

Bayesian Subnational Estimation using Complex Survey Data: Space-time Smoothing in R

Zehang Richard Li

Departments of Biostatistics
Yale School of Public Health

Overview of this session

In this session, we will use two simulated datasets to illustrate three different scenarios of small area estimation (SAE):

- Spatial smoothing of the prevalence of a binary indicator.
- Space-time smoothing of neonatal mortality rates (NMR).
- Space-time smoothing of under-5 mortality rates (U5MR).

Learning objectives

- Perform spatial and space-time smoothing of a generic binary indicator in R.
- Compare naive, smoothed, weighted, and smooth weighted estimates.
- Understand different components in the smoothing models.
- Understand and calculate direct and smoothed direct estimates of U5MR.

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., Chen, C., and Lumley, T. (2014). A comparison of spatial smoothing methods for small area estimation with sampling weights. *Spatial Statistics*.
- 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*.
- SUMMER vignettes on CRAN: <https://cran.r-project.org/web/packages/SUMMER/index.html>