Predicting informal food vendor distributions in Kuala Lumpur using MaxEnt: A spatial modelling approach for urban food environment research

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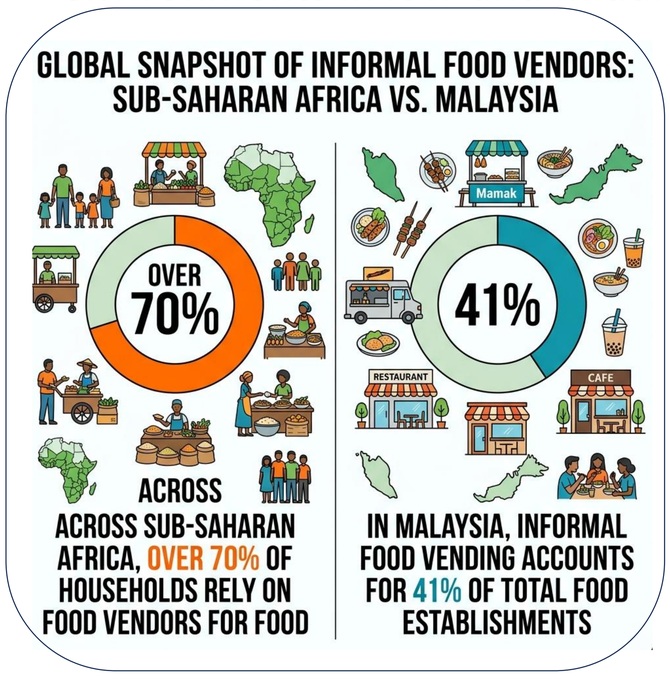
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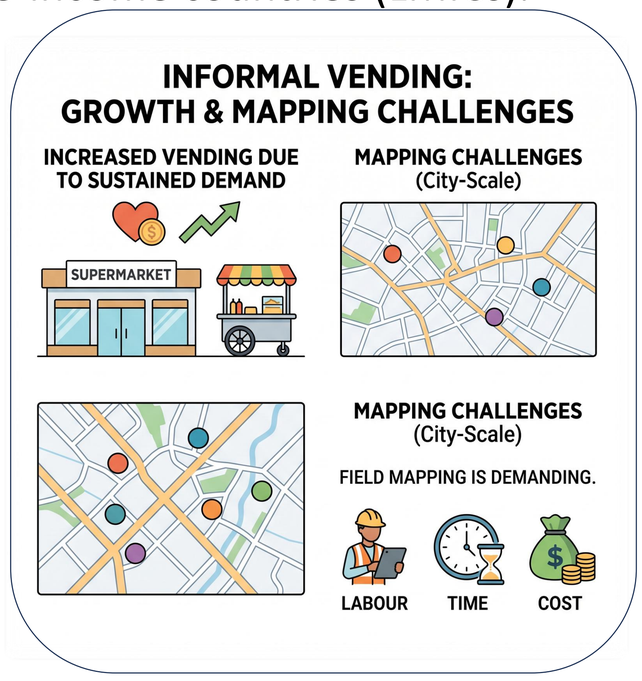
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Introduction

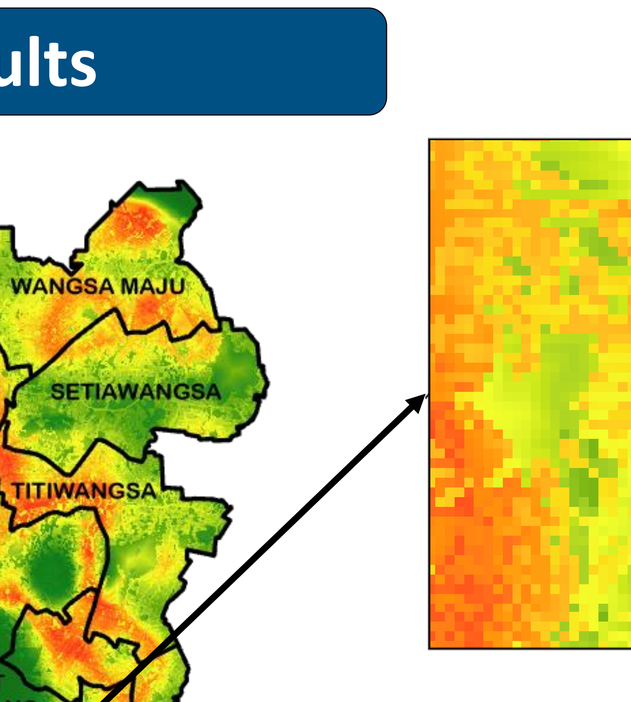
- Informal food vendors are a key component of urban food environments in low-and middle-income countries (LMICs).



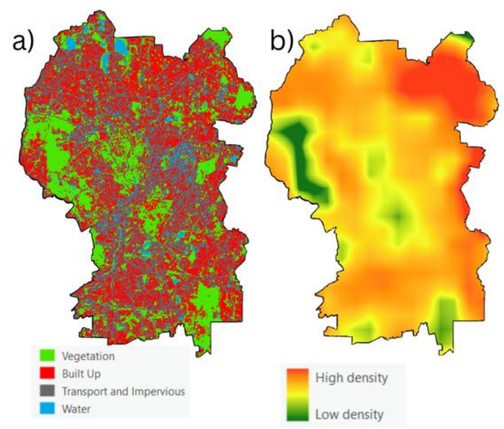


Methodology

1. Study location and sub-sample collection.



2. Spatial harmonisation.



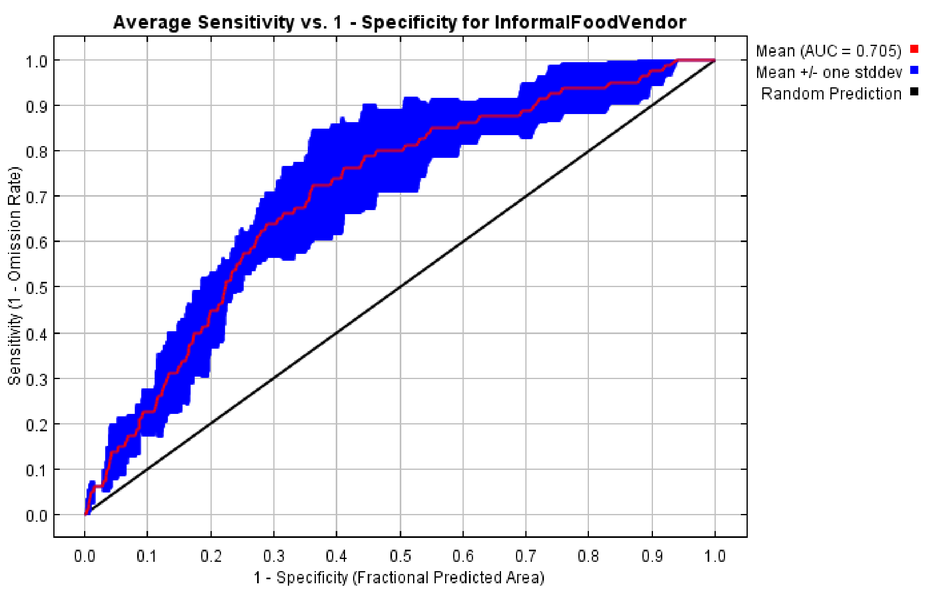
3. Predictive modelling.

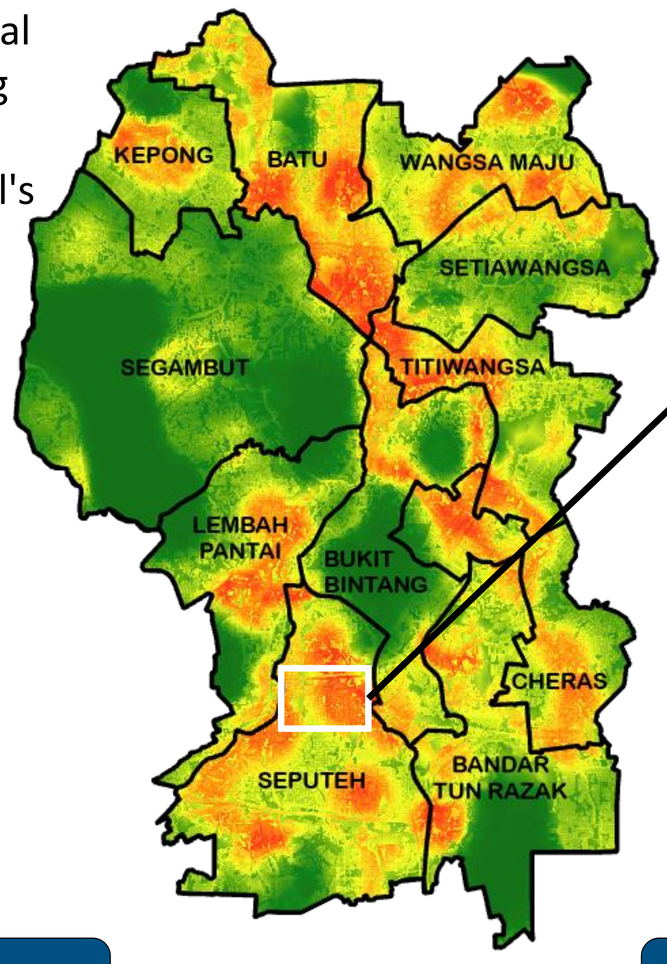


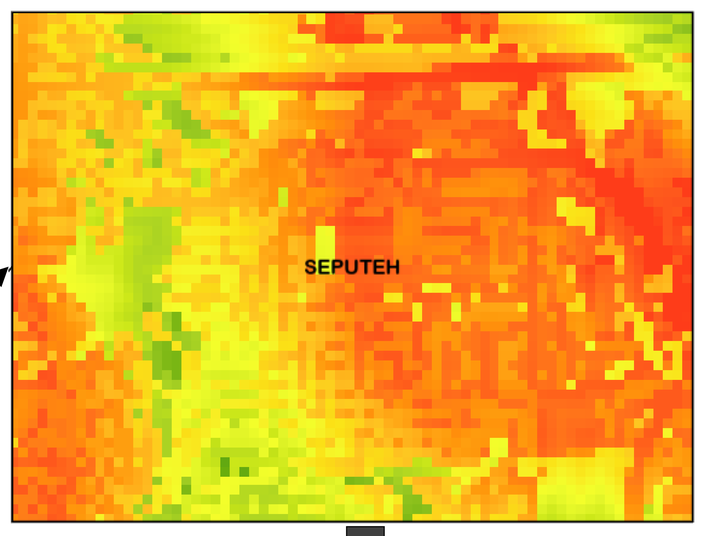
Results

i. Vendor hotspots heavily cluster along commercial corridors and transit nodes, highlighting a strong reliance on urban foot traffic

ii. A robust **AUC score of 0.705** validates the model's strong predictive performance and the selected environmental covariates.











Discussion

- MaxEnt comprehensively maps food environments, capturing informal vendors that drive food security across LMIC cities.
- This cost-effective model provides a highly replicable framework for generating city-scale spatial maps in data-scarce regions.
- This framework operationalises core food environment dimensions by linking external and personal domains.

Conclusion

By operationalising core food availability and accessibility metrics, this scalable MaxEnt framework empowers LMICs to prevent misdirected interventions and integrate informal vendors into inclusive food systems planning.



Acknowledgements

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Key References

[1] Turner, C., Ambikapathi, R., Battersby, J., Blake, C. E., Coates, J., Daivadanam, M., Delobelle, P., Downs, S., Drewnowski, A., Hawkes, C., Holdsworth, M., Laar, A., Leroy, J., Nugent Zgambo, O.,O'Meara, L., Salm, L., Spires, M., Talsma, E.F., Wairimu, S., Walls, H., Kadiyala, S. (2025). Re-visiting key concepts for food environment research – a revised globally applicable framework for research,policy and practice. Agriculture, Nutrition and Health Academy Food Environments Working Group (ANH-FEWG). Technical Brief. Innovative Methods and Metrics for Agriculture and Nutrition Actions(IMMANA) programme. London, UK.

[2] Phillips, S.J., Anderson, R.P., Schapire, R.E., 2006. Maximum entropy modeling of species geographic distributions. Ecol. Model. 190.

[3] Ambikapathi, R., et al. (2021). Informal food environment is associated with household vegetable purchase patterns and dietary intake in the DECIDE study: Empirical evidence from food vendor mapping in peri-urban Dar es Salaam, Tanzania. Global Food Security. 28, 100474.