

# Why do we use spatial models?

Zambia HIV Estimates Technical Working Group

Adam Howes

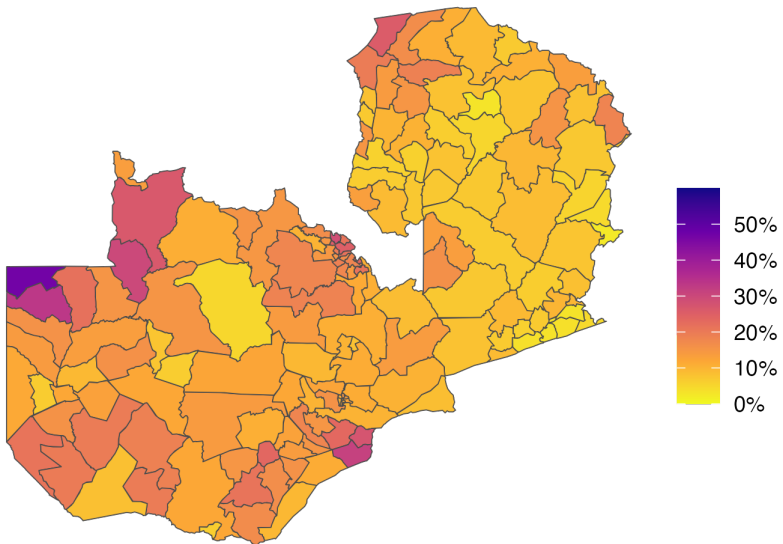
Imperial College London

August 2023

## The 156 constituencies of Zambia

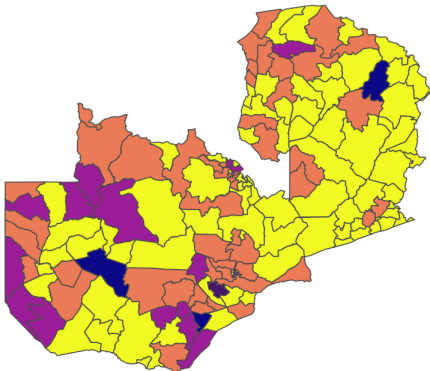


## Underlying truth

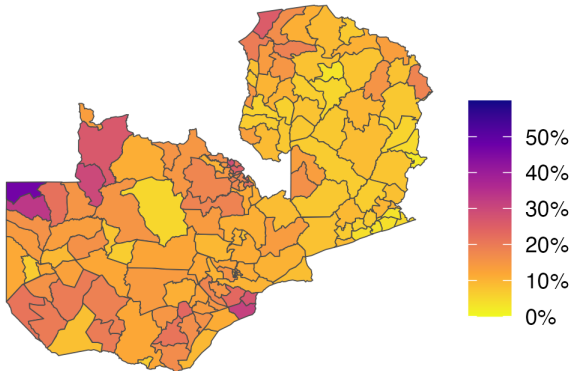


## Survey of size 5

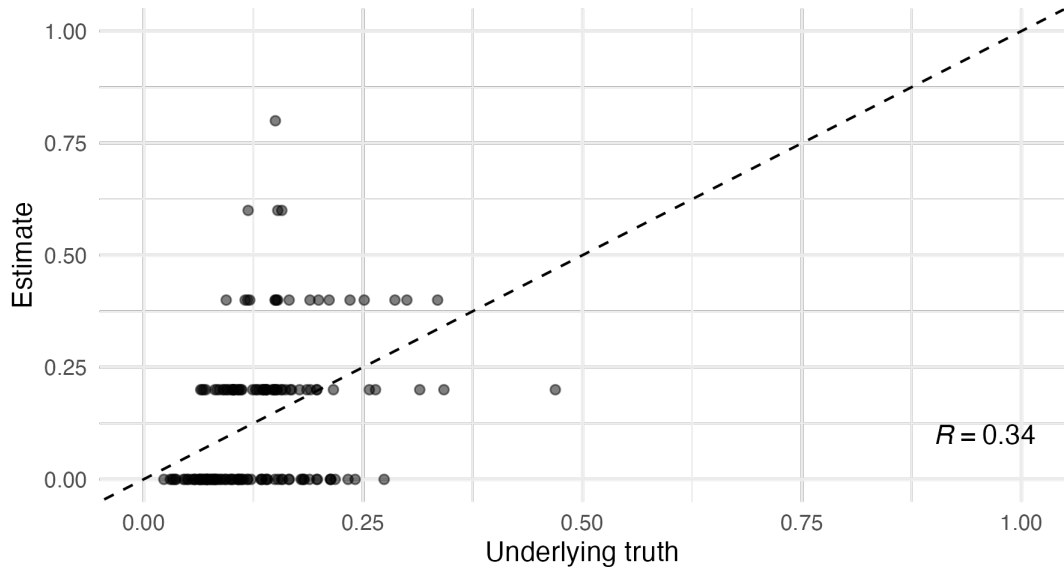
Direct estimates



Underlying truth

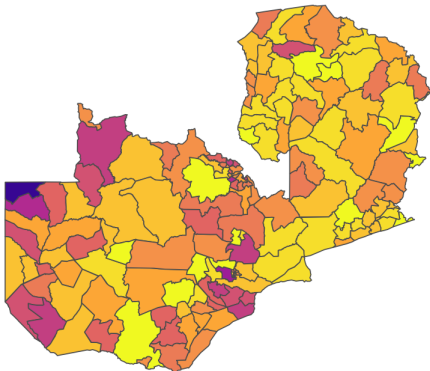


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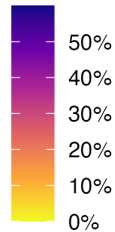
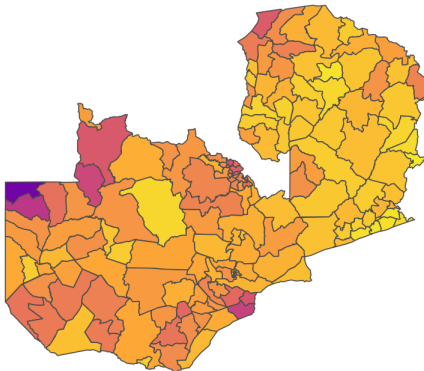


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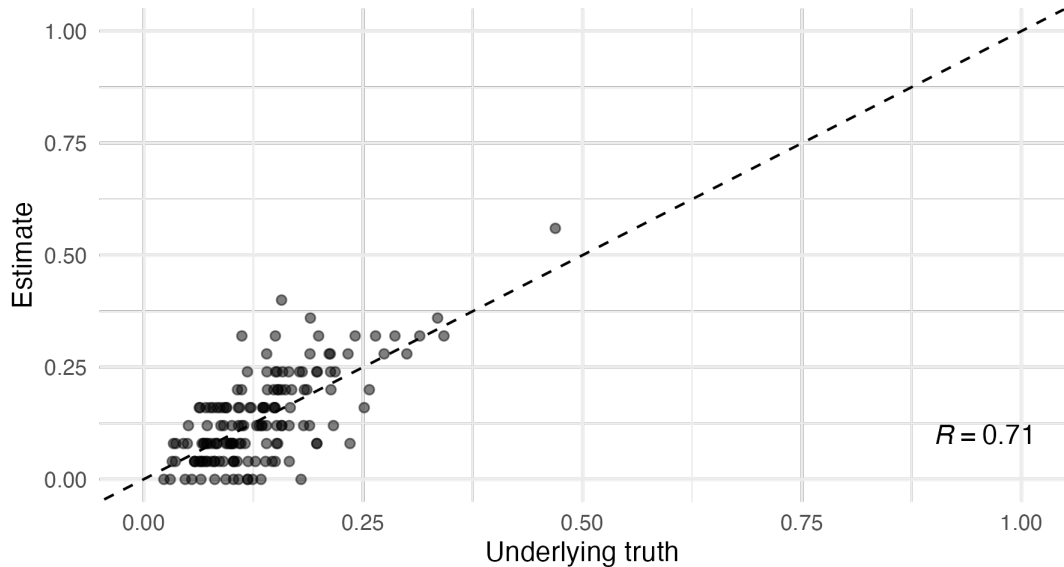
Direct estimates



Underlying truth

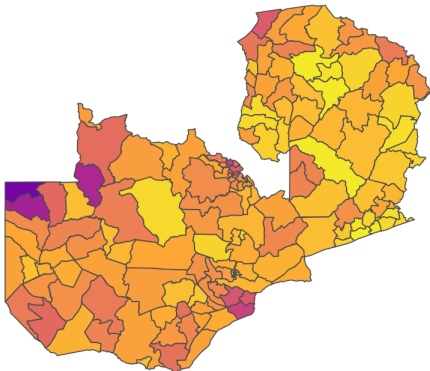


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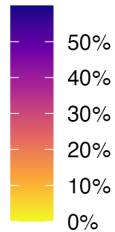
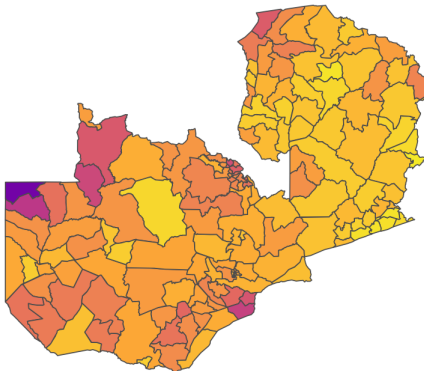


## Survey of size 125

Direct estimates

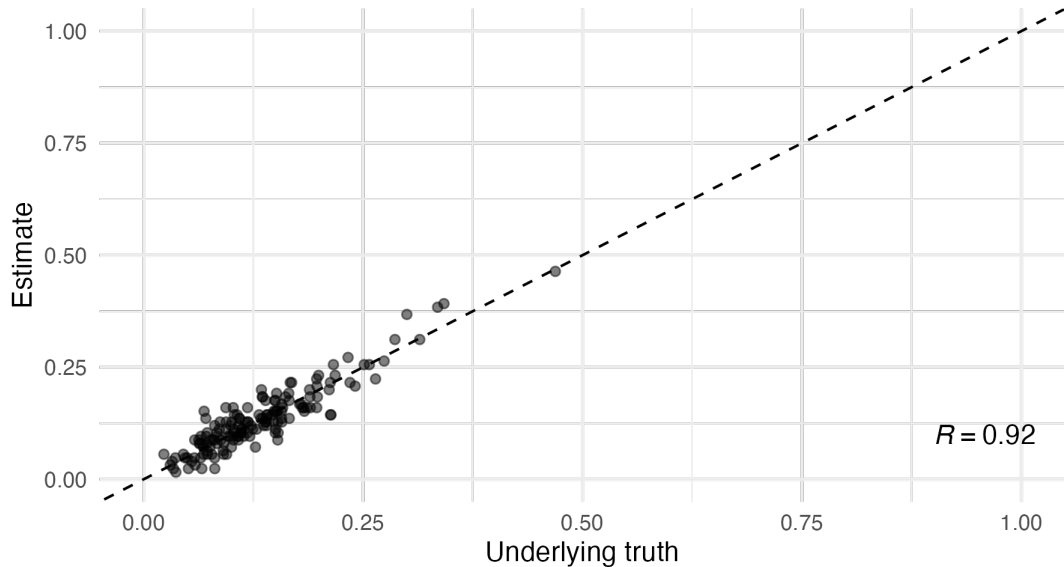


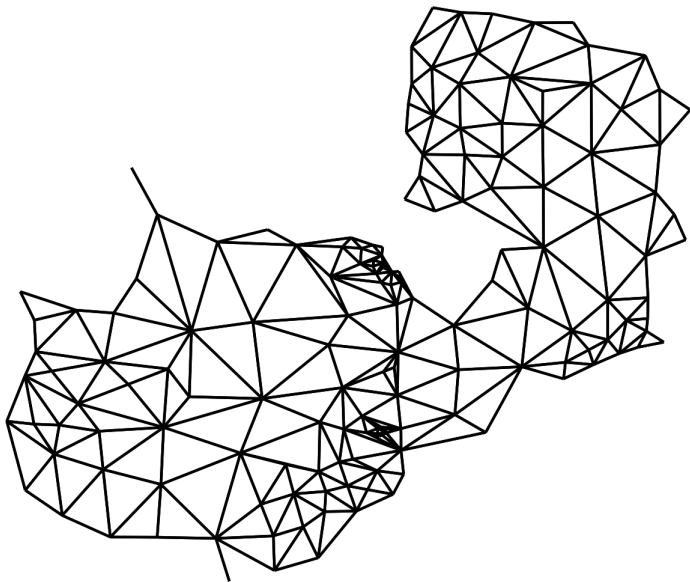
Underlying truth





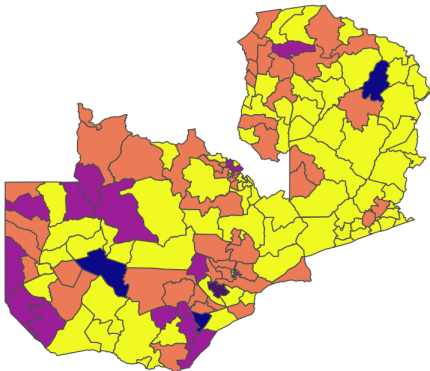
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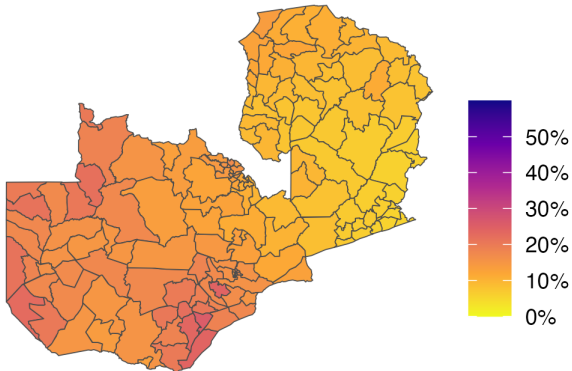


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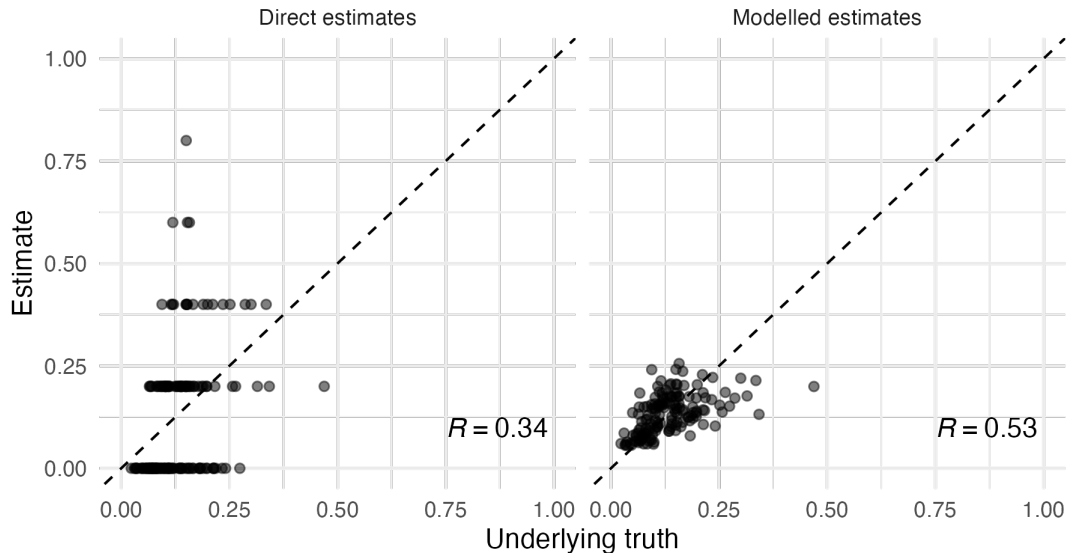
Direct estimates



Modelled estimates

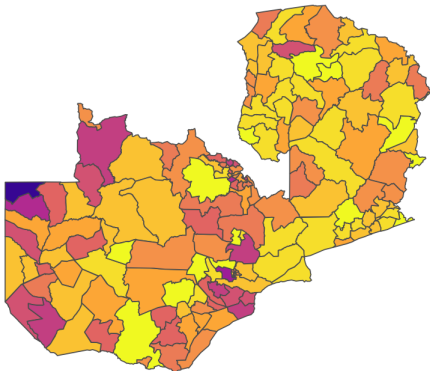


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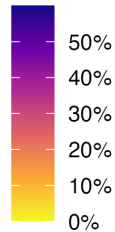
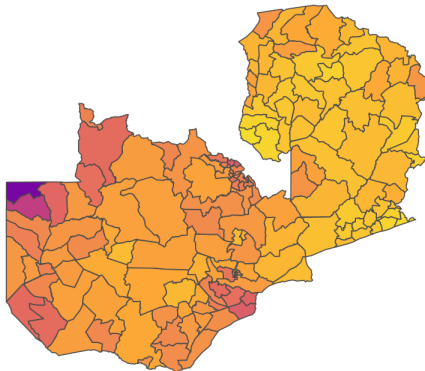


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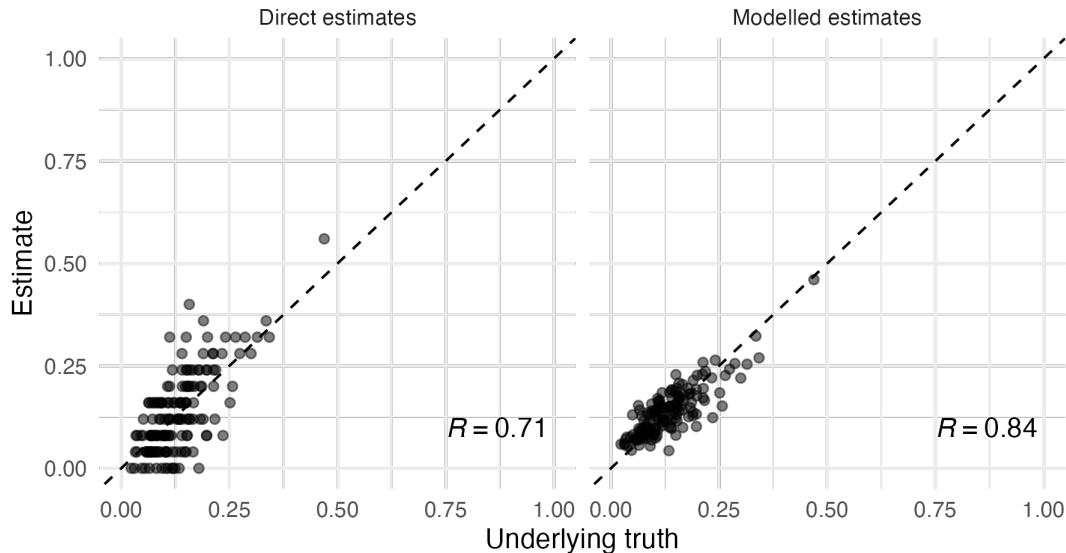
Direct estimates



Modelled estimates

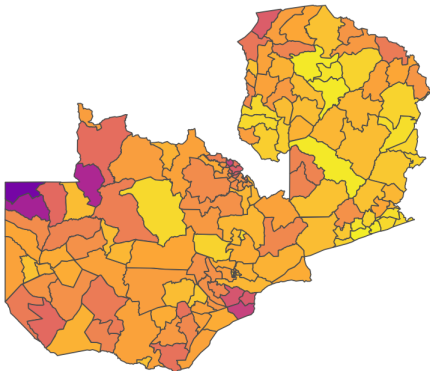


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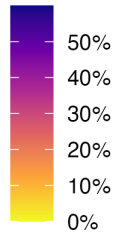
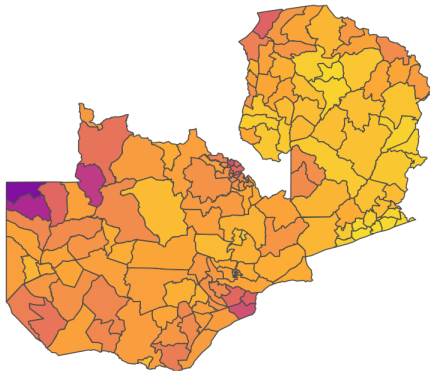


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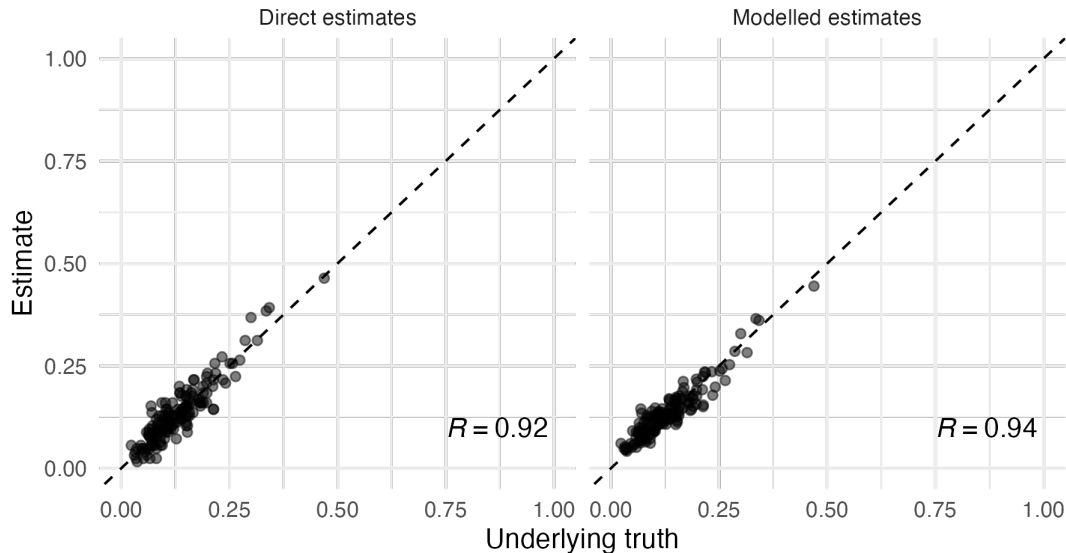
Direct estimates



Modelled estimates



## Survey of size 125





- Besag, York, and Mollié (1991)
- Simpson et al. (2017)

# Thanks for listening!



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Disease Analysis

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MACHINE LEARNING  
& GLOBAL HEALTH NETWORK

## References I

- Besag, Julian, Jeremy York, and Annie Mollié. 1991. "Bayesian image restoration, with two applications in spatial statistics." *Annals of the Institute of Statistical Mathematics* 43 (1): 1–20.
- Simpson, Daniel, Håvard Rue, Andrea Riebler, Thiago G Martins, and Sigrunn H Sørbye. 2017. "Penalising Model Component Complexity: A Principled, Practical Approach to Constructing Priors." *Statistical Science* 32 (1): 1–28.