

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:

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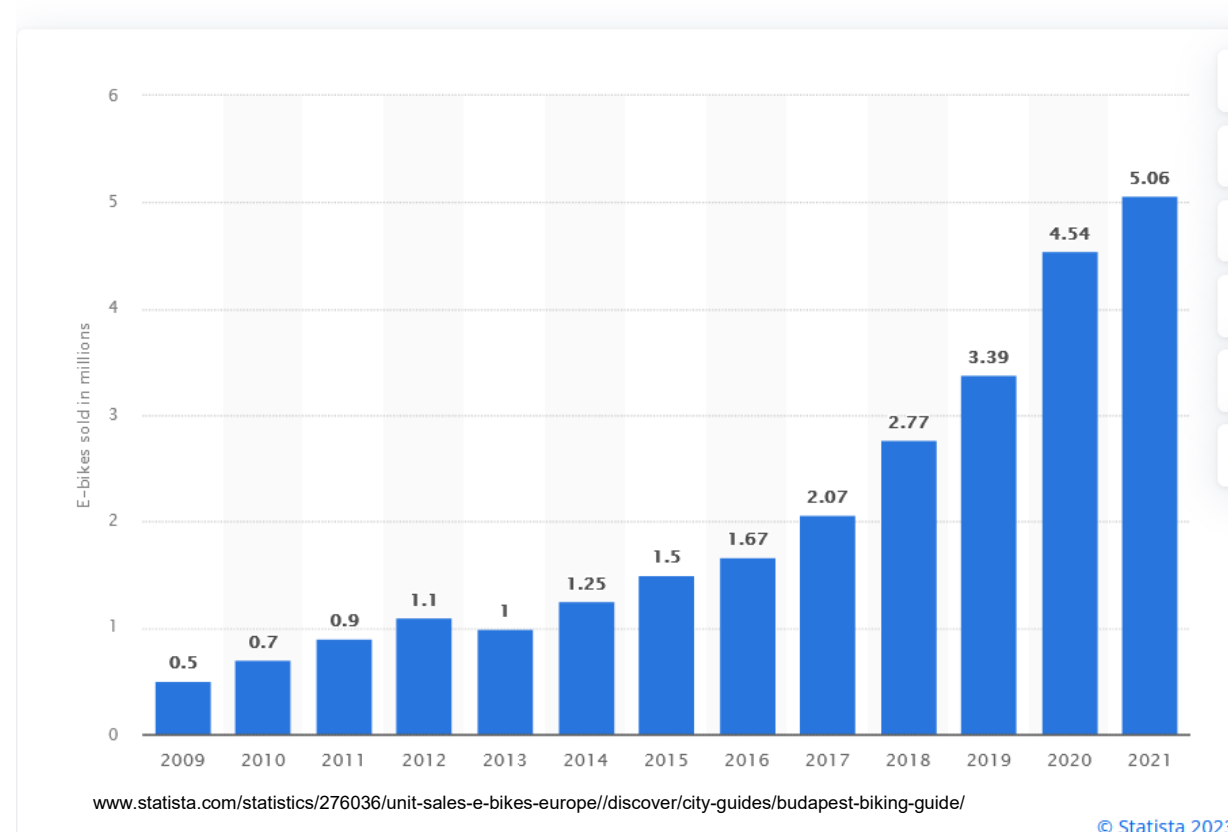
Active mobility and public transport have important climate mitigation and health co-benefits

Mitigation strategy	Potential to reduce emissions (illustrative)	Likely reduction of health risk factors		Additional effects, limitations and comments	
		Size and direction of effect	Strength of		
IPCCc Land use changes and alternatives to private motorized transport	Package of walkways, cycleways and bus rapid transit could reduce emissions by 25% at a cost of US\$ 30/tCO ₂ . ²⁰ Improved land use could reduce emissions by 21% over a 20-year period at a cost of US\$ 91/tCO ₂ . ¹⁰	Air pollution	++	Moderate	
		Physical activity	++	Moderate	
		Road traffic injury	++	Moderate	
		Noise	++	Weak	
		Social effects	++	Weak	
		Land use	Not applicable		
changes and alternatives to private motorized transport	transit could reduce emissions by 25% at a cost of US\$ 30/tCO ₂ . ²⁰ Improved land use could reduce emissions by 21% over a 20-year period at a cost of US\$ 91/tCO ₂ . ¹⁰	Road traffic injury Noise Social effects Land use	++ ++ ++ Not applicable	Moderate Weak Weak Not applicable	Can make walking and cycling safer for vulnerable groups, e.g. children, older adults and people without cars. Increases in walking and cycling need to be accompanied by improvements in the safety of the walking and cycling environment.

E-bikes are on the rise

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

(in millions)



Evidence on e-biking, health & climate impacts



ELSEVIER

Transport Policy

Volume 116, February 2022, Pages 11-23



<https://www.sciencedirect.com/science/article/pii/S0967070X21003401>

E-bikes and their capability to reduce car CO₂ emissions

SYSTEMATIC REVIEW article

Front. Sports Act. Living, 19 October 2022

Sec. Physical Activity in the Prevention and Management of Disease

Volume 4 - 2022 | <https://doi.org/10.3389/fspor.2022.1031004>

This article is part of the Research Topic

Walking, Cycling and Active Travel As Part of Physical Activity and Public Health Systems

[View all 12 Articles >](#)

E-cycling and health benefits: A systematic literature review with meta-analyses

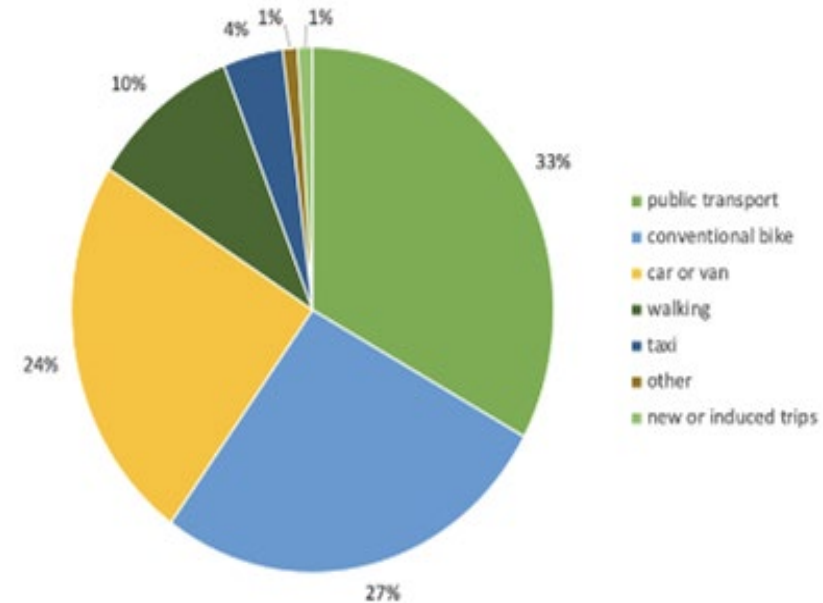
<https://www.sciencedirect.com/science/article/pii/S259019821930017X>

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

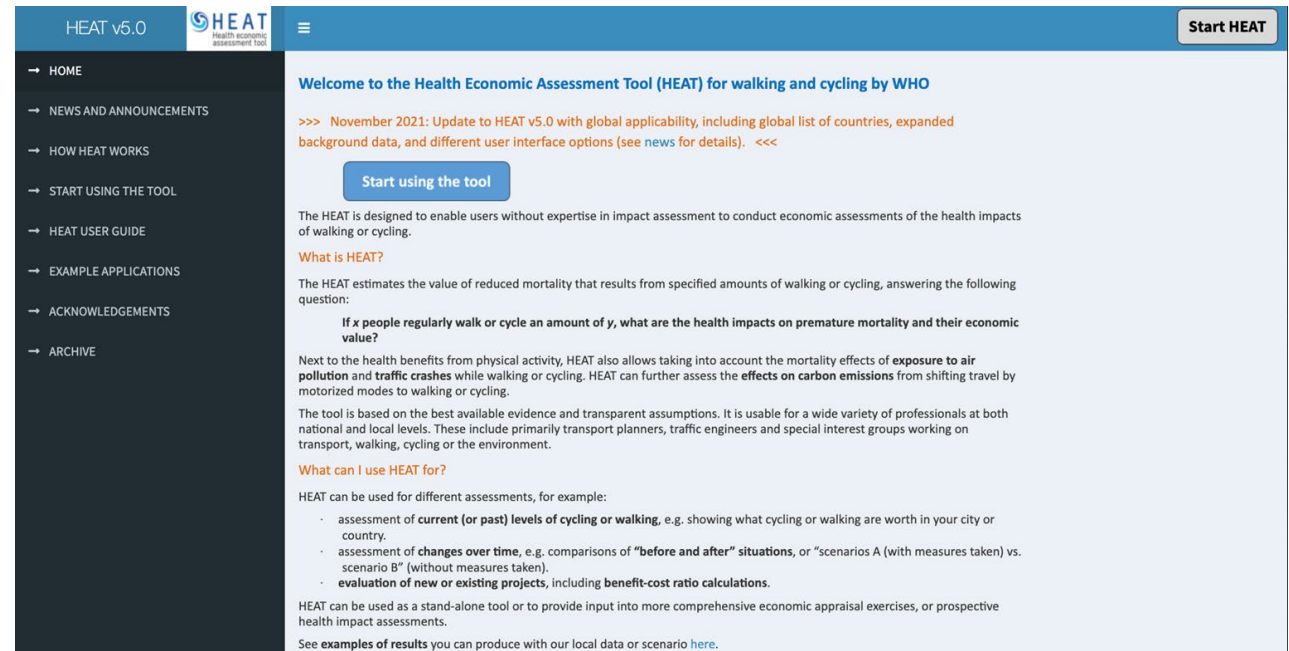
Figure 2: Median mode substitution to e-biking based on meta-analysis of 24 studies



Source: Bigazzi and Wong (2020)

What is the HEAT?

- Online tool
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



The screenshot shows the HEAT v5.0 website. The header includes the HEAT logo and a 'Start HEAT' button. A dark sidebar on the left contains a navigation menu with links to HOME, NEWS AND ANNOUNCEMENTS, HOW HEAT WORKS, START USING THE TOOL, HEAT USER GUIDE, EXAMPLE APPLICATIONS, ACKNOWLEDGEMENTS, and ARCHIVE. The main content area features a welcome message, a 'Start using the tool' button, and detailed text explaining the tool's purpose, what it assesses (premature mortality, carbon emissions), and how it can be used for various assessment scenarios.

HEAT v5.0

HEAT Health economic assessment tool

Start HEAT

Welcome to the Health Economic Assessment Tool (HEAT) for walking and cycling by WHO

>>> November 2021: Update to HEAT v5.0 with global applicability, including global list of countries, expanded background data, and different user interface options (see news for details). <<<

Start using the tool

The HEAT is designed to enable users without expertise in impact assessment to conduct economic assessments of the health impacts of walking or cycling.

What is HEAT?

The HEAT estimates the value of reduced mortality that results from specified amounts of walking or cycling, answering the following question:

If x people regularly walk or cycle an amount of y , what are the health impacts on premature mortality and their economic value?

Next to the health benefits from physical activity, HEAT also allows taking into account the mortality effects of **exposure to air pollution and traffic crashes** while walking or cycling. HEAT can further assess the **effects on carbon emissions** from shifting travel by motorized modes to walking or cycling.

The tool is based on the best available evidence and transparent assumptions. It is usable for a wide variety of professionals at both national and local levels. These include primarily transport planners, traffic engineers and special interest groups working on transport, walking, cycling or the environment.

What can I use HEAT for?

HEAT can be used for different assessments, for example:

- assessment of **current (or past) levels of cycling or walking**, e.g. showing what cycling or walking are worth in your city or country.
- assessment of **changes over time**, e.g. comparisons of “before and after” situations, or “scenarios A (with measures taken) vs. scenario B” (without measures taken).
- **evaluation of new or existing projects**, including **benefit-cost ratio calculations**.

HEAT can be used as a stand-alone tool or to provide input into more comprehensive economic appraisal exercises, or prospective health impact assessments.

See **examples of results** you can produce with our local data or scenario [here](#).

HEAT – A collaborative project



Project coordinating team:

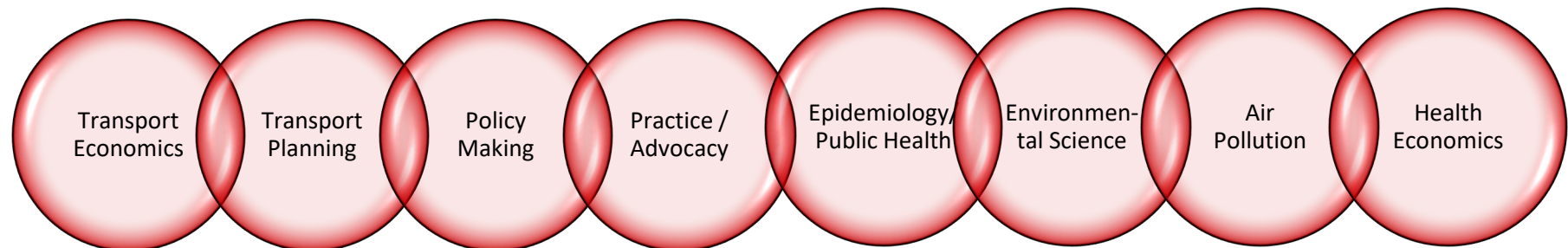
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Expertise involved:

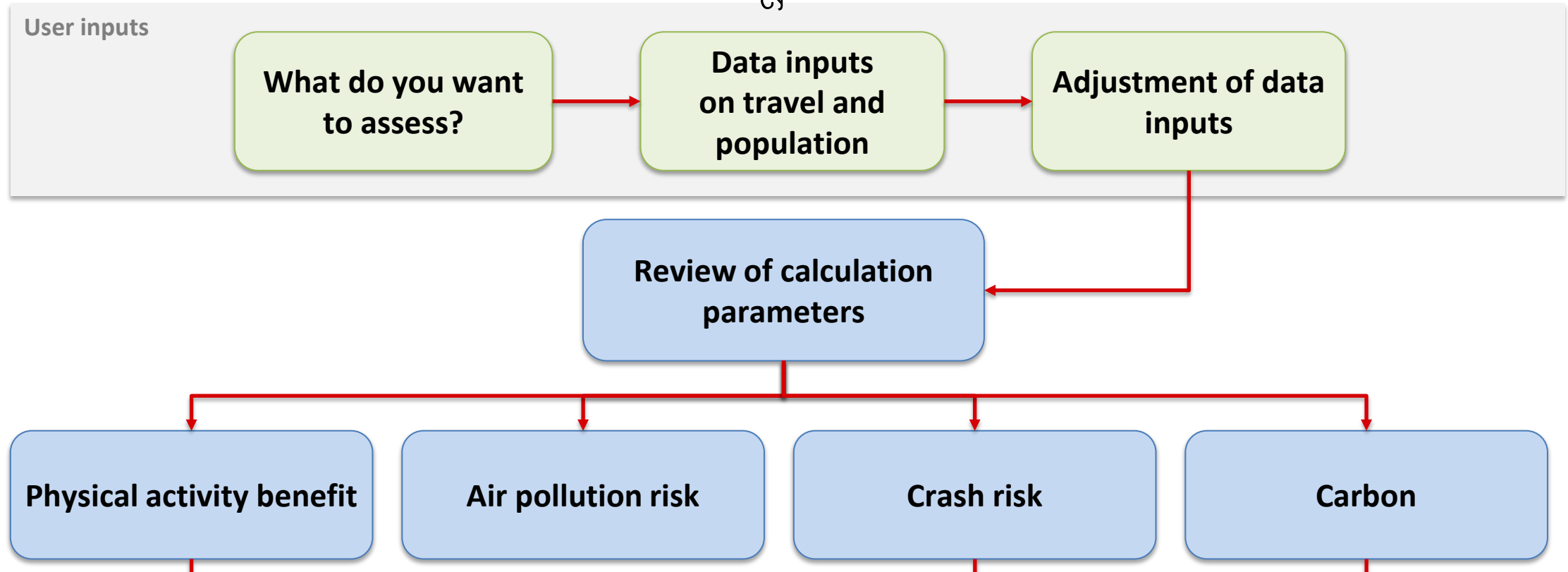


HEAT answers the question:

- 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**?

HEAT workflow

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



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 ⓘ

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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 ▲

- Hypothetical scenario
- Population survey
- Intercept survey
- Count data
- Modeled 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) ▼

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Population data

Provide your information about the population you are assessing below.

[Tell me more!](#)

Total population size for your city (Data source: [United Nations, Statistics Division](#)) ⓘ

Figure includes all ages

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](#)) ⓘ

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

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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.

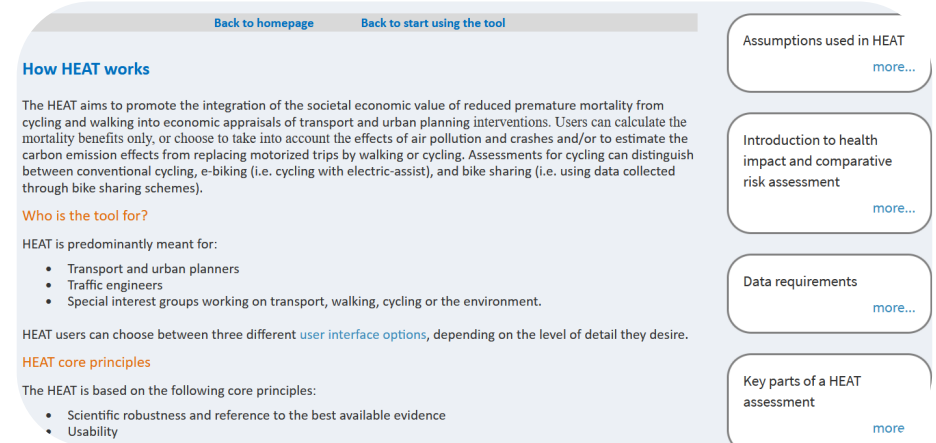
Over the full assessment period of 10 years, the total economic impact is 814,000,000 (US\$).

Adjusted to 2023 value (i.e. discounted/inflated), the total economic impact is 629,000,000 (US\$).

Supporting documentation

- **Website:** www.heatwalkingcycling.org including methods and user guide
- **Methodology:**
 - Latest methods paper: www.mdpi.com/1660-4601/17/20/7361
- **HEAT booklet**
 - Methods & user guide: <https://www.heatwalkingcycling.org/#userguide> (updated version forthcoming)
- **For technical support & input**
 - Email: heatwalkingcycling@who.int

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Back to homepage Back to start using the tool

How HEAT works

The HEAT aims to promote the integration of the societal economic value of reduced premature mortality from cycling and walking into economic appraisals of transport and urban planning interventions. Users can calculate the mortality benefits only, or choose to take into account the effects of air pollution and crashes and/or to estimate the carbon emission effects from replacing motorized trips by walking or cycling. Assessments for cycling can distinguish between conventional cycling, e-biking (i.e. cycling with electric-assist), and bike sharing (i.e. using data collected through bike sharing schemes).

Who is the tool for?

HEAT is predominantly meant for:

- Transport and urban planners
- Traffic engineers
- Special interest groups working on transport, walking, cycling or the environment.

HEAT users can choose between three different [user interface options](#), depending on the level of detail they desire.

HEAT core principles

The HEAT is based on the following core principles:

- Scientific robustness and reference to the best available evidence
- Usability

Assumptions used in HEAT [more...](#)

Introduction to health impact and comparative risk assessment [more...](#)

Data requirements [more...](#)

Key parts of a HEAT assessment [more](#)

