Asian Transport Observatory

Kochi

Urban Transport - State of Play

Insights from the Asian Transport Observatory (ATO)

Uploaded Jan 2025

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With the support of: Mobilise Your City

Section 1: Kochi – State of play

Kochi: Introduction

Population: 0.67 million (2023) (Source: CMP Projections)

Area: 95 sqkm (2023) (Source: CMP)

Population Density: 7,034 people/sqkm (2023) (Source: CMP)

Main Transport features:

- Kochi Metro: Modern, elevated metro system with wide coverage of the city and integrated smart card ticketing.
- KSRTC (Buses): State-run buses connecting Kochi with nearby towns and cities, offering affordable travel options.
- Private Buses: Extensive network of private buses providing frequent service within the city and outskirts.
- Ferries (Water Metro): Water-based transit connecting islands and the mainland, reducing congestion and offering scenic commutes.
- Auto-rickshaws: Widely available for short trips within the city, offering flexible last-mile connectivity.
- Taxis & Ride-hailing (Ola, Uber): App-based services offering door-to-door convenience, with flexible route options.

Metro rail

Water metro

Buses

CNG Autos

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Sources abbreviations

CIESIN	Center for International Earth Science Information Network
CMP	Comprehensive Mobility Plan
CODATU	Cooperation for urban mobility in the developing world
CPPR	Centre for Public Policy Research
ESAF	Evangelical Social Action Forum
GHS	Global Human Settlement Data by EU
ICLEI	Local Governments for Sustainability (ICLEI, originally International Council for Local Environmental Initiatives)
ITDP	Institute for Transportation and Development Policy
MORTH	Ministry of Road Transport & Highways
MOUD	Ministry of Urban Development
MYC	Mobilise Your City
NATPAC	National Transportation Planning and Research Centre
RITES	Rail India Technical and Economic Service Limited
RTO	Regional Transport Office
Primary Survey*	The primary survey refers to the primary study conducted by the urban local body and employed agencies

Note: The sources for the visualizations are either marked on the chart axes, chart titles, chart legends or footer of the slide.

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Urban form and space

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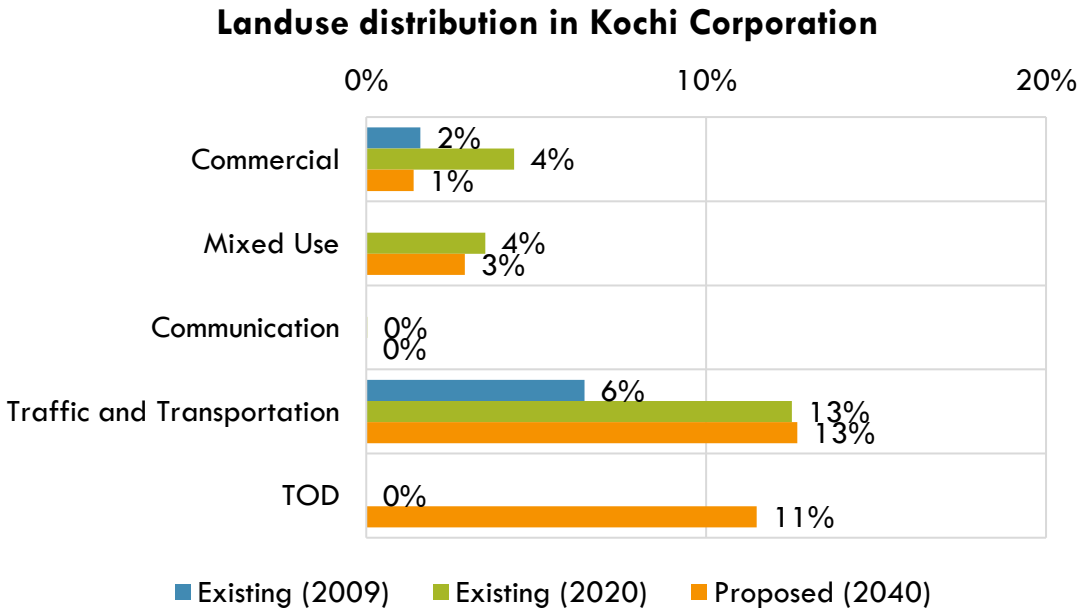
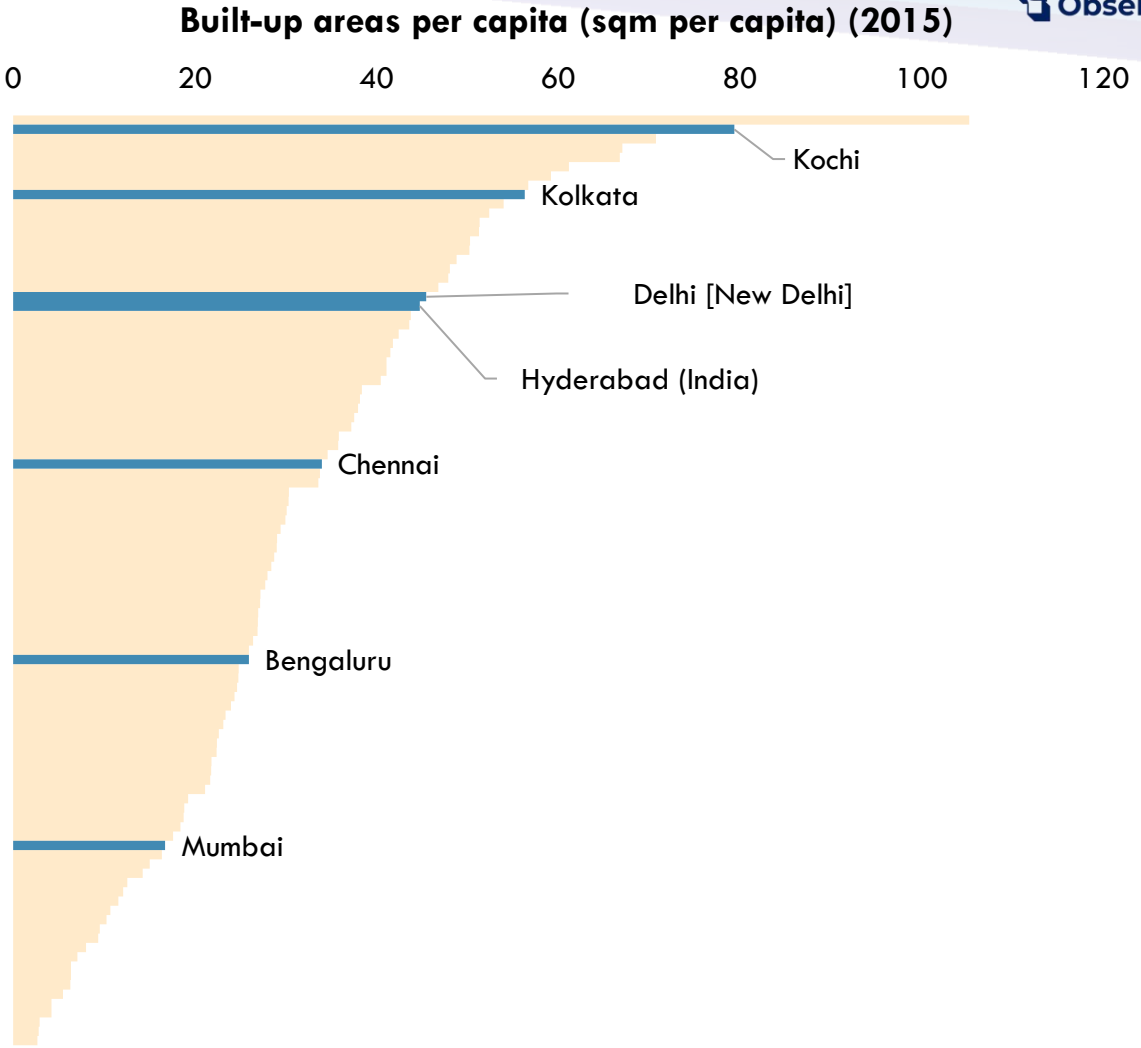
Kochi has increased transport landuse share and proposes to add relevant categories like TOD



- The land use study for Kochi shows that the share of land dedicated to transport activities, such as roads and rail, increased from 6% in 2009 to 13% in 2020. It is proposed to maintain a similar percentage by 2040, with an additional 11% allocated for Transit-Oriented Development (TOD).
- This is significant for sustainable transport because it encourages efficient land use by promoting higher density development near transit hubs. This approach reduces reliance on private vehicles, lowers greenhouse gas emissions, and enhances accessibility, ultimately contributing to a healthier urban environment and improving the quality of life for residents.



- Kochi boasts a remarkably high built-up area per capita, reaching approximately 79 square meters per person as of 2015. This significantly surpasses figures for major Indian cities like Delhi and Mumbai, which typically have lower per capita built-up areas due to their denser populations.

Source: 2009 - DEVELOPMENT PLAN FOR KOCHI CITY REGION 2031 - Vol III; 2020 - MASTER PLAN FOR KOCHI MUNICIPAL CORPORATION AREA -2040 Vol. 1A; 2015 - GHS

Kochi has 17 blocks per sqkm, standing significantly lower compared to majority of the Indian cities.

- Kochi's urban form is characterized by a low block density of 17 blocks per square kilometer, significantly less than most Indian cities. This indicates a more dispersed layout with fewer, larger land parcels. This has important implications for urban planning.

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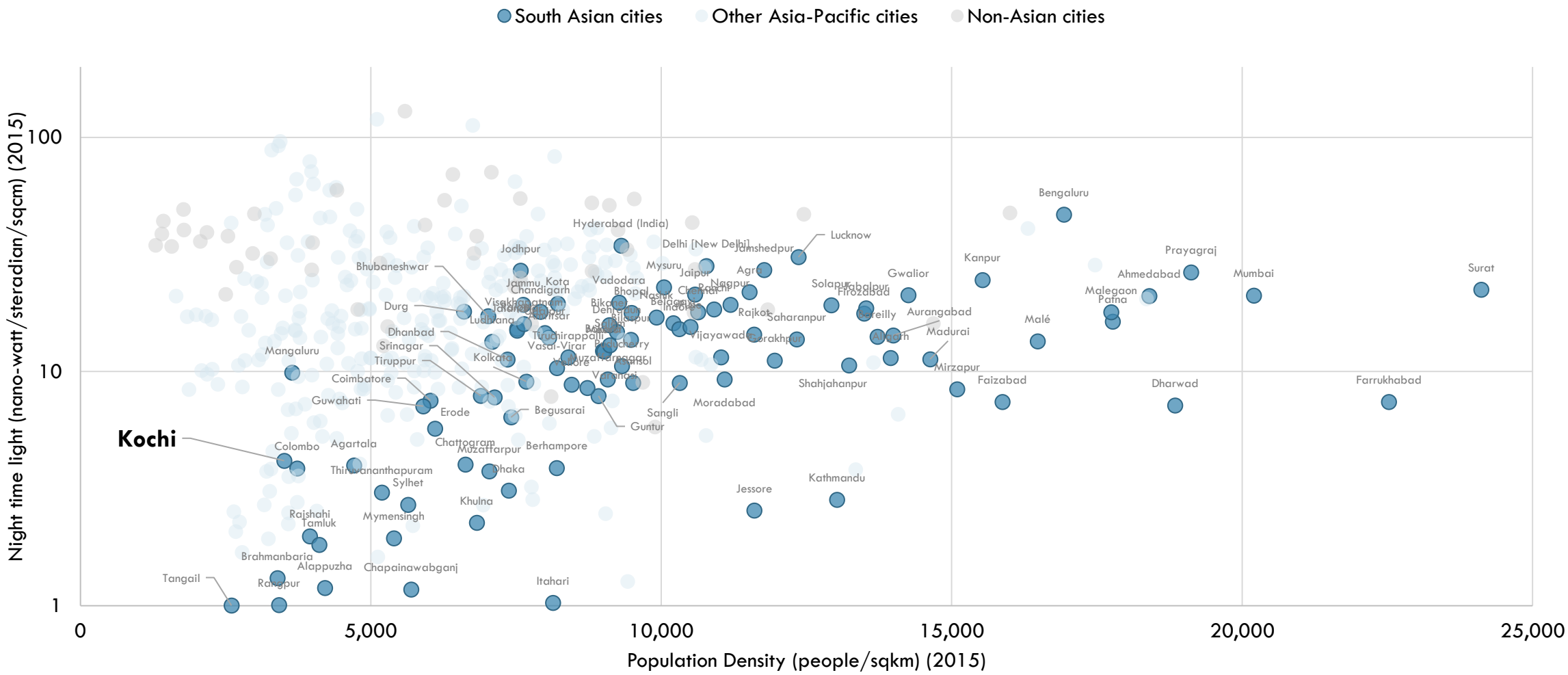
Source: ITDP

Kochi demonstrates modestly packed urban activities compared to other Indian cities



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Source: GHS

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Transport activity

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Mode share of public transport and motorized 2W stands strong throughout *All the studies follow a different analytical methodology

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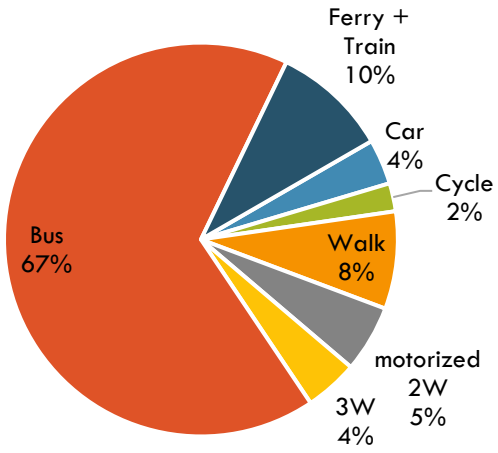
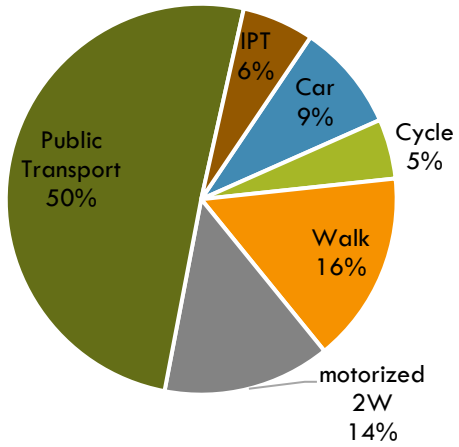
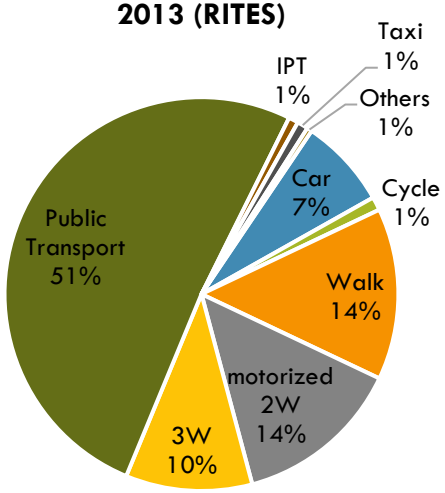
2001 (RITES)



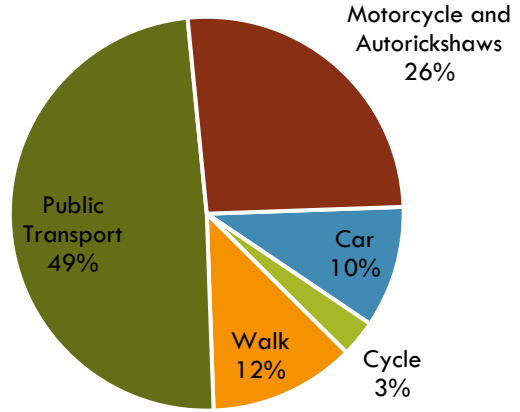
2007 (World Bank, MOUD (India), TEEMP Defaults)



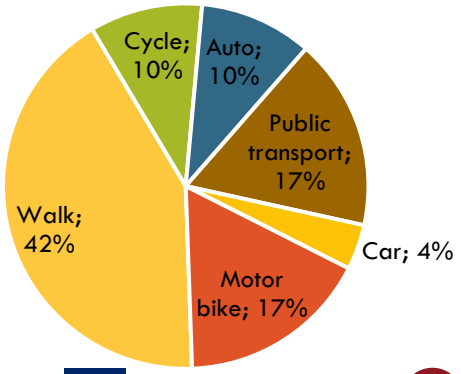
2013 (RITES)



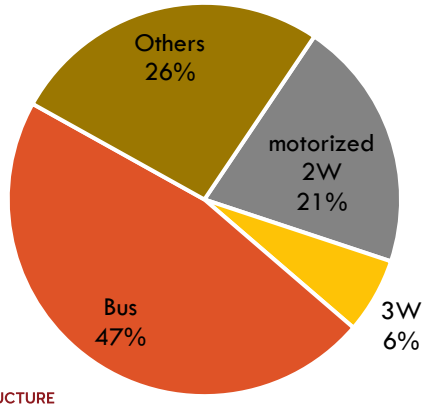
2016 (ICLEI)



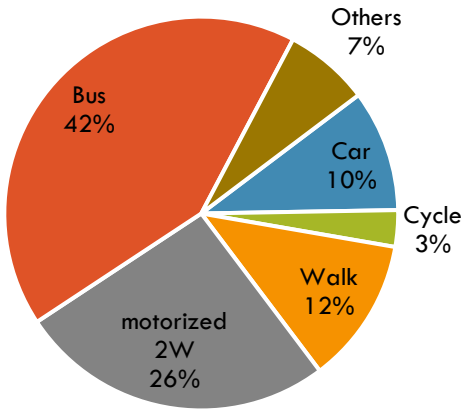
Mode of transportation used for short trips (<2km) (2017) (ESAF)



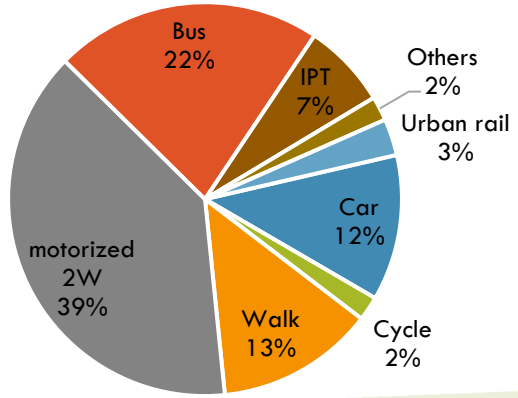
2019 (NATPAC)



2022 (MYC)



2023 (CMP)



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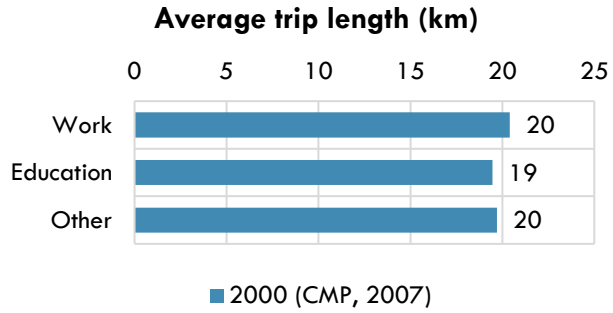
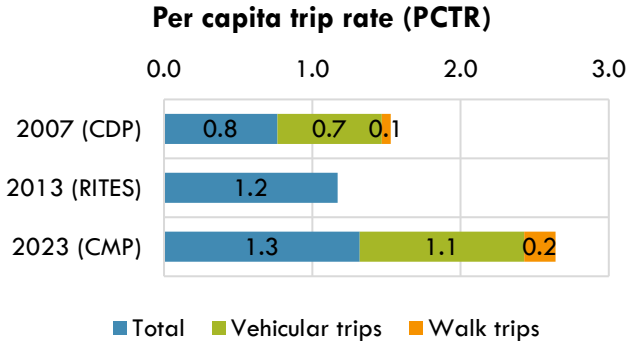
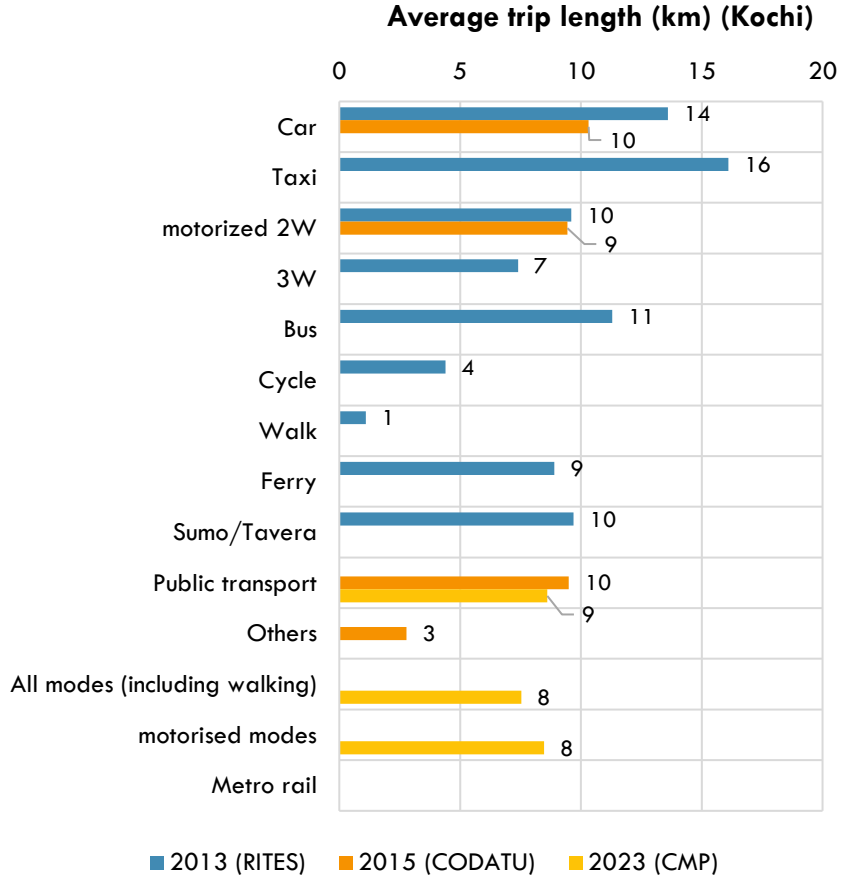
Source: As mentioned in the chart titles, axes, or legends

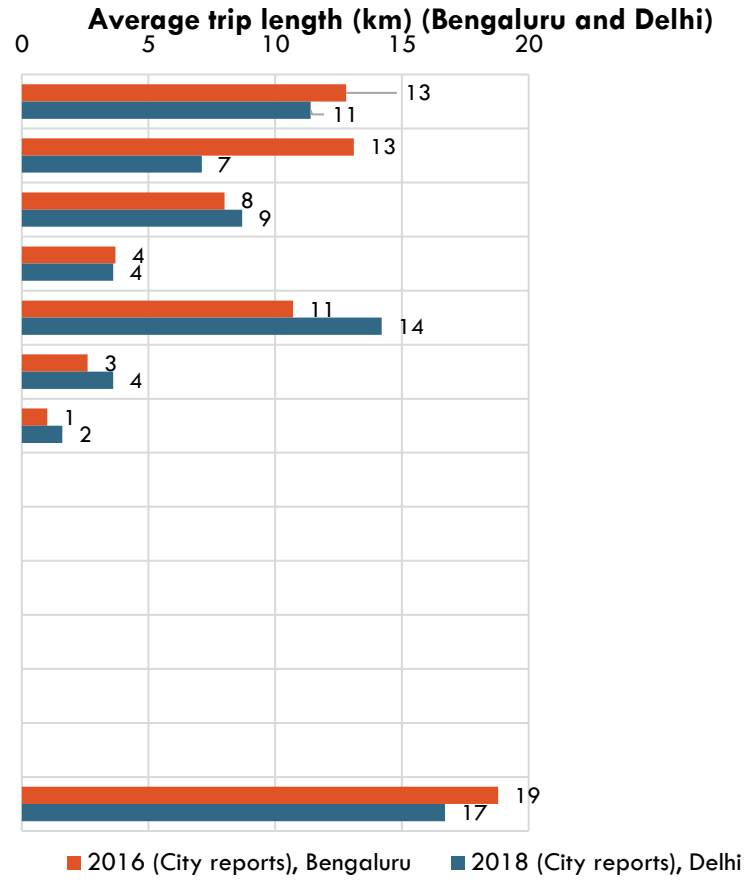
Changing Trips Thru Time: Increasing Trips per capita and shortening of average trip lengths





- The average trip length for work-related travel is the highest, at approximately 20 km, followed closely by educational trips, which average around 19 km.
- Based on three studies, the total per capita trip rate has shown a significant increase, rising from 0.8 in 2007 to 1.3 in 2023. The vehicular trip rate also saw a notable rise, increasing from 0.7 to 1.1 during the same period. Walk trips experienced a slight uptick, going from 0.1 to 0.2 per capita.





- The average trip length for cars in Kochi was recorded at 14 km in 2013 and 10 km in 2015, while public transport trip lengths were 10 km in 2015 and 9 km in 2023.
- It's important to note that the methodologies used in the studies conducted in 2013, 2015, and 2023 may differ, which limits direct comparison of the data.
- For reference, in Bengaluru and Delhi, the average car trip lengths were 13 km and 11 km, respectively. Meanwhile, bus trip lengths were 11 km in Bengaluru and 14 km in Delhi.

Source: As mentioned in the chart titles, axes, or legends

Work trips dominate the purpose split. Daily commutes dominate inter-city trips, accounting for 64%, while alternate and occasional visits each represent 10%

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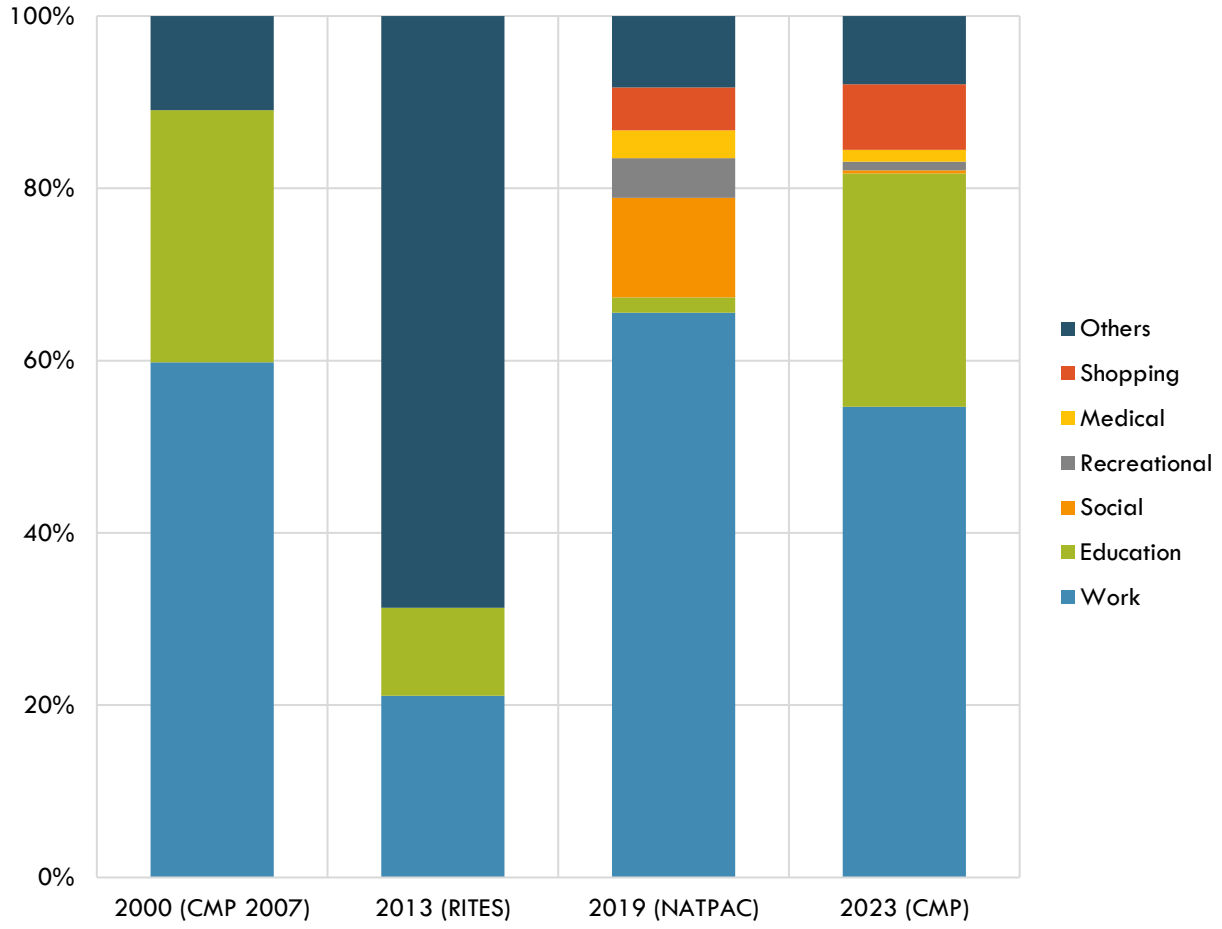
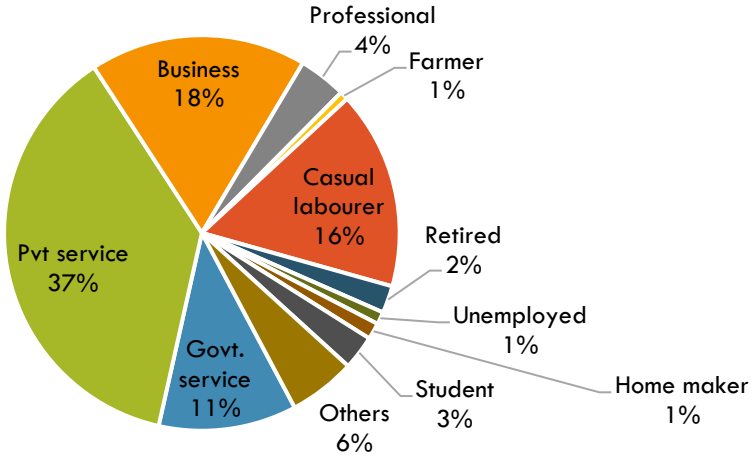
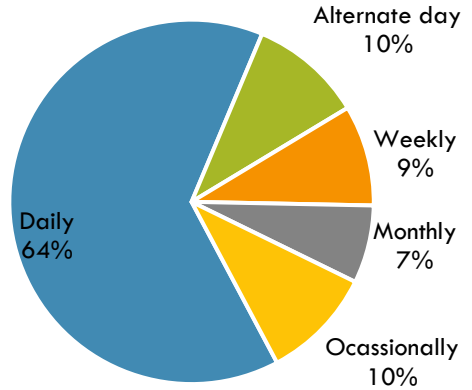
Purpose of passenger trips



Occupation of inter-city passengers by road (2019) (NATPAC)



Frequency of travel of inter-city passenger trips by road (2019) (NATPAC)



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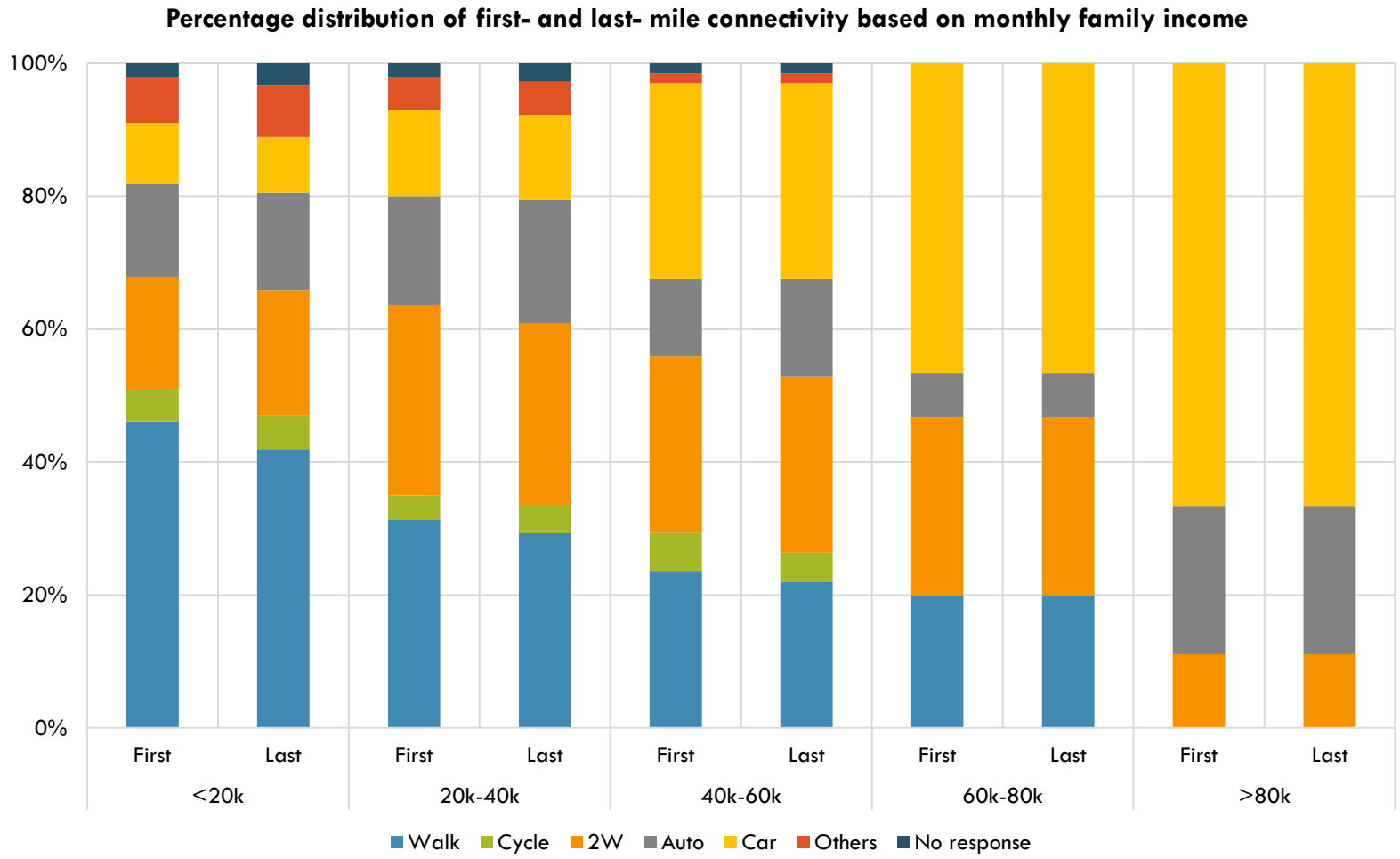
Source: As mentioned in the chart titles, axes, or legends

First and Last Mile Modes and Income (in INR)

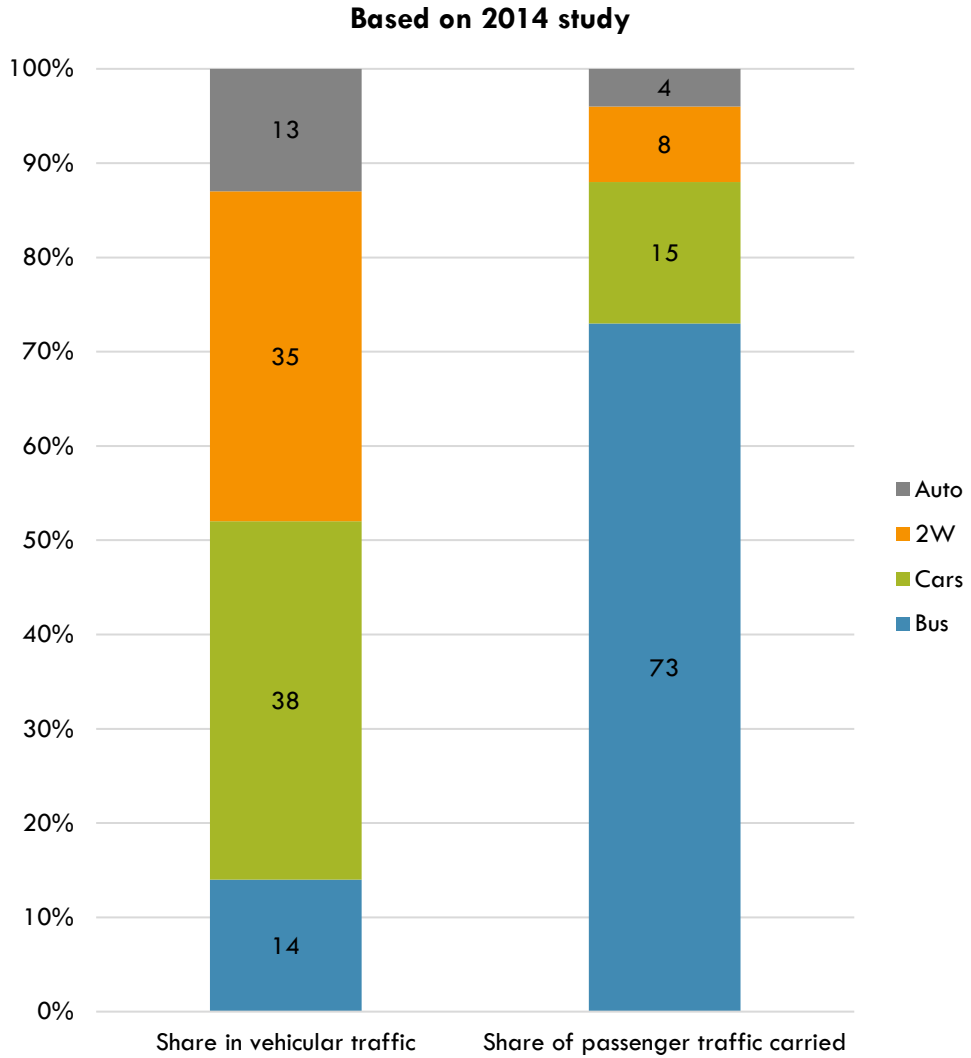
- Around 54.5% belonging to the income group <20,000 INR used bus as their main mode of travel, while 12% use two wheelers as the main mode.
- As income increases, main mode shifts to car; 66.6% of those who use car as their main mode belong to the income category of >80k

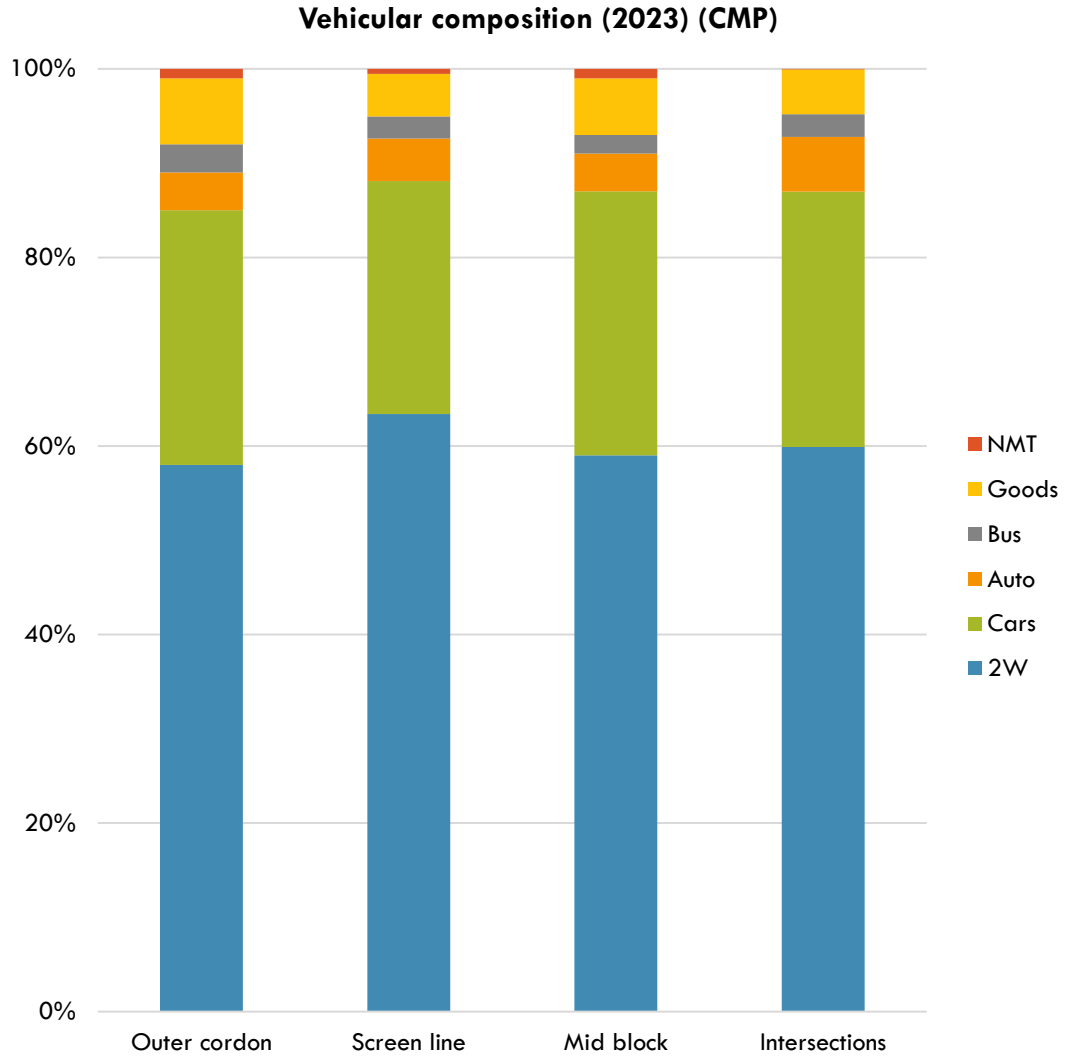


2W – Two-wheeler; 3W – Three-wheeler; 4W – Four-wheeler

Source: CPPR (https://www.cppr.in/wp-content/uploads/2018/04/Mobility-and-Mode-Distribution-in-Kochi.pdf)

At just about 10+% of vehicular traffic, buses carry about 70+% of the passenger traffic



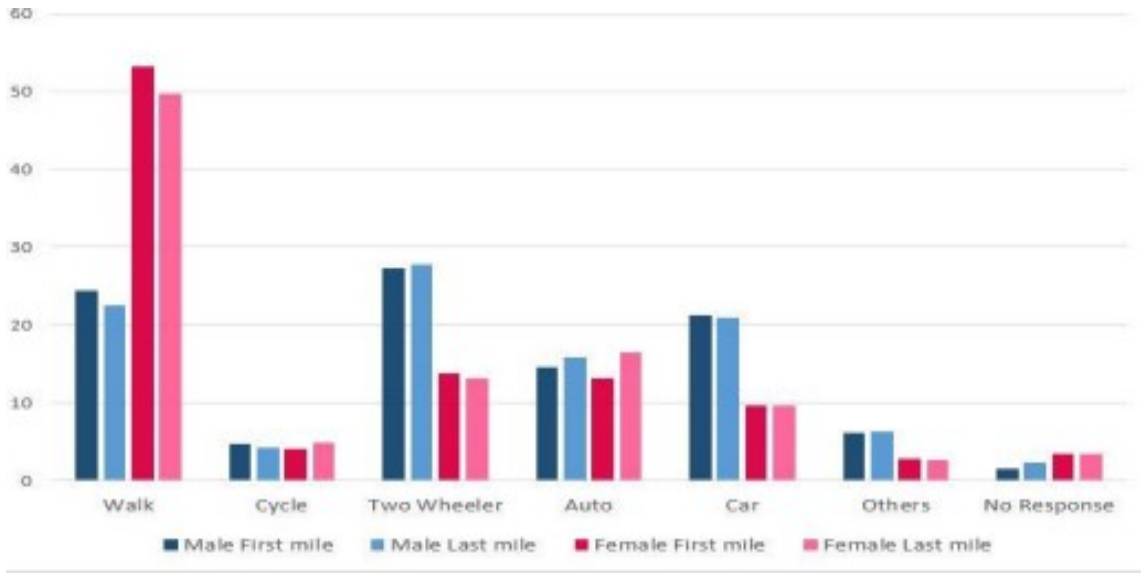


2W – Two-wheeler; 3W – Three-wheeler; 4W – Four-wheeler

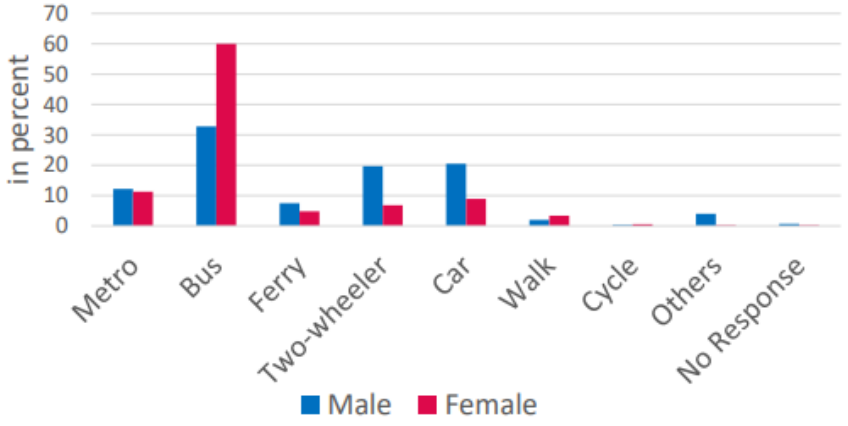
Gender & mobility

- Around 60% of women surveyed take buses for work, shopping, leisure etc. Women are more dependent on public transport than men.
- Nearly 53% and 50% women surveyed prefer walking for first mile and last mile connectivity respectively, whereas 27% of men use two-wheelers for first and last mile connectivity.
- 73% women and 58% men say that safety is a main issue while choosing public transport.
- A service that is direct and conveniently scheduled is an important factor. 72% of the women surveyed consider availability of direct services as very important factor while choosing public transport.
- Around 60% women and 44% men surveyed cite availability of information regarding public transport as a very important factor while choosing a mode of public transport. Information such as timetable, routes, number of buses/trains is an important factor.

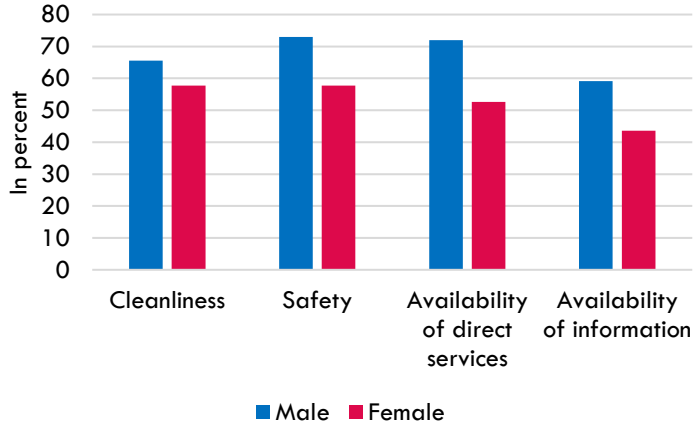
Gender-wise preference of first and last mile connectivity for different modes



Gender-wise preference of main modes of transport



Gender-wise rating for 'Very Important'



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Source: CPPR (https://www.cppr.in/wp-content/uploads/2018/04/Mobility-and-Mode-Distribution-in-Kochi.pdf)

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Freight transport

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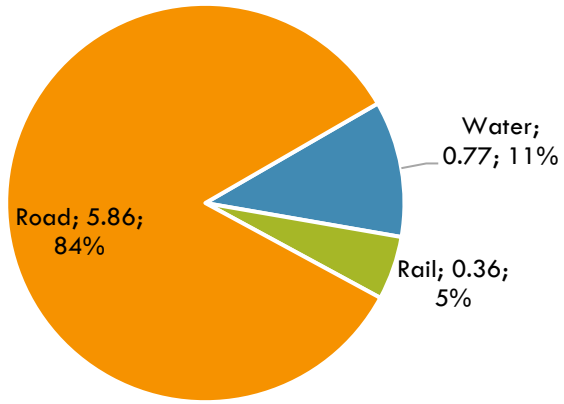
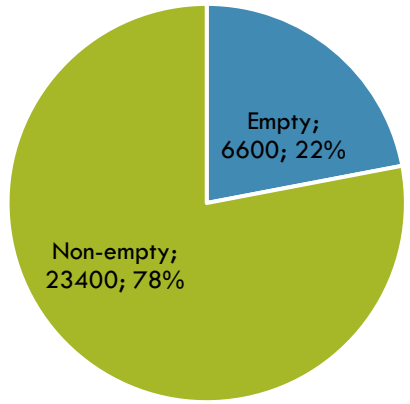
Inter-city modal share of road freight traffic is dominated by mini-trucks

- Freight Transport Overview: According to the 2022 ICLEI study, road transport handled approximately 84% of the city's freight, measured in terms of tonnage. This translated to 5.86 million tonnes being moved via road.
- Goods Vehicle Traffic: The 2019 NATPAC study revealed that around 22% of goods vehicles recorded at the city's outer cordon were 'empty,' reflecting potential inefficiencies in freight movement.
- Freight Vehicle Traffic Trends: Comparing studies from 2017 and 2019:
  - In 2017, total freight vehicle traffic was about 26,000 vehicles, while in 2019, this figure increased to approximately 30,000 vehicles.
  - Mini-trucks made up a significant portion of this traffic, accounting for 33% of the freight vehicle fleet in 2017 and rising to 39% in 2019.
  - It's important to note that these two studies may have employed slightly different methodologies, which may affect direct comparisons.
- Freight by Tonnage: In 2019, mini-trucks transported 47,260 metric tonnes (MT) of goods, representing about 42% of the total freight carried by road.

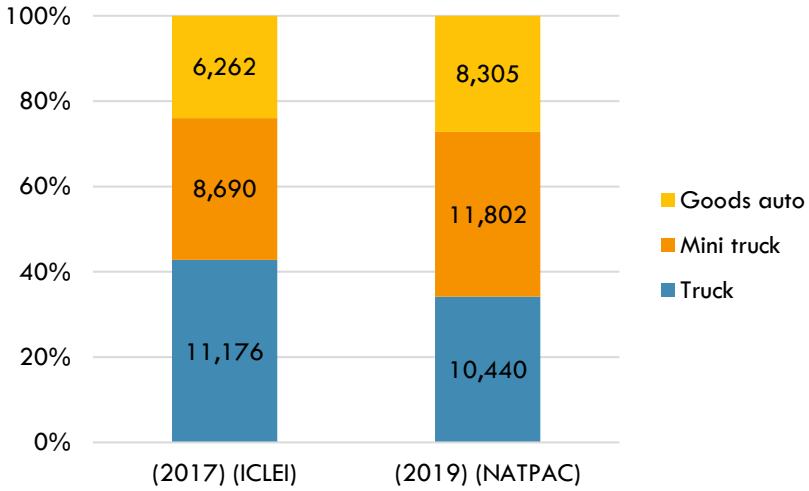
Share of freight in the city by modes (million Tonnes) (2022) (ICLEI)



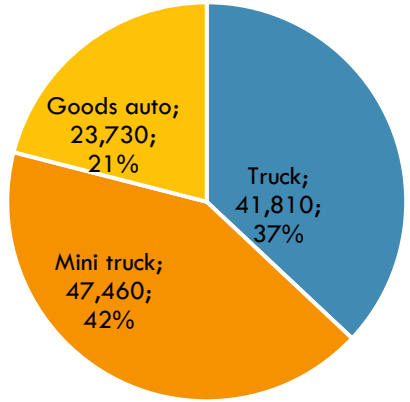
Share of goods vehicles traffic recorded at the outer cordon (2019) (NATPAC)



Share of inter-city goods vehicle traffic by count



Share of inter-city goods vehicle traffic by tonnage transported (MT) (2019) (NATPAC)

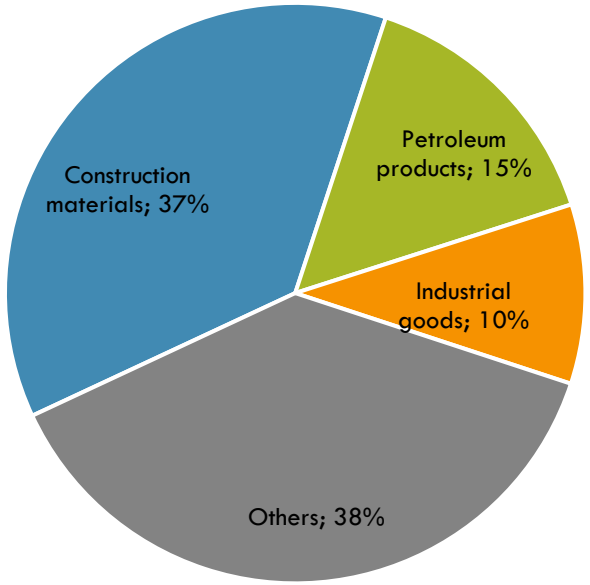


Source: As mentioned in the chart titles, axes, or legends

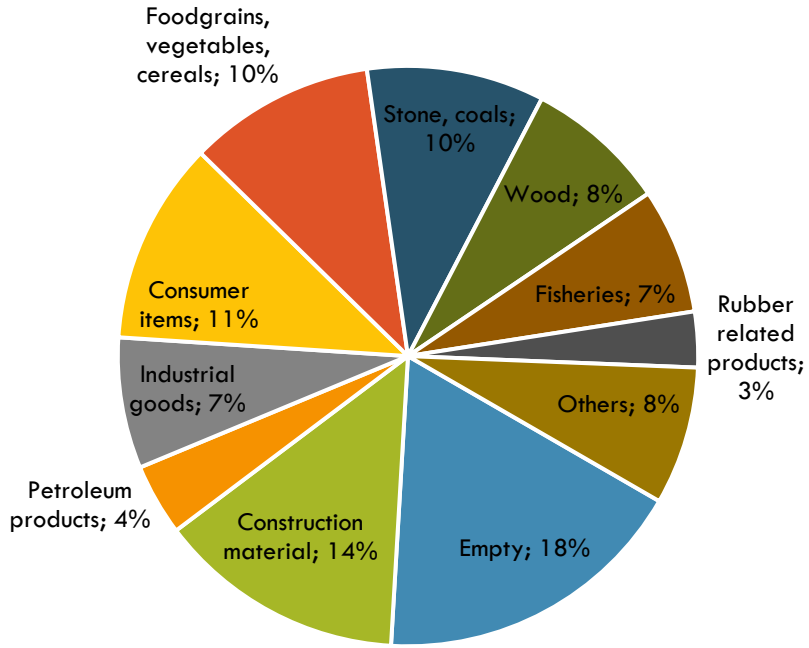
Construction material retains highest share of commodities carried

- In 2019, construction materials made up the largest share of commodities transported, recorded at outer cordon points, accounting for approximately 37%. This was followed by petroleum products, which constituted 15%.
- By 2022, the distribution had shifted significantly. Construction materials dropped to 14%, while petroleum products declined to 4%.
- Consumer items represented 11%, and foodgrains, vegetables, and cereals combined accounted for 10%.
- Similarly, stone and coal together constituted 10% of the total goods transported.
- It's important to note that these two studies may have employed slightly different methodologies, which may affect direct comparisons.

Share of commodities carried in the goods vehicles recorded at the outer cordon points (2019) (NATPAC)



Share of commodities carried in the goods vehicles recorded at the outer cordon points (2022) (ICLEI)

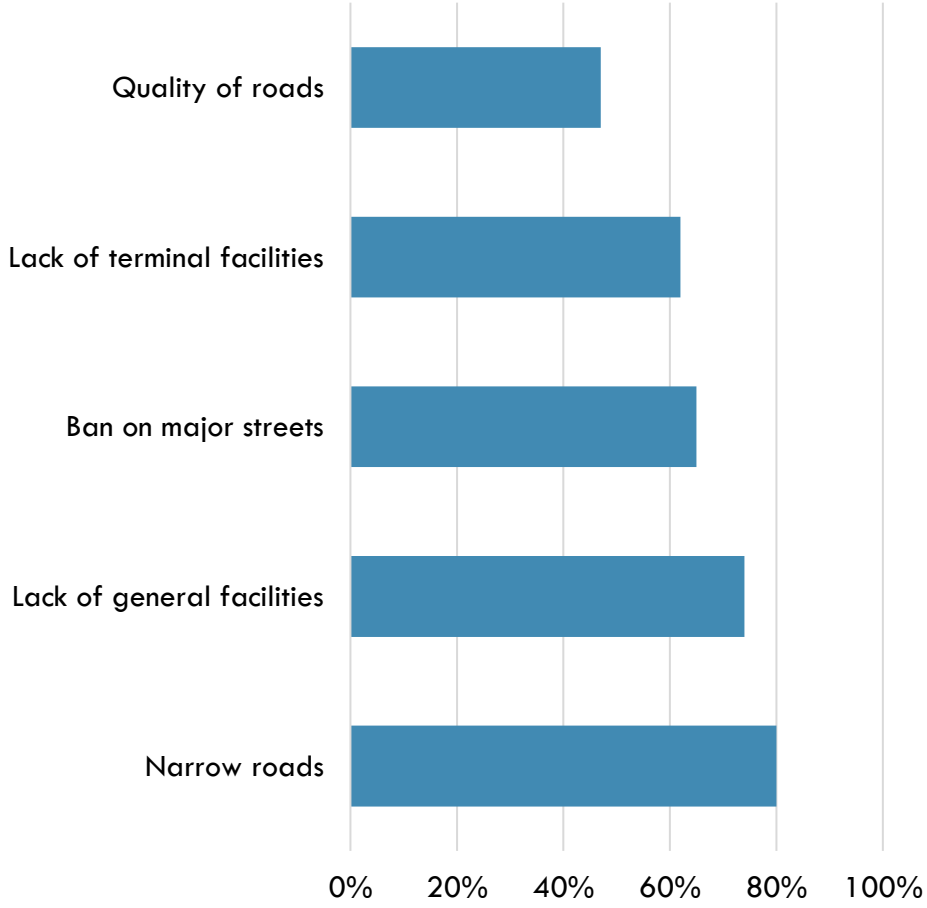


Source: As mentioned in the chart titles, axes, or legends

Goods vehicle characteristics

- About 65% of the trips are made on weekly basis and 25% occasional basis indicating considerable number of intercity interactions. (CMP)
- Among the surveyed vehicles, 34% mentioned having no parking to low parking facilities, while 42% had proper facilities to park the vehicles. (CMP)
- According to various transport studies, inter-city goods traffic in the region in 2017, Goods measuring 80,797 metric tons were transported to various destinations. A substantial number of goods vehicles (78 percent) either originated from or terminated in Kochi City. Only 21 percent of the total vehicles were found to be bypassing or passing through the city. Additionally, the exact number of inter-city goods trips by independent retailers and local convenience stores is unknown. The majority of Indian cities are estimated to have more than 40 percent of their freight share generated by these stores. Growth in the use of the Internet has led to the rapid development of e-commerce, which is one of the fastest growing consumption sectors in Kochi. (ICLEI study)

Share of goods operators facing the operational concerns (2013) (ICLEI)



Source: As mentioned in the chart titles, axes, or legends

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Transport infrastructure

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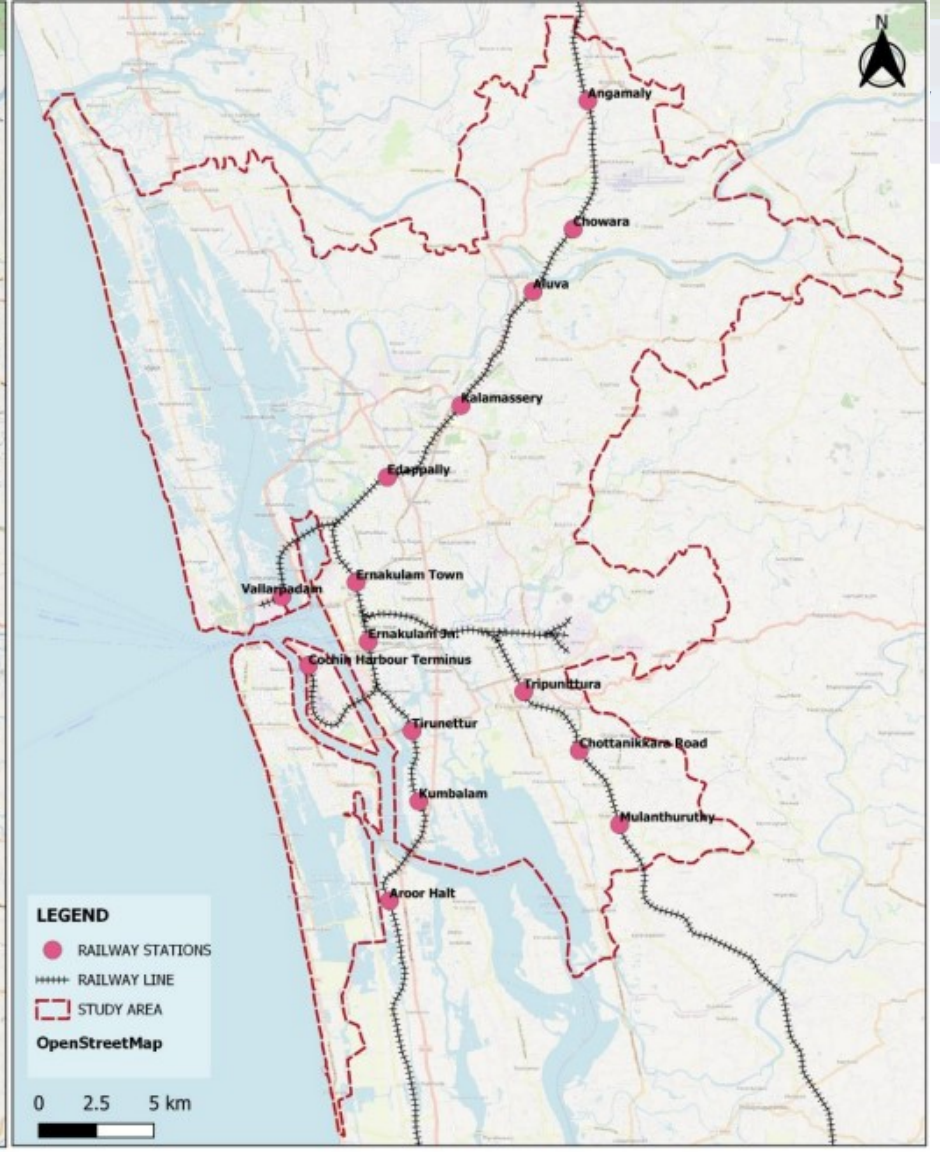
- Kochi has a dense and extensive transportation network that connects it to interstate destinations and far beyond by road, rail, waterway, and air.
- The rail transport in the city is administered by the Southern Railway Zone of Indian Railways. The total length of the rail line within the study area is 95 kilometres.

Title: Comprehensive Mobility Plan for Kochi

Map: Rail, Water & Air Connectivity



Title: Comprehensive Mobility Plan for Kochi

Map: Rail Network & Stations

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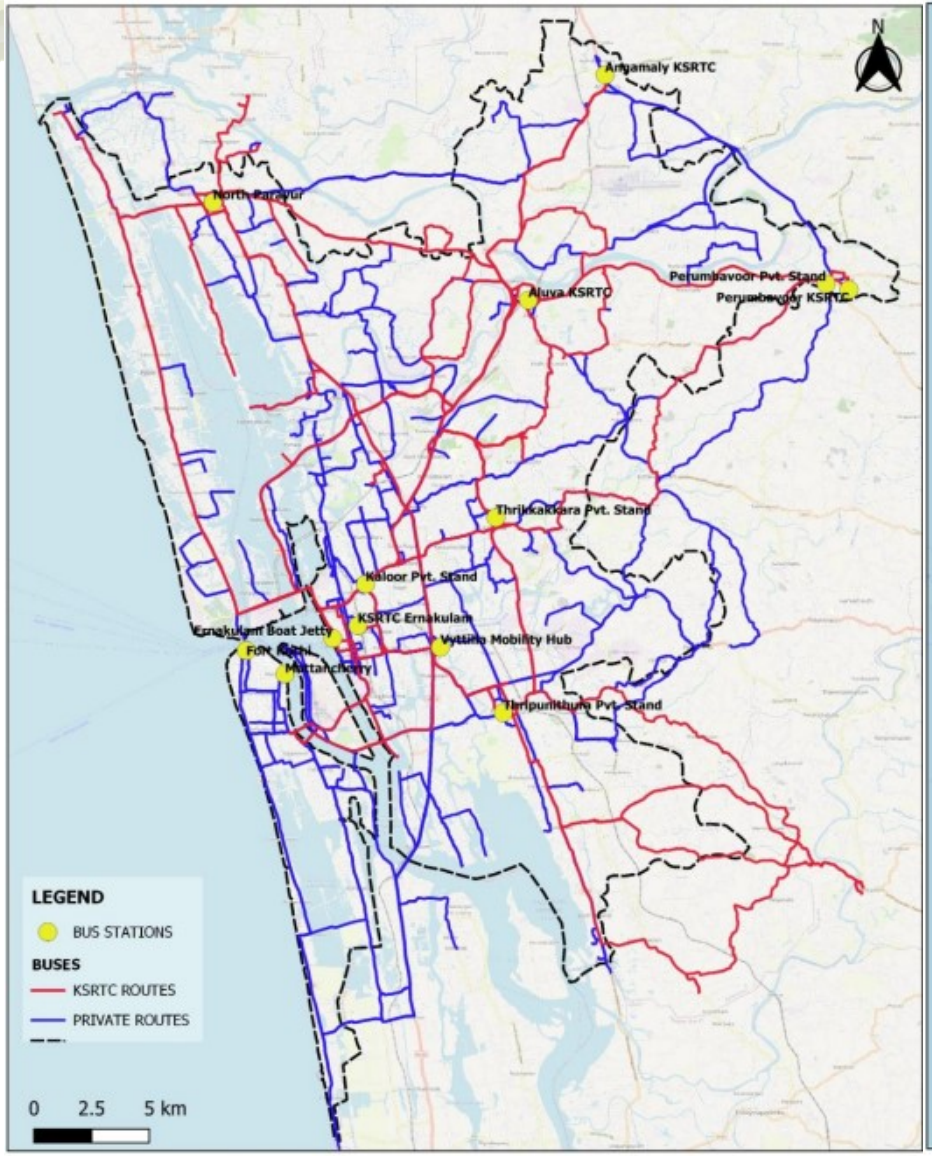
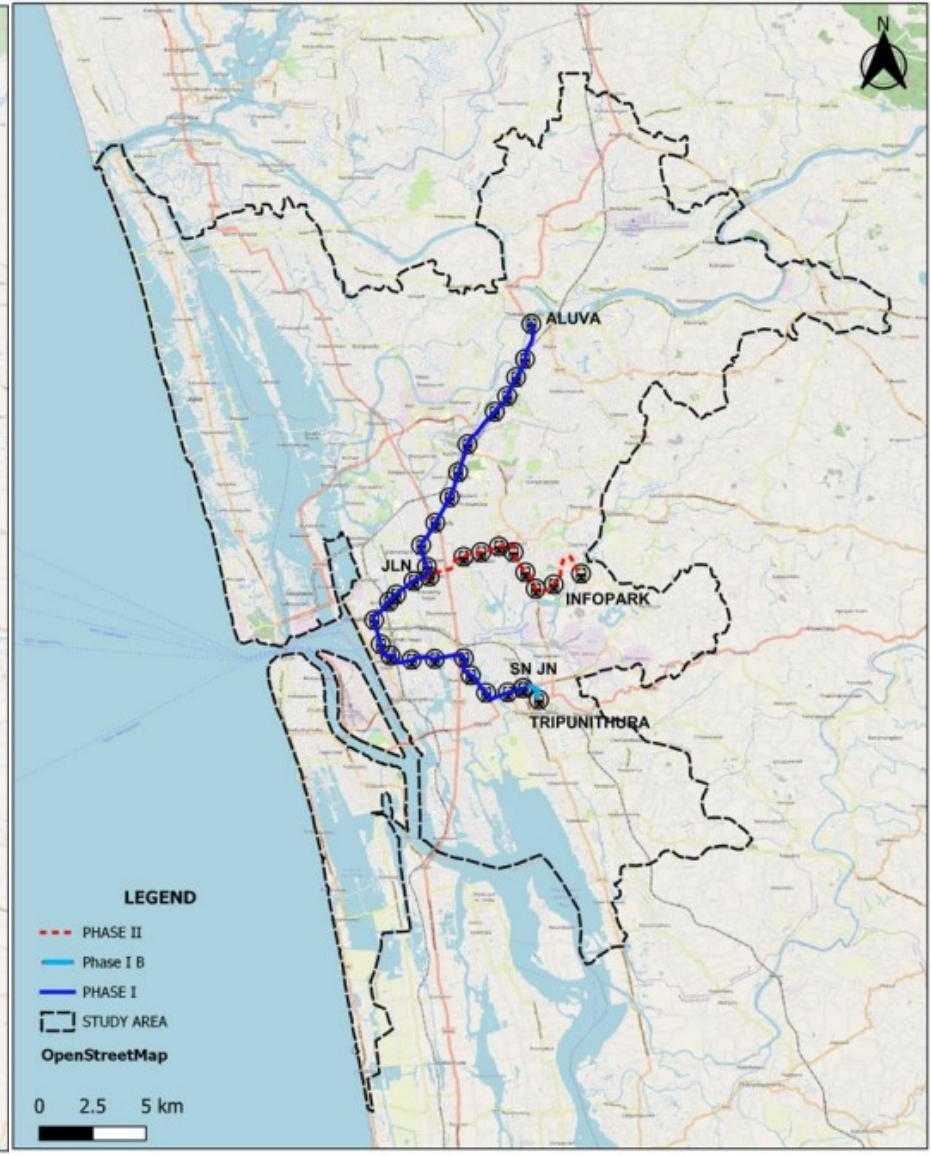
Source: CMP

- Kochi is well connected to other parts of the state using KSRTC & private bus services. Kochi city and the neighbouring satellite towns mainly depend upon the bus transport, for meeting the travel demands of majority of the people.
- Metro system has been operational since 2017, with 1 elevated line having a length of 27.31 km and 24 metro stations from Aluva to SN Junction. The 1.2 km length of Phase 1B from SN Junction to Thripunithura is made operational in 2024. The current operation length of metro is about 28.12km



Title: Comprehensive Mobility Plan for Kochi

Map: Bus Network & Stations



Title: Comprehensive Mobility Plan for Kochi

Map: Existing & Under Construction Metro Corridors

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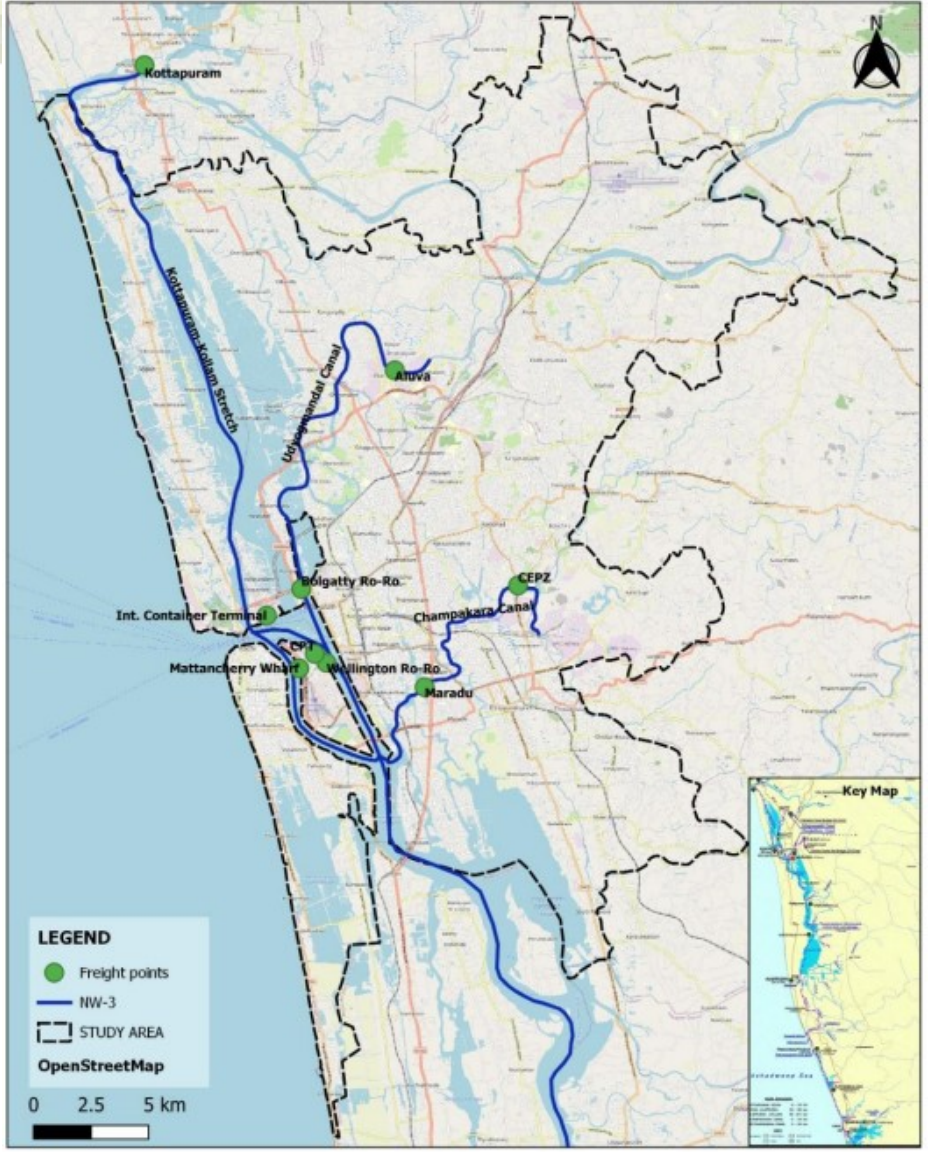
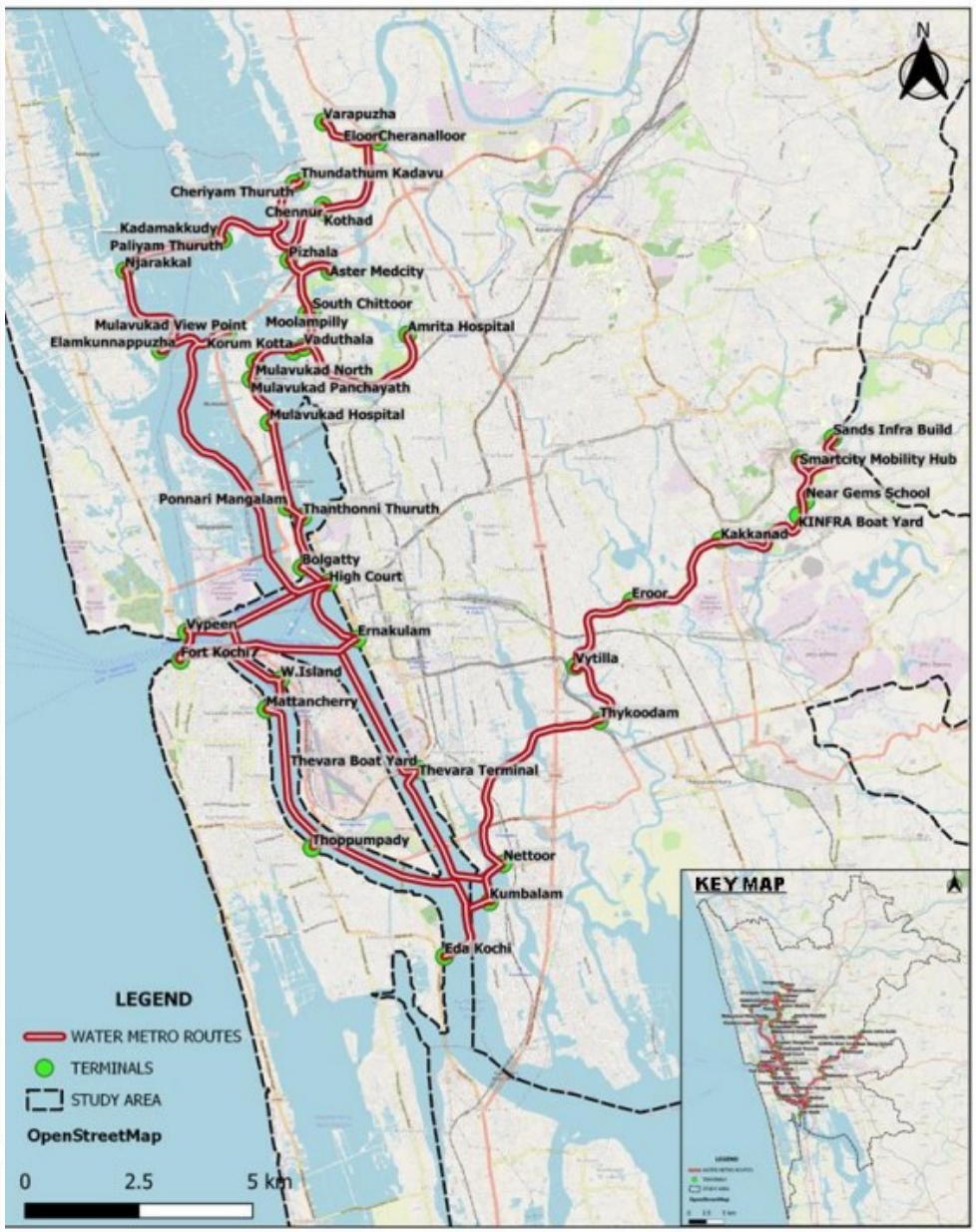
Source: CMP

- The National Waterway – 3 i.e., the Kollam – Kottapuram Waterway passes through the region, which inland navigational route.
- In addition to the main stretch, Champakkara and Udyogamandal canals are connecting the industrial centres of Kochi to Port Inland Waterways Authority of India (IWAI) under the Ministry of Shipping are under development of national waterways.



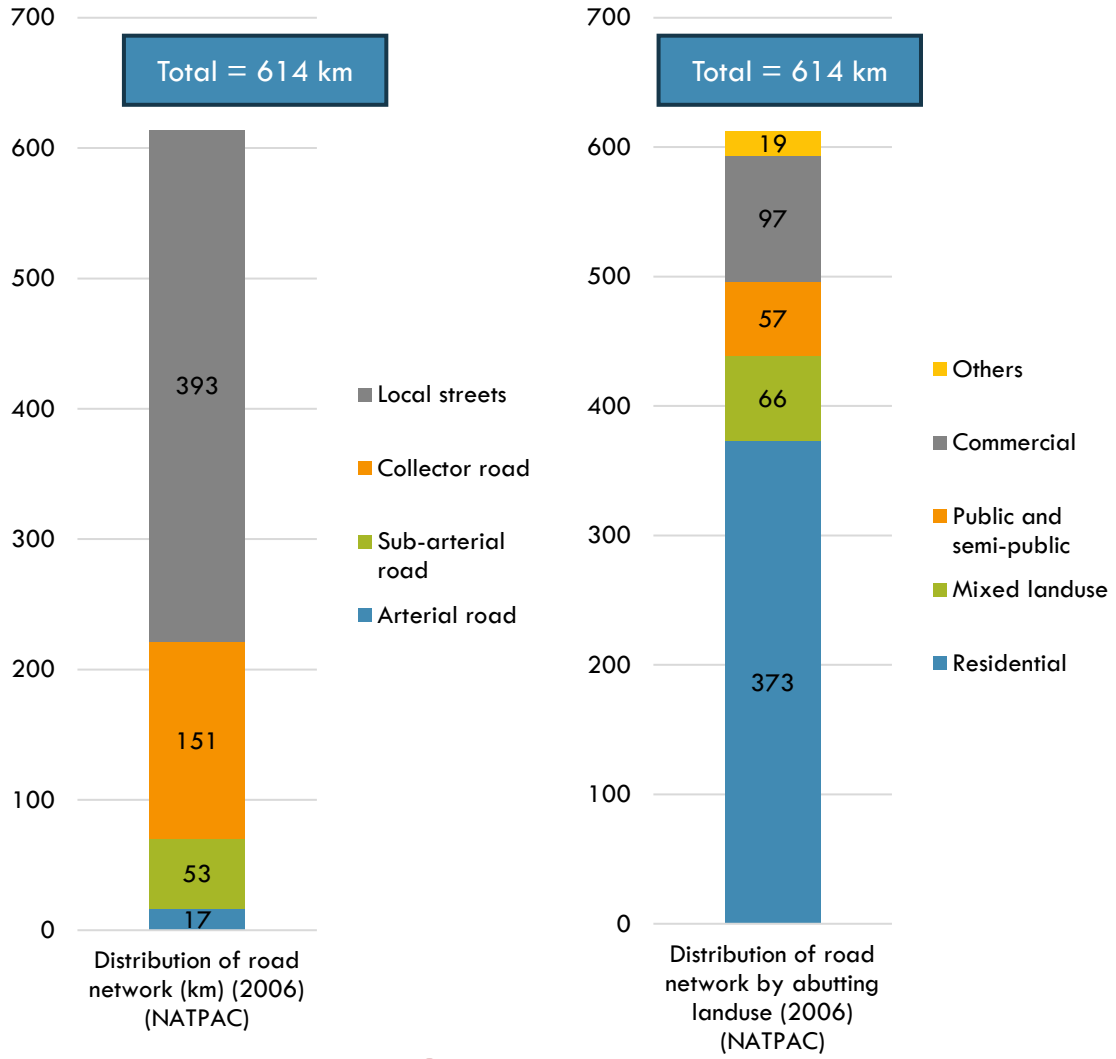


Title: Comprehensive Mobility Plan for Kochi	
Map: National Waterway - 3	

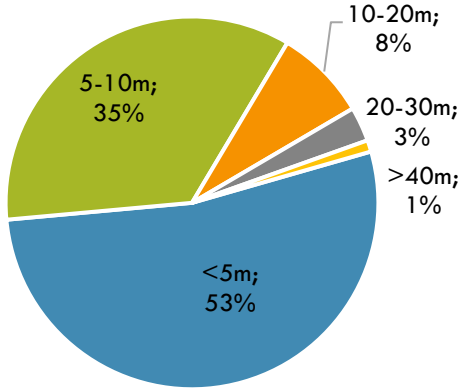
Figure 42 Water Metro Terminals & Routes – All Routes (Source: KMRL)

Source: CMP

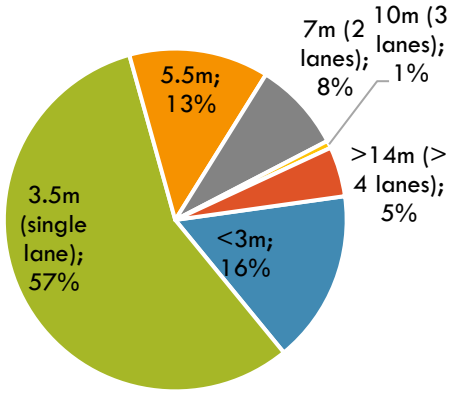
Majority of the 614 km of Kochi roads are bordered by residential areas



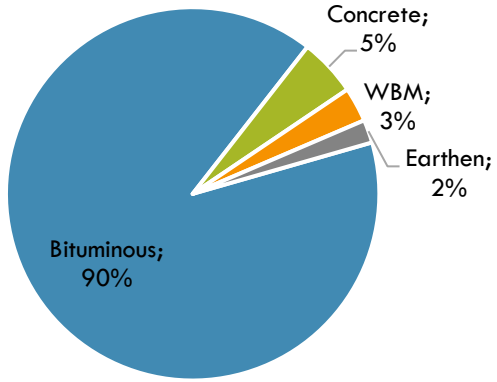
Distribution of road network based on ROW (2006) (NATPAC)



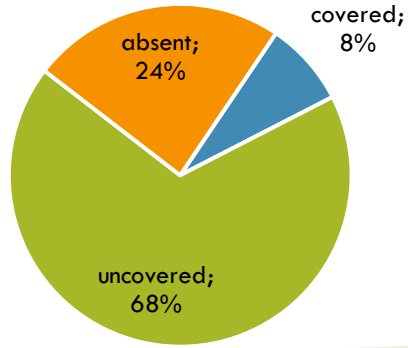
Distribution of road network based on carriageway width (2006) (NATPAC)



Distribution of road network based on surface type (2006) (NATPAC)



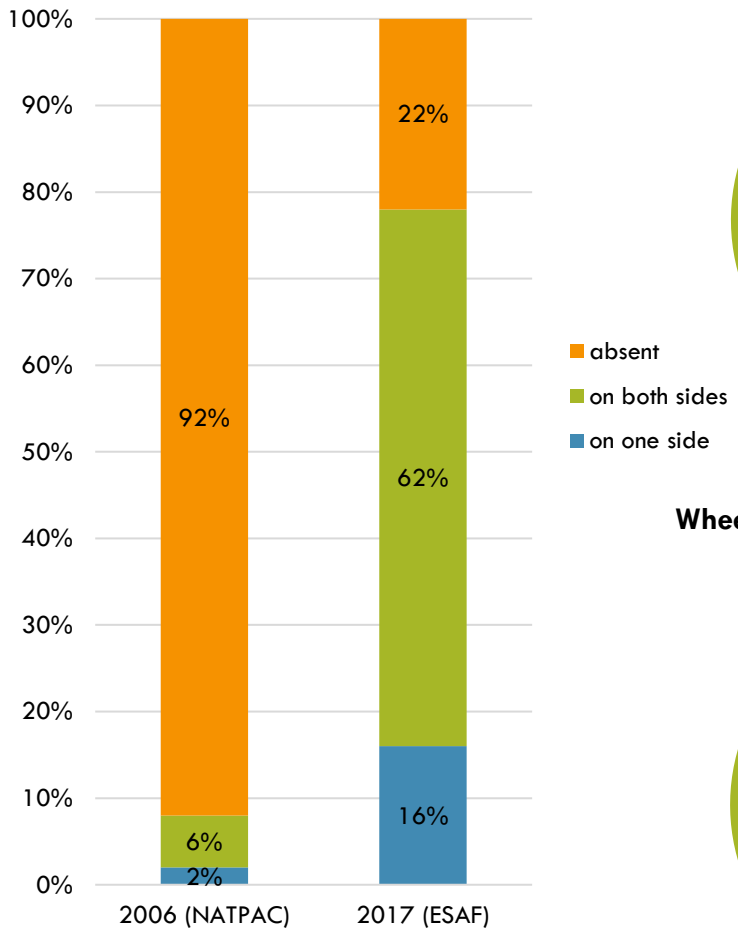
Distribution of road network based on availability of drain (2006) (NATPAC)



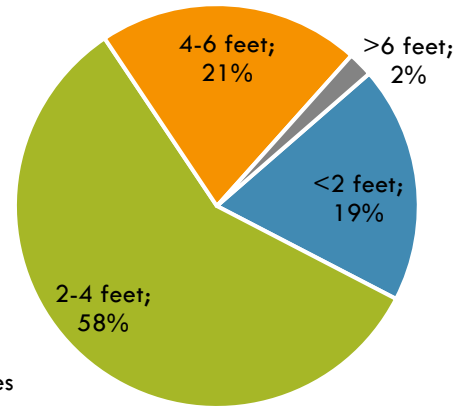
Source: As mentioned in the chart titles, axes, or legends

Footpath coverage has increased but condition is still majorly poor

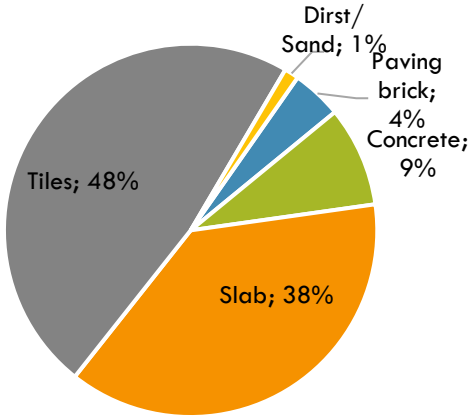
Distribution of road network based on availability of footpath



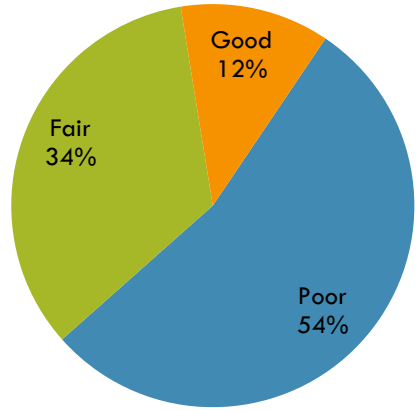
Width of footpath (2017) (ESAF)



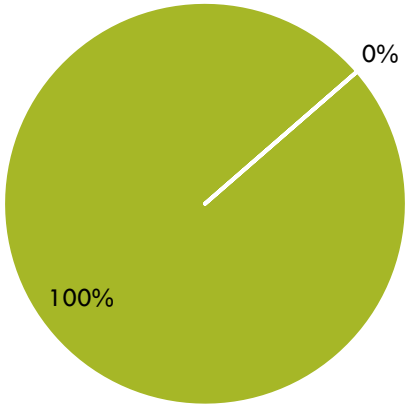
Materials used for pavement (2017) (ESAF)



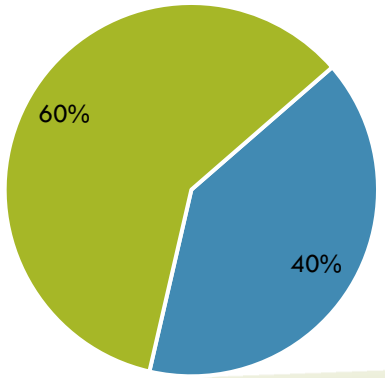
Conditions of footpath (2017) (ESAF)



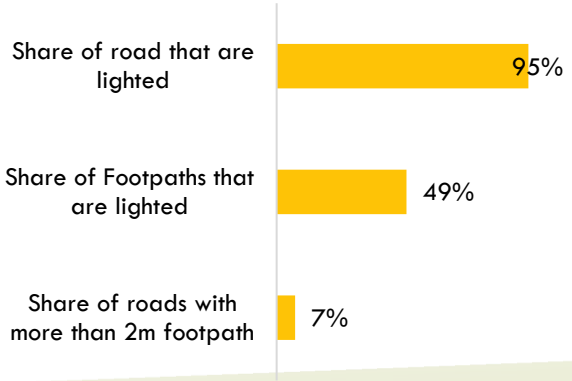
Wheelchair accessibility (2017) (ESAF)



Pedestrian perception on safety while walking at night (2017) (ESAF)



Walkbaility scenario (2023) (CMP)



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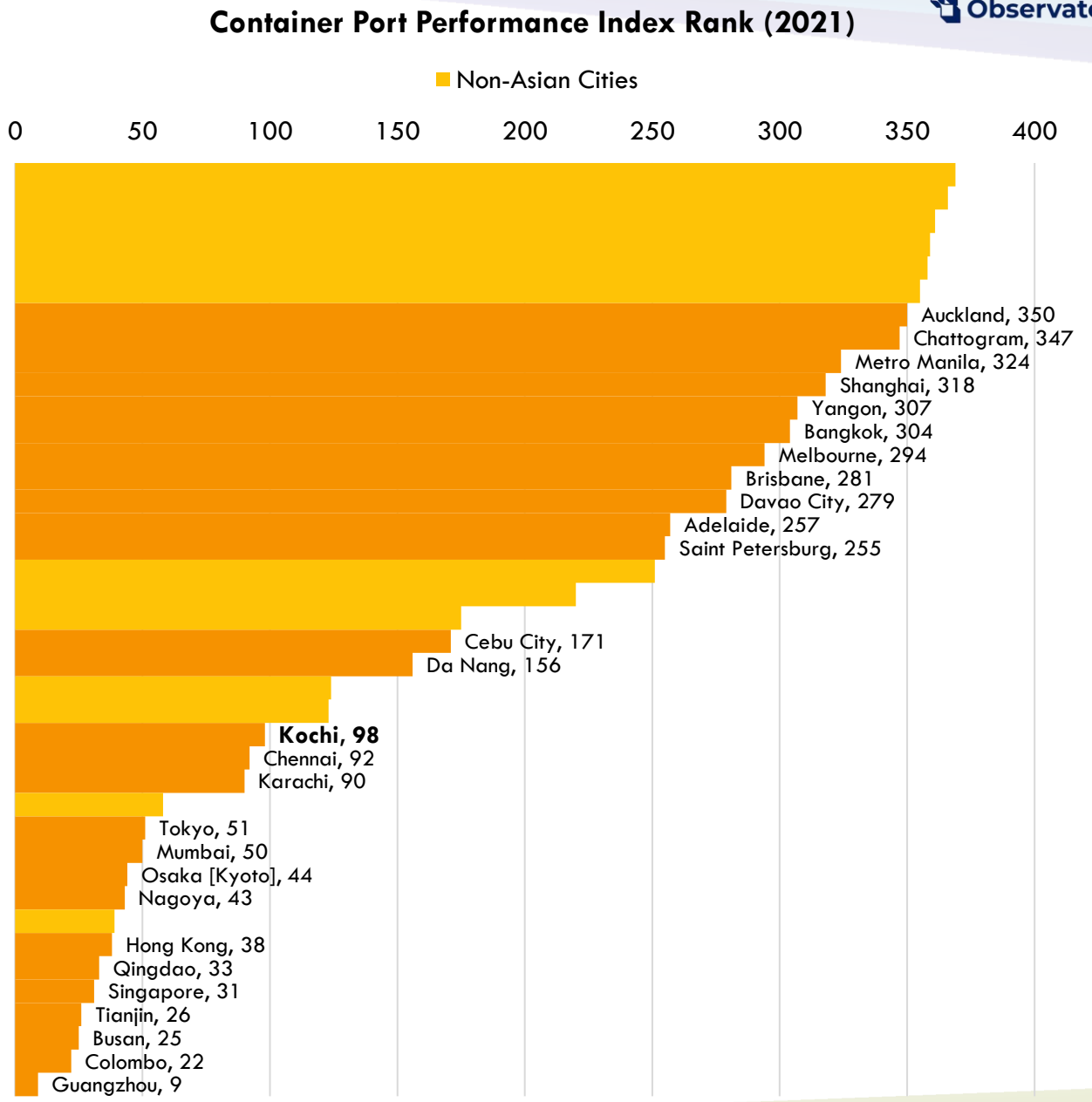
Source: As mentioned in the chart titles, axes, or legends

Container Port Performance Index

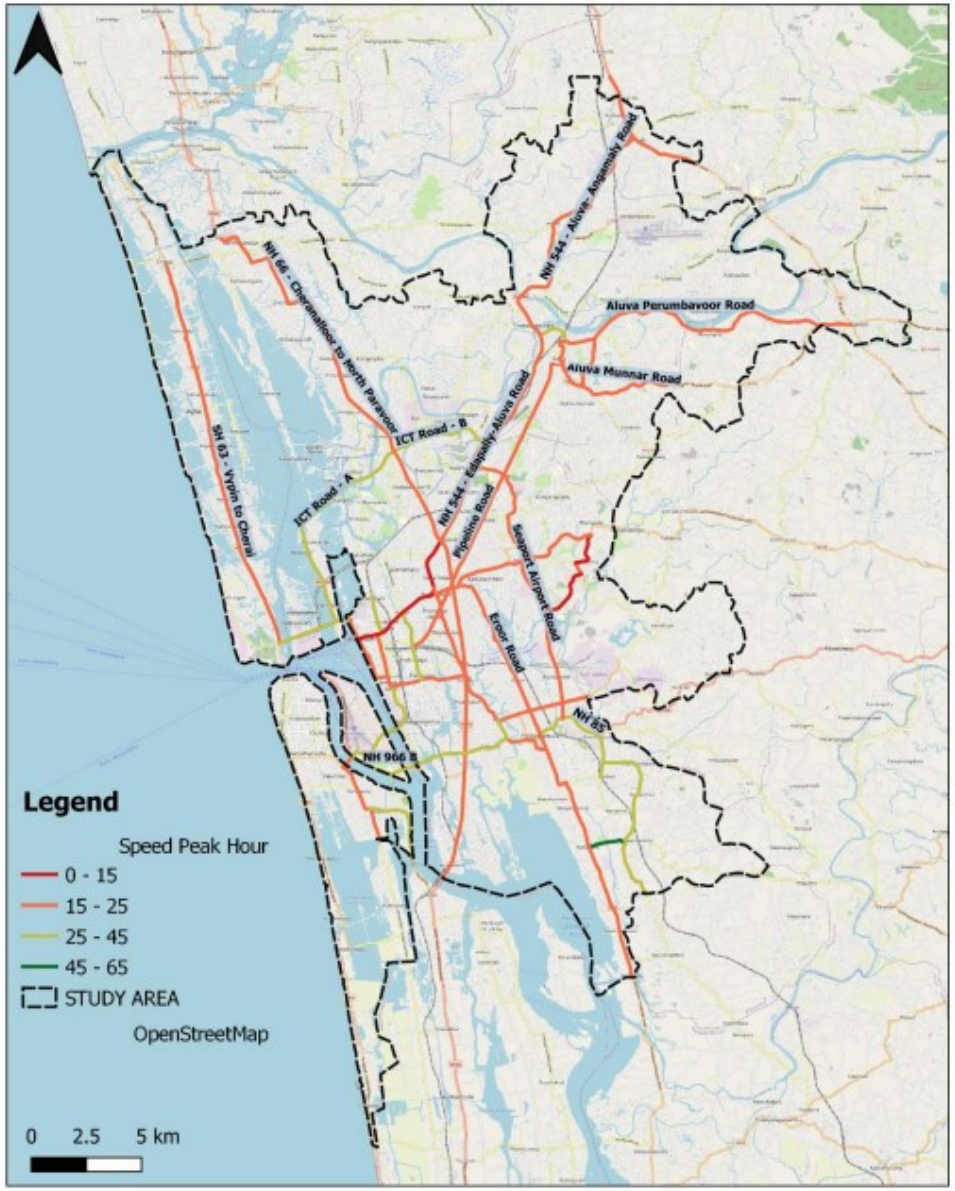
- The Container Port Performance Index (CPPI), developed by the World Bank in collaboration with S&P Global Market Intelligence, addresses the need for a reliable, consistent, and comparable measure of port performance. The CPPI 2021, which includes data from 370 ports, uses two methodological approaches—administrative and statistical—to ensure robustness. The index identifies gaps and opportunities for improvement, benefiting stakeholders from shipping lines to governments. Lower rankings indicate better performance. The CPPI aims to guide improvements in port operations, ultimately enhancing global trade efficiency and economic growth.
- According to the 2023 update, Kochi city maintains its rank at 98.
- The 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).



Sources: IBRD, IDA, WB

The average journey speed during peak hours in the Central Business District (CBD) is 19.5 kmph

- The average journey speed during peak hours in the Central Business District (CBD) is 19.5 kmph, while it is observed to be about 28 kmph in non-core area.
- The average delay of 4 minutes is observed in the study area during peak hours on major corridors. The major reason for delay is largely due to traffic and signals. Maximum delay of 14 to 15 minutes is observed on NH 544 and NH 66.



Title: Comprehensive Mobility Plan for Kochi

Map: Journey Speed for Major Roads during Peak Hour

Source: CMP

Figure 55 Journey Speed for Major Roads during Peak Hour

Proposed Transportation Network Map - 2040

(Master Plan 2040) The strategies that are formulated for the sector include:

- Development of an effective road network strategy at a regional and city level.
- Integration of Land Use and Transport sectors through concepts like Transit Oriented Development (TOD) etc.
- Reducing dependency on private vehicles and congestion caused by it through placing increased importance on Non-Motorised Transport, shared mobility and improving the efficiency of existing public transport facilities.
- Make Kochi walkable and cyclable by retrofitting existing and proposed roads to be “Healthy & Green Streets” by ensuring equitable distribution of road space to create an urban environment that is healthy & liveable.
- Ensuring Multi-Modal Integration as a key principle to be followed at all transit stations.
- Ensuring seamless movement on roads through junction improvement schemes and grade-separated facilities.
- Management of parking in Kochi
- Provide emphasis on traffic movement within the city and delineate efficient traffic engineering strategies
- Formulation of a Freight management plan
- Incorporation of technology for various uses such as smart parking, real-time traffic management etc.

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Vehicle composition

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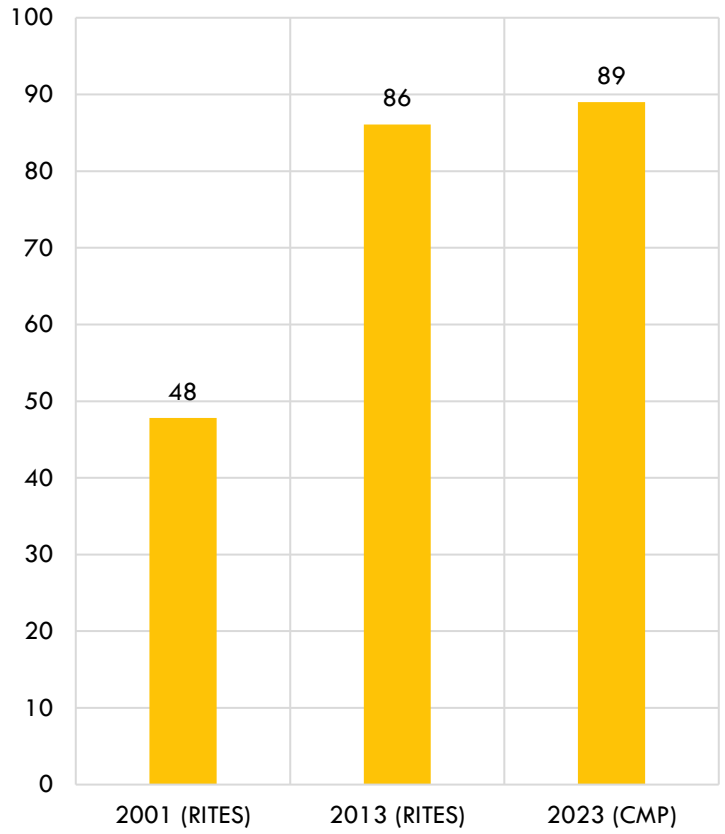
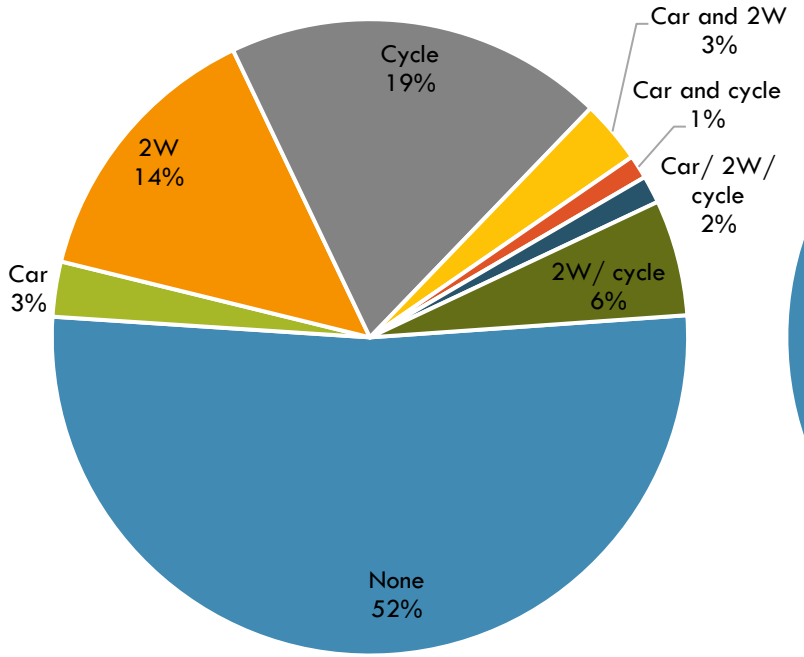
Motor vehicle ownership has increased with majority owning 2W

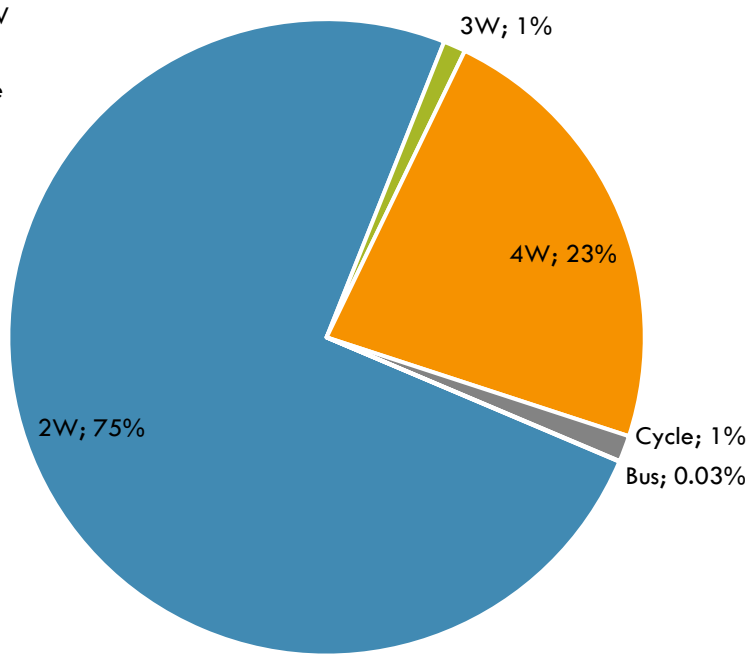
Motor vehicle ownership (%) (share of households owning motor vehicle)



Household vehicle ownership (2001) (RITES)



Household vehicle ownership (2023) (CMP)

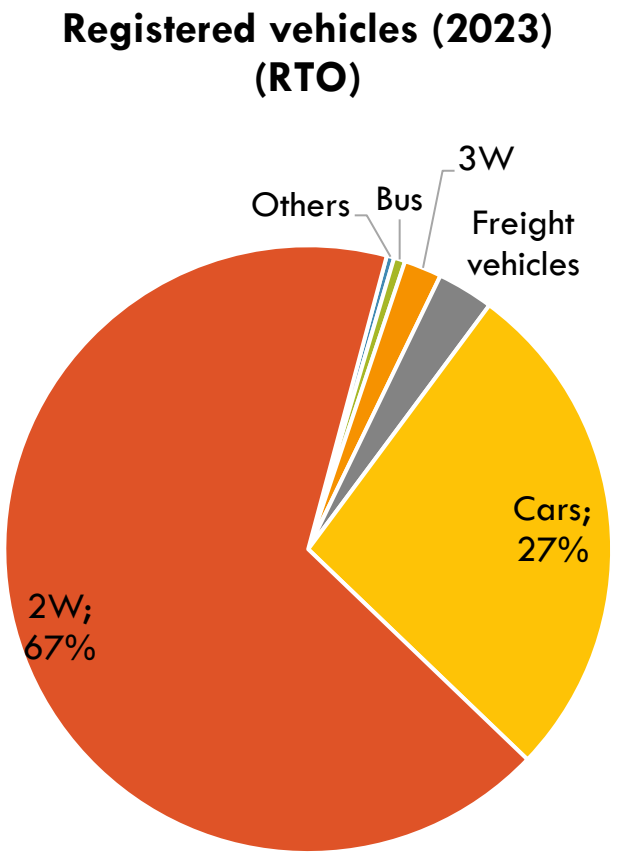


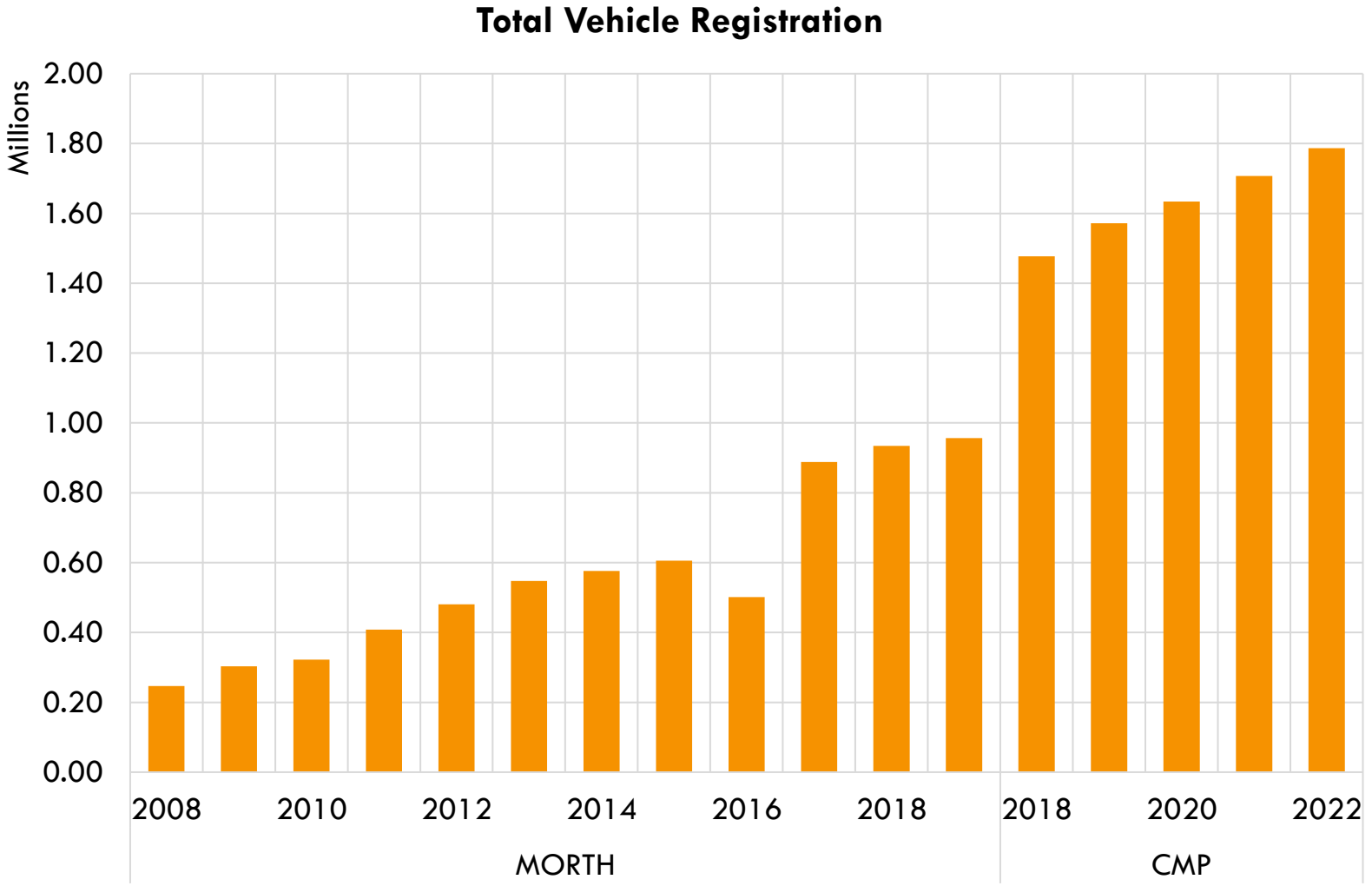
- On an average 1.2 vehicles are owned in every household.
- It is observed that majority of the vehicles in the study area run on petrol owing to 90% of the total composition.
- 89% of the intermediate public transport (IPT) vehicles surveyed are self-owned, while only 11% are rented or hired and mostly consist of 3-seaters (89.4%).

2W – Two-wheeler; 3W – Three-wheeler; 4W – Four-wheeler

Source: As mentioned in the chart titles, axes, or legends

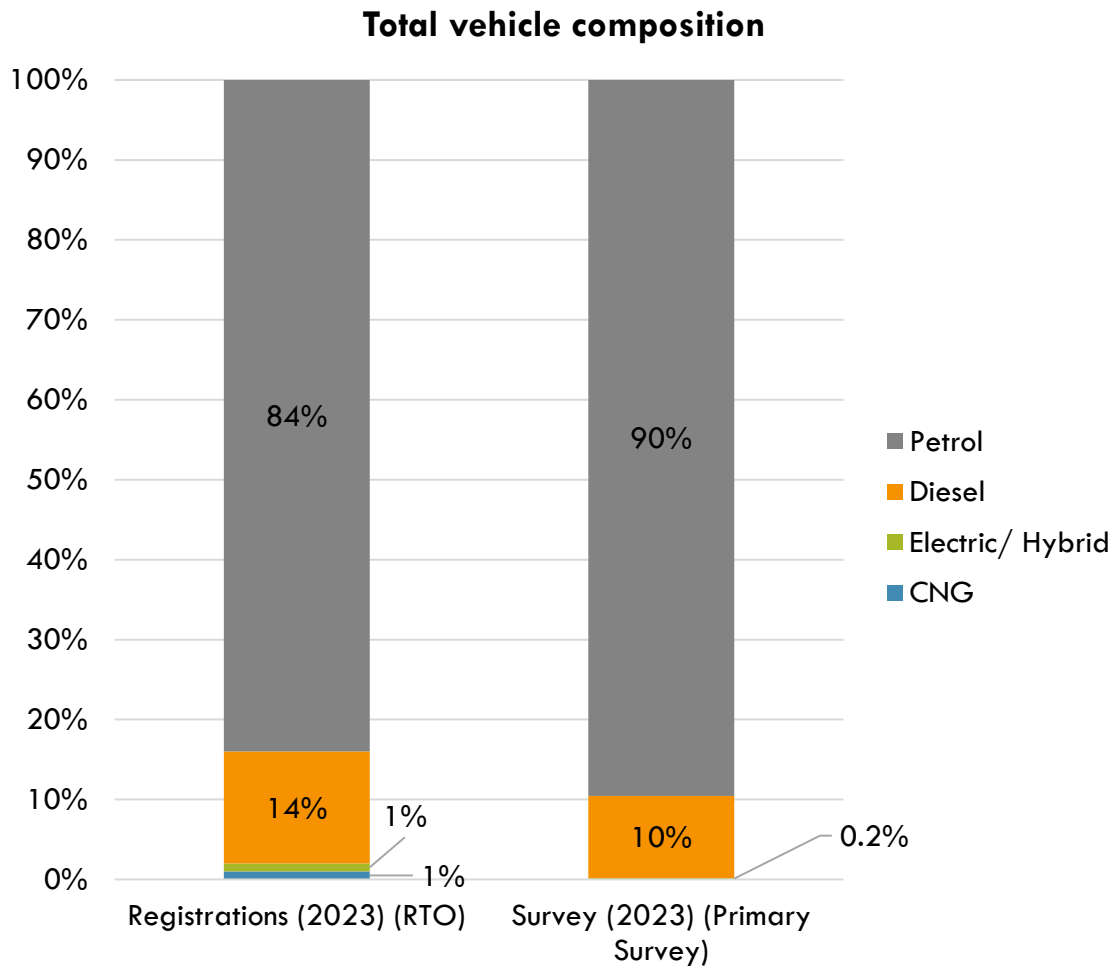
Total registered vehicles have increased annually at about 5% in the last 5 years, highest share is of 2W

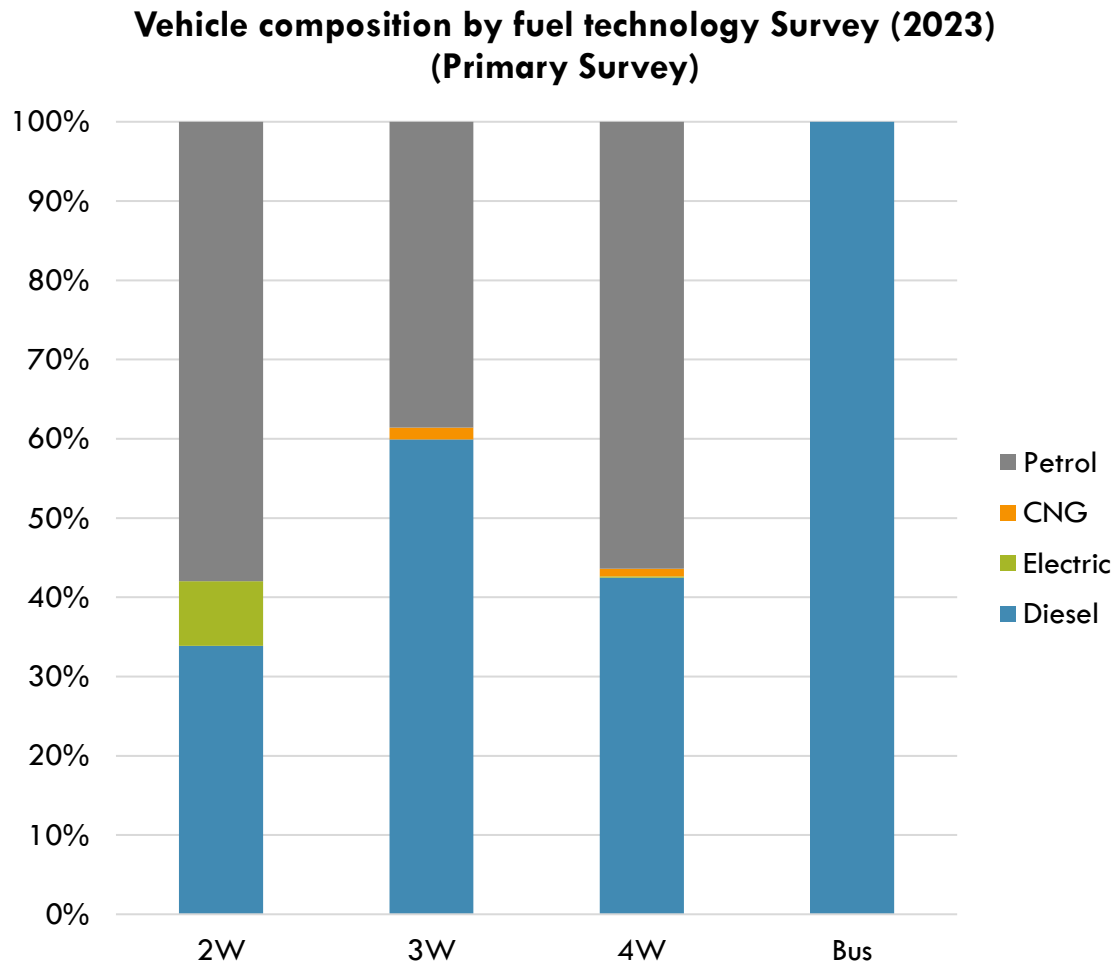




2W – Two-wheeler; 3W – Three-wheeler; 4W – Four-wheeler
Source: As mentioned in the chart titles, axes, or legends

Overall vehicle composition by fuel type is dominated by Gasoline (petrol)





2W – Two-wheeler; 3W – Three-wheeler; 4W – Four-wheeler

Source: As mentioned in the chart titles, axes, or legends

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Parking

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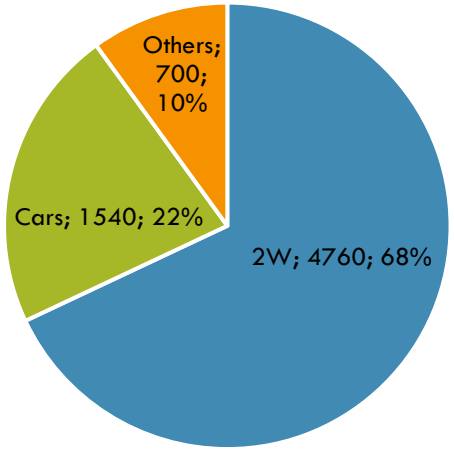
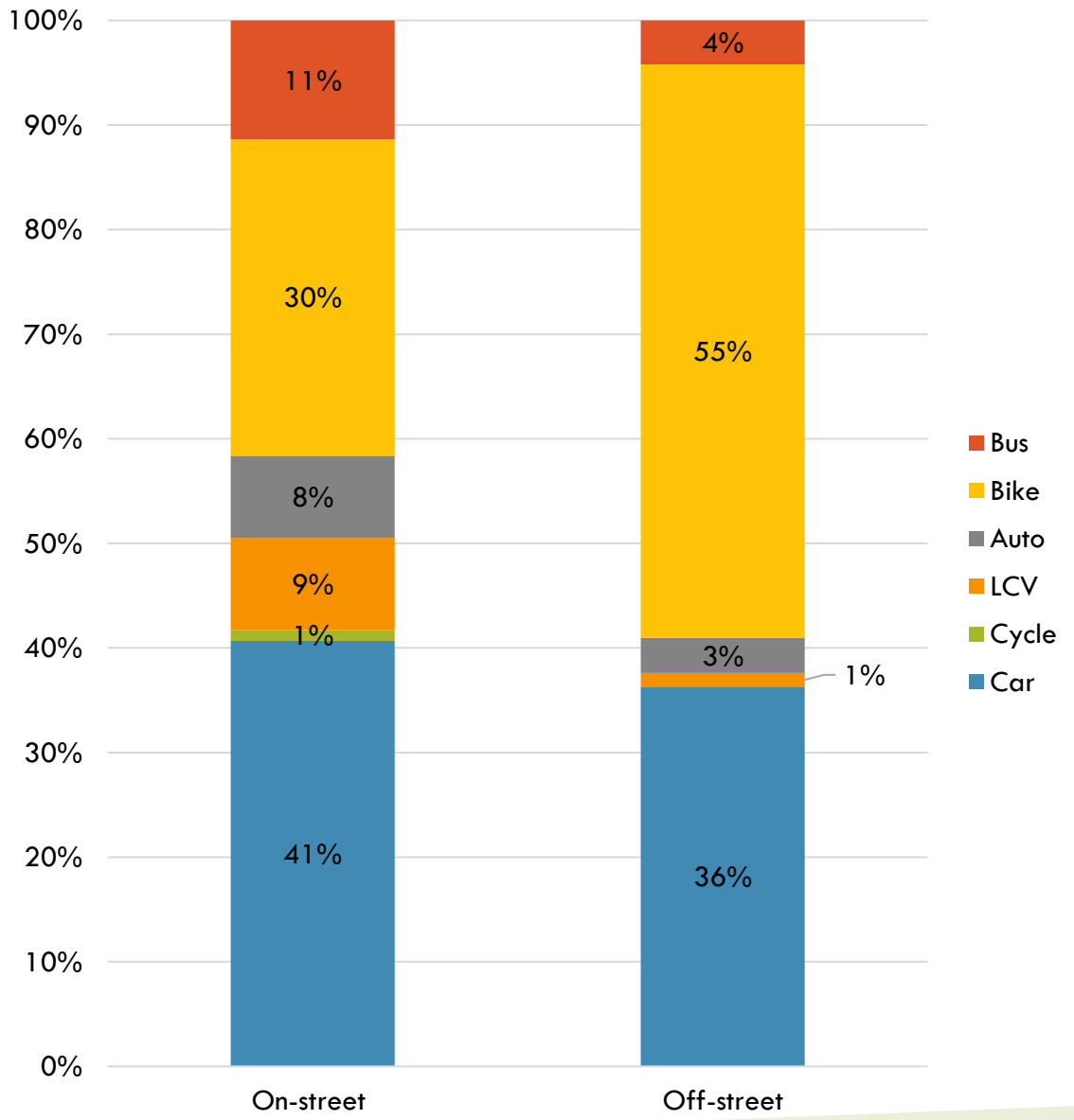
Parking accumulation

Parking accumulation (2019) (NATPAC)



- Two wheelers constituting 74% of the total had a predominate influence over the duration of parking at different intervals. Maximum parking accumulation of two-wheelers was seen at lesser than 30 minutes and 30 to 60 minute intervals. (Master plan 2040)
- The analysis indicates that about 59% of the major network has on-street parking or encroachments hindering the road space allocated for traffic flow and pedestrian movement. (CMP)

Parked vehicle composition (2023) (Primary Survey)



2W – Two wheeler; LCV – Light Commercial Vehicle

Source: As mentioned in the chart titles, axes, or legends

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Accessibility & public transit

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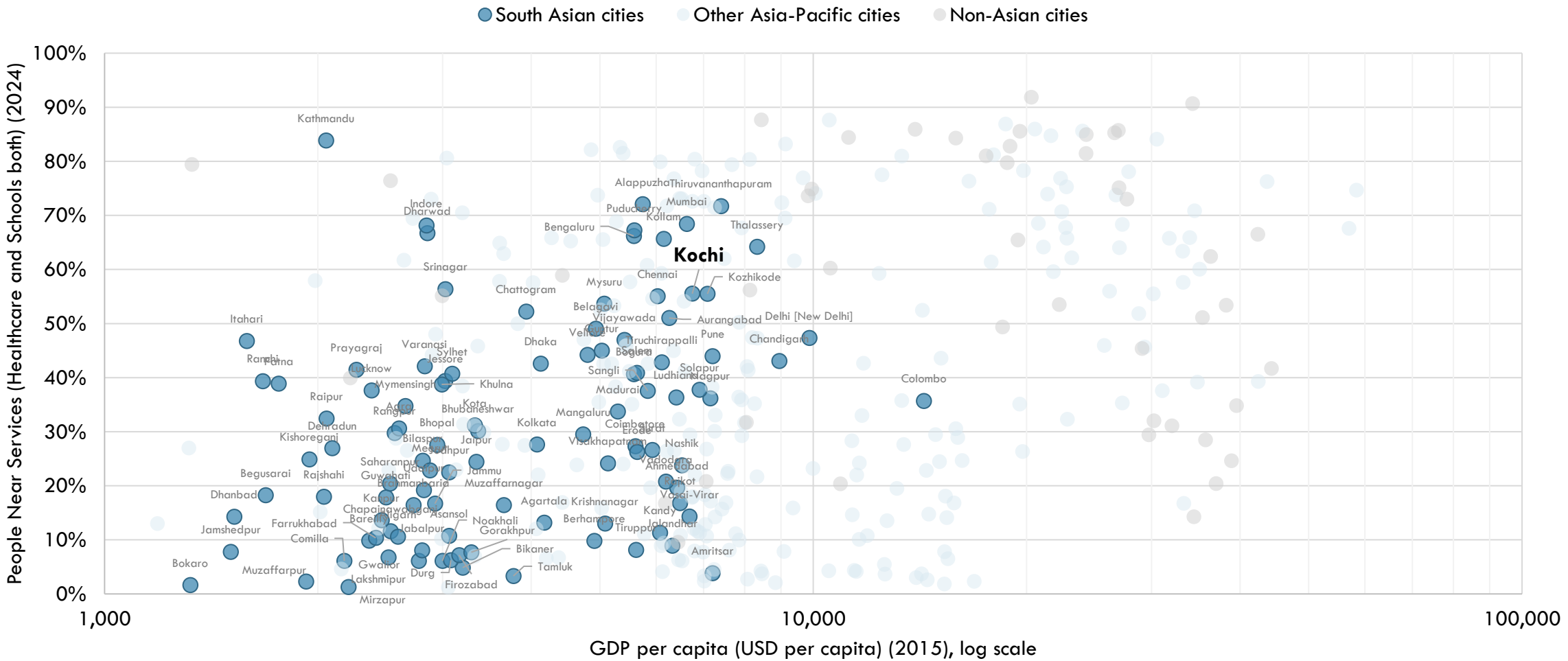
54% of Kochi population is estimated to live within 1km walk of both healthcare and educational services



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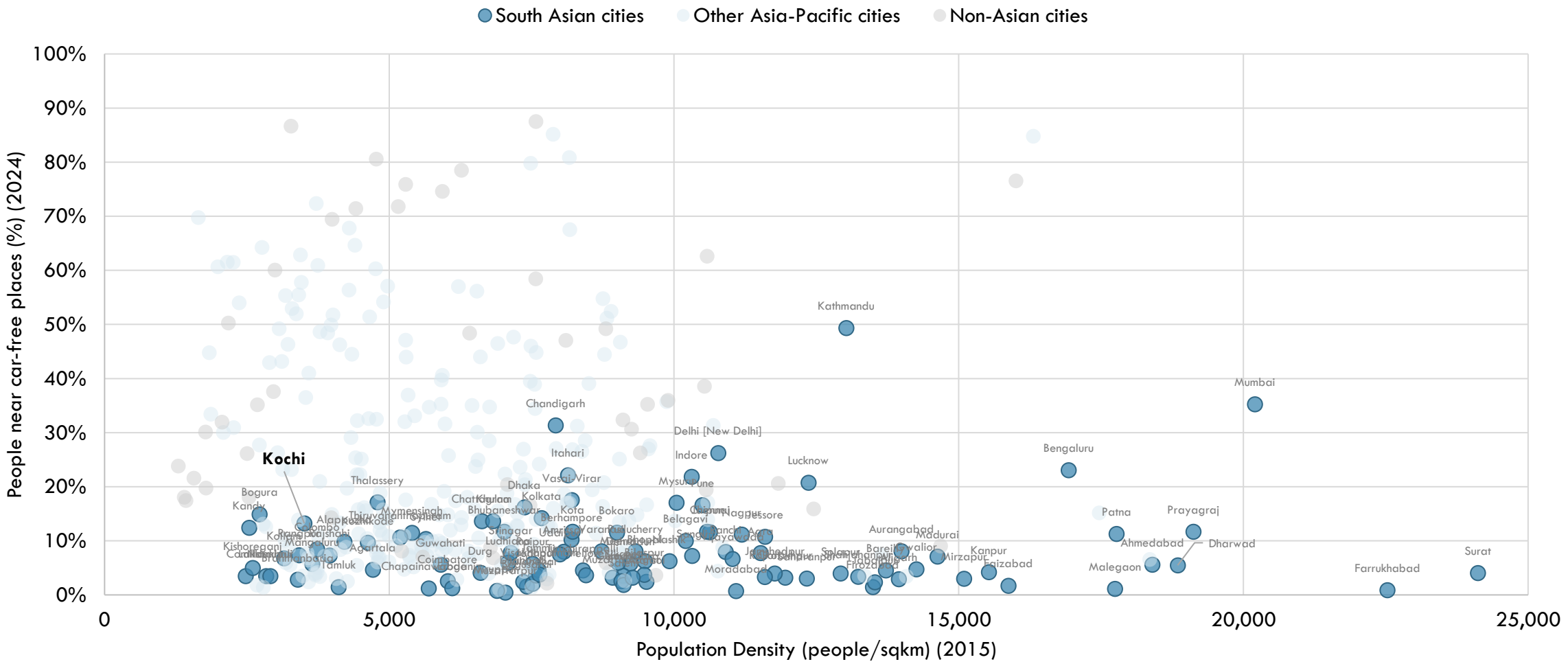
Source: ITDP

Only 13% of the Kochi population live near car-free places



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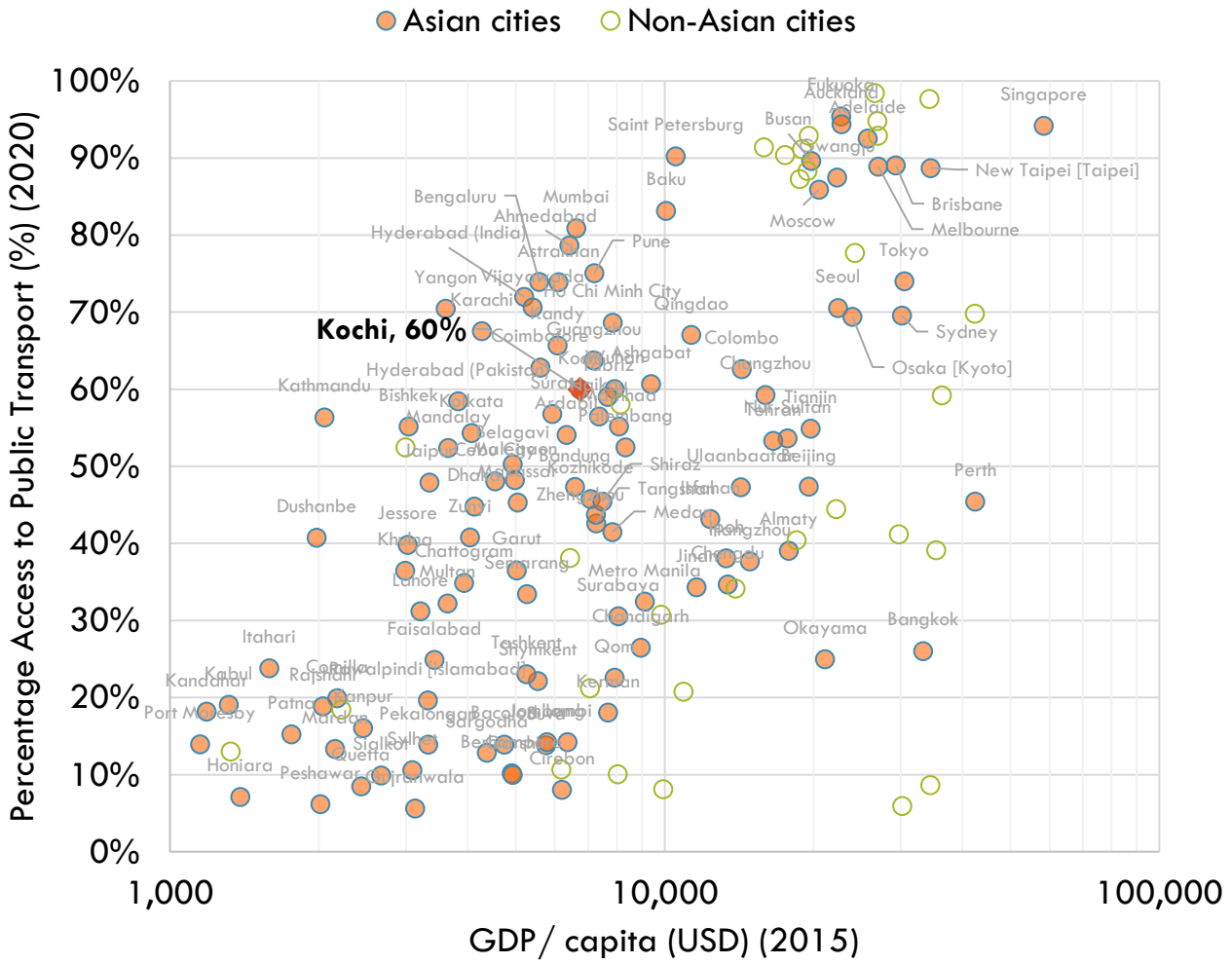
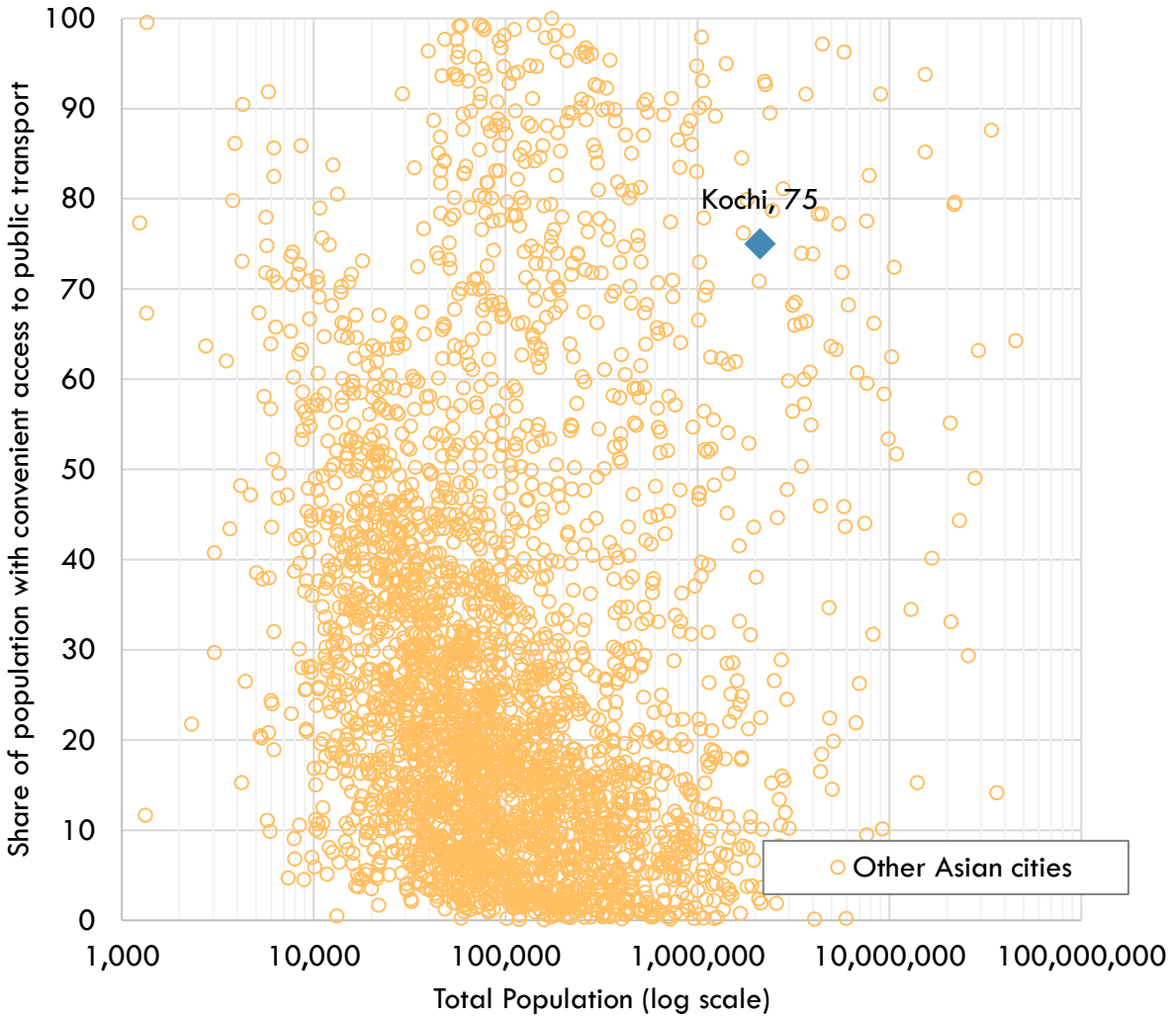
Source: ITDP

60%-75% of the Kochi's population has decent public transport access

- The household's access to the nearest formal or informal public transit stop is 0.7 km





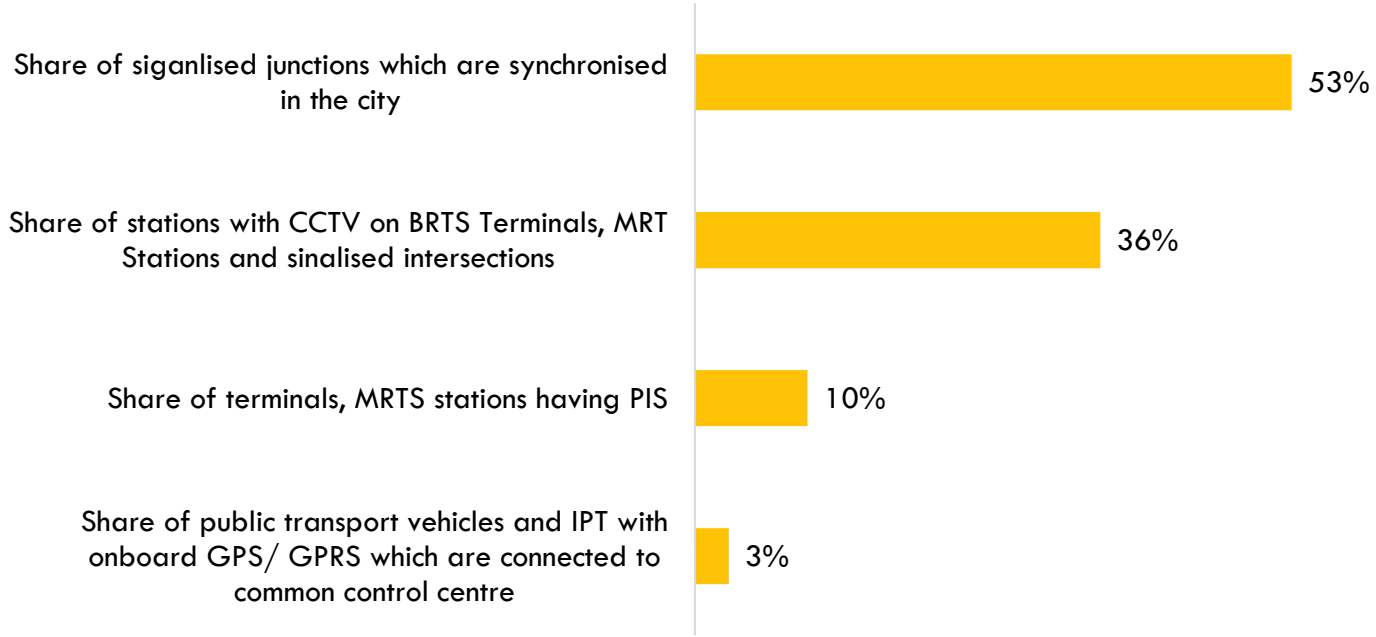
Source: UN-Habitat; For Kochi, the data is sourced from CMP and is for 2023

Source: Visualization by the Asian Transport Outlook (ATO) using data from CIESIN Columbia University (2023)

Public transport accessibility- 2019

- As of 2019, from the analysis, it was found that the percentage of area within a convenient distance of 500m is 86%. (CMP)

ITS scenario for the Public transport system (2023) (CMP)



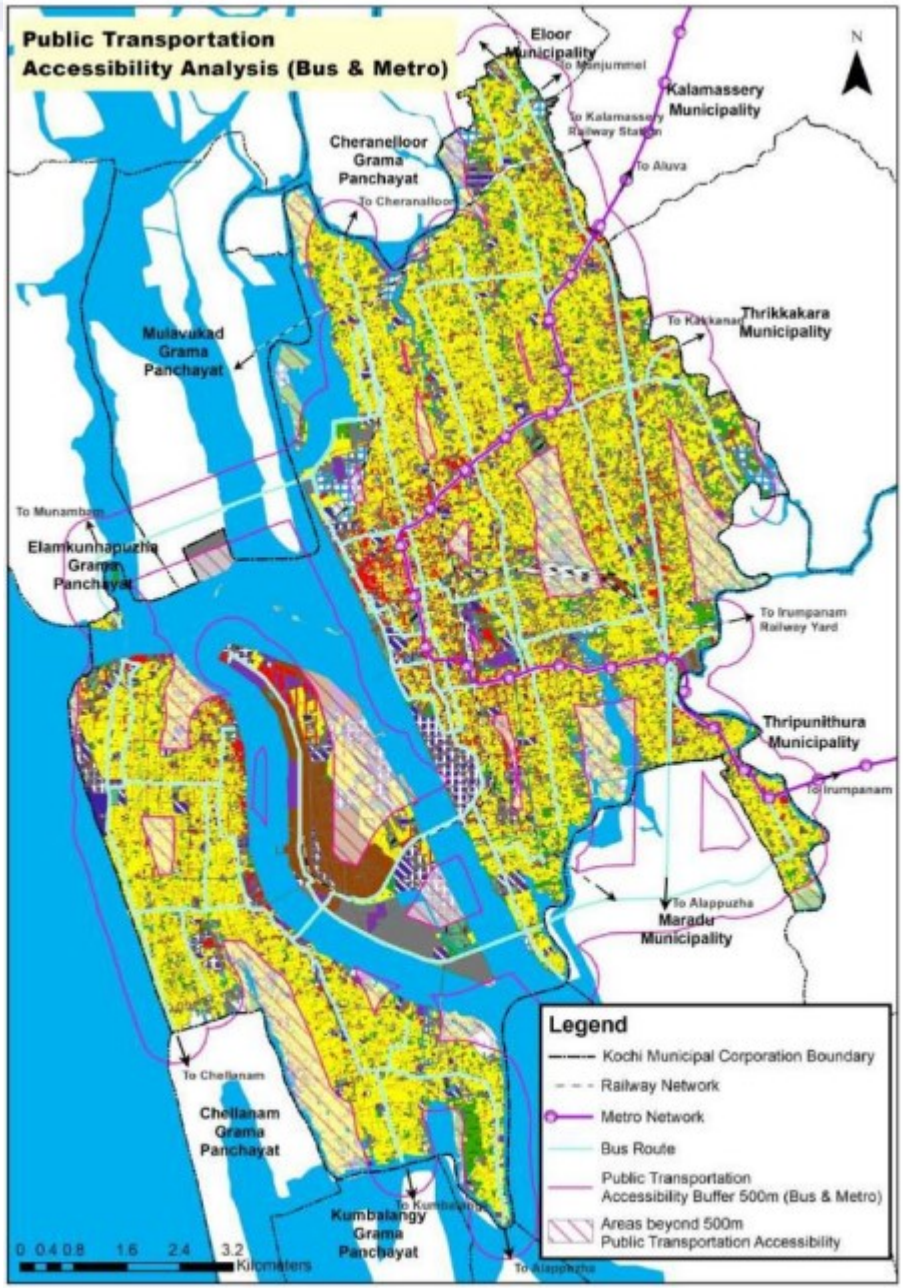


Figure 8:20 Public Transport Accessibility (Bus and Metro)
Source: Primary surveys, NATPAC surveys

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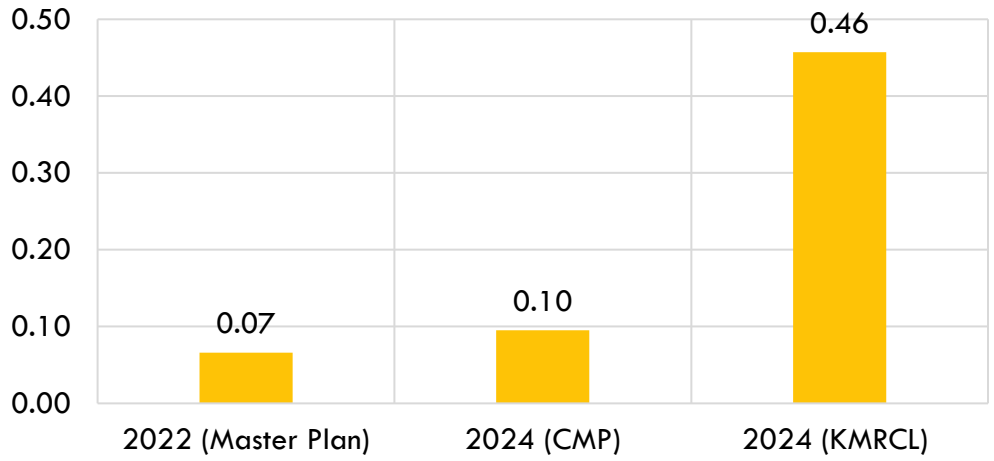
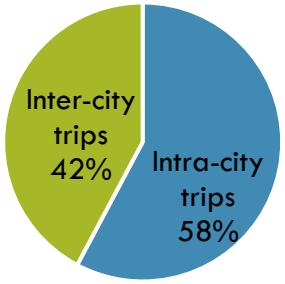
Metro ridership is on the rise

Metro ridership (mln. count/ day)

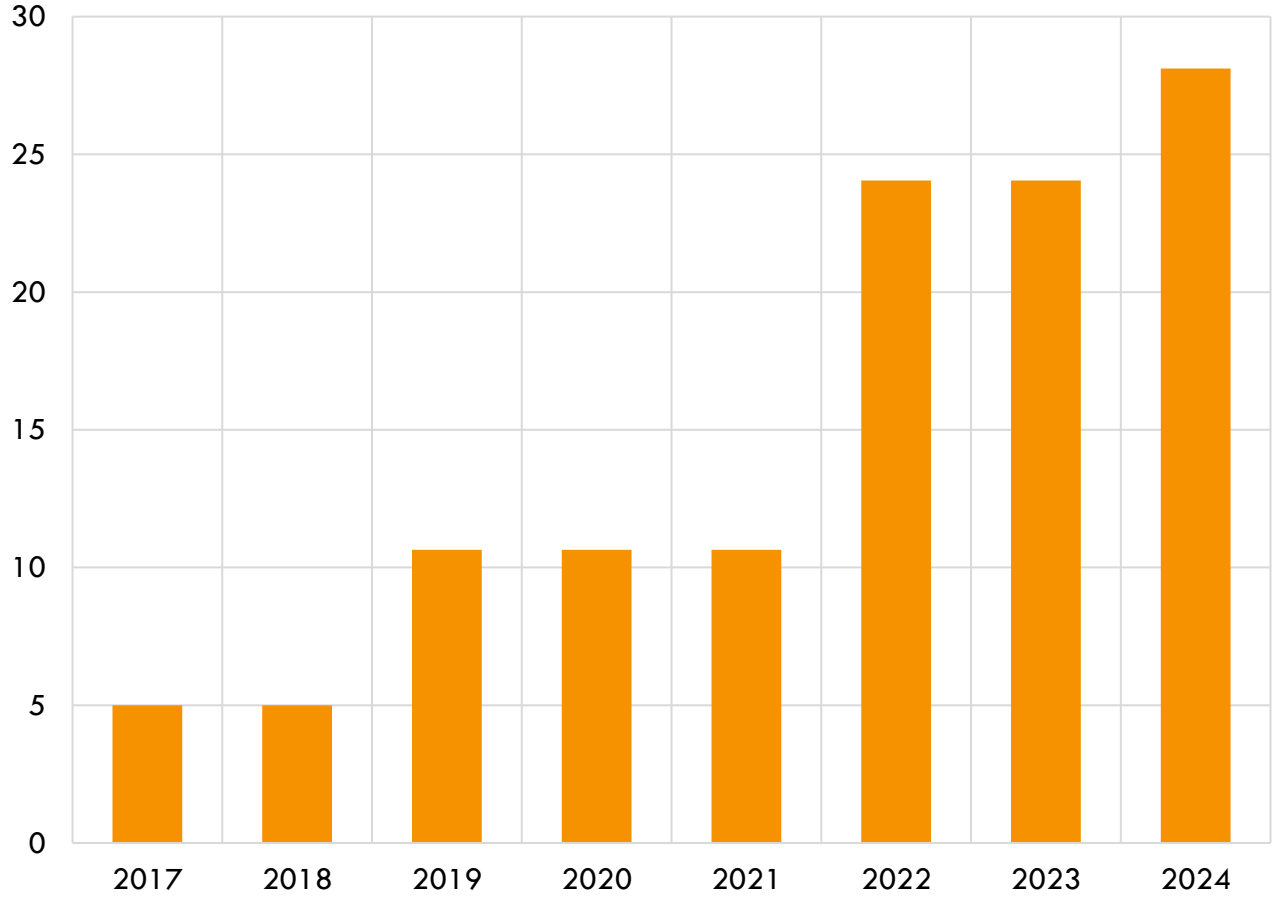


- Metro system has been operational since 2017, with 1 elevated line having a length of 27.31 km and 24 metro stations from Aluva to SN Junction. The 1.2 km length of Phase 1B from SN Junction to Thripunithura is made operational in 2024. The current operation length of metro is about 28.12km.

Metro passengers - tripwise distribution (2022) (Master Plan)

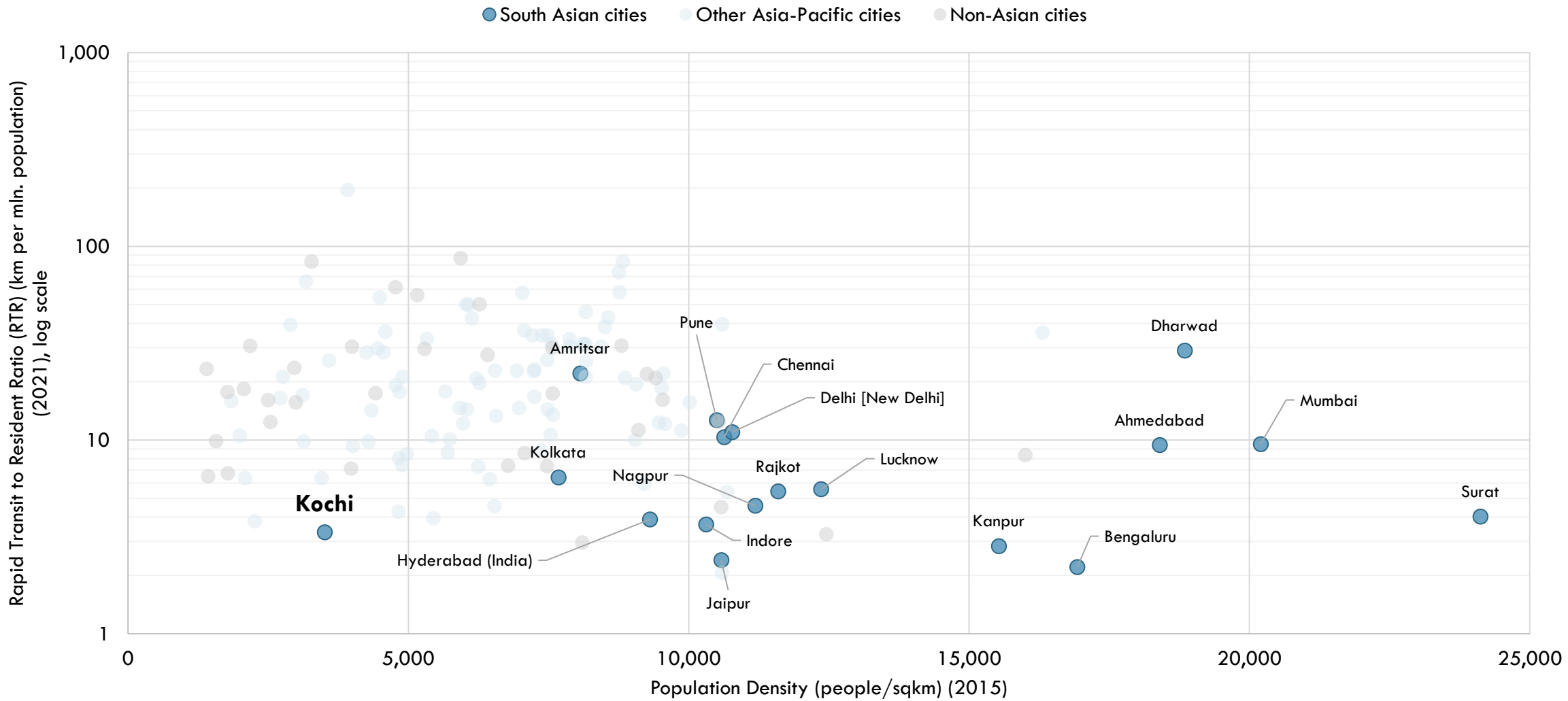


Metro route kms



Source: 2017-2021 – ITDP; 2022 – 2024 – City official statistics

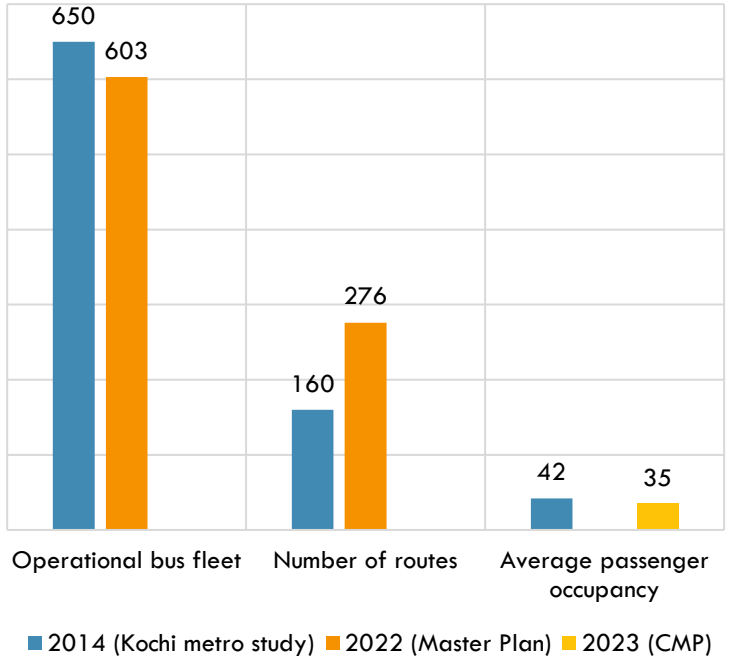
Kochi has a low rapid transit to resident ratio at about 3km per million population compared to majority of the Indian cities.



Source: ITDP

Operational bus fleet and average occupancy have reduced

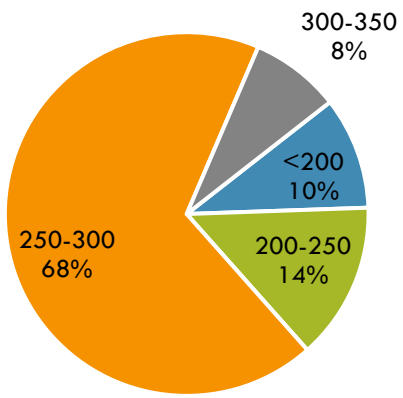
Bus Transport statistics



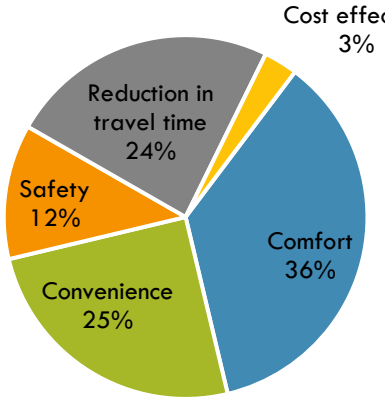
CMP

- The primary survey assessment shows a daily footfall of nearly 16 thousand passengers at the major bus stops
- Percent of public transport fleet in compliance with Indian emissions standards 45%
- The average waiting time for bus services is observed to 6 minutes. The longest waiting time is observed for buses with a wait time of 35 minutes.

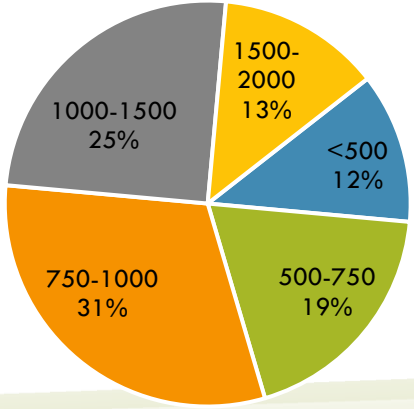
Distribution of pvt buses by kilometer operated per day (2006) (NATPAC)



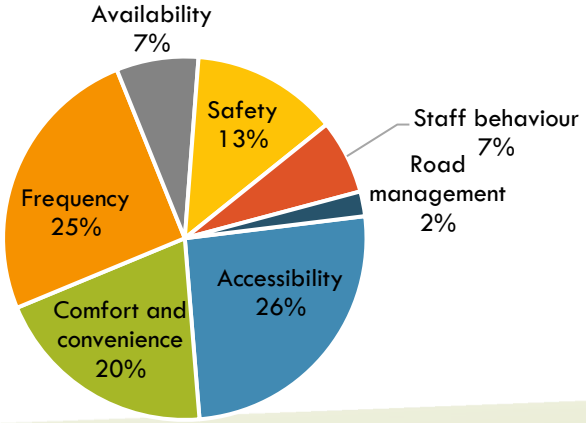
Reasons for shifting from public to private transport (2018) (CPPR)



Distribution of pvt buses by passenger carried per day (2006) (NATPAC)



Suggested measures to improve public transport (2018) (CPPR)

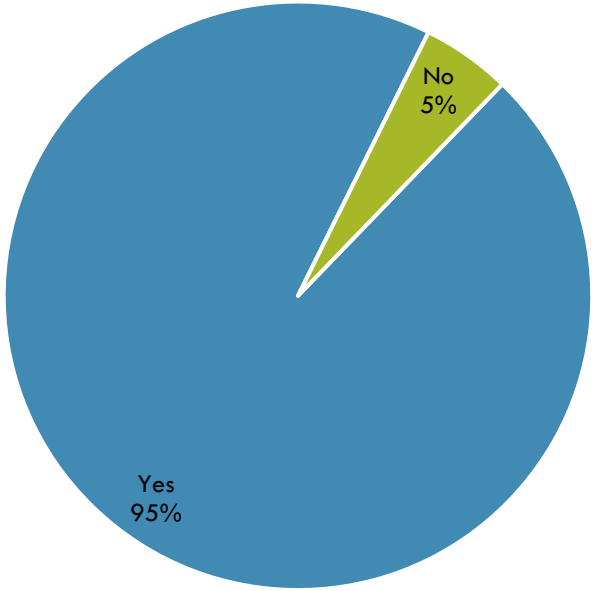


Source: As mentioned in the chart titles, axes, or legends

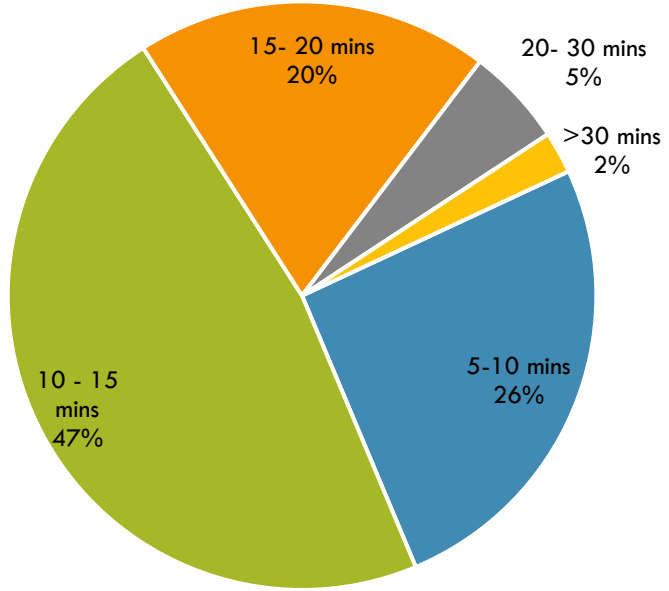
Kochi water metro

- Kochi Metro Rail Limited has implemented an integrated water transport network in Greater Kochi, first phase, (Vyttila- Infopark) of which was completed in October 2021. Water Metro Services are operational along five corridors – High Court to Vypeen & Vyttila to Kakkanad, High Court-Bolgatty-Mulavukad North-South Chittoor and South Chittoor-Eloor-Cheranalloor. The full-fledged operation of the water metro project is expected to have better waterway connectivity along the western coastline in the city. The boats with passenger capacity of 50 and 100, will be operating at an optimal speed of about 15 kilometres per hour, with the potential to increase up to 22 kilometres per hour. No of boat jetties in the system: 38; Route Length: 76 km; No of boats, Phase 1: 78. (CMP)
- The Water Metro Project for Kochi envisages to provide connectivity across ten island communities across a 76 km route network. 38 jetties are proposed out of which 18 are proposed to be developed as major jetties or main boat hubs while the remaining 20 jetties shall be developed as minor jetties for water transit services. (Master plan 2040)

Willingness to shift to an improved water transport system



Willingness to shift in case of time savings



Source: https://cdn-dev.watermetro.co.in/01_DPR_WM_1_b782f1566c.pdf

Inferences from Origin-Destination cum Opinion Survey The following observations were drawn from the Origin-Destination cum Opinion Surveys conducted at the selected 15 jetty locations.

1. The average monthly income of the ferry passengers is observed to be Rs 12,500/-

2. The average monthly expenditure on transport by ferry passengers is observed to be Rs 625/-, which is 5% of their average monthly income.

3. 41% of the ferry passengers do not own vehicles, as they mainly constitute of students, unemployed, housewives, retired people and others.

4. 81.36% of the ferry passengers use the ferry services operated in Kochi on a daily basis.

5. 55.56% of the passengers use the ferry system exclusively for work and business purposes.

6. As for the access trips, it is observed that 53.05% of the ferry passengers access jetty locations on foot, followed by 37.63% who use the public transport.

7. The average length of an access trip is 4 km, the average time taken for an access trip is 17.5 minutes and the average trip cost is Rs 7.5/-.

8. As for the Line Haul trips, it was observed that the average trip length is 4 km, as majority of these trips are between opposite ends of the canal such as Pizhala and Kothad, Moolampilly and South Chittoor etc.

9. The average time taken for a Line haul trip is 25 minutes and the trip costs Rs 7.5/-.

10. As for the egress trips, it is observed that 53.76% of the ferry passengers disperse from the jetty locations on foot, followed by 36.72% by public transport.

11. The average trip length for the egress trips is 2.5 km, the average trip time for an egress trip is 17.5 minutes, and the average trip cost is Rs 7.5/-.

12. Majority of the ferry passengers use the public transport (bus) as an alternate mode of transport. They use the alternate modes primarily due to the irregular operations of the ferry systems and lack of proper access to the jetty locations being the major reasons, followed by easily available modes for emergency purposes and personal uses.

13. It was also observed from the surveys that 60.57% of the existing passengers are willing to pay 10% more than the current fares to access a better and improved ferry transport system.

14. Major Origin-Destination Pattern: Based on the Origin Destination Survey conducted at the Jetty Locations, it was observed that the maximum movements were observed between Mattancherry – Fort Kochi, Ernakulam-Wellington, Ernakulam-Fort Kochi, Thevara-Nettor etc.

Source: https://cdn-dev.watermetro.co.in/01_DPR_WM_1_b782f1566c.pdf

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Transport pollutants

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Kochi is estimated to emit 133 grams of transport PM2.5 per year per capita

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Source: GHS

Kochi is estimated to emit 85 kilograms of transport CO2 per year per capita

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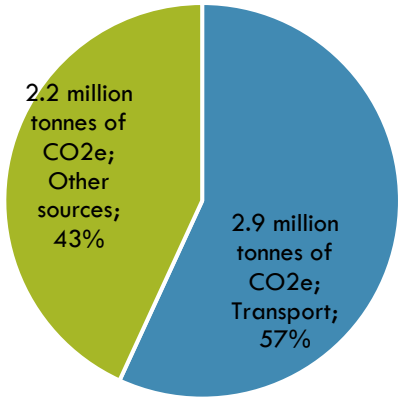
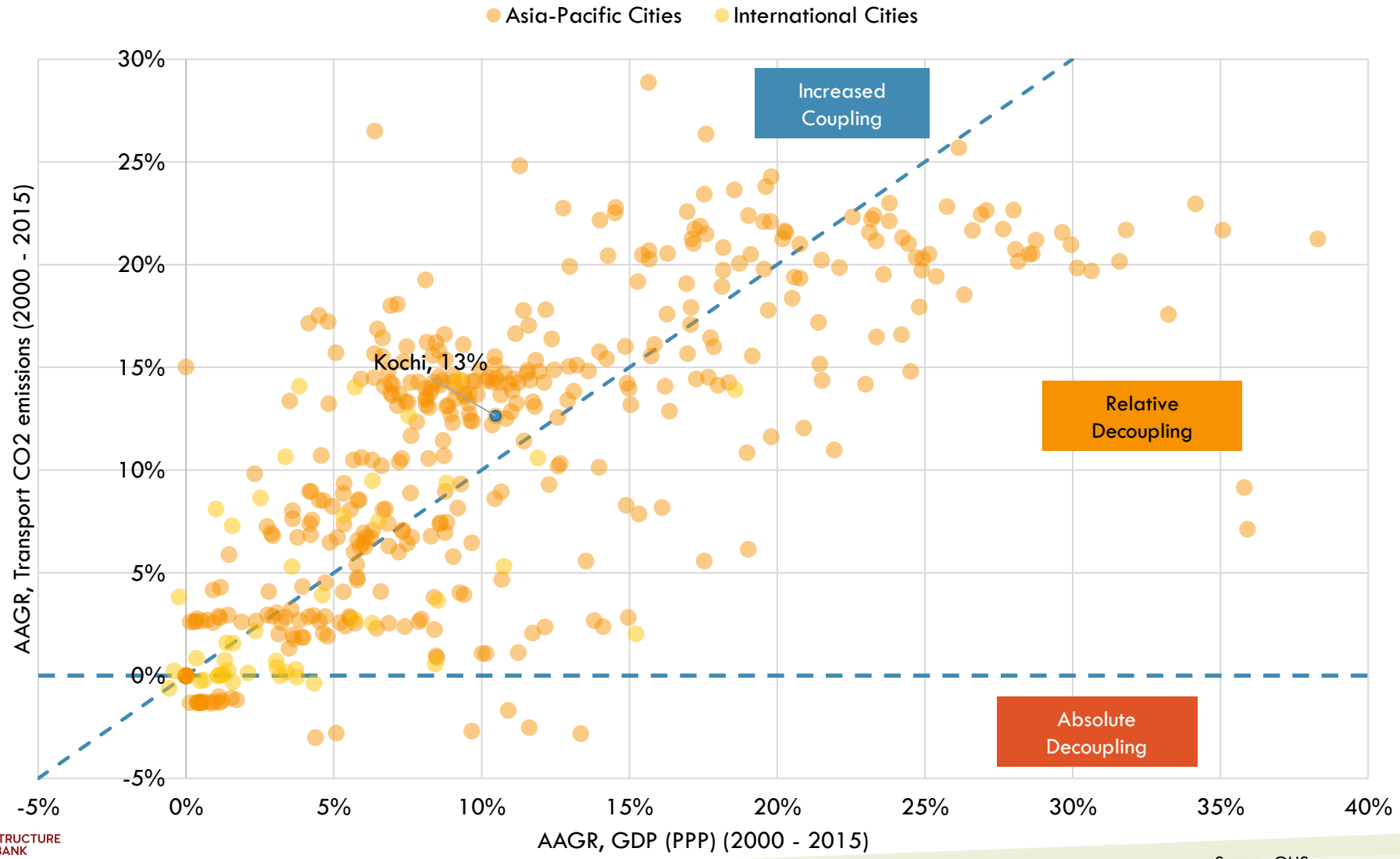
Source: GHS

Kochi transport CO2 emissions are relatively coupling with the GDP

Share of GHG emissions (2013) (ICLEI)





Source: GHS

Asian Transport Observatory

Road safety

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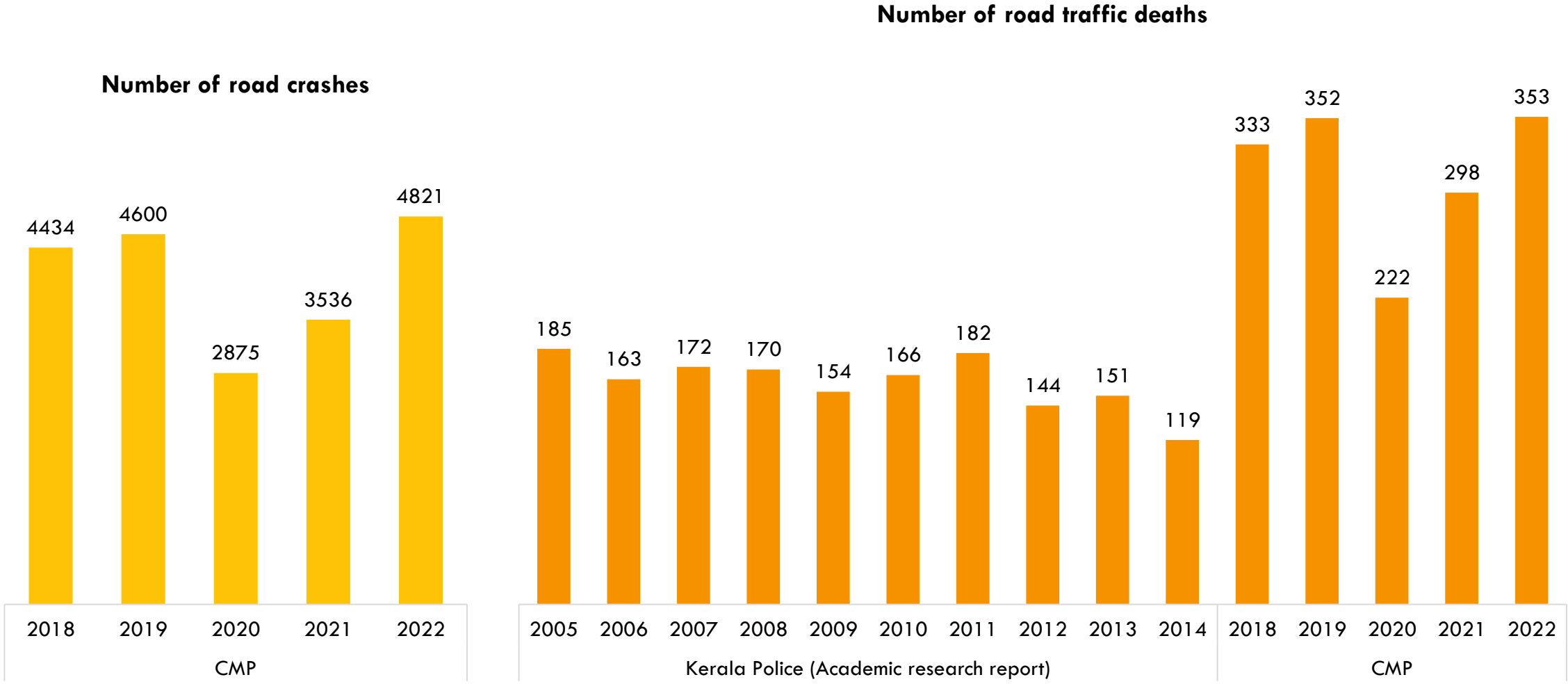
Road traffic crashes and resultant deaths have increased in the last 3 years (2020 – 2022)



Source: As mentioned in the chart titles, axes, or legends

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Institutional structure

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Institutional framework

- (CMP) Following is the list of departments and Organizations involved in urban affairs and urban transport in Kochi.
  - Kochi Municipal Corporation (KMC)
  - Greater Cochin Development Authority (GCDA)
  - Goshree Islands Development Authority (GIDA)
  - Kochi Metro Rail Limited (KMRL)
  - Kochi Metropolitan Transport Authority (KMTA)
  - Cochin Smart Mission Limited (CSML)
  - Local Self Government Department (LSGD)
  - State Urban Development Department
  - Public Works Department (PWD)
  - Roads and Buildings Department (R&B)
  - National Highway Authority of India (NHAI)
  - Traffic Police Department
  - Kerala State Road Transport Corporation (KSRTC)
  - Railways
  - Regional Transport Authority (RTA)
  - CIAL, Kochi

- The facilitation and management of traffic and transportation in this area is at present done by a multiplicity of agencies/departments like Local Bodies, GCDA, GIDA, Roads and Bridges Corporation, PWD, NHAI, RTO, Police, KINCO, KSRTC, Railways, Road Fund Board, Inland Waterways Authority of India etc. No single agencies are solely accountable for providing transport services as well as transport infrastructure resulting in overlapping functions, functional and spatial fragmentation. (https://www.kochimetro.org/wp-content/uploads/2014/11/Traffic-Transportation-study-report-for-kochi.pdf)

Source: CMP, https://www.kochimetro.org/wp-content/uploads/2014/11/Traffic-Transportation-study-report-for-kochi.pdf

Proposed integrated landuse transport plan - CMP

The four major elements that outline the vision for Kochi are:

SUSTAINABILITY

The transportation system of Kochi shall be conducive to lower consumption of fossil fuels.

It shall be based on managing the travel demand itself, rather than trying to provide for whatever demand exists and allowing demand to grow in an unplanned way.

EQUITY

Transportation shall be accessible to all demographic sections of society.

Kochi shall provide **"Integrated Mobility for all"**, meaning any person above a certain age should be able to travel independently.

CONVENIENCE

Not only residents of the study area but also visitors should also be able to figure their way around the city very easily.

SAFETY

To improve safety on roads for Non-Motorised Transport users, by providing NMT infrastructure, and seamless connectivity and for passengers accessing Public Trasnport Terminals

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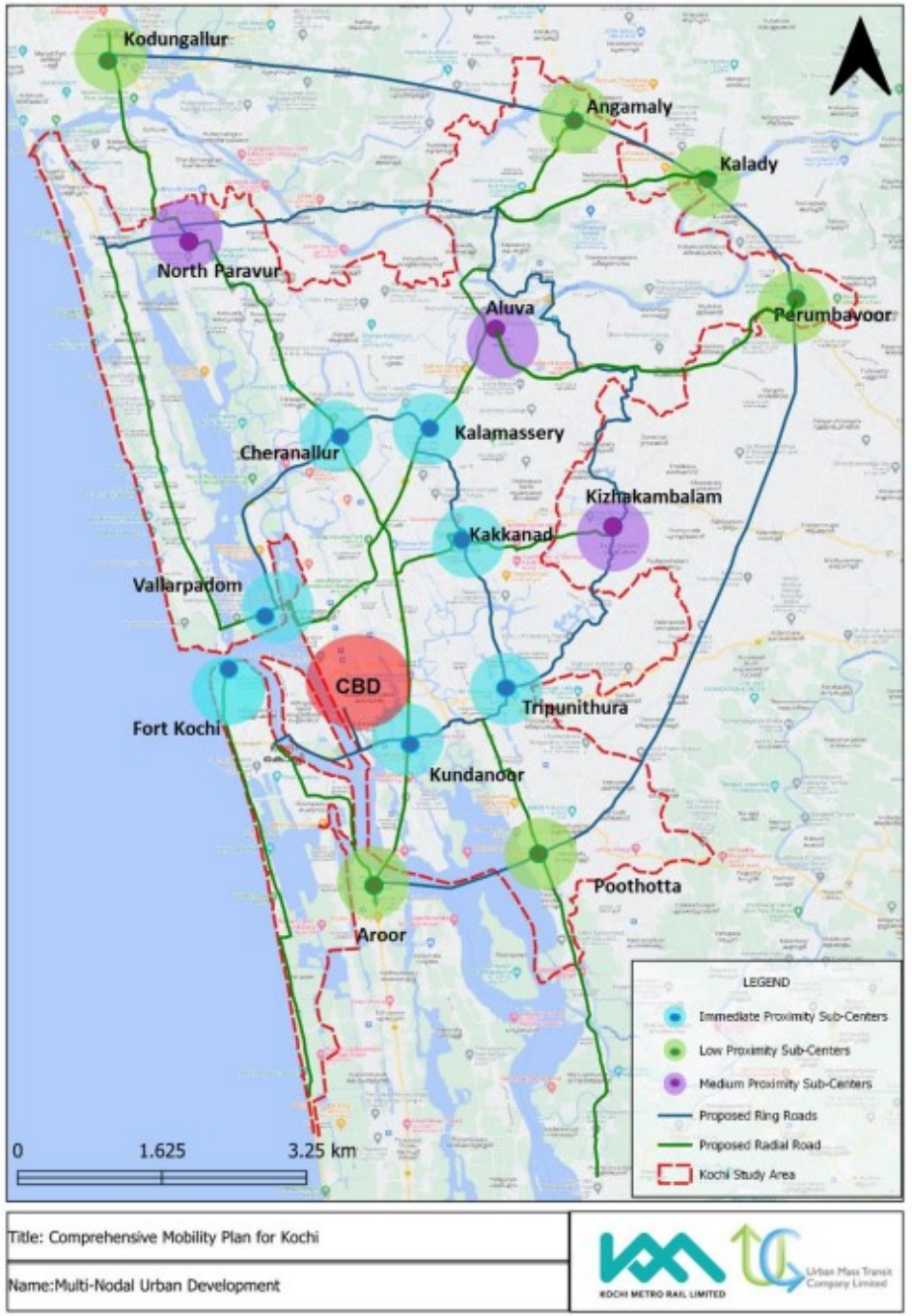

Source: CMP

Figure 104 Integrated Land Use Transport Plan

Scenario development

(Based on the Draft CMP)

BAU scenario

Table 79 Fleet Requirement Over the Years

YEAR	POPULATION (in Lakhs)	EXISTING FLEET	RECOMMENDED FLEET	SCRAPPED BUSES	ADDITIONAL FLEET REQUIRED
2023	23.63	1027	1182		
2027	26.61		1331	133	437
2031	30.08		1504	150	190
2041	35.95		1798	180	324
2051	47.62		2381	238	641

Table 57 Fuel Mix for BAU Scenario

VEHICLE TYPE	% FUEL TYPE - 2051			
	PETROL	DIESEL	CNG/ LNG	ELECTRICITY
Cars	53.00%	17.00%	3.00%	27.00%
2Ws	62.00%	0.00%	0.00%	38.00%
3Ws	0.00%	63.00%	4.00%	33.00%
Buses	0.00%	60.00%	0.00%	40.00%

Table 58 Mode Share (Excluding NMT) for Horizon Year under BAU Scenario

NAME OF THE INDICATOR	BASE YEAR (2023)	BAU (2051)
Private Transport (PVT) Trips	59%	61%
Public Transport Trips	31%	33%
IPT Modes	10%	6%

Table 60 Carbon Emissions in Horizon Year (BAU 2051)

SN	INDICATOR TYPE	DESCRIPTION	BAU (2051)
1	GHG Emissions	Equivalent CO2 emissions per passenger Km	72.93

- The BAU scenario extrapolates existing trends and assumes no radical policy interventions for sustainable development and emission mitigation. However, it does incorporate infrastructure development on the on-going projects and projects to be implemented in the immediate years.
- Future transport demand is based on the preferences of different socio-economic groups in the base year.
- The BAU scenario predicts increased private vehicle ownership with higher demand for motorization. In terms of technologies, the scenario foresees continued reliance on fossil fuel vehicles.

Source: CMP

S.NO.	INDICATOR TYPE	DESCRIPTION	BASE YEAR	HORIZON YEAR
i) Mobility and Accessibility				
1	**Modal Share (%)-Motorized Modes (Model Results)**			
	Private Modes	% of trips made by private motorized modes (two-wheelers, car)	59%	61%
	Public Modes	% of trips made by public transport modes	31%	33%
	IPT Modes	% of trips made by intermediate public transport modes (auto-rickshaws, shared auto-rickshaws)	10%	6%
2	**Trip Length (Km)**			
	Trip Length (PvT Modes)	Average Trip Length of the Two-wheeler, Car, and Auto users in the study area	10.6	11.2
	Trip Length (PT Modes)	Average Trip Length of the Public Transport users in the study area	8.61	10.4
ii) Infrastructure and Land use				
1	**Infrastructure Quality**			
1.1	Average Speed (Kmph) (PvT)	Average speed of private modes	23.3	20.11
	Average Speed (Kmph) (PT)	Average speed of public transport modes	15.25	11.34
1.2	**Accessibility to Public Transport (Population)**			
	Access to PT	Population having access to PT	0.60	0.73
2	**Land use parameters**			
2.1	**Land use mix intensity**			
	Land use mix intensity	Job and housing balance (employment / residing population)	0.42	0.51

S.NO.	INDICATOR TYPE	DESCRIPTION	BASE YEAR	HORIZON YEAR
iii) Safety				
1	**Safety**			
1.1	Quality of footpath infrastructure	% of roads with more than 2m footpath	7.0%	29%
iv) Environmental Impacts				
1	**Emissions**			
1.1	Emissions (Tonnes/day)		36.53	72.93
2	**Depletion of land resource**			
2.1	Consumption of land for transport activity	Percentage of total land used in transport for different type of transport infrastructure – road, parking bus lanes, railways, etc.	12%	12.68%
iv) Technology				
1	**Vehicle Fuel Technology**			
1.1	Vehicle Fuel Technology	Percent of public transport fleet in compliance with Indian emissions standards	45%	65%

Source: CMP

SUT scenario

- The land use transitions for SUT scenario considers the growth pattern on assessing growth and variation of the existing land use plan of 2020 with proposed Master Plan proposal for 2040.
- The existing transport sector in the study relies primarily on fossil fuels (Petrol and diesel). The CMP-Toolkit 2014 indicates that the aggregate fuel efficiency is expected to improve in the BAU scenario where India will achieve the 4.5 lit per 100 km global target in 2051. Considering the current vehicle technologies and initiatives the following fuel mix is considered for SUT. The estimated mix of vehicle in terms of their fuel usage for base year is obtained from the sampling of vehicles during household surveys and for horizon year the initiatives taken by the State Government, Smart city, KSEB have been considered to equate the following trend of fuel mix linked to the SUT scenario.
- The holistic and integrated implementation of proposals indicate a trend towards the sustainable growth. The share of public is expected to increase to 64% by 2051 (share of trips excluding walk) considering the proposals are being implemented in phased manner.

Table 65 Fuel Mix for SUT Scenario

VEHICLE TYPE	% FUEL TYPE - 2051			
	PETROL	DIESEL	ELECTRIC	TOTAL
Cars	40.00%	30.00%	30.00%	100.00%
2Ws	45.00%	0.00%	55.00%	100.00%
3Ws	0.00%	25.00%	75.00%	100.00%
Buses	0.00%	0.00%	100.00%	100.00%

Table 66 *Mode Share for Horizon Years – Excluding NMT trips.*

Mode	2023	2031	2041	2051
Car	45%	25%	24%	23%
TW	14%	12%	11%	10%
Auto	10%	5%	4%	3%
PT	31%	58%	61%	64%
Total	100%	100%	100%	100%

Table 116 Vehicle Fuel Transition Impacts of Proposed Projects

NAME OF THE IMPACT	BASE YEAR (2023)	BAU (2051)	SUT (2051)
Percent of public transport fleet in compliance with Indian emissions standards	45%	65%	85%

Source: CMP

- Reduction in intensity of vehicles on major roads is observed along with the distribution onto other roads in SUT scenario. However, the impact on SUT scenario on travel demand is observed to improve in intensity as well as the coverage due to introduction of new routes and improved frequency of PT transit systems. The impact on the congestion levels is assessed the same has been presented in the following table on the major mobility corridors.
- The average speed of vehicles on the network was measured for the horizon years in the model and is observed that vehicle speed in the SUT scenario have increased owing to the improvements in road network and public transport proposals.

Table 109 Social Impacts of Proposed Projects

NAME OF THE IMPACT	BASE YEAR (2023)	BAU SCENARIO (2051)	SUT SCENARIO (2051)
Walkability (Arterial & Sub-Arterial)	7%	29%	100%
Cyclability (Arterial & Sub-Arterial)	0%	10%	>50%
Public Transport Accessibility	60%	72%	80%
Average distance to nearest stop from house of a PT user	0.7	0.7	0.6
Percent of public transport vehicles that provide disability access (by public transport mode)	<1 %	<10%	50%
Percent public transport stations / bus stops that provide disability access	<1%	<10%	50%
Percent length of public footpaths (km) that provide disability access	<1%	<10%	75%

Table 111 Environmental Impacts of Proposed Projects

NAME OF THE IMPACT	BASE YEAR (2023)	BAU (2051)	SUT (2051)
GHG Emissions (Tonnes/day)	36.53	72.93	49.59
Exposure to Transport Noise	>75	>75	<75

Source: CMP

Section 2: Kochi – policy overview

List of identified policy documents

Document Name	Year Published	Weblink
WALKABILITY STUDY KOCHI	2017	https://healthbridge.ca/dist/library/Walkability_Report_-_Kochi_2016-2017.pdf
CITY MOBILITY PLAN - KOCHI	2007	https://kochimetro.org/wp-content/uploads/2014/11/city_mobility_plan_kochi_2007.pdf
MASTER PLAN FOR KOCHI MUNICIPAL CORPORATION AREA -2040	2023	https://kochicorporation.lsgkerala.gov.in/en/master-plan-kochi-municipal-corporation/498
Kochi City Development Plan	2007	https://www.kochimetro.org/wp-content/uploads/2014/11/CDP-Kochi-2007.compressed.pdf
Low carbon action plan for urban freight - Kochi	2022	https://sustainablemobility.iclei.org/wpdm-package/lcap-uf_kochi/?wpdmdl=72138
COMPREHENSIVE MOBILITY PLAN FOR KOCHI (Draft)	2024	https://kochimetro.org/kmrl_content/uploads/2024/07/Draft_CMP_Kochi.pdf
DEVELOPMENT PLAN FOR KOCHI CITY REGION 2031 - vol 2	2014	https://kochimetro.org/wp-content/uploads/2014/11/Vol2_Development_ConceptsStrategies.pdf
DEVELOPMENT PLAN FOR KOCHI CITY REGION 2031 - vol 3	2014	https://kochimetro.org/wp-content/uploads/2014/11/Vol3_Development_ProposalsControlRegulations.pdf
Integrated Water Transport System for Kochi City - DPR	2015	https://cdn-dev.watermetro.co.in/01_DPR_WM_1_b782f1566c.pdf
Smart city proposal	2015	https://smartnet.niua.org/sites/default/files/resources/Kochi_SCP.pdf
Transit Oriented Development Plan For Kochi	2014	-
NON-MOTORIZED TRANSPORT (NMT) MASTER PLAN FOR KOCHI CITY	2015	-
INTRODUCTION OF LOW CARBON CITY BUS SERVICES IN GREATER KOCHI	2016	-
DETAILED PROJECT REPORT FOR INTEGRATED WATER TRANSPORT SYSTEM FOR KOCHI	2015	-
PARKING MASTER PLAN	2017	-
Building a Resilient Kochi	2023	https://www.transformative-mobility.org/wp-content/uploads/2023/03/2020_08_BuildingAResilientKochi_WRIIndia-rUFdqF.pdf
Solar City Draft Master Plan	n.d.	-

Source: ATO Urban Policy Tracker

Identified targets from CMP

Target	Target year	Document Name
% of city covered with footpath (Arterial and Sub-Arterial) = 100% % of city covered with Cycle Tracks (Arterial and Sub-Arterial) = >50% (Base, 2023 = 7%, 0%)	2051	COMPREHENSIVE MOBILITY PLAN FOR KOCHI (Draft)
Private = <45% Public = >40% IPT = <10% (Base, 2023 = 59%, 31%, 10%)	2051	COMPREHENSIVE MOBILITY PLAN FOR KOCHI (Draft)
Avg. speed (kmph) Private = >23 Public = >18 (Base, 2023 = 23.3, 15.25)	2051	COMPREHENSIVE MOBILITY PLAN FOR KOCHI (Draft)
GHG Emissions (Tonnes/day) = Reduce by 30% of the BAU (Base, 2023 = 36.53, BAU 2051 = 72.93)	2051	COMPREHENSIVE MOBILITY PLAN FOR KOCHI (Draft)

Source: ATO Urban Policy Tracker

Identified policy measures from the CMP

Active transport infrastructure expansion	Bike Sharing	Cycling/ Bike Lanes	Walking measures	Traffic calming	Disability access planning/ Barrier free design	Cycling measures	EV charging infrastructure
General e-mobility	General freight and logistics	Road geometry improvement	Passenger Transit hub	General transport relevant zoning	Mobility as a Service	General innovations and digitalization	Technical standards for road infrastructure
Mixed use	Transit Oriented Development	General land use	Bus fleet renewal	Public transit integration	General inland waterways improvement	Public transit expansion	Public transport information
Enhanced bus networks	Modeshare targets	General IPT/ paratransit measures	Access restriction by corridor/ road	Parking Pricing	General parking measures	Peak time traffic management	Vehicle speed
General reference to finance mechanisms in the urban area	Road infrastructure expansion	Stakeholder involvement	Development of other transport-related plan/ policy	General Emission reduction	General education and behavior change	Public awareness campaigns	Audits/ star rating for existing roads for road safety

Source: ATO Urban Policy Tracker

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"ATO translates data into insights, policies, and investments"

ATO Team	info@asiantransportobservatory.org
Jamie Leather	jleather@adb.org
Andres Pizarro	andres.pizarro@aiib.org
Manuel Benard	manuel.benard@aiib.org
Alvin Mejia	alvinmejia@asiantransportobservatory.org
Sudhir Gota	sudhirgota@asiantransportobservatory.org
Mel Francis Eden	meleden@asiantransportobservatory.org
Adwait Limaye	adwait@asiantransportobservatory.org
Benjamin Soco	benjaminsoco@asiantransportobservatory.org

X: @transportATO
Linkedin: bit.ly/ATOlinkedin