Unlocking the value of walking and cycling

Active mobility and health

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The health burden in Europe

Source: Institute for Health Metrics and Evaluation, University of Washington
Let’s look at the potential for improving health through transport!
Building health: cleaner air in Europe

Gain in life expectancy (months) in 25 Aphekom cities expected with a decrease in PM$_{2.5}$ to WHO AQG (10 µg/m$^3$) for ages $\geq$ 30 years
Building health: physical activity

• 30 minutes of moderate to vigorous physical activity per day (e.g. cycling) could lead to risk reductions of:
  – 20-30% for CHD and CVD morbidity and mortality
  – 30% for colon cancer, 20% - 40% for breast cancer, 20% for lung cancer, 20% for ovarian cancer
  – ca 30% for premature all-cause mortality

Physical inactivity: a risk factor comparable to smoking

![Graph showing comparison of global burden between smoking and physical inactivity.](http://dx.doi.org/10.1016/S0140-6736(12)61031-9)

How to realize this health potential? Walk and cycle!

• It can have a big impact
  • Improve road safety, air quality and noise
  • Reduce congestion, energy consumption and CO2 emissions
  • Reduce need for more expensive infrastructure for cars
  • Improved accessibility and quality of urban life
  • Big potential for replacing car trips

• It’s easy and fair
  • Equitable and easily accessible
  • Does not require much extra time
  • Minimal investment of household income
What about the balance of benefits vs. risks?

City cyclists are at increased risk of lung injury from inhaled soot

Sunday 25 September 2011

People who cycle through London and other major cities have higher levels of black carbon in their airway cells, according to research from Queen Mary, University of London.

The research, which will be presented at the European Respiratory Society’s Annual Congress in Amsterdam, suggests that cyclists inhale more black carbon than pedestrians, which may cause damage to the lungs.

The combustion of fossil fuels results in the generation of large numbers of inhalable particles of soot. There is increasing evidence that inhalation of these black particles is associated with a wide range of health effects - including heart attacks and reduced lung function.
What about the balance of benefits vs. risks?

The health benefits and risks from cycling using the bicycle sharing scheme (Bicing) in Barcelona, Spain:

<table>
<thead>
<tr>
<th>Variables</th>
<th>Relative risk*</th>
<th>$AF_{exp}$ †</th>
<th>Deaths/year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Road traffic injury</td>
<td>1.0007</td>
<td>0.0007</td>
<td>0.03</td>
</tr>
<tr>
<td>Air pollution (particulate matter &lt;2.5 μm)</td>
<td>1.002</td>
<td>0.002</td>
<td>0.13</td>
</tr>
<tr>
<td>Physical activity</td>
<td>0.80</td>
<td>-0.23</td>
<td>-12.46</td>
</tr>
<tr>
<td>Carbon dioxide emissions saved (kg/year)‡</td>
<td>—</td>
<td>—</td>
<td>9 062 344</td>
</tr>
</tbody>
</table>

*Relative risk of death during cycling compared with travel by car.
†Attributable fraction of mortality among exposed (Bicing users).
‡Calculated for Barcelona vehicle fleet, reported in 2008 by Spanish traffic department.

Source: Rojac-Rueda, D et al. „The health risks and benefits of cycling in urban environments compared with car use: health impact assessment study” BMJ 2011; 343: d4521 doi: 10.1136/bmj.d4521
But how can we integrate health considerations in transport planning?
<table>
<thead>
<tr>
<th>Costs</th>
<th>Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction</td>
<td>Congestion</td>
</tr>
<tr>
<td>Maintenance</td>
<td>Journey ambience</td>
</tr>
<tr>
<td>Inconvenience</td>
<td>CO2</td>
</tr>
<tr>
<td>Road traffic casualties</td>
<td>All-cause mortality</td>
</tr>
<tr>
<td>Environmental</td>
<td>Absenteeism</td>
</tr>
<tr>
<td></td>
<td>Morbidity</td>
</tr>
<tr>
<td>...</td>
<td>...</td>
</tr>
</tbody>
</table>
Integration of health in transport planning

• Recognition of the importance of economic analysis in transport planning

• Easy-to-use tool needed to estimate the economic value of the health benefits of regular walking and cycling

• Evidence-based, transparent and adaptable

• Conservative
Integrate health into transport planning

For a given volume of walking or cycling within a defined population what is the economic value of the health benefits?
THE PEP partnership to answer this question

Sonja Kahlmeier, Nick Cavill, Hywell Dinsdale, Harry Rutter, Thomas Götschi, Charlie Foster, Paul Kelly, James Woodcock, Dushy Clarke, Pekka Oja, Richard Fordham, Dave Stone, Christian Schweizer, Francesca Racioppi, Lars Bo Andersen, Andy Cope, Mark Fenton, Mark Hamer, Max Herry, I-Min Lee, Brian Martin, Markus Maybach / Christoph Schreyer, Marie Murphy, Gabe Rousseau, Candace Rutt / Tom Schmid, Elin Sandberg/ Mulugeta Yilma, Daniel Sauter, Peter Schantz, Peter Schnohr, Heini Sommer, Jan Sørensen, Gregor Starc, Wanda Wendel Vos, Paul Wilkinson
Health Economic Assessment Tool (HEAT) for walking and cycling

http://www.euro.who.int/HEAT

http://www.heatwalkingcycling.org
Volume of walking/cycling per person (entered by user)

Protective benefit (reduction in mortality as a result of walking/cycling) =

\[(1 - RR^t) \times \left( \frac{\text{User's volume of walking/cycling}}{\text{Reference volume of walking/cycling}} \right)\]

Population that stands to benefit (entered by user or calculated from return journeys)

General parameters
- Intervention effect, build-up period, mortality rate, time frame (changeable default values)

Estimate of economic savings using VSL (changeable default value)

\(^t\)RR = relative risk of death in underlying studies (walking: 0.89 and cycling: 0.90 (20)).

\(^t\)Volume of cycling per person calculated based on 100 minutes per week for 52 weeks per year at an estimated speed of 14 km/hour. Volume of walking based on 168 minutes per week at 4.8 km/hour.

Requires user input
New version launched in August 2014

• updated relative risk functions for walking and cycling;
• new averages and country-specific Values of Statistical Life (VSL) updated and more detailed mortality rates for European countries;
• Bug fixes and usability improvements
Example from Kaunas

• Inhabitants: 309,200
• Modal split:
  – walking 6%
  – cycling 4%
  – Public transport 66%
Example from Kaunas

HEAT estimate

Reduced mortality as a result of changes in cycling behaviour
The cycling data you have entered corresponds to an average of 620 km per person per year.
This level of cycling provides an estimated protective benefit of: 5% (compared to persons not cycling regularly)
From the data you have entered, the number of individuals who benefit from this level of cycling is: 12368
Out of this many individuals, the number who would be expected to die if they were not cycling regularly would be: 72.12
The number of deaths per year that are prevented by this level of cycling is: 4

Financial savings as a result of cycling
Currency: EUR, rounded to 1000

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>The value of statistical life applied is:</td>
<td>1,505,000 EUR</td>
</tr>
<tr>
<td>The annual benefit of this level of cycling, per year, is:</td>
<td>5,547,000 EUR</td>
</tr>
<tr>
<td>The total benefits accumulated over 10 years are:</td>
<td>55,471,000 EUR</td>
</tr>
<tr>
<td>When future benefits are discounted by 5% per year:</td>
<td></td>
</tr>
<tr>
<td>the current value of the average annual benefit, averaged across 10 years is:</td>
<td>4,283,000 EUR</td>
</tr>
<tr>
<td>the current value of the total benefits accumulated over 10 years is:</td>
<td>42,833,000 EUR</td>
</tr>
</tbody>
</table>
Example from Kaunas

HEAT estimate

Reduced mortality as a result of changes in walking behaviour

The walking data you have entered corresponds to an average of 3 km per person per day.
This level of walking provides an estimated protective benefit of 17% (compared to persons not walking regularly)
From the data you have entered, the number of individuals who benefit from this level of walking is: 18,552
Out of this many individuals, the number who would be expected to die if they were not walking regularly would be: 161.56
The number of deaths per year that are prevented by this level of walking is: 28

Financial savings as a result of walking

Currency: EUR, rounded to 1000

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>The value of statistical life in your population is:</td>
<td>1,505,000 EUR</td>
</tr>
<tr>
<td>The annual benefit of this level of walking, per year, is:</td>
<td>41,798,000 EUR</td>
</tr>
<tr>
<td>The total benefits accumulated over 10 years are:</td>
<td>417,981,000 EUR</td>
</tr>
<tr>
<td>When future benefits are discounted by 5% per year:</td>
<td></td>
</tr>
<tr>
<td>the current value of the average annual benefit, averaged across 10 years is:</td>
<td>32,275,000 EUR</td>
</tr>
<tr>
<td>the current value of the total benefits accumulated over 10 years is:</td>
<td>322,754,000 EUR</td>
</tr>
</tbody>
</table>
Economic benefits of active mobility go beyond health: jobs in green and healthy transport

- If the 56 study cities achieved the same modal share of cycling as Copenhagen:
  - about 76,600 local jobs could be created
  - about 10,000 deaths could be avoided each year
  - Vilnius: 628 jobs and 102 lives
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