

Progress of Modelling workpackage

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London School of Hygiene and Tropical Medicine



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GATES *foundation*

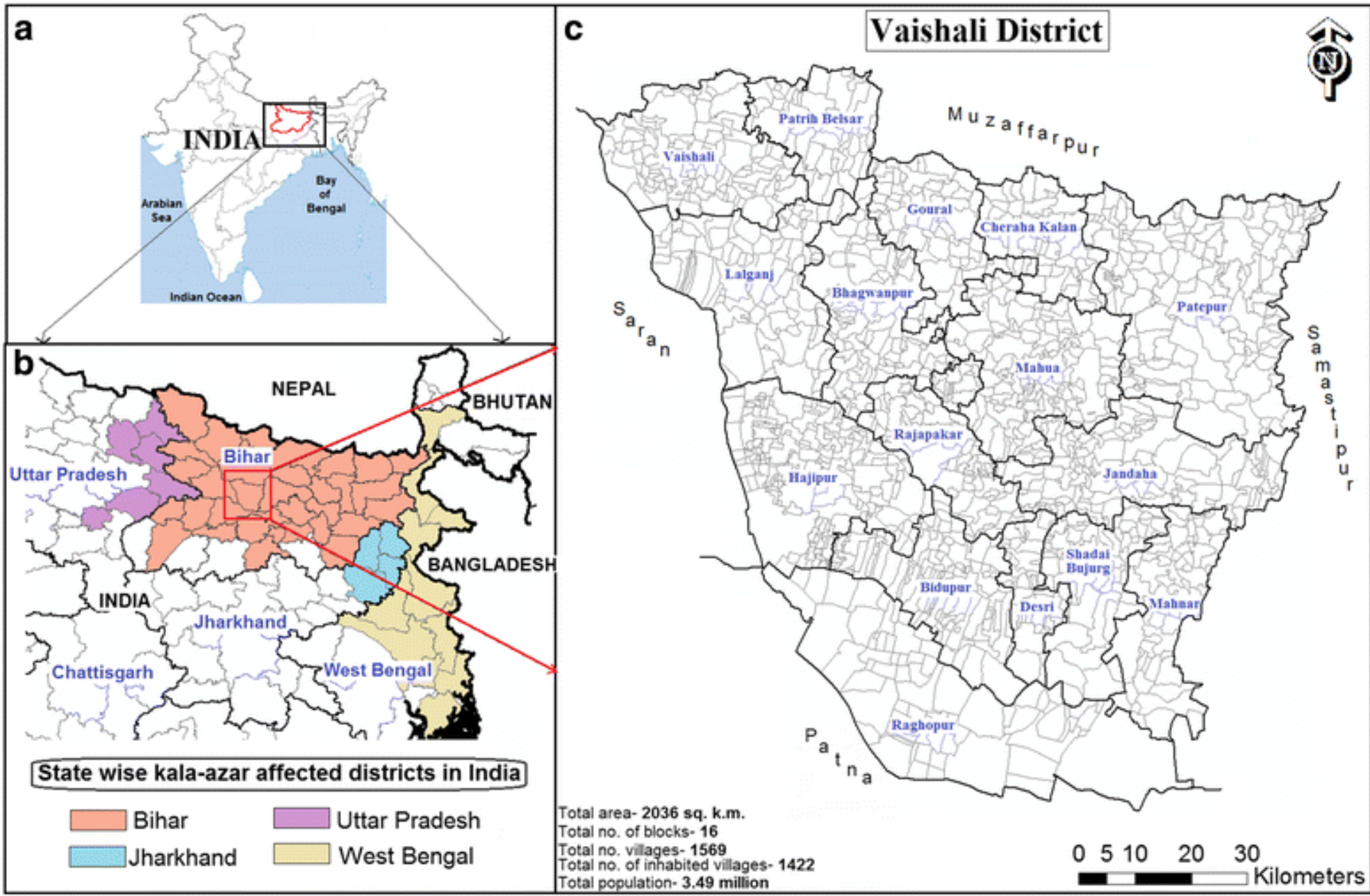


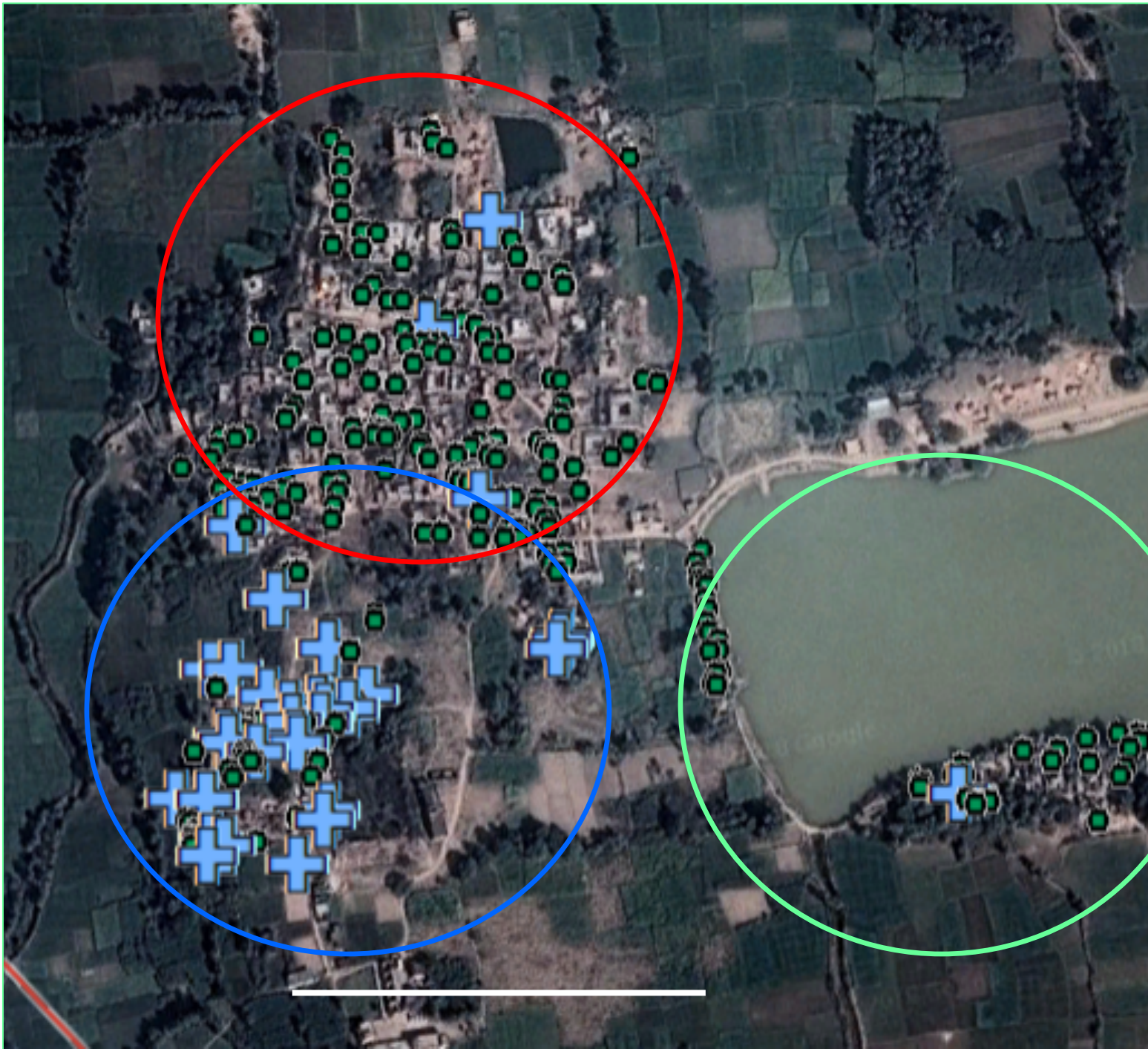
Aims

- Risk projection
 - Provide a framework for using incidence data, environmental data and health-systems data to rank Blocks by risk of outbreak
- Mathematical modelling
 - What measurements are required to demonstrate progress to true elimination?
 - Support of development of novel interventions (e.g. reactive-IRS)

Forecasting

- Spatial scale
- Risk ~
 - Susceptibility x (time since last case)
 - Suitability x (environmental indices)
 - Infectiousness x (cases last year, or next door)
- Statistical & machine-learning approaches will potentially fail to predict outbreaks
 - Until we have seen a lot of them
- Include transmission dynamic models
 - Spatial aggregation





Kosra outbreak, 2016-17

White line is ~200m

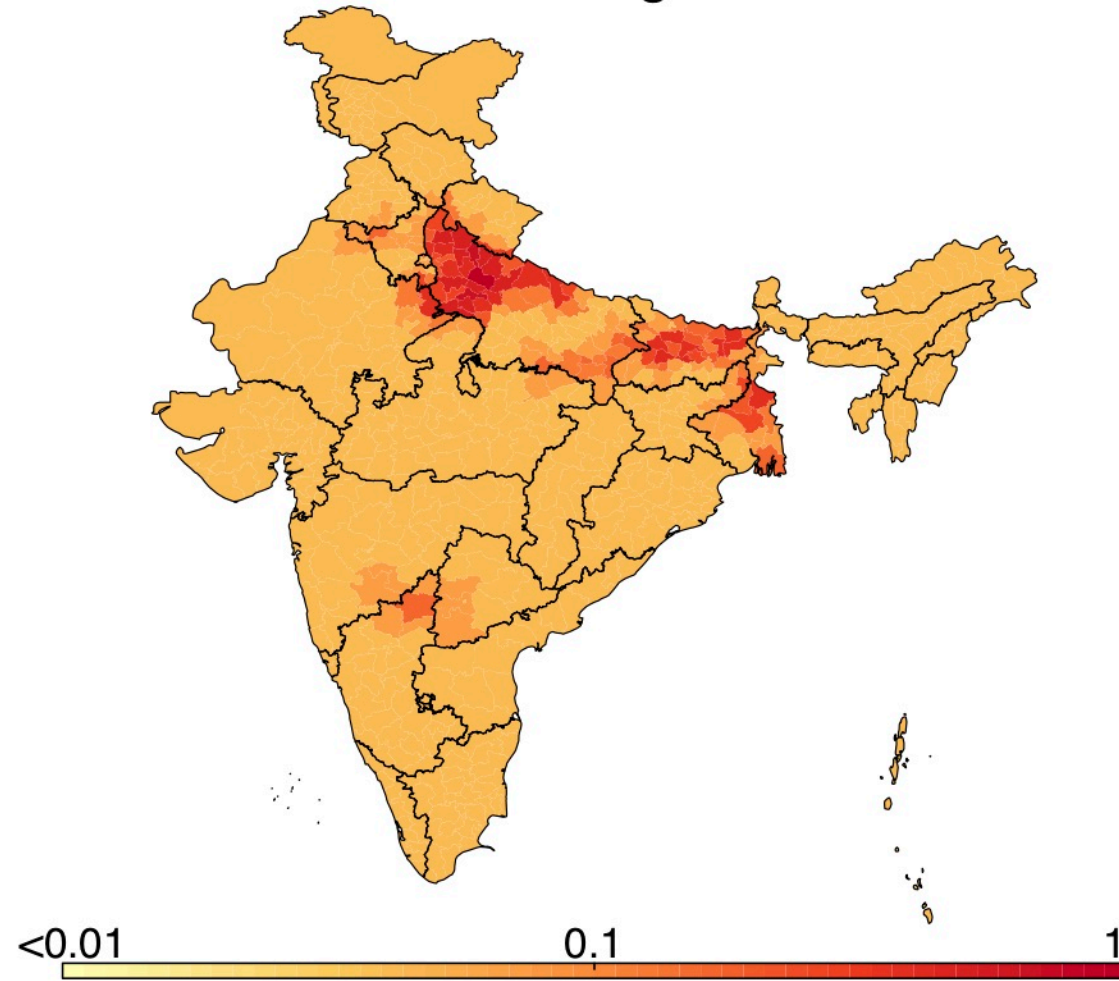
Map by Alan Hightower

Data from CARE India

Risk Mapper software

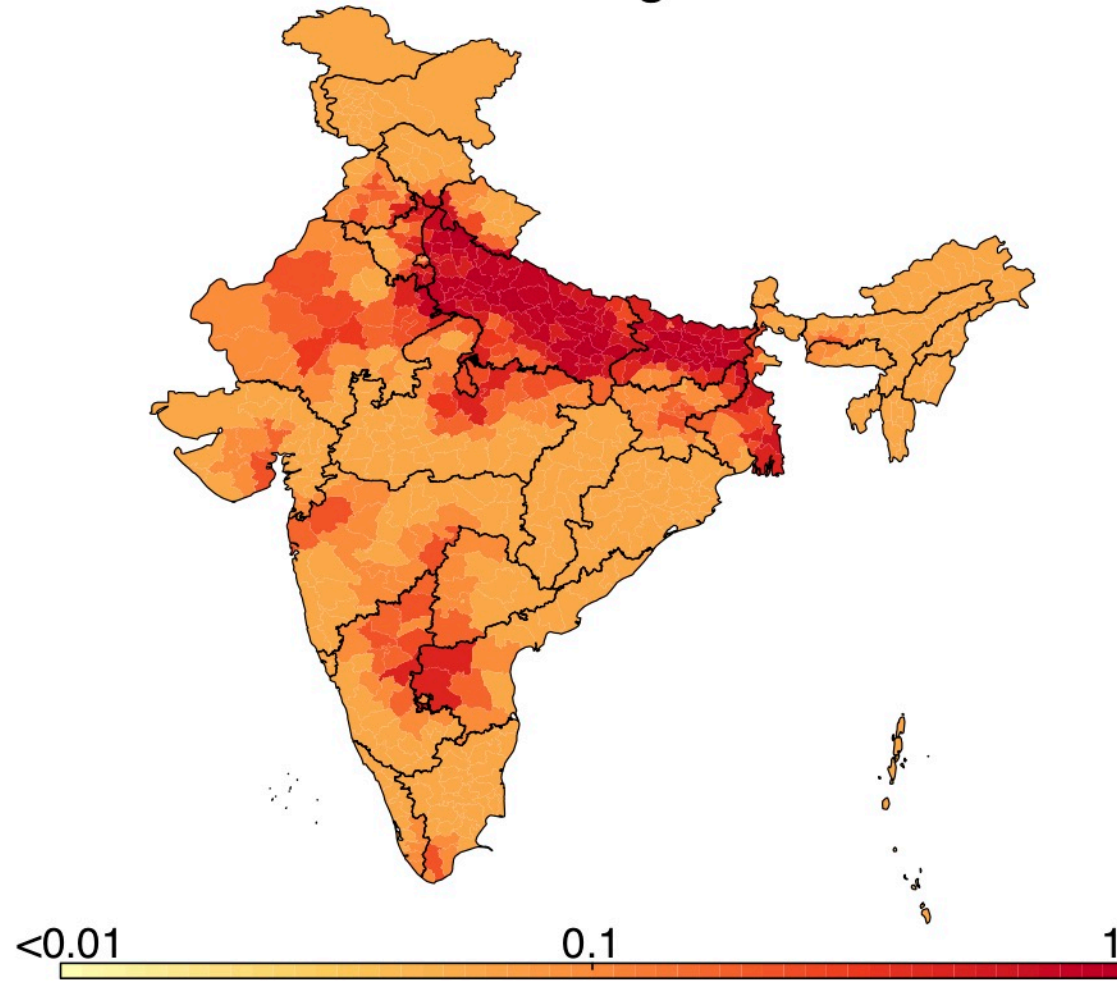
- Institute of Disease Modeling (IDM)
 - Early stage of development – made for Polio
 - Requires adaption and development for VL and other VBD
- Main features
 - Data handling & checking
 - Secure and confidential treatment of data and results
 - Framework for different prediction modules
- Live demonstration in modelling workshop...

Risk map
2006-01-01 through 2006-12-31



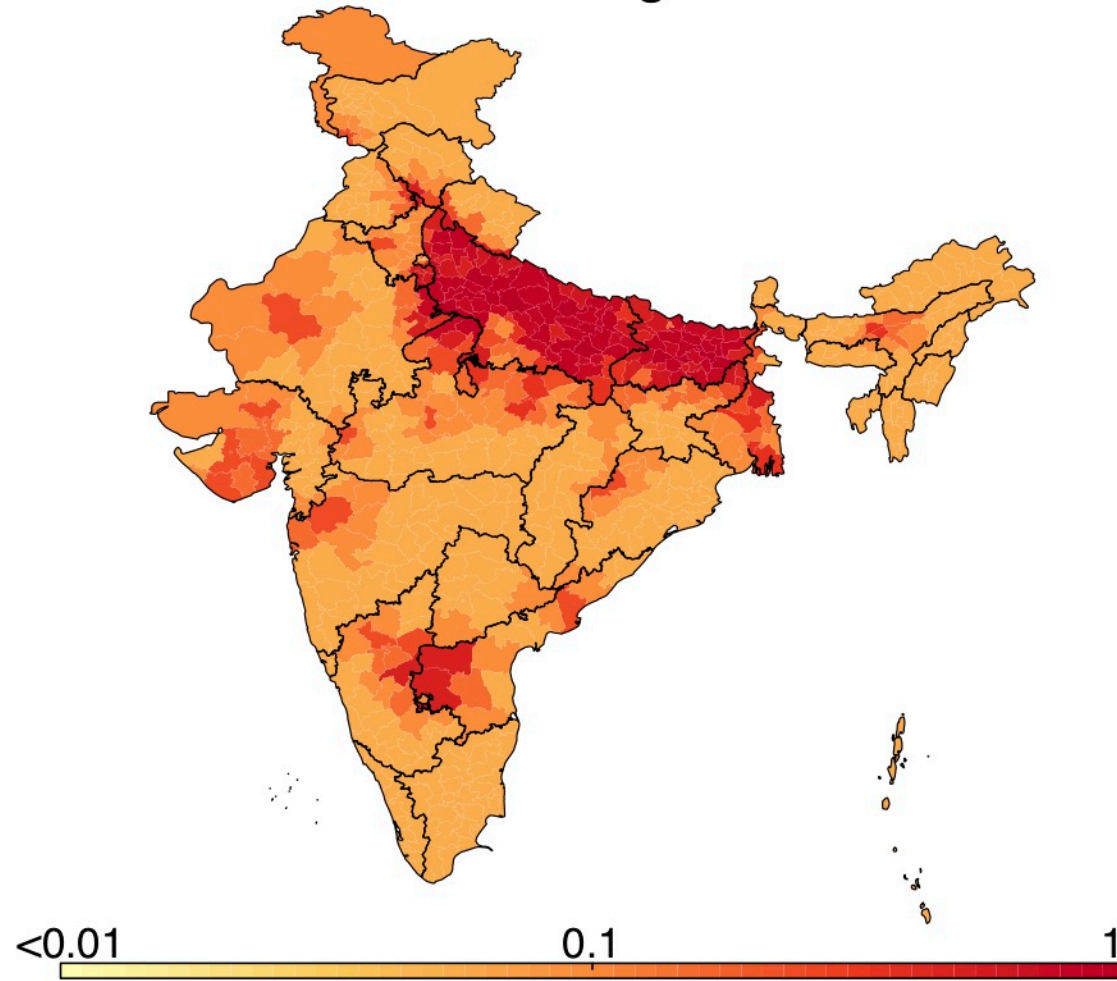
Probability of observing a case

Risk map
2007-01-01 through 2007-12-31



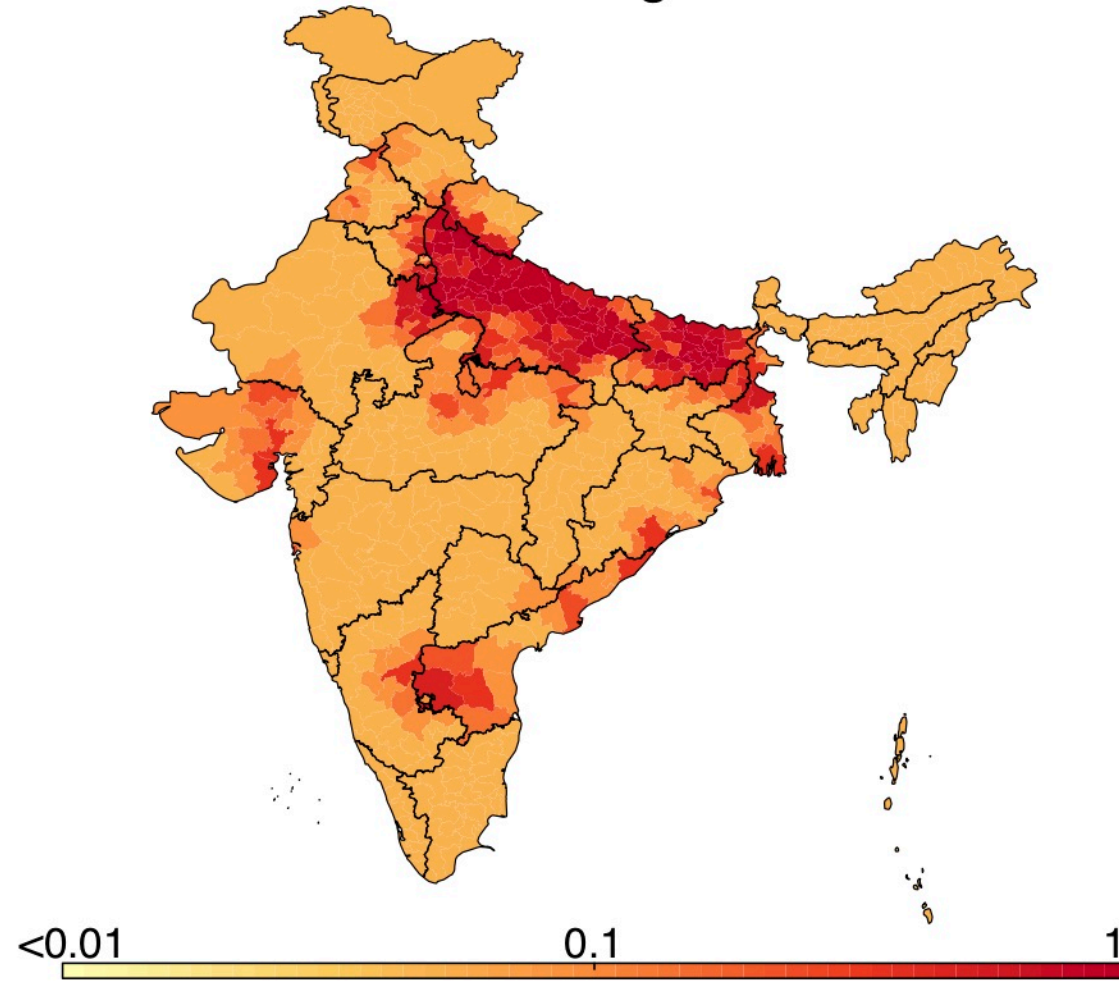
Probability of observing a case

Risk map
2008-01-01 through 2008-12-31



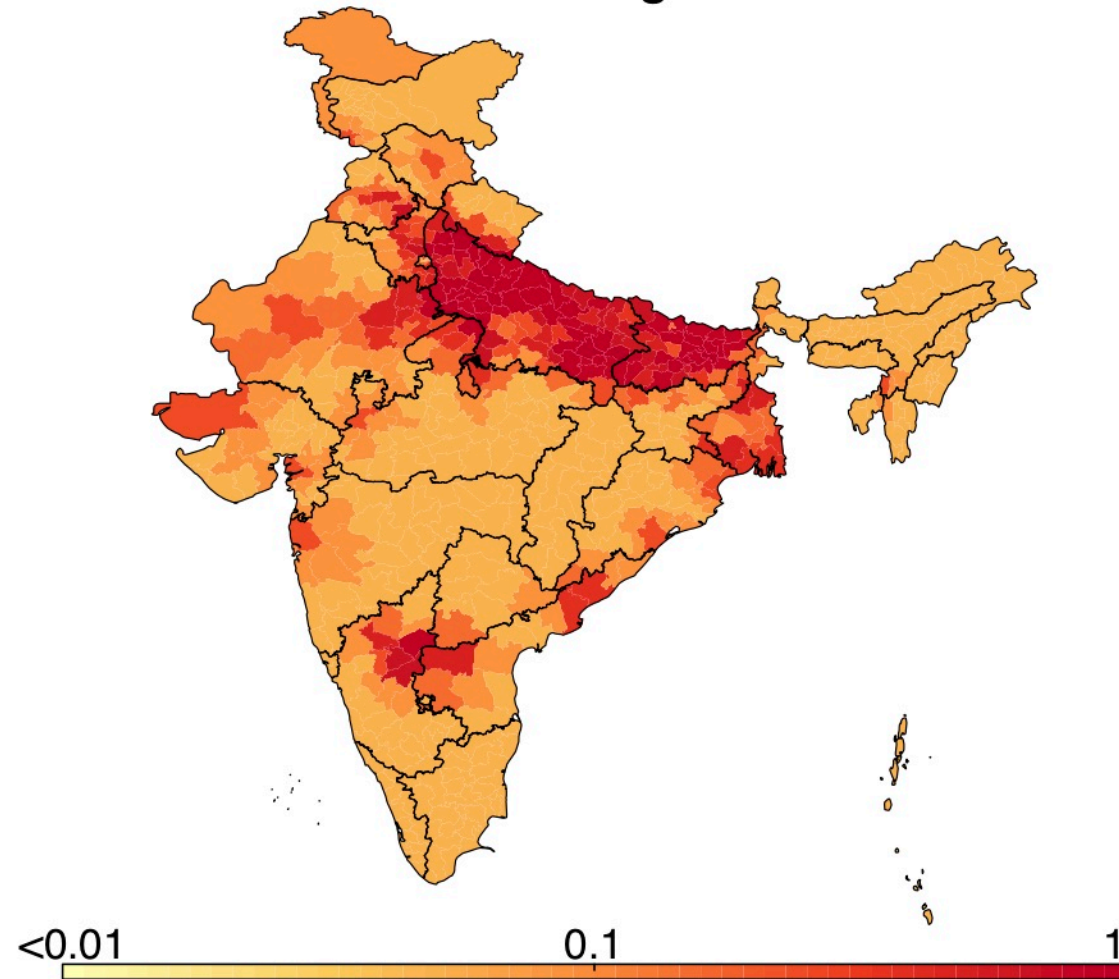
Probability of observing a case

Risk map
2009-01-01 through 2009-12-31



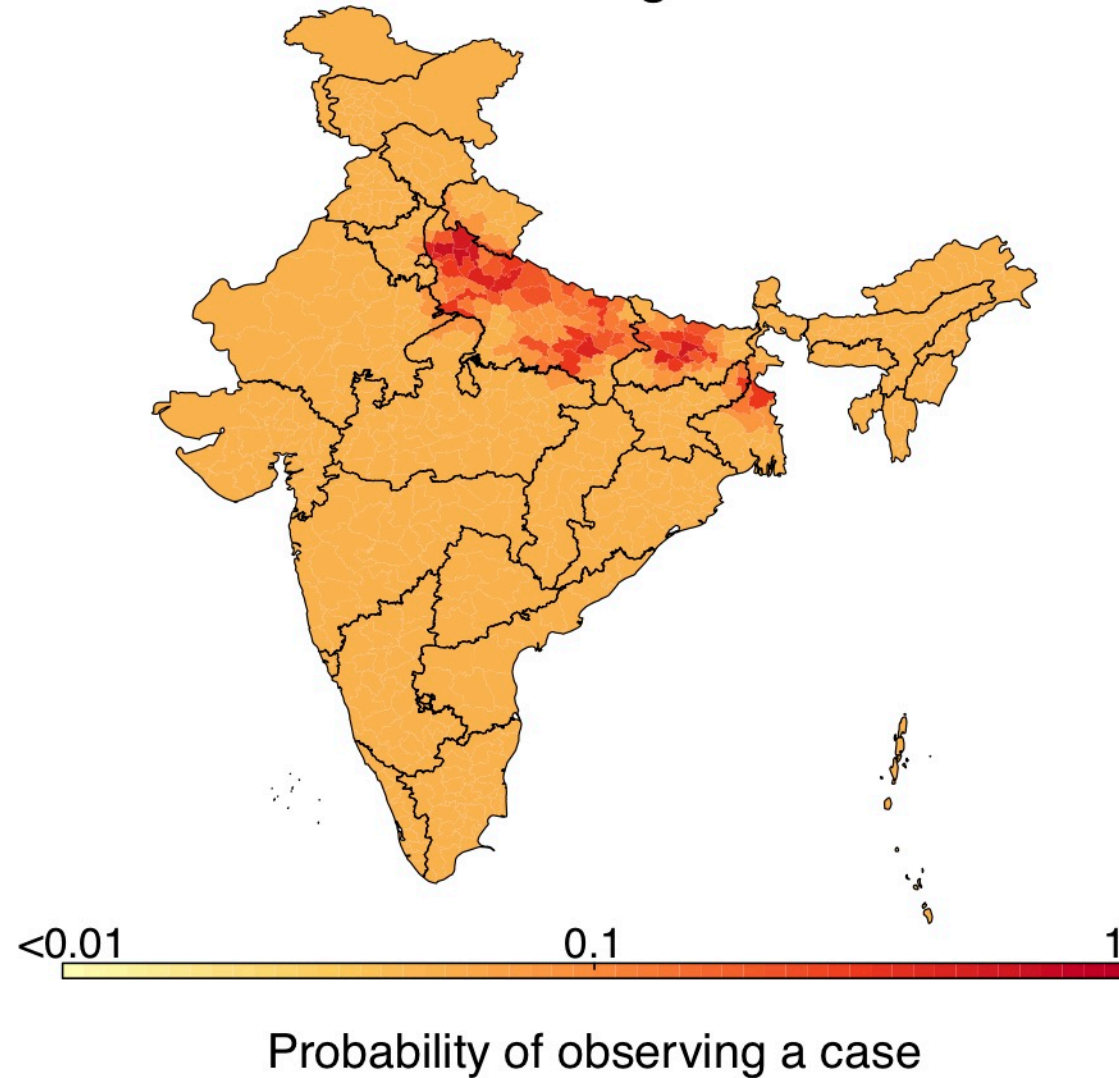
Probability of observing a case

Risk map
2010-01-01 through 2010-12-31

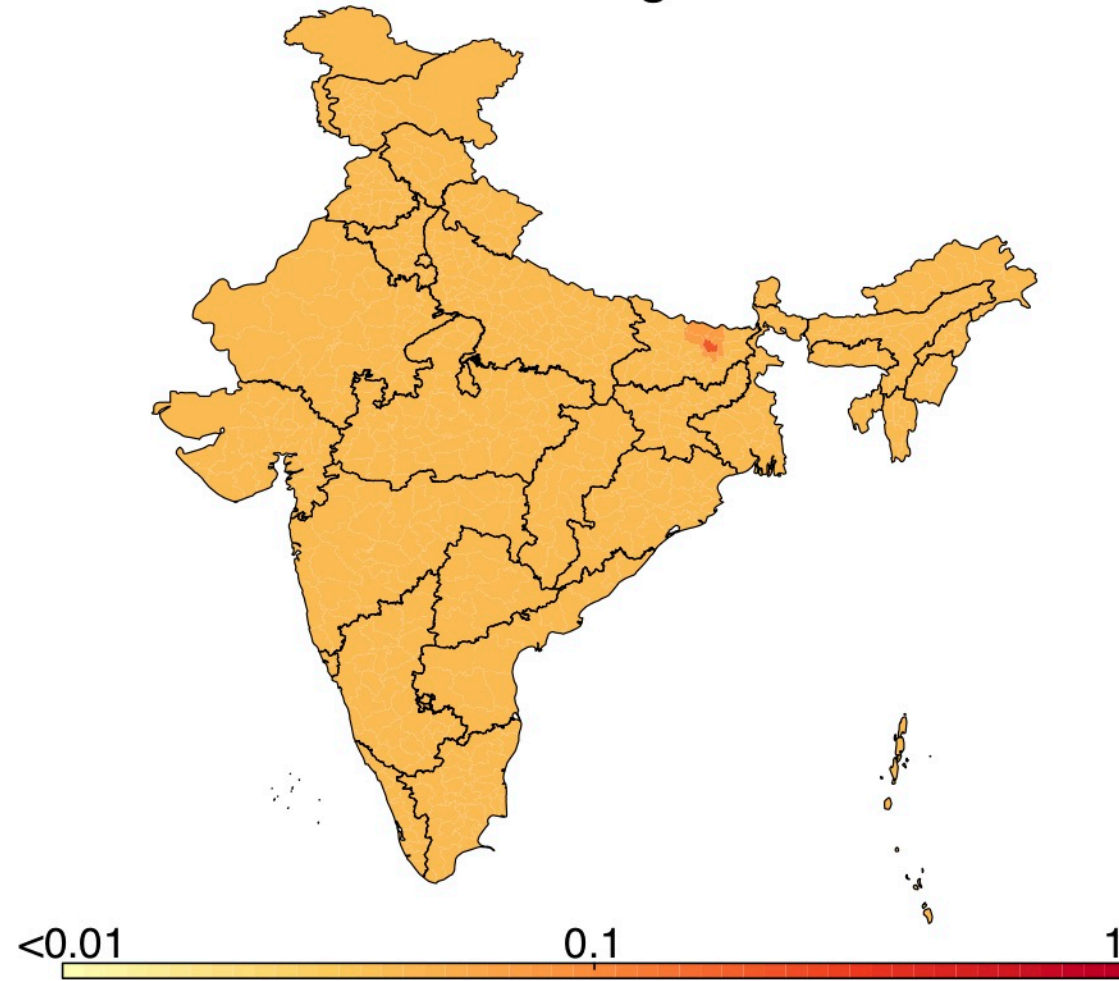


Probability of observing a case

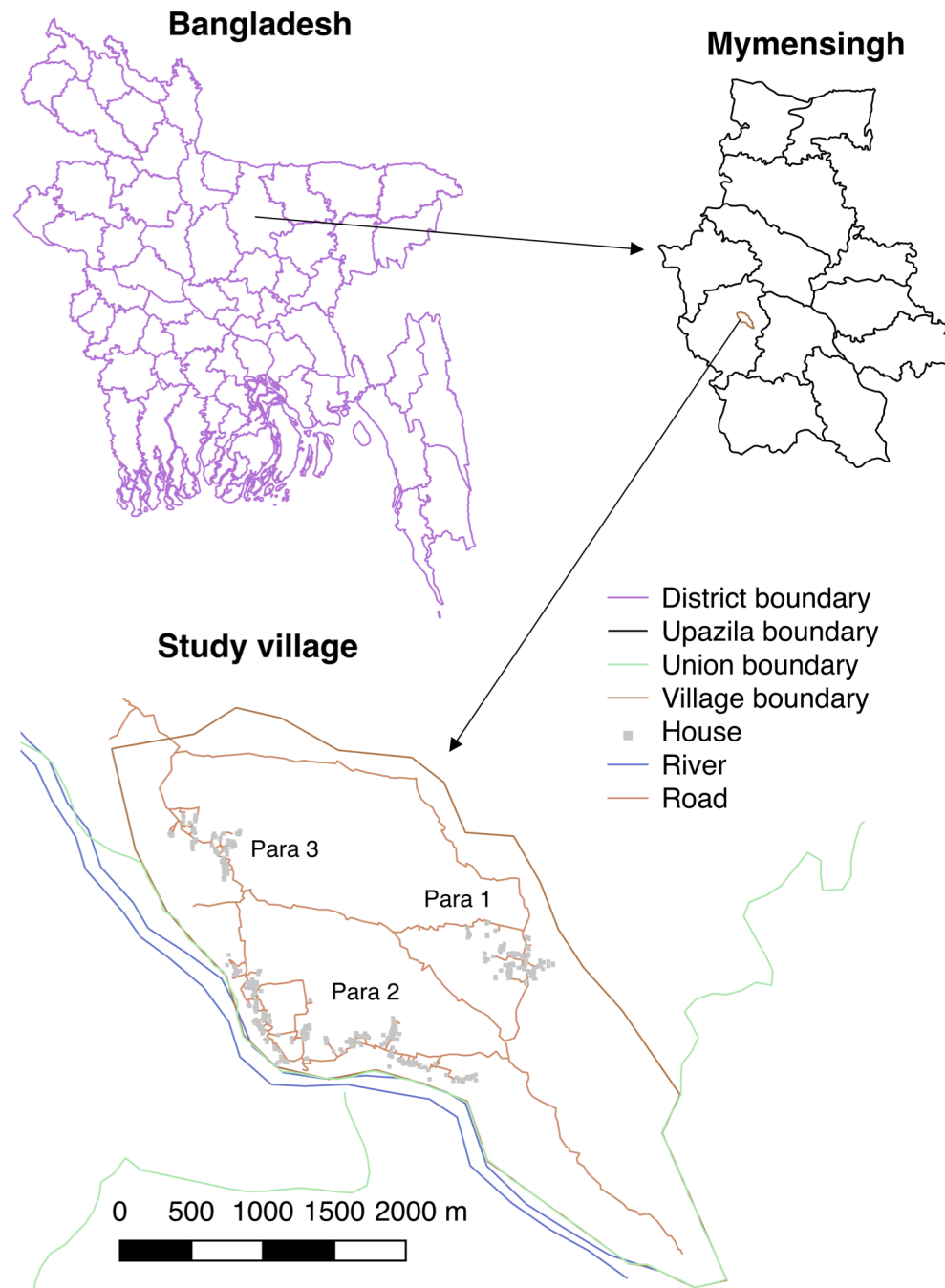
Risk map
2011-01-01 through 2011-12-31



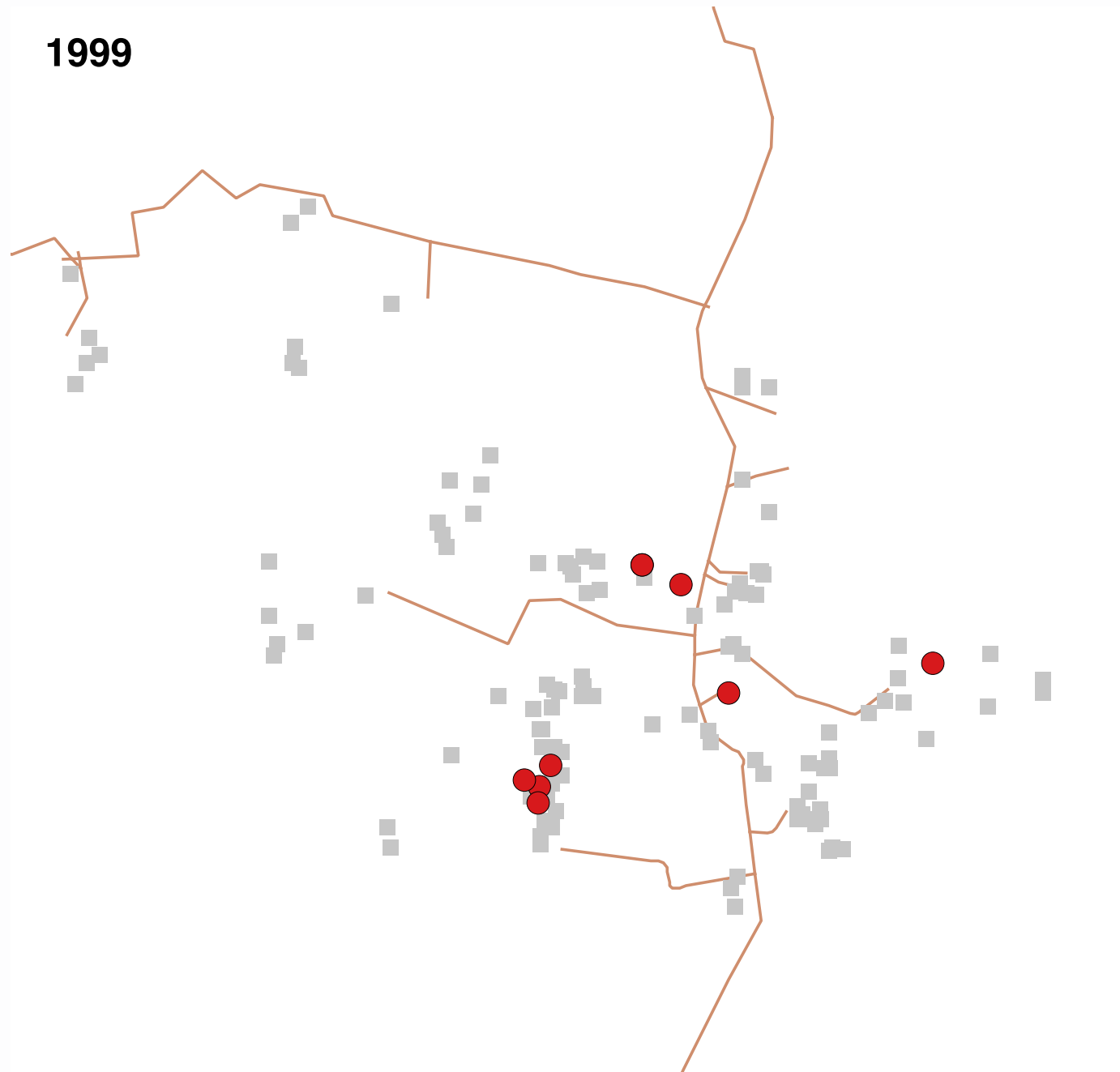
Risk map
2012-01-01 through 2012-12-30



Probability of observing a case



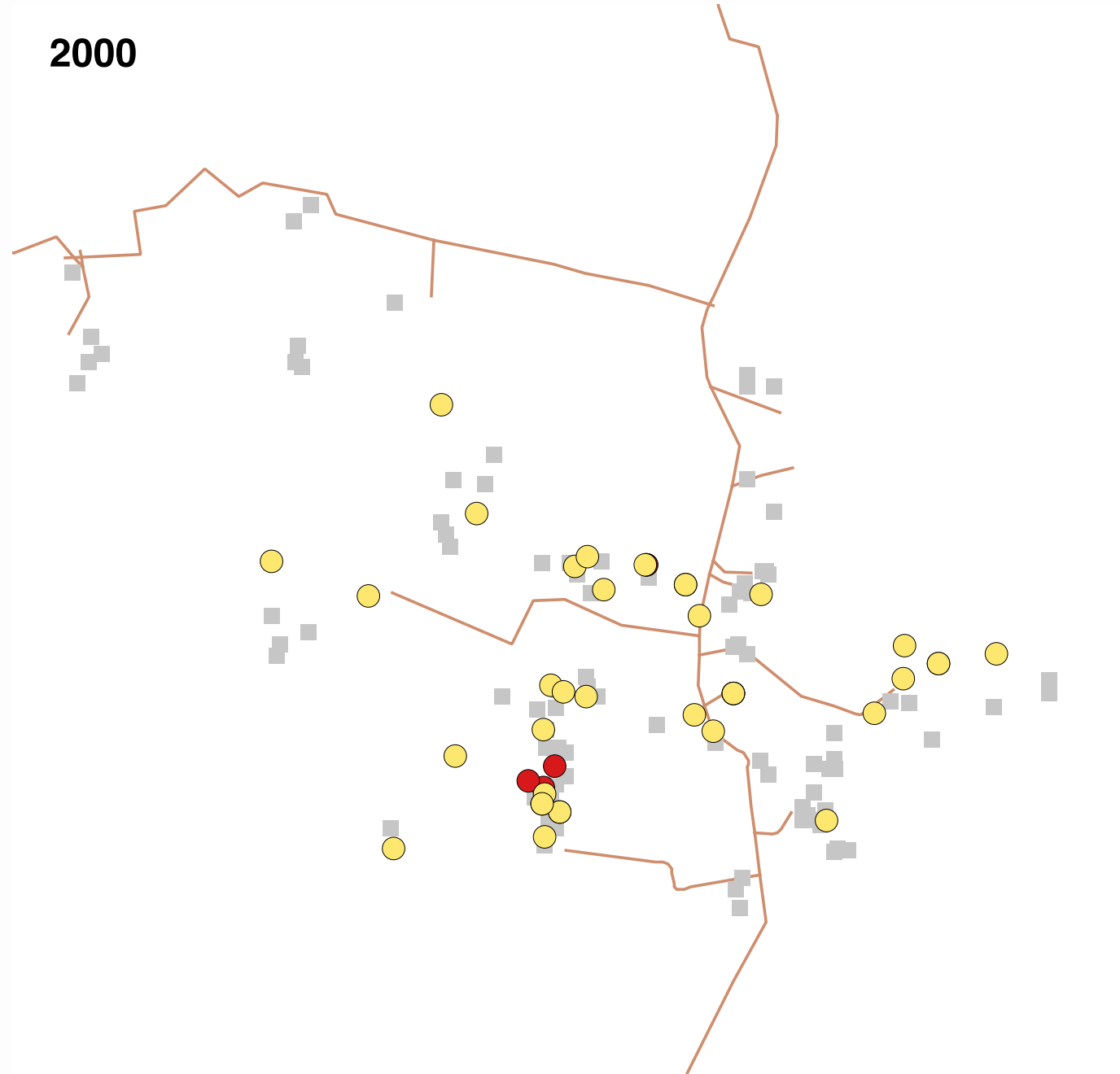
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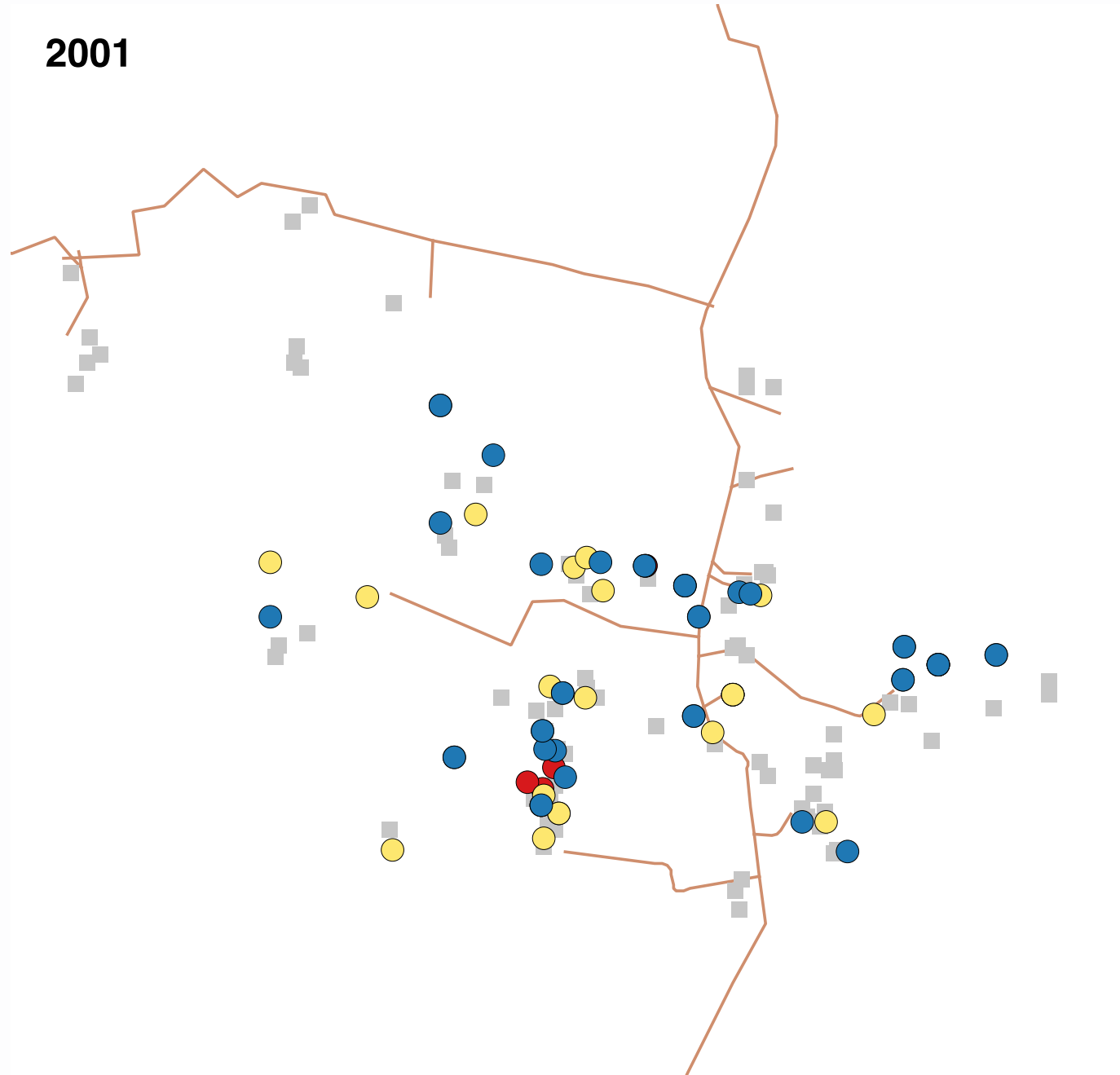
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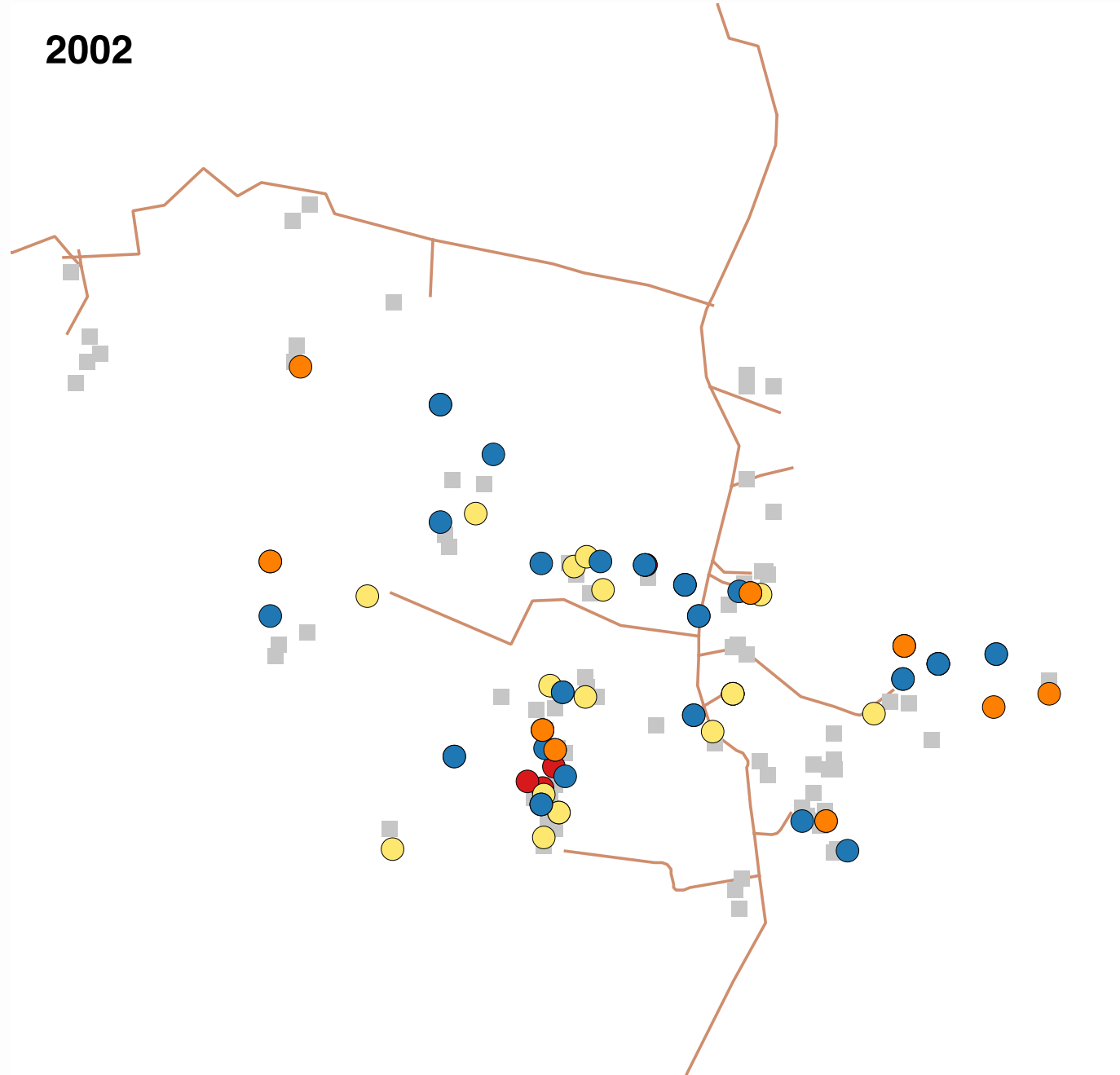
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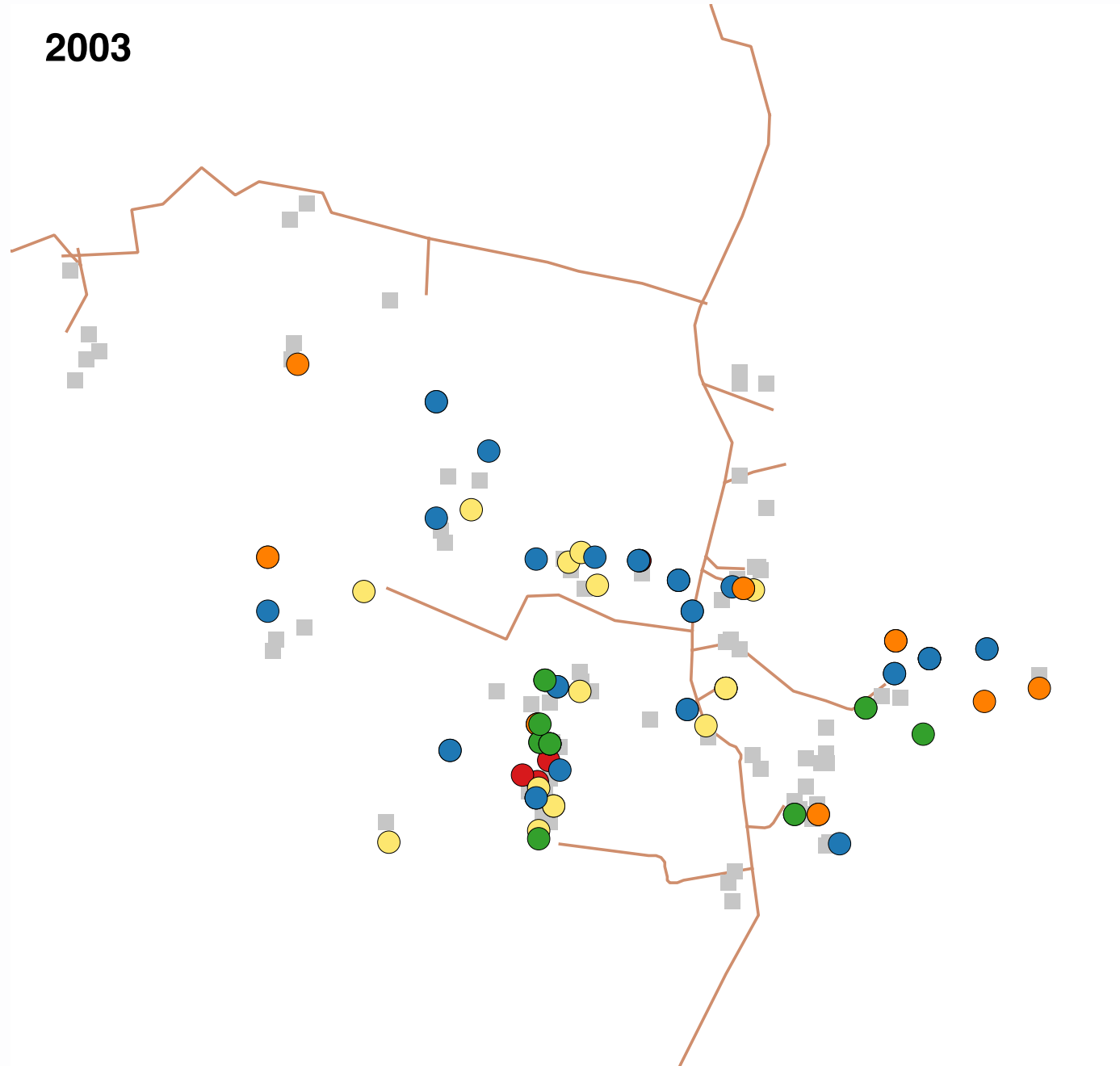
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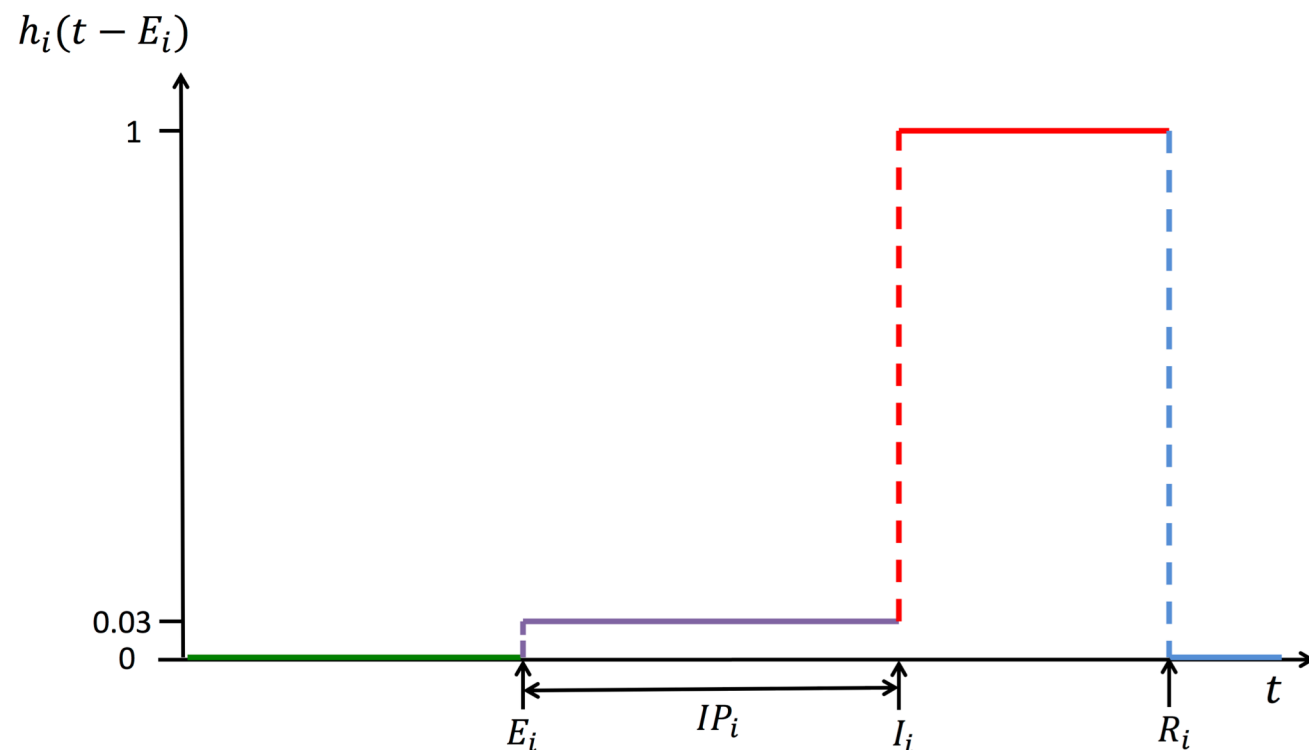
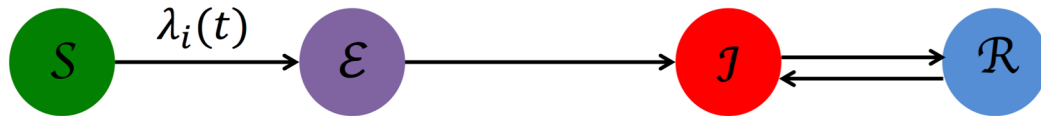
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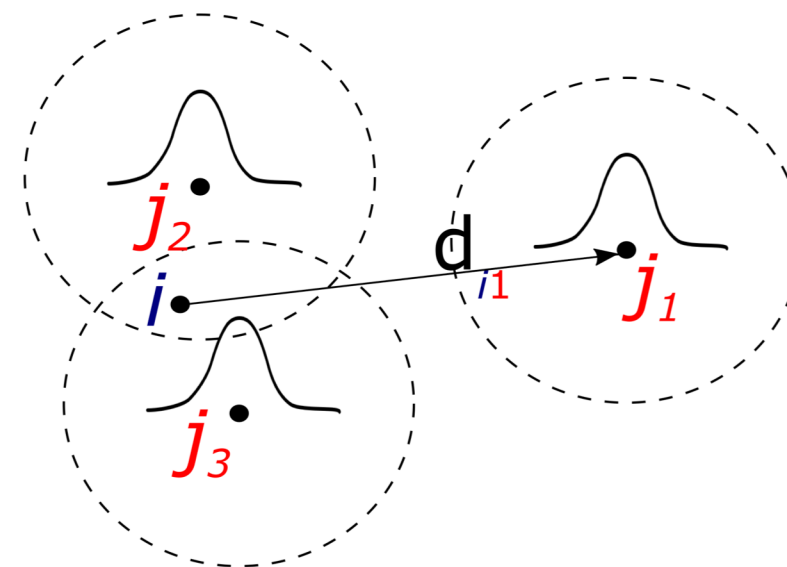
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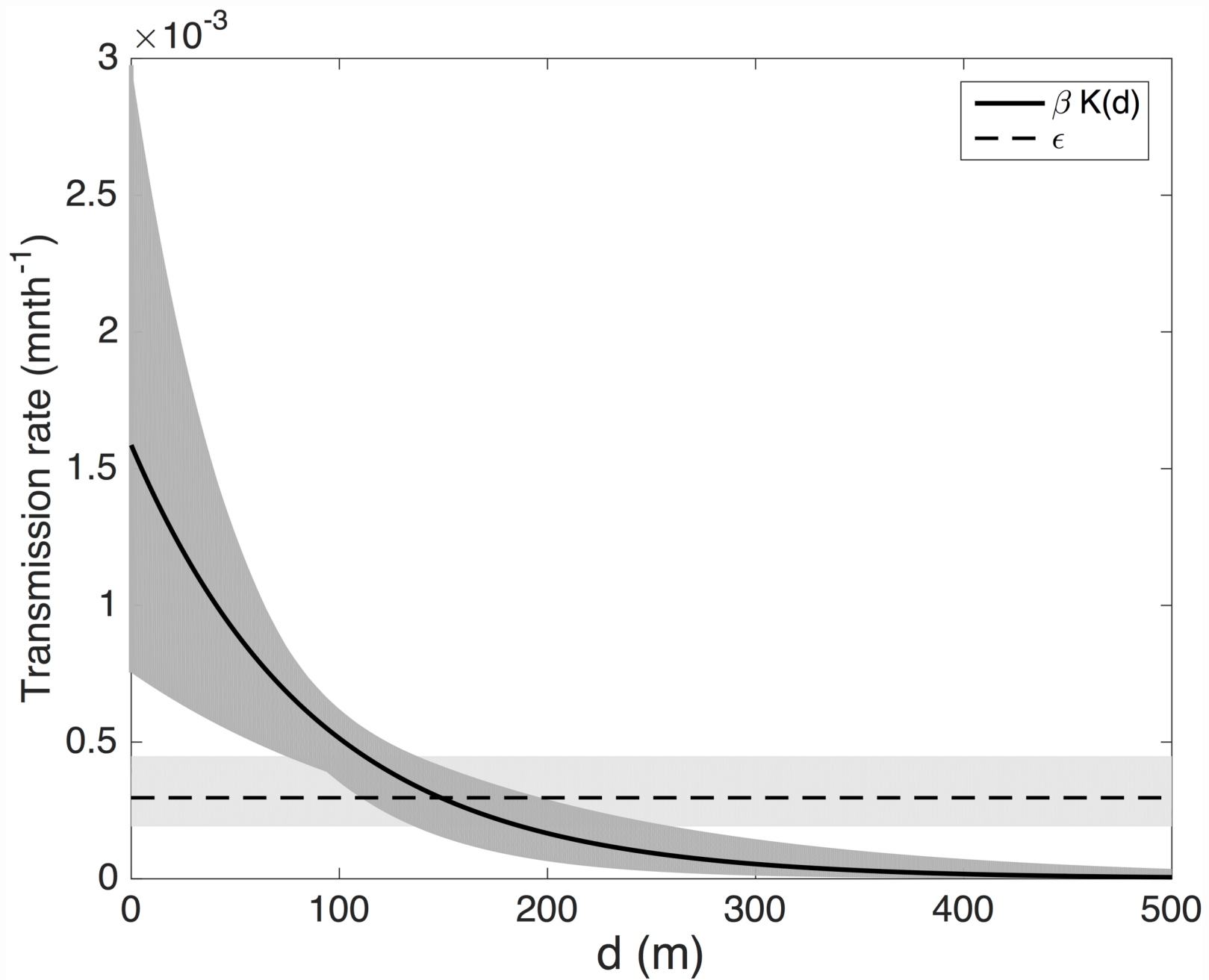


A

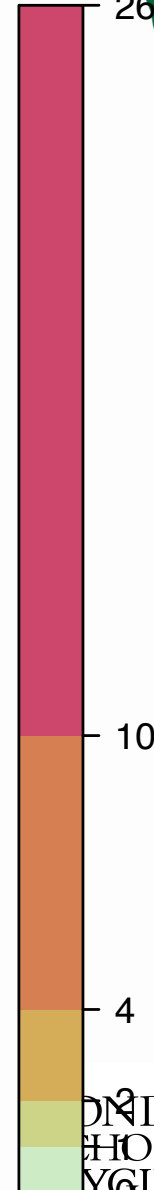
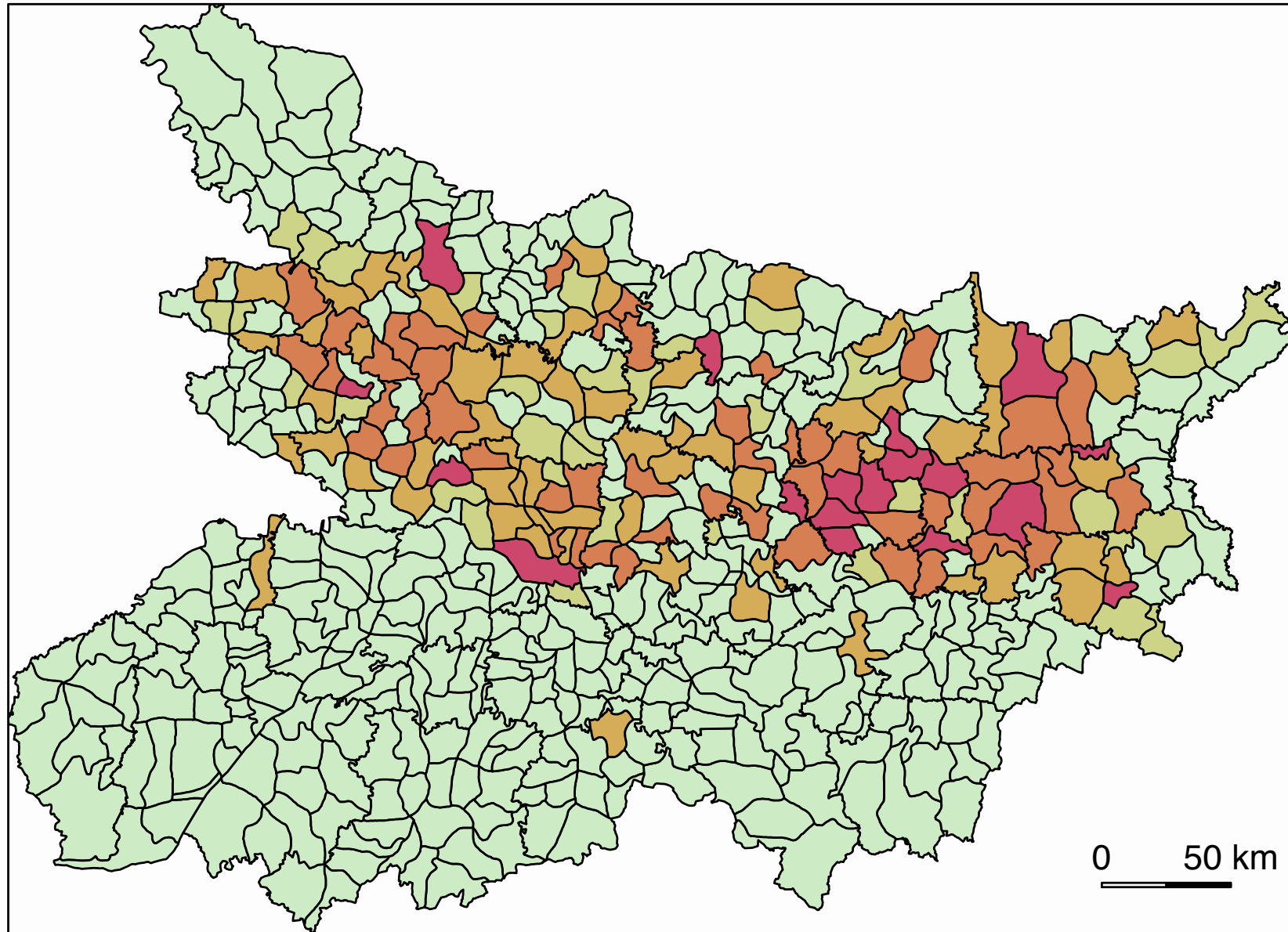


B





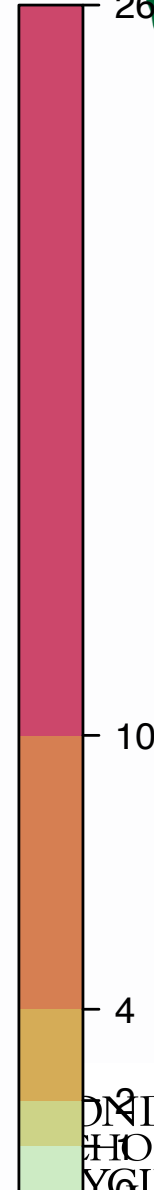
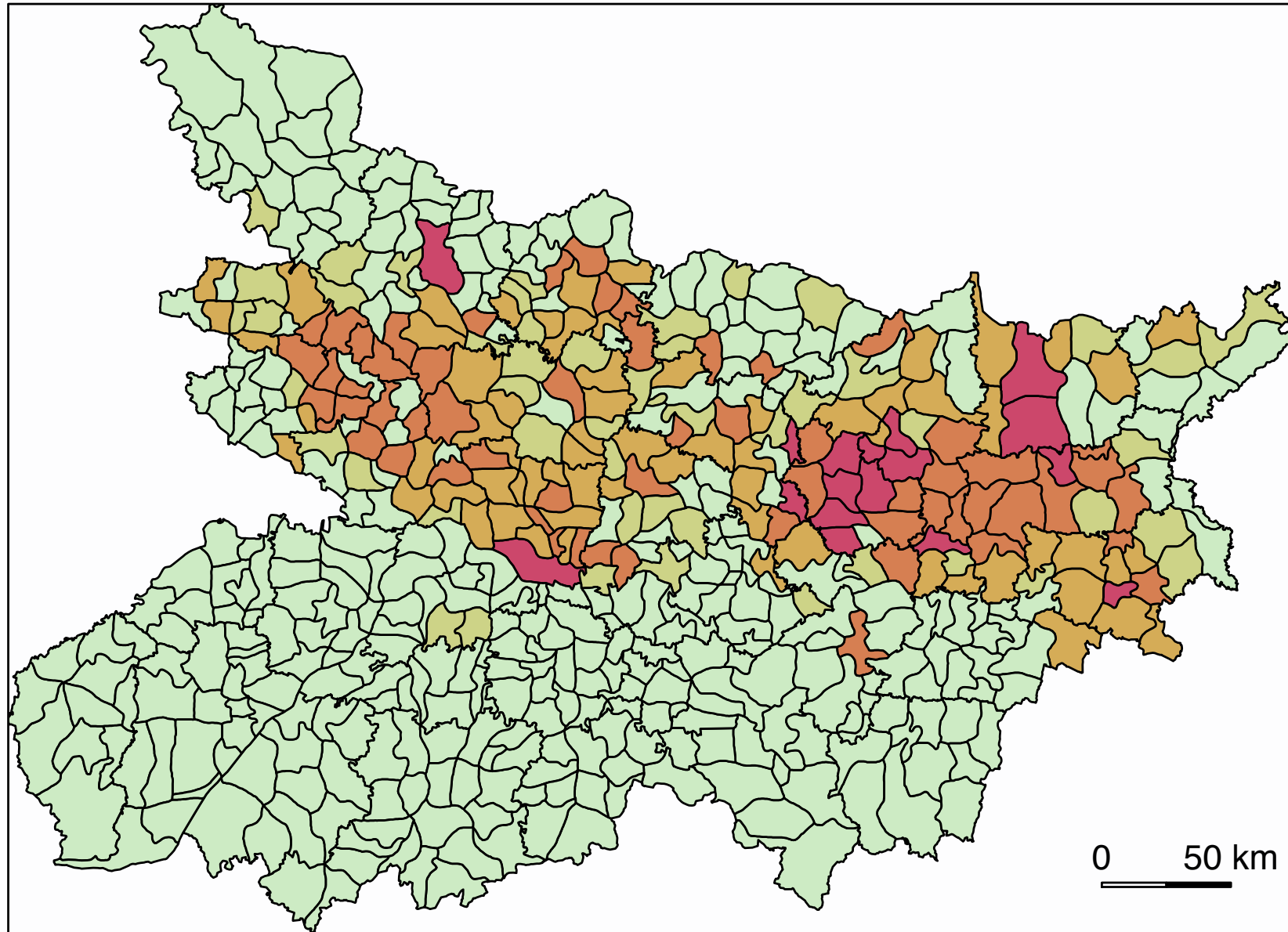
KA incidence (cases/10,000/yr) 2009



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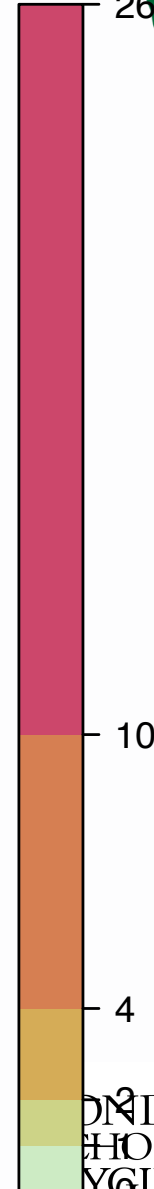
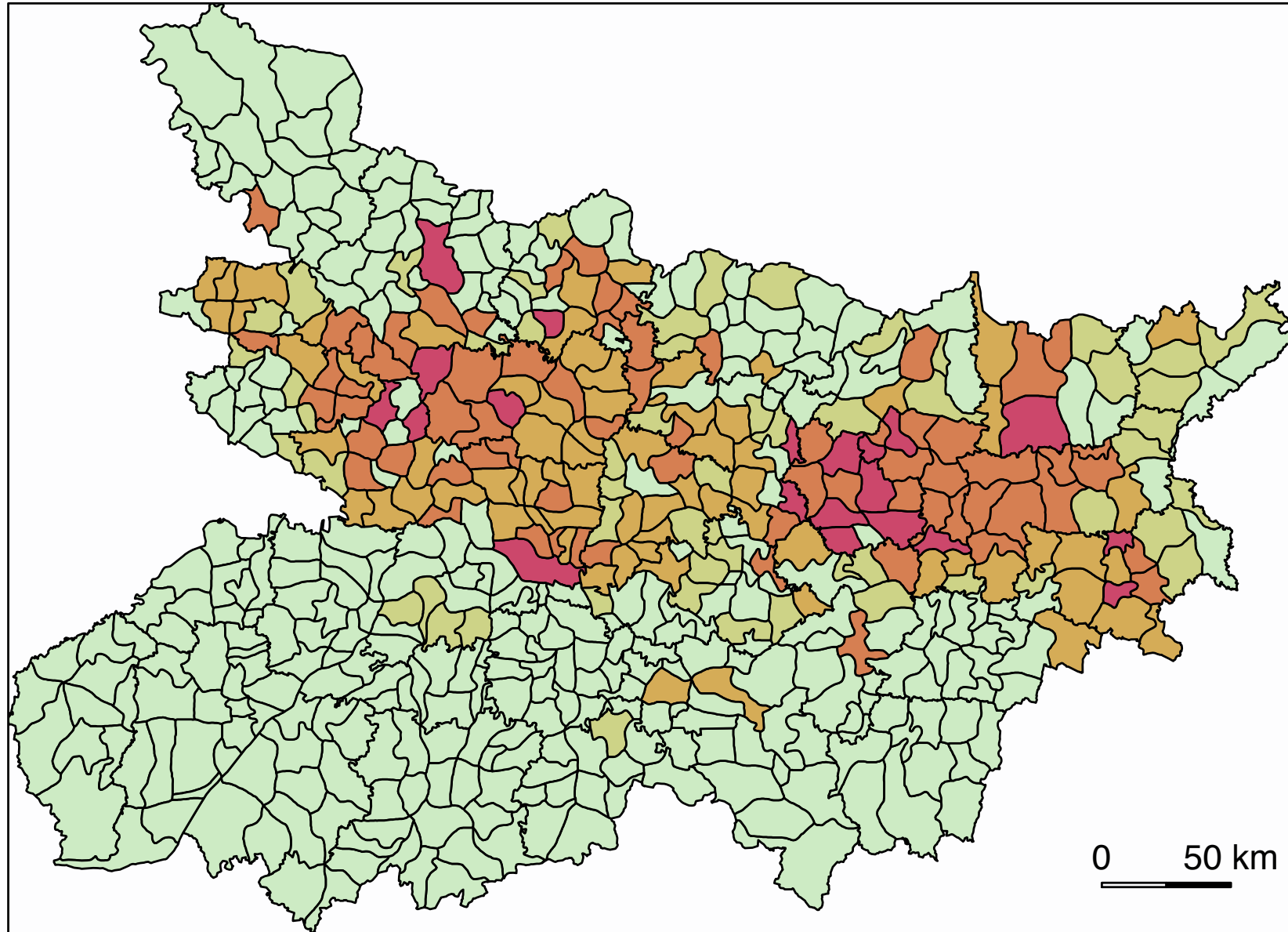
KA incidence (cases/10,000/yr) 2010



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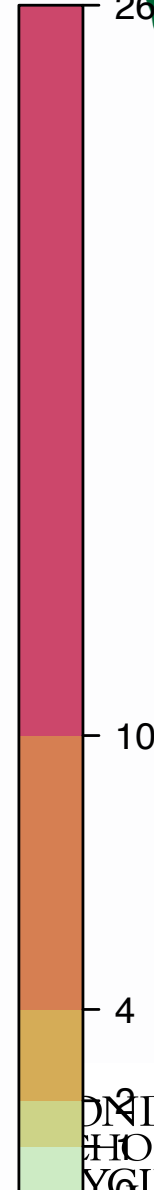
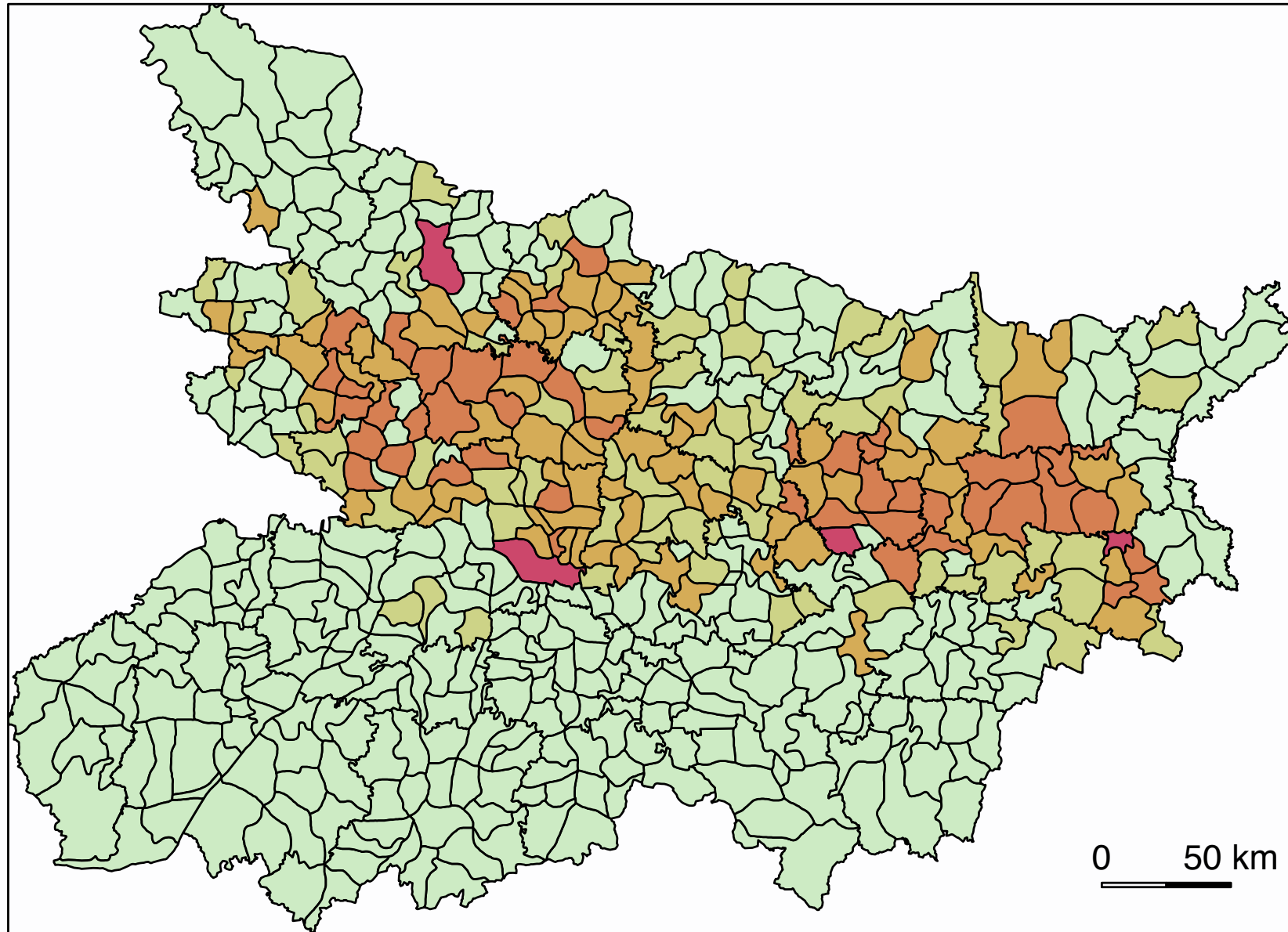
KA incidence (cases/10,000/yr) 2011



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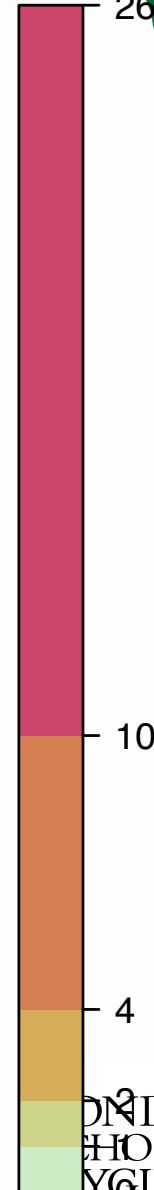
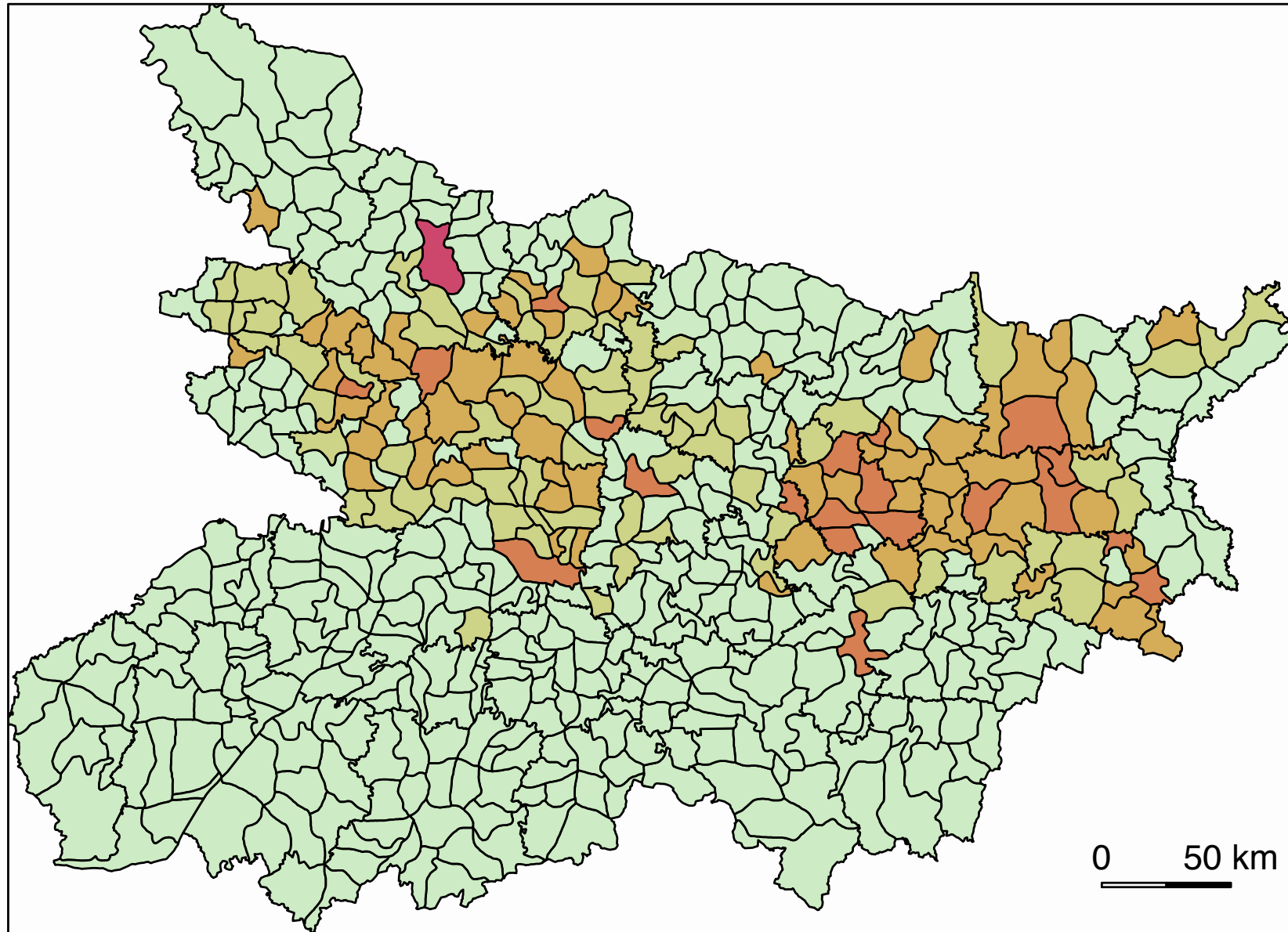
KA incidence (cases/10,000/yr) 2012



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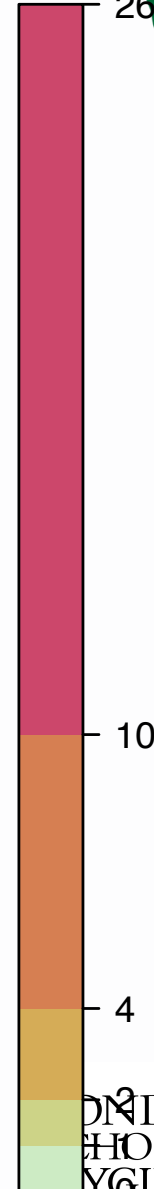
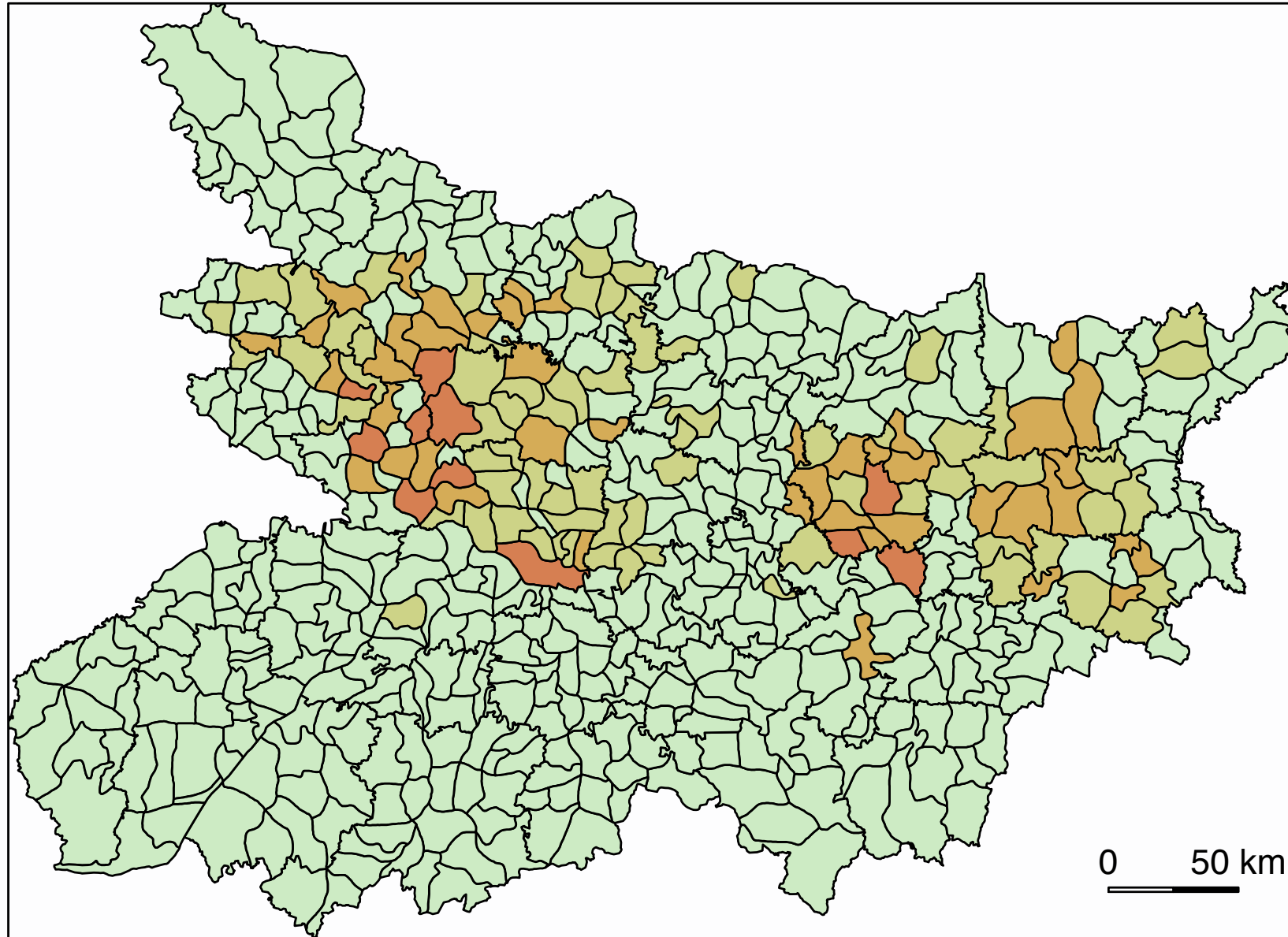
KA incidence (cases/10,000/yr) 2013



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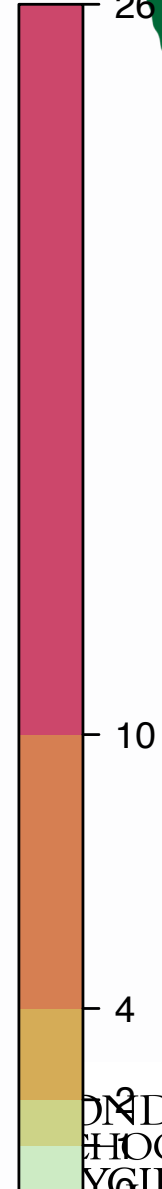
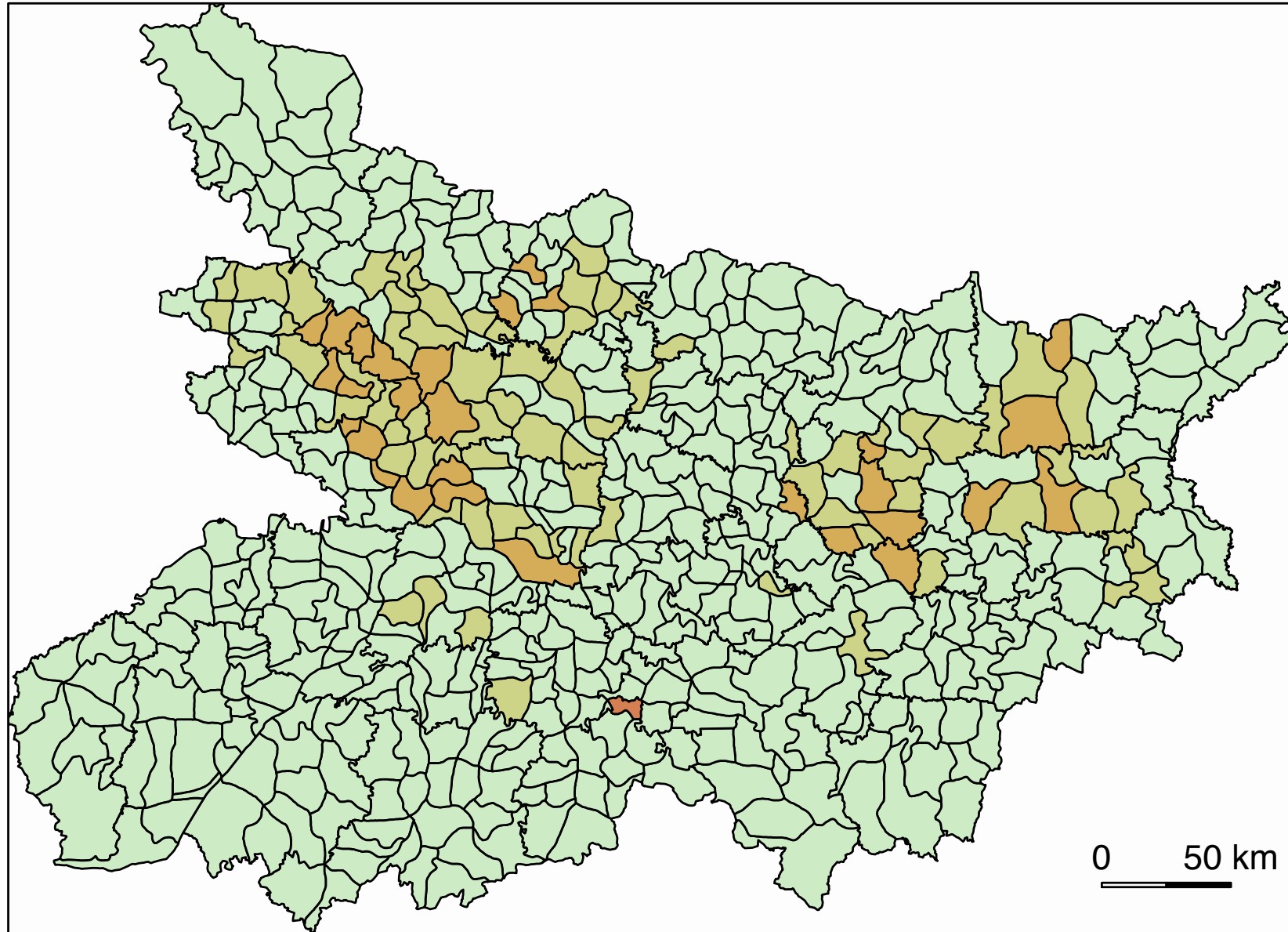
KA incidence (cases/10,000/yr) 2014



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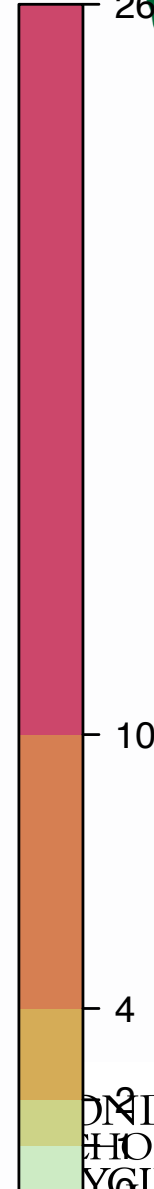
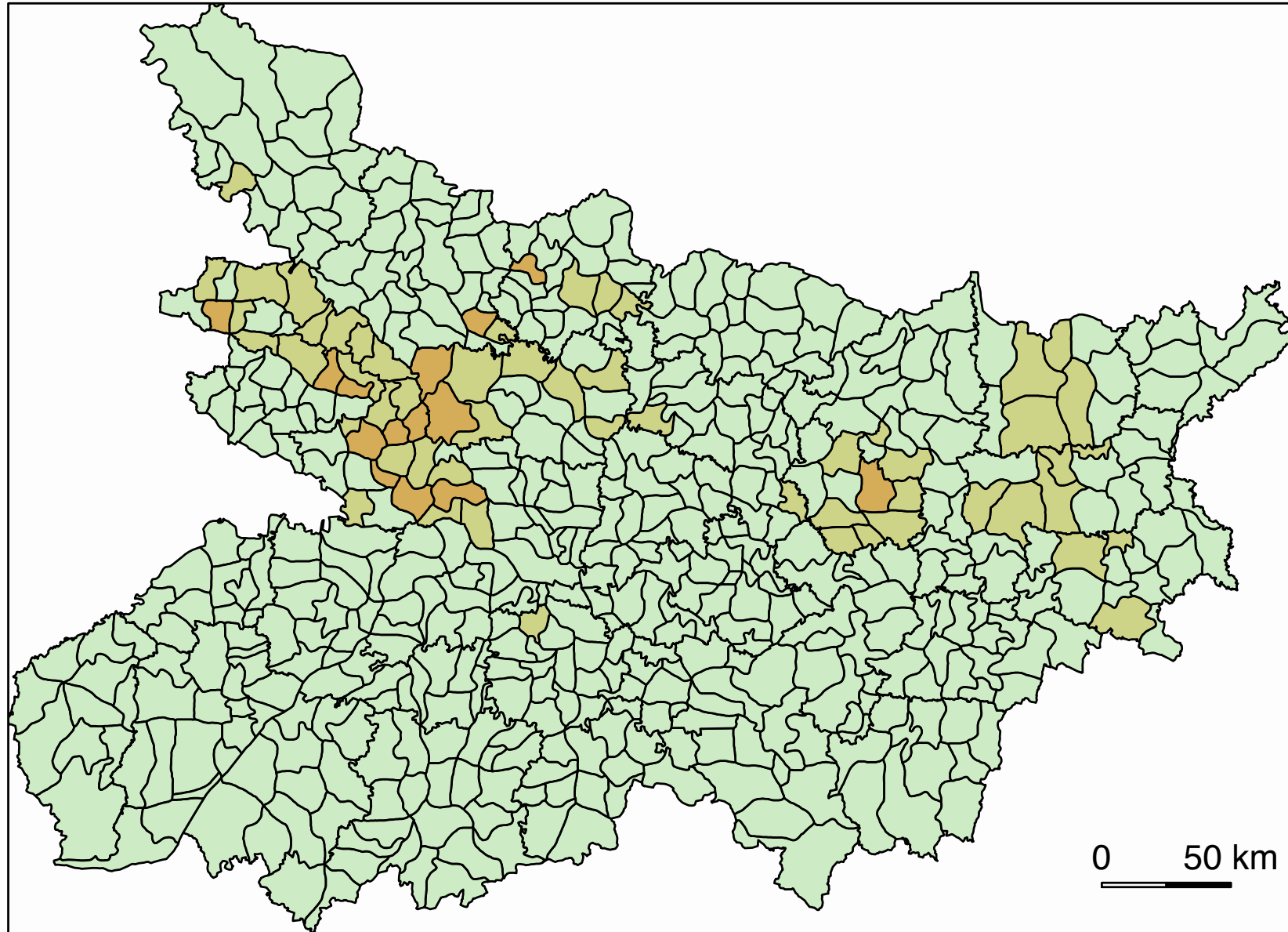
KA incidence (cases/10,000/yr) 2015



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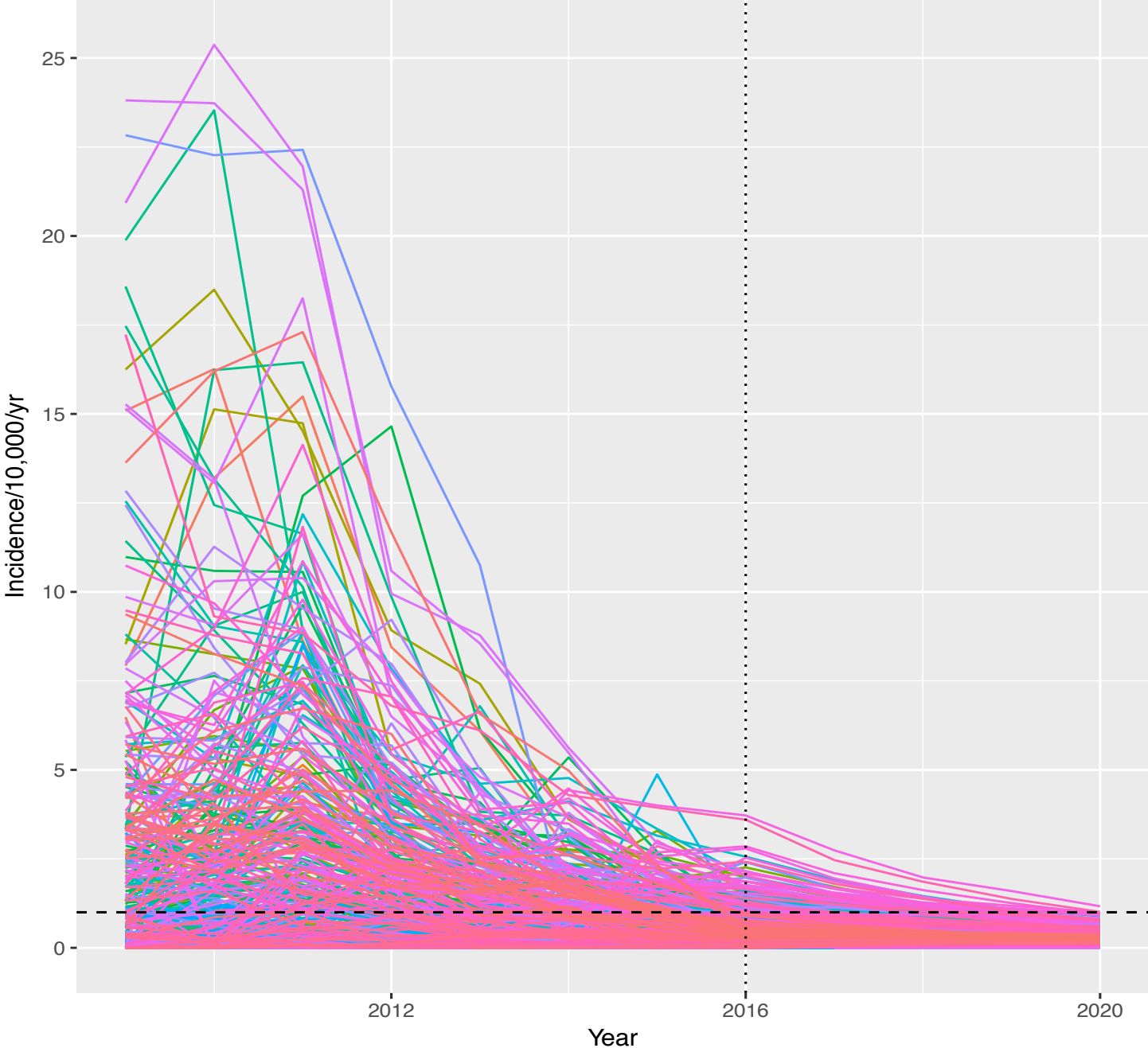
KA incidence (cases/10,000/yr) 2016



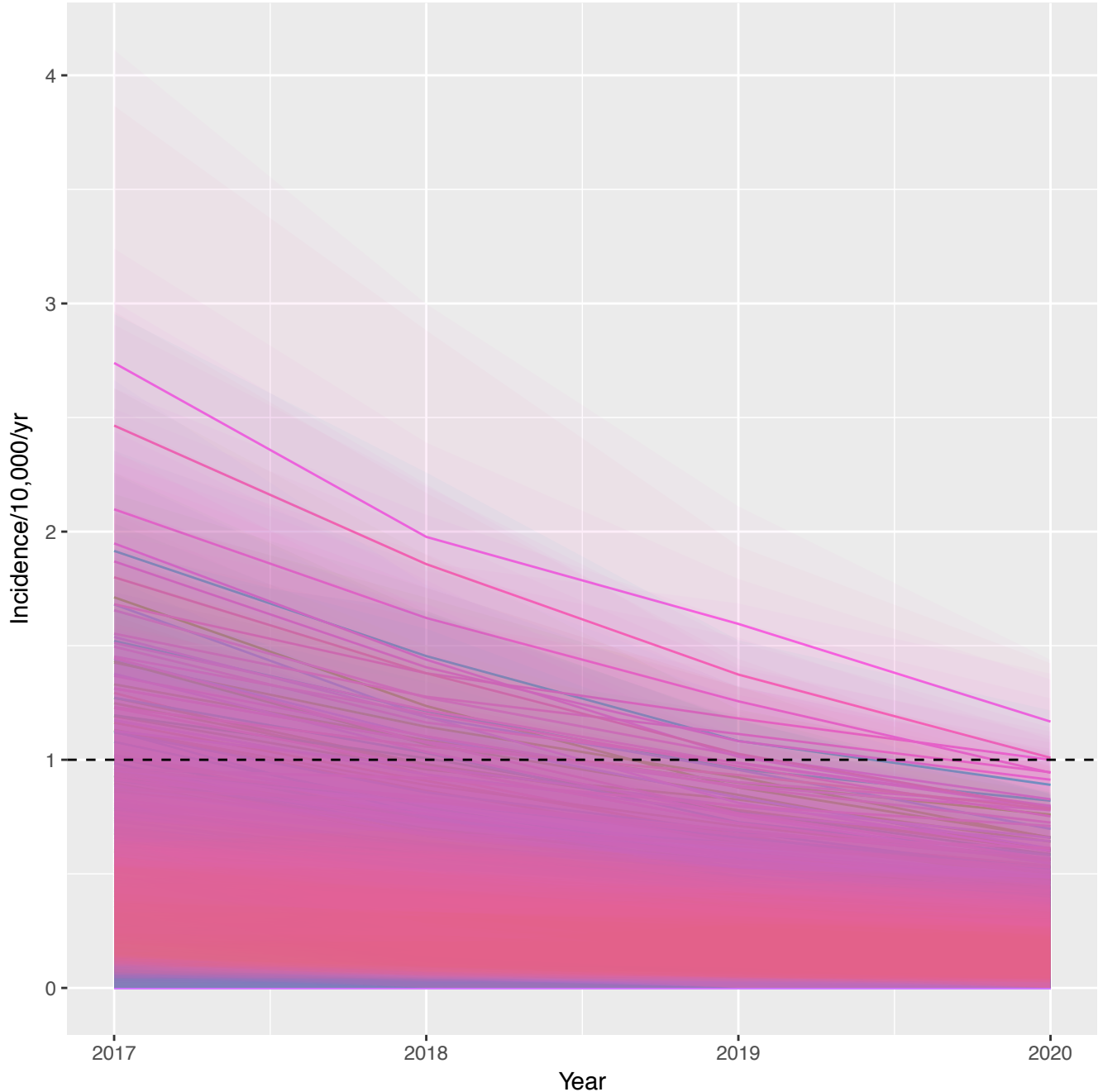
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Subdistrict-level KA incidence predictions up to 2020



Subdistrict-level KA incidence predictions up to 2020



Thank you!



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Modelling infectious disease dynamics to improve global health

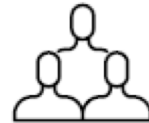


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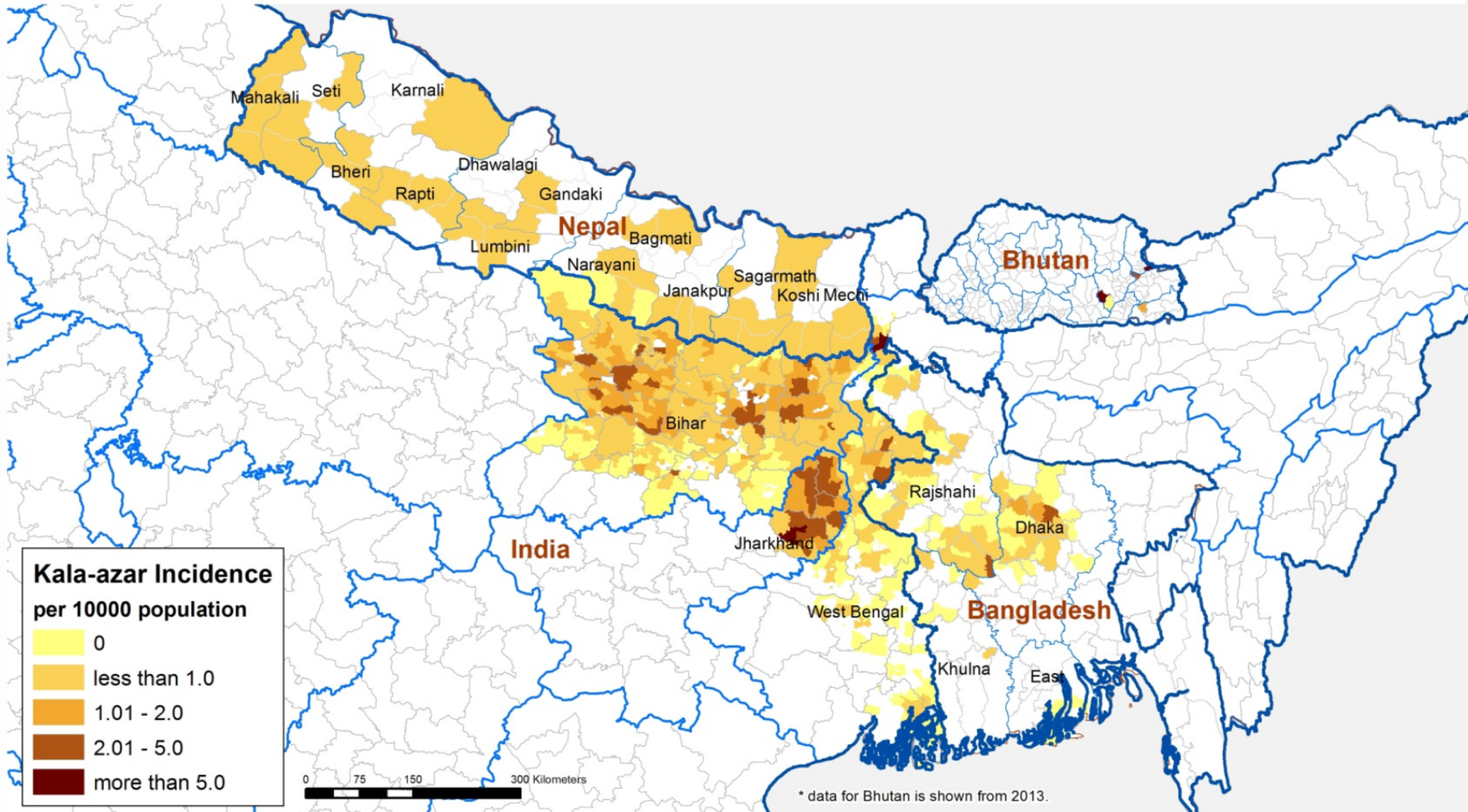
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GATES foundation



SPEAK
India

Setting the Post-Elimination Agenda for Kala-azar in India

Kala-azar Incidence (per 10000 population) in SEA Region in 2015



The boundaries and names shown and the designations used on this map do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted lines on maps represent approximate border lines for which there may not yet be full agreement.

Data Source: World Health Organization
Map Production: CDSO
World Health Organization 2016
Date : 02/11/2016

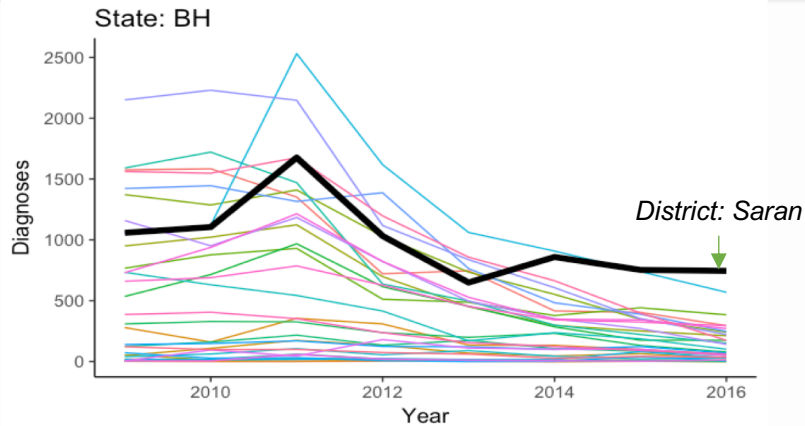


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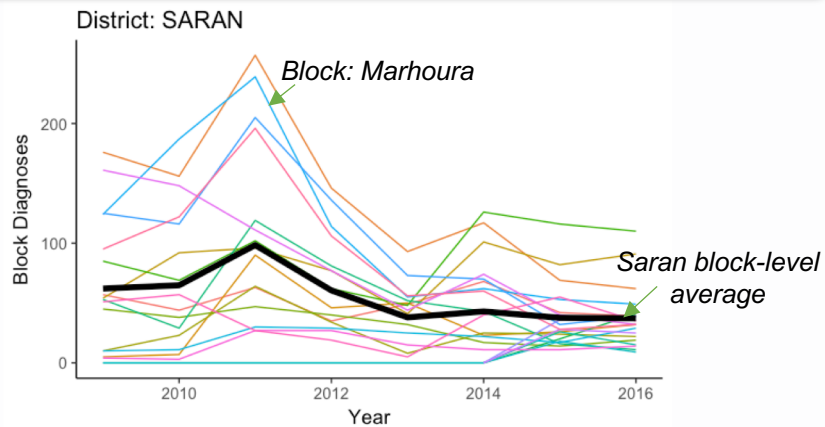
Modeling insights on heterogeneity of case incidence will help to predict outbreaks and test approaches to break transmission

While decline in case incidence has been consistent at block and district levels, incidence is highly heterogenous

1.a) What are the sources of spatio-temporal heterogeneity?
(e.g. differences in access to care, sandfly density or other interactions)

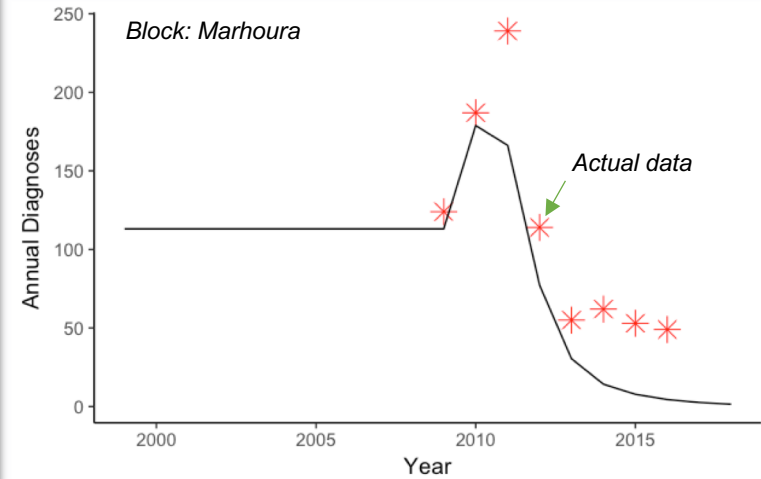


1.b) What are the drivers of case reduction?
(e.g. IRS or Active case management)



2) Can we develop a data-driven, model-based support tool for short-term prediction of likely areas of flare-up and outbreaks?

i We are collaborating with IDM to use *RiskMapper* platform as the basis for moving the technical capacity into NVBDCP



3) Can we model transmission dynamics to work out strategies to interrupt transmission using current tools (or newer approaches informed by operational research)?

