

IMPACTS OF TRANSPORT ON HEALTH – AN OVERVIEW

**A summary prepared by the
Public Health Advisory Committee**

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**NATIONAL ADVISORY COMMITTEE
ON HEALTH AND DISABILITY**

HIUNGA KAITITIRO I TE HAUORA O TE TANGATA

**Incorporating the Public Health Advisory Committee
Te Rōpū Tohutohu I Te Hauora Tūmatanui**

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1 INTRODUCTION

This paper gives a brief summary of evidence for the effects of transport on health, as outlined by two background papers to the Public Health Advisory Committee (PHAC).¹

The PHAC is a sub-committee of the National Health Committee established under the New Zealand Public Health and Disability Act 2000. The Committee's role is to independently advise the Minister of Health on public health issues, including factors underlying the health of people and communities.

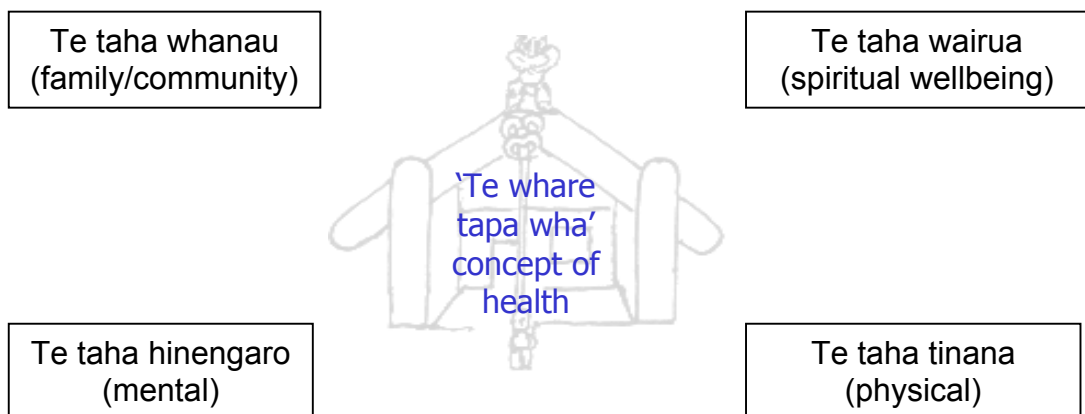
This work is a component of the PHAC's project on health impact assessment, which uses transport as an example of a sector outside of health that has significant impacts on health. The project has focused on land transport (including walking and cycling) rather than transport by sea or air.

1.1 Concept of health

It is essential to have a clear definition of health for the project, as health can mean different things to different people.

Health is not just about physical injury or disease. The Whare Tapa Wha model² (Figure 1) is the concept of health adopted for the PHAC's work on transport and health. It assumes a broad view of health as a state of physical, mental, social and spiritual wellbeing.

Figure 1: Te Whare Tapa Wha model of health



Source: Durie 1994

This model of a four-sided house incorporates physical and mental wellbeing but also includes interrelated components of family and personal relationships and a spiritual dimension ('taha wairua'). All four sides of the house need to be strong and harmonised to ensure health and wellbeing.

This view of health is consistent with other holistic views of health such as that of the World Health Organisation.³

Spiritual health can be hard to define and is often equated with organised religion. The concept here may include religious beliefs but is much broader. In work on a Māori measure of mental health outcomes, Professor Mason Durie acknowledged the challenges in defining *taha wairua*. He portrays *taha wairua* in a way that does not require specific cultural or religious reference points, which may allow accessibility to a wider audience. *Taha wairua* is described as incorporating:

“the experience of mutually rewarding encounters between people, a sense of communion with the environment, access to heritage and cultural integrity.”⁴

2 KEY IMPACTS OF TRANSPORT ON HEALTH

Transport is a key element of life in the 21st Century, providing us with access to work, school, shopping, social networks and recreation. The ability to use some form of transport to get from ‘a’ to ‘b’ is vital to maintaining good health. Transport takes many forms, from walking or cycling to the use of motor vehicles and public transport.

A range of direct and indirect health impacts arise from transport, including:

- opportunities for physical activity
- road traffic injuries
- air pollution
- noise
- effects on communities
- climate change.

This paper will briefly summarise evidence for each of these potential health effects in turn.

2.1 Physical activity

The most beneficial health impact of transport is the potential for physical activity through walking and cycling.^{5,6,7} Transport configurations can either create more opportunities for physical activity or restrict opportunities by encouraging sedentary forms of transport such as cars.

A compelling body of research evidence shows that regular physical activity is associated with improvements in health status.⁸ Health benefits include significant reductions in the risk of cardiovascular disease, some cancers, adult diabetes and obesity.

Sport and Recreation New Zealand (formerly the Hillary Commission) recommends 30 minutes of moderate physical activity (eg, brisk walking) each day in order to enjoy health benefits. As this time can be broken up into several shorter blocks of time, walking or cycling for transport purposes is an ideal way to achieve this physical activity goal.

Although walking and cycling are beneficial to health, these modes of transport are in decline, while motor vehicle use is increasing.

Half of the adult population in western countries is classified as 'sedentary' and levels of physical activity are declining.⁹ In New Zealand one-third of adults are classified as not active enough to benefit their health, and adult obesity increased by 55 percent between 1989 and 1997.^{10, 11}

It is estimated that physical inactivity accounts for the death of 2,600 New Zealanders each year or nine percent of all deaths.¹² This figure is likely to increase in future, as current demographic trends suggest the prevalence of physical inactivity will rise four percent by 2021.

Although the configurations of many transport systems mean that pedestrians and cyclists are vulnerable, the overall health gains are substantial. For instance, the British Medical Association concluded that even in hostile traffic environments, the health benefits gained from regular cycling outweighed the risks of cycling-related injuries.¹³ If modal shifts from the motor vehicle to walking or cycling became widespread, there would be health benefits in terms of reducing road traffic injury rates, pollution and noise, as well as direct benefits to health from increased physical activity levels.

Public transport can play a role in encouraging physical activity. On average, a journey by public transport requires a 10-minute walk. Therefore, if a person uses the bus twice a day they will be physically active for 20 minutes – two-thirds of the required amount for health benefits.¹⁴

2.2 Road traffic safety

Road traffic injuries represent the most apparent, and one of the most significant, effects of transport on health. Road traffic injuries include both deaths and non-fatal injuries resulting from motor vehicle crashes.

The health consequences of motor vehicle crashes are well documented and are responsible for a considerable proportion of morbidity, disability and mortality in New Zealand and other countries, despite declining injury rates in some developed countries.

In 1999 New Zealand's rate of traffic-related deaths was 13.3 deaths per 100,000 people. This was below the United States at 15.5 deaths per 100,000, but higher than other comparable countries such as Australia (9.3), Canada (9.7), United Kingdom (6.0) and Ireland (11.0).¹⁵ New Zealand's high road accident fatality rate is partly due to the high number of vehicles per capita. However the rate **per vehicle** is also one of the highest in developed countries.

Drivers of Māori or Pacific ethnicity face a higher risk of injury per distance driven than other drivers. The risk of being hospitalised as a result of a road crash is three times higher for Māori and almost three times higher for Pacific drivers.¹⁶

Among New Zealand males aged 20 to 59 years, the traffic crash mortality rate for the lowest socioeconomic group is more than twice as high as the highest one, with the medium group in between. This pattern is known as a socioeconomic gradient, where each socioeconomic group experiences higher death rates than the group that is a little better off. The remainder of mortality (for all causes apart from the traffic crash contribution) shows a less prominent gradient. This suggests that traffic crash mortality is an important contributor to the socioeconomic gradient for all-cause mortality in New Zealand.¹⁷

Road traffic also has impacts on mental health. Studies have found that 14 percent of survivors of motor vehicle crashes suffer from post traumatic stress disorder, 25 percent have psychological problems one year after a crash, and one-third have clinical symptoms at follow-up 18 months afterwards.¹⁸

2.3 Air quality

Air pollution from motor vehicles that burn fossil fuels, along with other sources such as home heating and industry, impacts on health in a range of ways. It is also clear that transport is a significant source of air pollution.

Several contaminants produced by vehicles are known to damage air quality and affect physical and mental health. For example, carbon monoxide (CO) is associated with increased hospital admissions and mortality from cardiovascular disease, and fine particulate matter exacerbates respiratory conditions such as asthma and bronchitis.

Motor vehicles in New Zealand emit air pollutants to the same extent as in other countries, except that there is no legal requirement here to fit catalytic converters on cars. This makes our emissions of CO, nitrogen dioxide (NO₂) and hydrocarbons higher than in countries with more widespread use of these devices. However, the final air concentrations of pollutants and the exposure levels are dependent on the density of vehicles in urban areas, the topography and the weather patterns of these areas.

The death toll attributed to vehicle emissions has been coined the 'invisible' road toll. Research in Europe using comparable methods has estimated the number of deaths caused by air pollution from fine particle vehicle emissions to be approximately twice the number of deaths due to road traffic injuries.¹⁹

Recent New Zealand research has estimated the ratio of mortality attributed to vehicle emissions compared with road traffic injuries to be 0.8 (in other words, for adults aged over 30 years, there were 200 premature deaths attributed to emissions compared with a road toll of 243).²⁰

The lesser impact of vehicle emissions in New Zealand, compared with Europe, is due to a higher per capita road toll and lower per capita air pollution exposure. Another possible reason for the difference is that in New Zealand vehicle emissions are generally significant only in urban areas, whereas in Europe they are widespread across whole countries. Even so, the

New Zealand research indicates that air pollution from vehicle emissions is a significant and under-recognised cause of illness and premature death.

2.4 Noise levels

There is growing scientific evidence on the effects of noise on health outcomes, including physical and mental wellbeing. The health effects of noise include impaired communication, disturbed sleep, impaired school and work performance, annoyance, depression and aggression. There is also evidence that noise can aggravate heart disease and hypertension, and cause hearing impairment.²¹ The British Medical Association suggests that sleep interference is probably the most important effect of long-term exposure to traffic noise on health and wellbeing. It is estimated that up to 63 percent of households in Britain are exposed to a level of night-time noise high enough to interfere with sleep.²²

According to the World Health Organization, transport is the main source of noise pollution in Europe.²³ Ambient sound levels have increased due to growing numbers of road trips and kilometres driven, higher speed of cars and increased frequency of flying. Noise is the only environmental factor in Europe for which complaints have increased since 1992.

There is very little New Zealand data on noise levels from transport or the effects on the health and wellbeing of communities. Information is limited to occasional community surveys and some studies carried out by or on behalf of government departments. Transit New Zealand carried out a study of residential exposure to traffic noise in Christchurch during the early 1990s. This recorded levels of noise exposure similar to those experienced by urban populations in Australia, France, Germany and Switzerland, but greater than those recorded in the Netherlands.²⁴

2.5 Communities and social support

Transport has positive impacts on health by facilitating social support, for instance enabling better access to friends or family. On the other hand, transport can damage health through community severance.

Community severance arises when roads carrying high levels of traffic cut through residential neighbourhoods. It creates indirect health effects, for example disruption of social networks and reduced social support, thereby affecting health.

There is evidence for the influence of social support on health and wellbeing. For example, low levels of social contact has been linked to an increase in mortality, where those with few social contacts are at more than twice the risk compared with those with many contacts.²⁵ Community severance produces a range of direct negative impacts on health, including reduced social support, reduced access to facilities and restricted access for disabled people. The stress associated with community severance can exacerbate depression and anxiety.

Social isolation may be increased by lack of car access, especially in areas with poor public transport.²⁶ Figures from the 1996 census indicate that 8.1 percent of people in New Zealand do not have access to a car.²⁷ According to the New Zealand Transport Survey, car usage is lower in women, in Māori and Pacific peoples and in those with low income.²⁸

While there is considerable evidence showing that levels of social support relate to health outcomes, it is difficult to quantitatively isolate a link between transport and the degree of community severance that occurs.

2.6 Climate change

There is strong evidence that most of the global warming of the past 50 years is due to human activity.²⁹ Motorised transport is a major contributor to climate change by producing emissions from the combustion of fossil fuel, particularly carbon dioxide.

Potential implications for human health arising from climate change include increased mortality from extremes of temperature, increased rates of waterborne diseases due to flooding, higher rates of skin cancers due to ozone layer depletion, and increased vector-borne diseases such as dengue fever (as global warming increases the likelihood of disease-carrying mosquitoes).

Throughout the world, the use of motor vehicles is increasing and transport is the fastest growing sector of emissions globally.³⁰ Contemporary transport patterns have led to a significant increase in the use of fossil fuels. Motor vehicles are responsible for producing a quarter of the carbon dioxide emissions in European Union countries.³¹ In New Zealand, transport is thought to be responsible for more than 40 percent of the total carbon dioxide released into the atmosphere.³²

3 CONCLUSION

Transport is an essential component of modern life, and brings with it the potential to both improve and erode public health. This paper has briefly summarised evidence for a variety of positive and negative impacts that transport has on health.

Transport's ability to promote or inhibit opportunities for physical activity has the most potential for influencing health outcomes. There is also compelling evidence for road traffic injuries as a major cause of ill health. Emerging research suggests that air quality (and the contribution of motorised transport to poor air quality) is an important, and previously overlooked, contributor to ill health. Potential social effects of transport in terms of facilitating community support are an area for further research.

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