Bringing health into transport planning: unlocking the value of walking and cycling

Christian Schweizer
World Health Organization Regional Office for Europe

With acknowledgements to:
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Harry Rutter, National Obesity Observatory, United Kingdom
Hywell Dinsdale, South-East Public Health Observatory, United Kingdom
Sonja Kahlmeier, WHO Regional Office for Europe
Francesca Racioppi, WHO Regional Office for Europe
Pekka Oja, UKK Institute for Health Promotion Research
Often urban environments / land use planning favour motorized transport…
… and hinder walking and cycling
**Why has the health sector an interest in transport and urban development policies?**

*Transport and the urban environment play a role in several of the leading risk factors for health*

<table>
<thead>
<tr>
<th>Health outcomes</th>
<th>Risk factor related to urban/transport policies</th>
</tr>
</thead>
<tbody>
<tr>
<td>High blood pressure</td>
<td>Physical activity / diet</td>
</tr>
<tr>
<td>High body mass index</td>
<td>Physical activity / diet</td>
</tr>
<tr>
<td>Respiratory diseases</td>
<td>Urban air pollution</td>
</tr>
<tr>
<td>Cardiovascular diseases</td>
<td>Urban air pollution, physical activity, diet, noise</td>
</tr>
<tr>
<td>Cancer (some)</td>
<td>Physical activity / diet</td>
</tr>
<tr>
<td>Injuries</td>
<td>Road traffic</td>
</tr>
</tbody>
</table>
The burden

- Physical inactivity is estimated to cause:
  - 21–25% of breast and colon cancer burden
  - 27% of diabetes burden
  - 30% of ischaemic heart disease burden
The potential

Risk reductions for:

- 20-30% for CHD and CVD morbidity and mortality
- Cancer risks:
  - 30% for colon cancer
  - 20% - 40% for breast cancer
  - 20% for lung cancer
  - 30% for endometrial cancer
  - 20% for ovarian cancer
- 30% for developing functional limitations
- 30% for premature all-cause mortality

Why walking and cycling?

- **It can have a big impact!**
  - In Europe, many car trips are short
    - 10% shorter than 1km, 30% shorter than 3km and 50% shorter than 5km
  - Shifting some of these trips to walking and cycling can help to
    - Reduce congestion
    - Reduce energy consumption and CO2 emissions
    - Improve road safety, air quality and noise
    - Reduce need for more infrastructure for cars
    - Improved accessibility and quality of urban life
    - Complement technological improvements to vehicles and fuels
Why walking and cycling?

➢ It’s easy!
   ▪ Avoids dependence on facilities for physical activity
   ▪ Most people can do it: equitable and easily accessible
   ▪ Does not require much extra time
   ▪ Minimal investment of household income

➢ It can make transport a lot healthier!
   ▪ Most of these trips could be done by walking or cycling
   ▪ Contributing to the recommended daily dose of at least 30 minutes of moderate-intensity physical activity
Null hypothesis

Research project

Published evidence

Politics based policy

Costs/savings

By H Rutter/Walk 21 Satellite Symposium on Transport-Related Physical Activity, Magglingen, Switzerland, 2006
Health Dividends from Green Growth

- Much greater health gains from shifting to rapid transit/public transport and walking and cycling than from improving fuel and vehicle efficiency

- Consider all costs and benefits of Green Growth strategies!
Integration of health effects in transport assessments: challenges

Complex methodological questions for transport planners:

- which health endpoints to include?
- form of the relationship between exposure and effect?
- activity substitution
- which costs to include?
- how to calculate costs?
- which time lag periods to apply before benefits/costs occur?

⇒ easy to use tools needed!
The question

—if people walk/cycle a distance of kilometers 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?
The answer

http://www.euro.who.int/HEAT
The Health Economic Assessment Tool for walking and cycling (HEAT)

- Easy tool to calculate the economic value of the health benefits of regular walking and cycling
- Recognises importance of economic analysis in transport: benefit-cost ratio is king
- New and updated version just launched end of May 2011 at the International Transport Forum in Leipzig
The Health Economic Assessment Tool for walking and cycling (HEAT)

- Effective public health:
  - action outside as well as within the health sector
  - identify levers
  - working upstream
  - Helps efficient use of public resources

- Evidence-based, transparent and adaptable

- Conservative

World Health Organization Europe
Collaborative project

Core group

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Contributors

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Number of trips per day $\times$ Distance per trip

Data entered by user for study area

Days cycled per year $\times$ Average speed

Local parameters (changeable default values)

Distance cycled per year in study area

Relative risk of death among cyclists =

$$1 - \left( \frac{\text{Distance cycled in study area}}{\text{Distance cycled in Copenhagen}^*} \times (1 - \text{RR}^*) \right)$$

Estimate of economic savings based on reduced mortality among cyclists in the study area
HEAT estimate

Reduced mortality as a result of changes in cycling behaviour

The cycling data you have entered corresponds to an average of 450 km per person per year.
This level of cycling provides an estimated protective benefit of: 9.31 % (compared to persons not cycling regularly)
From the data you have entered, the number of individuals who benefit from this level of cycling is: 60000
Out of this many individuals, the number who would be expected to die if they were not cycling regularly would be: 436.27
The number of deaths per year that are prevented by this level of cycling is: 40.64

Financial savings as a result of cycling

Currency: EUR

The value of statistical life applied is: 1,000,000 EUR
The annual benefit of this level of cycling, per year, is: 40,635,000 EUR
The total benefits accumulated over 10 years are: 406,353,000 EUR
When future benefits are discounted by 5 % per year,
The current value of the average annual benefit, averaged across 10 years is: 31,377,000 EUR
The current value of the total benefits accumulated over 10 years is: 313,775,000 EUR

It is important to remember that many of the variables used within this HEAT calculation are liable to be estimates, and therefore liable to some degree of error.

In order to be sure of the validity of the figures outlined above, you are advised to rerun the model entering slightly different values for variables where you have provided a shirtsqueal— for example...
HEAT estimate

Reduced mortality as a result of changes in cycling 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 26.54% (compared to persons not walking regularly).
From the data you have entered, the number of individuals who benefit from this level of walking is: 60,000
Out of this many individuals, the number who would be expected to die if they were not walking regularly would be: 436.27
The number of deaths per year that are prevented by this level of walking is: 115.79

Financial savings as a result of walking

Currency: EUR

The value of statistical life in your population is: 1,000,000 EUR
The annual benefit of this level of walking, per year, is: 115,789,000 EUR
The total benefits accumulated over 10 years are: 1,157,888,000 EUR
When future benefits are discounted by 5% per year:
The current value of the average annual benefit, averaged across 10 years is: 89,409,000 EUR
The current value of the total benefits accumulated over 10 years is: 894,090,000 EUR

It is important to remember that many of the variables used within this HEAT calculation are liable to be estimates, and therefore liable to some degree of error.

In order to be sure of the validity of the figures outlined above, you are advised to rerun the model.
HEAT for cycling: selected applications
Austrian Masterplan Cycling 2006
National strategy to promote cycling

- Goal: doubling of the Austrian cycling modal share from 5% to 10% by 2015
- Large potential
- Positive effects for the environment
- Positive effects for the economy
- Mid-term evaluation:
  - First success: increase of cycling modal share from 5% to 7% (2010)
  - New measure “Cycling as health promotion” as a result of applying HEAT for Cycling
Applying HEAT for Cycling
Austria

- 2008 HEAT for Cycling used to calculate the economic benefits of 10% cycling modal share in 2015

- Input data:
  - 2.5 Mio. daily cycling trips in Austria
  - 2 kilometres mean trip length

- Set of Austrian parameter:
  - Value of Life: EUR 1,876,121 (UNITE)
  - Discount rate: 3.25% (gov bonds)
  - 7 year build-up of uptake and benefit (2008-2015)
Applying HEAT for Cycling
Austrian results

- 811 Mio. Euro mean annual benefit
- 824 ‘saved lifes’ per year
- 1253 Euro annual savings per cyclists
- Strong arguments for the promotion of cycling in particular for investments in cycling infrastructure
Cycling Demonstration Towns
Development of Benefit-Cost Ratios
February 2010

Table 2. Benefits and Costs of Cycling Demonstration Towns

<table>
<thead>
<tr>
<th>Impact</th>
<th>Estimate of benefits and costs over 10 year period (£m, 2007 prices and values)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduced mortality</td>
<td>Benefit of £45 million</td>
</tr>
<tr>
<td>Decongestion</td>
<td>Benefit of £7 million</td>
</tr>
<tr>
<td>Reduced absenteeism</td>
<td>Benefit of £1-3 million</td>
</tr>
<tr>
<td>Amenity</td>
<td>Benefit of £9 million</td>
</tr>
<tr>
<td>Accidents</td>
<td>Disbenefit of £0-£15 million</td>
</tr>
<tr>
<td><strong>TOTAL BENEFITS</strong></td>
<td><strong>£47-64 million</strong></td>
</tr>
<tr>
<td>Costs</td>
<td>£18 million</td>
</tr>
<tr>
<td>Benefit-Cost Ratio</td>
<td>2.6 – 3.5</td>
</tr>
</tbody>
</table>
HEAT in Russian

- Complete HEAT website to be available in English and Russian by end 2011

- HEAT for cycling is now available also in Russian thanks to the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety
Conclusions

- Identifies a major public health issue and uses effective lever to promote it
- Works outside traditional health care paradigm to achieve health gain
- Uses language of the target sector, not health
- Highly influential
- Cheap and sustainable
- Effective demonstration of using evidence to drive practice
“I thought of that while riding my bicycle.”

Albert Einstein
on the theory of relativity
Costs: Economic valuation of transport-related health effects

- Selection of health effects in adults and children
- Relationships between exposure and health effect
- Estimated fraction of exposure coming from transport
- Assign costs to health effects
- Practical guidance for quantification of health effects of air pollution, injuries, noise and physical inactivity

World Health Organization
Regional Office for Europe

THE PEP
Transport, Health and Environment
Pan-European Programme
Look for “win-win-win” opportunities

- Environmental, health and economic benefits
- Opportunities that address each sector’s goals
- For example: safe walking and cycling in urban areas
### Example data from Switzerland

<table>
<thead>
<tr>
<th></th>
<th>Passenger transport</th>
<th></th>
<th>Freight transport</th>
<th></th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Car</td>
<td>Public bus</td>
<td>Trolley</td>
<td>Tram</td>
<td>Private coach</td>
</tr>
<tr>
<td>Costs in millions of US dollars</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Road crashes</td>
<td>3675</td>
<td>53</td>
<td></td>
<td>119</td>
<td>923</td>
</tr>
<tr>
<td>Air pollution</td>
<td>461</td>
<td>33</td>
<td>3</td>
<td>NA</td>
<td>8</td>
</tr>
<tr>
<td>Noise</td>
<td>365</td>
<td>18</td>
<td>0</td>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td>Total</td>
<td>4470</td>
<td>108</td>
<td>135</td>
<td>1547</td>
<td>1</td>
</tr>
<tr>
<td>Costs in US dollars per vehicle-km</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Road crashes</td>
<td>0.071</td>
<td>0.177</td>
<td>1.12</td>
<td>0.449</td>
<td>2.99</td>
</tr>
<tr>
<td>Air pollution</td>
<td>0.009</td>
<td>0.143</td>
<td>0.096</td>
<td>N.A.</td>
<td>0.073</td>
</tr>
<tr>
<td>Noise</td>
<td>0.007</td>
<td>0.08</td>
<td>0.007</td>
<td>0.022</td>
<td>0.080</td>
</tr>
<tr>
<td>Total</td>
<td>0.087</td>
<td>0.361</td>
<td>1.273</td>
<td>0.701</td>
<td>0.115</td>
</tr>
</tbody>
</table>
Find more information at:

- Quantification of health benefits of cycling and walking: www.euro.who.int/transport/policy/20070503_1


- HEPA Europe (European network for promotion of health-enhancing physical activity): www.euro.who.int/hepa

Thank you!
HEAT

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In collaboration with:
HEPA Europe
European network for the promotion of health-enhancing physical activity

Transport, Health and Environment Pan-European Programme THE PEP

Pollution reductions options network
HEAT for cycling

User → Input data (Exposure) → Health Outcomes → Economic Benefits → Audience

- Required user input
- Default values modifiable by user
- Non-modifiable

- Trips/day
- Distance/trip
- Relative risk estimate
- All cause mortality
- Assumption of linear dose response
- Value of Lives saved (€€)
HEAT for cycling

User

Input data (Exposure)

Health Outcomes

Economic Benefits

Trips/day

Relative risk estimate

All cause mortality

Value of Lives saved (€€)

Distance/trip

Onset of health benefits

Value of statistical life

Population mortality rate

Days cycled per year

Assumption of linear dose response

Discount rate for future benefits

Proportion of return journeys

Proportion of new cyclists

Value of statistical life

Discount rate for future benefits

Proportion of new cyclists

Uptake time of cycling

Proportion of return journeys

Time period of calculation

Caption

Required user input

Default values modifiable by user

Default values for certain types of applications

Non-modifiable

Caption

Default values for certain types of applications

Non-modifiable

User

Audience
Input data: health

Step 1

Traffic characteristics
by mode of transport and type of vehicle

Step 2

Population density and exposure levels

Assessment of exposure
emissions → dispersion → concentrations

Step 3

Exposure–response functions identified through meta-analysis or epidemiological studies
Data on prevalence, incidence, background rates and demographics
Disease burden considering the severity and duration of effects

Estimated health effects
identifying exposure–response functions and calculating the number of cases

Economic valuation of health effects
all effects valued in economic terms

Step 4

Total costs
summing up the health effects multiplied by the cost figures

Input data: road traffic, environment and costs

Characteristics of road traffic (traffic volume, speed, density and infrastructure quality) by type of vehicle and mode of transport

Emissions of each type of vehicle and mode of transport
Dispersion models and meteorological data

Economic cost figures, such as health costs per case or cost of life-years

World Health Organization
Regional Office for Europe
Underlying study: Copenhagen cohorts

- 6,954 regular cycle commuters
- Total study population of 30,640
- Followed up for an average of 14.5 years
- Mean journey time of 3 hours per week
- Relative risk of death 0.72 (95% CI 0.57-0.91)
- Adjusted for age, sex, educational status, leisure time physical activity, body mass index, blood lipid levels, smoking and blood pressure

Why has the health sector an interest in transport and urban development?

Transport and the urban environment play a role in several of the leading risk factors for health.

<table>
<thead>
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<tr>
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<td>Physical activity/nutrition</td>
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<td>Cancer (some)</td>
<td>Diet, physical activity</td>
</tr>
<tr>
<td>Injuries</td>
<td>Road traffic</td>
</tr>
</tbody>
</table>
Collaborative project: econ valuation

Main partners:
- WHO Regional Office for Europe
- Ecoplan (Switzerland) – economic aspects
- RIVM (Netherlands) and contributors – epidemiological aspects

Contributors
- Lars Bo Andersen, Norway
- Fiona Bull, United Kingdom
- Nick Cavill, United Kingdom
- Luis Cifuentes, Chile
- Paul Fischer, Rob Jongeneel, Erna van Balen, Hannah van den Bogaard, the Netherlands
- Christoph Lieb, Switzerland
- Francesco Mitis, Pierpaolo Mudu, WHO Regional Office for Europe
- Pekka Oja, Sweden
- Larissa Roux, Canada

- Advisory group of 18 experts from 10 countries and WHO
- 3 external reviewers
- Synergy with key related initiatives:
  - OECD/EC VERHI project
  - THE PEP/HEPA Europe project on quantification of health benefits of cycling and walking
  - ENHIS/WHO guidelines for HIA air pollution, noise

Supported by:
Health effects represent the largest part of the external costs of transport

- The external costs of transport are estimated at ca 8% of GDP in the EU(*).

- Savings from improved health could be re-invested in other societal priorities;

## Why should the transport and urban development sectors have an interest in health?

<table>
<thead>
<tr>
<th>Which Goals</th>
<th>Whose Interest</th>
</tr>
</thead>
</table>
| Reduce emissions of:  
  - air pollutants;  
  - greenhouse gases;  
  - noise | Environment  
  Health  
  Transport  
  Urban Development |
| Reduce congestion | Transport |
| Reduce road traffic injuries | Transport  
  Health |
| Reduce investments in infrastructure to cater for more cars | Transport |
| Improve accessibility and quality of urban life | Transport  
  Urban development  
  Health |
| Complement technological improvements to vehicles and fuels | Transport |
| Increase physical activity | Health |
| Facilitate access to healthy diets | Health |
| Promote tourism | Tourism and leisure industry, urban development |
| Creation of new jobs | Economy, welfare, labour, urban development |
Selected applications

- **Czech Republic**: used HEAT for cycling used to calculate potential benefits from cycling in the city of Pilsen
  - **USD 1.2 million** if 2% of population took up regular cycling

- **Swedish Government**: adopted HEAT for cycling as part of official toolbox for the economic assessment of cycling infrastructure

- **UK/England DfT**: adopted HEAT for cycling as part of official toolbox for the economic assessment of cycling infrastructure

- **UK/Scotland**: HEAT used to estimate benefit from reaching cycling targets
  - **USD 1.5-3 billion** per year if modal share goal of 13% reached
  - Recommended that Scottish Transport Appraisal Guidance should include health benefits from cycling and walking

- **New Zealand**: University of Auckland used HEAT to value adding cycling and pedestrian facilities to the Auckland Harbour Bridge
  - **900,000 USD** per 1000 regular bike commuters

- **United States**: adaptation of tool for the US underway (by CDC)

- **Austria**: used HEAT for cycling to calculate current savings from cycling in Austria
Unlocking the value of cycling and walking

Sonja Kahlmeier | Nick Cavill | Francesca Racioppi
HEAT approach

- Effective public health:
  - action outside as well as within the health sector
  - identify levers
  - working upstream
  - efficient use of public resources

- Recognises importance of economic analysis in transport: benefit-cost ratio is king

- Evidence-based

- Conservative

- Transparent
Collaborative project

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Development of HEAT

- Use economic levers to influence transport appraisal
- Find best format for transport planners
- International advisory group including transport; health; economics; practice
- Review the evidence
- Generate a tool based on the evidence
- Test with range of experts and refine

Disseminate; evaluate; develop further
Key steps

1. Literature reviews (economics; health)
Economic analyses of transport infrastructure and policies including health effects related to cycling and walking: A systematic review

Nick Cavill b,⁎, Sonja Kahlmeier a, Harry Rutter b, Francesca Racioppi a, Pekka Oja b

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ARTICLE INFO

Available online 24 January 2009

Keywords:
Economic
Health
Walk
Cycle

ABSTRACT

We reviewed published and unpublished studies that presented the findings of an economic valuation of an aspect of transport infrastructure or policy, and included data on walking and/or cycling and health effects in the valuation. We included 16 papers, of which three were classified as ‘high’, six as ‘moderate’ and seven as ‘low’ quality. There is a wide variation in the approaches taken for including the health effects of physical activity in economic analyses of transport projects. This is not helped by a lack of transparency of methods in many studies. A more standardised approach is called for, including a clearer description of the applied methods and assumptions taken.

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Key steps

1. Literature reviews (economics; health)

2. Issues and draft tool
Issues

- Which health benefits: mortality, morbidity or both?

- Physical activity and health relationship: linear or non-linear? Threshold?

- Unique effects of cycling /walking vs. other forms or physical activity? Activity substitution?
Key steps

1. Literature reviews (economics; health)
2. Issues and draft tool
3. Consensus event – cycling
4. Develop HEAT cycling (Excel)
5. Literature reviews
Risk reduction for all-cause mortality for regular cycle commuters

Data from 3 population studies in Copenhagen combined

6,171 men and 783 women including 2,291 deaths

RR 0.72 (95% CI: 0.57-0.91)

Adjusted for age, sex, educ. level, blood pressure, weight, leisure time physical activity, cholesterol and smoking

Results consistent with other cycling studies and literature on physical activity eg

Matthews, Paffenbarger

Cycling to work

Number of trips per day \( \times \) Distance per trip
\[ \Rightarrow \]
Days cycled per year \( \times \) Average speed
\[ \Rightarrow \]
Distance cycled per year in study area
\[ \Rightarrow \]
Relative risk of death among cyclists =
\[ 1 - \left( \frac{\text{Distance cycled in study area}}{\text{Distance cycled in Copenhagen}^{**}} \times (1 - RR^*) \right) \]
\[ \Rightarrow \]
Estimate of economic savings based on reduced mortality among cyclists in the study area
Applications

Project website visited over 6000 times, products downloaded over 600 times

“Health in All Policies” in Practice: Guidance and Tools to Quantifying the Health Effects of Cycling and Walking

Sonia Kahaneier, Francesco Racioppi, Nick Cavill, Henry Rutter, and Pekka Oja

Background: There is growing interest in “Health in All Policies” approaches, aiming at promoting health through policies which are outside the control of the health sector. While economic evaluation is an established practice in transport planning, health effects are mostly taken into account. An international project was carried out to develop guidance and tools for practitioners for quantifying the health effects of cycling and walking, supporting their full implementation. Development process: A systematic review of existing approaches was carried out. Then, the tools were developed with an international expert panel through an extensive consensus building process. Products and applications: Methodological guidance was developed which addresses the main challenges practitioners encounter in the quantification of health benefits from cycling and walking. A “Health Economic Assessment Tool” (HEAT) for cycling was developed which is being used by several countries and is undergoing further evaluation to ensure its reliability. The HEAT tool can be used to estimate the health benefits of cycling and walking under various scenarios. This project is providing guidance and an illustrative tool for cycling for practical applications, setting clear standards for additional evaluations to be required. Such tools illustrate the importance of considering health in transport policy and transport planning, putting “Health in All Policies” into practice.

Keywords: economic assessment, transport, physical activity, feasible.
HEAT walking

Systematic review

- PubMed search for keywords ‘Walking’ and ‘Relative risk’ in studies that
  - specified walking as an independent behavior
  - reported a relative risk for mortality or morbidity

- Meta-analysis of 9 studies (controlled for leisure time physical activity)
  
  \[ RR = 0.78 \ (0.64-0.98) \] for all-cause mortality from walking 29 mins per day on 7 days/week
HEAT walking

Economic studies

- Updated systematic review of economic studies
- 8 studies included; 5 good quality
- Few methodological advances

Showed HEAT approach remained valid for walking
What’s new?

- Step-by-step online tool
- Assessment of walking data with a brand-new HEAT walking
- More data entry options:
  - (before: cycling trips only)
  - New:
    - Trips
    - Distance
    - Duration
    - Steps (for walking)

More explanations, tips and hints on every step
Welcome to the WHO/Europe Health Economic Assessment Tools (HEAT) for walking and for cycling.

This tool is designed to help you conduct an economic assessment of the health benefits of walking or cycling by estimating the value of reduced mortality that results from specified amounts of walking or cycling.

The tool can be used in a number of different situations, for example:

1. When planning a new piece of cycling or walking infrastructure.

HEAT attaches a value to the estimated level of cycling or walking when the new infrastructure is in place. This can be compared to the costs of implementing different interventions to produce a benefit:cost ratio (and help to make the case for investment), or as an input into a more comprehensive economic appraisal exercise.

2. To value the reduced mortality from current levels of cycling or walking, such as to a specific workplace, across a city or in a country. It can also be used to illustrate economic consequences from a potential future change in levels of cycling or walking.

3. To provide input into more comprehensive economic appraisal exercises, or prospective health impact assessments. For example, to estimate the mortality benefits from achieving targets to increase cycling or walking.

More information is available at http://www.euro.who.int/HEAT

Next step
• Start using HEAT for walking
• Start using HEAT for cycling
Conclusions

- Identifies a major public health issue and uses effective lever to promote it
- Works outside traditional health care paradigm to achieve health gain
- Uses language of the target sector, not health
- Highly influential

Cheap and sustainable
Mean age and reported risk

[Graph showing the relationship between mean age and reported risk with data points from various studies.]
Benefits outweigh the risks

De Hartog et al, 2011

Conclusion:

The health benefits of cycling are 11 times larger than the risks relative to car driving for the individual subjects shifting mode of transport. Societal benefits are even larger due to a modest reduction in air pollution emissions and traffic accidents.
Why cycling and walking?

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Carlos Dora, Tim Armstrong, Vanessa Candeias

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2 Institute of Social and Preventive Medicine, University of Zurich, Switzerland
3 World Health Organization Headquarters, Department of Chronic Diseases and Health Promotion
In this presentation:

- Physical activity and health: what do we know?
- WHO Global Recommendations on Physical activity for Health
- Why cycling and walking?
- Health dividends from Green Growth Strategies
Physical activity and health: what do we know?
Physical inactivity is a leading risk factor for health in Europe, associated to nearly 1 million deaths/year.

Inactivity status in the European Region

- WHO estimates that in adults:
  - 63% are not reaching the minimum recommended level of physical activity
  - 20% of those are rated as “inactive”
  - 38% are sufficiently/highly active

- 40% of EU citizens say that they play sport at least once a week

- Citizens of Mediterranean and central European countries tend to exercise less

- 22% of 11-year old girls and 30% of boys report at least one hour of daily moderate to vigorous PA (MVPA)

Eurobarometer 72.3. Special Eurobarometer 334: Sport and PA
Health Behaviour in School Aged Children 2005/06 Survey
Physical inactivity estimated to cause:
21–25% of breast and colon cancer burden
27% of diabetes burden
30% of ischaemic heart disease burden

Magnitude of benefits from reaching minimum recommendations for physical activity

- Risk reductions for:
  - 20-30% for CHD and CVD morbidity and mortality
  - Cancer risks:
    - 30% for colon cancer
    - 20% - 40% for breast cancer
    - 20% for lung cancer
    - 30% for endometrial cancer
    - 20% for ovarian cancer
  - 30% for developing functional limitations
  - 30% for premature all-cause mortality

WHO Global recommendations on physical activity for health
Adults aged 18-64

- **At least 150 minutes** of Moderate intensity PA spread throughout the week
- OR
- **at least 75 minutes** of Vigorous PA spread throughout the week
- OR
- **an equivalent combination** of those two
- Bouts of at least **10 minutes**.
WHY CYCLING AND WALKING?
Cycling and walking: a great way to meet the recommendations for healthier life!

- Do not require making a time slot available for that
  
  “I have no time for physical activity”

- Equitable and accessible options

- Feasible
  - 10% of trips made in car in Europe cover distances of less than 1 km
  - more than 30% less than 3 km and 50% of less than 5 km

Most people can do it is enjoyable!!!!

Photo courtesy of BASPO
The benefits of physical activity come as a “package” and are reflected on overall reduction in total mortality - 1/2

<table>
<thead>
<tr>
<th>Cyclists and effects on total mortality</th>
<th>FINDINGS</th>
<th>Reduction in risk for all cause mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Andersen et al (2000) Copenhagen Hearth Study</td>
<td>Danish adults reporting cycling to and from work: RR = 0.72 (95% CI: 0.6, 0.9) for all cause mortality</td>
<td>28%</td>
</tr>
<tr>
<td>Matthews et al (2007) Shangay Women’s Health Study</td>
<td>Chinese women reporting regular cycling for transportation: RR=0.79 (0.61-1.01) (0.1-3.4METs) and 0.66 (0.40-1.07) (&gt;3.5METs) for all-cause mortality</td>
<td>21-34%</td>
</tr>
</tbody>
</table>
The benefits of physical activity come as a package and are reflected on overall reduction in total mortality - 2/2

Meta-analysis results show nearly 30% reduced all-cause mortality for regular walkers

The association between walking and all-cause mortality in men and women. The referent group refers to the lowest walking (volume/intensity) group and hazard ratios of less than 1.0 suggest benefits of walking. MET, metabolic equivalent.

Source: Hamer and Chida, 2008
**Walking and cycling: an option that helps different sectors achieving their own goals**

<table>
<thead>
<tr>
<th>Goals</th>
<th>Interest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduce emissions of:</td>
<td></td>
</tr>
<tr>
<td>– air pollutants;</td>
<td>Environment</td>
</tr>
<tr>
<td>– greenhouse gases;</td>
<td>Health</td>
</tr>
<tr>
<td>– noise</td>
<td></td>
</tr>
<tr>
<td>Reduce congestion</td>
<td>Transport</td>
</tr>
<tr>
<td>Reduce road traffic injuries</td>
<td>Transport, Health</td>
</tr>
<tr>
<td>Reduce investments in infrastructure for more cars</td>
<td>Transport</td>
</tr>
<tr>
<td>Improve accessibility and quality of urban life</td>
<td>Transport, Health</td>
</tr>
<tr>
<td>Complement improvements to vehicles and fuels</td>
<td>Transport</td>
</tr>
<tr>
<td>Increase physical activity</td>
<td>Health</td>
</tr>
<tr>
<td>Promote tourism</td>
<td>Tourism and leisure industry</td>
</tr>
<tr>
<td>Creation of new jobs</td>
<td>Economy, welfare, labour</td>
</tr>
</tbody>
</table>

*World Health Organization*
Health dividends from Green Growth Strategies
Active transport as part of policies to reduce greenhouse gases emissions provides important health benefits

Scenarios for urban transport in London

* Health effects attributable to physical activity, air pollution, injuries per million population in 1 year, compared to “business as usual”. Negative numbers indicate a reduction in the disease burden.

<table>
<thead>
<tr>
<th>Health effects*</th>
<th>Low emissions vehicles</th>
<th>Increase in active mobility</th>
<th>Combining low emissions vehicles and active mobility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Premature mortality</td>
<td>-17</td>
<td>-530</td>
<td>-541</td>
</tr>
<tr>
<td>Years of Life Lost (YLL)</td>
<td>-160</td>
<td>-5188</td>
<td>-5295</td>
</tr>
<tr>
<td>Years of Life lived with Disability (YLD)</td>
<td>0</td>
<td>-2144</td>
<td>-2144</td>
</tr>
<tr>
<td>Disability Adjusted Life Years (DALYs)</td>
<td>-160</td>
<td>-7332</td>
<td>-7439</td>
</tr>
</tbody>
</table>

Evidence: physical activity and health linked to urban modal split

<table>
<thead>
<tr>
<th>Factor</th>
<th>Studies finding improved outcomes</th>
<th>Studies finding worse outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Use of different travel modes</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>More active transport (walking, cycling)</td>
<td>Increased physical activity&lt;br&gt;Reduced BMI or obesity&lt;br&gt;Reduced air pollution-related effects&lt;br&gt;Improved quality of life or reported health status&lt;br&gt;Revisions in specific health problems&lt;br&gt;Lower mortality / higher life expectancy</td>
<td>Increased stress and psychological distress&lt;br&gt;Increased road traffic injury</td>
</tr>
<tr>
<td>More use of public transport</td>
<td>Increased walking, cycling or active transport&lt;br&gt;Increased physical activity&lt;br&gt;Reduced BMI or obesity&lt;br&gt;Reduced air pollution-related effects</td>
<td>Increased air pollution-related effects&lt;br&gt;Increased risk of tuberculosis</td>
</tr>
<tr>
<td>Lower car use, car ownership and traffic volumes</td>
<td>Increased walking, cycling or active transport&lt;br&gt;Increased physical activity&lt;br&gt;Reduced BMI or obesity&lt;br&gt;Improved reported health status&lt;br&gt;Revisions in specific health problems</td>
<td></td>
</tr>
</tbody>
</table>
...and to mode of *infrastructure investment*

<table>
<thead>
<tr>
<th>Infrastructure for different travel modes (including presence and proximity of infrastructure)</th>
<th>Increased walking, cycling or active transport</th>
<th>Less active transport</th>
</tr>
</thead>
<tbody>
<tr>
<td>More infrastructure facilitating walking (including general assessments of &quot;walkability&quot; of neighbourhoods as well as presence of specific features, e.g. pavements)</td>
<td>Increased physical activity</td>
<td>Reduced BMI or obesity</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Reduced air pollution-related effects</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Improved reported health status</td>
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<td></td>
<td>Reductions in specific health problems</td>
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<tr>
<td></td>
<td></td>
<td>Lower mortality / higher life expectancy</td>
</tr>
<tr>
<td>More infrastructure facilitating cycling</td>
<td>Increased walking, cycling or active transport</td>
<td>Reduced BMI or obesity</td>
</tr>
<tr>
<td></td>
<td>Increased physical activity</td>
<td>Reduced air pollution-related effects</td>
</tr>
<tr>
<td>More infrastructure facilitating public transport use</td>
<td>Increased walking, cycling or active transport</td>
<td>Reduced air pollution-related effects</td>
</tr>
<tr>
<td></td>
<td>Increased physical activity</td>
<td></td>
</tr>
<tr>
<td>Less infrastructure facilitating car travel (including parking, motorways)</td>
<td>Increased walking, cycling or active transport</td>
<td>Reduced BMI or obesity</td>
</tr>
</tbody>
</table>

Review of studies on infrastructure investment, physical activity and health – WHO/Health in Green Economy (forthcoming)
Health Dividends from Green Growth

Conclusion:

Much greater health gains from shifting to rapid transit/public transport walking and cycling than from improving fuel and vehicle efficiency

Consider all costs and benefits of Green Growth strategies!
Welcome to the WHO/Europe Health Economic Assessment Tools (HEAT) for walking and for cycling.

This tool is designed to help you conduct an economic assessment of the health benefits of walking or cycling by estimating the value of reduced mortality that results from specified amounts of walking or cycling.

The tool can be used in a number of different situations, for example:

1. When planning a new piece of cycling or walking infrastructure.

HEAT attaches a value to the estimated level of cycling or walking when the new infrastructure is in place. This can be compared to the costs of implementing different interventions to produce a benefit-cost ratio (and help to make the case for investment), or as an input into a

How much is reduced mortality from regular walking and cycling worth?