



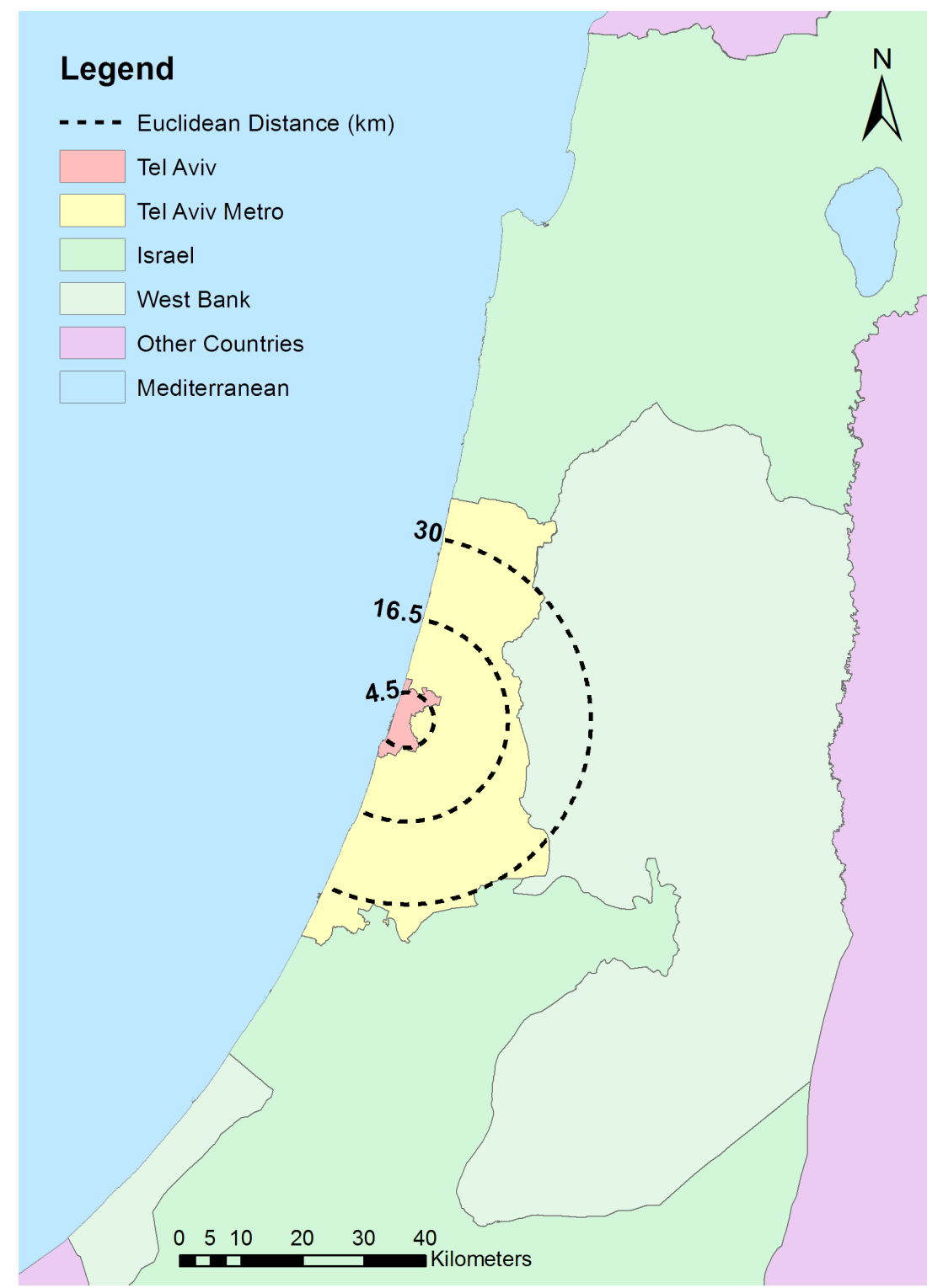
# E-bike Riding Routes and the Built Environment

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## Tel Aviv, Israel

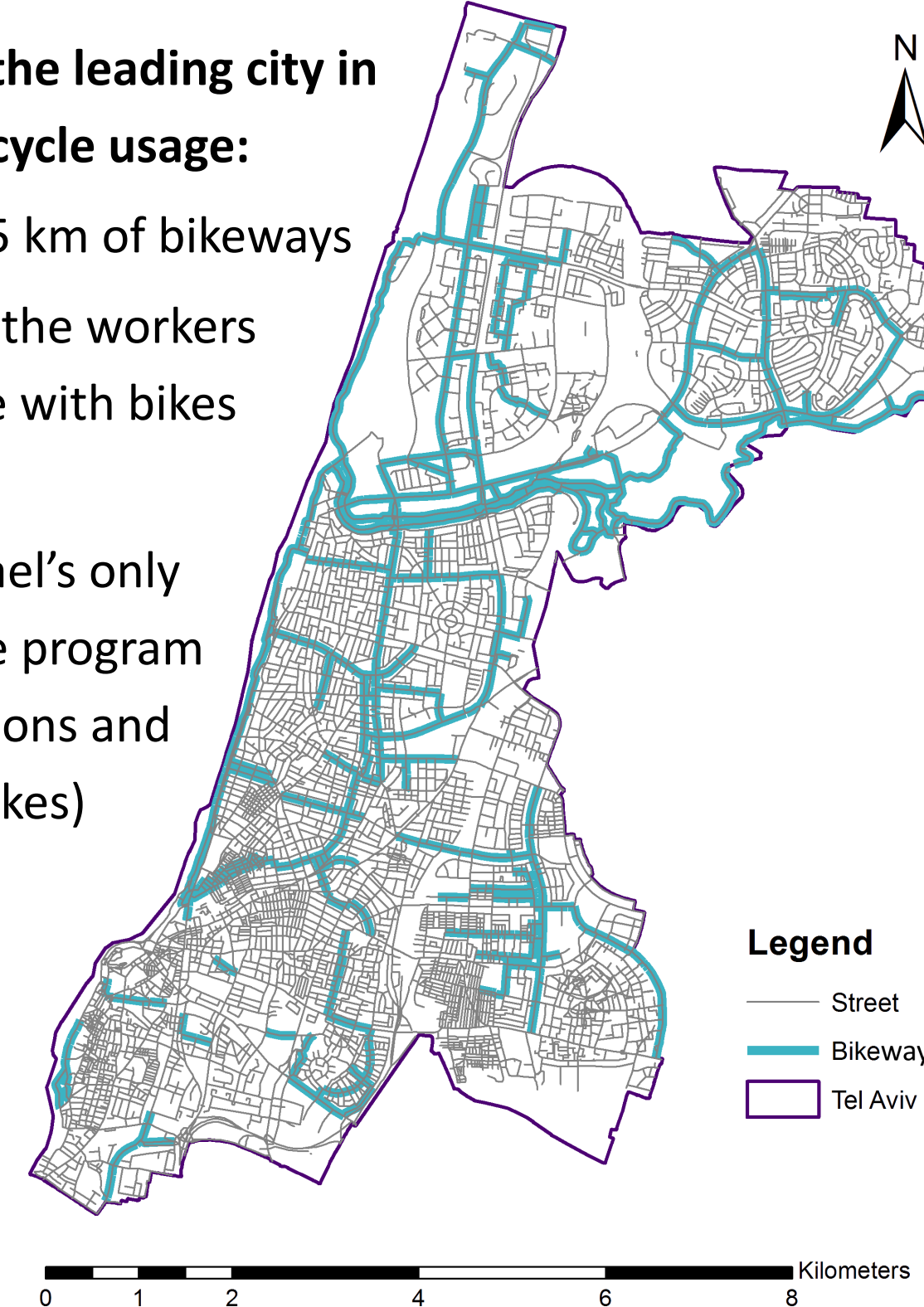
### Quick facts:

- Tel Aviv is the heart of Israel's biggest metropolitan area
- Flat city with hot and humid weather
- The streets suffer from heavy congestion and lack of parking spaces
- The public transportation is based on buses
- Tel Aviv has many e-bike riders:



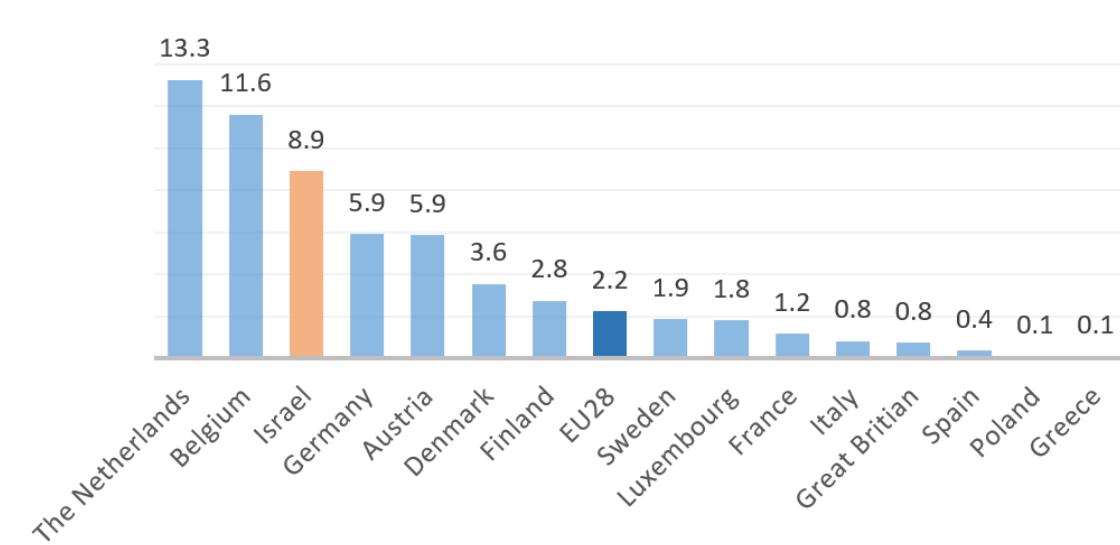
Tel Aviv is the leading city in Israel in bicycle usage:

- It has 115 km of bikeways
- 16.1% of the workers commute with bikes (2014)
- It has Israel's only bikeshare program (207 stations and >2,000 bikes)



Despite the relatively developed bicycle infrastructures, the bike network have low continuity, and many riders are forced to ride on the road or on the sidewalk

E-bike sales per 1000 people - 2014



## What are Electric Bicycles?

### Bicycle Style Electric Bicycles (BSEB)

- Activated by pedaling or by throttle
- Light-weighted (~20kg)
- Have low power (up to 250W)
- Have low speed (up to 25 km/h)
- The most common type in Israel and Europe

### Scooter Style Electric Bicycles (SSEB)

- Activated by throttle
- Heavy-weighted
- Have high power
- Have high speed
- The most common type in China

BSEBs that are activated by pedaling only called **pedelec**



E-bikes are the ultimate mobility solution in cities

- Faster and more comfortable than regular bikes
- Cheaper and safer than motor-bikes and scooters
- Use less space than cars
- Enable bike riding for people with disabilities
- Enable easy riding on hilly environment
- Have no tailpipe emissions
- Have low energy consumption - 2.1 kWh per 100 km (1 kWh for pedelec)
- BSEB Does not require driving license and insurance
- It is possible to ride with BSEBs on bikeways
- Pedelecs provide moderate physical activity

The law defines BSEBs as regular bicycles

## Survey among e-bike users in Tel Aviv

A survey of e-bike riders within Tel Aviv, was conducted in spring 2015. N = 118

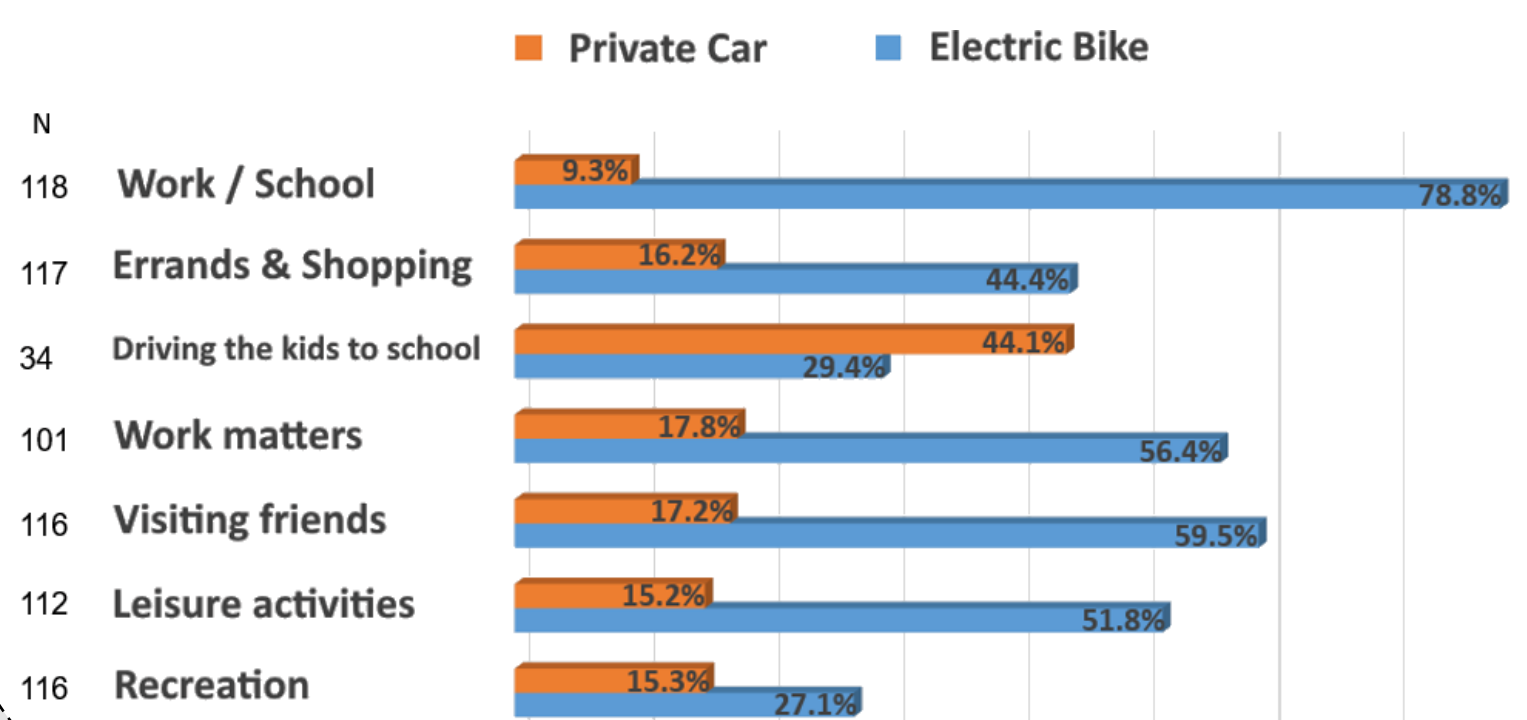
### E-bike users in Tel Aviv:

- **Young** - The median age is 29
- **Educated** - 69% own an academic degree
- **Have a high income** - 50% earn more than the average in Tel Aviv
- 38% Females, 62% Males

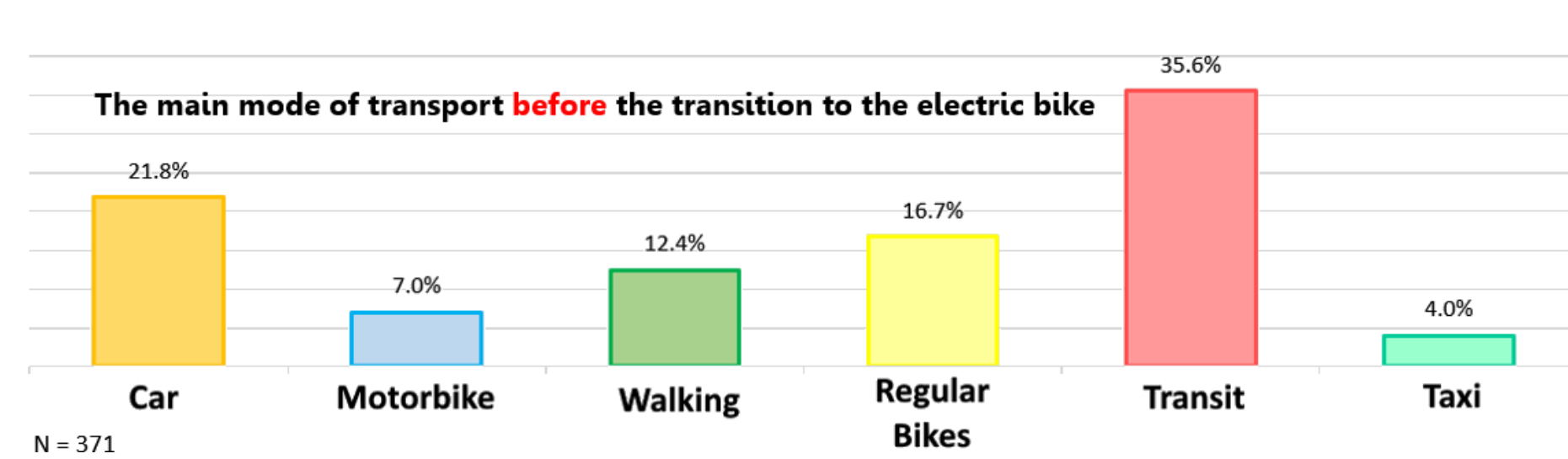
### Users' attitudes:

- Why they use e-bikes?**
- Reduce travel time - 81%
  - More comfortable - 67%
  - Reduce transportation cost - 64%
  - Enjoy riding e-bike - 43%
  - It is environmentally friendly - 35%
  - Cannot ride a regular bike - 5%
- What deter them of using e-bike?**
- Cars endanger the riders - 70%
  - Sidewalks are crowded - 68%
  - No parking - 67%
  - Not enough bikeways - 66%
  - Destination is far - 49%
  - Conflict with pedestrians - 36%
  - Battery does not last - 25%

### The main mode of transport used by the respondents



### The main mode of transport before the transition to the e-bike



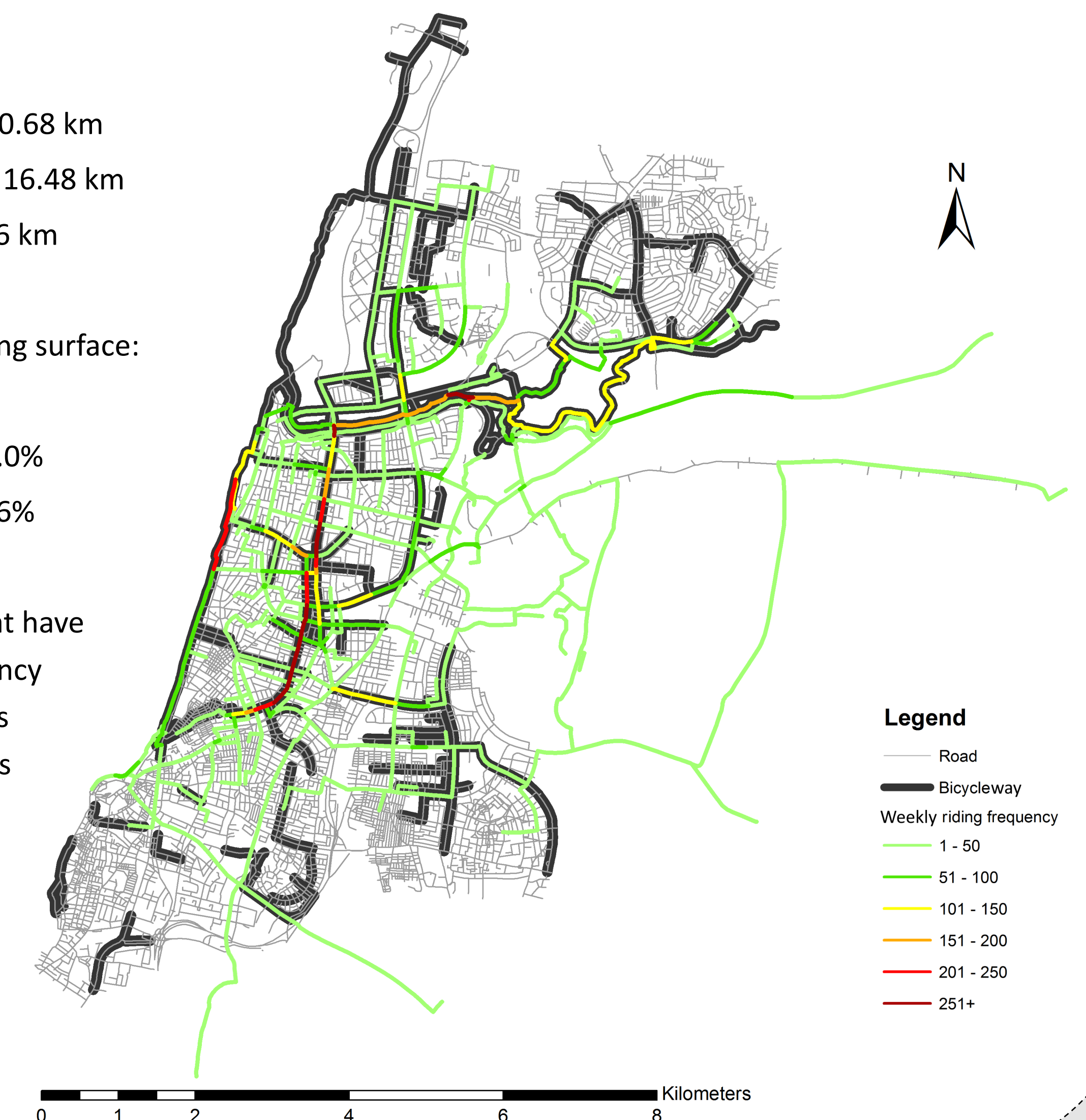
## Reported riding routes

N = 93  
Min. length - 0.68 km  
Max. length - 16.48 km  
Average - 4.56 km

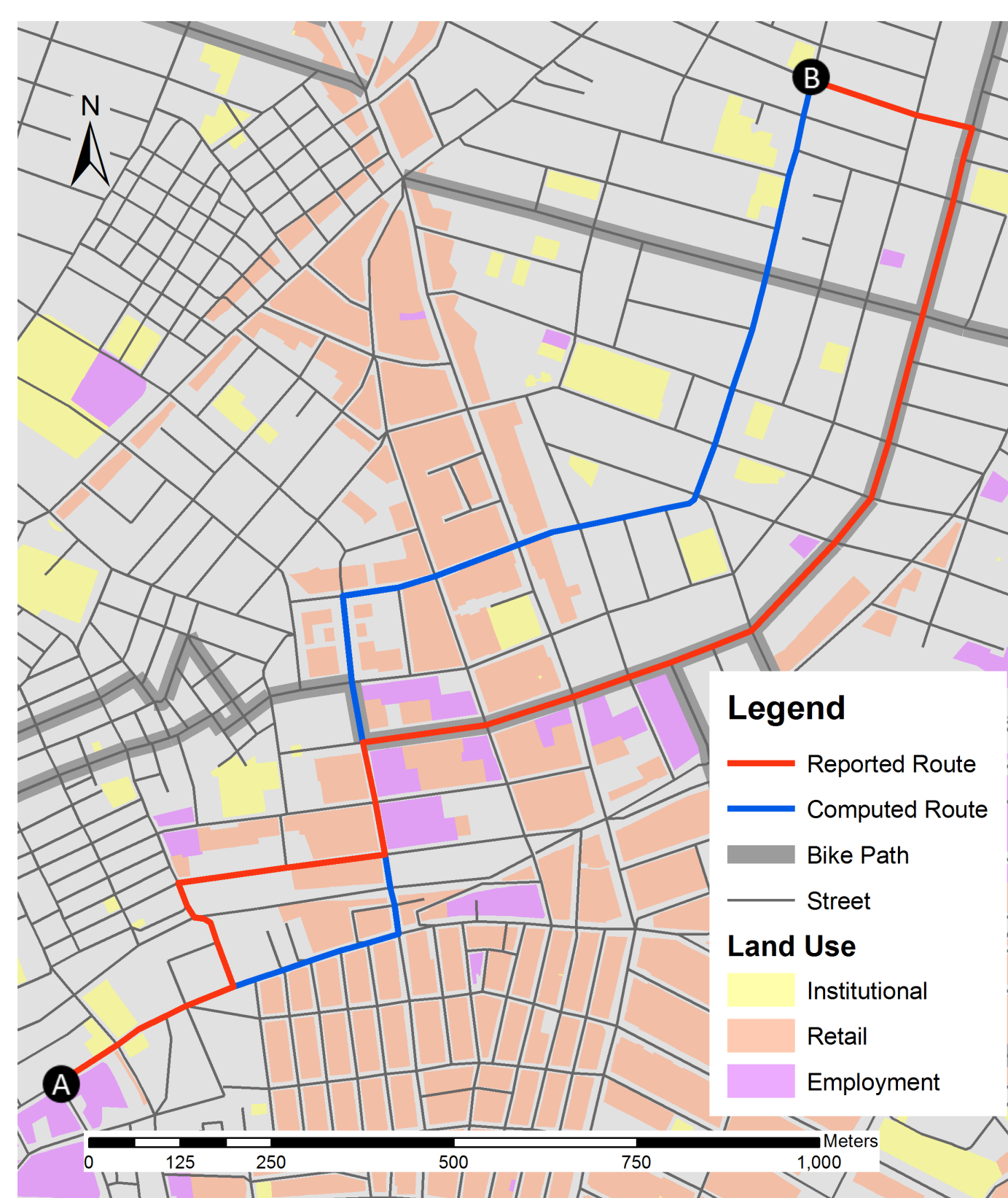
### Reported riding surface:

Road - 24.4%  
Sidewalk - 19.0%  
Bikeway - 56.6%

All streets that have a high frequency of e-bike rides have bikeways



## The routes and the built environment



The given example on the map:

	Reported route	Shortest route
Length (percent)	2443 m. (100%)	2086 m. (85%)
Overlap	24%	
Bikeways	55%	4%
Area of congregation	16%	26%

### Each reported route compared to the shortest possible route (based on the street network)

- The rate of bikeways along the route
- The rate of area of congregation along the routes: industrial, retail, and employment land uses

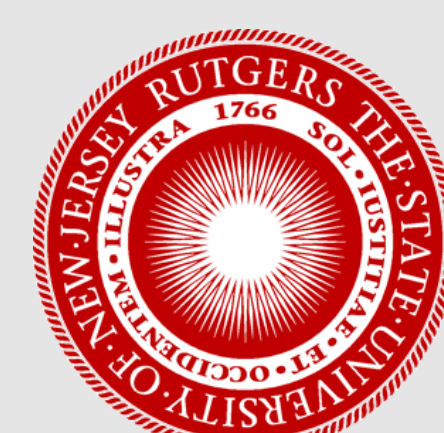
### Average for the entire sample:

	Reported routes	Shortest routes
Length (percent)	4556 m. (100%)	4011 m. (88%)
Overlap	45%	
Bikeways	58%	34%
Area of congregation	9%	12%

The presence of points of congregation along the route represents the effect of the built environment on selecting a riding route. Points of urban congregation along the route, including shopping, commerce, employment, business and public amenities, are considered factors that encourage walking. Bicycle riders, on the other hand, ride faster and farther so that the advantage achieved by clustering points of congregation is less important for them. Furthermore, the high crowdedness that is created around these areas is inconvenient for them.

## Conclusions

- Electric bicycles are a **new and distinct** mode of transportation.
- E-bike serves as a mode of transport for **multiple purposes**.
- The **average** riding range is **4.5 km** (a range that is considered the upper limit of riding a regular bicycle).
- The **upper range** of riding an e-bike is **16.5 km**. This distance from Tel Aviv covers most of the Tel Aviv metropolitan area (see map).
- Only **16%** of the e-bike riders have previously used an **ordinary bike**, compared to over **65%** who use the e-bike to replace **motor vehicles**, including cars and public transportation.
- Shortening riding **time**, improving **comfort**, and decreasing **costs** are the main reasons that induce riders to switch to e-bikes.
- E-bike riders in Tel Aviv are **younger**, more **highly educated**, and have a **higher income** than the average resident of the city. These findings are different from those in many western countries, where e-bikes serve an older population.
- E-bike riders tend to **deviate** from the **shortest** route in order to use **bikeways**.
- E-bike riders prefer to **stay away** from urban **points of congregation**.
- **Planning a suitable environment for riding ordinary and electric bicycling is different from an environment suitable for pedestrians.**
- **E-bike riders can reside in car-centered neighborhoods with separation of land uses and with low density, with an environment that is green, quiet, and healthier than in city centers, without dependency on a car.**



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