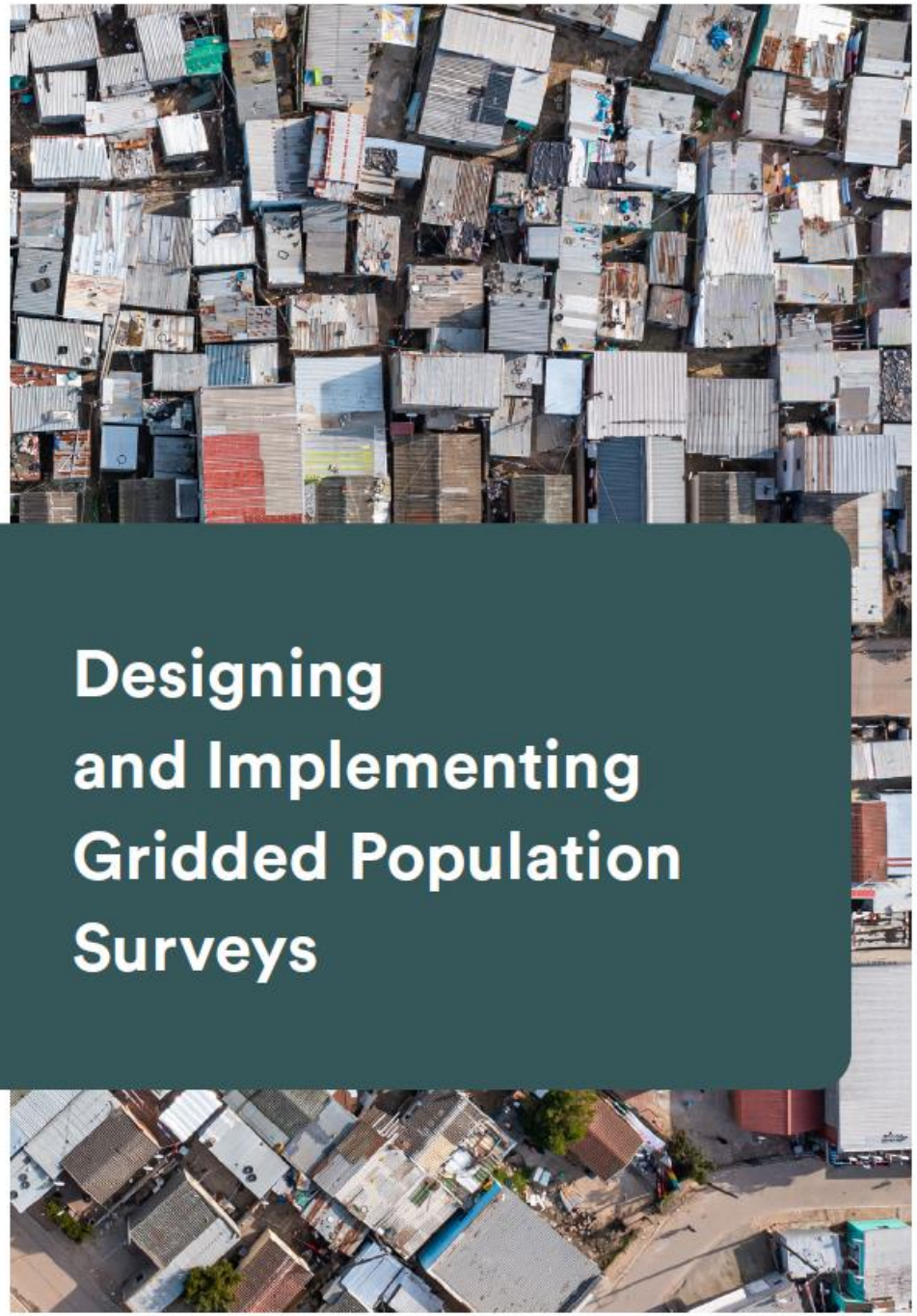

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Gridded Population Sampling

Dana R Thomson & Dale Rhoda

www.gridpopsurvey.com

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Overview

What is gridded population sampling?

Who uses it? For what?

When is gridded population sampling (not) appropriate? Why?

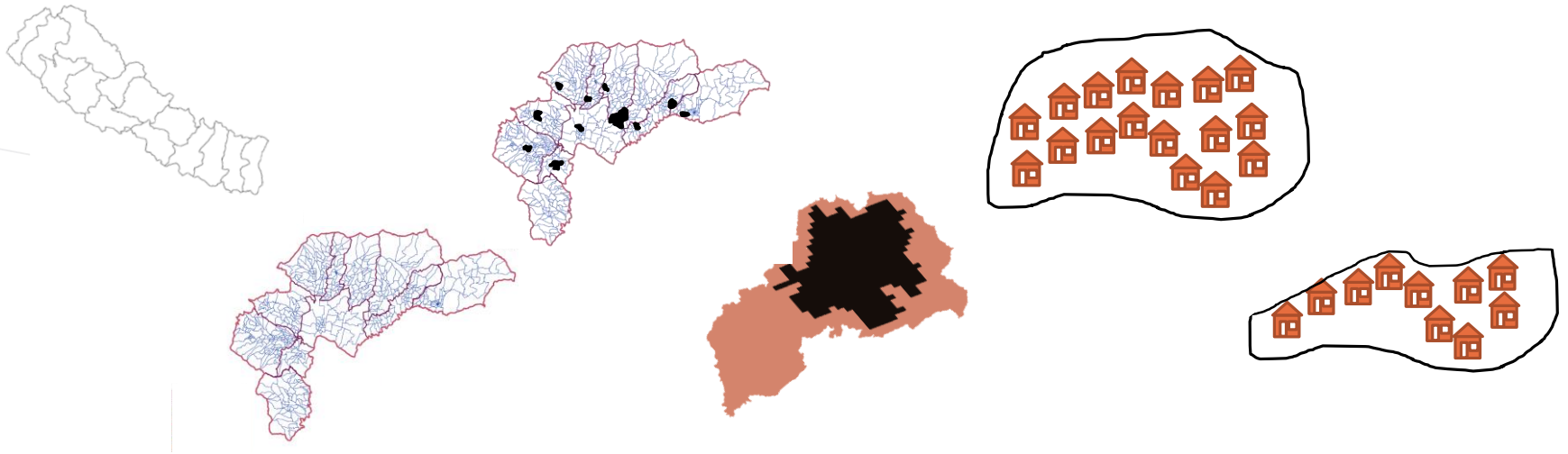
What tools can I use?

State of the field?

Example

Typical household survey in LMIC

Stratify by subnational region → In each stratum, list EAs → Sample EAs (now PSUs) → Oversample urban domain (optional) → Enumerate buildings in PSUs → Segment PSUs (if needed) → List households in segmented PSUs → Sample households (now SSUs)



Building	Dwelling	Household
1	1	1
1	1	2
1	2	1
1	3	1
2	1	1
2	1	2
3	1	1
4	1	1
4	2	1
.....	.....	.....

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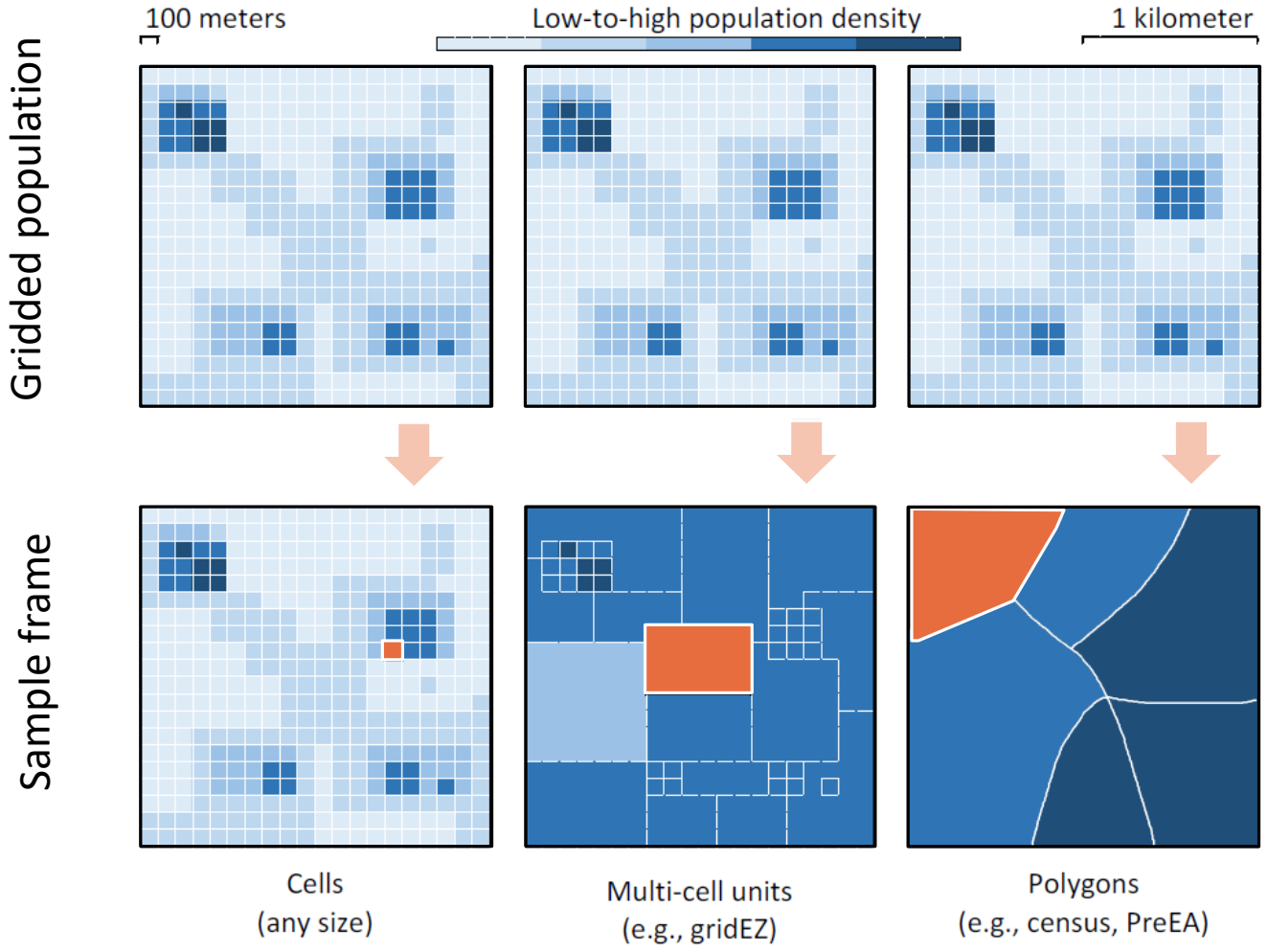
What is gridded population sampling?

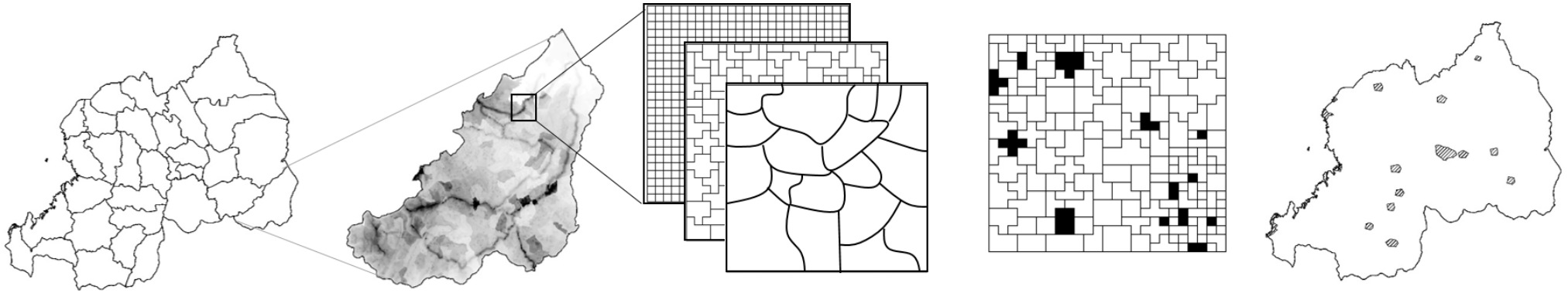


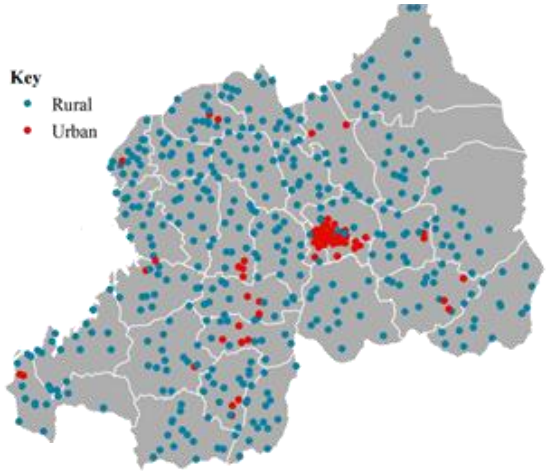
Any survey in which the sample frame is derived from modelled gridded population estimates

Example

Gridded population survey in LMIC (Draw PSUs)

(Optional) Stratify by subnational region → Create and list single-cell, multi-cell, or polygon units from gridded population data → Sample from unit listing (PSUs) → (Optional) oversample urban/rural





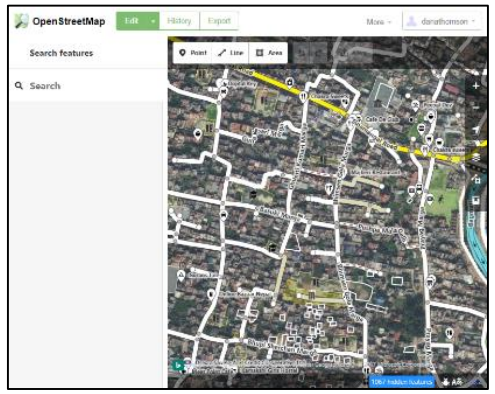
Output:

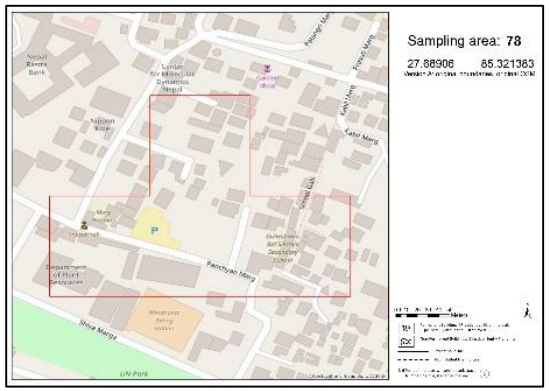
Gridded PSU boundaries with specified population and maximum area

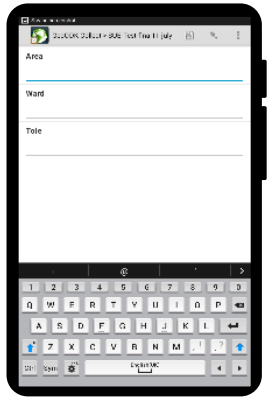
Example

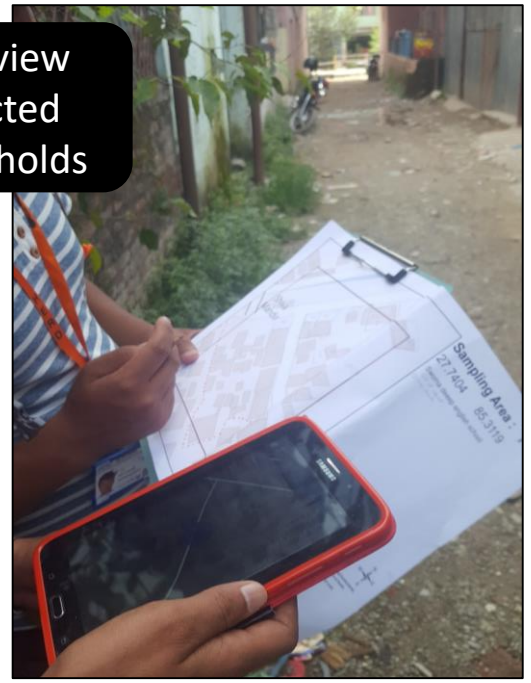
Gridded population survey in LMIC (Draw SSUs)

Pre-field enumeration in OpenStreetMap → Field enumeration (paper or digital) → List households (paper or digital) → Interview selected households





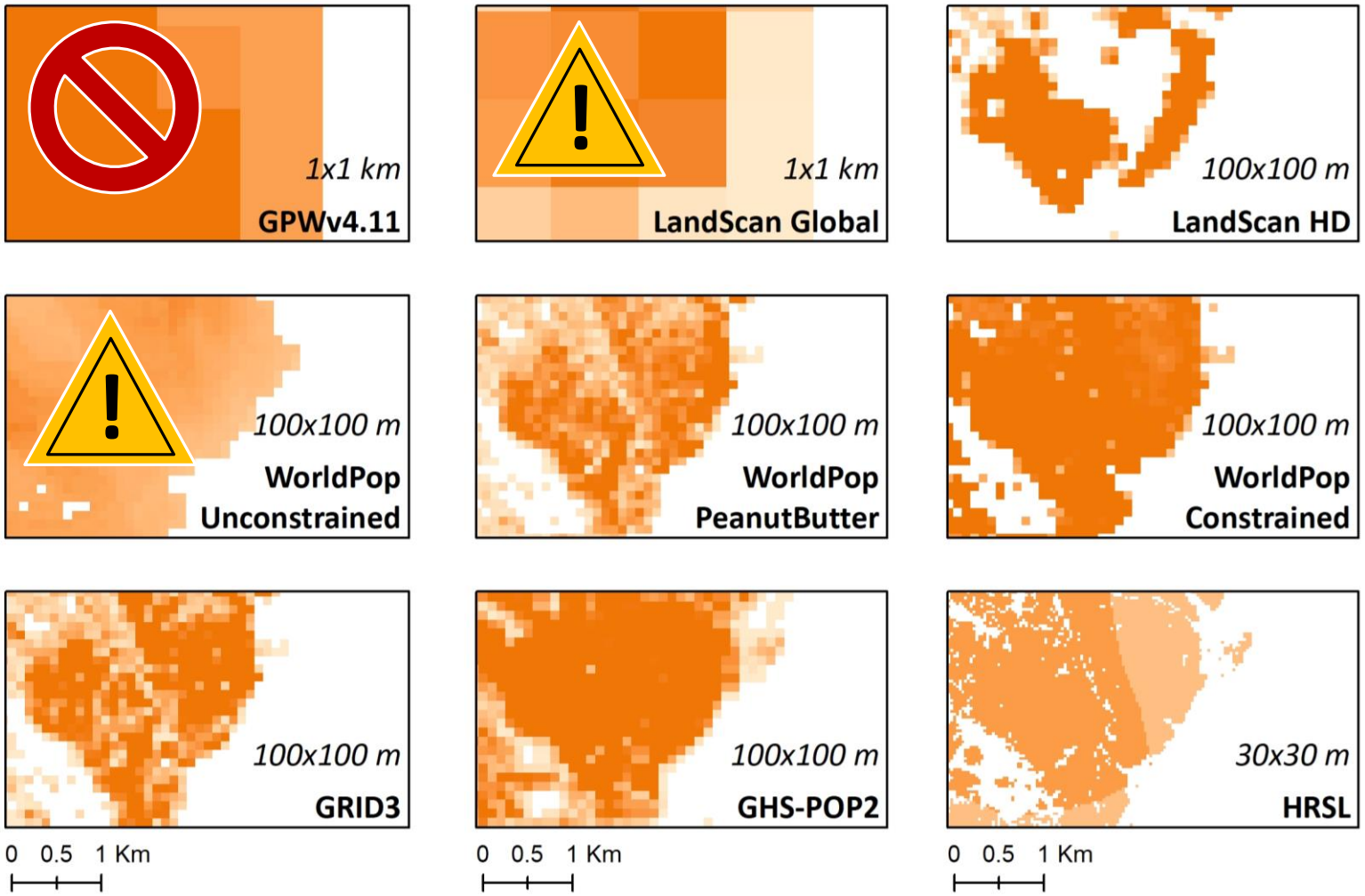




Output:

Geographically accurate digital map of each PSU, and a digital listing of households

Available gridded population datasets



Check out the manual

- ✓ Plain language descriptions of model methods
- ✓ Pros/cons for gridded population surveys

Who uses gridded population sampling? For what?

Number of gridded pop. surveys in LMICs is likely 2X or 3X greater today

Thomson, Rhoda, et al. (2020) **Gridded population survey sampling: A systematic scoping review of the field and strategic research agenda**. Int J Health Geogr. https://doi.org/10.1186/s12942-020-00230-4

When is gridded population sampling NOT appropriate?

- Recent widely-trusted census
- Very small coverage area (e.g., neighborhood)
- Survey planning team does not have:
  - Internet
  - Knowledge of basic mapping tools (e.g., Google Earth, Google Maps)

HERD International Kathmandu 2017

When is gridded population sampling appropriate?

- Census is grossly outdated or inaccurate
- Dangerous area
- Highly dynamic and complex
- Stratify by geographic characteristics

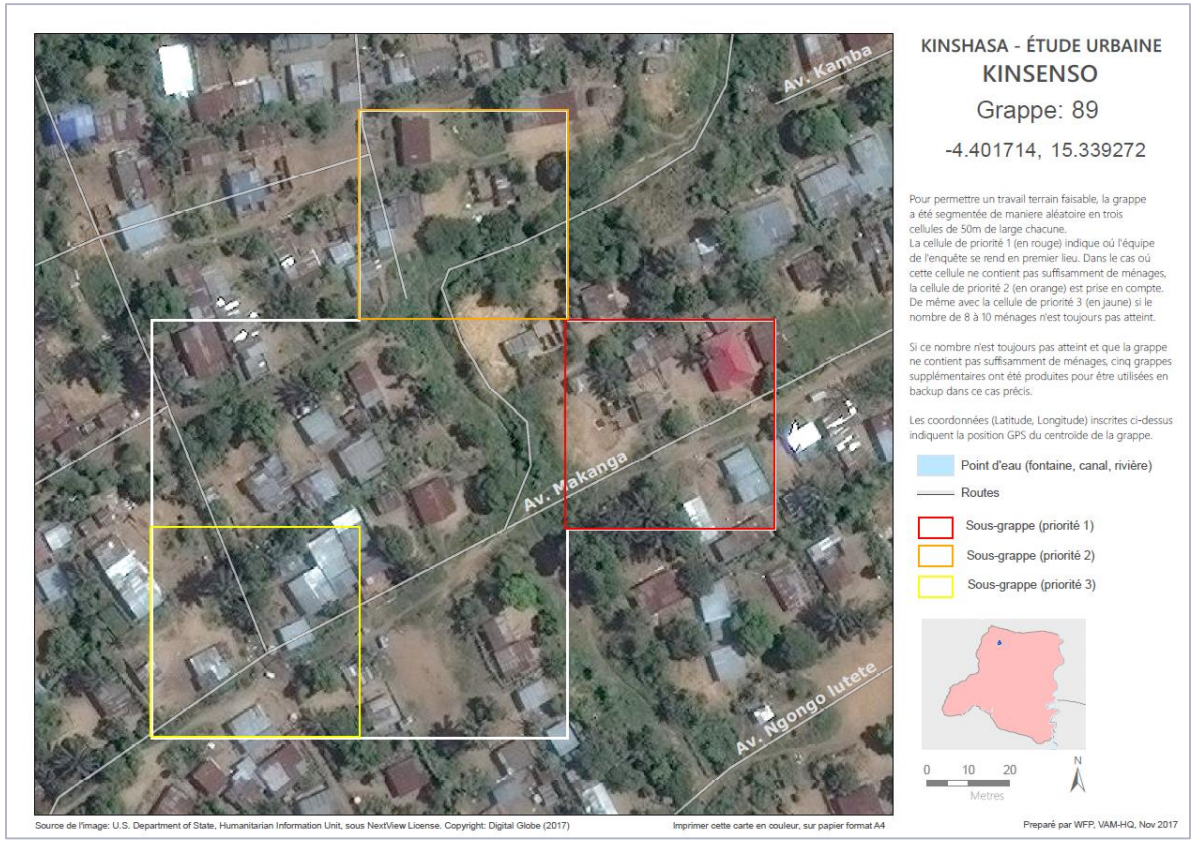
- *Distribution* of gridded populations are often more accurate than under-lying outdated/inaccurate census
- Small grid cells enable area-microcensus designs with 1 field visit
- Unlike listers, interviewers can build rapport & identify “hidden” HHs
- Gridded population sample frames are explicitly spatial

JEI / SDI
Lagos 2020

Area-microcensus design example

Sample weights	1	2
Robust	One-stage or two-stage, area-microcensus	Two-stage, full-listing
Approx.	Two-stage, random-walk	

Visits to the field



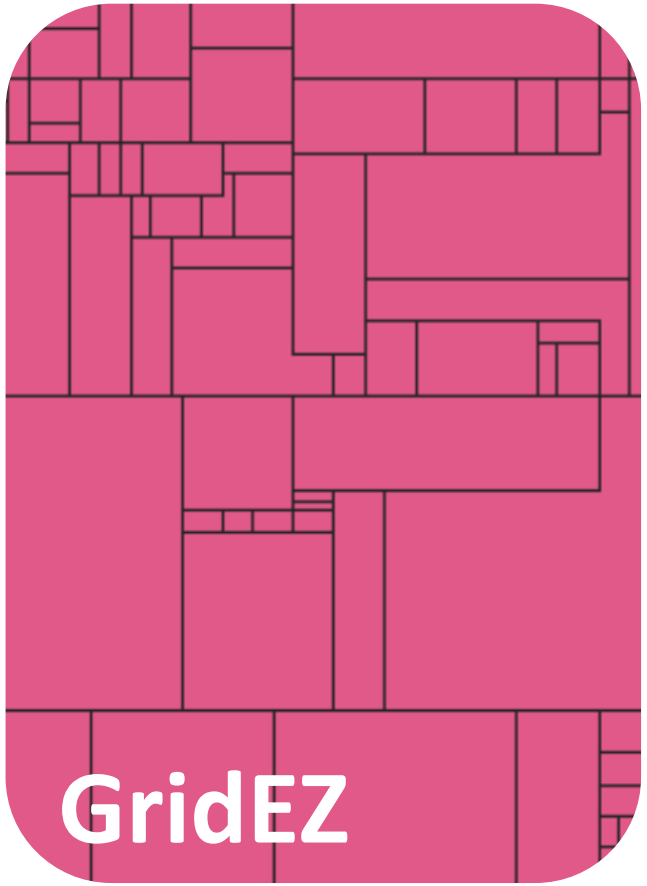
World Food Programme
Kinshasa 2017

Sample frame tools

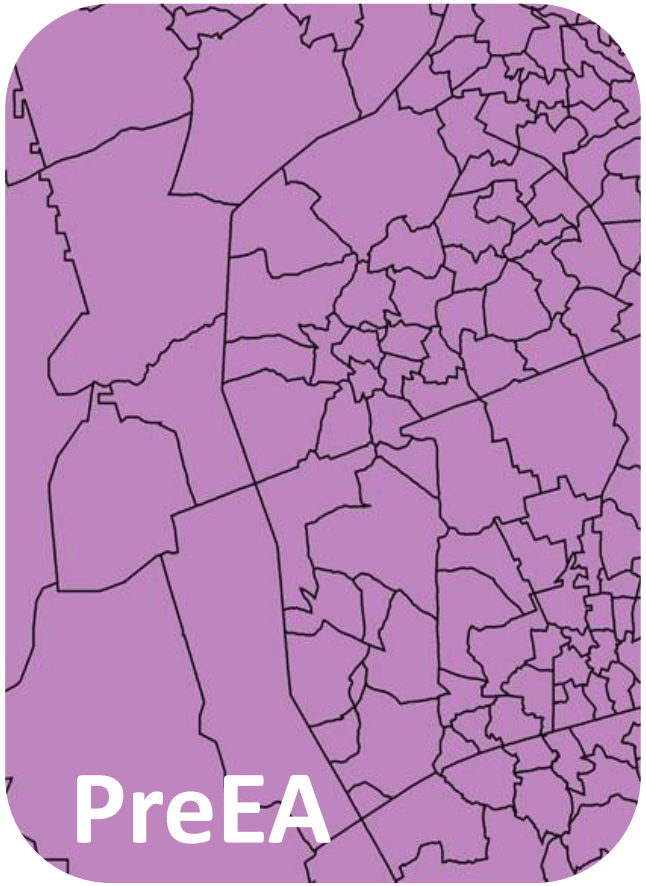
Non-GIS users

- Basic
- Intermediate
- Advanced

GridSample, R



RUPHIA
Uganda 2022



Census preparation
Burkina Faso 2019

GIS users

- Intermediate
- Advanced

QGIS

State of the field

Tools for designing and implementing gridded population surveys are piecemeal

Build better integrated tools

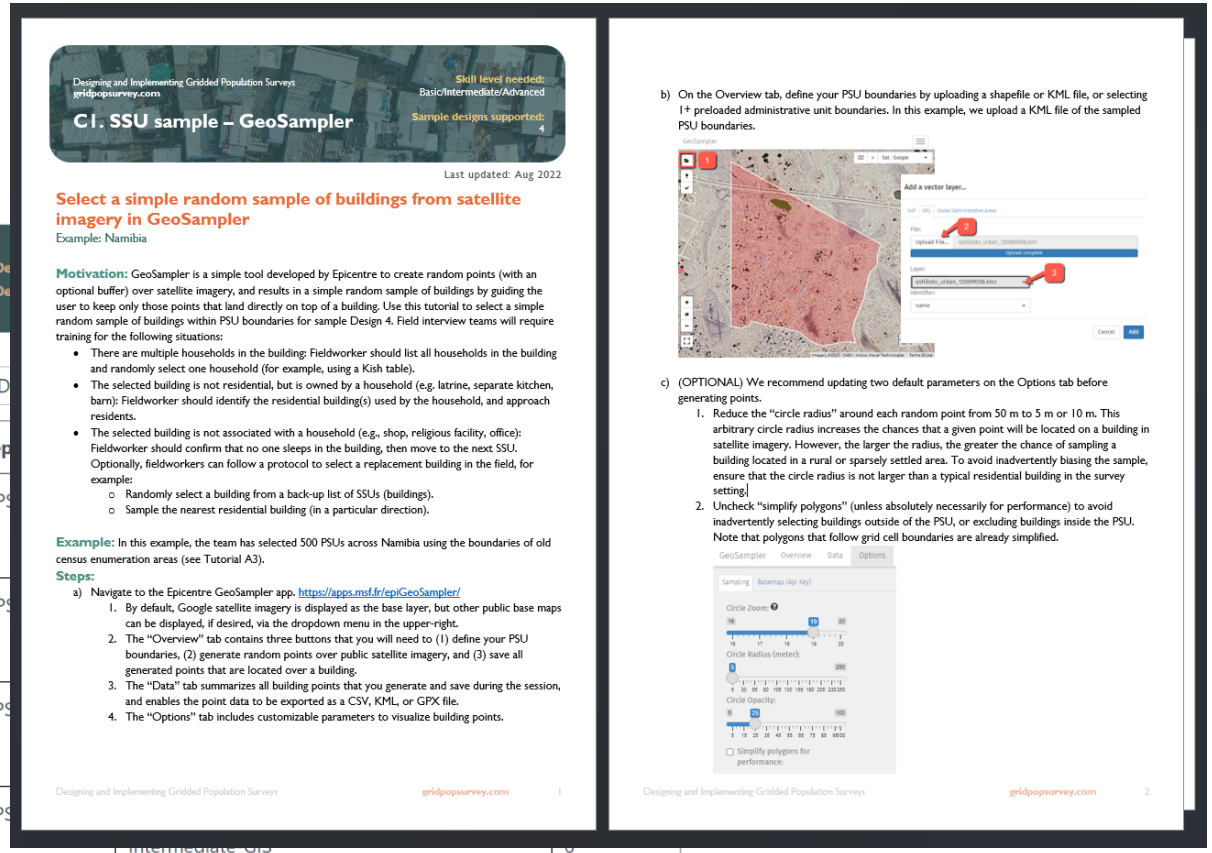
Gridded population datasets are evolving (and improving) rapidly

Use of field data to evaluate accuracy

Area-microcensus designs are promising, but need study (e.g. design effects)

Develop an evidence base

Tutorials: Mix-and-Match



Design 1. Two-stage, detailed-listing
Design 2. Two-stage, quick-listing

Step | Intermediate

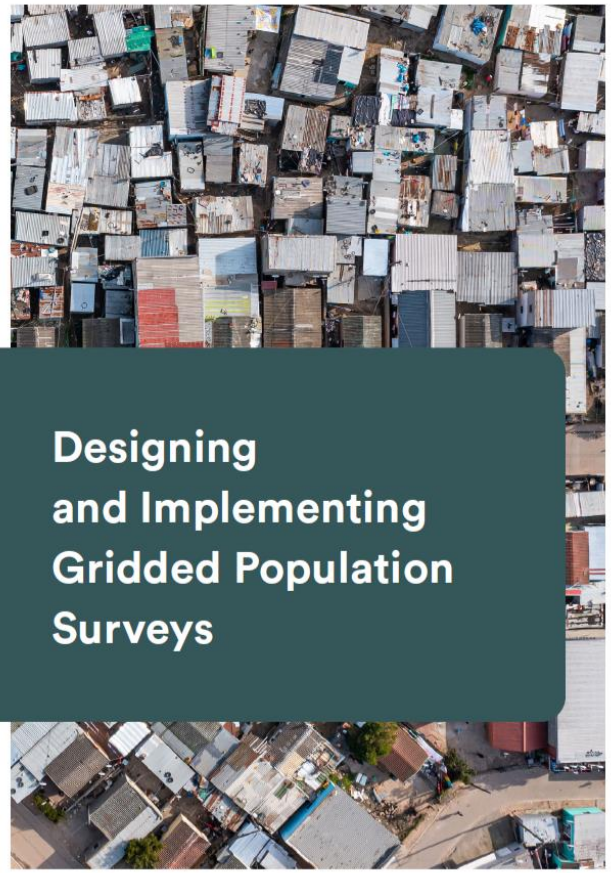
Advanced
Advanced-GIS
Basic
Intermediate
Intermediate-GIS

Image	Tutorial			
A1	A1. PSU San selection			
A3	A3. PSU San select PSUs			
B2	B2. PSU review – Google Earth segment	B. PS		
B5	B5. PSU review – Excel to drop & replace	B. PS		
C1	C1. SSU sample – GeoSampler	C. SSU Sample	Advanced, Advanced-GIS, Basic, Intermediate, Intermediate-GIS	4

Filter relevant tutorials

Download & modify in Word

Assemble your custom manual!



Thank you

www.gridpopsurvey.com

By skill level:
- ✓ Decision-trees
- ✓ Step-by-step tutorials

For each design:
- ✓ Real-world survey profile
- ✓ Sample weights calculations

SCAN ME

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