Mapping the distribution of zero-dose children and their characteristics in low- and middle-income countries

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(and other WorldPop colleagues)

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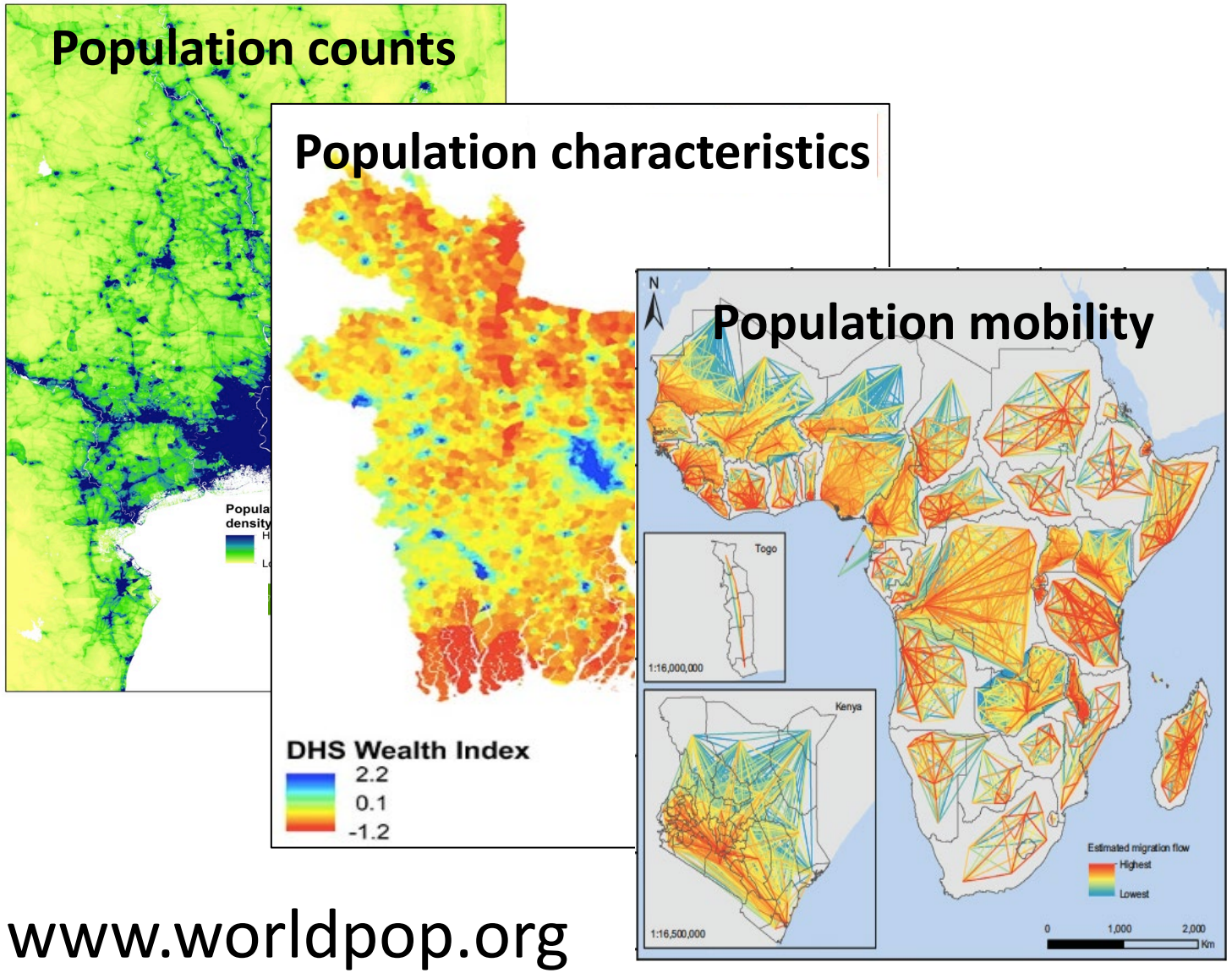
Incheon, Republic of Korea

28-30 March, 2023

WorldPop | University of Southampton | Gavi The Vaccine Alliance | Bill & Melinda Gates foundation

WorldPop and VaxPop



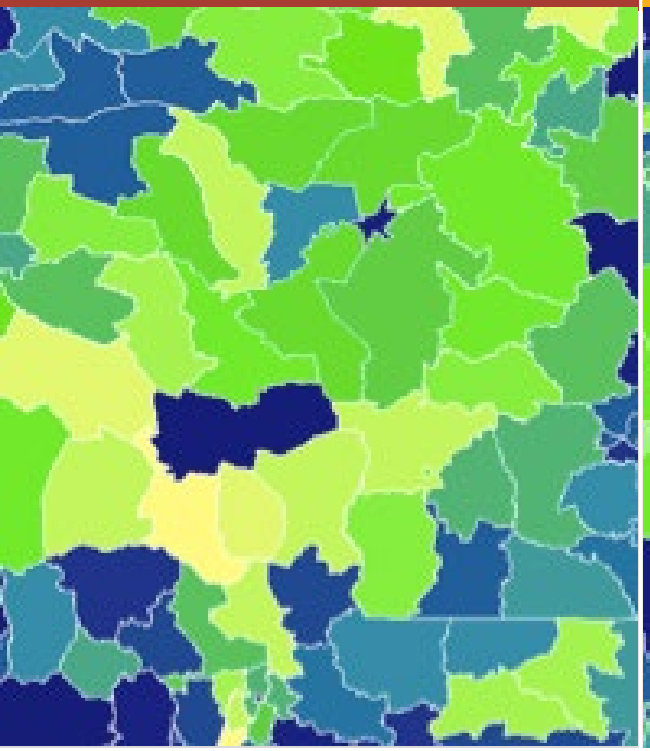
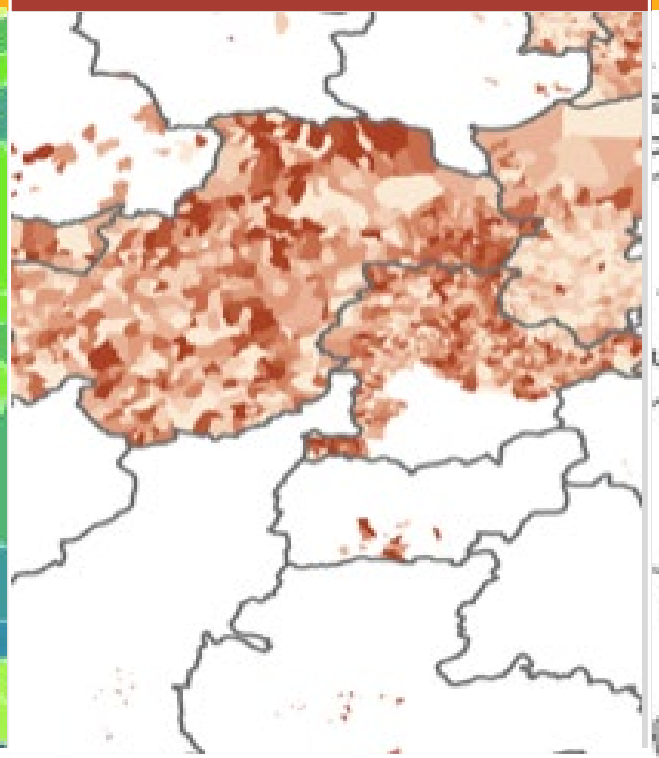
www.worldpop.org

Applied research group

Mapping small area demographics of low and middle income countries

Open data, open peer-reviewed statistical methods, user engagement

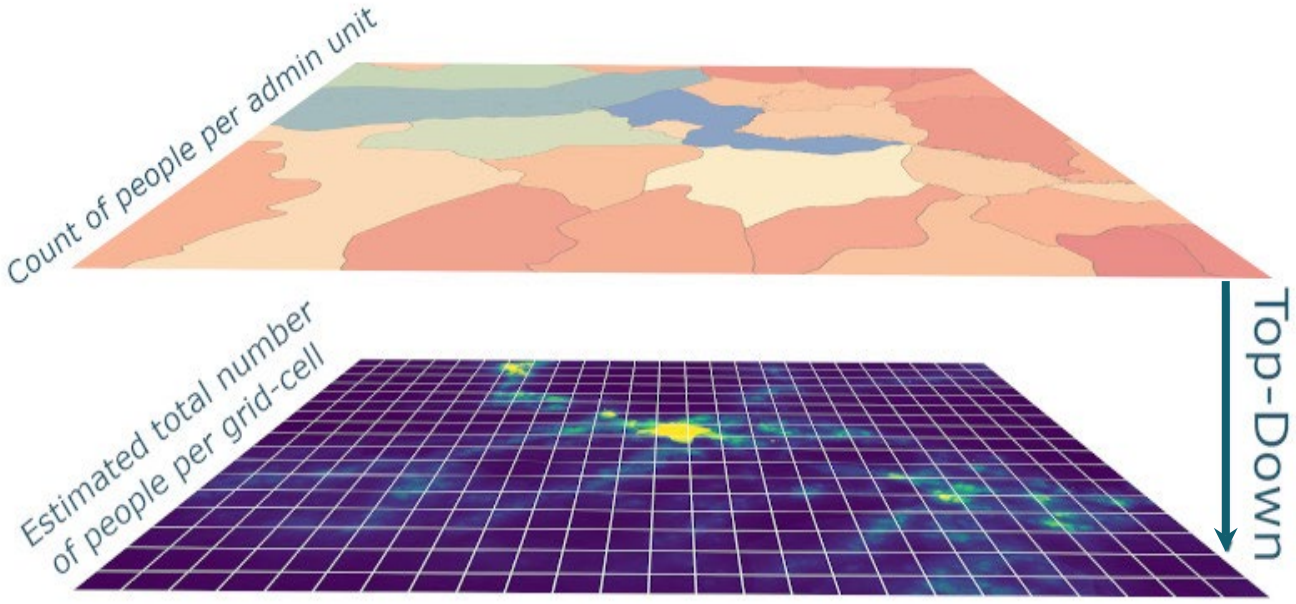
Applications in epidemiology, maternal/newborn health, childhood vaccination

Coarse resolution	Outdated	Incomplete	Inaccuracies, missing populations
			

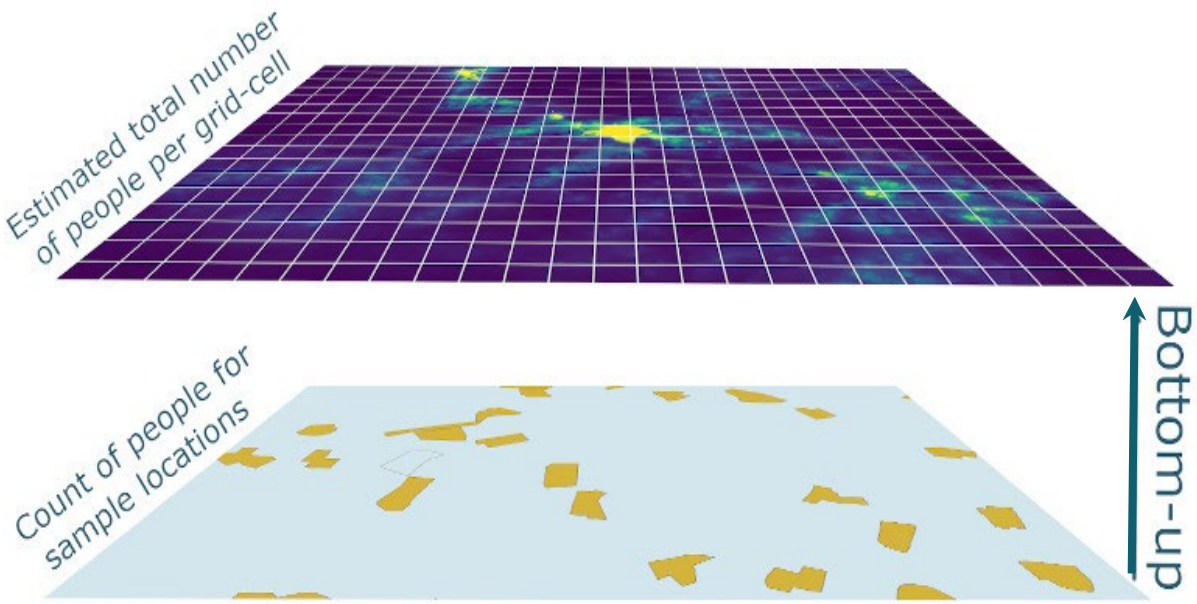
Demographic data challenges

Approaches for creating gridded population datasets

“Top down” modelling approach



“Bottom-up” modelling approach



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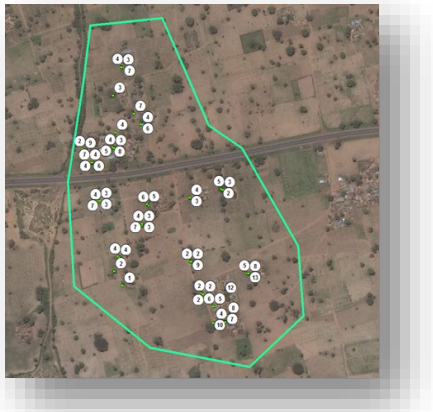
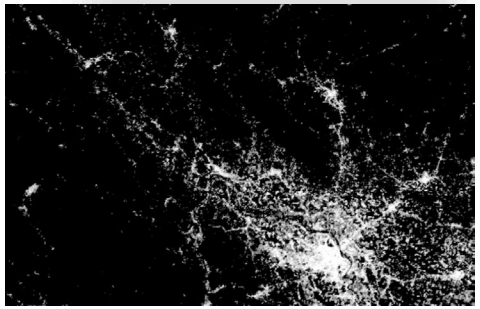
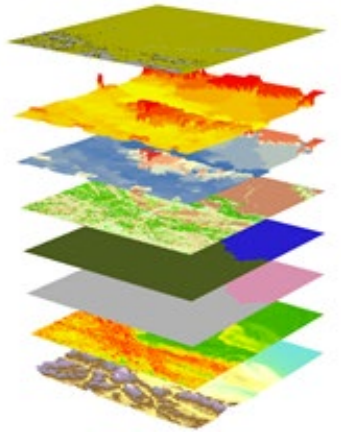
Approaches for creating gridded population datasets







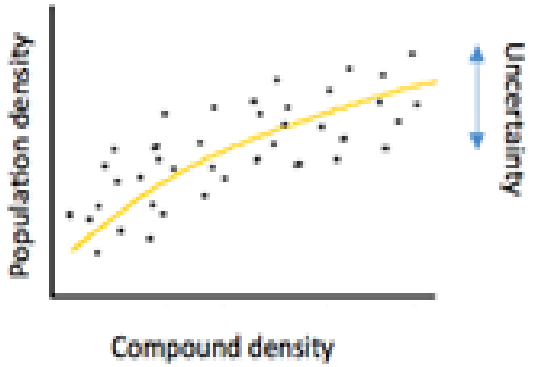
Population Data

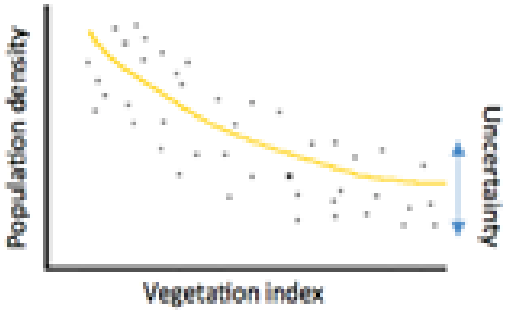
Settlement

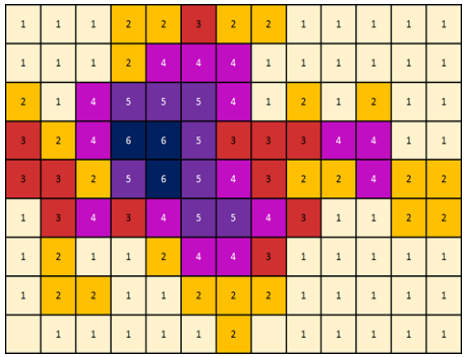
Geospatial covariates

Spatial statistical model

Population estimates (ideally with uncertainty)

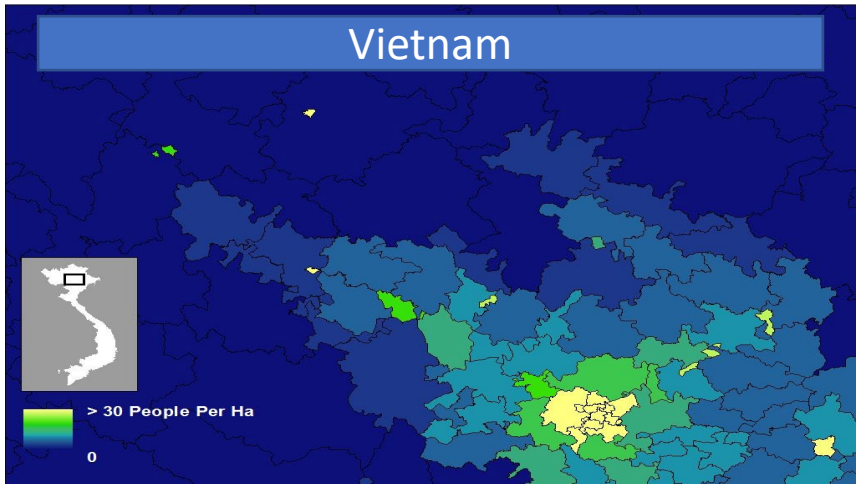


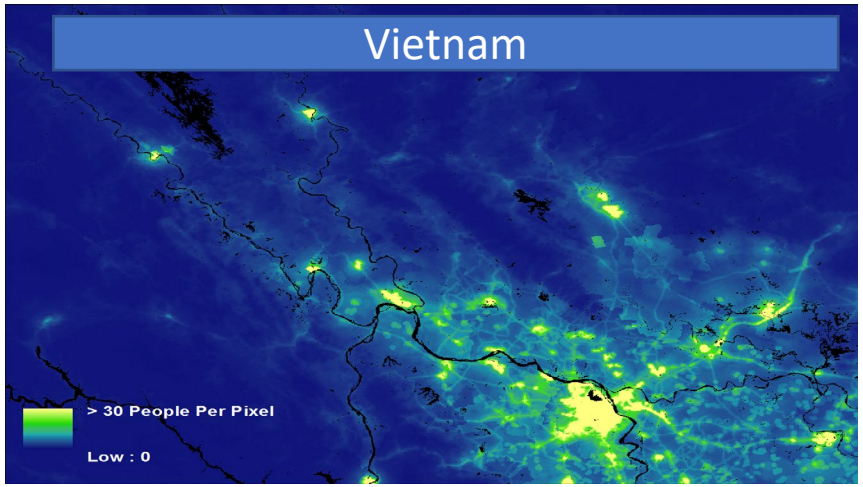


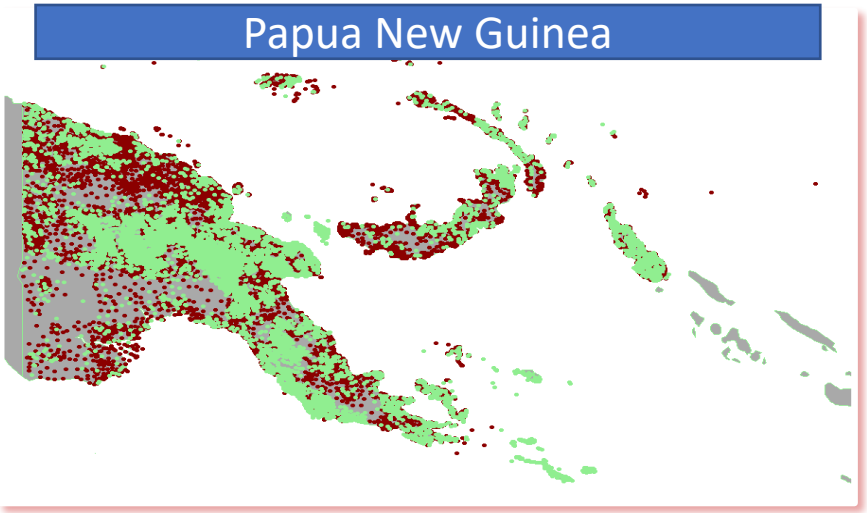


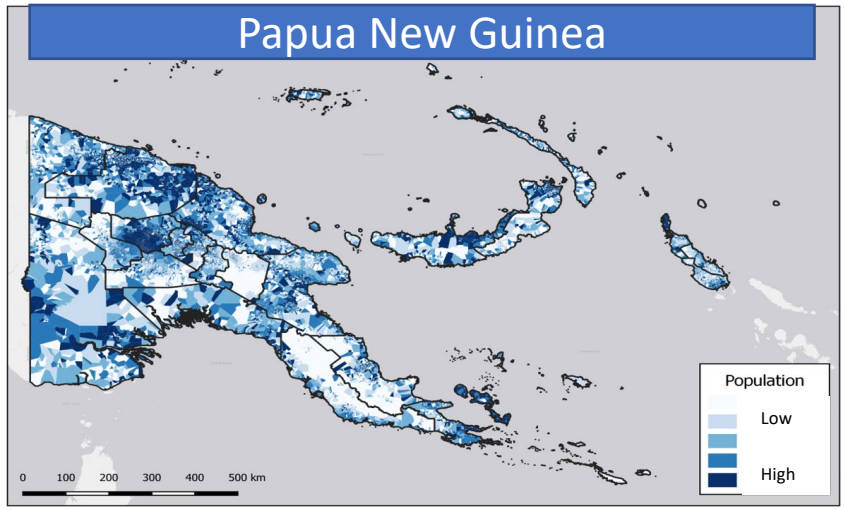
Wardrop et al (2018) PNAS

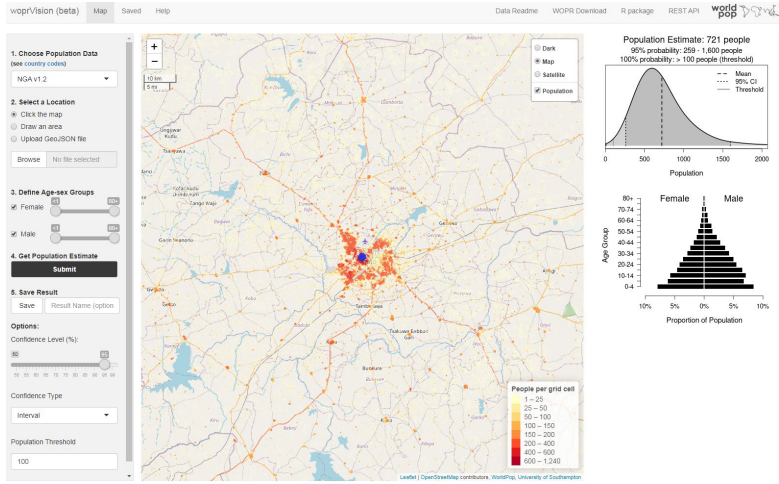
Gridded population estimates





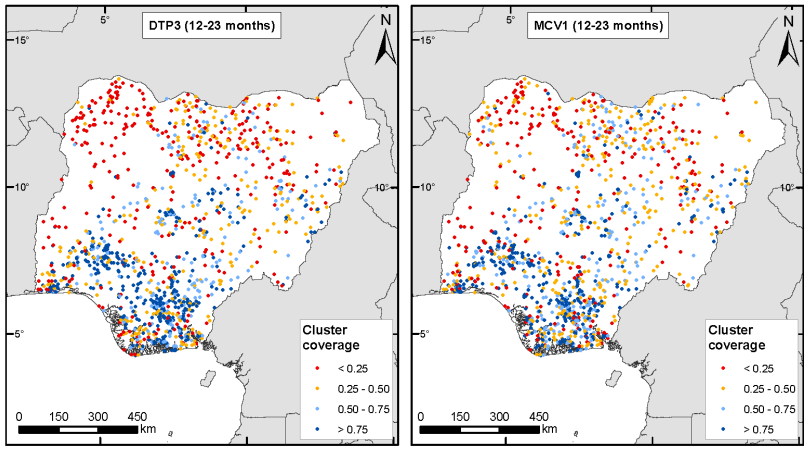


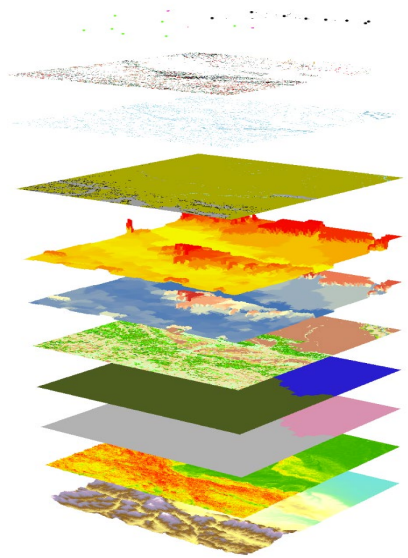




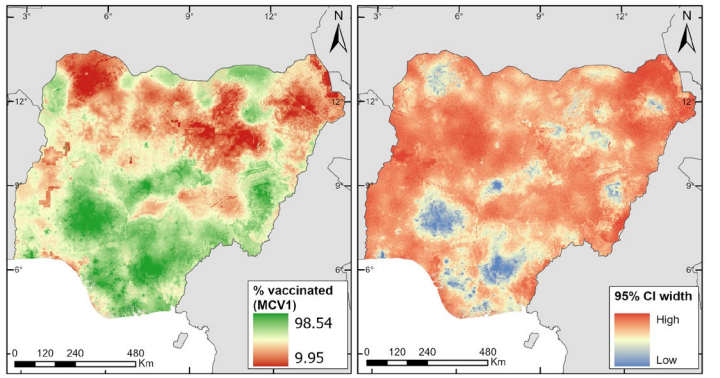
https://apps.worldpop.org/woprVision/

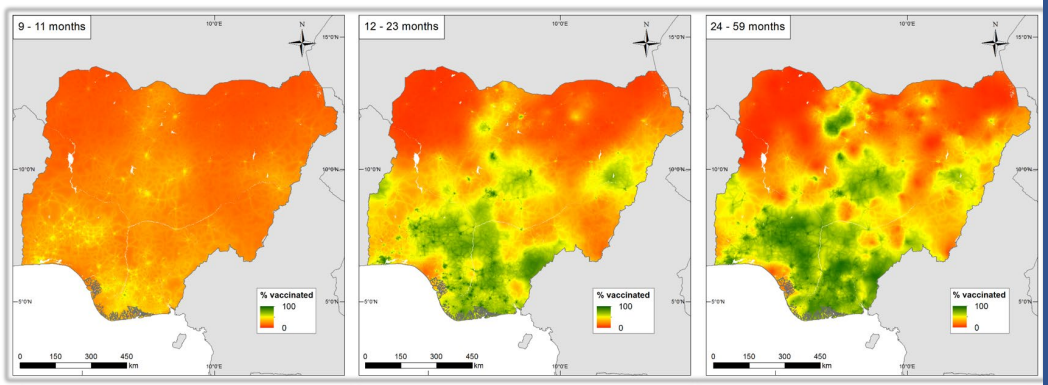
Geospatial analysis of vaccination coverage

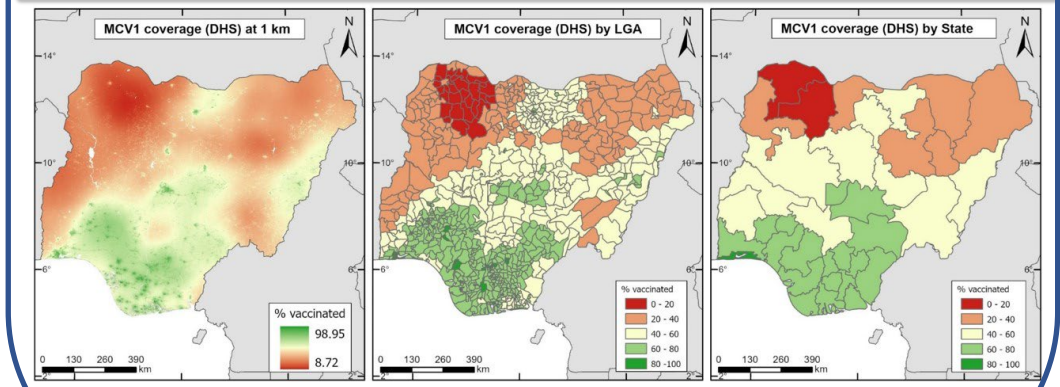




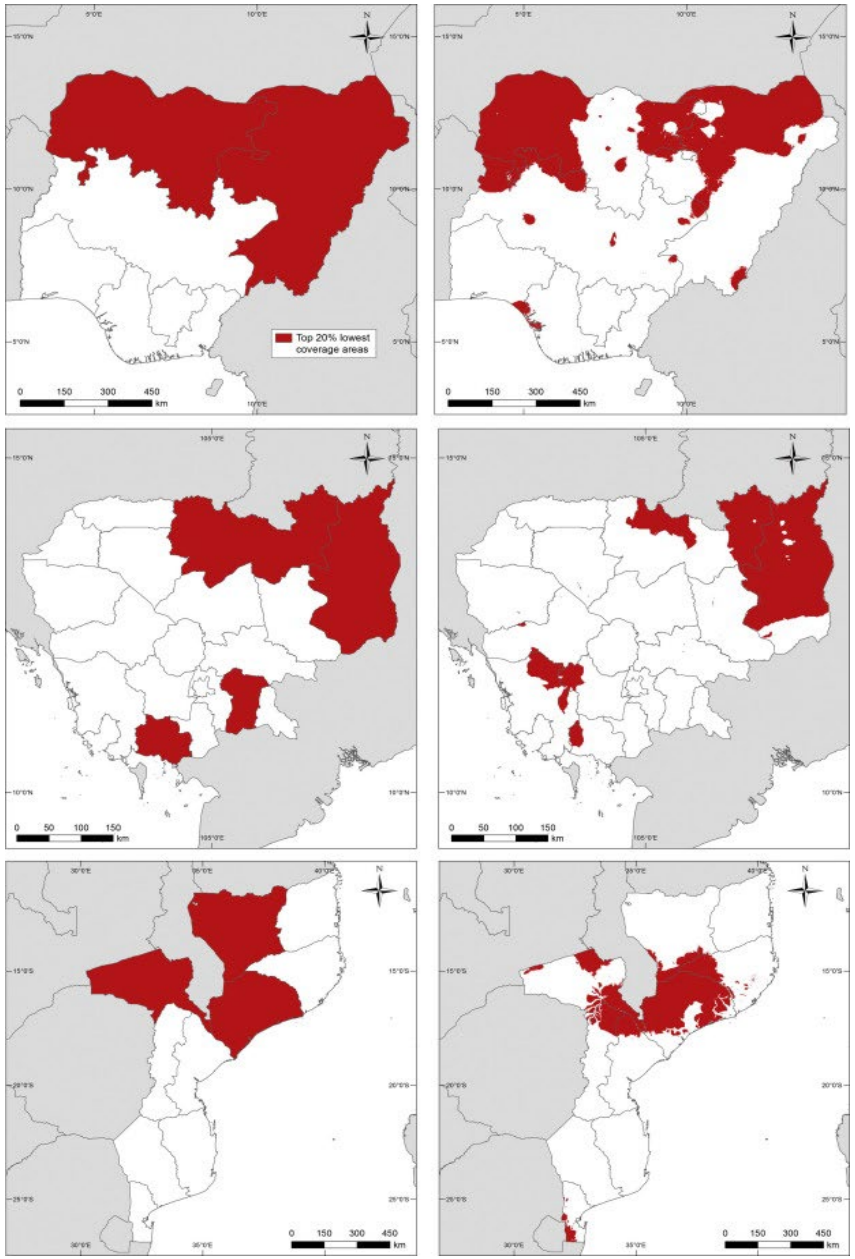
Spatial statistical model

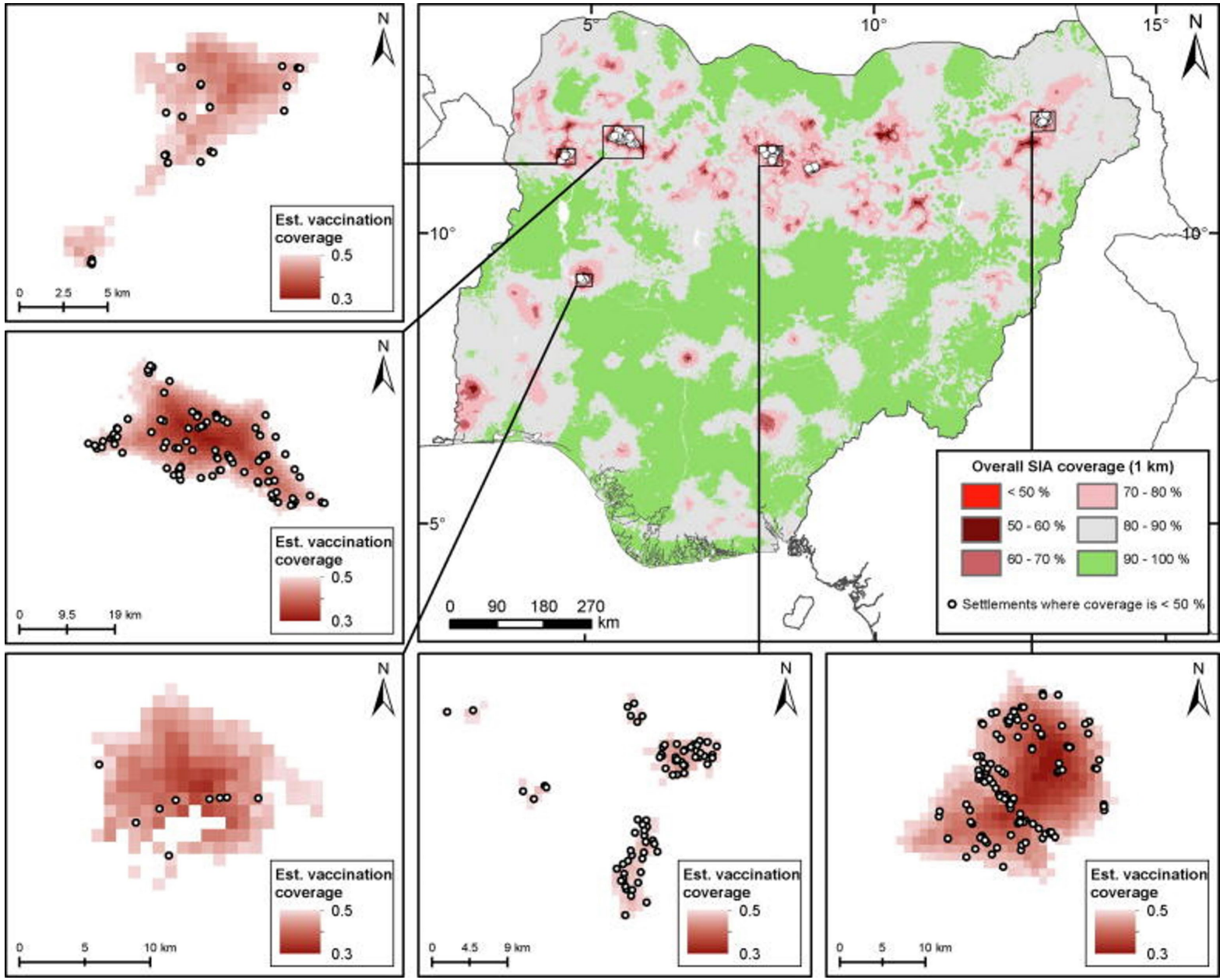




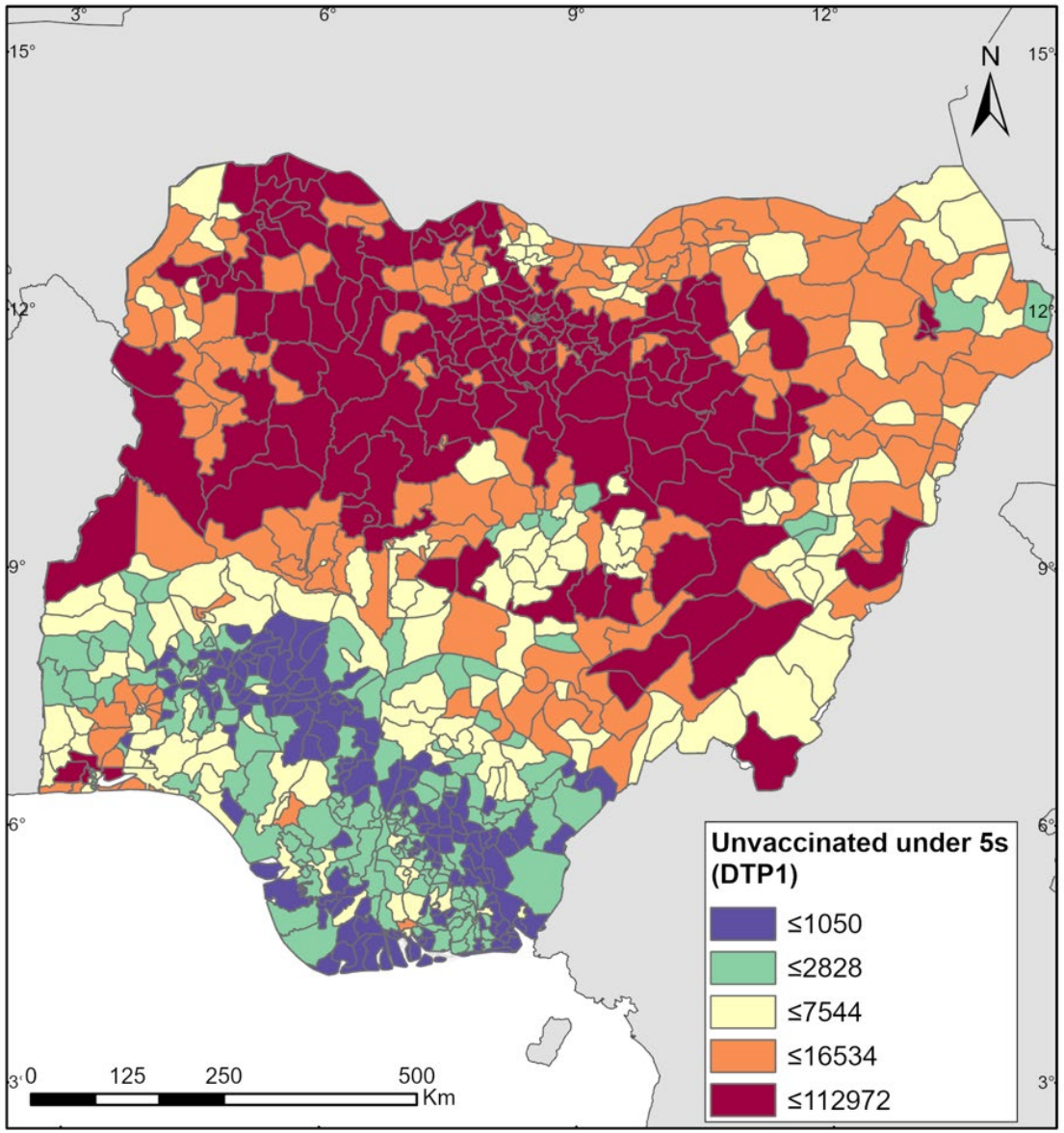


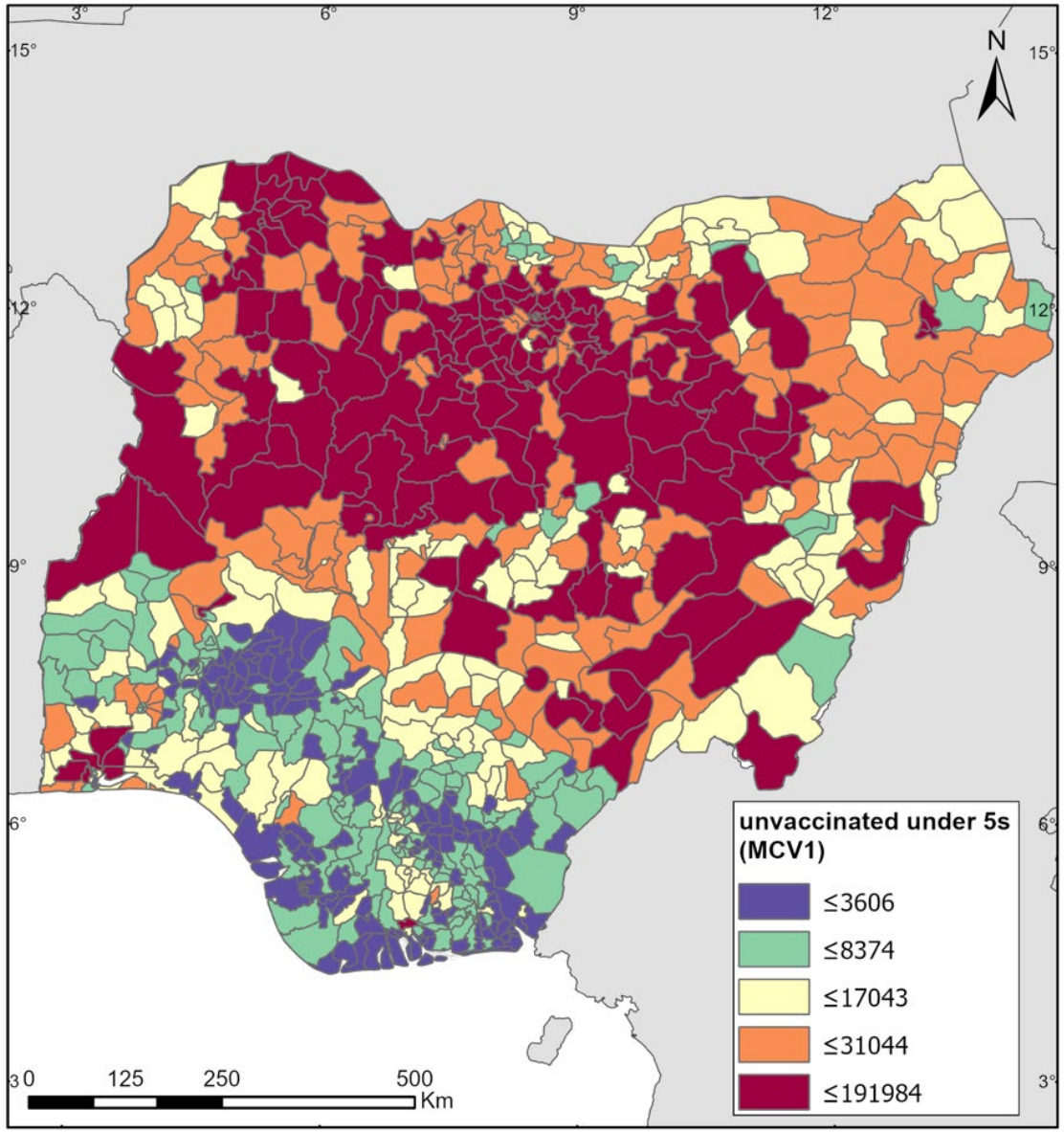
Finding zero-dose chilldren in low coverage areas



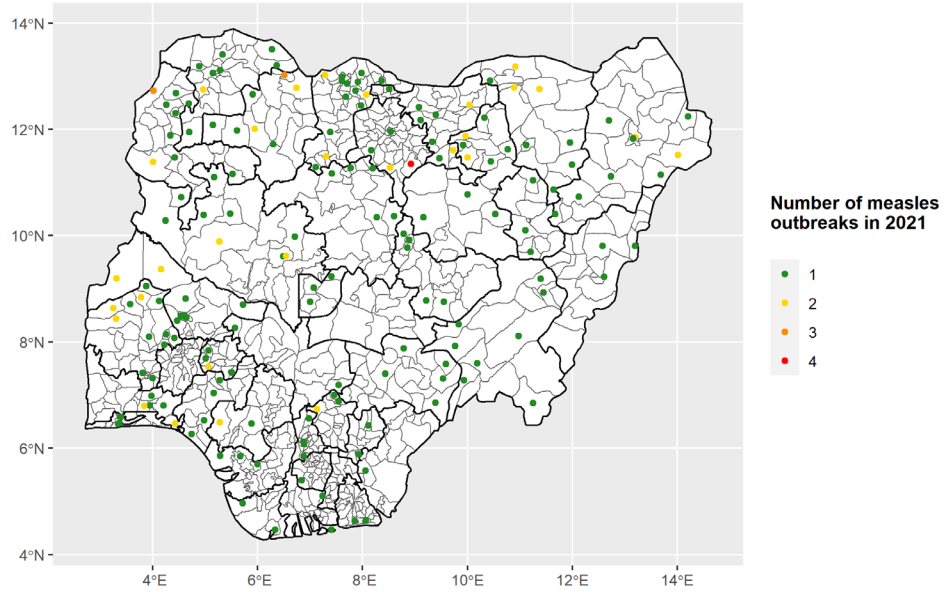


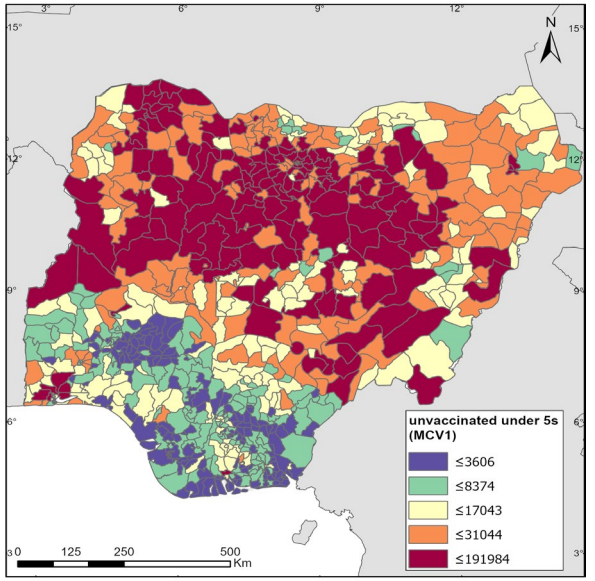
Distribution of zero-dose children at the district level

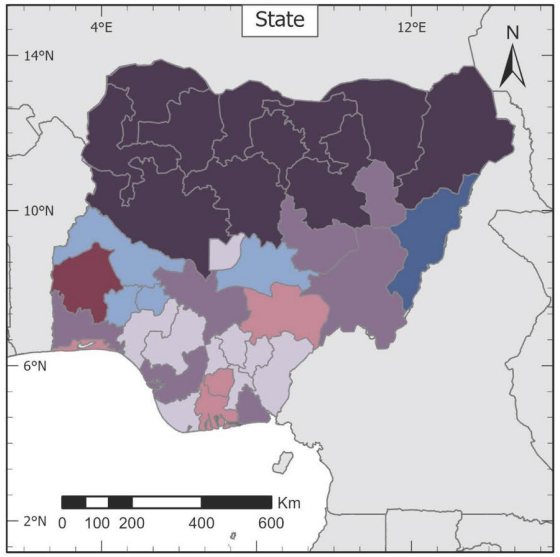


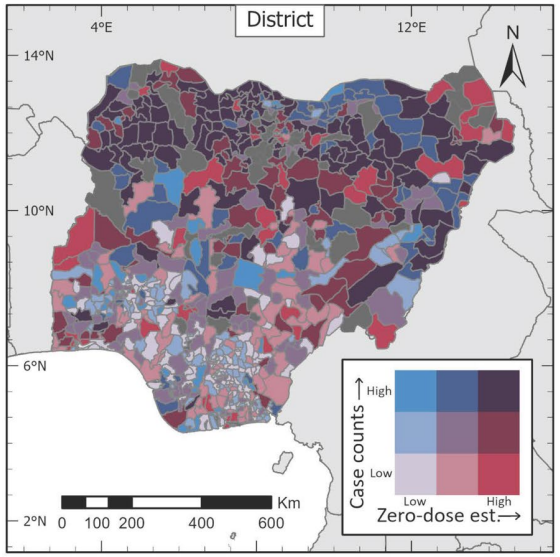


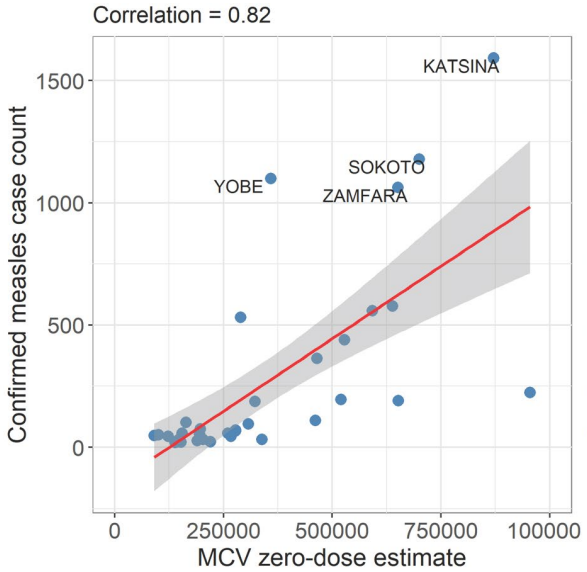
Zero-dose estimates vs disease incidence

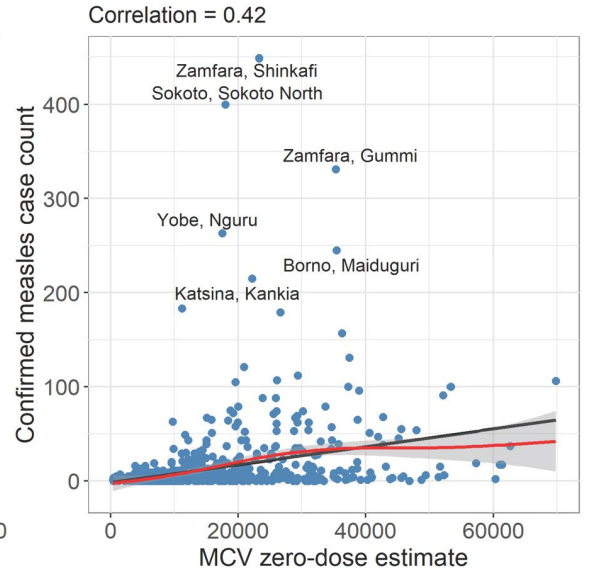




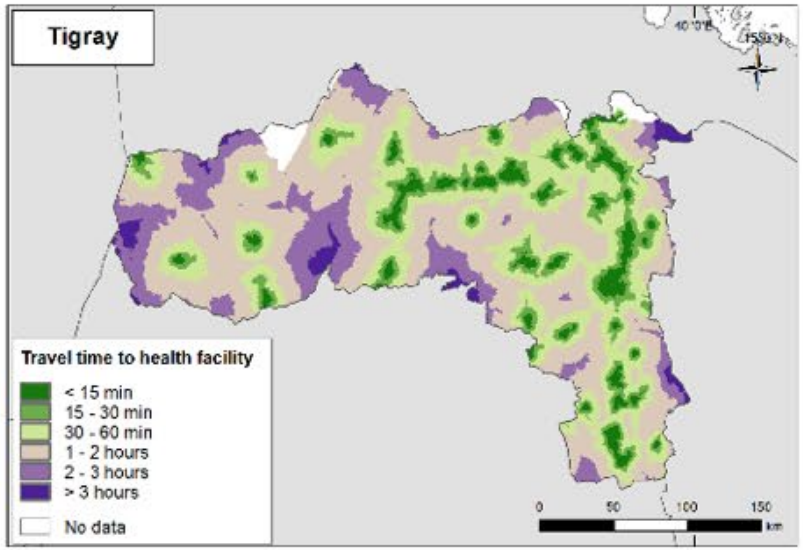


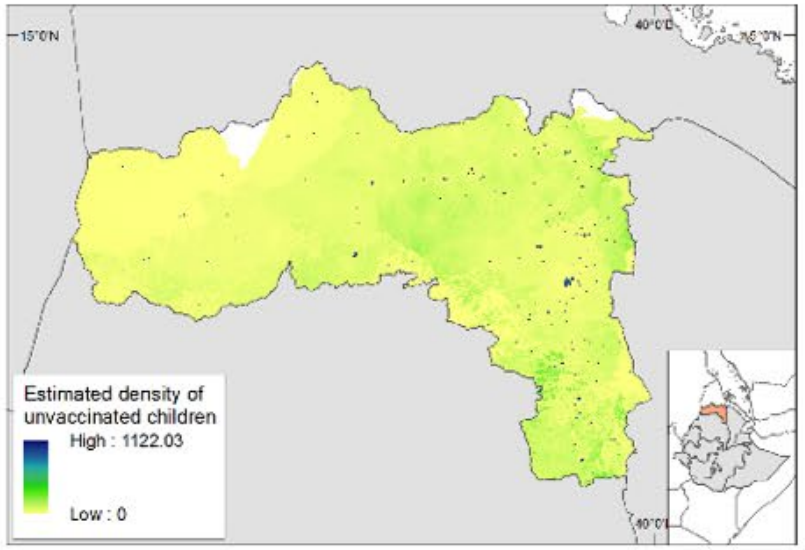


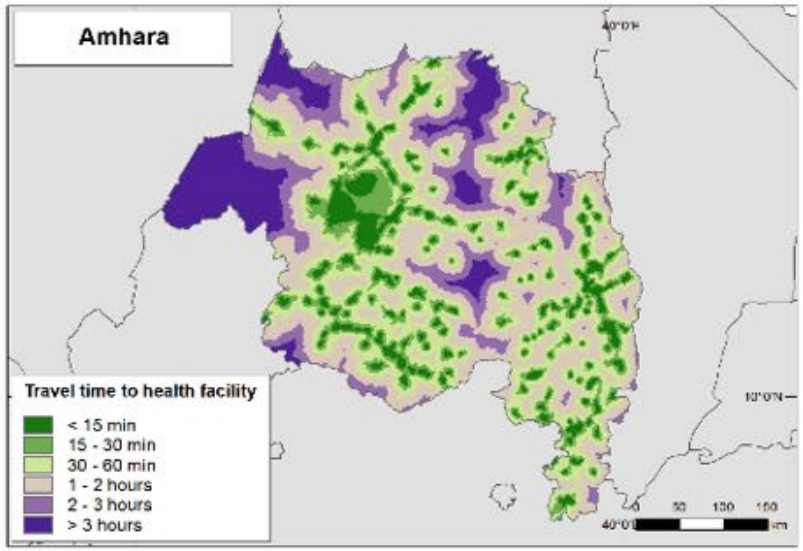


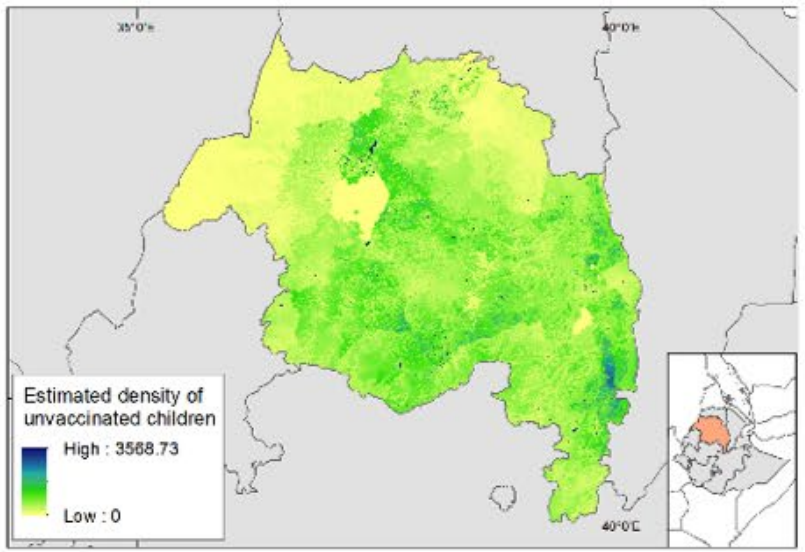


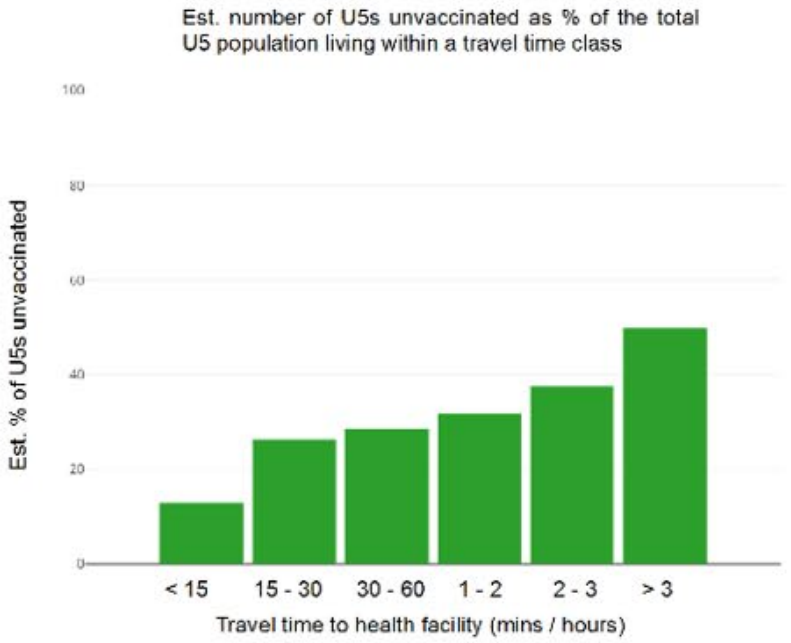
Remoteness vs the distribution of zero-dose children

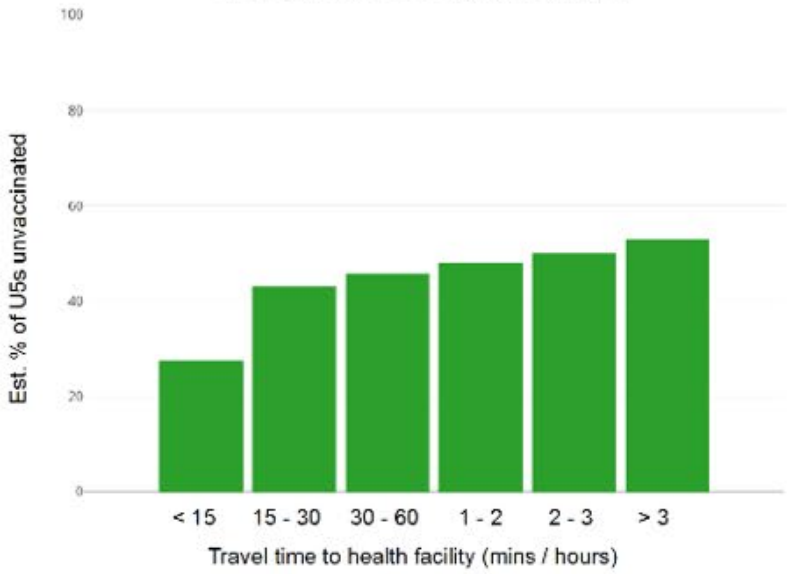












Distribution of zero-dose children among special populations

- Communities at risk of non- and under-vaccination are often characterized by poverty, lack of access to health care and other basic services, civil/political unrest, poor sanitation practices, overcrowding, etc

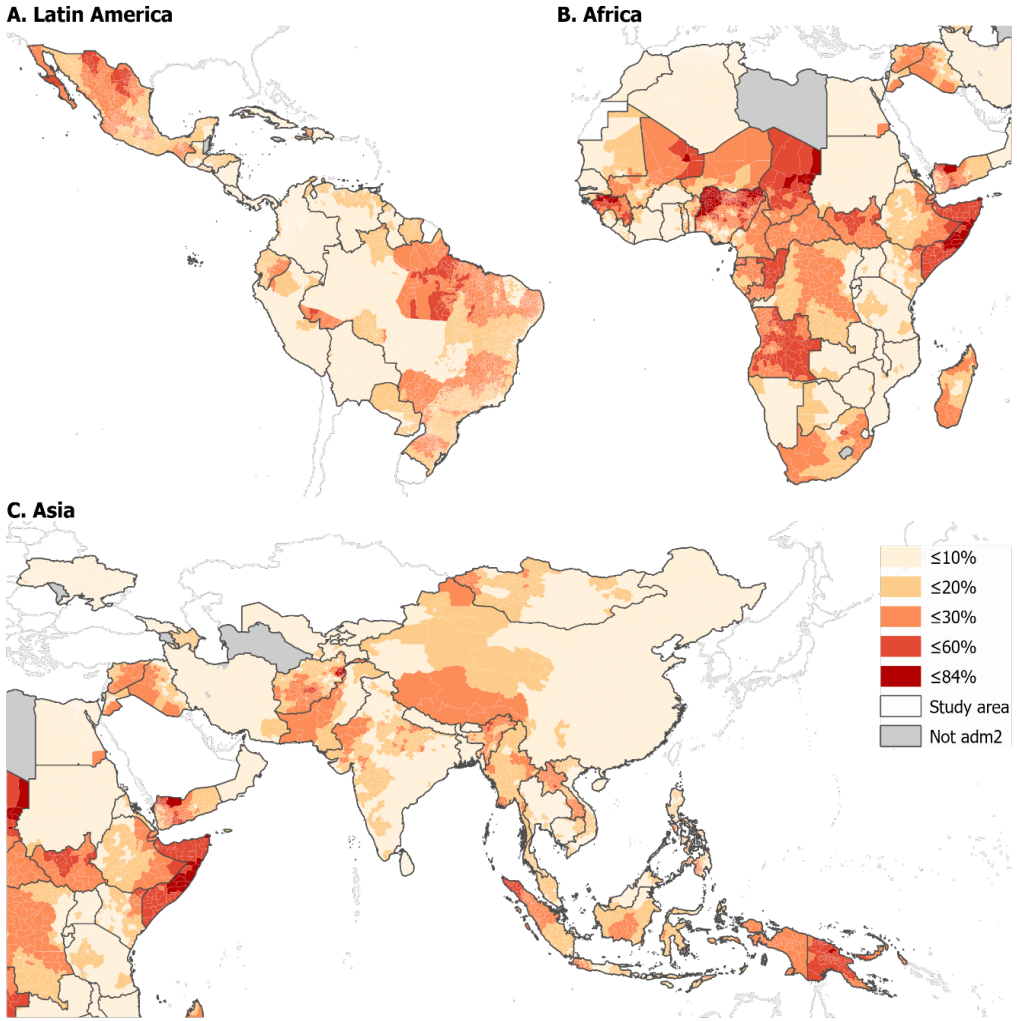
- In 2017, the Equity Reference Group (ERG) for immunization identified these to be remote-rural, urban slums and conflict-affected areas

Remote-rural

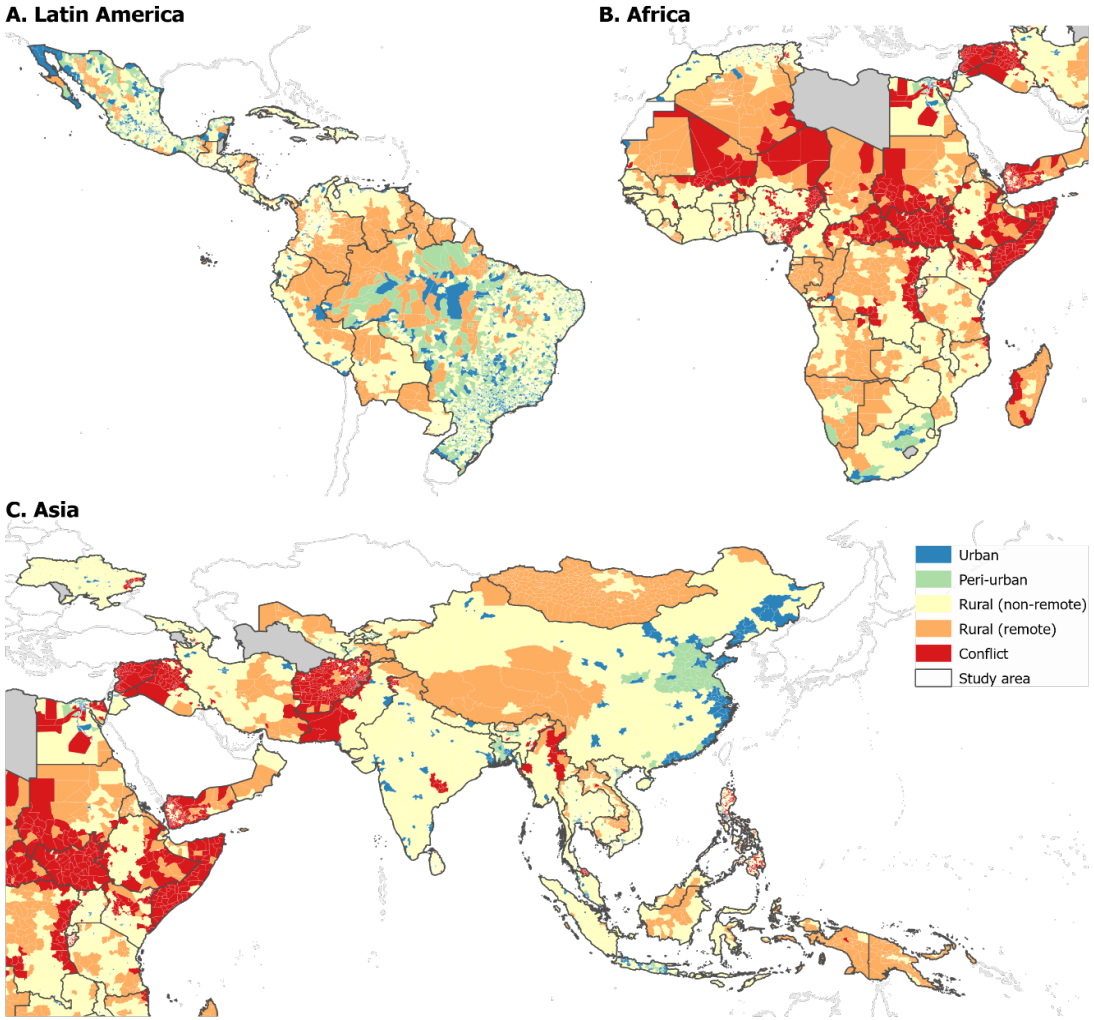
Urban slums

Conflict areas

Distribution of zero-dose children among special populations

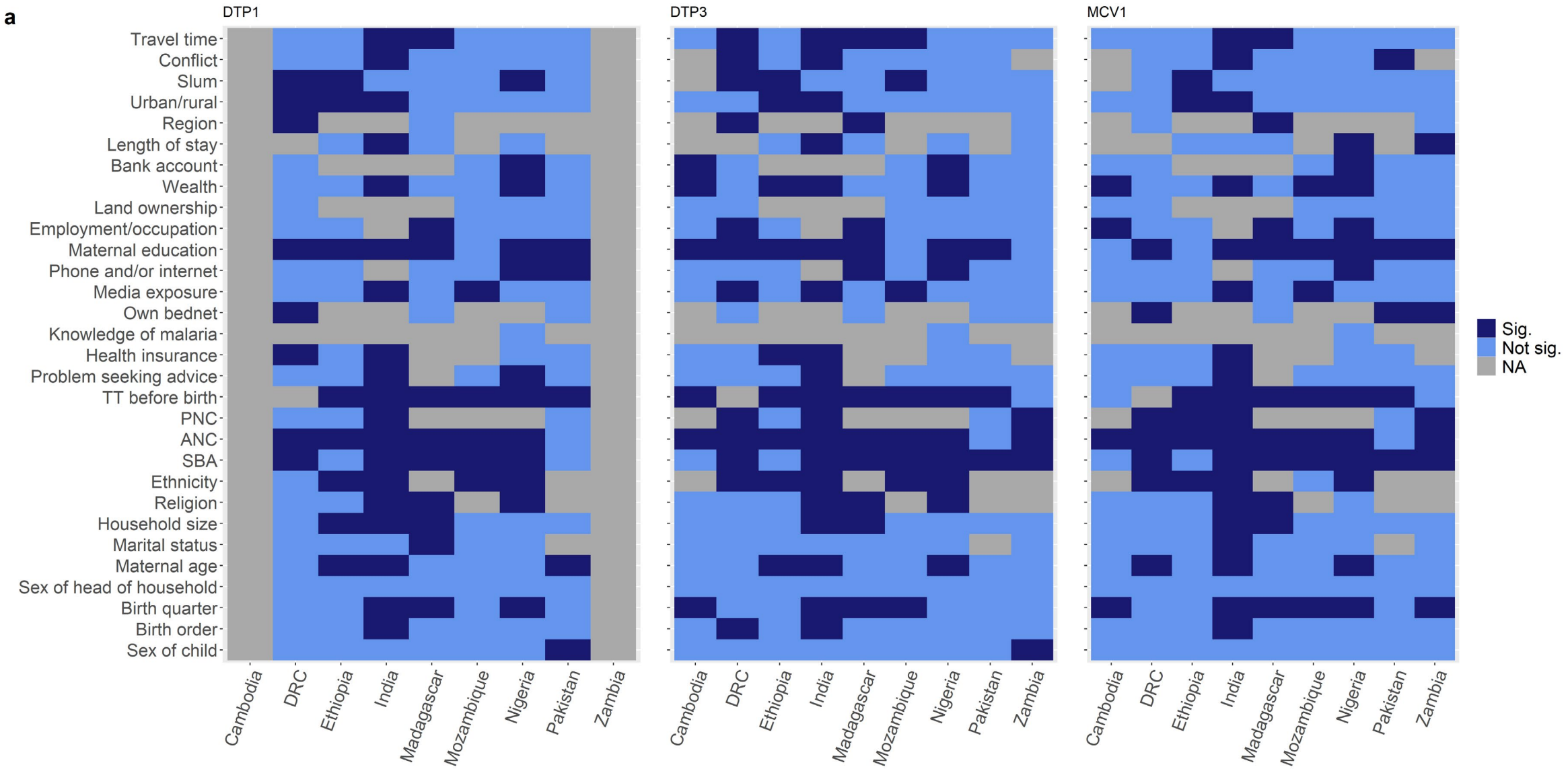


Proportion of under 1s estimated to have not received the first dose of the DTP vaccine in 2019 at ADM2

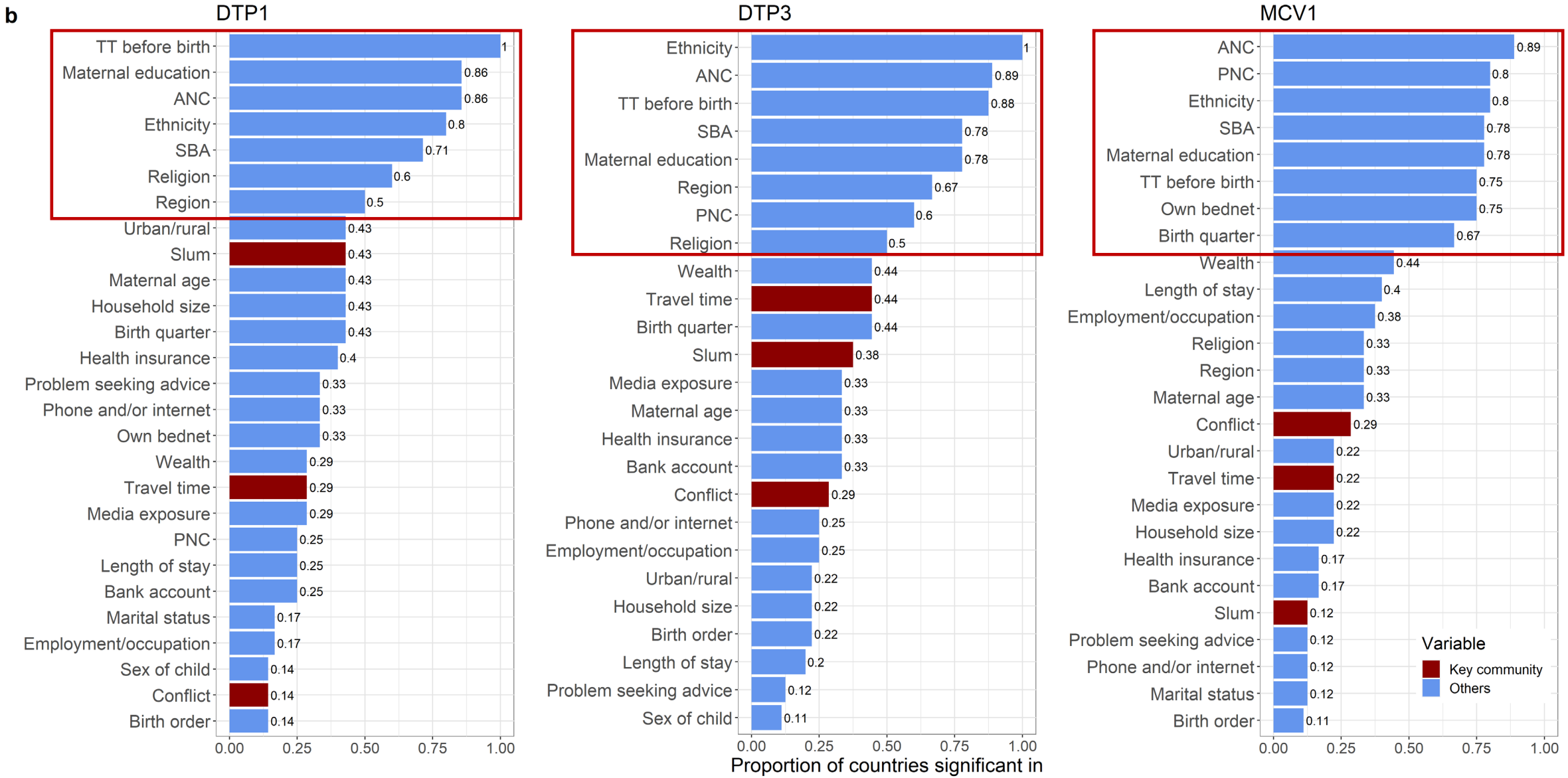


Geographical setting with the most unvaccinated under 1s in 2019 at ADM2

Characteristics of zero-dose children in LMICs

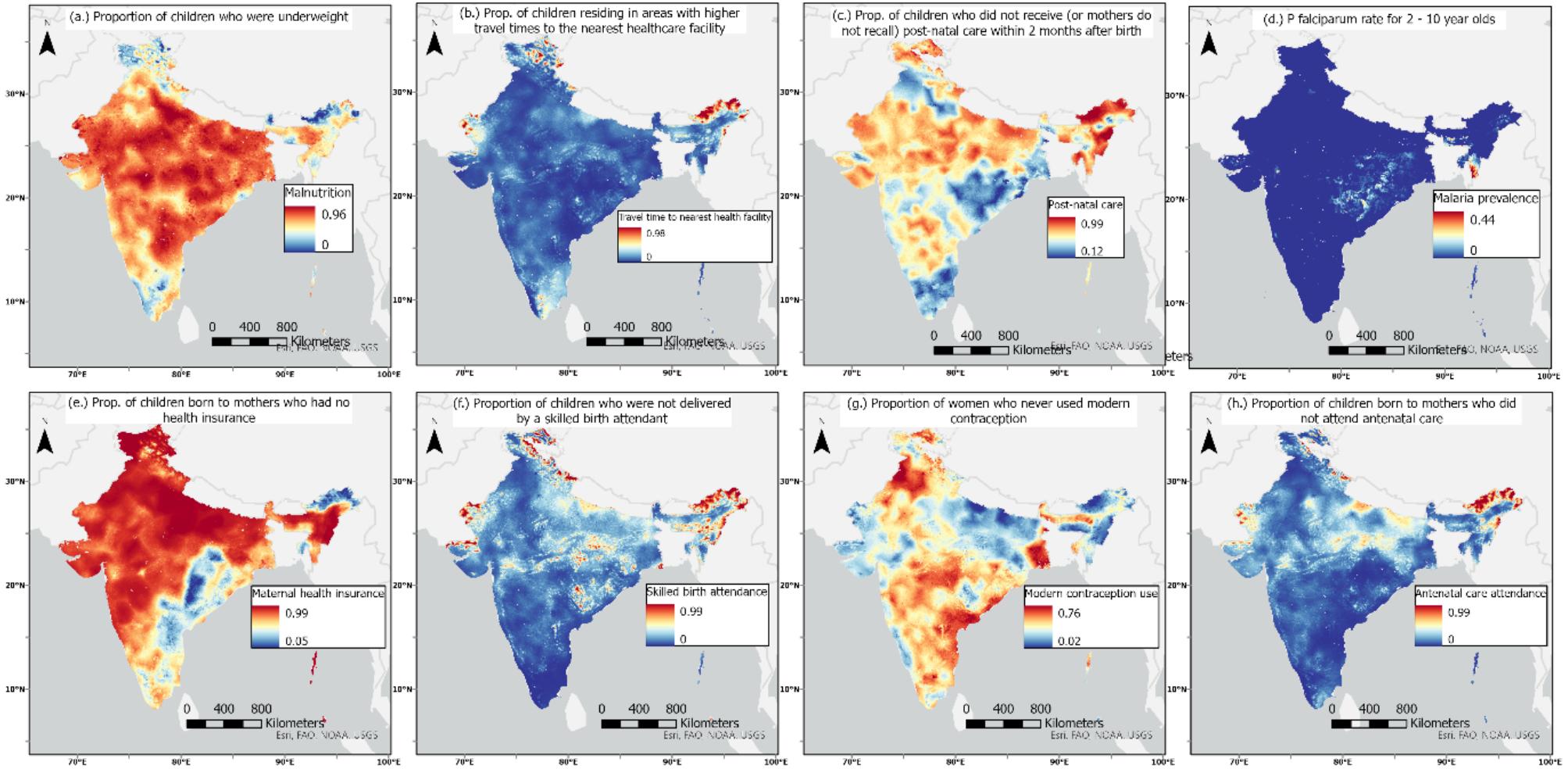


Characteristics of zero-dose children in LMICs

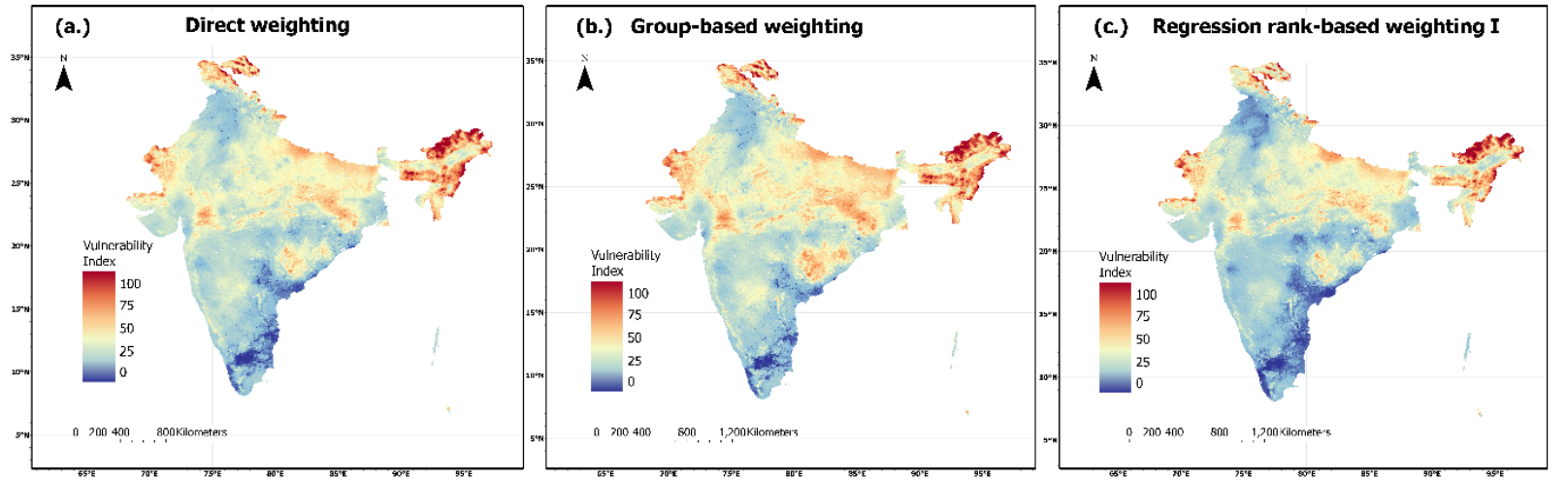


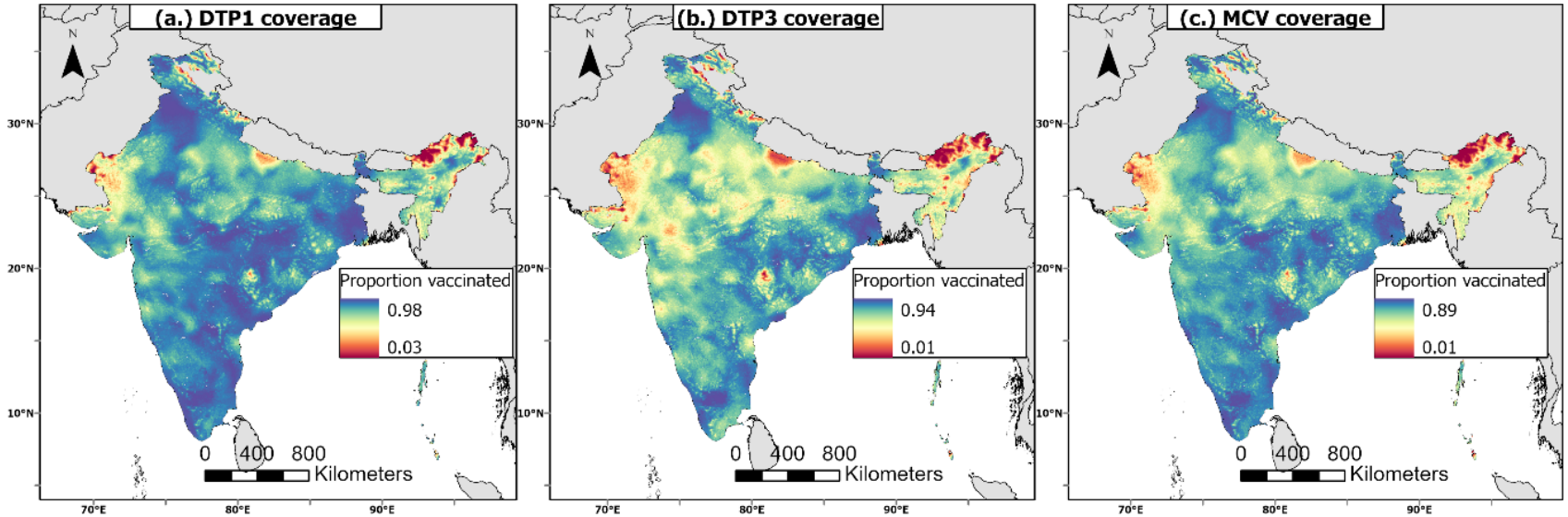
Creating a zero-dose vulnerability index

Can we identify zero-dose children whether or not information on vaccination coverage is available?



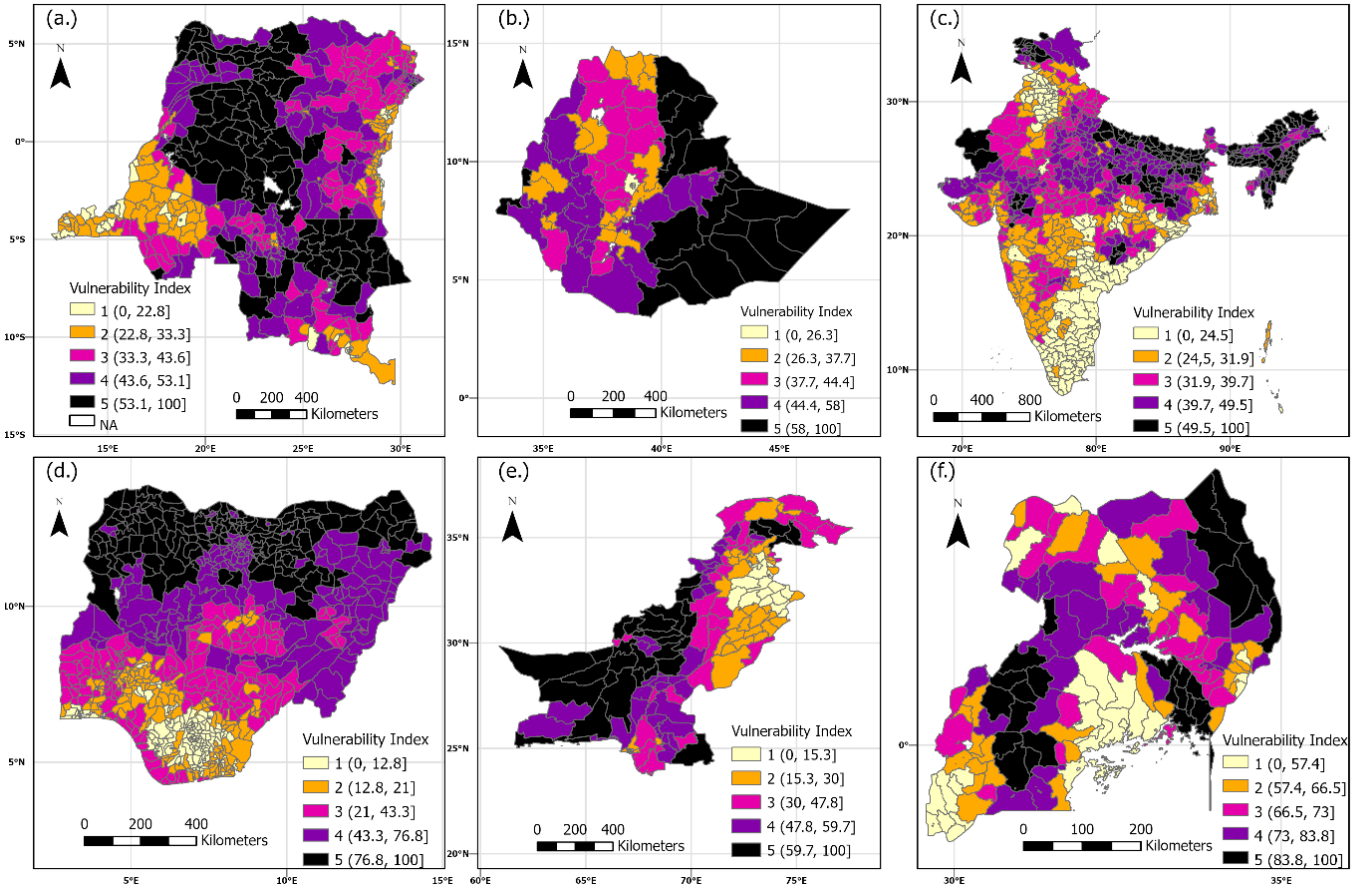
Creating a zero-dose vulnerability index

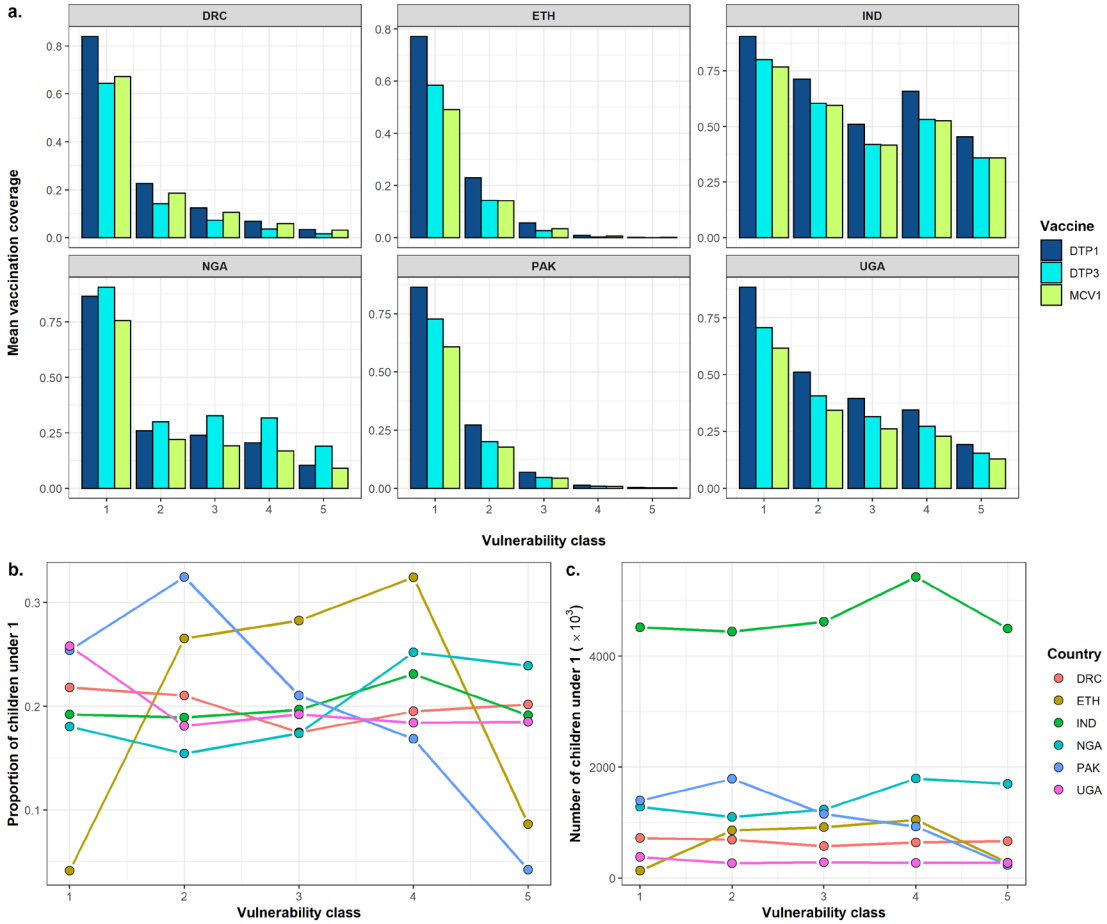




The similarities among these methods for producing the index demonstrate that the index can be created with limited information and without data on vaccination coverage.

Vulnerability index, vaccination coverage and population sizes within index classes





WorldPop

www.worldpop.org; @WorldPopProject

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Some references:

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