



# MEDAN, INDONESIA

## URBAN TRANSPORT PROFILE

December 2024



## Summary

Medan, the largest metropolitan area outside of Java in Indonesia, faces growing urban transport challenges due to its increasing population and reliance on private vehicles. With a population density of 6,000 persons per sqkm and a GDP per capita that has nearly doubled since 2000, the city is experiencing rising motorization rates. This trend is reflected in the high average vehicle-kilometer activity, reaching 4,291 kilometers per capita annually in 2022. Despite having a massive bus fleet, the current public transport system is underutilized, accounting for only 6% of trips, primarily served by informal minibuses known as Angkot. This over-reliance on private vehicles, particularly motorcycles which make up 72% of trips, contributes to congestion, time loss, and negative environmental and social impacts.

The lack of efficient and reliable public transport options is evident in Medan's low access to public transit. Only 5% of the population has convenient access to public transport services, significantly lower than the Southeast Asian average of 21%. Furthermore, the city's road infrastructure is underdeveloped. While Medan has no existing rapid transit system, there are plans for future development outlined in the Sustainable Urban Mobility Plan (SUMP) finalized in 2022. This plan aims to address the city's transport challenges by promoting a shift towards sustainable modes of transport.

The SUMP outlines a comprehensive strategy with a focus on improving public transport, optimizing urban planning, and investing in road infrastructure. Key initiatives include the development of six BRT corridors, new rapid rail lines, improvements to the existing bus and rail network, and the establishment of a metropolitan transit authority. By prioritizing sustainable transport solutions, Medan aims to reduce its reliance on private vehicles, improve air quality, and enhance the overall quality of life for its residents. The successful implementation of the SUMP will be crucial in shaping a more sustainable and efficient urban transport system for Medan in the years to come.

## About the Urban Transport Profiles

The Asian Transport Observatory (ATO) Urban Transport Profiles provide a comprehensive snapshot of urban transport dynamics for 40 cities in the Asia-Pacific region. These profiles compile data from official city reports, relevant sources from reputable research organizations, multilateral development institutions, international experts' reports, secondary studies, and all other research endorsed or guided by city governments. Featured cities are benchmarked against other cities, where data is available, in the region, subregional averages — and in some cases, global cities — offering valuable comparative insights. In cases where data is not available, placeholders for the graphs are retained. Each profile also includes a curated list of relevant urban transport policies and documents, presenting a concise overview of the city's policy framework. By covering a wide range of transport-related indicators, these profiles serve as a critical resource for understanding and improving urban transport systems.

## Disclaimer

The Asian Transport Observatory (ATO) project collects, collates, and organizes data from publicly available official, as well as reputable and peer-reviewed secondary sources, which may contain incomplete or inconsistent data. It is important to note that the ATO does not generate data. Moreover, while the ATO carries out quality control and assurance of whether the data are truthfully reflected in the ATO, the ATO does not make any warranties or representations as to the appropriateness, quality, accuracy, or completeness of the data in the ATO databases, and in the knowledge products that are produced from such. Users are encouraged to scrutinize, verify, interpret, and judge the data before utilizing them.

## General

**Population** 4.2 million  
(2020) (GHS)

**Population density**

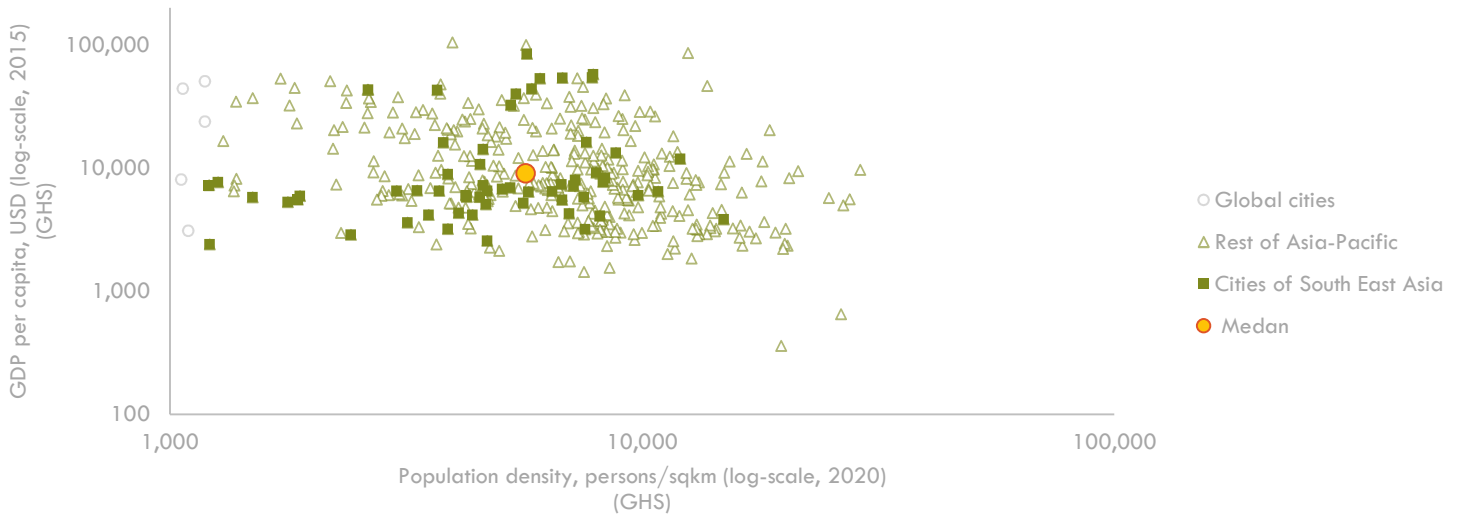
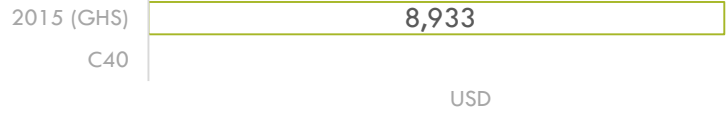
**Land area** 739 sqkm  
(2015) (GHS)



**Population density** 6 thousand per sqkm  
(2020) (GHS)

**GDP per capita**

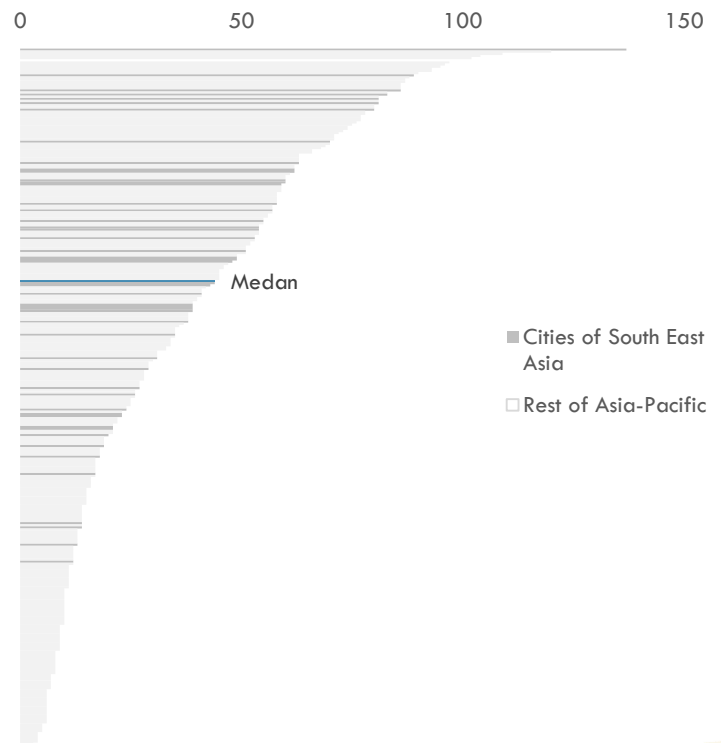
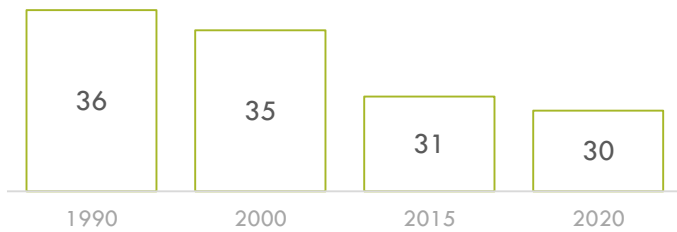
**GDP per capita** 9 thousand USD  
(2015) (GHS)



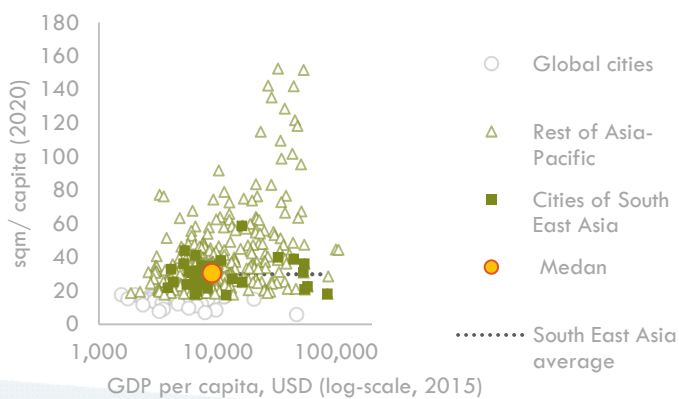
## Urban Form and Structure

**Builtup area per capita**  
sqm per capita (GHS)

**Mean block density**  
blocks per sqkm (2020) (ITDP)

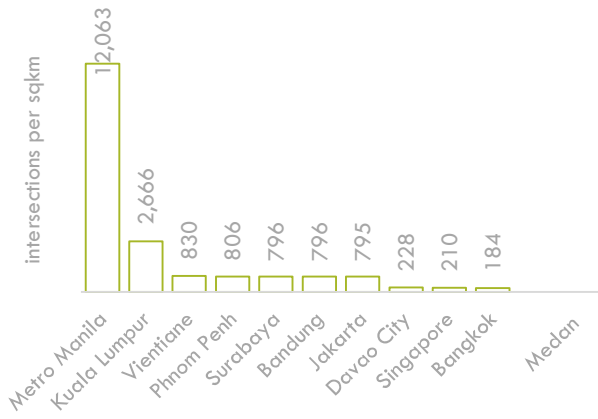


**Builtup area per capita**  
(GHS)



## Intersection density

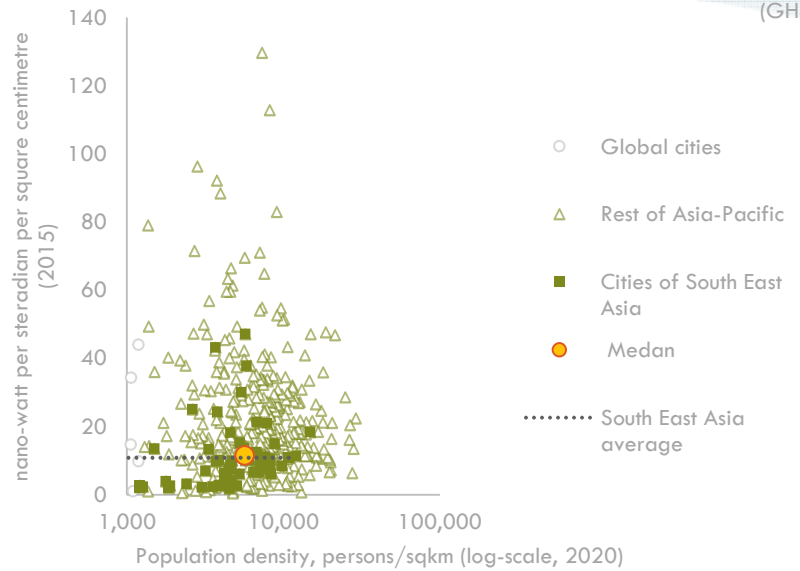
(Oke et.al. (2019) (OSM))



(a) Night time light intensity studies illustrate urban forms and patterns by mapping human activity, infrastructure, and connectivity, offering insights into urban sprawl, density variations, and transport network

## Night time light intensity (a)

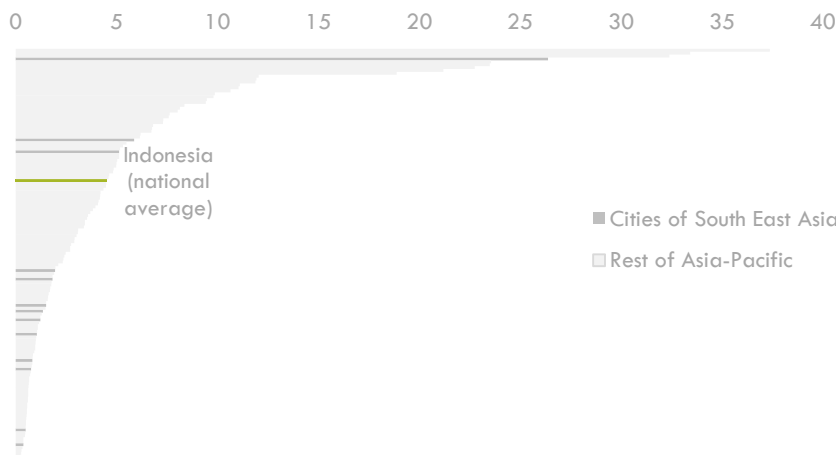
(GHS)



## Urban Transport Infrastructure

### Road availability

kilometers per thousand population (2019) (Oke et.al. (OSM) and GHS)



Road kilometers 3,280 kilometers

(2019) (Primary data)

### Rapid transit infrastructure

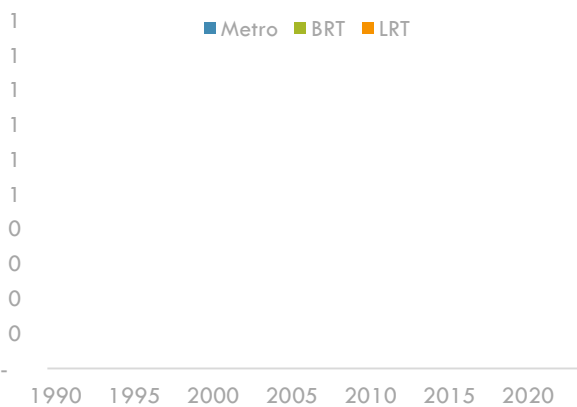
(2024) (TE)

■ Under construction ■ Planned

BRT LRT Metro

### Rapid transit infrastructure

kilometers (ITDP, Primary data)



**BRT** none

**LRT** none

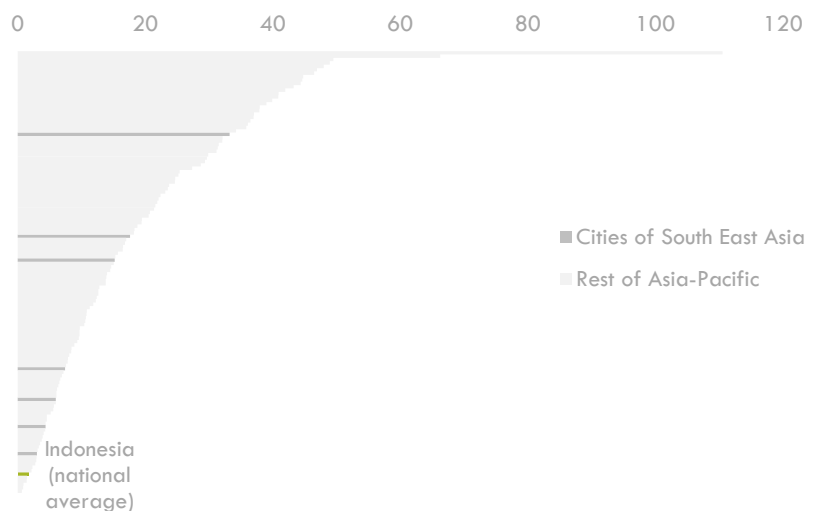
**Metro** none

**Total** none

(2023) (ITDP)

### Rapid transit availability

kilometers per million urban population (2021) (ITDP, Primary data)

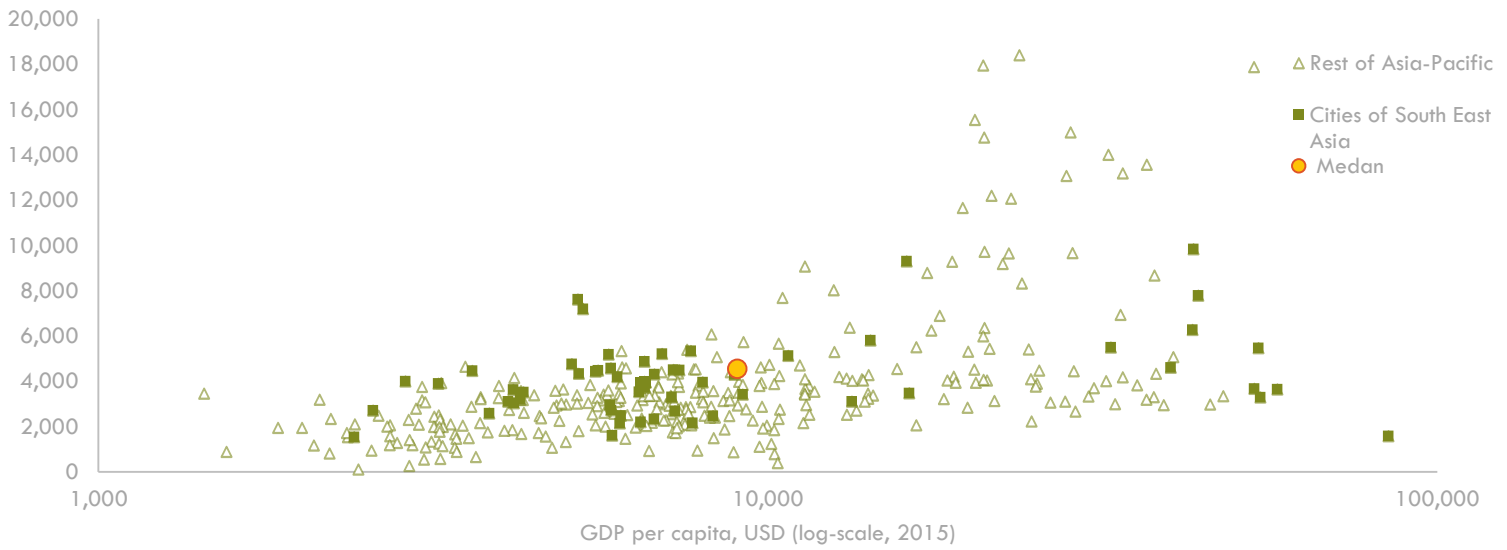


Approximate transit coverage n.d.

## Transport Activity and Services

### VKT per capita

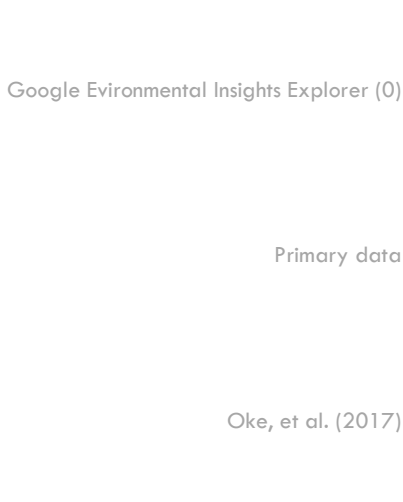
Vehicle-kilometer per capita (2022) (ClimateTrace)



### Trips Mode share (b)

Share, %

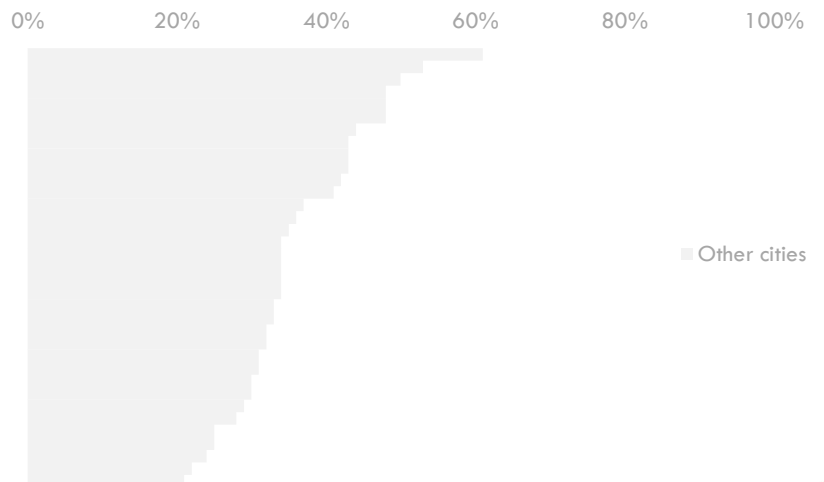
■ Walking and cycling ■ Private ■ Public transport (bus, ferry, informal public transit, etc)



(b) The methodologies used for mode share assessments vary across different studies, making direct comparison of results inadvisable. Specifically, the Google Environmental Insights Explorer derives its assessments from mobile data analysis, while primary data studies typically rely on survey-based approaches. In contrast, the study by Oke et al. utilizes a combination of secondary data sources.

### Congestion level

Percent increased travel time vs. uncongested conditions (2021) (TomTom)

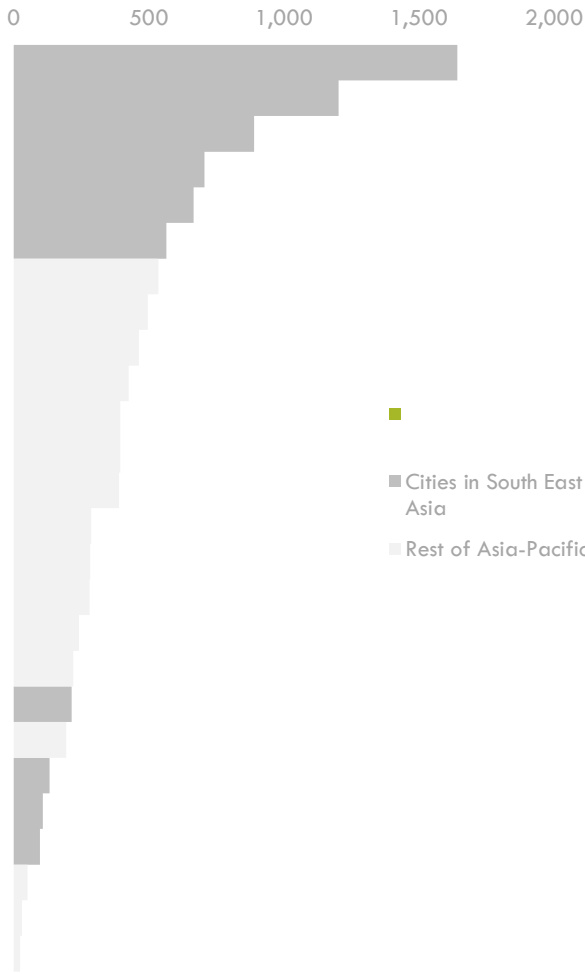


Metro ridership n.d.

Congestion ranking n.d.

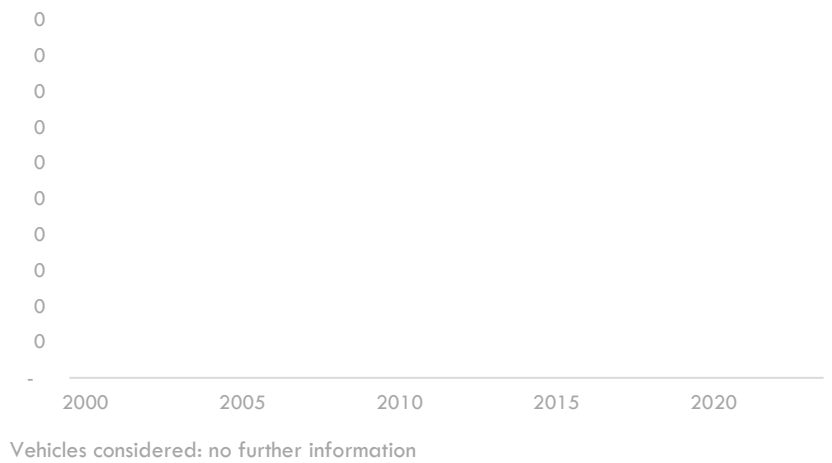
## Vehicle motorization

Vehicles per thousand population (Primary data)



## Vehicles registered (c)

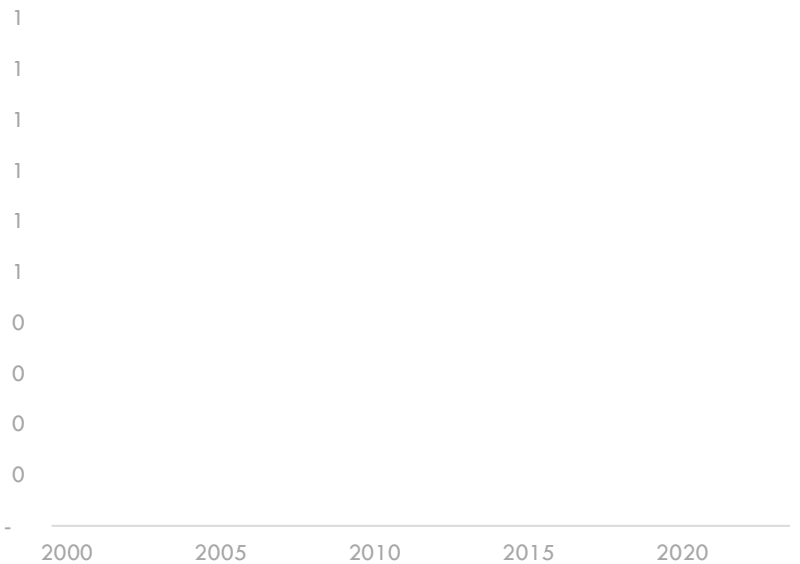
Thousand vehicles (Primary data)



Vehicles considered: no further information

## Bus fleet (operational)

Bus (and other public transport) fleet (Primary data)

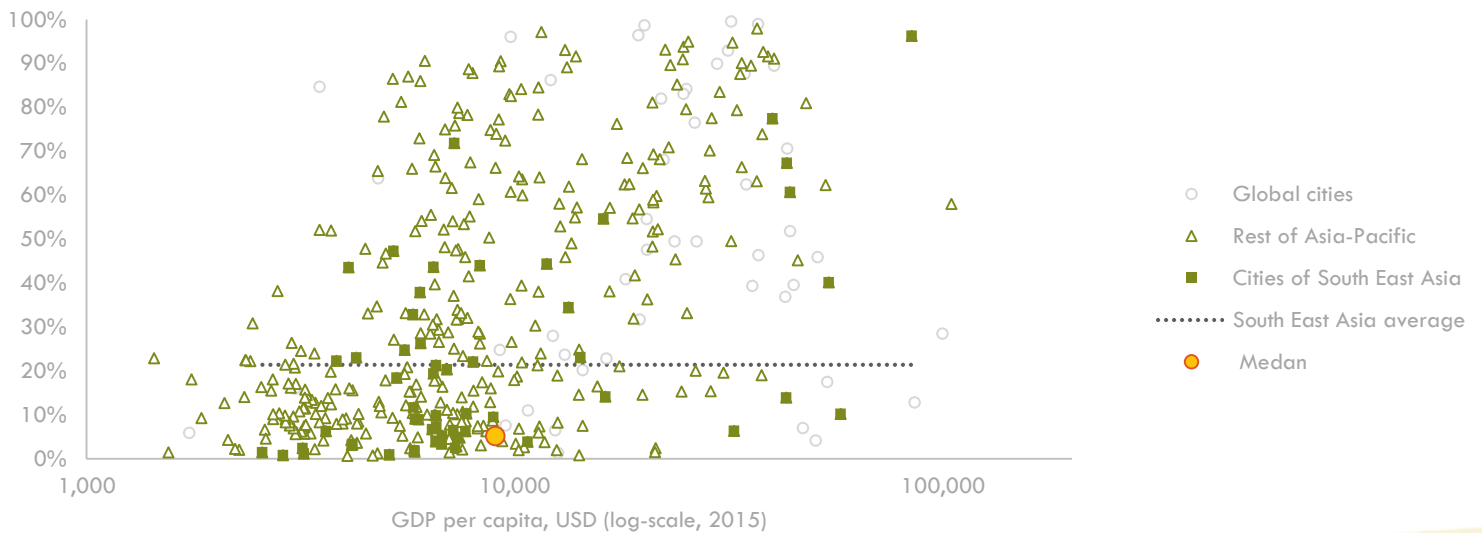


(c) It should be noted that, in most cases, scrapped vehicles are not de-registered, which may result in slightly inflated numbers.

## Urban Access

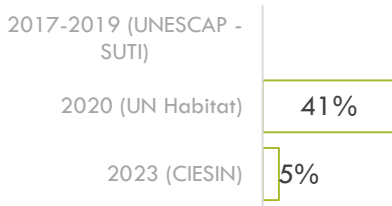
### Access to urban public transport

Share of population with convenient access to public transport (2023) (CIESIN)



## Access to urban public transport (d) - by source

Share of population with convenient access to public transport



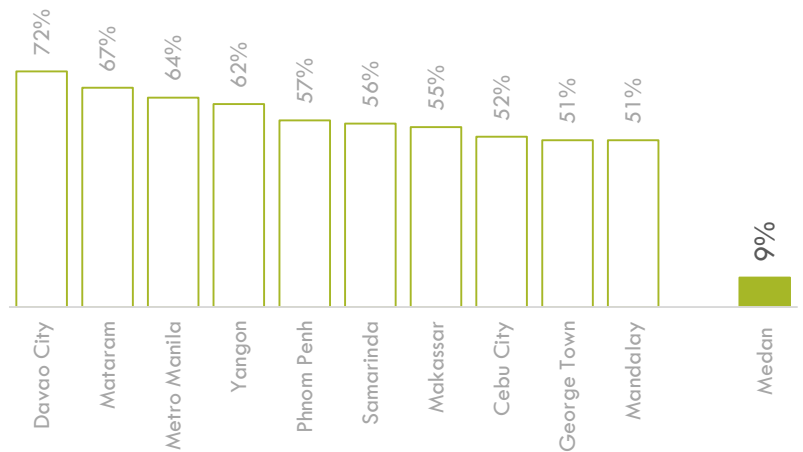
(d) "Access to urban public transport" is computed as share of population who live within a walking distance (along a street network) of 500m to a low capacity public transport system (eg bus, tram) and 1000m to a high capacity public transport system (eg trains, ferries, etc). Only public transport stops which are mapped are included in the analysis which may include both formal and informal stops. Many cities (mostly in the developing countries) have informal public transport systems which are not fully mapped - meaning that they may record higher levels of access to public transport than reported in this dataset.

(e) People Near Services measures the percentage of the city's population living within a 1km walk of both healthcare and education. These services are especially vital for babies, toddlers, and their caregivers, who should be able to reach them on foot.

(f) Percentage of the city's population that lives within 100m of a car-free place. These car-free places include pedestrian-only alleyways, nature trails, playgrounds, pedestrianized squares, and anywhere else that is not used by cars and trucks (except, in some cases, emergency vehicles).

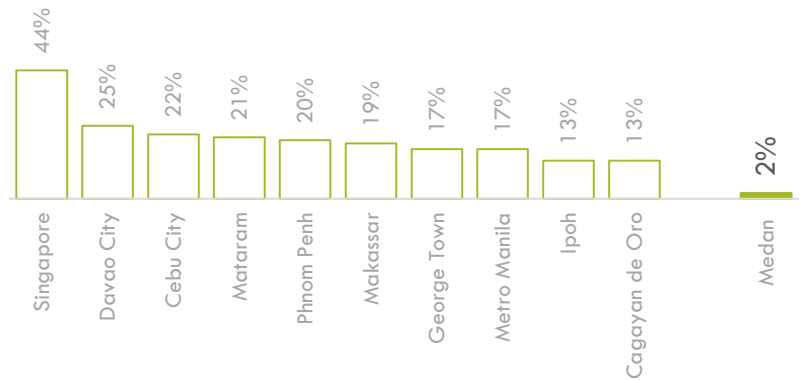
## People near services (both healthcare and schools) (e)

(Share of population) vs. highest 10 cities in South East Asia (2020) (ITDP)



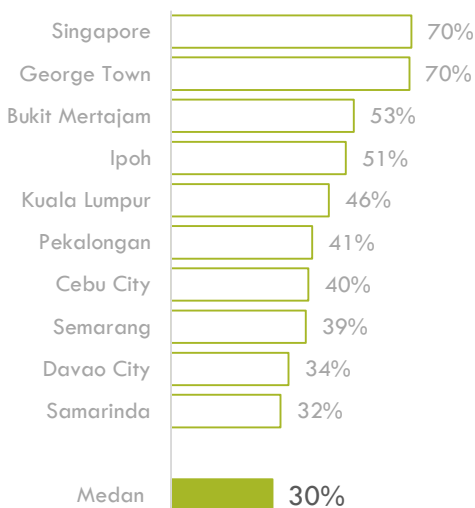
## People near car-free places (f)

(Share of population) vs. highest 10 cities in South East Asia (2020) (ITDP)



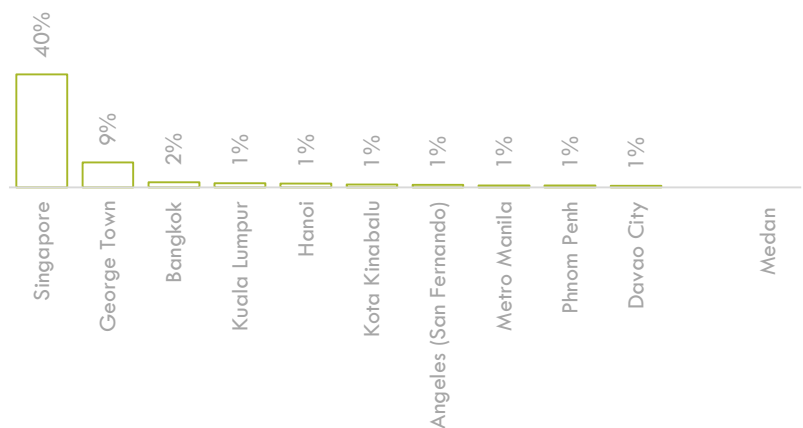
## People near open public space

(Share of population) vs. highest 10 cities in South East Asia (2020) (UN Habitat)



## People near protected bikelanes

(Share of population) vs. highest 10 cities in South East Asia (2020) (ITDP)



Transport externalities

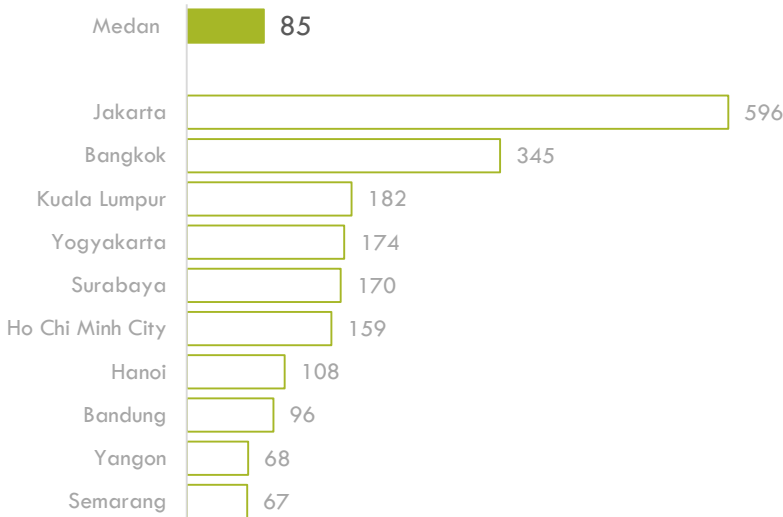
Road transport - CO2 emissions

Thousand tonnes (2022) (ClimateTrace)



Road transport - N2O emissions

Tonnes (2022) vs. highest 10 cities in South East Asia (ClimateTrace)



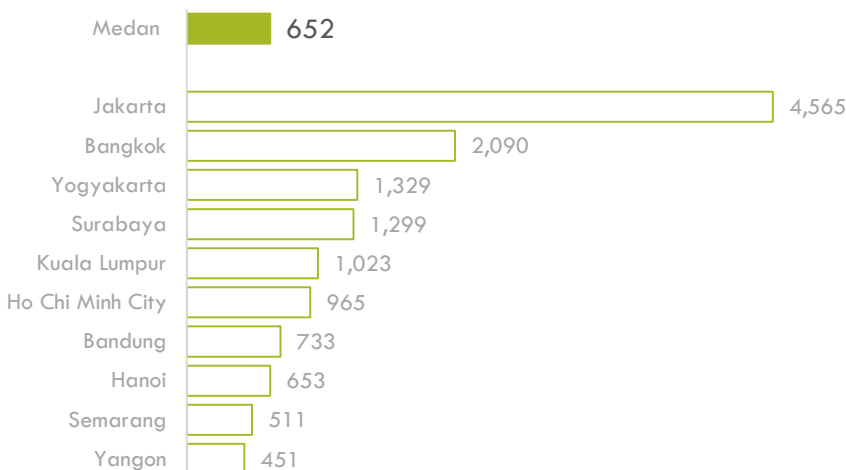
Population exposure to disasters

Share of population (2015) (GHS)



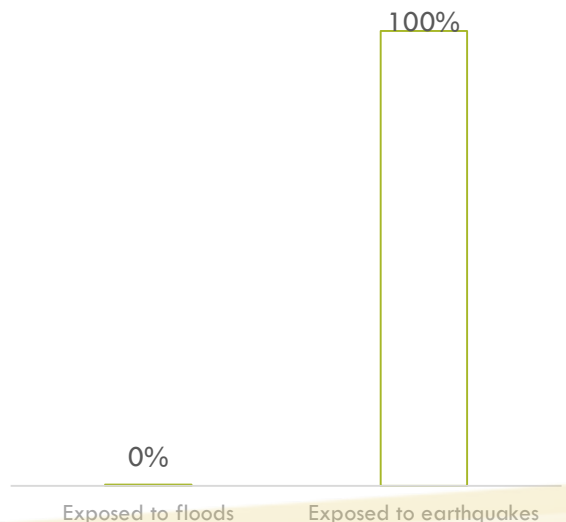
Road transport - CH4 emissions

Tonnes (2022) vs. highest 10 cities in South East Asia (ClimateTrace)



Urban built-up area exposure to disasters

Share of urban area (2020) (GHS)





Transport PM 2.5 emissions

(GHS)



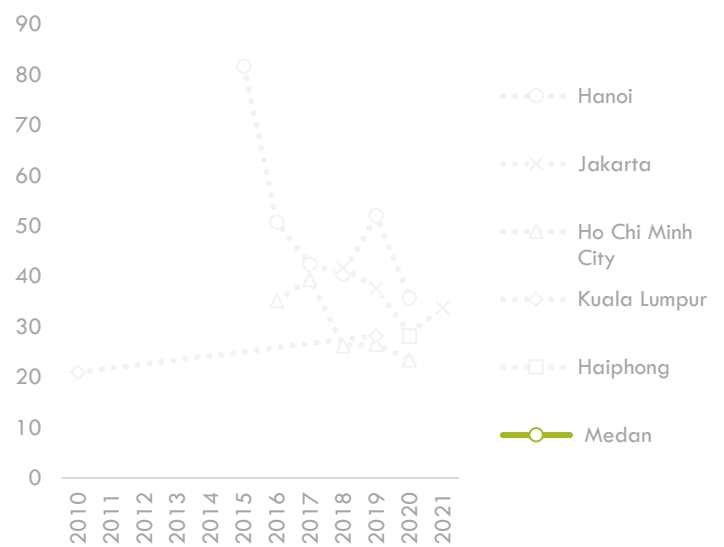
NO2 concentration

ug/m3 (vs. highest 5 cities in South East Asia) (WHO)



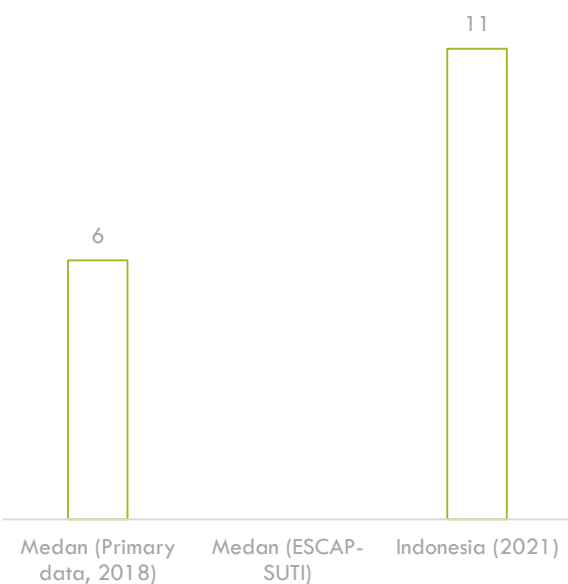
PM 2.5 concentration

ug/m3 (vs. highest 5 cities in South East Asia) (WHO)



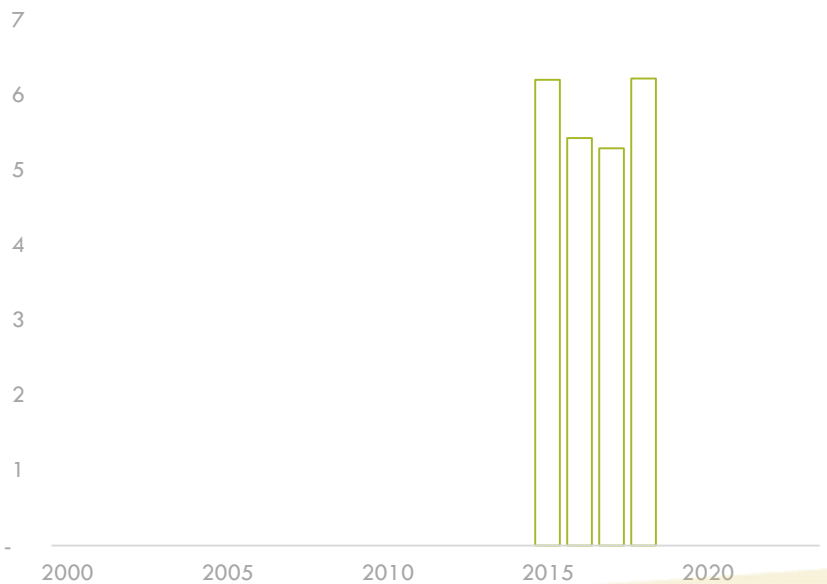
Road crash fatality rate

Deaths per 100,000 population



Road crash fatality rate

Deaths per 100,000 population (Primary data)



Transport related Indices

Container port performance index

Index is resultant of the sum of a weighted average of indices for each of the five vessel sizes: feeders (<1,500 TEUs), intra-regional (1,500–5,000 TEUs), intermediate (5,000–8,500 TEUs), neo-Panamax (8,500–13,500 TEUs), and ultra-large container carriers (>13,500 TEU)

Medan n.d.

Critical Infrastructures Spatial Index for the transportation sector

CISI is an index that spatially explicit indicates the coverage or lack of transport infrastructure. The CISI is expressed in a dimensionless value ranging between 0 (no CI intensity) and 1 (highest CI intensity). The index aggregates high resolution geospatial information on multiple CI assets per CI system

Medan 0.04/1.00  
(2020) (GHS)

SUTI Geometric Mean

The geometric mean in the Sustainable Urban Transport Index (SUTI) by UNESCAP is a mathematical approach to aggregate scores across its 10 sub-indicators, including public transport ridership, safety, affordability, air quality, and access to transport

Medan n.d.

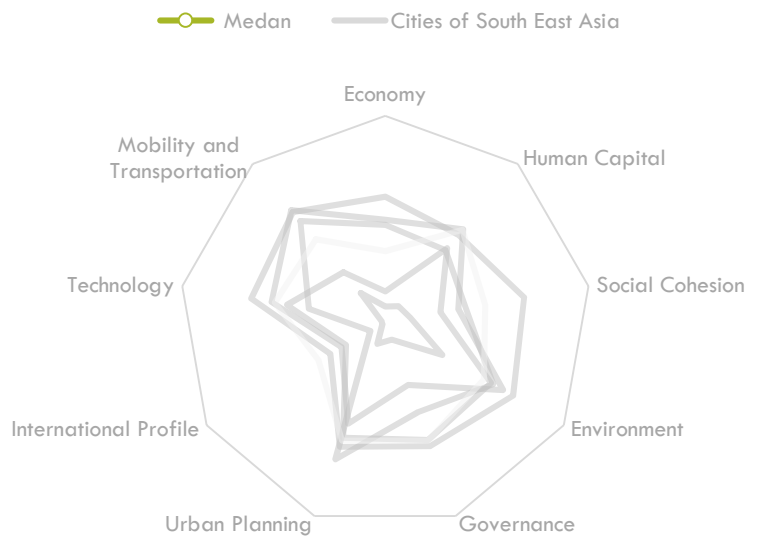
Cities in Motion index ranking

The Cities in Motion Index (CIMI) is a composite indicator evaluating cities across nine dimensions—governance, urban planning, technology, environment, international profile, social cohesion, human capital, mobility, and economy—focusing on sustainability and quality of life. It uses a weighted aggregation model to combine sub-indicators for a holistic assessment of urban performance

Medan n.d.

Cities in Motion index ranking by subcomponent

Ranking (vs. other Cities of South East Asia) (2024) (IESE)



Transport relevant policy documents

Year published	Document name
2022	Sustainable Urban Mobility Plan for Medan Metropolitan Area

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