



Global Observatory of
**Healthy and
Sustainable Cities**

Zhengzhou China 2024

Policy and spatial indicators for healthy and sustainable cities
1000 Cities Challenge report

Min Liu, 2024



Full details of the data and methods are available at:

Global Observatory of Healthy & Sustainable Cities
<https://www.healthysustainablecities.org>

Policy review conducted by: Ke Peng, Xiaoyu Cheng, Yaning Yang (2024-09-03)

Population data: Schiavina, M; Freire, S; Carioli, A., MacManus, K (2023): GHS-POP R2023A - GHS population grid multitemporal (1975-2030). European Commission, Joint Research Centre (JRC) [Dataset] doi: 10.2905/D6D86A90-4351-4508-99C1-CB074B022C4A

Urban boundaries: Florczyk, A. et al. (2019): GHS Urban Centre Database 2015, multitemporal and multidimensional attributes, R2019A. European Commission, Joint Research Centre (JRC). <https://data.jrc.ec.europa.eu/dataset/53473144-b88c-44bc-b4a3-4583ed1f547e>

Urban features: OpenStreetMap Contributors. OpenStreetMap.fr (2023).
<http://download.openstreetmap.fr/extracts/asia/china/henan.osm.pbf>

Colour scale: Crameri, F. (2018). Scientific colour-maps (3.0.4). Zenodo.
<https://doi.org/10.5281/zenodo.1287763>

Global Healthy & Sustainable City Indicators Collaboration

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Policy and spatial indicators for healthy and sustainable cities

1000 Cities Challenge report

This report outlines how Zhengzhou performs on a selection of spatial and policy indicators of healthy and sustainable cities. As part of the 1000 Cities Challenge, we examined the spatial distribution of urban design and transport features and the presence and quality of city planning policies that promote health and sustainability.

The findings could inform changes needed to local city policies. The maps show the distribution of urban design and transport features across Zhengzhou and identify areas that could benefit the most from interventions to create healthy and sustainable environments.

Zhengzhou context

Zhengzhou, the capital of Henan, lies in the central-northern part of the province, at the Yellow River's middle-lower boundary. It is a core area of the Central Plains Urban Agglomeration, with a southwest-high, northeast-low terrain.

Levels of government

Zhengzhou's policy list includes policies from the national, regional, and local levels of government. At the local level, the main urban planning policy documents cover land and spatial planning, public health system and national health planning.

Demographics and health equity

By the end of 2022, Wuhan's GDP reached 1.886643 trillion yuan, with a permanent population of 13.739 million. The city faces multiple health challenges, including major diseases such as cancer and chronic respiratory diseases, as well as common foundational diseases like hypertension and diabetes.

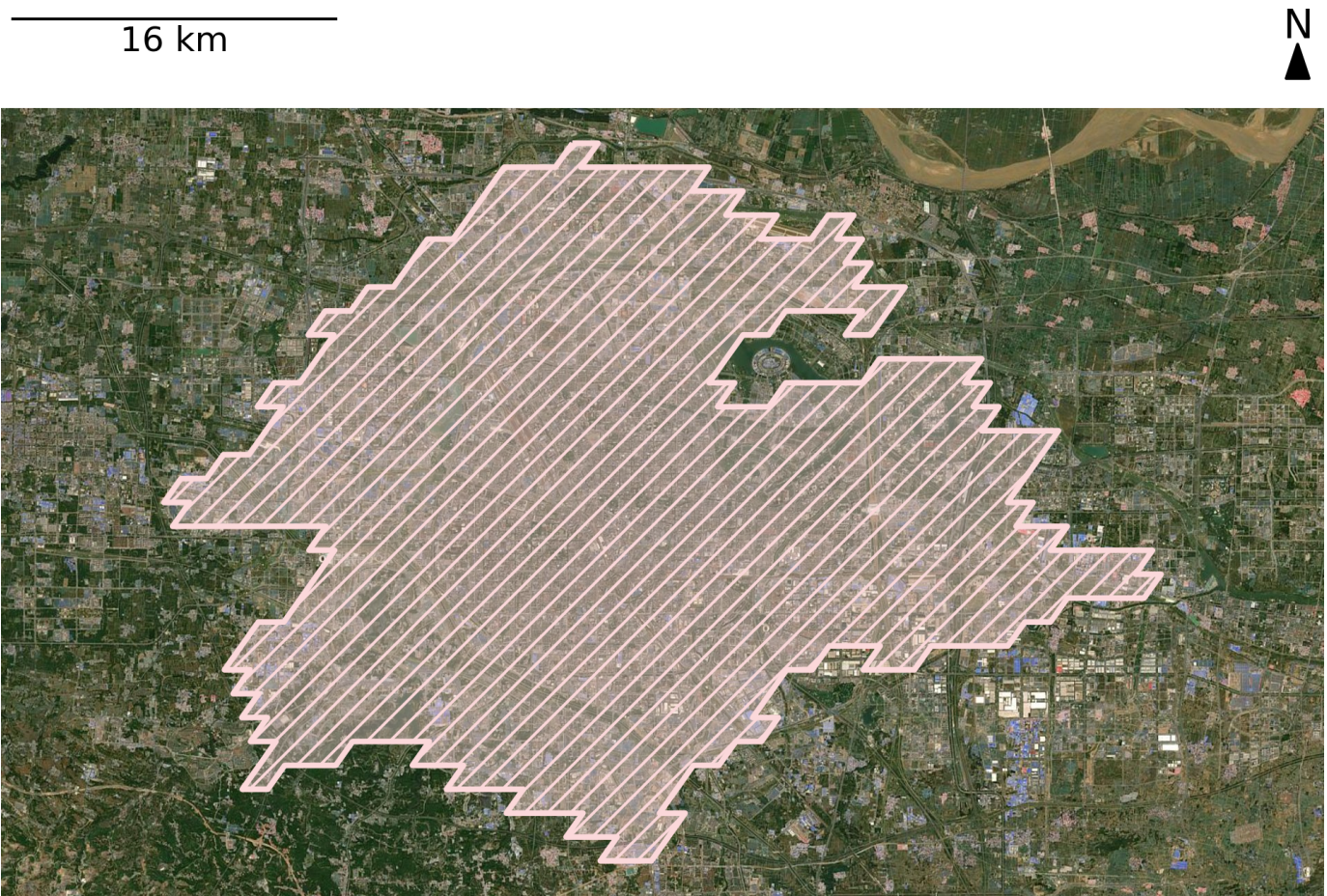
Environmental disaster context

Wuhan faces various environmental challenges, including urban heat, heavy rain, hail, flooding, and cold waves.



Study region

The study region used to calculate spatial indicators for the population of Zhengzhou presented in this report has been highlighted in the map below using parallel line shading.



Study region boundary (shaded region): GHSL - Global Human Settlement Layer under CC-BY-4.0; Global Human Settlements urban centres: 2015 (EU JRC, 2020; Changsha Center only) under CC BY 4.0 | Basemap: Sentinel-2 cloudless - <https://s2maps.eu> by EOX IT Services GmbH (Contains modified Copernicus Sentinel data 2021) released under Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License

Map legend



Administrative boundary
(GHSL - Global Human Settlement Layer.<https://ghsl.jrc.ec.europa.eu/download.php?ds=pop.>)



Urban boundary
(Global Human Settlements urban centres: 2015 (EU JRC, 2020; Changsha Center only) (GHS:UC_NM_MN=='Zhengzhou' and CTR_MN_NM=='China'))



Study region boundary
(intersection of administrative boundary and urban boundary)

Policy indicators for healthy and sustainable cities

Public policies are essential for supporting the design and creation of healthy and sustainable cities and neighbourhoods. The 1000 Cities Challenge Policy Checklist was used to assess the presence and quality of policies aligned with evidence and principles for healthy and sustainable cities.

Policy presence score

Presence of urban and transport policies supporting health and sustainability

24/32 (75.0%)

Policy quality score

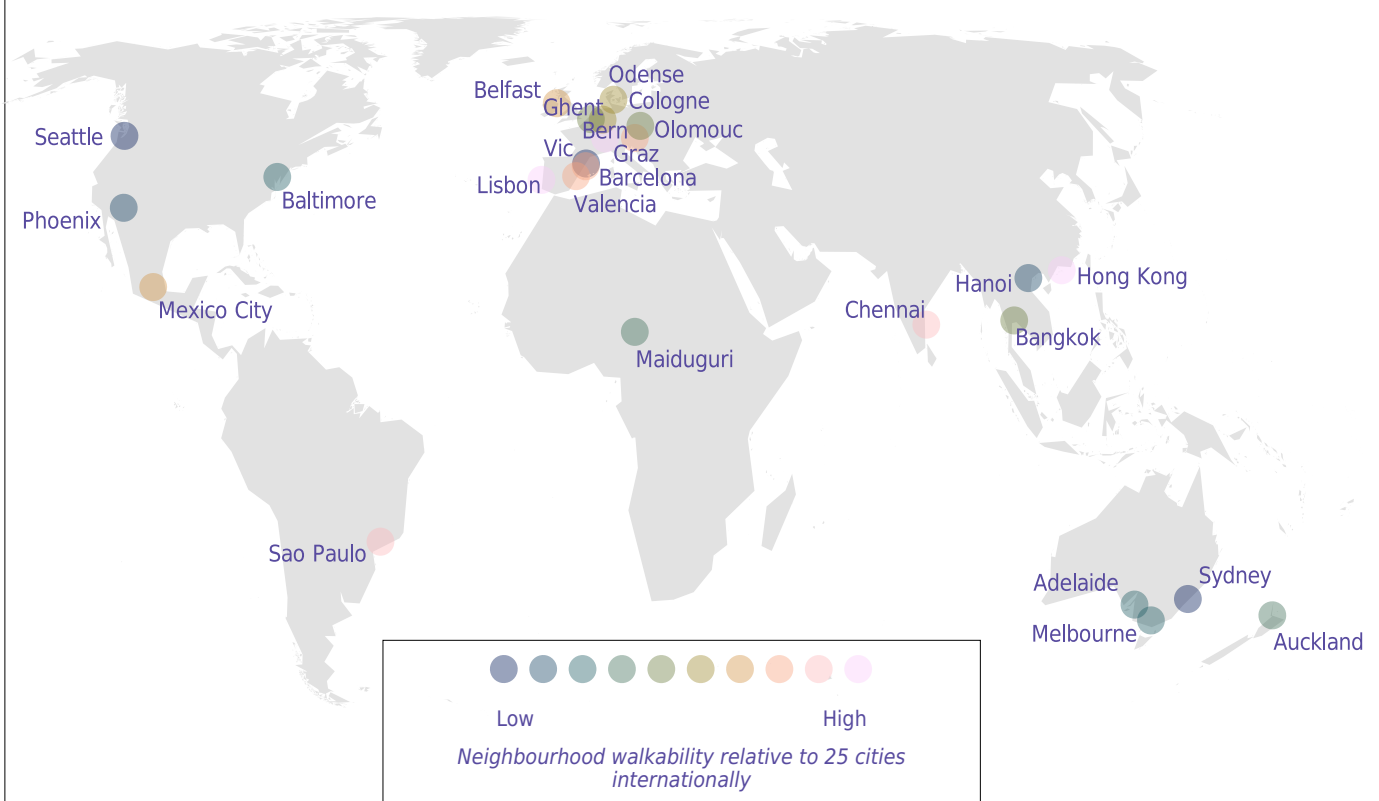
Policy quality score for measurable policies aligned with evidence on healthy cities

31.5/62 (50.8%)

Box 1: The Lancet Global Health Series study of 25 cities internationally

The 1000 Cities Challenge extends methods for assessing the health and sustainability of cities outlined in the 2022 Lancet Global Health Series on urban design, transport, and health. Policy and spatial indicators were calculated, analysed and reported in multiple languages for 25 diverse cities across 19 countries and 6 continents. These cities provide a useful reference for comparisons, but are not a representative sample of all cities internationally.

For more details, please see the 2022 The Lancet Global Health Series on Urban design, transport, and health (<https://www.thelancet.com/series/urban-design-2022>).



Integrated city planning policies for health and sustainability

Many sectors are involved in creating healthy and sustainable cities, including land use, transport, housing, parks, economic development, and infrastructure. Integrated planning is required to ensure policy alignment across sectors. Health considerations need to be embedded in transport and urban policies, and investment in active and public transport should be prioritised.

| | Policy identified | Aligns with healthy cities evidence | Measurable target |
|--|-------------------|-------------------------------------|-------------------|
| Transport policy with health-focused actions | ✗ | - | - |
| Urban policy with health-focused actions | ✓ | ✓ | ✗ |
| Health Impact Assessment requirements in urban/transport policy | ✓ | ✓ | ✗ |
| Urban/transport policy explicitly aims for integrated city planning | ✓ | ✓ | ✗ |
| Publicly available information on government expenditure for different transport modes | ✗ | - | - |

Key: Yes ✓ No ✗ Mixed ✓/✗ Not applicable -

Walkability and destination access

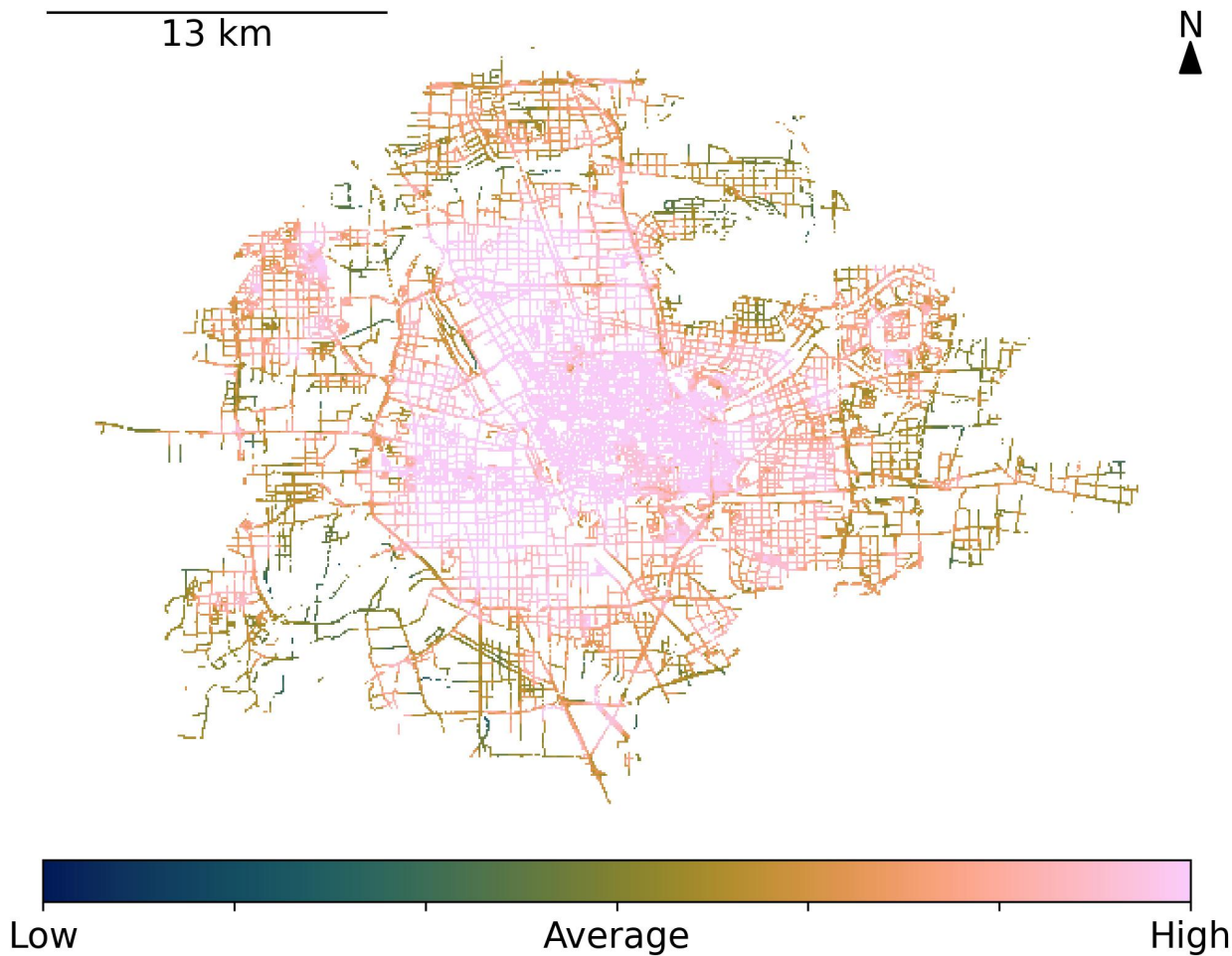
Walkable neighbourhoods provide opportunities for active, healthy, and sustainable lifestyles through having sufficient but not excessive population density to support adequate provision of local amenities, including public transport services. They also have mixed land uses and well-connected streets, to ensure proximate and convenient access to destinations. High-quality pedestrian infrastructure and reducing traffic through managing demand for car use can also encourage walking for transport.

Walkability and destination access policies

| | Policy identified | Aligns with healthy cities evidence | Measurable target |
|--|-------------------|-------------------------------------|-------------------|
| Street connectivity requirements | ✓ | ✓ | ✓ |
| Parking restrictions to discourage car use | ✓ | ✓/✗ | ✗ |
| Traffic safety requirements | ✓ | ✓ | ✗ |
| Pedestrian infrastructure provision | ✓ | ✓ | ✓ |
| Cycling infrastructure provision | ✓ | ✓ | ✓ |
| Walking participation targets | ✗ | - | - |
| Cycling participation targets | ✗ | - | - |
| Housing density requirements | ✓ | ✓/✗ | ✓ |
| Residential building height restrictions | ✓ | ✓ | ✓ |
| Limits on greenfield housing development | ✓ | ✓ | ✗ |
| Mixture of housing types/sizes | ✓ | ✓ | ✓ |
| Mixture of local destinations for daily living | ✓ | ✓ | ✗ |
| Close distance to daily living destinations | ✓ | ✓ | ✓ |
| Employment distribution requirements | ✗ | - | - |
| Ratio of jobs to housing | ✓ | ✓ | ✗ |
| Healthy food environments | ✓ | ✓ | ✓ |
| Crime prevention through environmental design | ✓ | ✓ | ✗ |

Key: Yes ✓ No ✗ Mixed ✓/✗ Not applicable -

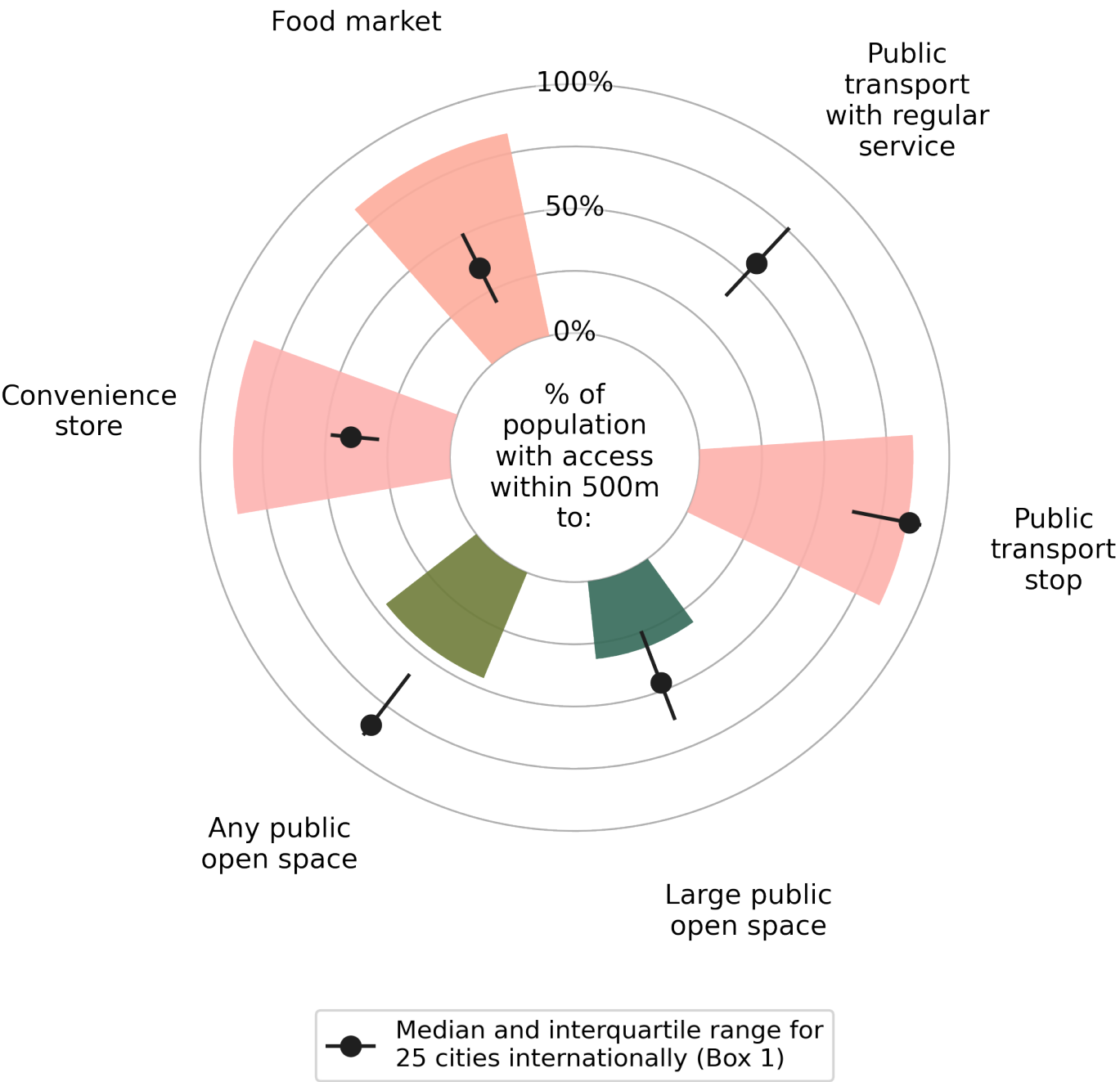
Neighbourhood walkability relative to 25 cities internationally



99.5% of the population in Zhengzhou live in neighbourhoods with walkability scoring above the median of 25 cities internationally (Box 1)

The spatial distribution maps featured in this report display results for areas with population estimates according to Global Human Settlements population data: 2025, Mollweide (EU JRC, 2022).

Percentage of population with access to amenities within 500 metres (m)



Urban design thresholds to promote walking

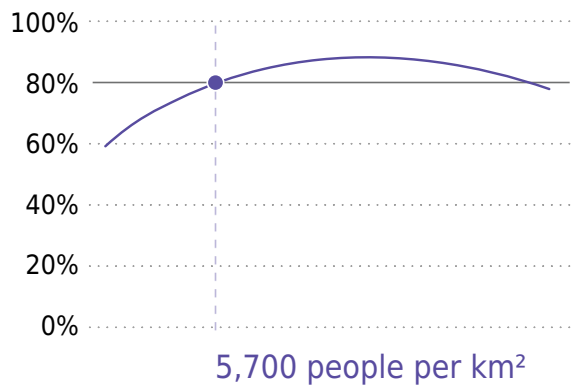
The 2022 Lancet Global Health Series found that to achieve at least 80% probability of engaging in any walking for transport, an average urban neighbourhood would need a population density of at least 5700 people km² and street connectivity of at least 100 intersections per km², approximately and depending on context. Preliminary evidence showed that street intersection density above 250 per km² and ultra-dense neighbourhoods (> 15,000 persons per km²) may have decreasing benefits for physical activity. This is an important topic for future research.



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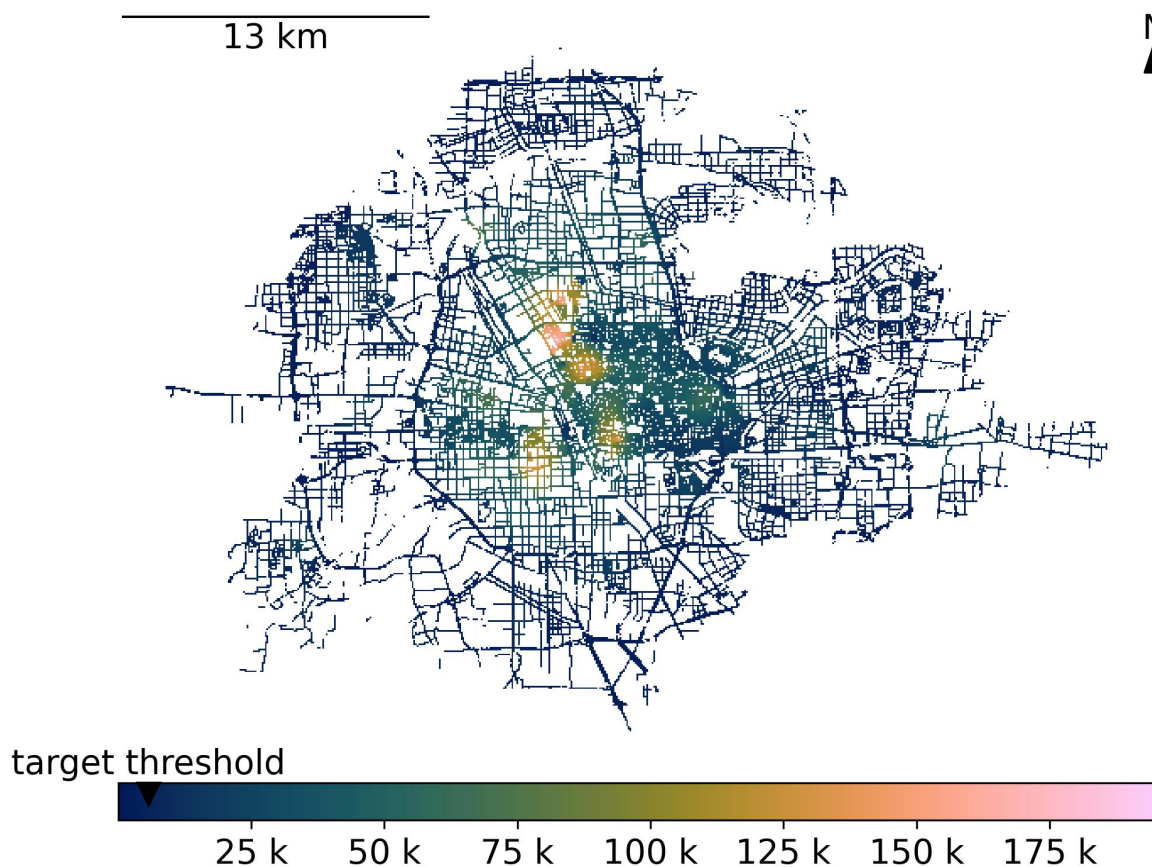
Neighbourhood population density (per km²)

Probability of engaging in any walking for transport

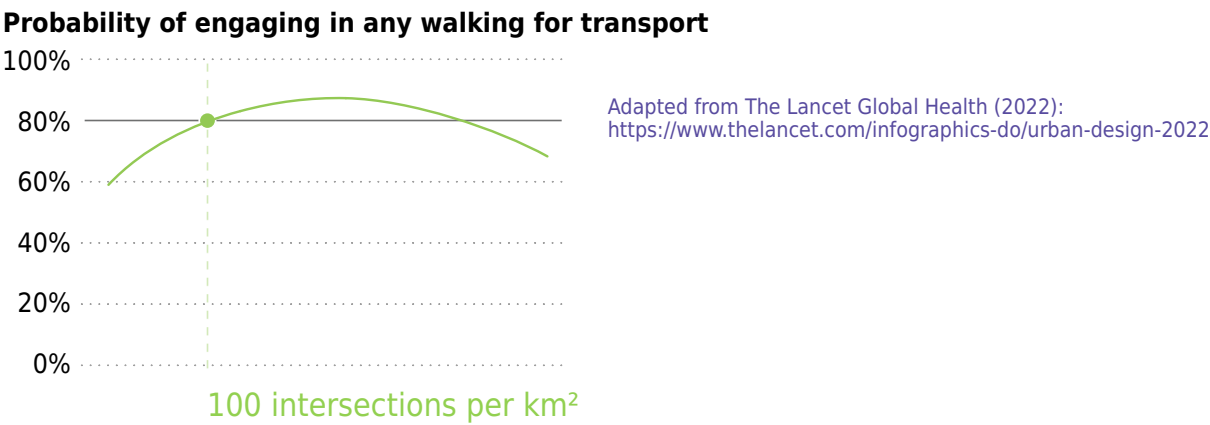


Adapted from The Lancet Global Health (2022):
<https://www.thelancet.com/infographics-do/urban-design-2022>

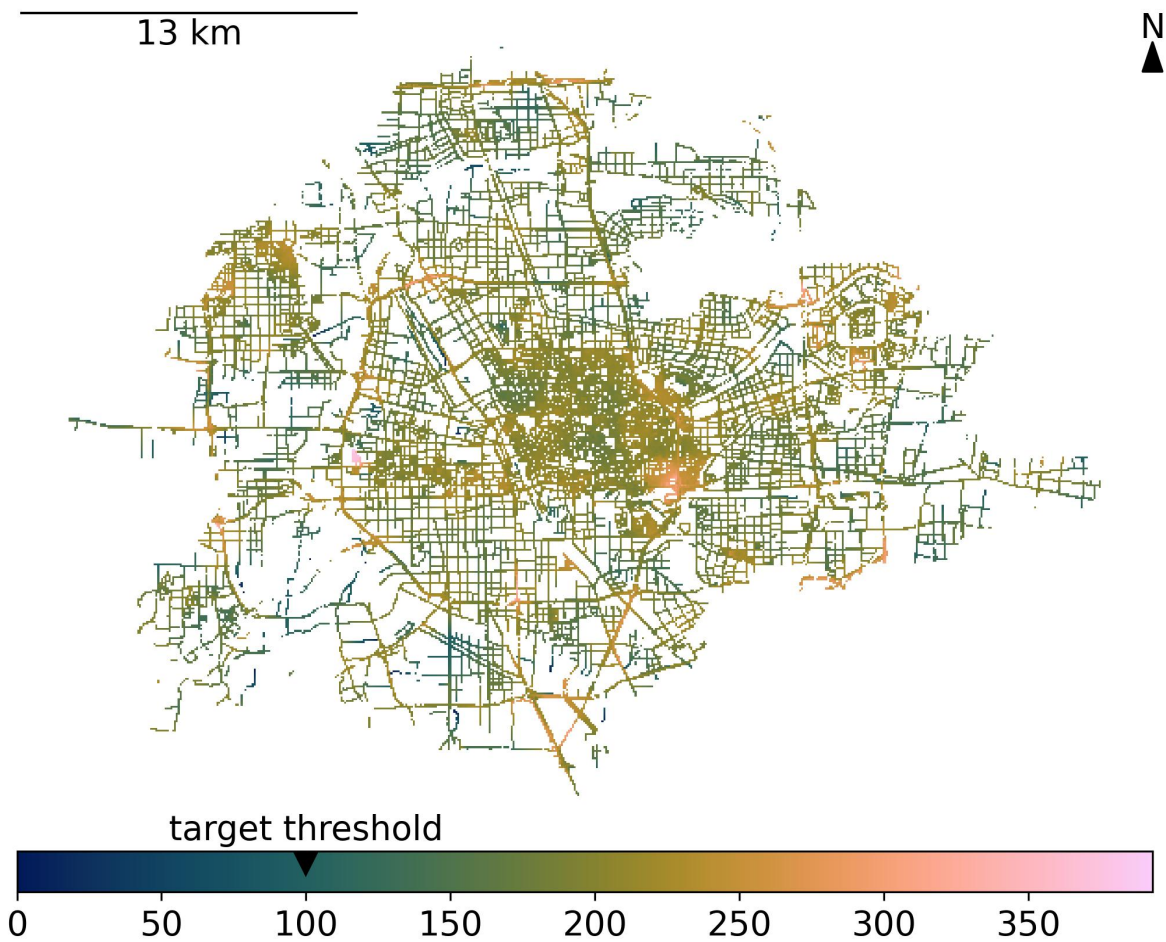
94.8% of the population in Zhengzhou live in neighbourhoods meeting the population density threshold for 80% probability of engaging in any walking for transport (5,700 people per km²)



Neighbourhood intersection density (per km²)



99.6% of the population in Zhengzhou live in neighbourhoods meeting the street intersection density threshold for 80% probability of engaging in any walking for transport (100 intersections per km²)

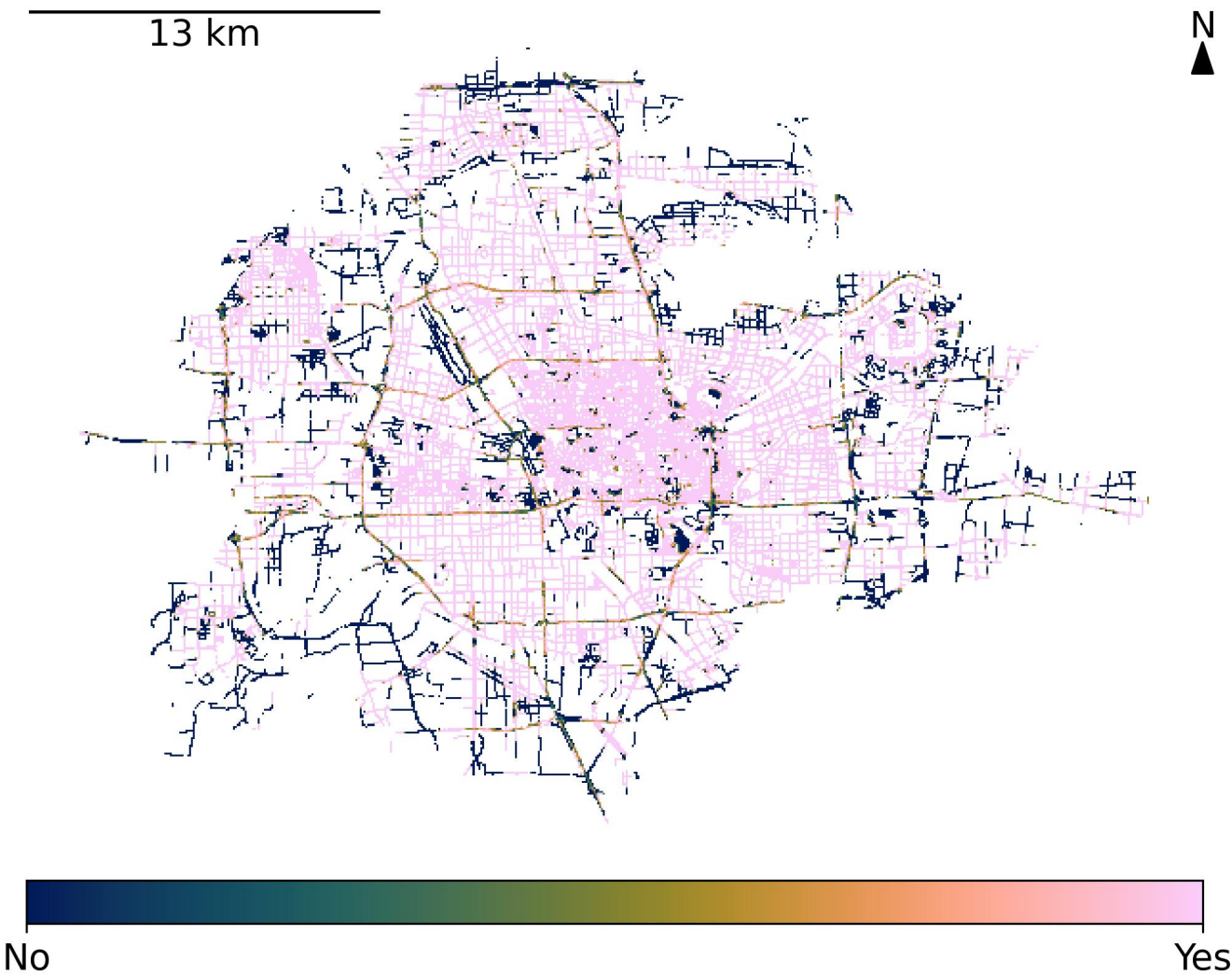


Public transport access

Easy access to frequent public transport is a key determinant of healthy and sustainable transport systems. Public transport near housing and employment increases the mode share of public transport trips, thus encouraging transport-related walking; offering access to regional jobs and services; improving health, economic development, and social inclusiveness; and reducing pollution and carbon emissions. The frequency of services also encourages public transport use, in addition to the proximity of stations or stops.

| | Policy identified | Aligns with healthy cities evidence | Measurable target |
|---|-------------------|-------------------------------------|-------------------|
| Requirements for public transport access to employment and services | ✗ | - | - |
| Minimum requirements for public transport access | ✓ | ✓ | ✓ |
| Targets for public transport use | ✗ | - | - |

Key: Yes ✓ No ✗ Mixed ✓/✗ Not applicable -



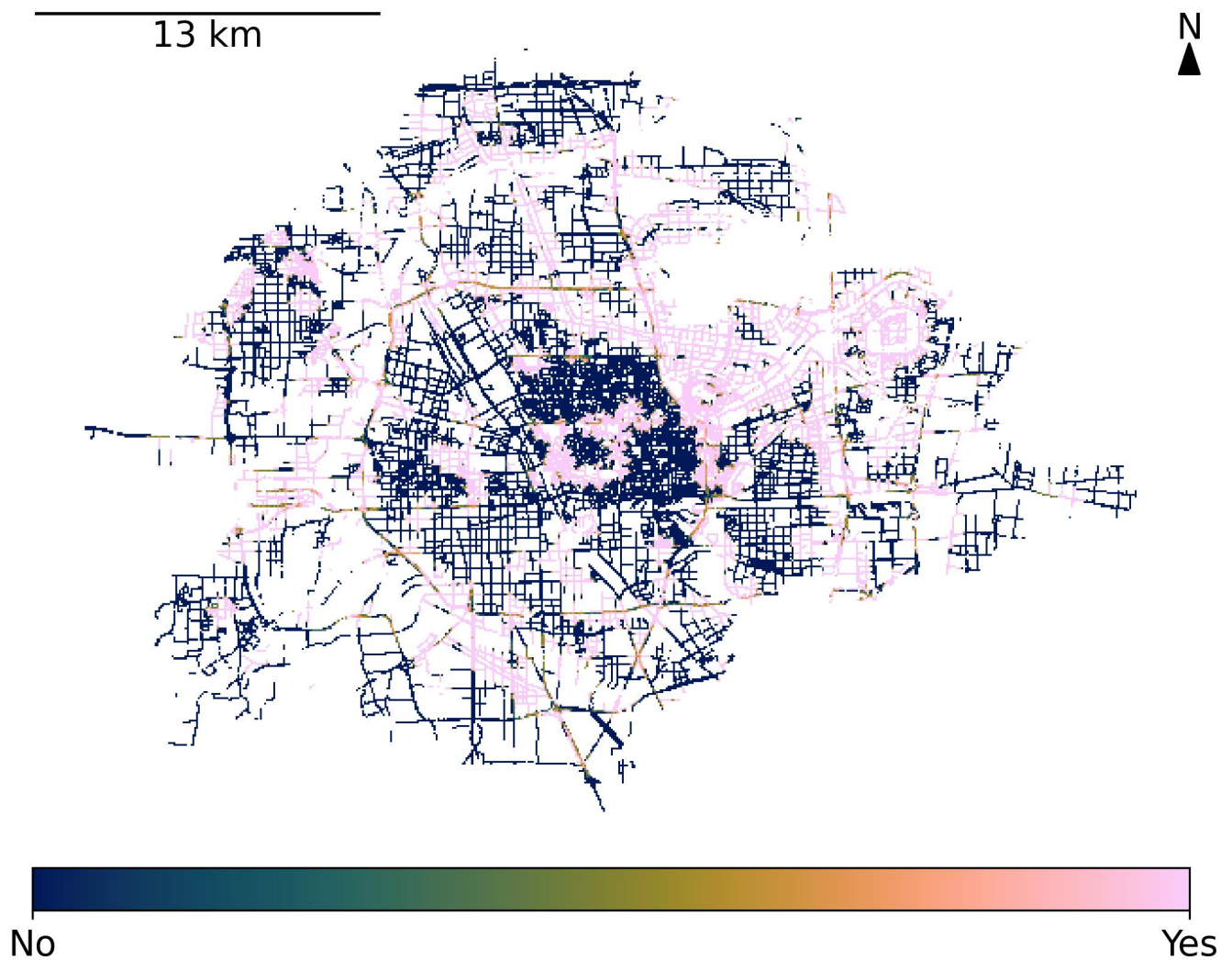
85.6% of the population in Zhengzhou live within 500m of public transport

Public open space access

Local access to high-quality public open space promotes recreational physical activity and mental health. Nearby public open space creates convivial, attractive environments, helps cool the city and protects biodiversity. As cities densify and private open space declines, providing more public open space is critical for population health. Having public open space within 400 m of homes can encourage walking. Access to larger parks may also be important.

| | Policy identified | Aligns with healthy cities evidence | Measurable target |
|---|-------------------|-------------------------------------|-------------------|
| Minimum requirements for public open space access | ✓ | ✓ | ✓ |

Key: Yes ✓ No ✗ Mixed ✓/✗ Not applicable -



31.4% of the population in Zhengzhou live within 500m of public open space of at least 1.5 hectares in size

Urban air quality, and nature-based solutions

Land use and transport policies play a key role in limiting air pollution, with multiple benefits for health and sustainability. Nature-based solutions, including urban greening and urban biodiversity protection, have mental health benefits by increasing contact with nature. Green spaces and vegetation cover can cool cities and help build resilience to extreme heat.

| | Policy identified | Aligns with healthy cities evidence | Measurable target |
|--|-------------------|-------------------------------------|-------------------|
| Transport policies to limit air pollution | ✓ | ✓/✗ | ✓ |
| Land use policies to reduce air pollution exposure | ✓ | ✓ | ✓ |
| Tree canopy and urban greening requirements | ✓ | ✓ | ✓ |
| Urban biodiversity protection & promotion | ✓ | ✓ | ✓ |

Key: Yes ✓ No ✗ Mixed ✓/✗ Not applicable -

Climate disaster risk reduction

In the face of climate change, built environments need to be designed to reduce the health impacts of increasingly frequent and severe extreme weather events, such as heat waves, flooding, bushfires/wildfires and extreme storms.

| | Policy identified | Aligns with healthy cities evidence | Measurable target |
|---|-------------------|-------------------------------------|-------------------|
| Adaptation and disaster risk reduction strategies | ✓ | ✓ | ✓ |

Key: Yes ✓ No ✗ Mixed ✓/✗ Not applicable -



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Summary

The evaluation of Zhengzhou's Healthy City policies shows that the city's urban planning policy framework is relatively comprehensive. Although there is a lack of policies related to destination accessibility and transportation infrastructure investment, there are policies addressing integrated transportation and land use planning, air pollution, design, density, and other aspects. In terms of policy quality, Zhengzhou's Healthy City policies generally lack descriptions of quantifiable action outcomes and corresponding result threshold standards, resulting in lower policy quality scores.

In terms of spatial aspects, the accessibility to public transport stations and convenience stores in Zhengzhou is comparable to the average level of 25 benchmark cities, with about 85.6% of the population living within 500 meters of a public transport station and about 87.4% of the population living within 500 meters of a convenience store. Zhengzhou performs poorly in terms of accessibility to public open spaces, with only 31.4% of the population living within 500 meters of a public open space of at least 1.5 hectares. The city's community walkability is relatively high, with only 0.5% of the population living in communities with walkability scores below the average level of other cities. About 94.8% of the population lives in communities that meet the population density threshold for 80% walking travel probability, and 99.6% of the population lives in communities that meet the street intersection density threshold for 80% walking travel probability.

Citation

Ke Peng, Xiaoyu Cheng, Yaning Yang. 2024. 1000 Cities Challenge report: Zhengzhou, China 2024—Policy and spatial indicators for healthy and sustainable cities (English). Global Observatory of Healthy and Sustainable Cities.



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