New e-biking functionality in the Health Economic Assessment Tool (HEAT) for walking and cycling

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HEAT coordinating team

On behalf of the HEAT coordinating team:
Rojas Rueda D, Rutter H, Sarmiento OL, Smith R, Thondoo M, Winters M, Woodcock J, Yunesian M
Active mobility and public transport have important climate mitigation and health co-benefits

<table>
<thead>
<tr>
<th>Mitigation strategy</th>
<th>Potential to reduce emissions (Illustrative)</th>
<th>Likely reduction of health risk factors</th>
<th>Additional effects, limitations and comments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Size and direction of effect</td>
<td>Strength of effect</td>
</tr>
<tr>
<td>IPCCc</td>
<td>Package of walkways, cycleways and bus rapid transit could reduce emissions by 25% at a cost of US$ 30/tCO₂.²⁰</td>
<td>++ Moderate</td>
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<td>Improved land use could reduce emissions by 21% over a 20-year period at a cost of US$ 91/tCO₂.¹⁰</td>
<td>+ + Moderate</td>
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<td></td>
<td>Land use changes and alternatives to private motorized transport</td>
<td>+ + Moderate</td>
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</tbody>
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E-bikes are on the rise

Number of e-bikes sold in Europe from 2009 to 2021

(in millions)

E-bikes sold in millions

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Evidence on e-biking, health & climate impacts
Which modes are being replaced by e-biking?

- Public transport 33%
- Motorized modes 28%
- Conventional bike 27%
- Walking 10%
- New / induced trips 1%
- Other 1%

→ needs to be considered for health / climate impact assessment

Source: Bigazzi and Wong (2020)
What is the HEAT?

- Online tool [www.heatwalkingcycling.org](http://www.heatwalkingcycling.org)
- Designed for transport planners and non-health experts
  - no in-depth health or economic expertise required
- Economic assessment of health benefits of walking or cycling
- Effects on mortality ‘only’
- Evidence-based
HEAT – A collaborative project

Project coordinating team:
Francesca Racioppi, WHO Regional Office for Europe, Sonja Kahlmeier, Swiss Distance University of Applied Science (FFHS), Switzerland, Thomas Götschi, University of Oregon, USA, Abraham Mwaura, WHO Headquarters

Project advisory and expert groups:

Development team: Tomasz Szenanski, Thomas Götschi, Alberto Castro Fernandez, Vicki Copley, Ali Abbas, Duy Dao, Hywell Dinsdale

Expertise involved:
- Transport Economics
- Transport Planning
- Policy Making
- Practice / Advocacy
- Epidemiology Public Health
- Environmental Science
- Air Pollution
- Health Economics
- Expertise involved:
HEAT answers the question:

- If x people walk/cycle an amount of y on most days, what is the economic value of the health benefits that occur as a result of the reduction in mortality due to their physical activity?

- In addition:
  - How much do **air pollution** or **crashes** affect these results?
  - What are the effects on the emissions of **carbon**?
What do you want to assess?
Data inputs on travel and population
Adjustment of data inputs
Review of calculation parameters

Physical activity benefit
Air pollution risk
Crash risk
Carbon

Now including e-biking functionality!
(as well as regular cycling & bike sharing)

VSL = Value of a Statistical Life, SCC = Social Cost of Carbon
How does it work?

- **An example: e-biking in Budapest**

  - Based on: situation in Switzerland
    - Average of 1 minute of e-biking across the adult population (Microcensus Transport & Mobility 2021)

  → Scenario: reaching the level of Switzerland within the next 10 years

- **Impacts of physical activity & carbon**

  www.heatwalkingcycling.org

Active travel modes

On this page, choose the active travel mode(s) you would like to assess.

Show me more options!

Which active travel mode(s) would you like to assess?

You can choose more than one:

- [ ] Walking
- [ ] Cycling
- [ ] E-biking
- [ ] Bikesharing

<- BACK       NEXT ->
Active modes data

Provide your data for each of the active travel modes selected earlier.

Tell me more!

E-biking data for the reference case

Data source
- Hypothetical scenario
- Population survey
- Intercept survey
- Count data
- Modelled data
- App-based data

E-biking data
Amount
Must be in specified unit per person, per day.

1

Population data
Population type
This specifies what type of population the volume data is based on.

General population

Age range of the assessed population
If the walking or cycling assessed stems predominantly from younger or from older subjects, select the age range accordingly.

Adult population (20-74 years)
Population data

Provide your information about the population you are assessing below.

- Total population size for your city (Data source: United Nations, Statistics Division)

Total population size: 1751010

Percent of total population within the age range you are assessing for e-biking in the reference case (City-level data from United Nations, Statistics Division)

Percent: 73

Population size used for your assessment of e-biking in the reference case

Population size: 1278237

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Results for e-biking (all pathways)

Summary of your input data
The volume data you have entered corresponds to 1 minute per person per day. Your assessed population is 1,278,237.

Summary of impacts for mortality and carbon emissions
As a result, 54 premature deaths are prevented per year and carbon emissions are reduced by 675 metric tons of CO2 per year. Over the full assessment period of 10 years, 543 premature deaths are prevented and carbon emissions are reduced by 6,745 metric tons of CO2.

Economic value of impacts
Mortality is monetized using Value of Statistical Life (VSL) of 1,498,000 (US$) per premature death and carbon emissions are monetized using social cost of carbon (SCC) of 79 (US$) per metric ton of CO2.

This corresponds to an economic value of 81,400,000 (US$) per year.
Over the full assessment period of 10 years, the total economic impact is 814,000,000 (US$).
Adjusted to 2023 value (i.e. discounted/inflated), the total economic impact is 629,000,000 (US$).
Supporting documentation

- **Website**: [www.heatwalkingcycling.org](http://www.heatwalkingcycling.org) including methods and user guide

- **Methodology**:
  - Latest methods paper: [www.mdpi.com/1660-4601/17/20/7361](http://www.mdpi.com/1660-4601/17/20/7361)

- **HEAT booklet**
  - Methods & user guide: [https://www.heatwalkingcycling.org/#userguide](https://www.heatwalkingcycling.org/#userguide) (updated version forthcoming)

- **For technical support & input**
  - Email: heatwalkingcycling@who.int

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