

Serum retinol concentration varies spatially: a secondary analysis of data from three states from the Indian 2016 cross-sectional Comprehensive National Nutrition Survey (CNNS)

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Background

- Vitamin A deficiency (VAD)** is a public health problem in India.
- As per **Comprehensive National Nutrition Survey (CNNS) 2016-2018** report (1) – **Highest prevalence** of VAD in adolescents was in **Bihar, Chhattisgarh** and **Jharkhand** - **higher than 20%**.
- Spatial information** about the variations in **retinol concentration** can help **targeting efforts**. (2)
- Spatial information can also help to understand the **aetiology** of **VAD**.
- Geospatial analysis paves the way for further work to answer important questions about the effect of **seasonality bias** in **survey designs and interpretations**. (3)

Methods

- Secondary data analysis of the CNNS data was conducted in the states having highest prevalence of VAD.
- Serum retinol was analyzed for adolescents as it was less affected by inflammation

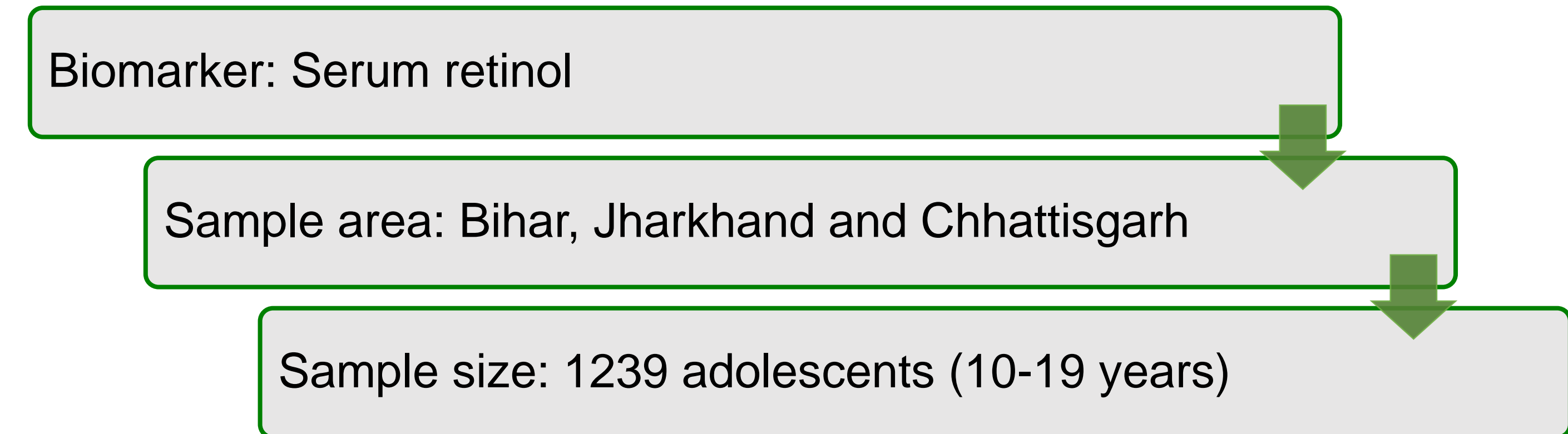


Fig 1. Sample of serum retinol analysis

- Geostatistical methods were used to reveal spatial dependence of retinol concentration in the states.
- Ordinary kriging predictions were made on aggregated mean values for each primary sampling unit.
- The predictions and their uncertainties [expressed in terms of the probability that the true value does not exceed 0.7 $\mu\text{mol/L}$, which is widely used to indicate VAD (4)] were presented as maps (Fig 4).

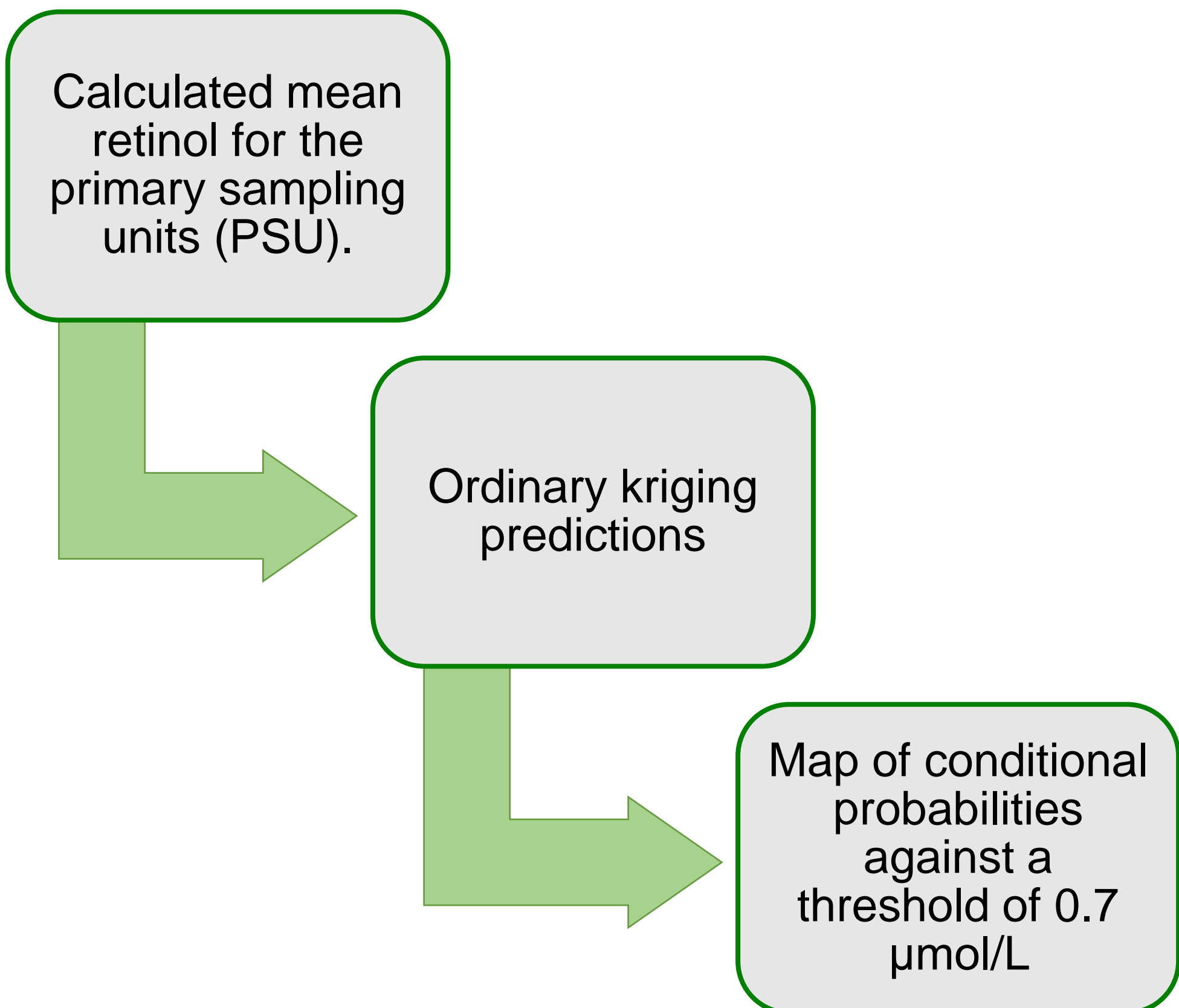


Fig 3. Steps in geostatistical analysis



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Results

A marked **spatial dependence** in **retinol concentration** was observed in the study area (Fig 4)

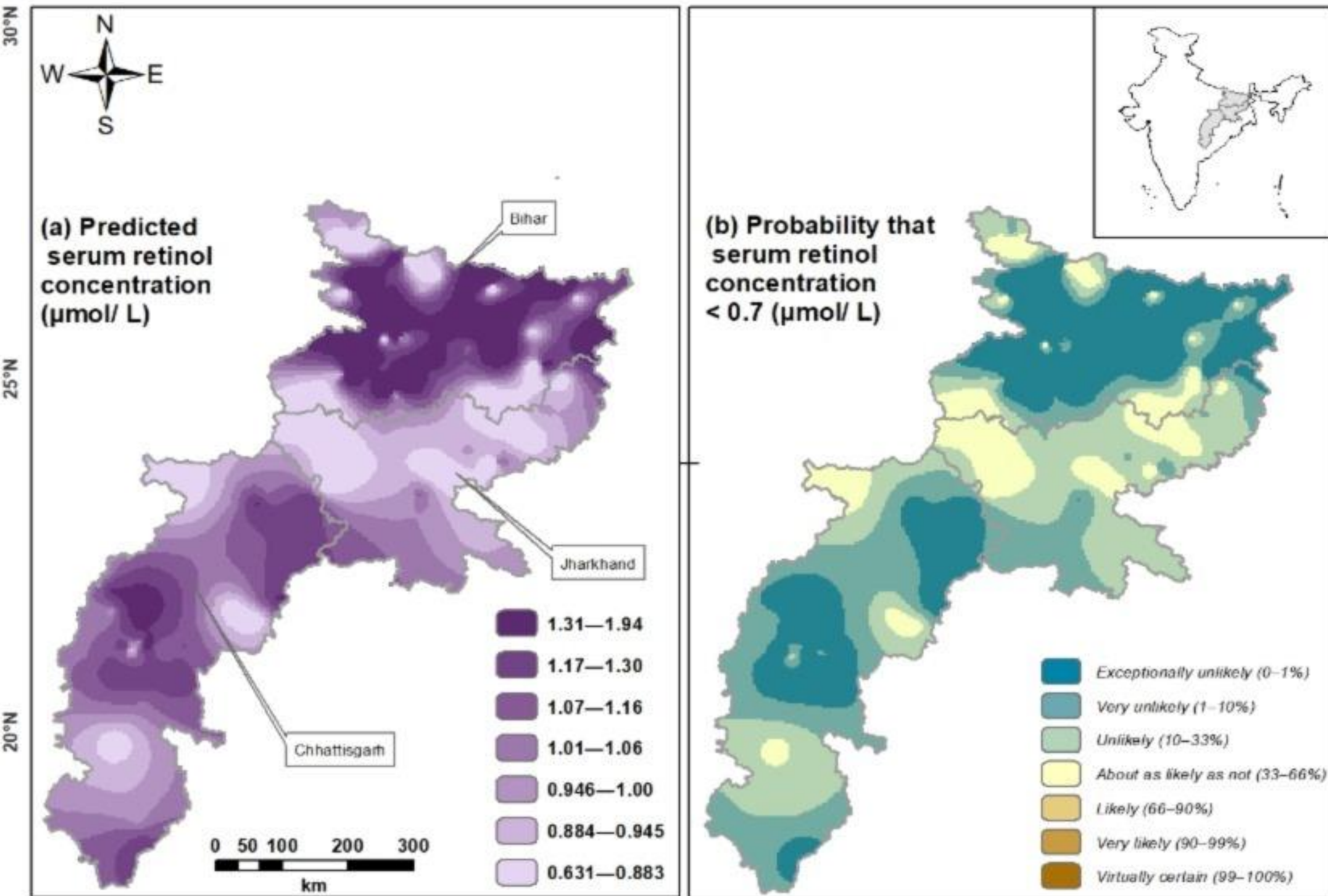


Fig 4. (a) Spatial prediction of concentration of serum retinol in adolescents, (b) probability that retinol concentration does not exceed 0.7 $\mu\text{mol/L}$ in adolescents of the study area

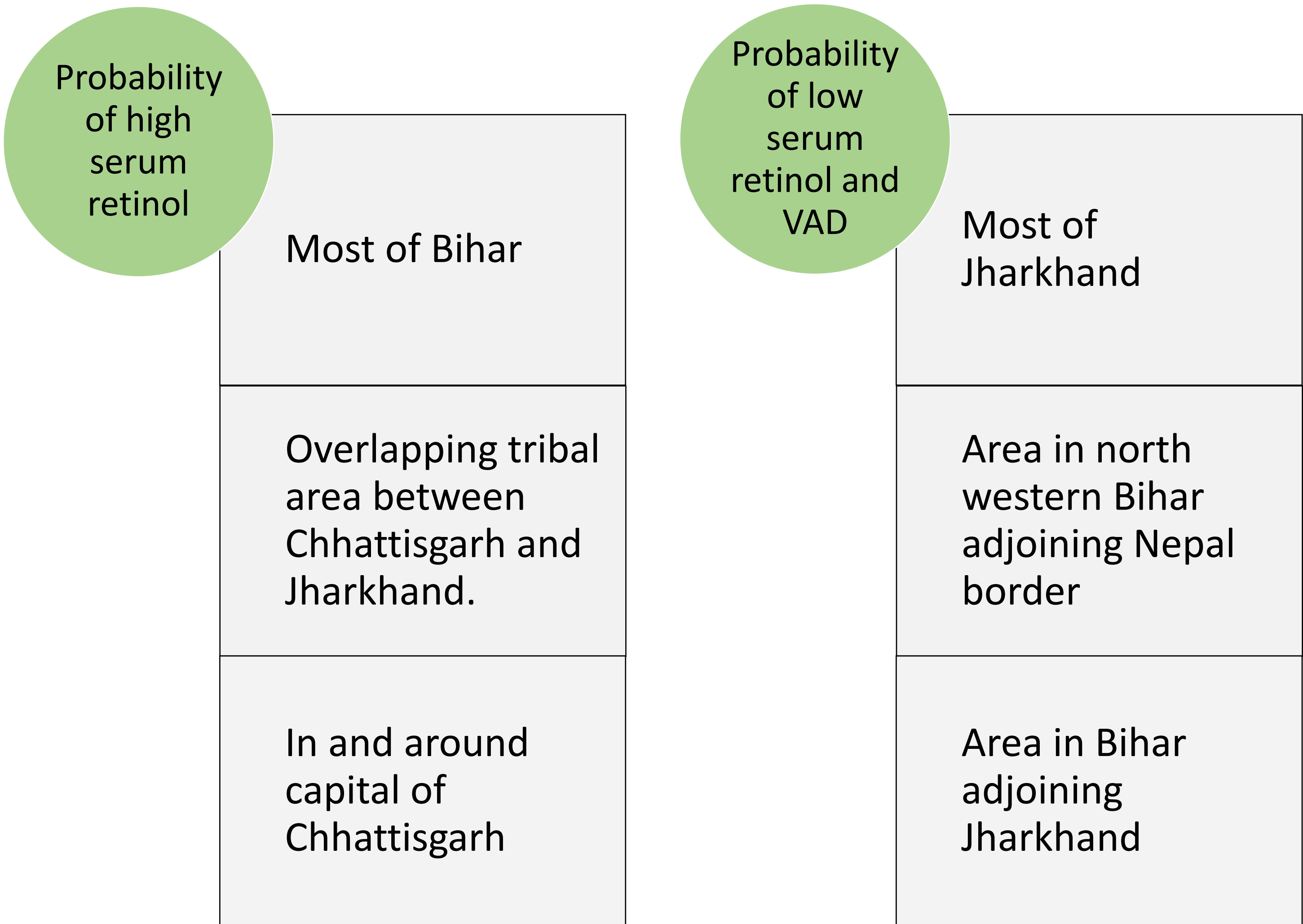


Fig 5 Description of areas with probability of high and low serum retinol and VAD in adolescents

Conclusion

- Single values** of **deficiency** prevalence estimates at state level can **mask substantial variation within the state**.
- Large uncertainties** in VAD prevalence estimates **outside the state capitals** can be used to inform the **design of subsequent surveys**.
- VAD exists but spatial predictions** can help design **targeted approaches for focus areas within the states**.

References

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