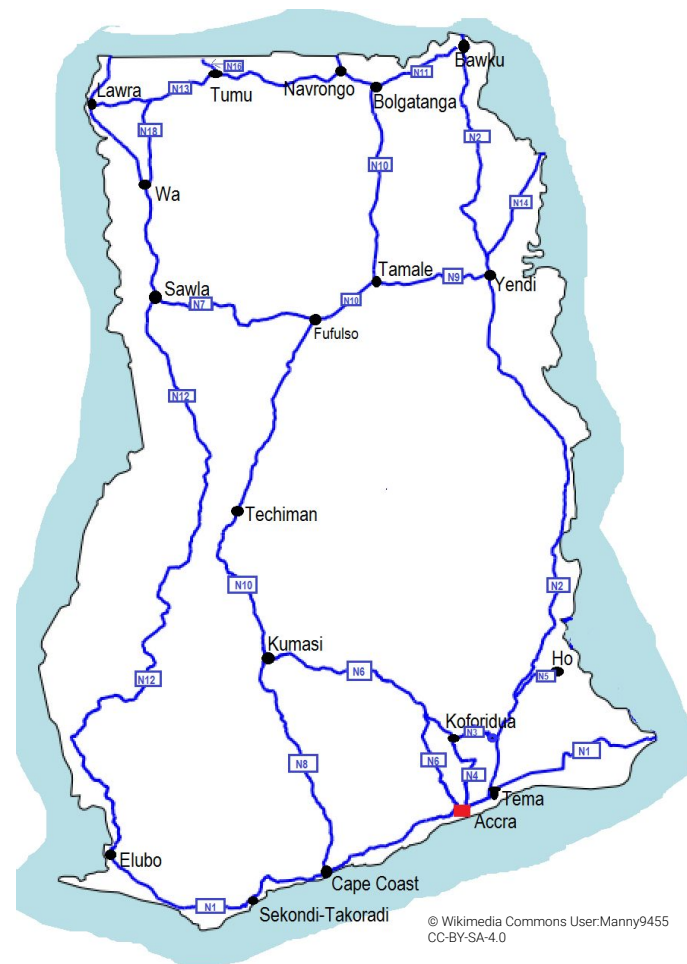
Day/Night Cycle



Locations of phone users at night

Ongoing collaborations with Ghana Statistical Services

- Ghana Highways Authority has expressed an interest in the use of CDRs to study traffic patterns and the use of highways.
- We are also using CDR data to measure seasonal migration in Ghana, in particular the movement of people from Northern areas during the dry season in search of work.



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