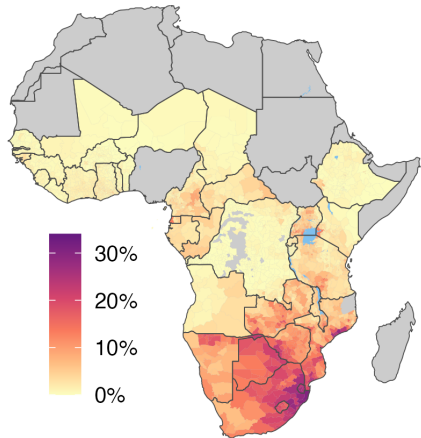
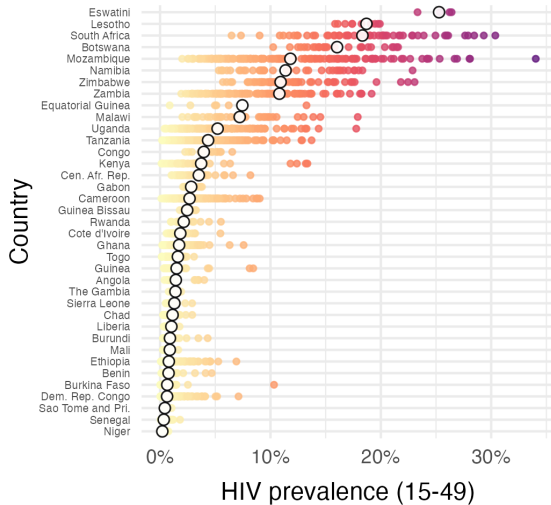


Bayesian spatio-temporal methods for small-area estimation of HIV indicators

Adam Howes

Imperial College London

March 2023



Source: UNAIDS Naomi model estimates, 2023

Proportional to number of neighbours

Average of neighbours

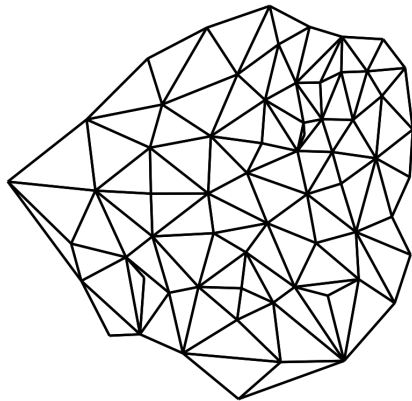
$$u_i \mid \mathbf{u}_{-i} \sim \mathcal{N} \left(\frac{1}{n_{\delta i}} \sum_{j:j \sim i} u_j, \frac{1}{n_{\delta i} \tau_u} \right)$$

i th full conditional

A



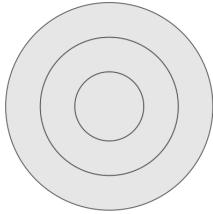
B



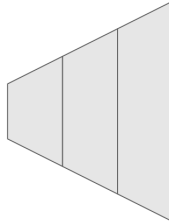
A



B



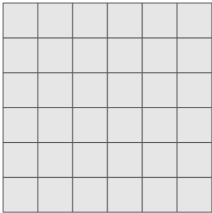
C



D



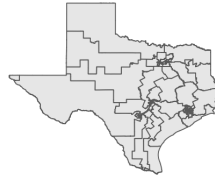
E

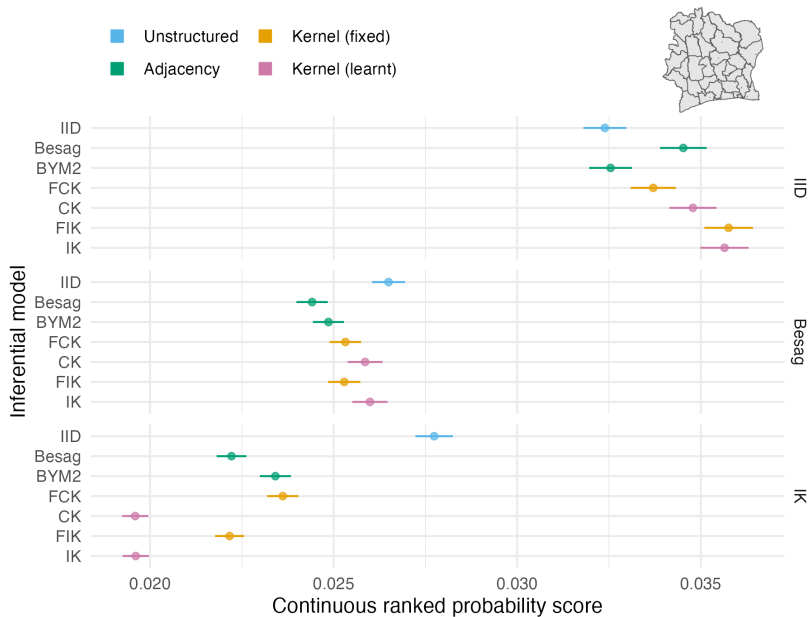


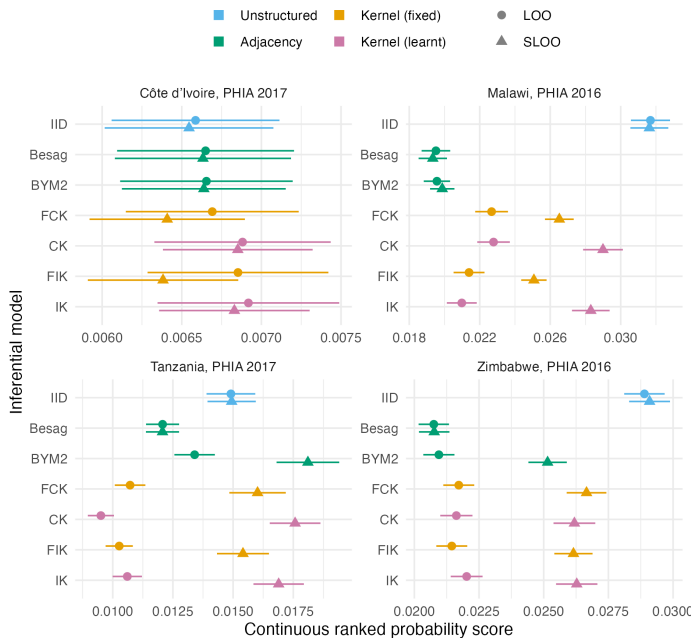
F



G

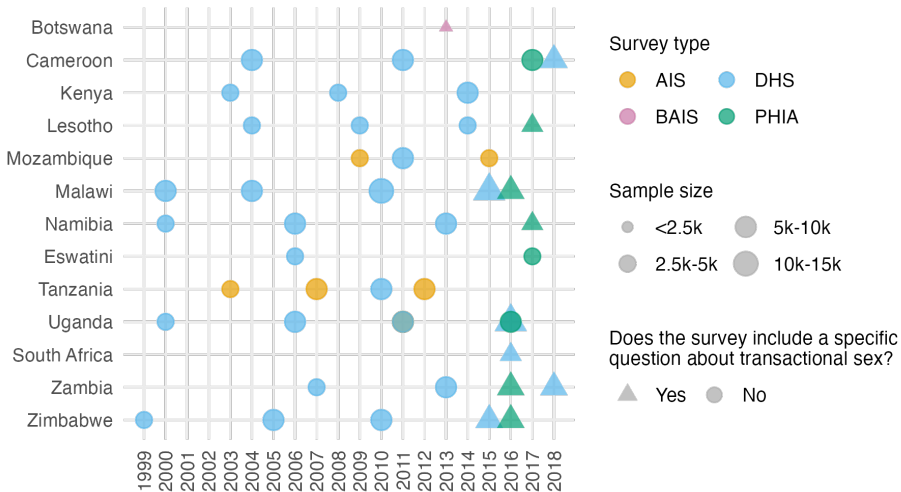




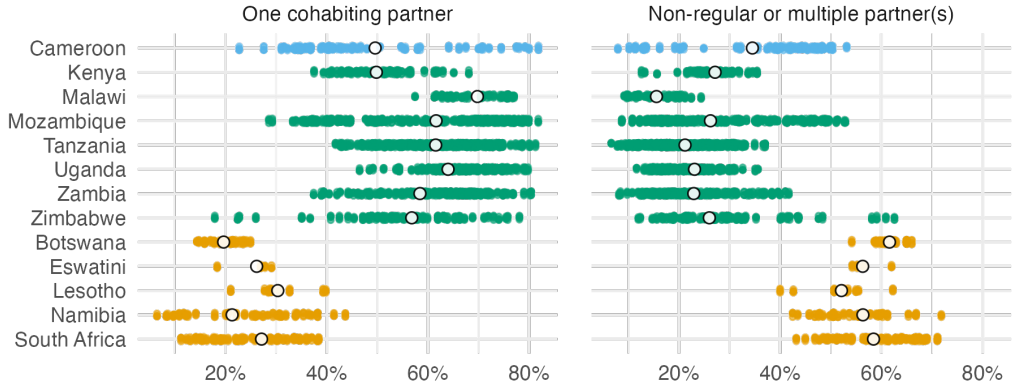


GLOBAL AIDS STRATEGY 2021-2026
**END INEQUALITIES.
END AIDS.**

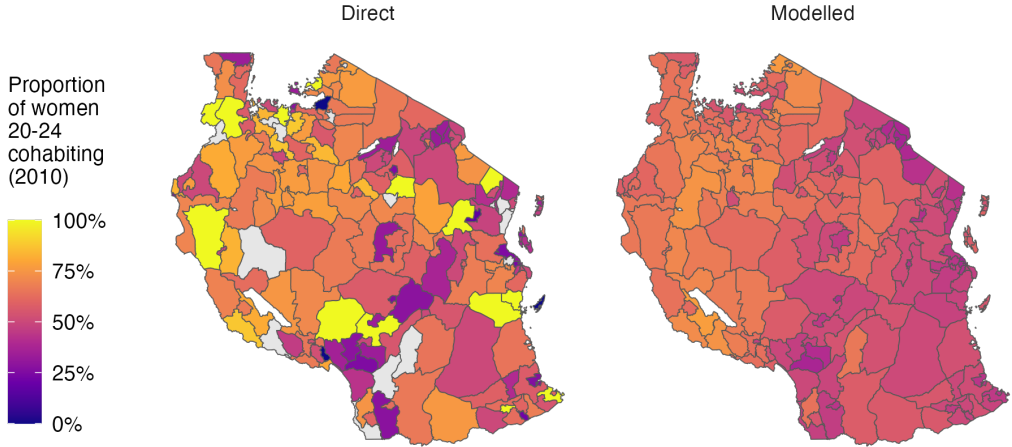


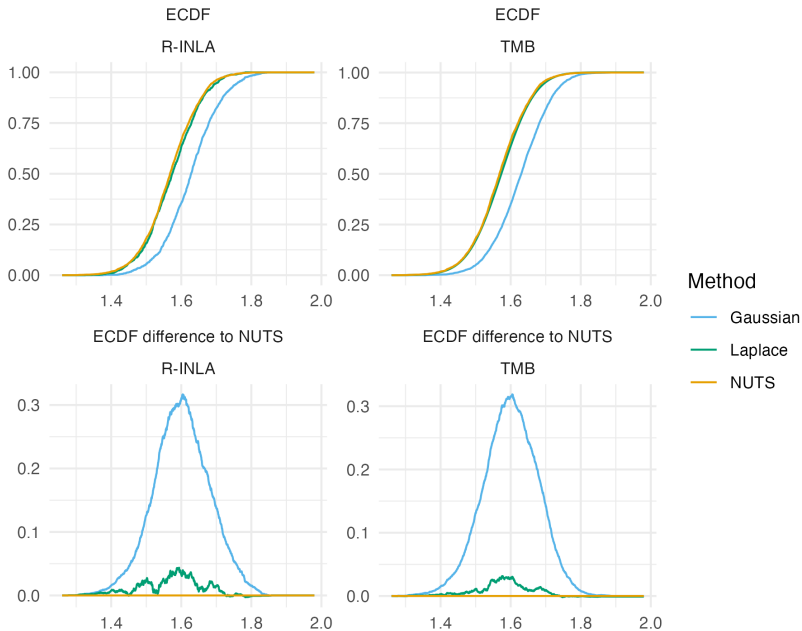


Regions of sub-Saharan Africa ● Central ● Eastern ● Southern

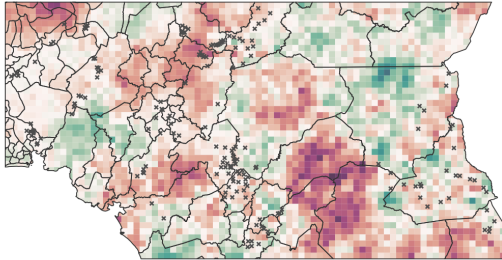


Not sexually active (not shown) + one cohabiting partner + non-regular or multiple partner(s) + FSW (not shown) = 100%

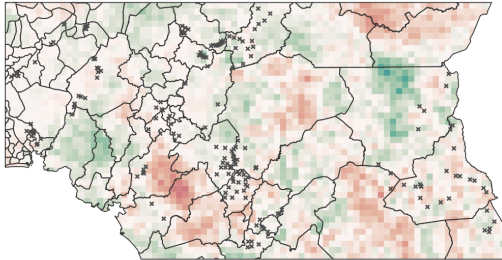




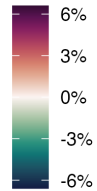
Gaussian



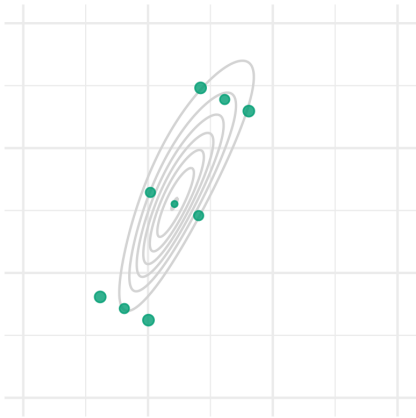
Laplace



Prevalence
difference
to NUTS

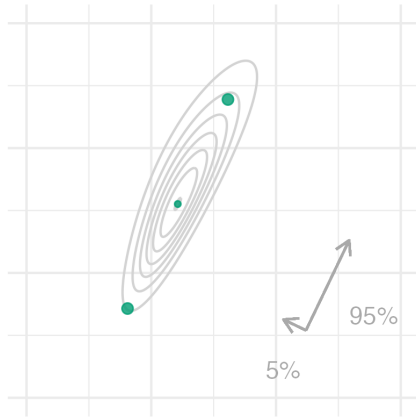


A

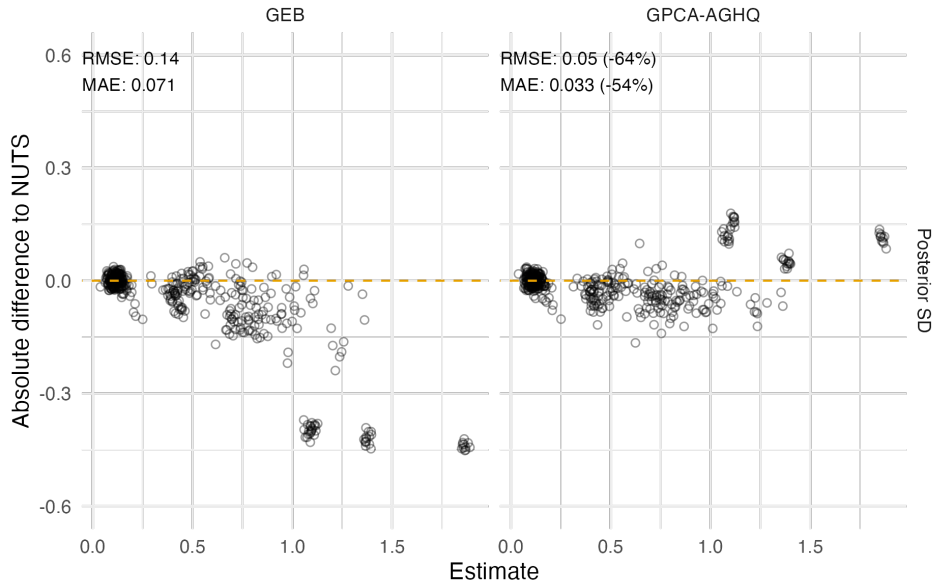


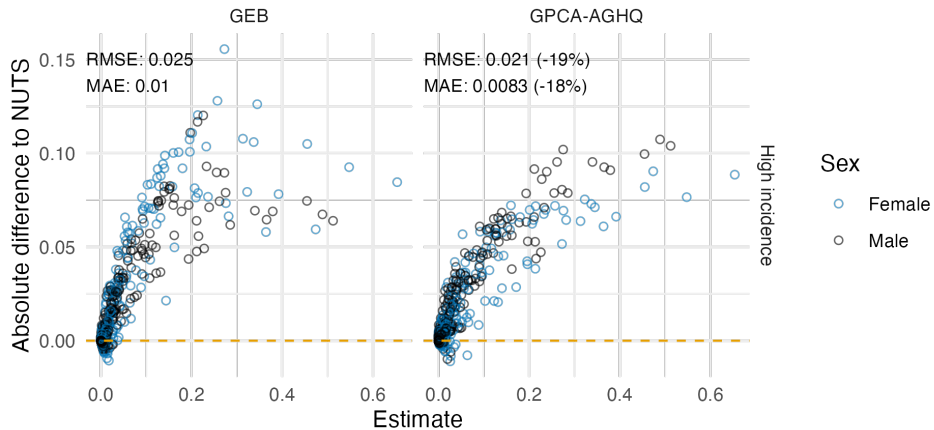
AGHQ (spectral)

B



PCA-AGHQ





Acknowledgements

Thanks to:

Collaborator	Affiliation
Jeff Eaton	Harvard, Imperial
Seth Flaxman	Oxford
Alex Stringer	Waterloo
HIV Inference Group	Imperial
Machine Learning and Global Health Network	Worldwide
StatML CDT	Imperial, Oxford