Title of template

**Skill level needed:**Intermediate/Advanced with GIS skills

**Sample designs supported:**

1, 2, 3, 4

Designing and Implementing Gridded Population Surveys

**gridpopsurvey.com**

**A2. PSU sample – ArcGIS frame**

Last updated: Aug 2022

**Generate sample frame in ArcGIS**

## Example: Namibia

**Motivation:** GIS users with their own PSU boundaries can use this tutorial to aggregate gridded population estimates within PSU boundaries, thereby updating the population count in each sample frame unit. Generally, users will not have PSU boundaries small enough to support sample Design 5, and Design 6 requires multi-cell gridded units.

**Example:** In this hypothetical example, the team has access to census enumeration area (EA) boundaries from the 2011 Namibia census, and they want to update EAs with population estimates from the 2020 WorldPop-Constrained gridded population estimates.

**Steps:**

1. Open the EA boundaries shapefile and gridded population raster dataset (called “nam\_ea.shp” and “nam\_ppp\_2020.tif”, respectively, in this example), and ensure that their projections match.

Graphical user interface, application

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A picture containing map

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1. Use the “Zonal Statistics as Table” tool to sum the 2020 WPG-Constrained gridded population estimates by EA boundary.

**Cells are aggregated within polygons based on the cell centroid location. For more advanced areal weighting of cells to polygons based on area of cell that is located in the polygon, python or R programming should be used.**

1. Use a “Table Join” to add the WPG-Constrained population estimates to the EA boundaries.
2. Then “Export Data” to a new permanent EA boundary file with 2020 population estimates.

Graphical user interface, application, Word, Excel

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**Before selecting a PPS sample of EAs (in Excel, statistical software, or programming language), check that all sample frame units have a non-zero population estimate, and that they have appropriate population sizes. If you wish to manually aggregate and/or segment EAs with small or large population estimates before sample selection, see Tutorials B1 and B3.**

1. Finally, join any additional attributes that you wish to use in the sample design. In this example, the team will stratify by Namibia’s 14 current regions and urban/rural areas. Namibia had only 13 regions during the 2011 census, but Kavango region has since been split into two, and urban areas have expanded dramatically.
   * + 1. Use a current list of constituencies[[1]](#footnote-1) (NAME\_2) to classify EAs in Kavango West vs Kavango East region (NAME\_1\_NEW).

Graphical user interface, application, Excel

Description automatically generatedA screenshot of a computer

Description automatically generated with medium confidence

* + - 1. Use an urbanicity dataset[[2]](#footnote-2) to determine if EAs are majority urban. In WorldPop’s “urban” building layer, 1=urban cells, 0=rural cells, and NA=cells without buildings. Therefore, we can calculate “mean” urbanicity value in each EA to determine if the majority (>0.5) of settled cells are considered “urban”, and then classify those EAs as such.

Map

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* + - 1. Add EA centroid latitude and longitude coordinates to support implicit stratification later in the process.

Graphical user interface, application, Excel

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Map

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Table

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1. <https://en.wikipedia.org/wiki/Constituencies_of_Namibia>

   [↑](#footnote-ref-1)
2. For example, Global Human Settlement FUA or SMOD datasets <https://ghsl.jrc.ec.europa.eu/download.php>, or WorldPop’s “urban” buildings layer <https://wopr.worldpop.org/?/Buildings>

   [↑](#footnote-ref-2)