Health Economic Assessment Tool (HEAT) for walking and cycling: an introduction

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What is the HEAT?

- Online tool [www.heatwalkingcycling.org](http://www.heatwalkingcycling.org)
- Designed for transport planners
- Economic assessment of health benefits of walking or cycling
- Effects on mortality ‘only’

Methods and user guide online
HEAT “core principles”

- Scientific robustness
- Usability
  - Minimal data input requirements
  - Availability of default values
  - Clarity of prompts/questions
  - Design and flow of the tool
- Transparency
  - Approach and assumptions
- Conservative
- Adaptable
- Modular
What can you use it for?

• Assessing **current (or past) levels** of cycling/walking
  – What is walking/cycling worth now in my city, region, country?

• Assessing **changes over time**
  – E.g. before – after, scenario A vs. scenario B

• Evaluating **new or existing projects**
  – Value of health benefits of investments and benefit–cost ratios
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 additional physical activity?

Additional HEAT options

- How much do air pollution or crashes affect these results?
- What are the carbon effects?
HEAT workflow (simplified)

User inputs

What do you want to assess?

Data inputs

Adjustment of data inputs

Calculation parameters
- Changeable default values (Uptake period, trip/step length, speeds, mortality rate, air pollution level)
- Other background values

Calculation parameters

Physical activity benefit

Air pollution risk

Crash risk

Carbon

Impacts on mortality & carbon emissions

Monetization
Worldwide use

- Project website visited >1’000’000 times by over 60,000 visitors since 2011
- (but: webstats not fully comparable since launch of HEAT 4.0)
- Variety of applications
- At least 30 scientific publications using HEAT
A collaborative project

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


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

Expertises involved

- Transport Economics
- Transport Planning
- Policy Making
- Practice / Advocacy
- Epidemiology / Public Health
- Environmental Science
- Air Pollution
- Health Economics
What if the adult population Prague cycled 10mins more / day?

• Online tool www.heatwalkingcycling.org

Methods and user guide online
What if the adult population Prague cycled 10mins more / day?

• **Summary of impacts for mortality**
  As a result, **16.0 premature deaths** are prevented per year. Over the full assessment period of **10 years, 161 premature deaths** are prevented.

• Mortality is monetized using **Value of a Statistical Life (VSL)** of 1 730 000 EUR.

• **Total Societal economic value:**  + EUR 216 000 000 / year (discounted)
  - Benefits (physical activity):  + EUR 255 000 000
  - Dis-benefits
    - air pollution  - EUR 19 500 000
    - crashes  - EUR 20 000 000
Glasgow, UK

Valuing current levels of cycling
• Centre for Population Health
• Valued existing levels of cycling in Glasgow
• Assessed 600 cyclists
• Strong data-led approach
  • Travel to work from 2001 census
  • Annual cordon counts
• Status quo assessment (i.e. current levels)
• **Mean annual benefit €3.5-€4.6m pa**
• Extensive media coverage and political interest

“…this analysis contributes to the evidence base on the public health benefits of cycling and adds further weight to the *arguments that promoting cycling represents extremely good value for money* for both individual and public health.”
Boston, USA

Negative impacts from reduced walking to public transport

• Boston Metropolitan Area Planning Council faced proposals to increase fares and cut services on public transport
• They used HEAT to support a Health Impact Assessment of estimated decreases in regular walking due to the proposals
• Estimated 30’000-50’000 public transport users shifting to driving
• Would lead to reduction in walking of 8 min per person per day
• 9-14 additional deaths per year; €57m-€89m per year
• Important addition to policy analysis
“Simplicity is a complexity resolved”
(Constantin Brancusi)

http://www.heatwalkingcycling.org
Calculation parameters

The table below provides an overview of the default values used for your assessment. If you would like to use other values, you can edit column "Editable value".

<table>
<thead>
<tr>
<th>Parameter description</th>
<th>Default value</th>
<th>Editable value</th>
<th>Unit</th>
<th>Parameter name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Discount rate</td>
<td>5</td>
<td>5</td>
<td>%</td>
<td>discrete</td>
</tr>
<tr>
<td>2 Average cycling speed</td>
<td>14</td>
<td>14</td>
<td>km/h</td>
<td>speed_bike</td>
</tr>
<tr>
<td>3 Value of statistical life in euro by country (value for Czech Republic in 2015)</td>
<td>1729432.2161</td>
<td>1729432.2161</td>
<td>euro/death</td>
<td>vsl</td>
</tr>
<tr>
<td>4 PM2.5 concentration (value for Prague)</td>
<td>17</td>
<td>17</td>
<td>ug/m³</td>
<td>pollution_concentration_bycity</td>
</tr>
<tr>
<td>5 All cause mortality rate for reference case (value for Czech Republic and age group 20-64)</td>
<td>341.94</td>
<td>341.94</td>
<td>deaths/inhab</td>
<td>mortality_rates_bike_ref</td>
</tr>
<tr>
<td>6 Fatality rate by country for bike (value for Czech Republic)</td>
<td>2.2216</td>
<td>2.2216</td>
<td>fatalities/100mio km</td>
<td>fatalityrates_national_crash_bike</td>
</tr>
</tbody>
</table>

The table below shows the background values that the tool uses for your assessment. These cannot be modified.

<table>
<thead>
<tr>
<th>Parameter description</th>
<th>Background value</th>
<th>Unit</th>
<th>Parameter name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Time needed to obtain full health impacts in single case assessment</td>
<td>0.00</td>
<td>years</td>
<td>builduptime_onecase</td>
</tr>
<tr>
<td>2 Time needed to obtain full health impacts in crash module</td>
<td>0.00</td>
<td>years</td>
<td>builduptime_crash</td>
</tr>
</tbody>
</table>