

Spatial disconnectivity: Singapore's perspective on cycling

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INTRODUCTION & AIM

Cycling is an essential sustainable commuting alternative, offering numerous environmental and health benefits- reducing emissions and congestion while improving health. Significant efforts include local investment of SGD 1 billion and achieving URA Draft Master Plan goals of 'Shaping a Happy, Healthy future' and 'Stewarding nature of heritage'. Yet, poor connectivity leads to a low cycling ridership of less than 2%.

Current measures



1300 km expansion of Park Connectors

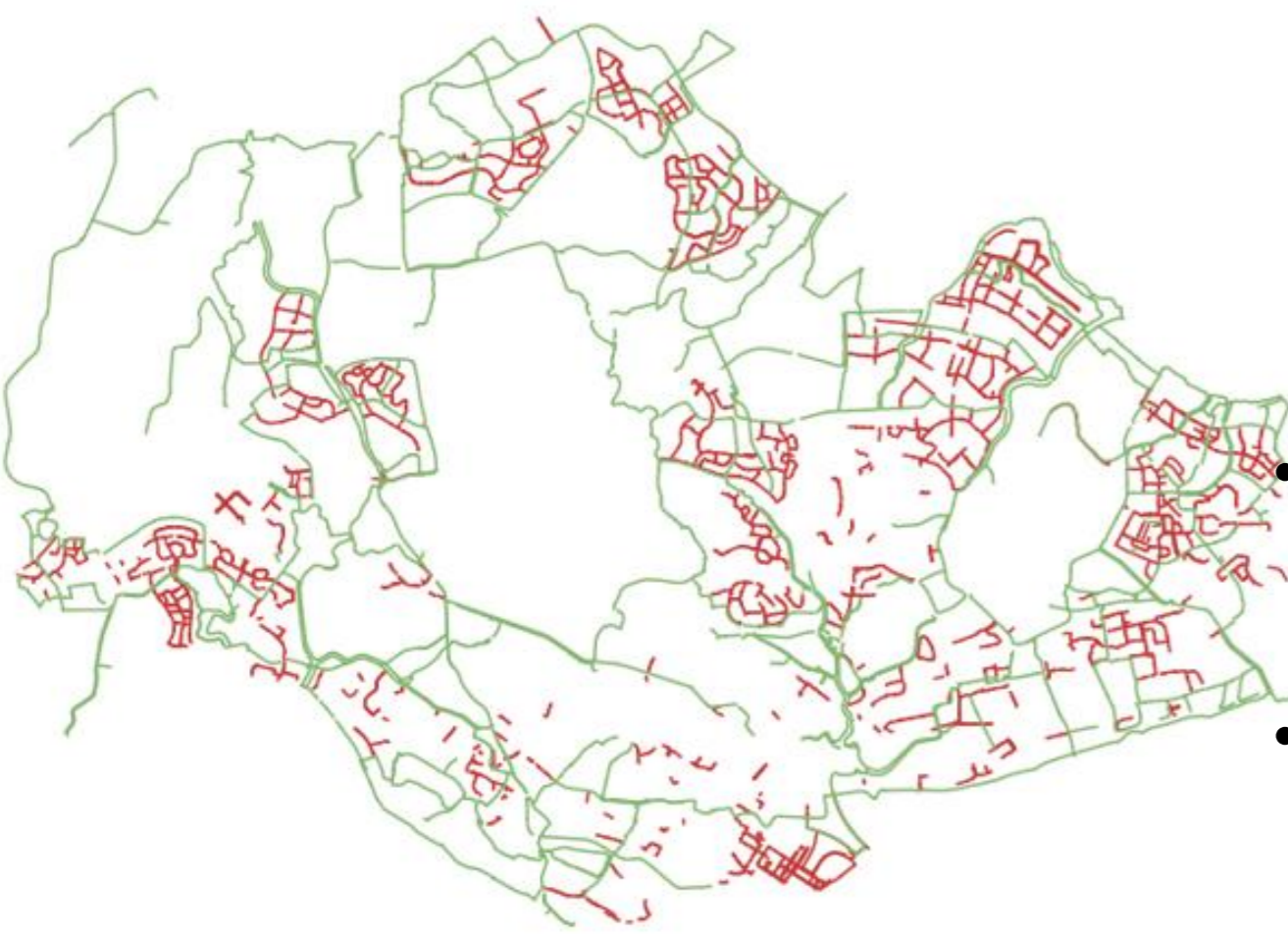
Walk-Cycle-Ride model

60 km of Transit Priority Corridors
Wider cycling paths
Consistent review every 5 years

This research focuses on how fragmented cycling infrastructure impacts cycling behaviour. It highlights the importance of accessibility and connectivity in promoting active transportation options for daily commutes.

METHOD

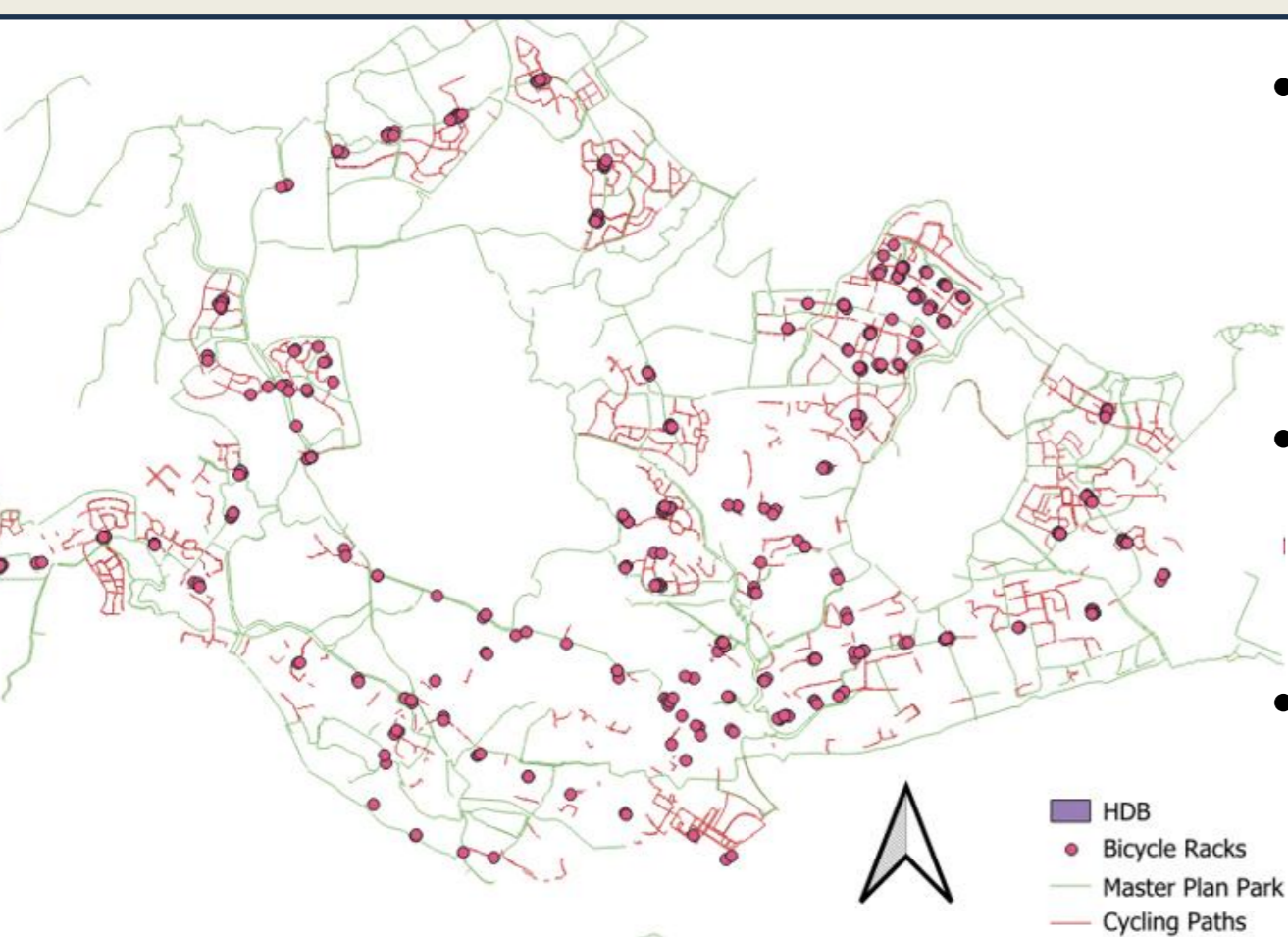
Distribution of Cycling Paths



Overview of Singapore's cycling network

- Utilised geospatial data on cycling paths in Singapore, measuring the closest distance between each path across 12,877 HDB residential flats
- Key indicators: availability and connectivity of cycling paths
- Aggregate the flat-specific metrics to town and block level to assess residential access to cycling infrastructure

Availability of Cycling Racks

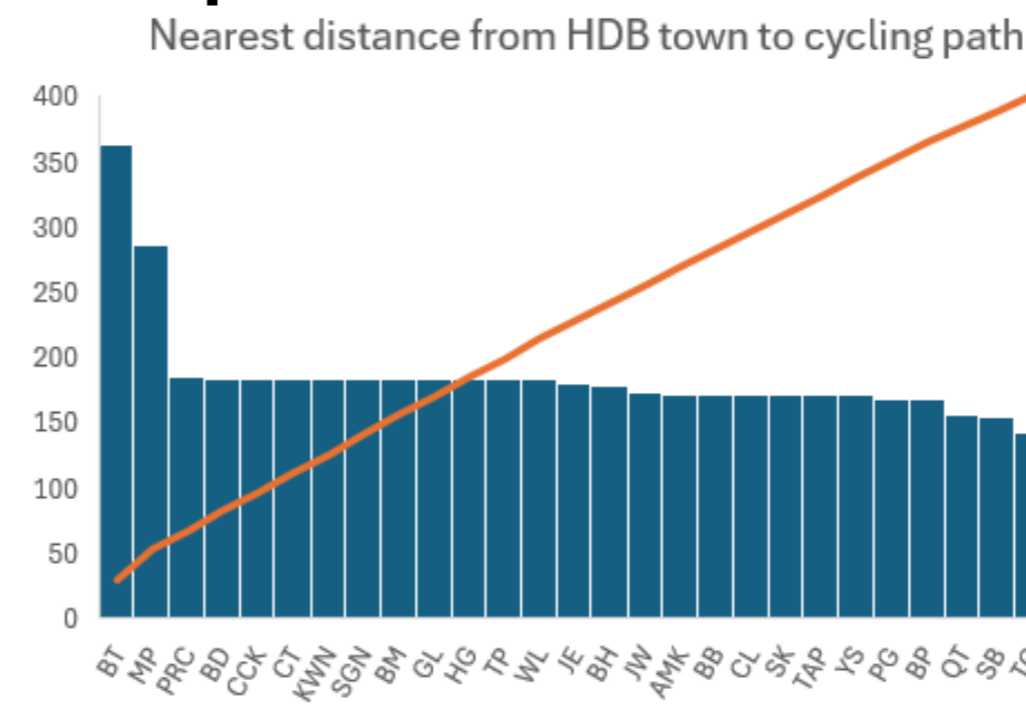


Islandwide availability of bicycle racks

- Computed access-to-cycling racks indices for each of the 12,877 HDB residential flats
- Aggregate the flat-specific metrics to the town level
- Apply network centrality and accessibility metrics to identify gaps in accessibility to cycling infrastructure.

RESULTS & DISCUSSION

Unequal access to nearest cycling paths



Town-wise average distance

- Tengah: 142m (closest)
- Bukit Timah: 363m (longest)

Block-wise average distance

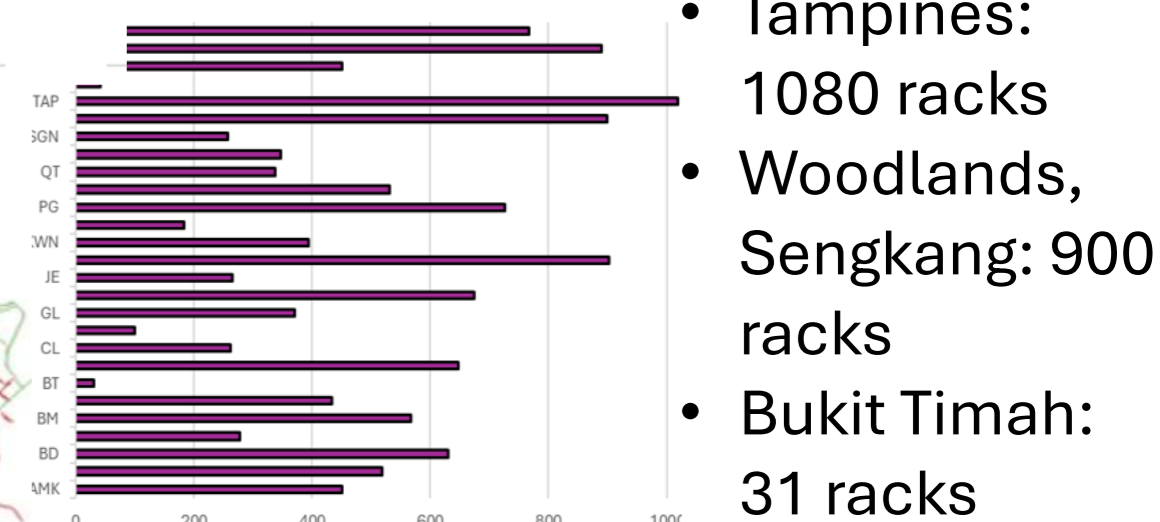
- Tampines (883 blocks): 0.193m
- Bukit Timah (27 blocks): 13.4m

Uneven bicycle rack distribution



Disjointed paths in Central region-Somerset Belt (left) vs well-connected cycling paths in East and Northeast (Tampines, Punggol) (right)

Total number of bicycle racks



Prioritisation of Northeast/East towns

Reasons

1. Location

- Bukit Timah: located in the central region mostly consisting of low-density private housing in exclusive neighbourhoods that are more conveniently accessible by car
- Tampines and Tengah at the Eastern & North-eastern peripheries, more suitable for cycling

2. Culture: behaviour shapes impact

- Bukit Timah: elite schools and primarily car access with recreational cycling
- Tampines: pioneered as Singapore's first cycling town, 2.4% cycling ridership (higher than average)
- Tengah: New car-lite town centred on eco-wellness and sustainability

3. Demographic

- Bukit Timah: smaller population consisting of high-income families with school-going children-> higher average age, working adults are also largely car-reliant
- Tampines: huge population size of >240,000 largely middle-income residents
- Tengah: Young couples and eco-conscious residents across 5 districts

4. Intention

- Cycling policies primarily focuses on large HDB towns
- Eg. Tampines planned to pilot off-road cycling paths contrasting with Bukit Timah's recent, selective upgrades in cycling infrastructure

Future policy considerations

Dedicated cycling lanes on roads

- Complements smart traffic light detection at major junctions, supporting seamless travel

Multi-modal transport network

- Height differentiation separates faster-flowing pedestrians/vehicles (top) from slower vehicles (bottom), reducing speed trips
- Misting devices at street lamps for enhanced thermal comfort, increasing active mobility uptake
- Increased end-of-trip facility access
 - Islandwide bicycle wheeling ramps along sheltered pathways
 - Shower facilities near bike lockers
 - Dual racks for increased capacity
 - Accompanied with educational efforts for stronger messaging

CONCLUSION

Expanding the green network requires supportive cycling infrastructure to boost ridership. Integrating pedestrian pathways is crucial for safety and harmonious sharing. In Singapore's transport planning, enhancing active mobility strategies with education on path etiquette is vital for improving the commuting experience, achieving strategic health and sustainability objectives to become an inclusive and climate-resilient nation.

FUTURE WORK / REFERENCES

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