
EXECUTIVE SUMMARY

The Ministry of Transport has commissioned this study in order to assess the health effects due to air pollution emissions from vehicles on the population of New Zealand.

The study has been based on methodologies established overseas, in particular a recent study in Europe which showed that the number of pre-mature deaths due to vehicle related air pollution was greater than that due to the road toll.

Whilst health effects can be attributed to a wide range of contaminants from vehicles, the focus of this study has been on fine particulates (PM₁₀). These are shown to have the dominant effect, and can also be considered as a good 'indicator' of the combined exposure to the range of pollutants from motor vehicles

An analysis has been conducted of the relevance of overseas research to New Zealand, and concludes that the overseas results are applicable and the methodologies valid for making such an assessment in New Zealand.

The input data used includes all available and appropriate particulate monitoring data from around New Zealand, and the study is based on average annual exposures in each city and town, with a population of over 5,000 people. This covers approximately 80% of the population, and includes most people who might be exposed to any significant air pollution. By far the greatest fraction of people exposed are in the major city areas with populations over 100,000. Results are given for (a) the whole of New Zealand, (b) separately for the four main centres, and (c) combined for smaller centres in the North and South Islands.

It must be emphasised that the amount of monitoring and exposure data available for New Zealand is relatively small, particularly in comparison to Europe. There is also considerable uncertainty over many aspects - such as the fraction of air pollution due to motor vehicles, the exposure rates in areas where no monitoring has been conducted, and the various risk levels and thresholds used to make mortality assessments. Nevertheless, this study has used whatever data are available, making realistic assumptions - which are all explained in detail - to arrive at the current best estimate for public health effects of vehicle related particulate emissions.

The authors and reviewers emphasise that this is a preliminary study. It should be considered as the first attempt in New Zealand to quantify health effects due to air pollution from vehicles - and as discussed throughout this report, is subject to many uncertainties and assumptions. It is likely these will be revised as planned research is completed. The results may be revised upwards - or downwards - but at present they are the best estimate based on available information.

The most likely estimate of the number of people above 30 years of age who experience pre-mature mortality in New Zealand due to exposure to emissions of PM₁₀ particulates from vehicles is 399 per year (with a 95% confidence range of 241-566 people). This compares with 970 people above age 30 experiencing pre-mature mortality due to particulate pollution from all sources (including burning for home heating), and with 502 people dying from road accidents (all ages).

Analysed on a regional basis, most of the increased mortality due to vehicle emissions (253 people, or 64% of the total) occurs in the greater Auckland region. Wellington and Christchurch experience somewhat lesser rates (56 and 41 people respectively, or 14% and 10%). The other cities and towns larger than 5000 people through New Zealand experience the remainder (46 people, or 12%).

For some purposes - such as a health cost analysis, or a comparison with the accident road toll - it may be appropriate to assess the traffic related air pollution mortality in terms of years of life lost, since air pollution mortality generally affects older people, resulting in fewer years of life lost than for other causes of death. This has been done by analysing causes of death, and results in an "adjusted" mortality due to PM₁₀ of 200 people per year (although there are still 399 pre-mature deaths per year).

Although confidence limits are given in the mortality estimates, there are other factors which may need to be taken into account, which may be different in different parts of the country. One of these is the variability in particulate pollution from year to year - this appears to be greater in areas more affected by weather factors, which can vary substantially between years. Another is the potential for other types of vehicle emissions to affect mortality - including confounding effects from gaseous pollutants and possible carcinogenic effects due to aromatics such as benzene. Another is the effects on under 30 year olds - particularly young children - which are likely to be less, but non-negligible. These factors have not been included in the present report.

The PM₁₀ exposure results are consistent with previous studies in New Zealand examining mortality due to all sources in Christchurch.

The results are also consistent with the European studies, which show that mortality due to vehicle related air pollution is of the order of twice the accident road toll. New Zealand has a relatively higher road toll per capita, and a relatively lower air pollution problem than many European countries - but the results still show that the public health impacts from vehicle related pollution emissions are not insignificant.