

Bayesian Subnational Estimation using Complex Survey Data: Case Study (Kenya 2014 DHS)

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Overview of this session

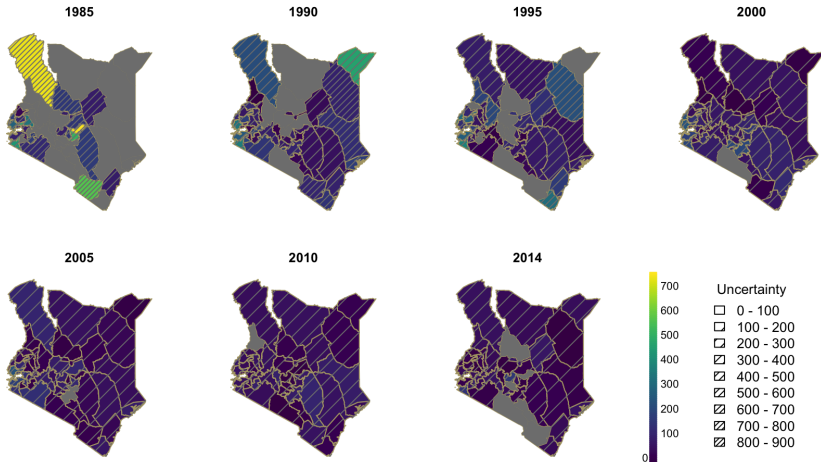
In this session, we will explore the following workflow in a case study:

- Download and work with real DHS data (Kenya 2014 DHS)
 - Birth records and GPS data, both require registration with DHS.
 - URL: https://dhsprogram.com/data/dataset/Kenya_Standard-DHS_2014.cfm?flag=0
- We will map sampled clusters to county-level map of Kenya,
 - Both province and county maps are available online and are needed in modeling.
 - URL: <http://spatialdata.dhsprogram.com/boundaries/>

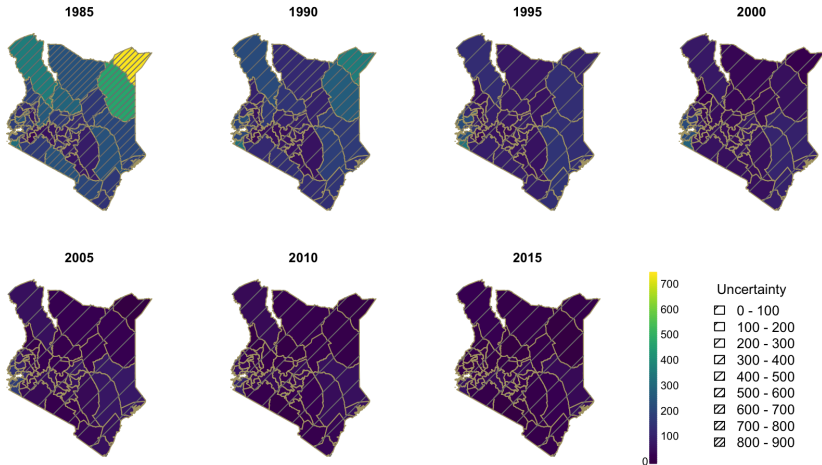
Overview of the models

- The target of these examples is to estimate yearly U5MR from 1985 to 2014 and projections to 2019, using one DHS survey.
- We will explore two types of models: **smoothed direct modeling**, and **cluster-level modeling**.
- The estimates will be compared to the **direct estimates**.
- We also discuss the reduced form of both models for national estimates.
- We will perform **bias adjustment** as well to illustrate some additional functionalities in SUMMER.
- We will also show how to examine model components.

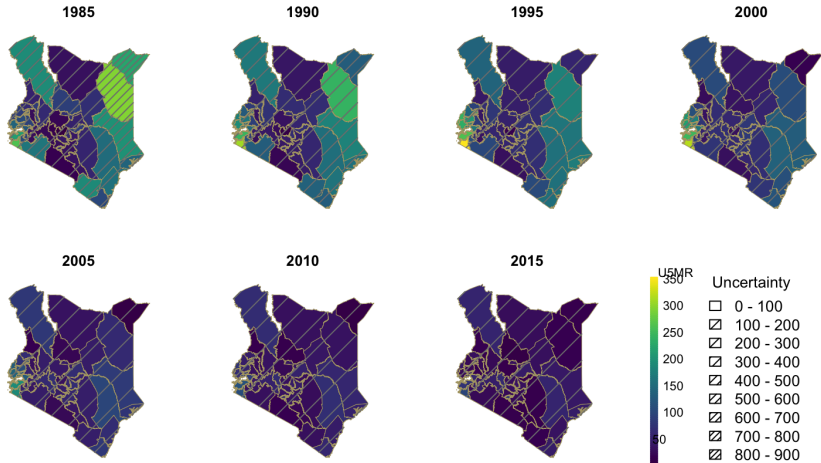
Preview of results: Direct estimates



Preview of results: Smoothed direct model



Preview of results: Cluster-level model



Learning objectives

- Understand the workflow of estimating U5MR.
- Understand function arguments in SUMMER.
- Understand output of SUMMER.
- Use visualization tools to evaluate and interpret fitted models.

Now we will switch to R

All codes and documentations are available on

<http://faculty.washington.edu/jonno/space-station.html>

Additional Resources

- Mercer, L., Wakefield, J., Pantazis, A., Lutambi, A., Mosanja, H., and Clark, S. (2015). *Small area estimation of childhood mortality in the absence of vital registration. Annals of Applied Statistics*
- Li, Z. R., Hsiao, Y., Godwin, J., Martin, B. D., Wakefield, J., and Clark, S. J. (2019). *Changes in the spatial distribution of the under five mortality rate: small-area analysis of 122 DHS surveys in 262 subregions of 35 countries in Africa. PLoS One.*
- Wakefield, J. and Fuglstad, G.-A. and Riebler, A. and Godwin, J. and Wilson, K. and Clark, S.J. (2018). *Estimating under five mortality in space and time in a developing world context. Statistical Methods in Medical Research.*
- SUMMER vignettes on CRAN: <https://cran.r-project.org/web/packages/SUMMER/index.html>