



GRID³

GEO-REFERENCED INFRASTRUCTURE AND
DEMOGRAPHIC DATA FOR DEVELOPMENT

“Leaving no one behind” Helping Improve Population Data

Lorant Czaran
UNFPA

BILL & MELINDA
GATES foundation



world pop
FLOWMINDER.ORG



Center for International Earth
Science Information Network
EARTH INSTITUTE | COLUMBIA UNIVERSITY

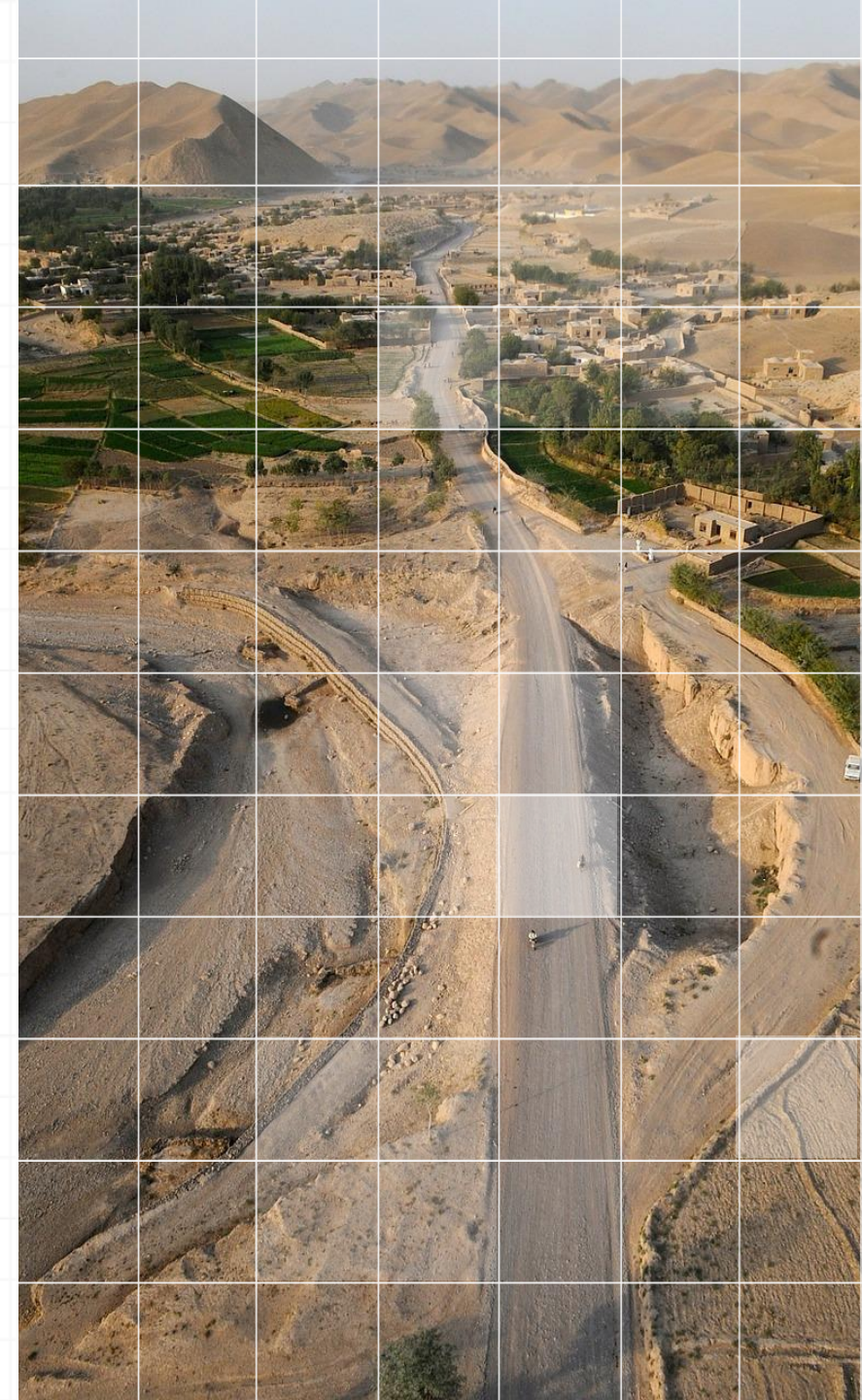
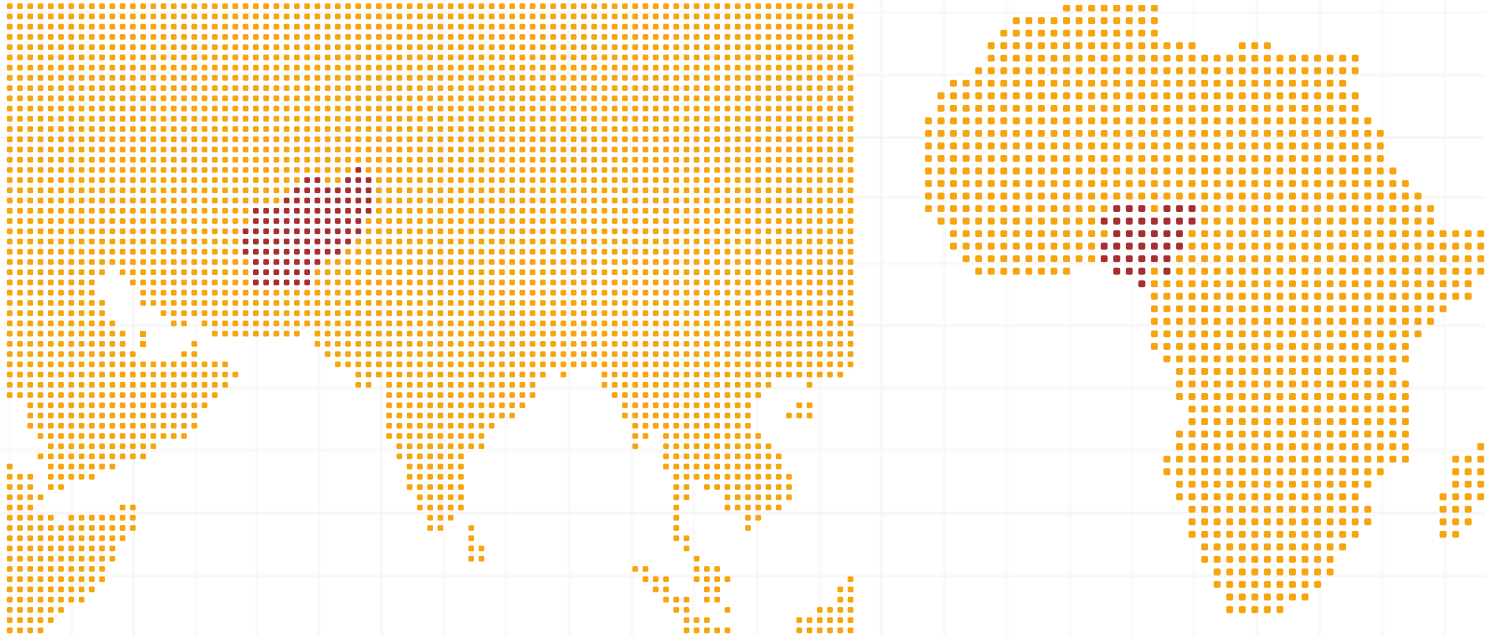


Project Overview



Precursor to GRID3

The idea behind GRID3 started with an effort to eradicate Polio in Nigeria, and grew out of the collaboration between UNFPA and WorldPop/Flowminder in Afghanistan.



Our Vision:

Mapping a path to sustainable development for everyone.

Our Mission:

To build spatial data solutions that make development goals achievable.



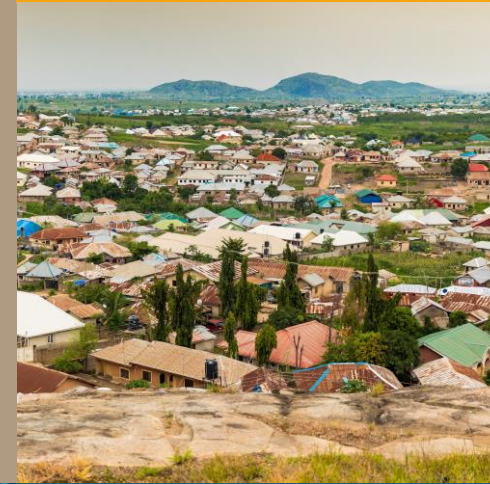
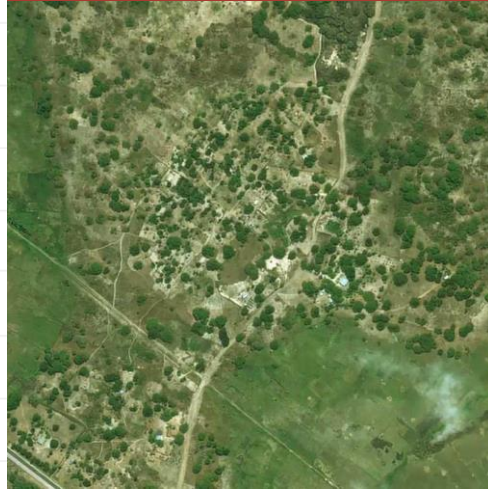
Housing census & hybrid method support



High-resolution population estimates



Harmonized Subnational boundaries



Comprehensive settlement locations

Locating critical infrastructure



Capacity Strengthening



GRID3 is currently operating in five African countries:

- South Sudan
- Nigeria
- Zambia
- Mozambique
- Democratic Republic of the Congo





GRID3 Partners

A global partnership

Funding Partners

BILL &
MELINDA
GATES
foundation



Implementing Partners

world
pop
FLOWMINDER.ORG



Coordinating Partner

Center for International Earth
Science Information Network
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**Oversight and Decision
Making**

**Technical Expertise
and Capacity
Strengthening**

**Technical Support and
Advocacy**

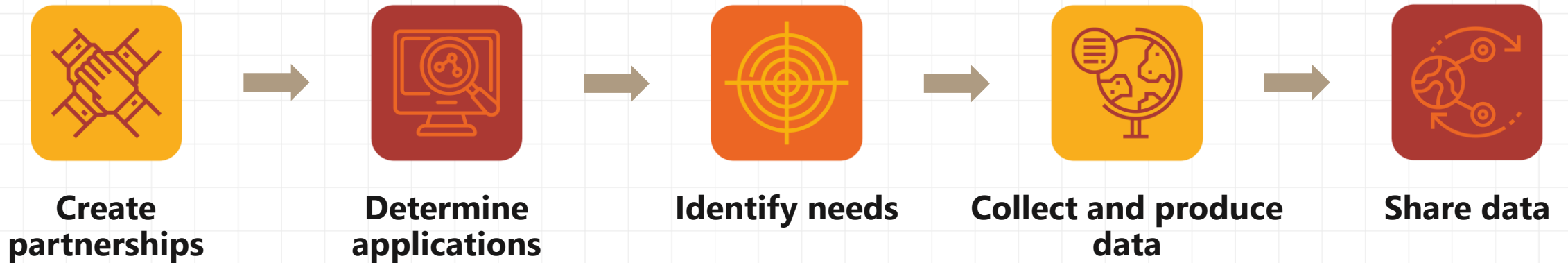




Approach

Approach

GRID3 works with national level partners to develop tailor-made strategies

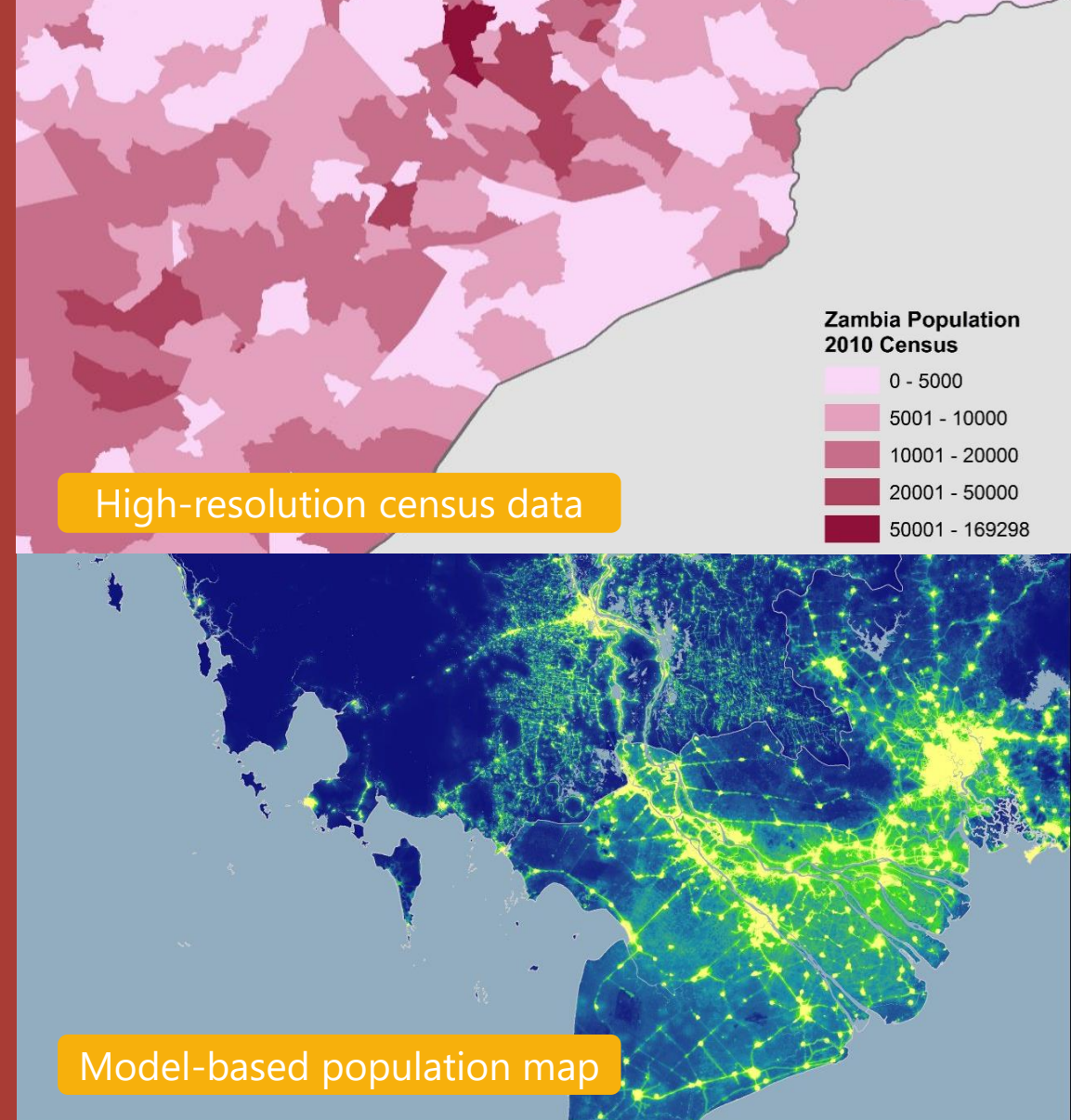




Outcomes

High-resolution population maps

Depending on needs and feasibility, GRID3 can support the generation of high-resolution geo-referenced **census data** or produce **model-based population maps**



Two complementary approaches

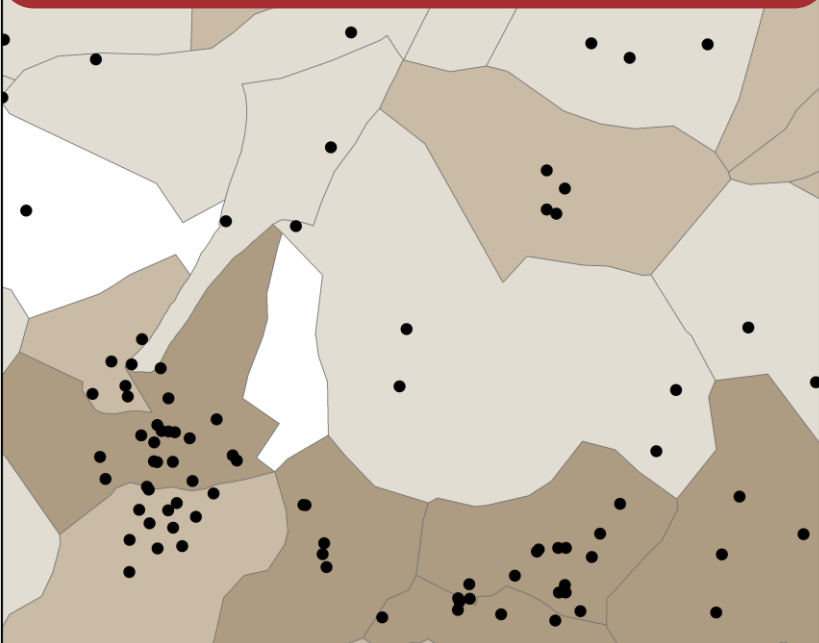
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232	243	247	240	252	266	293	318	304	334	243	295	334	327	309	252	292	289	304	292	293	291	145	95	252	
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240	236	255	249	292	255	264	309	311	325	282	226	290	308	229	278	288	258	269	253	261	276	338	269	262	253
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249	241	213	236	212	202	11		4		4	209	237	232	186	83	123	190	82	22	156	184	204	83	183	113



Gridded population estimates

Value of high-resolution demographic data

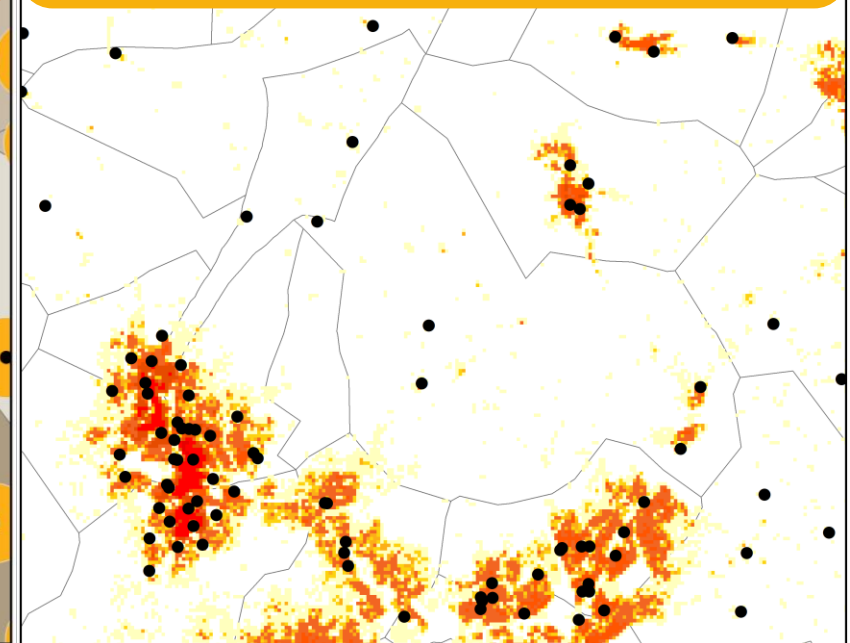
Health facilities overlaid on admin
unit population counts



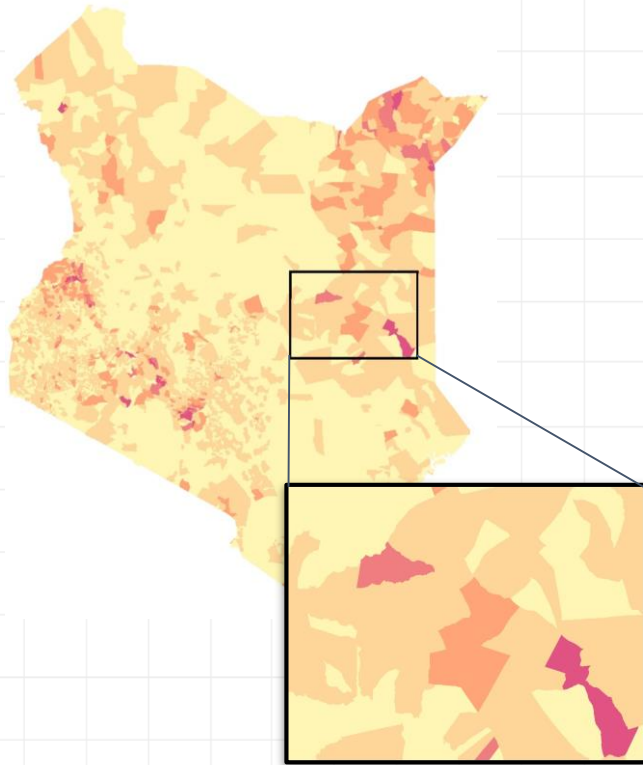
How many people live within 1km of
a facility?



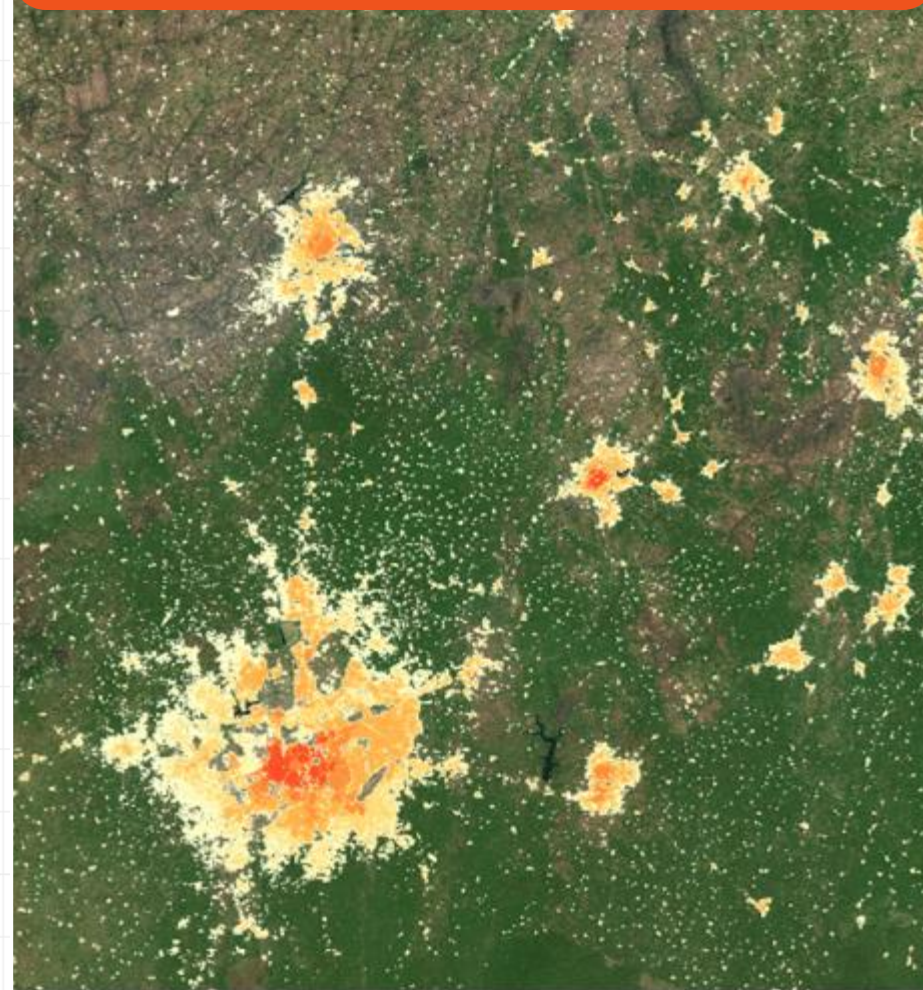
Much easier and more accurate to
measure using gridded population
data



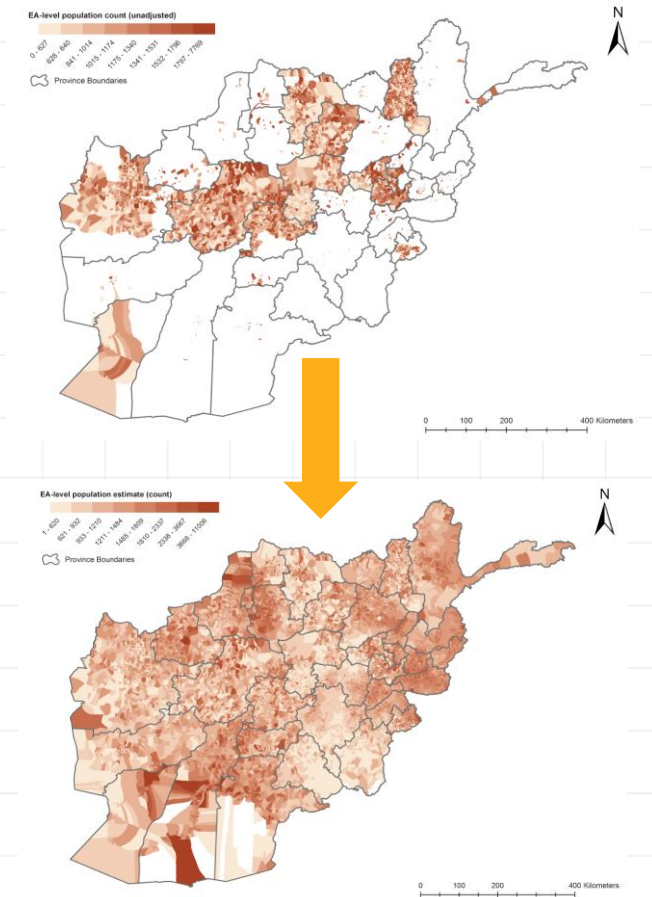
Mapping from census data



Disaggregation to grid cells



Population estimation models



Paths to high-resolution demographic data

High-quality geo-referenced census

GRID3 assists in carrying out the highest resolution census possible, and where insecurity or inaccessibility make a full census impossible, supports through a “hybrid census” approach.

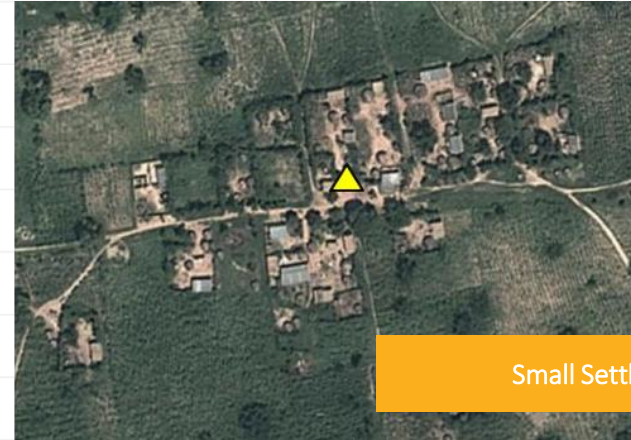


Settlement locations

GRID3 collects and assigns names of places to point locations or areas of settlement



Hamlets (point features)



Small Settlements (point features)

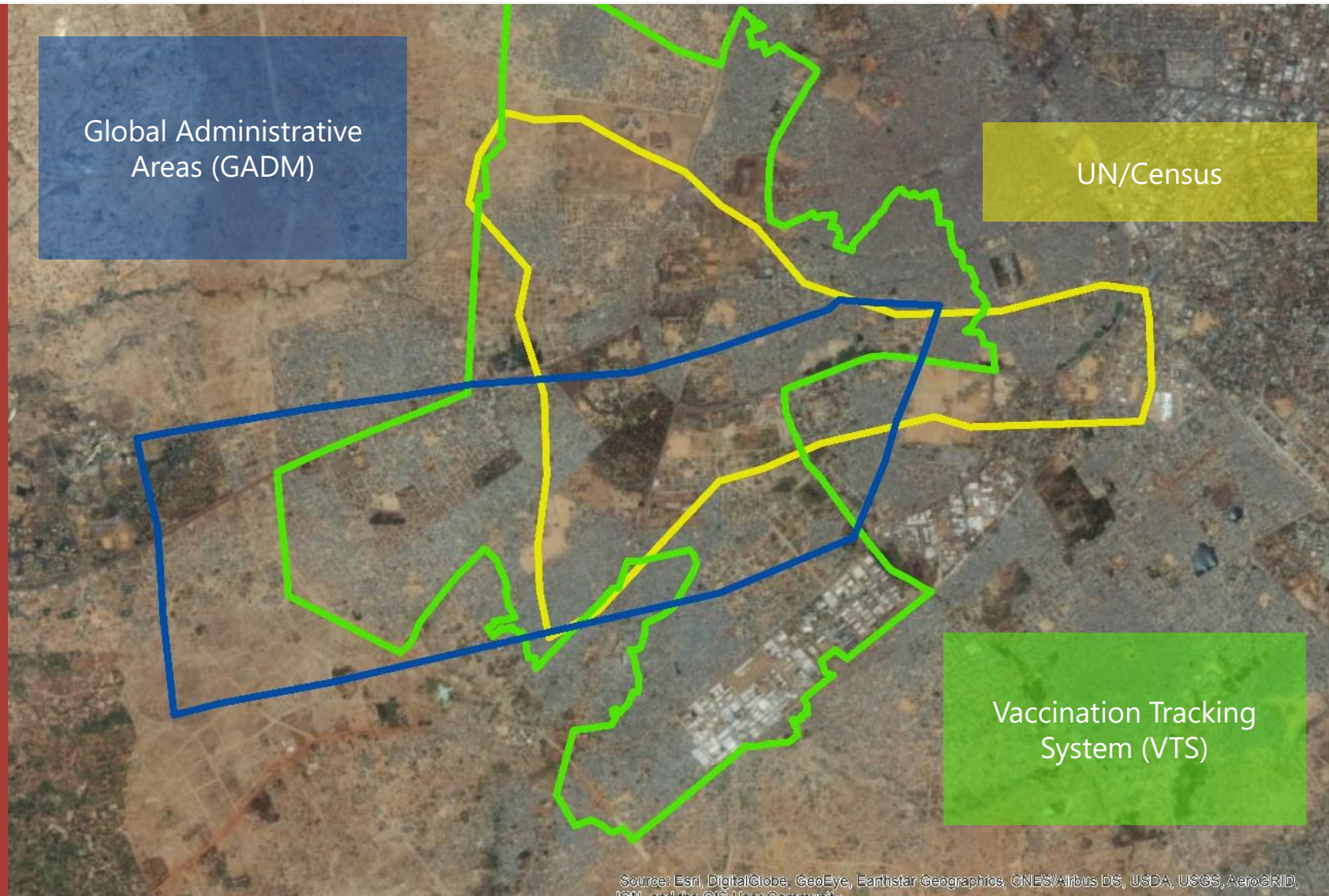


Boundary Unit Area (polygon features)



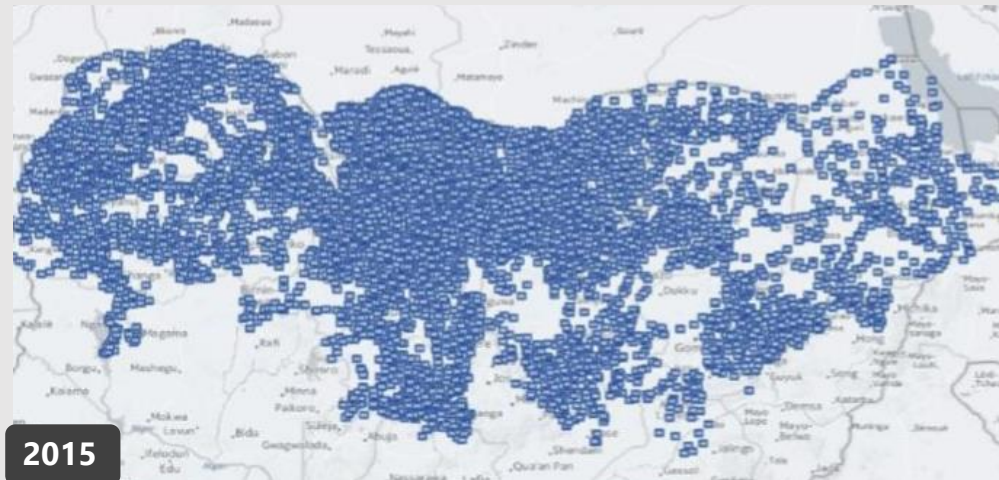
Subnational boundaries

GRID3 provides the methodology to access, edit and validate sub-national administrative boundaries.

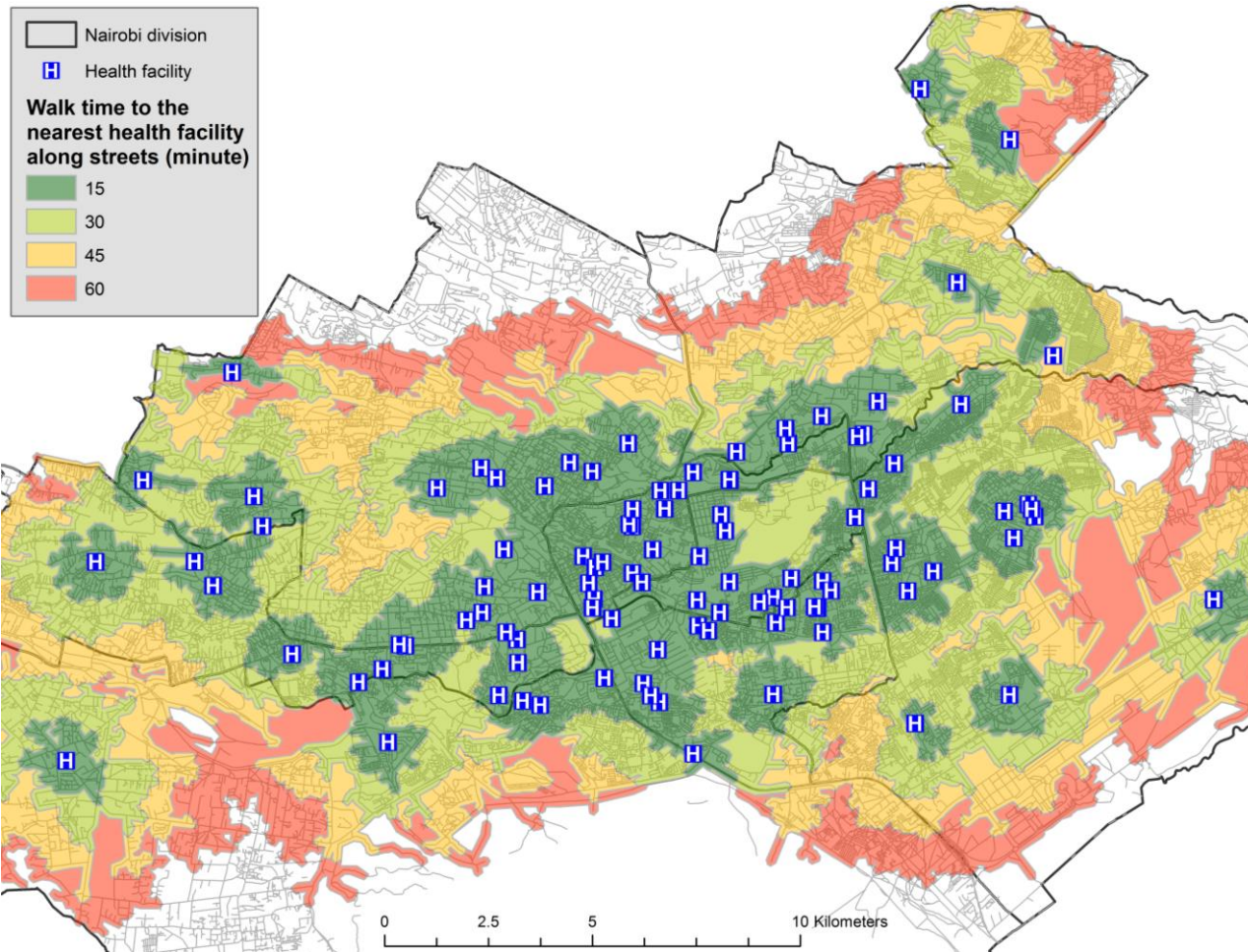


Infrastructure mapping

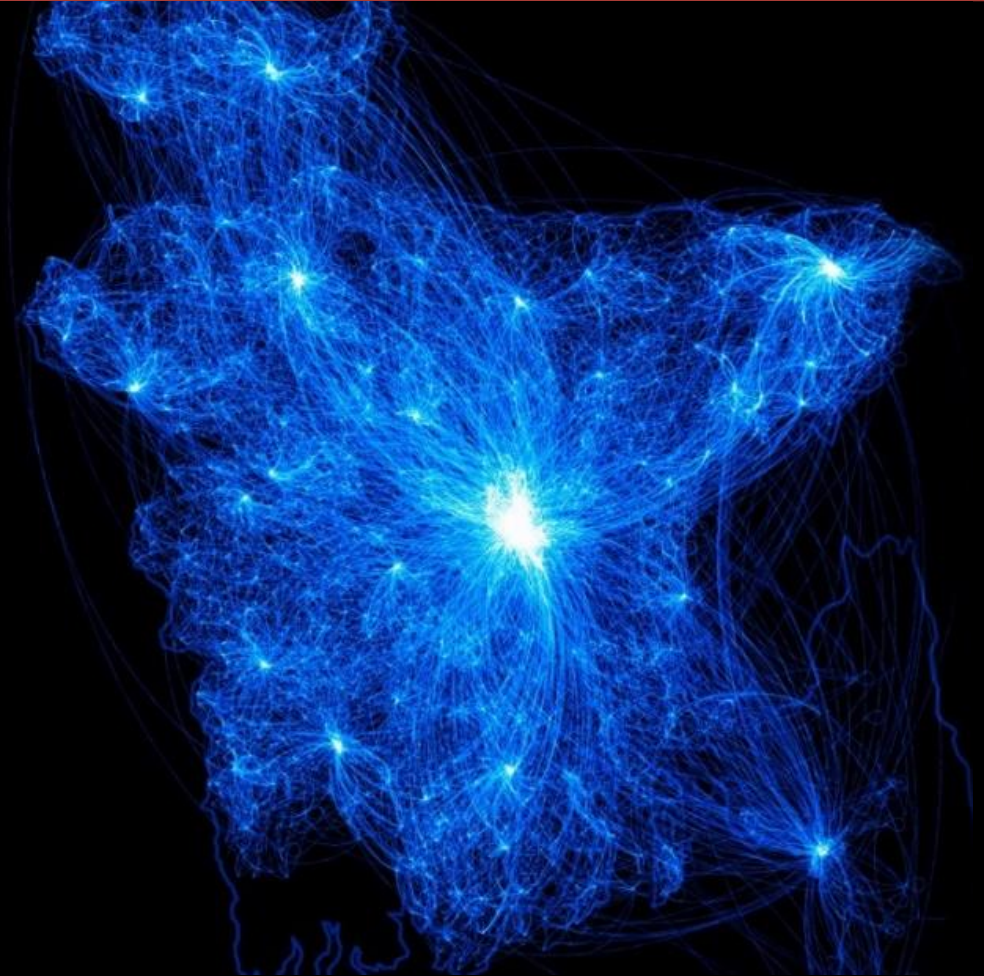
GRID3 can target and produce infrastructure data layers depending on a country's current needs or desires.



High-resolution mapping of population health and welfare indicators



Integration of **mobile network data**



Other spatial data improvements

Capacity strengthening

- Generate/collect high resolution GRID3 data
- Manage, analyse and utilise GRID3 data to meet development and humanitarian needs
- Disseminate & share GRID3 data





Applications

Case study

Democratic Republic of the Congo (DRC)



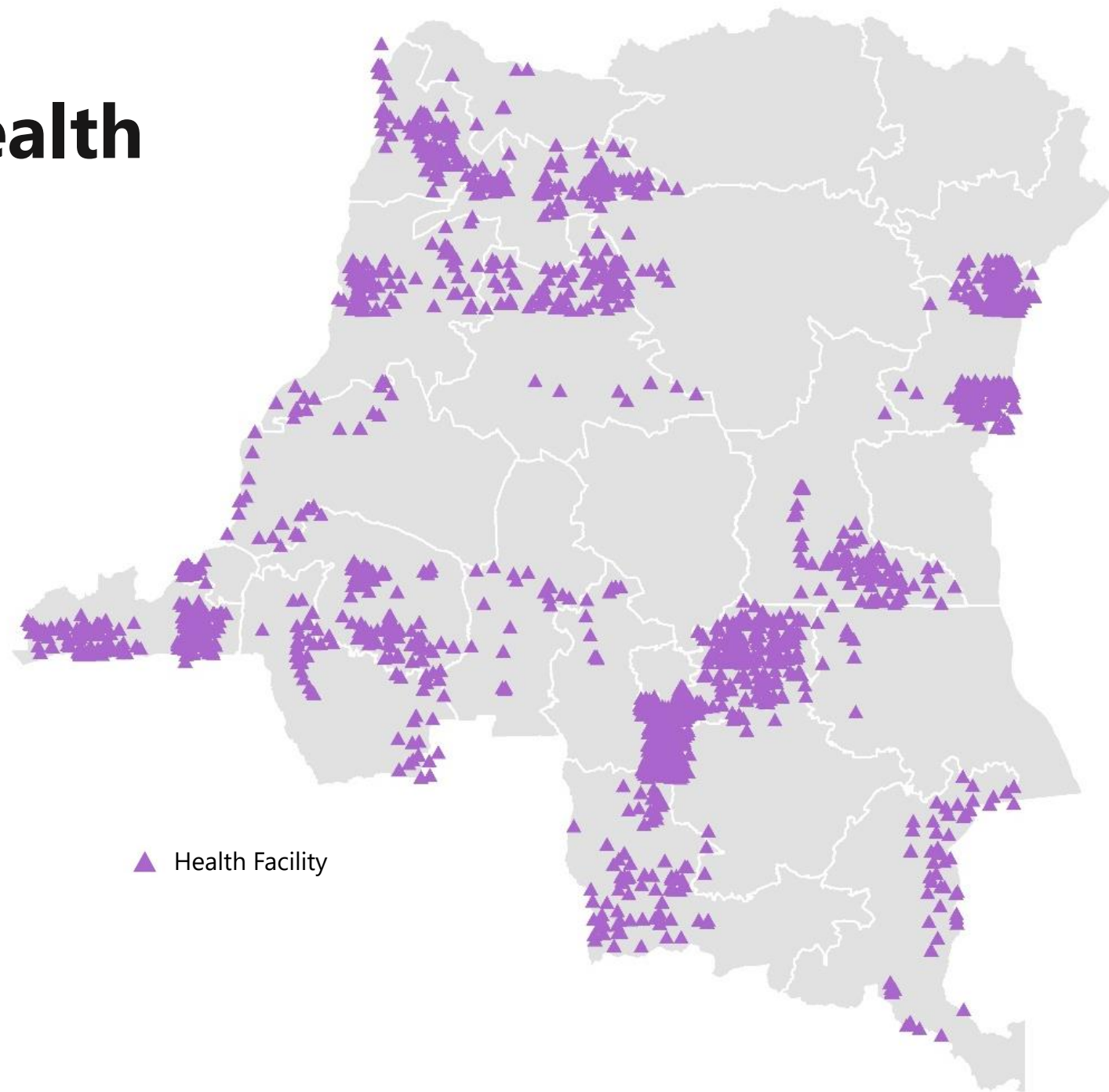
35 years ago

The Democratic Republic of the Congo had its **last census in 1984**. Current population estimates are still based on this number.

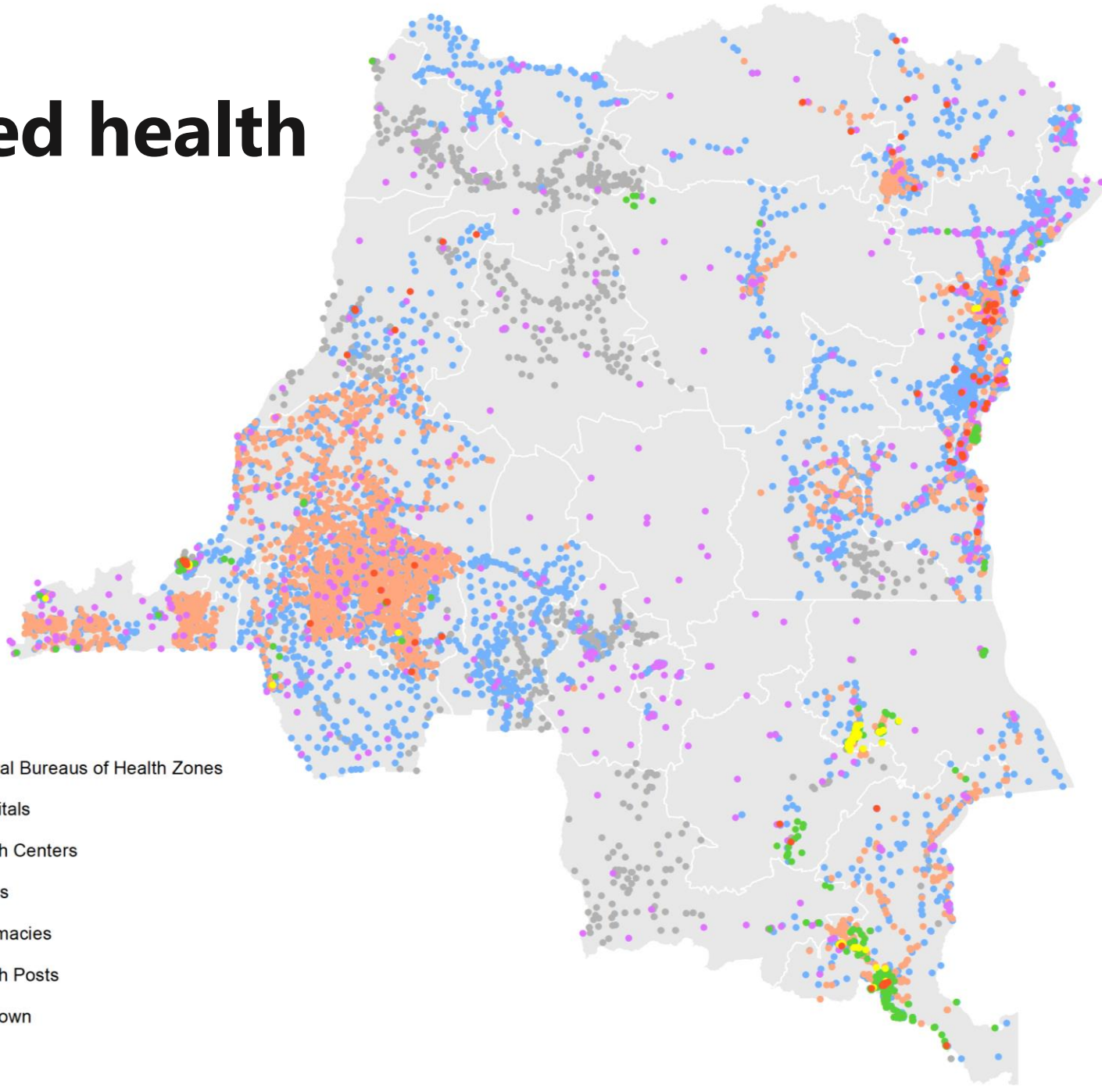


The outskirts of Kinshasa - A sudden transition into paddy fields on this side. Photo credit: F

Pre-GRID3 health facilities map



GRID3 updated health facilities map

- 
- The map displays the geographical distribution of various health facilities across Ethiopia. The country's outline is shown in light gray, with internal administrative boundaries delineated by thin white lines. Numerous colored dots are scattered across the map, representing different types of health facilities. A high concentration of orange dots (Health Posts) is visible in the central-western region. Blue dots (Health Centers) are widely distributed, particularly in the eastern and southern parts of the country. Purple dots (Hospitals) are more sparsely located, often in the northern and central regions. Other colors like green (Clinics), yellow (Pharmacies), and red (Central Bureaus of Health Zones) appear in smaller numbers across various regions. Gray dots (Unknown) are also present, mostly in the central and southern areas.
- Central Bureaus of Health Zones
 - Hospitals
 - Health Centers
 - Clinics
 - Pharmacies
 - Health Posts
 - Unknown





Use cases &
impact

Types of use cases - Examples



Support Field Operations

Bednet delivery
Vaccination campaigns
Supply chain routing



Assess needs

Location of unmet needs / regional prioritisation
Exposure to risks



Design programmes

Optimise location of new facilities/services
Characterise benefits to citizens and donors



Empower private sector

Market research
Investment location



Enhance statistical power

Sampling frames
Common benchmarks for denominators
Common aggregation units

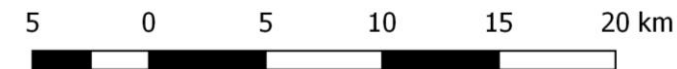
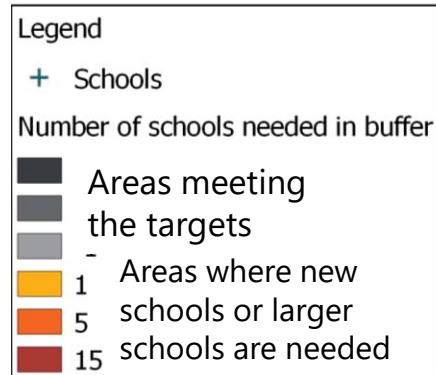
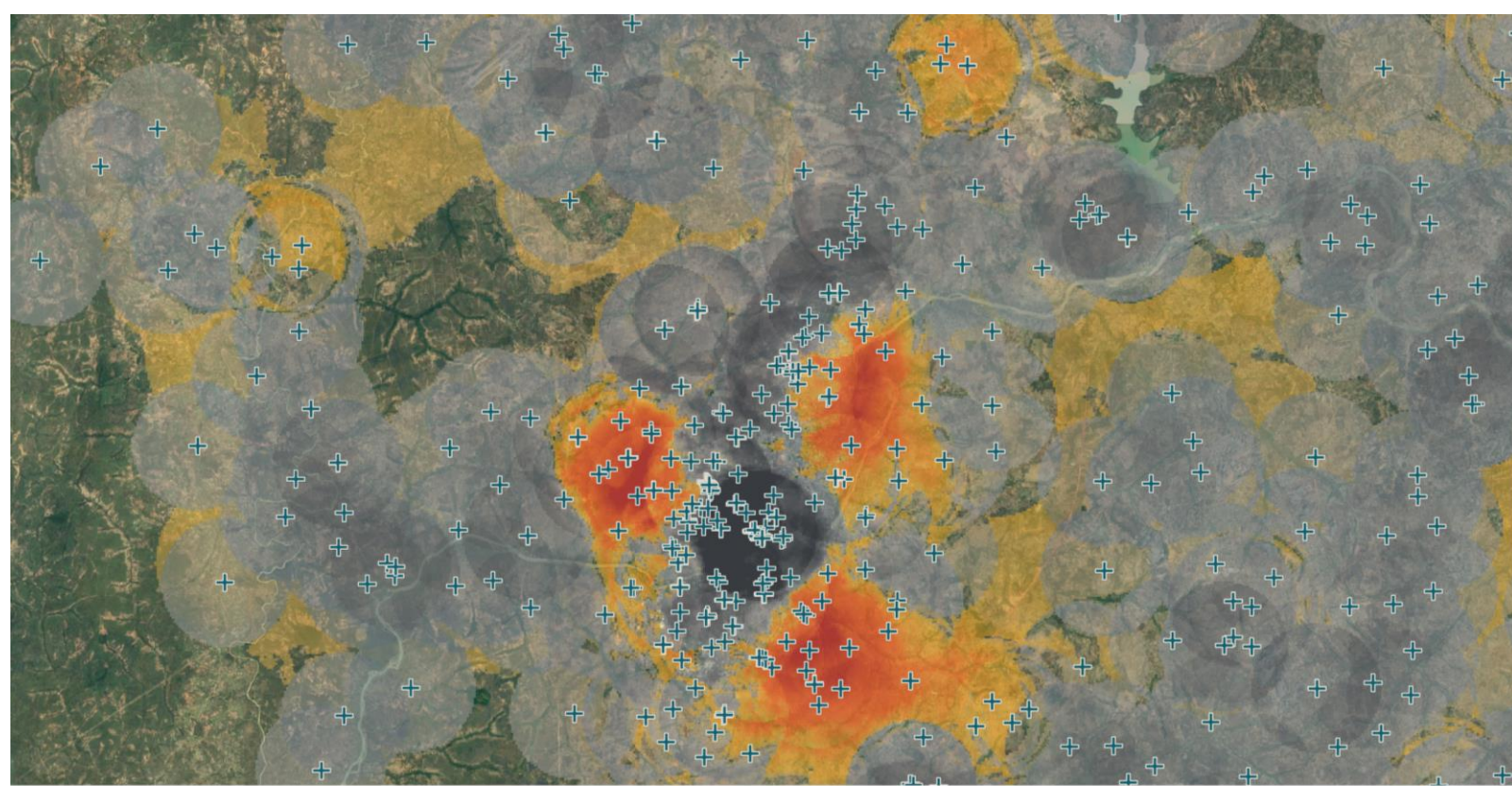




Assess needs

Access to Schools

Combining geo-referenced school data with high-resolution population data permits **identification of unmet needs by local administrative unit.**



**Number of schools needed
to meet targets**

(Number of people in buffer / target) – number of schools in buffer



Design programmes

Health Facility Siting

Proportion of women aged 15-49 with demand satisfied for family planning

Simulated results of optimal new health facility construction, relying on different resolution population data.



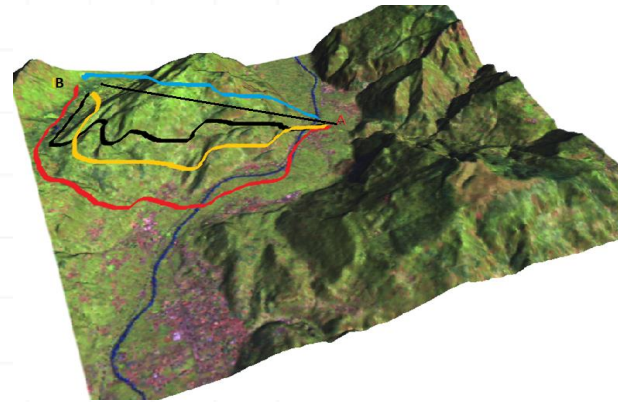
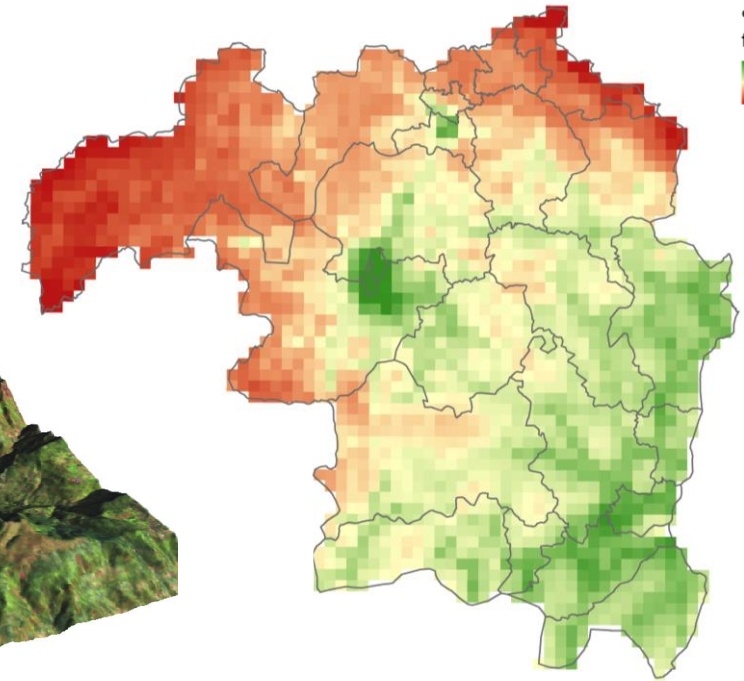
% Demand Satisfied for Family Planning

LGA

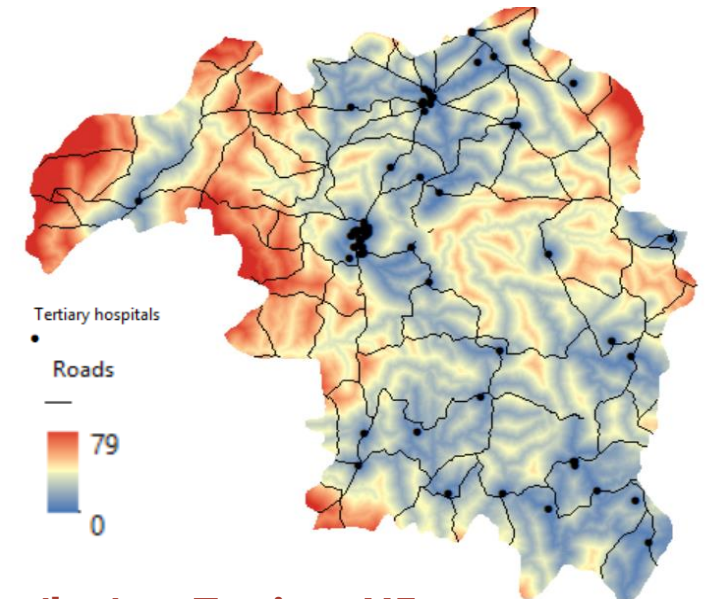
% Demand Satisfied for Family Planning

High : 77

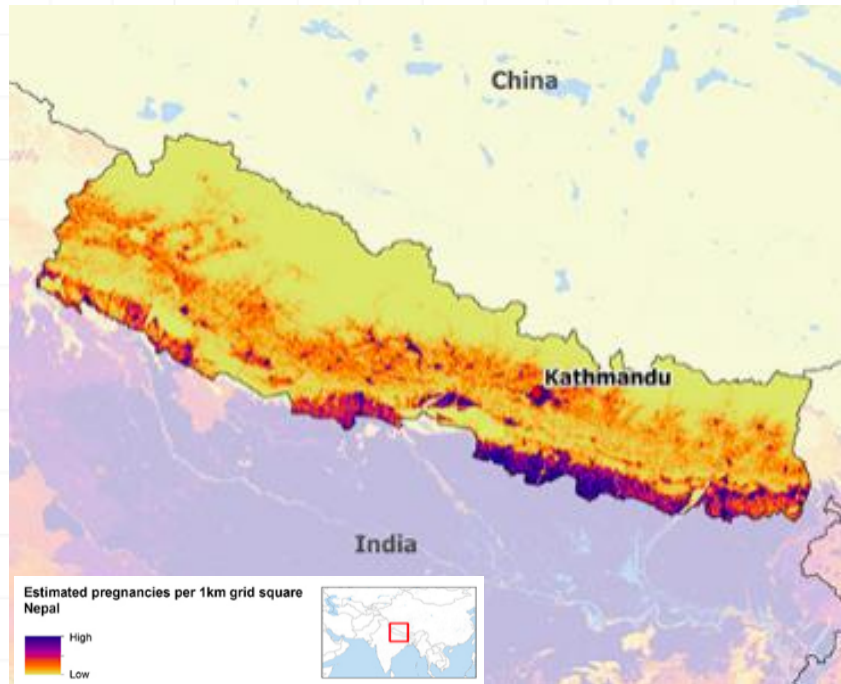
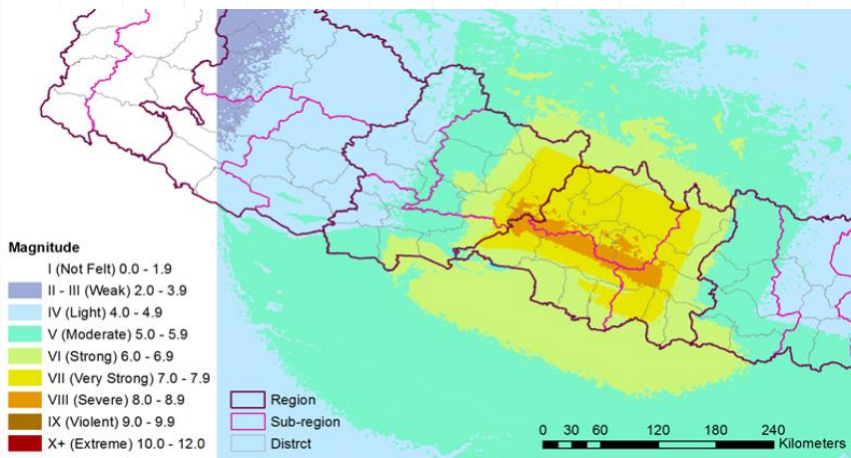
Low : 8



Natural barriers: time and distance

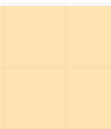
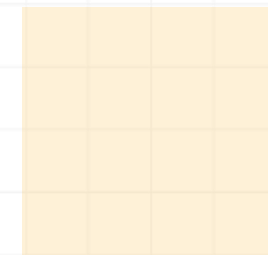
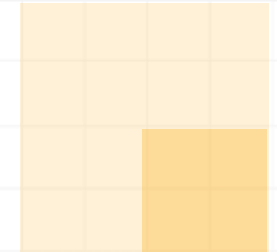
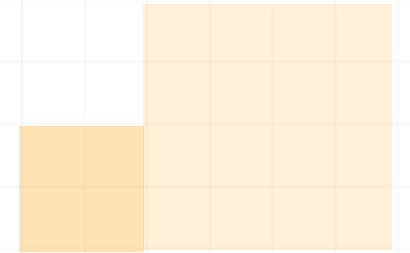


Distance (km) to Tertiary HFs

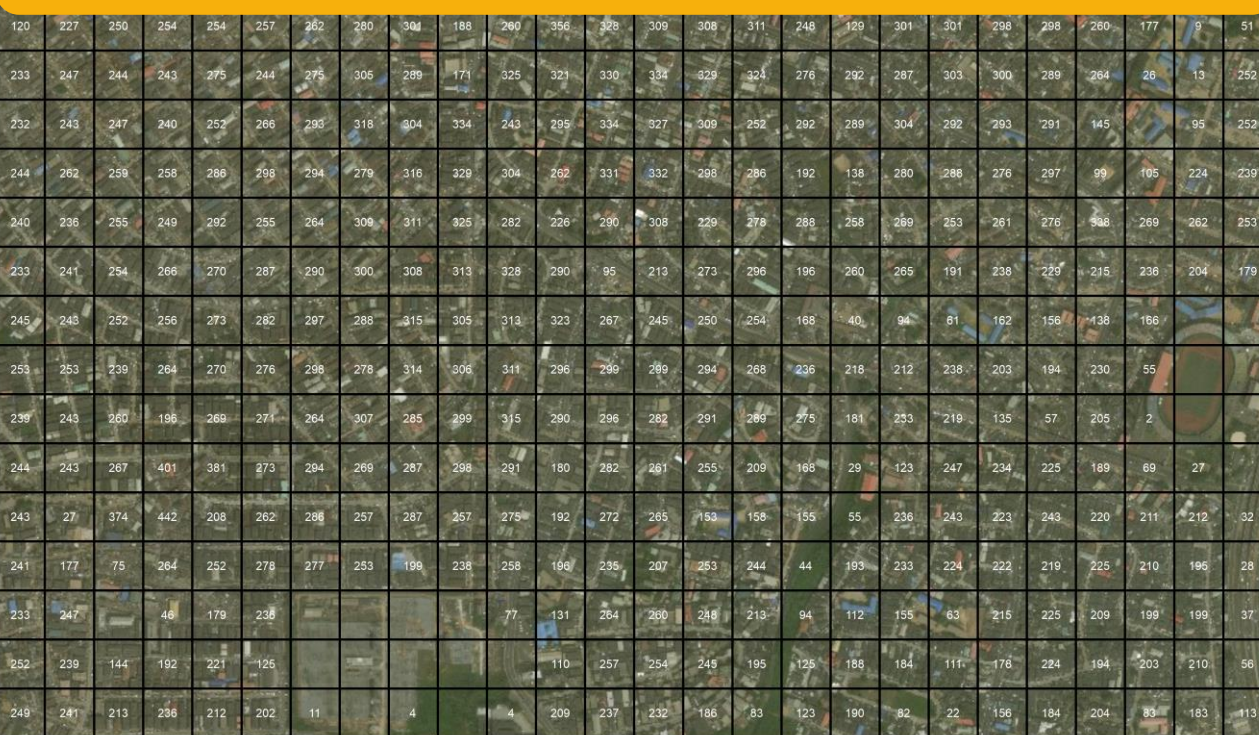


Population at risk

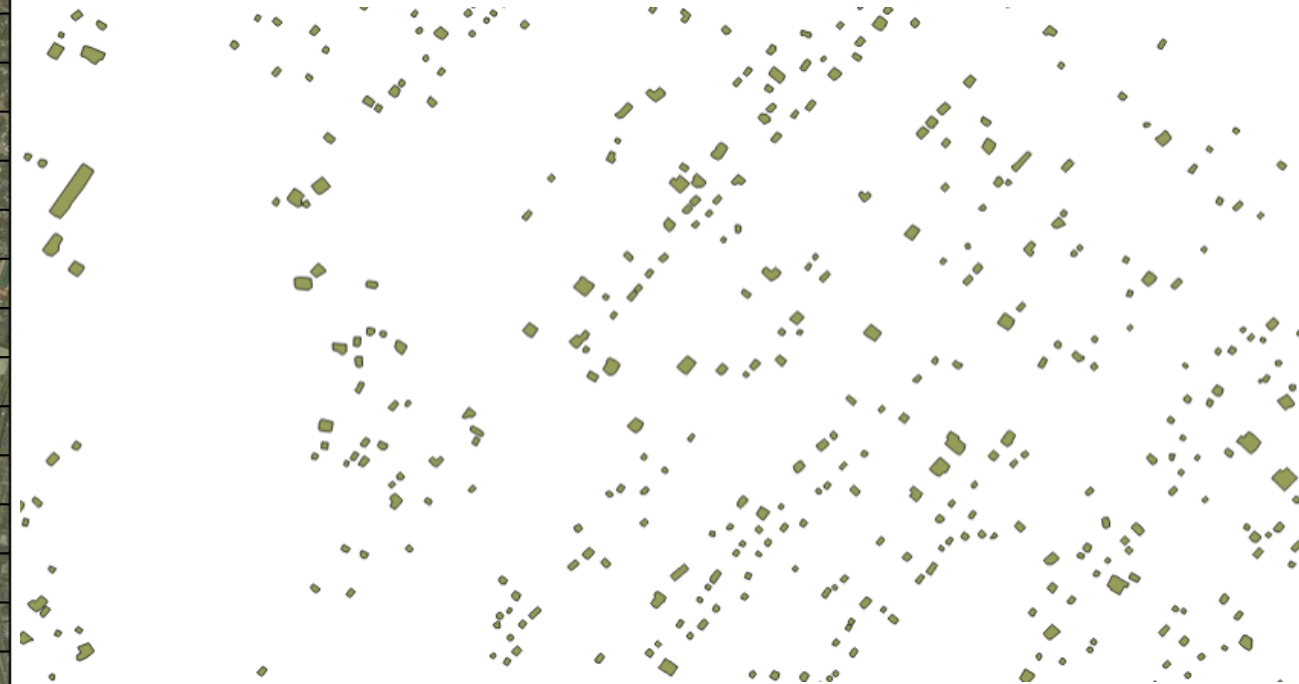
How many pregnant women were at risk after the **2015 Nepal earthquake**?



Intercensal population estimate map



Updated satellite-derived building map



Census Planning

GRID3 Country level impact

Health



Photo credit: Maggie Hallahan, Flickr

Infrastructure and Climate



Education



Photo credit: Steve Jurvetson, Flickr

Agriculture and Resources



GRID3 Global impact





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