

THE UNEQUAL HEALTH BURDEN OF AIR AND NOISE POLLUTION IN EUROPE



ABOUT THIS FACTSHEET

[BEST-COST](#) is an EU-funded research project working to improve methodologies to better understand the socioeconomic cost of environmental stressors, focusing on air and noise pollution. The project aims to support improved policies and practices that reduce the burden of disease, and create living and working environments that are more health-promoting, equitable and sustainable.

This factsheet explores how air and noise pollution affect people's health in different ways across Europe, zooming in on the five BEST-COST case study countries. It shares tools developed by the project to help researchers and policymakers take action to reduce the burden of disease and mitigate health inequalities.

DEFINITIONS

ENVIRONMENTAL STRESSORS	Factors related to the environment that can impact human physical and psychosocial health. Environmental stressors include air and noise pollution.
SOCIOECONOMIC INEQUALITIES	Differences in social and economic conditions (income, education, employment, etc.) between different groups of people, which are avoidable by reasonable means. ¹
ENVIRONMENTAL INEQUALITIES	Differences in the levels of exposure to environmental stressors between groups of people according to their socioeconomic status.
HEALTH BURDEN, OR BURDEN OF DISEASE	Measuring the impact of diseases and risk factors on physical and psychosocial health in a comprehensive and comparable way. ²

THE SITUATION IN EUROPE

1. Environmental stressors such as air and noise pollution can have a wide range of negative impacts on physical and mental health.

**AIR
POLLUTION**
350,000
**PREMATURE
DEATHS
ANNUALLY**

Air pollution is the largest environmental health risk in Europe. Air pollution is linked to health conditions such as asthma, lung cancer, heart diseases, and stroke.^{3,4}

**NOISE
POLLUTION**
66,000
**PREMATURE
DEATHS
ANNUALLY**

More than one in five people in Europe are exposed to chronic noise levels from transport considered harmful to their health.⁵

2. Exposure to environmental stressors is **unequal**, both within and between countries and regions in Europe.

UNEQUAL EXPOSURE

Communities with **lower levels of income and education** often live, work, and go to school in more polluted environments, for instance urban areas with high traffic and high population density, or industrial areas.⁶

Regions in eastern and south-eastern Europe are both relatively **poorer and more exposed** to air pollution.⁷

3. The health impacts of environmental stressors are also **unequally distributed**. This worsens health and socioeconomic inequalities.

UNEQUAL DISTRIBUTION OF ENVIRONMENTAL STRESSORS WORSENS SOCIOECONOMIC INEQUALITIES

Older people, children, and people with pre-existing health conditions are more vulnerable to the impacts of air and noise pollution.⁸ Over **1200 premature deaths per year** of people under the age of 18 in Europe can be attributed to air pollution.⁹

Lower socioeconomic groups are likely to be both **more exposed** and **more susceptible** to the health impacts of environmental stressors. They are also less able to cope with these impacts, for instance facing difficulties to access health care.

FIVE COUNTRY EXAMPLES

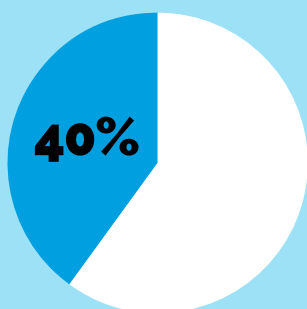
Exposure to and impact of air and noise pollution is unequally distributed within and between countries across Europe.



IMPACTS OF EXCESSIVE VEHICLE NOISE ON HEALTH IN TALLINN¹¹

140
strokes annually

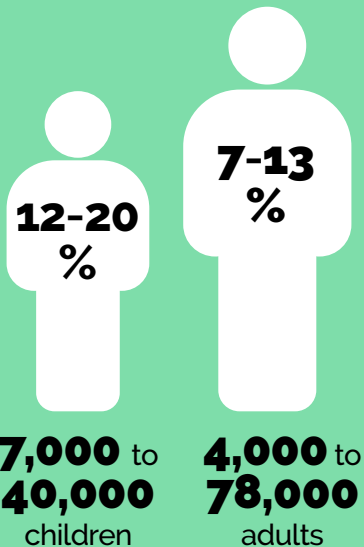
130
cases of ischemic heart disease



Approximately **160,000 residents** live in areas affected by unhealthy traffic noise levels.

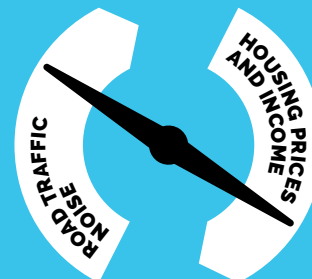
FRANCE IMPACTS OF AIR POLLUTION ON CHILDREN AND ADULT HEALTH¹²

Incident cases



High numbers of incident cases of **respiratory, cardiovascular or metabolic diseases** are attributable each year to long-term exposure to fine particles (PM_{2.5}) and nitrogen dioxide (NO₂).

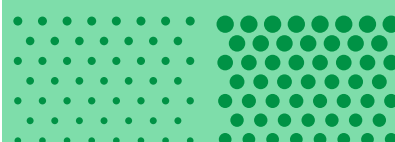
NORWAY INEQUITABLE IMPACTS OF ROAD TRAFFIC NOISE IN URBAN AREAS¹³



Road traffic noise **can be found in lower-cost housing areas.**

People living in noisier areas tend to have a lower income and lower net wealth than people living in quieter areas.

PORTUGAL EXPOSURE TO AIR POLLUTION IN URBAN VS. RURAL AREAS AND IMPACTS ON HEALTH¹⁴

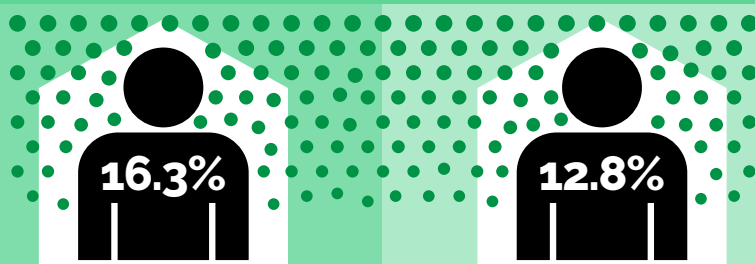


RURAL
lower PM_{2.5}
concentration

URBAN
higher PM_{2.5}
concentration

Between 2011 and 2021, around **22%** of deaths due to ischemic heart disease and **23%** of deaths due to stroke were attributable to PM_{2.5} exposure.¹⁵

BELGIUM POPULATION (15+) DISTURBED AT HOME BY AIR POLLUTION¹⁰



lowest income quintile

highest income quintile

HOW BEST-COST CAN HELP RESEARCHERS AND POLICYMAKERS

Policymakers need to take action to reduce the health burden of air and noise pollution and mitigate resulting health inequalities. To do so, they need reliable and evidence-based information from researchers. However, there is still **no systematic monitoring of environmental health inequalities**.

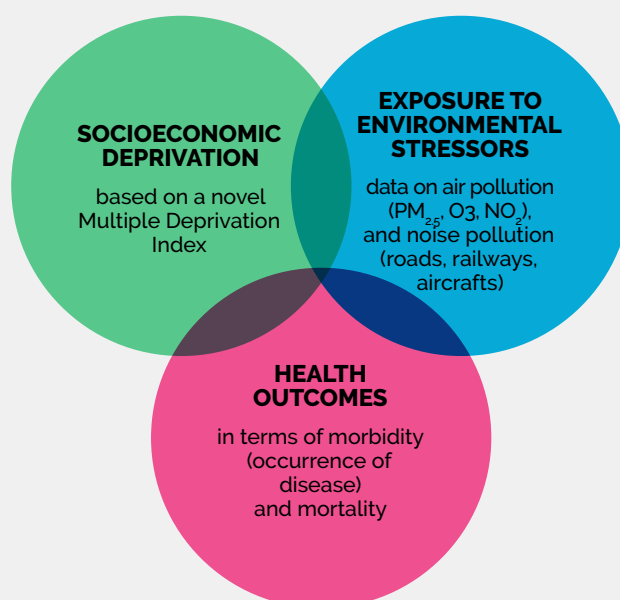
BEST-COST, a pan-European EU-funded research project, has developed an **innovative methodological framework to assess socioeconomic inequalities in the health burden of air and traffic-related noise pollution**. The framework can be used at a small geographical level (such as municipalities) to capture local variations in socioeconomic inequalities and the health burden of exposure to environmental stressors. In this way, it highlights the contribution of socioeconomic inequalities to the health burden of environmental stressors.

ASSISTING RESEARCHERS: USING A METHODOLOGICAL FRAMEWORK AND DEVELOPING MAPS

The BEST-COST methodological framework is based on **three areas of focus**.

Researchers have selected a comprehensive set of indicators for each dimension. When selecting which indicators to use, researchers paid particular attention to the geographical and temporal resolution of the available data to be able to reach the highest common resolution across EU countries.

The three areas and data sources of the BEST-COST methodological framework



WHAT IS THE BEST-COST MULTIPLE DEPRIVATION INDEX (MDI)?

BEST-COST has developed a new MDI covering social and material dimensions of deprivation across five domains: basic amenities, education, employment, family structure, and demographics. The selection of indicators was based on the need to ensure the availability of data at small-area level and enable comparability across countries. The BEST-COST MDI prioritises simplicity and ease of implementation to facilitate practical usage.

WHY DOES BEST-COST USE THE TERM 'DEPRIVATION' AND NOT 'SOCIOECONOMIC INEQUALITIES'?

Deprivation relates to a disadvantage relative to the local community or society. It brings together multiple different indicators. In BEST-COST, it is measured at the area-level. Measuring deprivation is an effective way to assess socioeconomic inequalities.

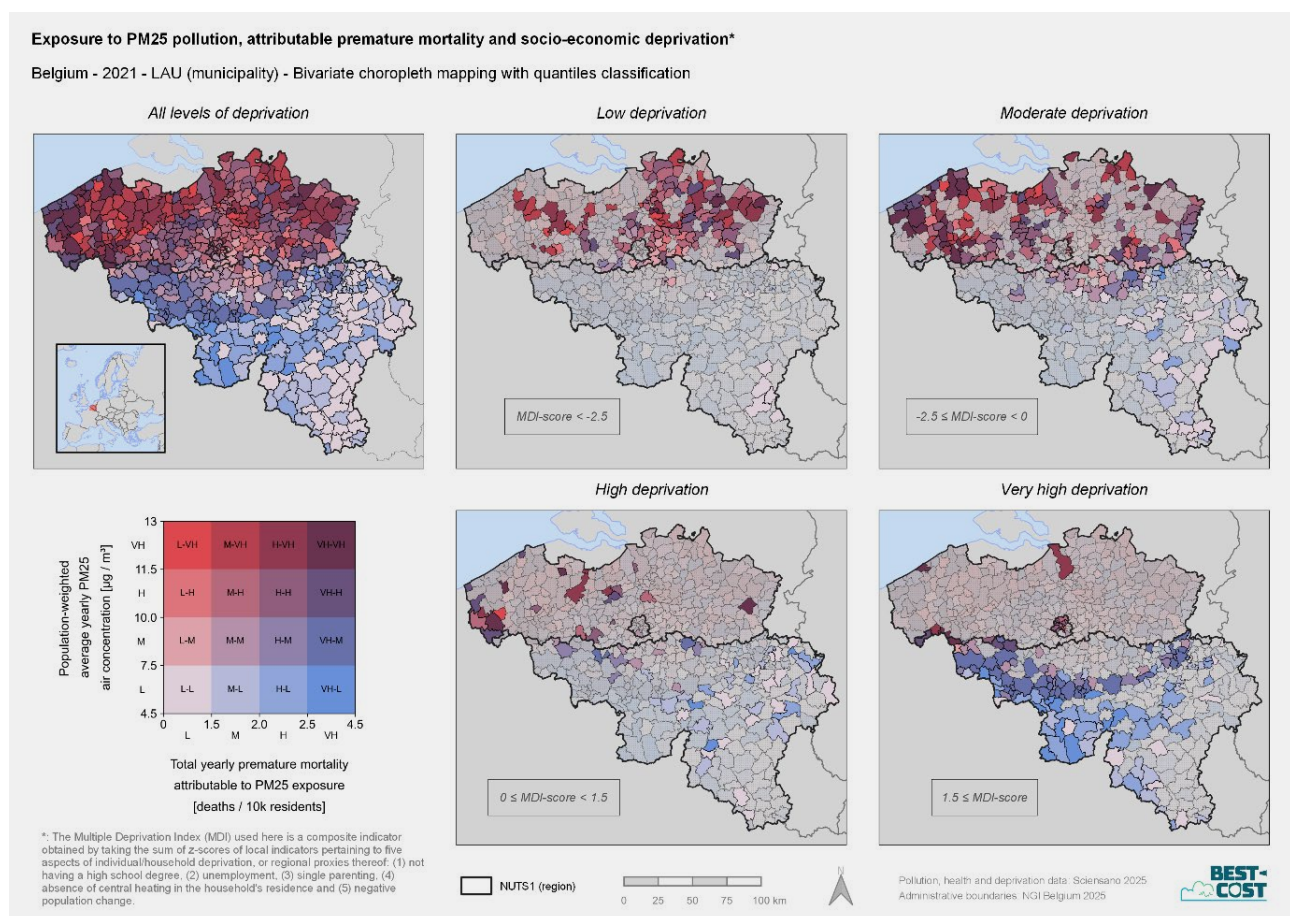
Find out more on the BEST-COST MDI [here](#).¹⁶

The BEST-COST methodological framework can be applied to produce maps that provide spatial insights into the three areas of focus (deprivation, environmental exposure, health outcomes) and their interrelations. The maps can focus on a single area or a combination of areas.

SUPPORTING POLICYMAKERS: USING BEST-COST MAPS TO MAKE EVIDENCE-BASED DECISIONS AND REDUCE THE HEALTH BURDEN OF AIR AND NOISE POLLUTION

The BEST-COST framework and maps enable policymakers to better understand and make evidence-informed decisions tailored to respond to the situation at a granular level. For instance, the maps can help identify population groups living in specific areas who should be the focus of targeted policies to improve their health.

Exposure to $PM_{2.5}$ pollution, all-cause premature mortality (<70 years old) attributable to $PM_{2.5}$ and socioeconomic deprivation at municipality level in Belgium (2021)



By presenting maps focusing on different deprivation levels, BEST-COST allows policymakers to clearly understand the different situations in these different areas. For instance, the maps above highlight that even though municipalities with very high levels of deprivation in Belgium often have low concentrations of $PM_{2.5}$, premature mortality related to $PM_{2.5}$ exposure still remains high.

The BEST-COST methodological framework and maps provide the evidence-base needed to support the design and implementation of multidimensional, inclusive policies that increase current and future people and ecosystem wellbeing.

GET INVOLVED

BEST-COST aims to collaborate and co-create with researchers and policymakers by providing opportunities for exchange and co-developing tailored resources.

FOR RESEARCHERS:

- Become a test user of the BEST-COST R Package, *healthiar*. You can express your interest in learning more and taking part in a workshop by [signing up here](#).
- Benefit from the maps, workflows, scripts, and protocols, which will all be made available through open-source software.

FOR POLICYMAKERS:

- Take part in a capacity-building workshop or a policy roundtable to learn more about how to apply the project's outputs in your work and share your perspectives.
- Contribute to and draw on our policy recommendations and action framework.

If you are interested in learning more about or taking part in any activity, we would love to hear from you. Please get in touch: best-cost.eu/contact/

FIND OUT MORE

Follow BEST-COST to stay informed about project developments.



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More information on the work underlying this factsheet can be found in these reports produced by BEST-COST:

- [Report on the EU index of multiple deprivation methodology – Quantifying social inequalities using a multiple deprivation index](#)
- [Report on the quantification of social inequalities in the health burden of environmental stressors](#)



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ENDNOTES

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