E-bike Riding Routes and the Built Environment
By Or Caspi & Pnina Plaut

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 infrastructure, the bike network has low continuity, and many riders are forced to ride on the road or on the sidewalk.

What are Electric Bicycles?

- **Bike 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

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

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

The main mode of transport used by the respondents

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

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 routes and the built environment

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:

<table>
<thead>
<tr>
<th></th>
<th>Reported routes</th>
<th>Shortest routes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length (percent)</td>
<td>4556 m. (100%)</td>
<td>4011 m. (88%)</td>
</tr>
<tr>
<td>Overlap</td>
<td>45%</td>
<td></td>
</tr>
<tr>
<td>Bikeways</td>
<td>58%</td>
<td>34%</td>
</tr>
<tr>
<td>Area of congregation</td>
<td>9%</td>
<td>12%</td>
</tr>
</tbody>
</table>

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 crowedness 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 10% 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.