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Characterising Residential Environments for Children: A Nationwide Linked Data Approach to Mapping Built and Natural Features

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Background

The environments where children live play a critical role in shaping health trajectories, yet comprehensive population-level descriptions of these environments remain limited. Understanding residential environmental characteristics is essential for informing urban planning and public health strategies aimed at creating child-friendly neighbourhoods.

Methods

We linked nationwide geographic information systems (GIS) data to residential addresses for children in Wales, enabling detailed characterisation of local environments. Indicators included housing type, garden size, neighbourhood greenness (Enhanced Vegetation Index from Landsat 8 imagery), walkability, access to recreational spaces, and food outlet density. Using these measures, we classified neighbourhoods into distinct “environmental phenotypes” representing combinations of built and natural features. Spatial analyses explored variation in these phenotypes across urban and rural areas and by area-level deprivation.

Results

Five discrete environmental phenotypes emerged, ranging from high-density housing with limited greenspace and high fast-food outlet density to low-density, walkable neighbourhoods with private gardens and abundant greenspace. These classifications reveal substantial geographic variation and highlight clusters of potentially obesogenic environments.

Conclusion

This work demonstrates the feasibility of using linked GIS and administrative data to generate robust, scalable measures of residential environments for children. Such classifications provide a foundation for future research examining environmental influences on health and for guiding policy interventions to promote healthier, child-friendly communities.

