

# Transport Systems That Protect Health and Climate

The climate crisis is an acute and protracted health emergency with far-reaching effects on both human health and the environments that sustain our health. The climate crisis and significant health risks are interlinked, having many of the same drivers and solutions.

Transport plays a critical role in trade, mobility, and access to goods, services, and employment, but accounts for 24% of direct CO<sub>2</sub> emissions from fossil fuel use<sup>1</sup>. Modern transport systems also contribute to ill health, including through air pollution, traffic injuries and deaths, personal safety, and health risks associated with physical inactivity. Reshaping mobility with a focus on health and equity will dramatically reduce these risks while increasing access to convenient, affordable transport and protecting the climate.

This paper outlines a set of recommendations for national and local authorities to support the transition to health-promoting, zero-carbon transport. Such a transition would reduce emissions while saving money and lives.

## Recommendations

1. Prioritise safe active and public transport in planning and infrastructure decisions to reduce emissions and increase health benefits.
2. Invest in efficient and zero-carbon systems and technologies using the principles:
  - Avoid the need to travel.
  - Shift to more sustainable modes of transport.
  - Improve the energy efficiency of operations.
3. Ensure that mobility solutions reduce inequities and benefit everyone.

# How are health, climate and transport connected?

Existing transport systems contribute to air pollution, road traffic injuries and deaths, physical inactivity, and socioeconomic exclusion.

## Transport-related air pollution is a major health risk factor.

- The World Health Organization (WHO) estimates that in 2016 **around 4.2 million people died from ambient air pollution**, including emissions from transport<sup>2</sup>. Recent studies place this figure much higher<sup>3</sup>. Today, air pollution is the largest environmental risk factor for health, with over 90% of air pollution-related fatalities occurring in low- and middle-income countries (LMIC)<sup>4</sup>. In India, air pollution caused almost 20% of total deaths in 2019<sup>5</sup>.
- The **transport sector is responsible for about 20% of total emissions of small particulate (PM<sub>2.5</sub>) air pollution**<sup>6</sup>, exposure to which increases individuals' risk of cardiovascular and respiratory diseases<sup>7</sup>.

## Transport options affect physical activity

- The WHO estimates that **one in four adults and 81% of adolescents are not sufficiently physically active**, due in part to urban and transportation infrastructure that is designed for vehicles, not people<sup>8</sup>. Many countries are currently facing health challenges associated with lower physical activity, including obesity and cardiovascular disease. Globally, diabetes deaths have risen by 70% since 2000<sup>9</sup>.

## Transport provides access to resources and opportunities

- **The world's poorest populations make most of their daily journeys on foot**, as public transport is often unavailable or unaffordable<sup>10</sup>. This can limit their access to critical services like education, healthcare, decent jobs, and nutritious food, and to non-essential goods that nevertheless contribute to well-being, such as entertainment.

## Road transport poses direct health risks

- With **urban roads often mixing passenger motorised and non-motorised transport in the same space, those who cannot afford or access public transport may be more exposed to health risks** like air pollution and road crashes, thus expanding inequity, plus higher personal security risk. Expanding private vehicle ownership will only exacerbate the problem.

## Transport is a growing source of climate emissions globally

- **Road vehicles** – cars, trucks, buses, and two- and three-wheelers – **account for nearly three-quarters of transport CO<sub>2</sub> emissions, but emissions from aviation and shipping continue to rise**<sup>11</sup>.
- **On current trends, car ownership is projected to increase three- to four-fold by 2050, compared to 2010**, driven largely by shifts in modes of transport in non-OECD countries<sup>12</sup>. Some projections estimate that global emissions from the transport sector, if unchecked, could increase by over 70% in the next 30 years, fuelled by growth in low- and middle-income countries<sup>13</sup>.
- **Increased government investment in energy-efficient public transport, zero-carbon vehicles, shifting land freight to rail, and pedestrian-friendly urban planning can disrupt this trend** and prevent the associated damage to health and the climate.

- Maritime transport and aviation combined (including passenger and freight) currently represent over 5% of global greenhouse gas emissions and are also a growing concern. Since 1990, **nitrogen oxide emissions have increased for shipping, and emissions of almost all climate pollutants from aviation have increased**<sup>14</sup>. Importantly, high-altitude **aviation emissions are estimated to have two to four times more climate impact** than those at land level, so are far more damaging<sup>15</sup>.
- **Just 1% of people cause half of global aviation emissions**<sup>16</sup>. For a frequent flier, aviation makes up the vast majority of their personal contribution to greenhouse emissions. But there are large inequalities in how much people fly; about 80% do not, or cannot afford to, fly at all<sup>17</sup>.

#### **The health-related economic benefits of a transport transition are significant**

- **Promoting non-motorised and public transport also has health and economic benefits.** Studies have highlighted the economic savings associated with reduced air pollution, congestion, and crashes, as well as the associated health benefits<sup>18</sup>. For example, one study found that the potential health benefits of increased walking and cycling in urban England and Wales could lead to **savings of as much as 1% of the yearly budget for health care** by reducing the prevalence of multiple diseases<sup>19</sup>.

Reducing transport demand while promoting low-carbon options can reduce greenhouse gas emissions, air pollution, and crashes, while improving citizens' physical health and having significant economic benefits. **By transitioning to a healthier transport system – one designed around humans, not vehicles – we can ensure these benefits are equitably distributed to all people and reduce current inequalities caused by transport.**

# Actions for delivering transport systems that protect health and climate

To deliver healthy and sustainable transport and mobility systems for all people and a thriving planet, national governments and local authorities are recommended to take the following actions:

## 1) Prioritise safe active and public transport in planning and infrastructure decisions to reduce emissions and increase health benefits.

Active transport – meaning non-motorised modes of transportation, including walking, cycling, and wheelchair use – and shared or public transport are cornerstones of healthy and sustainable transport systems. By ensuring these options are safe and accessible, national governments will reduce emissions and protect their citizens' health.

Where city design and transport infrastructure are not oriented towards health, many people do not get enough physical activity. Inactivity is directly linked to 3.2 million deaths annually from conditions such as Type 2 diabetes and cardiovascular disease<sup>20</sup>.

Conversely, in many low-income countries, residents have limited access to public transport, instead relying on high-polluting minibuses and motorcycles or being limited to the resources and opportunities they can access on foot. No access to safe, designated pedestrian areas or public transport has many compounding health effects, including increased exposure to traffic pollution and a risk of road injuries and deaths.

Improved active transport and public transport options will protect the health of people and the climate while delivering substantial cost savings. Research modelling transport policy in nine countries found that a shift towards greater active transport would help save around 1.2 million lives annually by 2040 due to increased exercise<sup>21</sup>. Ensuring these transport solutions are safe and accessible – through investment in dedicated infrastructure – will ensure the health benefits are equitably distributed.

### Policy recommendations:

- Reroute investment in roads towards subsidising public transport and improving active transport infrastructure, for example through protected cycle lanes, outdoor lighting, and pedestrian-only areas.
- Invest in data collection on mobility to ensure public transport solutions are locally relevant and reduce existing inequities.
- Remove subsidies from fossil fuels<sup>22</sup> and from high-carbon vehicles and relevant infrastructure, including highways and airports.
- Implement fair pricing to reflect the health and climate impacts of transport. This would help disincentivise current patterns of unsustainable vehicle use and raise revenue to fund alternatives. This should include increased fuel and vehicle taxes, infrastructure user charges and congestion charges.

## 2) Invest in efficient and zero-carbon systems and technologies.

A transition to zero-carbon transport and mobility can save lives, limit climate damage, and reduce costs in the countries hardest hit by the climate crisis. The combined costs related to air pollution, congestion, lost productivity, road accidents and other costs associated with high-carbon transport systems, contribute to losses of around 10% of GDP in low-income countries annually<sup>23</sup>.

Low-carbon transport can both promote health and save money. A study in Rwanda has shown how investment in low-carbon transport can reduce emissions in its capital city Kigali and pay for itself in under a decade<sup>24</sup>. In London, England, Guy's and St Thomas' NHS Trust is paying £250,000 to install a temporary low-traffic neighbourhood, citing the public health benefits of reduced motor traffic and increased active transport<sup>25</sup>.

Shipping and aviation each contribute about 2.5% of greenhouse gas emissions<sup>26</sup>, and emissions from both

are increasing. Progress on addressing the climate damaging emissions from air and sea travel is slow, while demand for both is rising (outside of periods with Covid-19 restrictions).

For both passenger and freight transport, national governments must urgently invest in zero-carbon technologies such as electric vehicles, in addition to incentives to manage demand like removing tax exemptions.

**Policy recommendations:**

- Base planning and infrastructure decisions around the Avoid, Shift and Improve framework (ASIF)<sup>27</sup>:
  - Avoid the need to travel.
  - Shift to more sustainable modes of transport.
  - Improve the energy efficiency of operations and vehicles.
- Increase investment in research, development, and implementation for zero-carbon transport technologies, especially for public transport, shared vehicles, and freight.

**3) Ensure that mobility solutions reduce inequities and benefit everyone.**

Climate change is a global problem, but its causes and impacts are not felt equally around the world. This is also true when it comes to transport. Equitable outcomes will require effort and investment at the local, national and global level, including cost-sharing where appropriate.

The world's poorest populations make most of their daily journeys by walking, often on dangerous roads next to high-emitting vehicles, exposing them to high levels of air pollution, and limiting their access to resources including healthcare<sup>28</sup>. Where public transport is available in low-income countries, it's often expensive – commuters in Lagos, Nigeria, spend on average 40% of their income on transportation comprised of high-polluting motorcycles and minibuses<sup>29</sup>.

Surveys have found that the most socially disadvantaged within society – including women, disabled people, and the elderly – are also the most likely to experience transport disadvantage<sup>30</sup>. Inclusive transport systems depend on reliable infrastructure and affordable fares. Ensuring the systems are zero-carbon will help protect citizens' health and the environment while targeting inequalities.

**Policy recommendations:**

- Ensure that everyone has access to affordable and safe zero-carbon transport that meets their needs.
- Adopt an equitable, rights-based approach to decisions around mobility, including by promoting capacity-building, data generation and management, and locally relevant solutions.
- Embed a focus on health and equity in transport policies to ensure maximum benefit for all; this will require integration with social, employment, health, and education policy at national and local levels.
- National governments in high-income countries should support low- and zero-carbon transport systems in LMICs, including by providing financing and technology transfer in consultation with local authorities.

## References

- <sup>1</sup> IEA (International Energy Agency), 2020, Tracking transport. <http://www.iea.org/topics/transport>
- <sup>2</sup> WHO (World Health Organization), n.d., Air Pollution [who.int/health-topics/air-pollution](http://who.int/health-topics/air-pollution)
- <sup>3</sup> See: Carrington, 2019, Air pollution deaths are double previous estimates, finds research, *The Guardian*. [theguardian.com/environment/2019/mar/12/air-pollution-deaths-are-double-previous-estimates-finds-research](https://www.theguardian.com/environment/2019/mar/12/air-pollution-deaths-are-double-previous-estimates-finds-research) and Burnett et al., 2018, Global estimates of mortality associated with long-term exposure to outdoor fine particulate matter, PNAS. [pnas.org/content/115/38/9592](https://www.pnas.org/content/115/38/9592) and Lelieveld et al., 2019, Cardiovascular disease burden from ambient air pollution in Europe reassessed using novel hazard ratio functions, *European Heart Journal*. [academic.oup.com/eurheartj/article/40/20/1590/5372326](https://academic.oup.com/eurheartj/article/40/20/1590/5372326)
- <sup>4</sup> WHO, 2016, Ambient air pollution: A global assessment of exposure and burden of disease. [who.int/iris/bitstream/handle/10665/250141/9789241511353-eng.pdf](http://who.int/iris/bitstream/handle/10665/250141/9789241511353-eng.pdf)
- <sup>5</sup> India State-Level Disease Burden Initiative Air Pollution Collaborators, 2020, Health and economic impact of air pollution in the states of India: the Global Burden of Disease Study 2019, *The Lancet*. [thelancet.com/action/showPdf?pii=S2542-5196%2820%2930298-9](https://www.thelancet.com/action/showPdf?pii=S2542-5196%2820%2930298-9)
- <sup>6</sup> European Environment Agency, 2021, Indicator Assessment: Emissions of air pollutants from transport. [eea.europa.eu/data-and-maps/indicators/transport-emissions-of-air-pollutants-8/transport-emissions-of-air-pollutants-8](https://eea.europa.eu/data-and-maps/indicators/transport-emissions-of-air-pollutants-8/transport-emissions-of-air-pollutants-8)
- <sup>7</sup> WHO Regional Office for Europe, 2013, Health effects of particulate matter: Policy implications for countries in eastern Europe, Caucasus and central Asia. [euro.who.int/\\_data/assets/pdf\\_file/0006/189051/Health-effects-of-particulate-matter-final-Eng.pdf](http://euro.who.int/_data/assets/pdf_file/0006/189051/Health-effects-of-particulate-matter-final-Eng.pdf)
- <sup>8</sup> WHO, n.d., Physical activity. [who.int/health-topics/physical-activity](http://who.int/health-topics/physical-activity)
- <sup>9</sup> WHO, 2020, The top 10 causes of death. [who.int/news-room/fact-sheets/detail/the-top-10-causes-of-death](http://who.int/news-room/fact-sheets/detail/the-top-10-causes-of-death)
- <sup>10</sup> Nagaba, 2018, The African commute: city transport trends. <https://www.engineeringforchange.org/research/african-commute-city-transport-trends/>
- <sup>11</sup> IEA, 2020, Tracking transport. <http://www.iea.org/topics/transport>
- <sup>12</sup> International Transport Forum, 2012, Transport Outlook: Seamless Transport for Greener Growth. [oecd.org/greengrowth/greening-transport/Transport%20Outlook%202012.pdf](https://www.oecd.org/greengrowth/greening-transport/Transport%20Outlook%202012.pdf)
- <sup>13</sup> Sudmant et al, 2017, Private opportunities, public benefits? The scope for private finance to deliver low-carbon transport systems in Kigali, Rwanda. *Urban Climate*, Science Direct. [sciencedirect.com/science/article/pii/S2212095517300184](https://www.sciencedirect.com/science/article/pii/S2212095517300184)
- <sup>14</sup> European Environment Agency, 2021, Indicator Assessment: Emissions of air pollutants from transport. [eea.europa.eu/data-and-maps/indicators/transport-emissions-of-air-pollutants-8/transport-emissions-of-air-pollutants-8](https://eea.europa.eu/data-and-maps/indicators/transport-emissions-of-air-pollutants-8/transport-emissions-of-air-pollutants-8)
- <sup>15</sup> IPCC (Intergovernmental Panel on Climate Change), 2007, Fourth Assessment Report. [ipcc.ch/assessment-report/ar4/](http://www.ipcc.ch/assessment-report/ar4/)
- <sup>16</sup> Carrington, 2020, 1% of people cause half of global aviation emissions – study, *The Guardian*. [theguardian.com/business/2020/nov/17/people-cause-global-aviation-emissions-study-covid-19](https://www.theguardian.com/business/2020/nov/17/people-cause-global-aviation-emissions-study-covid-19)
- <sup>17</sup> Ritchie, 2020, Climate change and flying: what share of global CO2 emissions come from aviation? *Our World in Data*. [ourworldindata.org/co2-emissions-from-aviation](https://ourworldindata.org/co2-emissions-from-aviation)
- <sup>18</sup> Lah et al, 2019, Transition to sustainable mobility: Pathways, policies, co-benefits and opportunities of low carbon transport future. Background paper prepared for 12th Regional EST Forum in Asia. <https://www.uncrd.or.jp/content/documents/793812th%20EST%20Forum-Background%20paper%202%20for%20Pre-Event%201-Santhosh%20et%20al.pdf> and European Union, 2019, State of play of internalisation in the European Transport sector. [europa.eu/en/publication-detail/-/publication/696d402f-a45a-11e9-9d01-01aa75ed71a1](https://eea.europa.eu/en/publication-detail/-/publication/696d402f-a45a-11e9-9d01-01aa75ed71a1)
- <sup>19</sup> Jarrett et al, 2012, Effect of increasing active travel in urban England and Wales on costs to the National Health Service. *The Lancet*. [thelancet.com/journals/lancet/article/PIIS0140-6736\(12\)60766-1/fulltext](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(12)60766-1/fulltext)
- <sup>20</sup> WHO, 2011, Health in the green economy: Health co-benefits of climate change mitigation – Transport sector. [who.int/iris/bitstream/handle/10665/70913/9789241502917\\_eng.pdf?sequence=1&isAllowed=y](http://who.int/iris/bitstream/handle/10665/70913/9789241502917_eng.pdf?sequence=1&isAllowed=y)
- <sup>21</sup> Hamilton et al., 2021, The public health implications of the Paris Agreement: a modelling study. *The Lancet*. [thelancet.com/journals/lanplh/article/PIIS2542-5196\(20\)30249-7/fulltext](https://www.thelancet.com/journals/lanplh/article/PIIS2542-5196(20)30249-7/fulltext)
- <sup>22</sup> Health and Climate Network, 2021, HCN Briefing 2: Energy systems that protect climate and health.
- <sup>23</sup> ESCAP (Economic and Social Commission for Asia and the Pacific), 2012, Low Carbon Green Growth Roadmap for Asia and the Pacific. Turning resource constraints and the climate crisis into economic growth opportunities. [unescap.org/resources/low-carbon-green-growth-roadmap-asia-and-pacific](https://www.unescap.org/resources/low-carbon-green-growth-roadmap-asia-and-pacific)
- <sup>24</sup> Sudmant et al, 2017, Private opportunities, public benefits? The scope for private finance to deliver low-carbon transport systems in Kigali, Rwanda. *Urban Climate*, Science Direct. <https://www.sciencedirect.com/science/article/pii/S2212095517300184>
- <sup>25</sup> Reid, 2020, London hospital trust to pay £250k to install LTN for public health benefits, *The Guardian*. [theguardian.com/environment/2020/nov/17/london-hospital-trust-to-pay-250k-to-install-ltn-for-public-health-benefits](https://www.theguardian.com/environment/2020/nov/17/london-hospital-trust-to-pay-250k-to-install-ltn-for-public-health-benefits)
- <sup>26</sup> European Commission, n.d., Reducing emissions from the shipping sector. [europa.eu/clima/policies/transport/shipping\\_en](https://eea.europa.eu/clima/policies/transport/shipping_en) and Ritchie, 2020, Climate change and flying: what share of global CO2 emissions come from aviation? *Our World in Data*. [ourworldindata.org/co2-emissions-from-aviation](https://ourworldindata.org/co2-emissions-from-aviation)
- <sup>27</sup> SUTP (Sustainable Urban Transport Project), n.d., Sustainable urban transport: Avoid-Shift-Improve. [https://ledsgp.org/wp-content/uploads/2016/01/SUTP\\_GIZ\\_FS\\_Avoid-Shift-Improve\\_EN.pdf](https://ledsgp.org/wp-content/uploads/2016/01/SUTP_GIZ_FS_Avoid-Shift-Improve_EN.pdf)
- <sup>28</sup> Lucas, 2012, Transport and social exclusion: Where are we now? *Transport Policy*, Science Direct. [sciencedirect.com/science/article/pii/S0967070X12000145](https://www.sciencedirect.com/science/article/pii/S0967070X12000145) and Del Carmen Pérez-Peña et al, 2021, Transport Poverty with Special Reference to Sustainability: A Systematic Review of the Literature. *Sustainability*, MDPI. [mdpi.com/2071-1050/13/3/1451/html](https://www.mdpi.com/2071-1050/13/3/1451/html)
- <sup>29</sup> Nagaba, 2018, Engineers for Change, 2019, The African Commute: city transport trends <https://www.engineeringforchange.org/research/african-commute-city-transport-trends/>
- <sup>30</sup> Lucas, 2012, Transport and social exclusion: Where are we now? *Transport Policy*, Science Direct. <https://www.sciencedirect.com/science/article/pii/S0967070X12000145>

This briefing is supported by the following organisations:



HCN is sponsored by the Wellcome Trust.



This is part of a series of HCN Briefings. Others include:

- *Diet and Food Systems for Health, Climate and Planet*
- *Energy systems that protect climate and health*
- *Sustainable and climate resilient health systems.*