POLICY BRIEF

REDUCING THE SOCIOECONOMIC COST OF AIR AND NOISE POLLUTION IN EUROPE



KEY MESSAGES

1 Air and noise pollution are major yet preventable threats to public health. Despite the substantial impacts, the societal and economic costs of pollution are not always adequately captured in policy and investment decisions.

2 Novel approaches and tools can support policymakers to better measure and quantify these impacts.

3 Integrating evidence on the socioeconomic cost of environmental stressors into policy development and implementation across sectors will help to effectively deliver integrated measures that jointly benefit health, environment, and inequalities.

WHY ACT NOW

Environmental stressors such as air pollution and environmental noise have a **substantial impact on population** health. Although progress has been made, air pollution remains the largest environmental health risk in Europe, causing over 239,000 premature deaths in the EU every year, and worsening respiratory diseases, cardiovascular disease, stroke and diabetes.[1] Environmental noise is the third most important environmental risk factor driving disease burden in the EU – behind air pollution and temperature-related factors.[2] Long-term exposure to noise pollution can generate stress, reduced sleep quality and increased risk of cardio-vascular disease and diabetes. Environmental noise is estimated to contribute to 66,000 premature deaths, 50,000 cases of cardiovascular diseases, and 22,000 cases of type 2 diabetes each year in the EU.[3]

These **health impacts are unequally distributed**. People who are less able to avoid exposure to environmental stressors, such as low-income communities, as well as older persons and children, are at higher risk from the impacts of air and noise pollution and are more likely to face serious consequences. This contributes to widening socioeconomic inequalities within and between countries. Whilst air quality is on average improving in regions at all income levels, the average pollutant concentrations remain one third higher in the poorest European regions.[4]

The impacts of air and noise pollution also generate **wide-ranging societal costs**, including healthcare expenditure and productivity losses, as well as declines in health-related quality of life. In a context of persistent health inequalities and scarcity of healthcare resources, national healthcare systems often struggle to deal with the rising demands of an ageing population and growing burden of non-communicable diseases. **Reducing the health and societal impacts of air and noise pollution is critical, bringing wide-ranging health, societal, economic, and environmental benefits.**

WHAT POLICYMAKERS CAN DO

Policymakers play a critical role in **shaping healthy environments** in which everyone can thrive. Legislation at EU, national, regional and local level can help prevent or reduce health risks associated with environmental exposures as well as contribute to reducing health inequalities and protecting the planet, for current and future generations.

THE CHALLENGE

Policy gaps and fragmentation mean that current legislation does not sufficiently address the health and equity burden of environmental stressors. A policy context of weakening environmental legislation, competing financial priorities, cuts to health funding, and close examination of public investment returns, add to the complexity. Particular challenges focus on:

- **Identifying cost-effective solutions**
- **Addressing health inequalities**

HOW NOVEL TOOLS CAN SUPPORT POLICYMAKING

Quantifying the impacts of air and noise pollution in socioeconomic terms is essential for evidence-based policymaking and priority setting at EU, national, regional and local level. However, methodological challenges have limited the integration of such evidence into policy. The Horizon Europe BEST-COST project (2023–2026) addressed this gap by improving methodologies to quantify and monetise the health burden, socioeconomic costs, and social inequalities associated with environmental stressors.

This policy brief draws on approaches and evidence exploring how socioeconomic cost estimates can effectively inform policy decisions and how complex cost metrics can be translated into actionable tools that support priority setting, regulatory impact assessment, and policy evaluation, from the EU level to the very local geographical level.

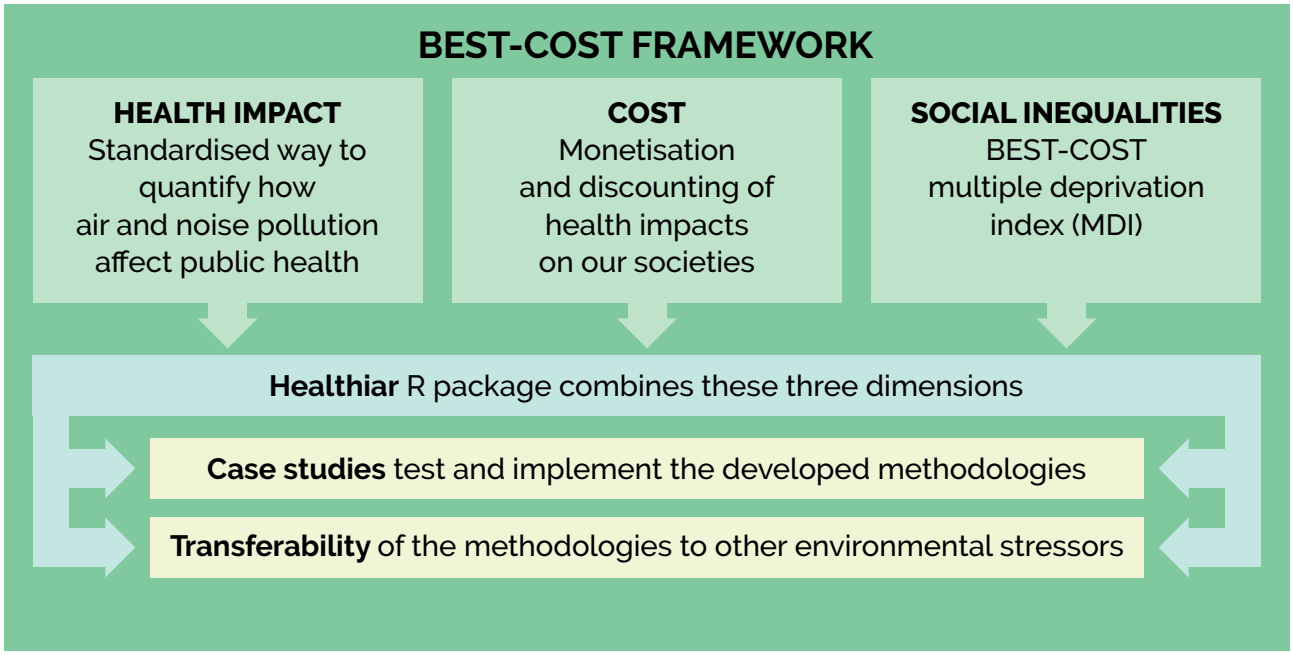
The right to a healthy, clean and sustainable environment is a universal human right, and it should not depend on a favourable calculation, particularly for communities facing the greatest exposure. Improving health is, in its own right, an argument to spur action, and it is also an argument that can help gain public acceptance for acting on environmental stressors.
In addition, assigning monetary value to diverse impacts can strengthen the case for action and help policymakers, researchers and health economists compare interventions and allocate resources efficiently and equitably, based on expected benefits, effectiveness, and overall societal value.

This brief provides:

- **Methods and tools**
- **Evidence: applying novel methods to evaluate interventions**
- **Policy recommendations**

METHODS AND TOOLS

BEST-COST developed a novel approach and improved methodologies to quantify the health burden and cost, as well as the social and health inequalities, caused by air and noise pollution.



HEALTH IMPACT

Methodological protocol for quantifying environmental burden of disease: Provides a standardised way to quantify how environmental factors, particularly air and noise pollution, affect public health. The methodology provides a single number representing the total health burden, expressed in Disability-Adjusted Life Years (DALYs). The approach can also be used to estimate the potentially avoidable disease burden under different exposure-reduction scenarios or policies, allowing policymakers to compare the potential health impacts of different scenarios.
→ ***Find out more:*** Video, Podcast, ***Research report available shortly*** here

COST

Methodological protocol for monetisation and discounting health impacts: While the first methodology quantifies the health burden of environmental exposures in physical units (DALYs), this one translates these impacts into monetary values. This allows policymakers to compare health impacts directly with the costs of interventions, supporting cost-benefit analysis and more efficient resource allocation. The impacts of environmental exposures (e.g., premature mortality, chronic diseases, reduced quality of life) do not have direct market prices. This protocol provides a harmonised framework to assign them monetary values, distinguishing between direct costs (e.g., healthcare expenditures), indirect costs (e.g., productivity losses) and intangible costs (e.g., reduced quality of life).
→ ***Find out more:*** Video, Podcast, ***Research report available shortly*** here

SOCIAL INEQUALITIES

Methodological protocol for integrating social inequalities into the socioeconomic cost of environmental stressors: This methodological protocol is based on three areas of focus: socioeconomic deprivation (novel Multiple Deprivation Index), exposure to environmental stressors (air pollution and noise pollution), and health outcomes (in terms of morbidity and mortality). The framework can be used at small geographical levels to capture local variations in socioeconomic inequalities and the health burden of exposure to environmental stressors, enabling policymakers to make evidence-informed decisions to respond to the situation at a granular level. The framework can be applied to produce maps that provide spatial insights into the three areas of focus and their interrelations.
→ ***Find out more:*** Factsheet, Podcast, Research report

R PACKAGE

Bringing together the three methodological frameworks, an R package, **healthiar**, allows users to quantify and monetise health impacts attributable to environmental exposure.
→ ***Find out more:*** Access healthiar, Podcast

TRANSFERABILITY

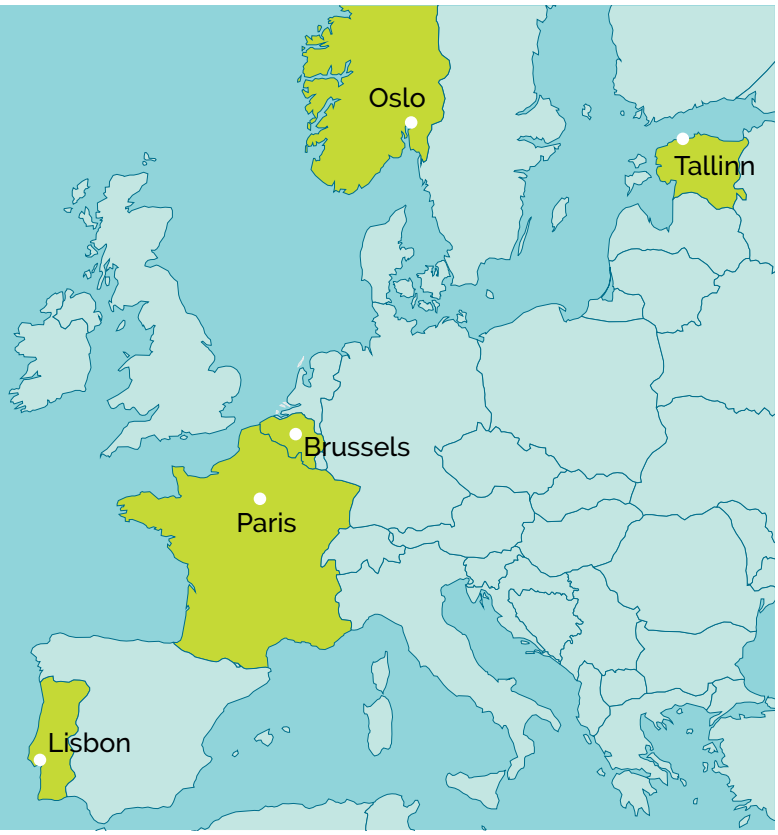
BEST-COST explored how to transfer environmental burden of disease approaches to other environmental stressors beyond air pollution (chemicals, heat), as well as health-promoting factors (green space). BEST-COST also explored how to transfer methods to other countries, including by providing practical policy recommendations on how to do so. More research is needed to take this forward, as well as to consider pollutants such as those related to food and agriculture.
→ ***Find out more:*** Factsheet, Research report on transferability to other stressors, Research report on geographical transferability

EVIDENCE: APPLYING NOVEL METHODS TO EVALUATE INTERVENTIONS

The methods can be used to **evaluate interventions for reducing the impact of air and noise pollution**. This can be done through a health impact assessment that estimates the exposure to air pollutants and the avoidable burden of disease associated with the selected interventions, then monetises the health benefits and compares them with the costs of the interventions. This allows policymakers to compare and rank interventions, identifying which ones are likely to provide the greatest expected benefits relative to their costs, enabling evidence-based decision-making.

BEST-COST evaluated two intervention scenarios: **Low Emission Zones** (LEZ) and a **Reduction in Heavy Vehicle traffic** (RHV), looking at air pollution ($PM_{2.5}$ and NO_2) for the LEZ, and both air and noise pollution for the RHV scenario.

These scenarios were explored in five European capitals:
- Brussels (Belgium)
- Lisbon (Portugal)
- Oslo (Norway)
- Paris (France)
- Tallinn (Estonia)



Key findings are as follows:

EXPOSURE TO AIR POLLUTANTS

- Low Emission Zones scenario had a small impact on reducing $PM_{2.5}$ exposure, particularly in Tallinn and Paris.
- Reduced Heavy Vehicle traffic scenario had little or no impact on $PM_{2.5}$ exposure.
- Both scenarios reduced NO_2 exposure. The LEZ scenario produced the strongest impact on NO_2 exposure in Brussels, and the RHV scenario had the clearest effect in Tallinn.

IMPACT ON BURDEN OF DISEASE

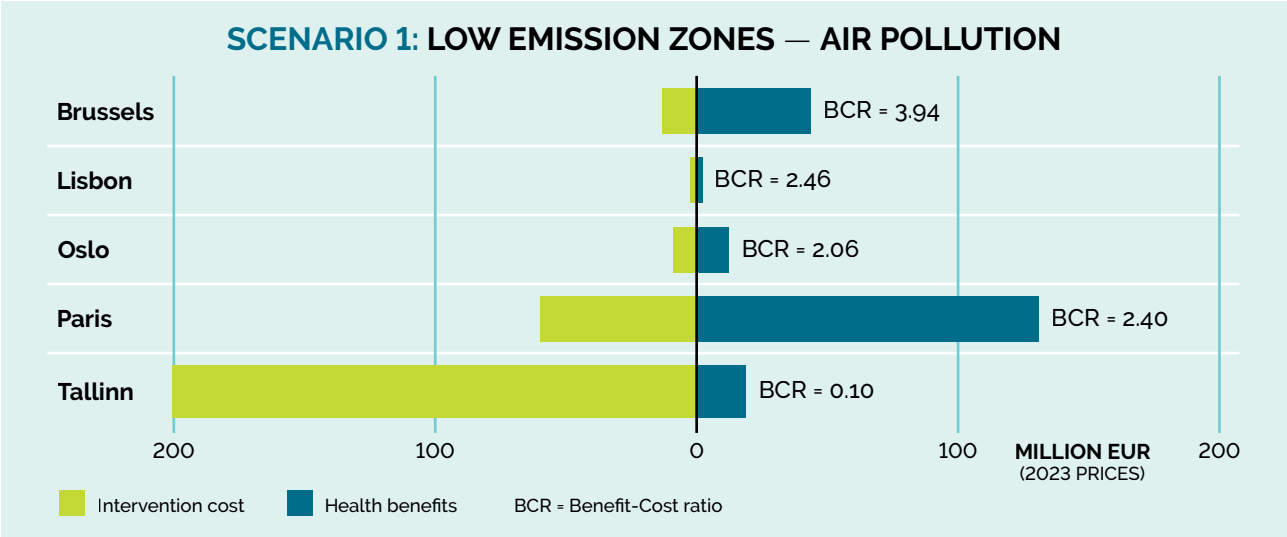
- Reductions in NO_2 exposure contributed to reducing total disease burden, expressed in Disability-Adjusted Life Years (DALYs).
- Low Emission Zones generally produced greater reduction in NO_2 attributable burden compared to Reduced Heavy Vehicle traffic, particularly in Brussels and Oslo. The RHV scenario had a slightly greater effect in Paris and a markedly greater effect in Tallinn.

NOISE POLLUTION

- Reduced Heavy Vehicle traffic scenario generally reduced the number of people exposed to high levels of noise, particularly at nighttime. This consistently lowered the burden of disease attributable to road-traffic noise across all five cities (reduced estimates of high sleep disturbance and high annoyance as well as ischaemic heart disease, stroke and diabetes), although the changes were modest.

COST-BENEFIT ANALYSIS: LOW EMISSION ZONES SCENARIO

The estimated air pollution-related health benefits of the Low Emission Zones scenario exceeded the intervention costs in four cities – Brussels, Lisbon, Oslo, and Paris.

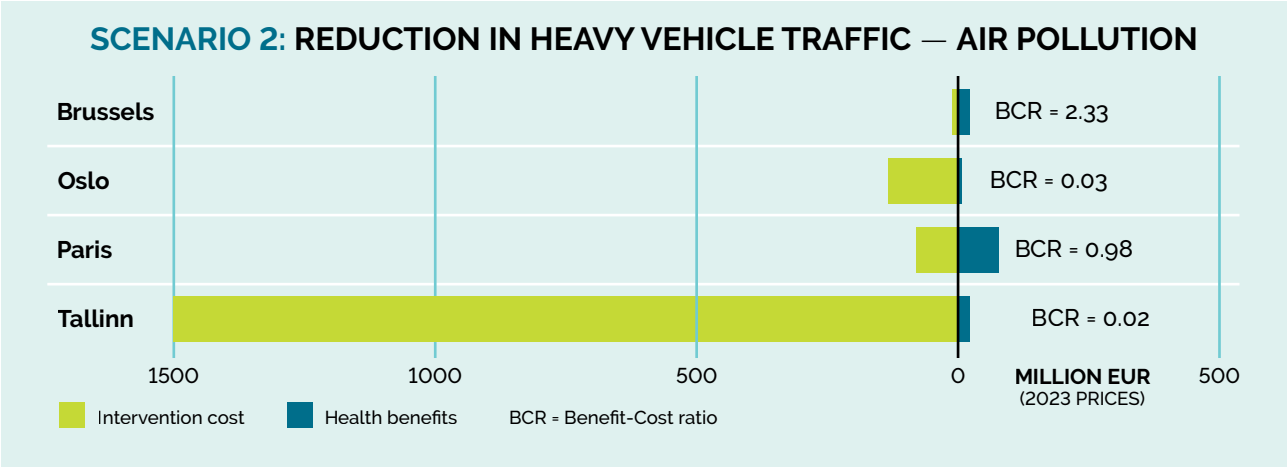


Of particular interest:

- **Paris** recorded the largest absolute health improvement, with approximately 1,800 averted DALYs, corresponding to around €130 million in benefits and €79 million in net benefits.
- **Brussels** achieved the highest benefit–cost ratio: almost €4 in monetised health benefits for every euro spent. Although its absolute benefits are smaller than those of Paris, its lower intervention cost produces a higher return per euro.
- The intervention is profitable in both **Lisbon** and **Oslo**, although with lower net benefits than Paris and Brussels, €1.5 million and €7 million respectively.
- In **Tallinn**, despite an estimated over 180 averted DALYs and roughly €20 million in health benefits, the intervention cost of €200 million resulted in a net loss of −€180 million and a benefit–cost ratio of only 0.10.

COST-BENEFIT ANALYSIS: REDUCED HEAVY VEHICLE TRAFFIC SCENARIO (AIR POLLUTION ONLY)

The economic results of the RHV scenario, when only considering air pollution impacts, varied across four cities (Lisbon was not considered for this scenario).

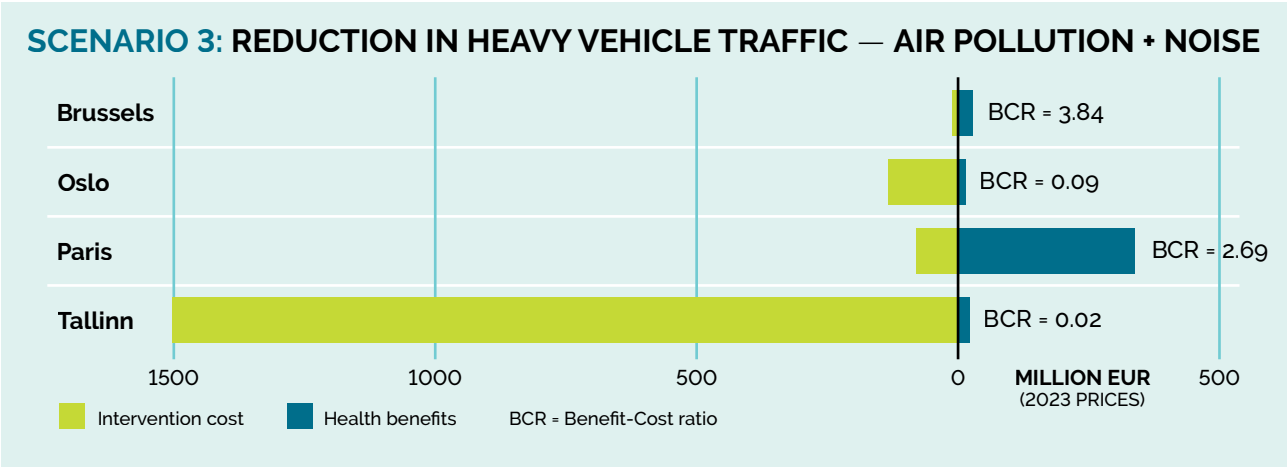


Of particular interest:

- **Brussels** shows positive net benefits of approximately €10 million, with estimated health benefits of about €18 million against an intervention cost of over €7.5 million. Its benefit–cost ratio indicates approximately €2.33 in air pollution-related health benefits per euro spent.
- **Paris** achieved the largest health improvement, with nearly 1,600 averted DALYs and around €113 million in monetised benefits. However, its intervention cost of €115 million places it right below the break-even point.
- In **Oslo** and **Tallinn**, the included intervention costs substantially exceeded the monetised air-pollution benefits.

COST-BENEFIT ANALYSIS: REDUCED HEAVY VEHICLE TRAFFIC SCENARIO (AIR AND NOISE POLLUTION)

Including noise benefits in the RHV scenario improves to some extent the economic results in all four cities.



Of particular interest:

- **Paris** records the largest combined health gain, with around 4200 averted DALYs and over €310 million in monetised benefits. Against an intervention cost of nearly €120 million, this produces net benefits of around €190 million. Adding noise benefits therefore changes the Paris assessment from a nearly break-even point to a clearly positive result.
- **Brussels** also shows substantial gains, with 420 averted DALYs, €30 million in benefits, and €21 million in net benefits.
- Although including noise benefits also improves the results for **Oslo** and **Tallinn**, their intervention costs remain substantially higher than the combined monetised health benefits.

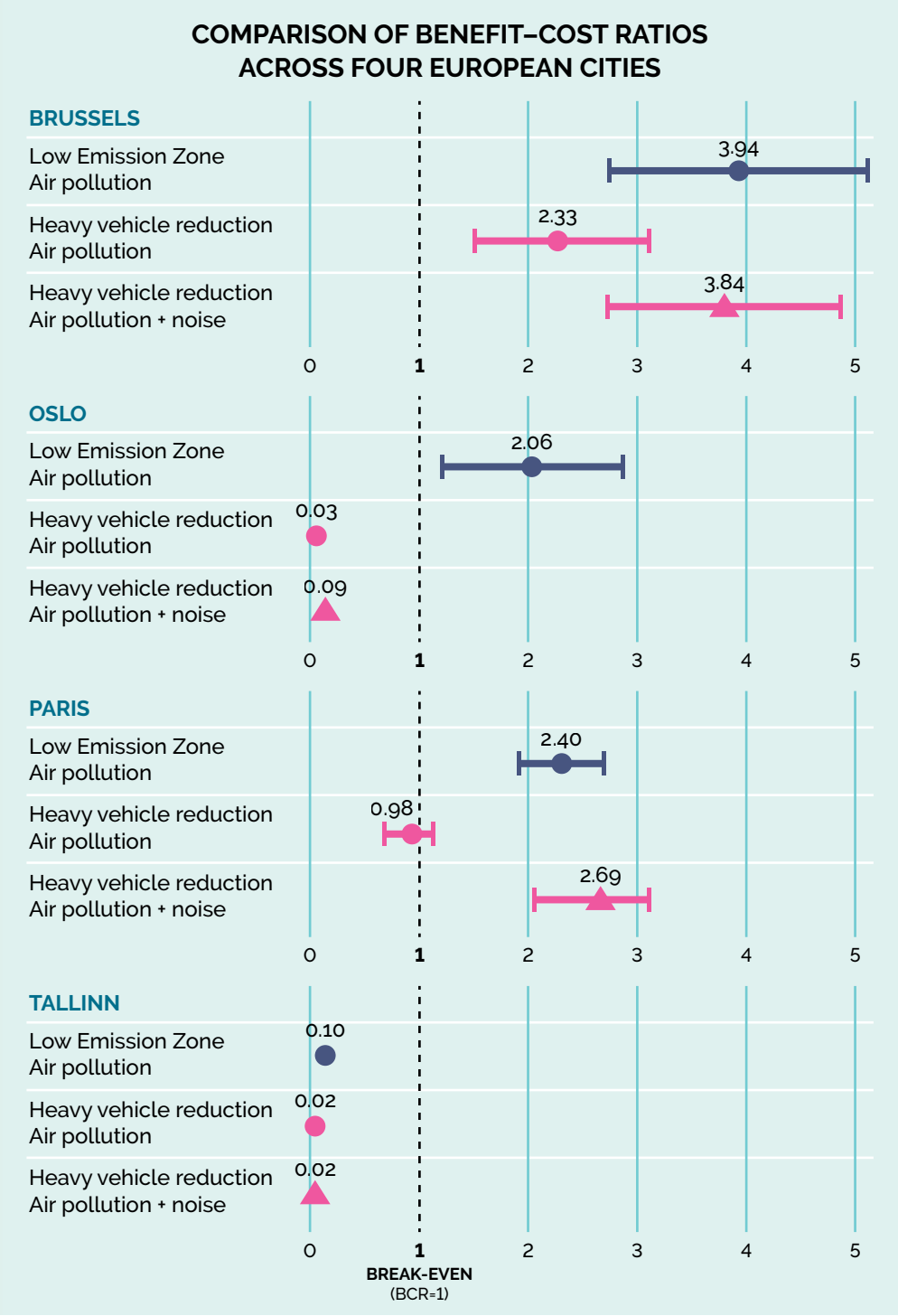
COMPARING THE TWO SCENARIOS

Comparing the economic returns of the two scenarios helps to identify which intervention provides greater monetised health benefits per euro spent in each city.

Points show central estimates; horizontal lines show 95% uncertainty intervals.

Dashed line: break-even (BCR = 1). Heavy vehicle assessments use the same intervention cost, with either air pollution benefits alone ● or combined air pollution and noise benefits ▲.

More information, methods and detailed results will be available in scientific reports and publications in 2027, available here.



POLICY RECOMMENDATIONS

The policy recommendations focus on the need to **develop and effectively implement and monitor integrated policies that jointly consider health, environment, and inequalities**.

The recommendations are relevant for policymakers across **EU, national, regional and local levels**. The different levels of policymaking interact. Whilst the EU level can define ambitions and set targets, it is national, regional or local authorities who are responsible for implementation.

Across the recommendations, and in particular for the recommendation related to inequalities, it is critical for policymakers to **meaningfully involve affected communities** to co-define priorities and co-shape and co-implement agendas and actions through informed deliberation. This bottom-up approach, in which data and actions are interpreted in their local context, is likely to better respond to lived realities, and to achieve greater buy-in and impact. Citizen science, for instance, and partnering with civil society organisations to help local communities monitor air and noise pollution, can connect scientific evidence, public support, and political decisions.



EMBED MONETISATION OF HEALTH AND INEQUALITY IMPACTS IN ENVIRONMENTAL AND CLIMATE POLICIES



INCLUDE A FOCUS ON INEQUALITIES IN ENVIRONMENTAL AND CLIMATE POLICIES



CONSIDER ENVIRONMENTAL STRESSORS IN HEALTH POLICIES



INTEGRATE ANALYSIS OF SOCIOECONOMIC COSTS OF ENVIRONMENTAL STRESSORS INTO BUDGET AND FUNDING DECISION MAKING

EMBED MONETISATION OF HEALTH AND INEQUALITY IMPACTS IN ENVIRONMENTAL AND CLIMATE POLICIES

Why: factoring in the cost of health and inequality impacts when developing, updating or implementing policies on the environment and climate aims to reduce the health, societal and economic burden of environmental stressors and ensure policies are cost-effective and result in co-benefits for human health.

How: use novel methodologies on monetisation of health impacts of environmental stressors when designing or reviewing policies, e.g. during impact assessments processes, and to guide policy implementation, e.g., supporting prioritisation and selection of good practices.

SPECIFIC POLICIES THIS COULD BE APPLIED TO INCLUDE:

Ambient Air Quality Directive (AAQD):

- at **national level**, use cost-benefit analysis to better understand the socioeconomic benefits of implementation and/or cost of inaction of different strategies to improve air quality, helping to shape strong air quality roadmaps in support of effectively implementing the AAQD and monitoring this implementation.
- at **EU level**, use this evidence to assess the benefits of further alignment with WHO Air Quality Guidelines, for instance during the first review of the AAQD implementation scheduled for 2030.

National Emission reduction Commitments Directive:

- at **national level**, use evidence on the monetisation of health and inequality impacts of air pollution to identify and implement policies and measures that achieve co-benefits for health, equity and environmental sustainability as part of national air pollution control programmes (NAPCP), in line with AAQD targets.

Environmental Noise Directive:

- at **national level**, ensure the implementation of the Directive reflects the latest evidence on the physical and mental health impacts of noise exposure, as well as the monetisation of these health impacts, to select and implement cost-effective policies and interventions.
- at **EU level**, consider setting health-based noise limits, 2050 reduction targets, and binding obligations for Member States to implement actions.

Transport policies and urban planning:

- at **national and local level**, monetise health and inequality co-benefits of sustainable mobility solutions and urban planning, in support of measures to reduce traffic, and thus air and noise pollution, for instance as part of the EU Sustainable and Smart Mobility Strategy.

INCLUDE A FOCUS ON INEQUALITIES IN ENVIRONMENTAL AND CLIMATE POLICIES

Why: better understanding the distributional impact of environmental stressors helps develop targeted policies for communities with a high health burden. Although EU, national and local policies are increasingly considering inequalities in environmental exposure, gaps remain in terms of monitoring, setting binding targets, and taking actions forward through targeted policies.

How: use novel methodologies to integrate social inequalities into the socioeconomic cost of environmental stressors, to better understand and make evidence-informed decisions tailored to respond to the situation at a granular level, in collaboration with local communities.

SPECIFIC POLICIES THIS COULD BE APPLIED TO INCLUDE:

Climate resilience and adaptation strategies:

- at **local, national and EU level**, assess how exposure to environmental stressors, including those exacerbated by climate change (e.g., heat), impact different populations and communities, making use of the BEST-COST Multiple Deprivation Index. Identify policies and interventions that advance climate objectives whilst also achieving co-benefits for health and inequalities, in particular at a local level and in collaboration with local communities, but also in national climate risk assessments and climate-proofing plans, as well as in the EU's proposed Climate Resilience Law and strategic plan on climate resilience.

Ambient Air Quality Directive (AAQD):

- at **national and EU level**, develop and include quantitative targets on environmental equality aimed at narrowing the exposure gap between communities with higher/lower health burden due to environmental stressors. Support the achievement of this target by monitoring and measuring.[5]

Zero Pollution Action Plan (ZPAP):

- at **EU level**, develop indicators to monitor the socioeconomic impacts of environmental stressors as part of ZPAP monitoring, as suggested in the monitoring and outlook framework for the zero pollution ambition. This could involve developing indicators for combined or cumulative exposure to multiple environmental stressors, to provide a more comprehensive assessment of health impacts and capture the effects of policies that affect multiple stressors. Include specific targets on reducing health inequalities as part of the ZPAP's 2050 vision.

8th Environmental Action Plan (EAP):

- at **EU level**, continue monitoring air pollution exposure inequalities as part of the 8th EAP and consider expanding the indicator on inequalities to include environmental stressors beyond air pollution. Consider using the BEST-COST Multiple Deprivation Index to measure deprivation through several socioeconomic dimensions, rather than just GDP per capita. Use evidence on the socioeconomic impacts of environmental stressors to feed into the strategic planning of the next environmental action plan by December 2029.

Social Climate Fund:

- at **national level**, consider evidence on the socioeconomic impacts of environmental stressors to develop Social Climate Plans in collaboration with local communities, for instance developing indicators to measure health outcomes across different communities, which can feed into the development and implementation of targeted measures to support vulnerable groups.

CONSIDER ENVIRONMENTAL STRESSORS IN HEALTH POLICIES

Why: environmental stressors such as air and noise pollution, but also heat and chemicals, amongst others, have important health impacts. Taking these stressors and their impacts into account through solid evidence and comparable data when developing health policies can help to maximise health benefits, as part of a One Health approach that jointly considers environment and human health. The evidence on environmental stressors highlights the value of health promotion and the benefits of a preventive approach. Europe's Beating Cancer Plan, for instance, recognises the importance of reducing environmental pollution and exposure to carcinogenic substances.

How: use novel methodologies on the environmental burden of disease to identify and address gaps in current and upcoming health policies as well as in health monitoring, effectively integrating environmental determinants of health.

SPECIFIC POLICIES THIS COULD BE APPLIED TO INCLUDE:

Healthier Together – EU non-communicable diseases (NCD) initiative and national NCD strategies:

- at **national and EU level**, consider environmental stressors more systematically as part of processes to identify and implement effective policies and actions to reduce the burden of NCDs, also looking ahead to NCD policies post-2027.

Cardiovascular health:

- at **national level**, acknowledging that air and noise pollution and other environmental factors are risk factors for cardiovascular diseases, in line with the EU Safe Hearts Plan, include exposure reduction targets as part of plans to address cardiovascular diseases, for instance in existing or upcoming national cardiovascular health plans.
- at **EU level**, support national actions through the EU Safe Hearts Plan, including by providing targets and indicators on environmental risk factors to measure progress and effectiveness.

Heat action plans:

- at **local and national level**, explore how methods such as those developed by BEST-COST can support to capture evidence and set targets and priorities related to heat action plans.
- at **EU level**, include evidence of heat-related health and equity impacts into the upcoming European Heat Action Plan, and consider correlations between heat and air pollution. More information on the transferability of BEST-COST methods to heat can be found in our factsheet on upscaling the BEST-COST research methods.

INTEGRATE ANALYSIS OF SOCIOECONOMIC COSTS OF ENVIRONMENTAL STRESSORS INTO BUDGET AND FUNDING DECISION MAKING

Why: environmental, health and social policies are driven by overarching budgetary directions and decisions. It is critical for economic policies to take into account the socioeconomic costs of environmental stressors to improve health and wellbeing for everyone.

How: use novel methodologies to measure and monetise socioeconomic costs of environmental stressors, going beyond air and noise pollution to also include other stressors such as chemicals and heat, as well as health-promoting factors such as green space. Use this data to prioritise high-impact investments with measurable health and inequality outcomes.

SPECIFIC POLICIES THIS COULD BE APPLIED TO INCLUDE:

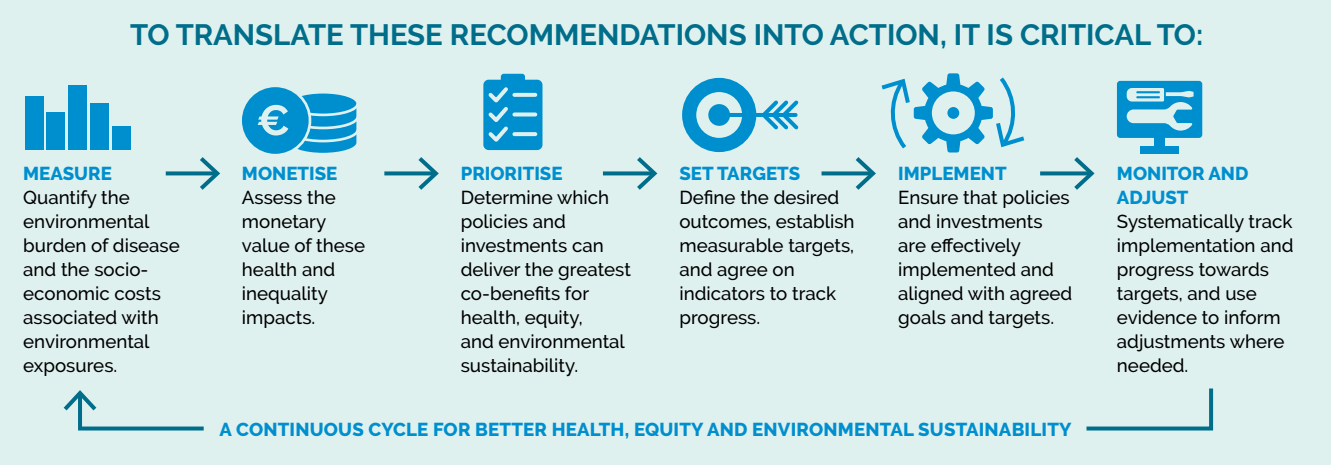
Multiannual Financial Framework (MFF):

- at **national and EU level**, feed evidence on the socioeconomic costs and monetisation of environmental stressors into discussions on the next EU budget, ensuring dedicated funding to improve people's health and wellbeing, reduce inequalities, and ensure environmental sustainability, for instance through a maintained Social Climate Fund. Dedicated investments to improve health and air quality and reduce noise are key to reducing national disease burdens, and have clear socioeconomic benefits. National and local funding is also key to support this goal. It is also important to ensure funding under FP10 to support interdisciplinary research linking health, environment and inequalities, as well as interventions targeting communities with high exposure to environmental stressors.

Urban policies:

- at **local and regional level**, use evidence on the socioeconomic impacts and monetisation of environmental stressors to prioritise funding from e.g., cohesion policy. Such evidence can help to develop policies and measures that produce co-benefits, in support of the EU Agenda for Cities' goals such as incorporating social inclusion and equality dimensions in the design and implementation of policies, increasing resilience concerning climate action, and adopting 'mission' approaches to tackle multiple challenges together.[6]

TAKING ACTION



LOOKING AHEAD

The coming years offer a unique opportunity to **strengthen policy coherence and mainstream and effectively implement policies that deliver co-benefits for health, inequalities, and environmental sustainability across EU, national, regional and local levels.** Failing to act on environmental stressors carries significant health, social, and economic costs, with impacts and exposure unequally distributed across populations and places. These costs and inequalities should therefore be systematically recognised and integrated into policy, investment, and implementation decisions. **Embedding methodologies such as those developed in BEST-COST into relevant policy processes and instruments can help decision-makers make these impacts visible, maximise the health and socioeconomic benefits of action, and support a just and fair transition towards zero pollution.**

BEST-COST researchers are happy to support policymakers and technical staff working across levels of governance to **build capacities on applying novel methods to strengthen policymaking on health and the environment**. If you would like to reach out, please get in touch with EuroHealthNet: info@eurohealthnet.eu.

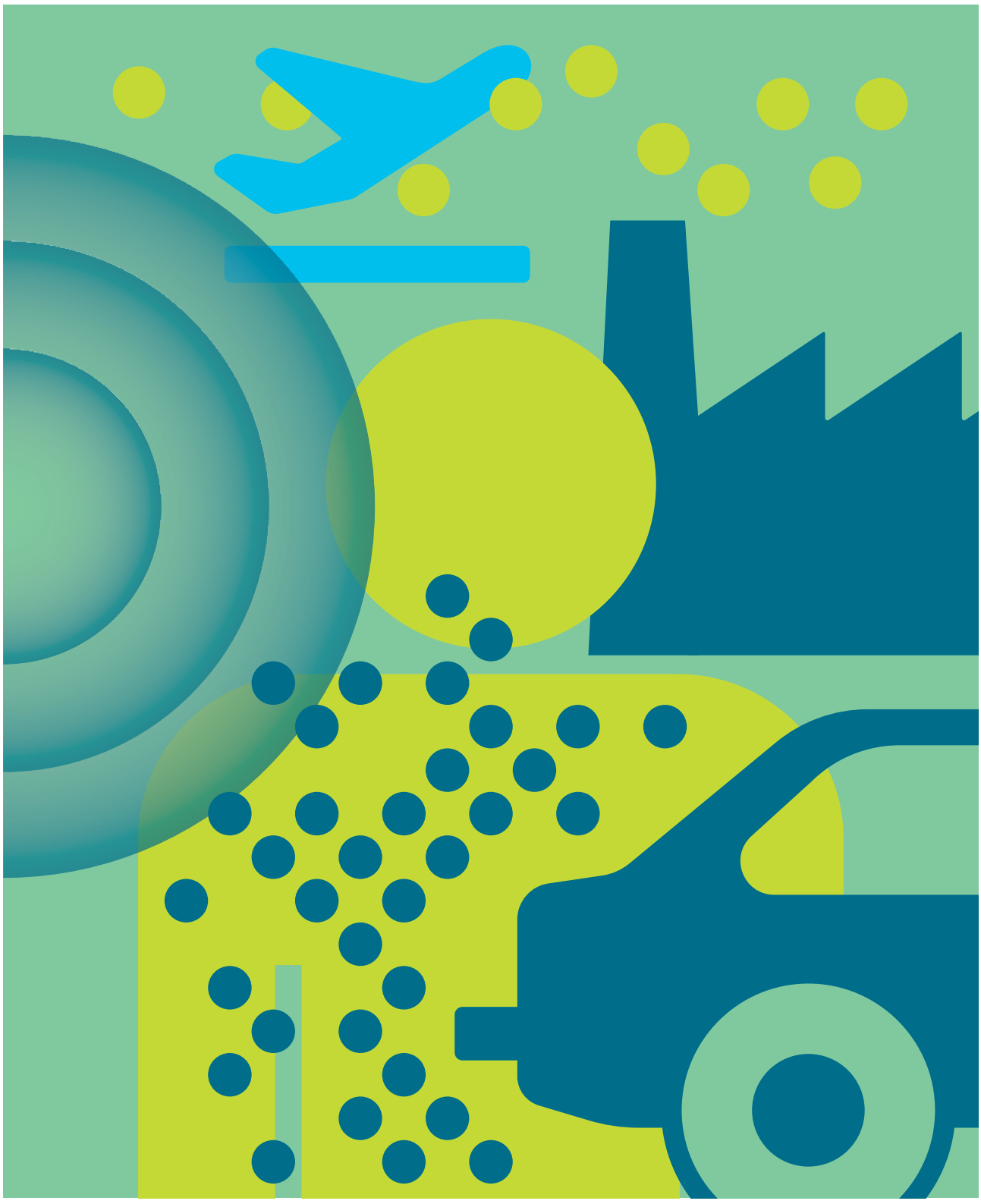
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ENDNOTES

1 European Environment Agency, 2025, Europes environment 2025 - Main report: Europes environment and climate: knowledge for resilience, prosperity and sustainability.
2 European Environment Agency, 2026, Environmental noise in Europe 2025.
3 European Environment Agency, 2025, Thematic briefing – Europe's environment 2025: 3.3 Environmental noise and impacts on human health, accessed 15 October 2026.
4 European Environment Agency, 2025, Thematic briefing – Europe's environment 2025: 3.6 Environmental health inequalities related to air pollution, accessed 15 October 2026.
5 European Environment Agency, 2025, Thematic briefing – Europe's environment 2025: 3.6 Environmental health inequalities related to air pollution, accessed 15 October 2026.
6 European Commission, 2025, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: An EU Agenda for Cities: Driving Growth and Prosperity.



This policy brief has been produced by EuroHealthNet, in the context of BEST-COST project. The work was supported by Sciensano, Erasmus MC, the Faculty of Medicine of the University of Porto, Swiss TPH, and the Norwegian Institute of Public Health. EuroHealthNet would like to thank the experts who contributed their perspectives during a policy roundtable in October 2026, as well as all BEST-COST partners for their collaboration.

BEST-COST is funded by the European Health and Digital Executive Agency (HaDEA) under the powers delegated by the European Commission. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or of HaDEA. Neither the European Union nor the granting authority can be held responsible for them.