

Air pollution in Aotearoa NZ: Five key ways to reduce the massive health and social costs

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A new study has estimated the surprisingly high level of harm from air pollution. This annual harm includes the premature deaths of more than 3300 adult New Zealanders and more than 13,100 hospital admissions for respiratory illness and heart disease. The annual social costs resulting from this pollution was estimated at \$15.6 billion. Fortunately there are many ways to reduce air pollution and we discuss five key ones in this blog. These range from free public transport to reform of the electricity market to lower costs to citizens.

The latest iteration of the Health and Air Pollution in New Zealand Study (HAPINZ 3.0) has summed up the health costs of air pollution, drawing on comprehensive air quality monitoring data from 2016.

The HAPINZ researchers estimate that anthropogenic (human-caused) air pollution in that year caused the premature deaths of more than 3,300 adult New Zealanders. This is not a small number, representing about 11% of all deaths in NZ in 2016.

This death toll is approaching the magnitude of that from tobacco smoking, which caused an estimated 4790 premature deaths in Aotearoa NZ in 2019 (95% uncertainty interval [UI]: 4510 to 5100).¹ And it far exceeds that of exposure to second-hand smoke, which causes an estimated 347 additional premature deaths per year in NZ.²

The HAPINZ authors also estimate that anthropogenic air pollution in 2016 caused:

- “more than 13,100 hospital admissions for respiratory and cardiac illnesses, including 845 asthma hospitalisations for children.
- over 13,200 cases of childhood asthma.
- approximately 1.745 million restricted activity days (days on which people could not do the things they might otherwise have done if air pollution had not been present).”

The estimated costs of these health and social impacts from human-made air pollution in 2016 amount to \$15.6 billion. This price tag not only reflects the direct costs incurred in the health system but also costs arising from loss of life, lost quality of life and lost productivity.

Air pollution’s deadly duo

The two main pollutants of concern are fine particulate matter smaller than 2.5 micrometres—dubbed PM_{2.5}—and nitrogen dioxide (NO₂).

Considering anthropogenic sources of PM_{2.5}, the main culprits are coal and wood fires used in home heating, which are responsible for 74% of the \$6.1 billion cost associated with PM_{2.5} pollution. Other contributors are motor vehicles (17%), and windblown dust (8%).

The even more important air pollutant, NO₂, is estimated to cost the country \$9.5 billion in terms of health and social impacts. Nearly all NO₂ pollution comes from motor vehicles, and disproportionately from diesel vehicles.

The health impacts of air pollution from motor vehicles were a surprise to the researchers. The updated analysis in HAPINZ 3.0 revealed transport pollution to be a far greater contributor to loss of life and poor health in NZ than previously thought—accounting for more than two-thirds of the social costs of air pollution. The major role played by NO₂ is a particularly important part of our new understanding of the air pollution hazard in NZ.

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Figure 1: Social costs from human made air pollution (NO₂ and PM_{2.5}) in NZ, by air pollutant and source of air pollution, 2016 (\$millions) Source: HAPINZ 3.0. (please click on the image for a closer view)

Air pollution is worse in Southern centres

The health costs of air pollution are not distributed evenly across the country. In terms of absolute number premature deaths, Auckland, with its larger population, suffered the most with an estimated 939 deaths in 2016.

However, when population size is taken into account, Invercargill emerges as the centre where air pollution is having the greatest impact (an estimated 219 premature deaths per 100,000 people aged 30+ years), followed by Christchurch City (206 per 100,000), and Waitaki District (191 per 100,000).

Readers can explore the variation in air pollution and its impacts across NZ using the HAPINZ 3.0 Dashboard.

The results of the HAPINZ 3.0 study highlight the immense cost air pollution incurs on New Zealanders’ health as well as the economy.

Five key solutions

For potential solutions, we considered the findings of a systematic review on the control of urban air pollution³ and various NZ publications (eg, ⁴⁵). Our top five solutions are as follows:

1. **Adopt free public transport** funded by upgraded **transport pricing** (ie, from fuel taxes along with congestion charging and distance pricing as considered in a Ministry of Transport Green Paper⁶).
2. **Progressively reduce emissions from existing internal combustion vehicles** by regularly raising fuel taxes according to the relative harm (ie, higher for diesel than petrol, as diesel vehicle exhausts produce 7-10 times more NO₂). These taxes could then fund subsidies for e-bike and electric vehicle purchase/rental for low-income citizens. Such taxes could also fund improved cycling and walking infrastructure in towns and cities. Regularly tightened emissions standards as part of warrant-of-fitness checks and annual registration fees reflecting pollution levels by vehicle types, should be considered as part of this approach.
3. **Prohibit the importation** into NZ of light vehicles with internal combustion engines from 2025. Such a step would accelerate the electrification of the light vehicle fleet and minimise the risk of fossil-fuel powered vehicles becoming “stranded assets” in the future. This approach would be similar to that taken by Norway which plans to end the sale of all fossil fuel-powered cars in 2025.⁷ The 2025 deadline date would greatly accelerate the proposal of the Climate Change Commission which has proposed 2035 as an end date for such imports.⁴
4. **Reduce electricity costs to citizens by upgrading the whole NZ electricity market** to reduce profiteering by the industry (with more details on the problems with the NZ market here). Lower electricity costs for citizens would make it easier for them to replace wood-burners with heat pumps. It may also lower the running costs of electric vehicles. Support for citizens to install home photovoltaic systems (eg, with generous feed-in tariffs) could also reduce costs to consumers and increase energy security.
5. **Phase out domestic heating with wood and coal** in towns and cities; with central and local government support to replace these in low-income households with heat pumps and improved insulation. Insulation upgrades are very cost-beneficial according to NZ research.⁸

In addition to the health and economic benefits of reducing air pollution by these means, all these measures would also have the major advantage of reducing NZ's greenhouse gas emissions. Indeed, reducing greenhouse gases via measures that also reduce air pollution is one of the key co-benefits of responding to climate change.⁹

Conclusions

The HAPINZ study has revealed the surprisingly high level of harm from air pollution in NZ – to health and to the economy. Fortunately there are many ways to reduce air pollution and we discuss five key ones in this blog. Some of these could even reduce costs to consumers, such as free public transport.

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