



TRANSPORT AND HEALTH

How transport affects the health of
New Zealanders

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Presentation to the Transport Knowledge Hub
22 February 2018

Outline

1. How does transport affect health?
2. EHI transport indicators: What is the data telling us?
3. What is the overall health impact of road transport in NZ?

How does transport affect health?



Traffic crashes



Road safety for
vulnerable road users



Active transport



Air
pollution

How does transport affect health?



Public transport

Noise pollution

Climate change



Barriers due
to lack of
transport



Traffic crashes

- Cause many deaths, injuries, disability
- In NZ, a few hundred people die each year in traffic crashes
- Cyclists, pedestrians and motorcyclists are more vulnerable road users

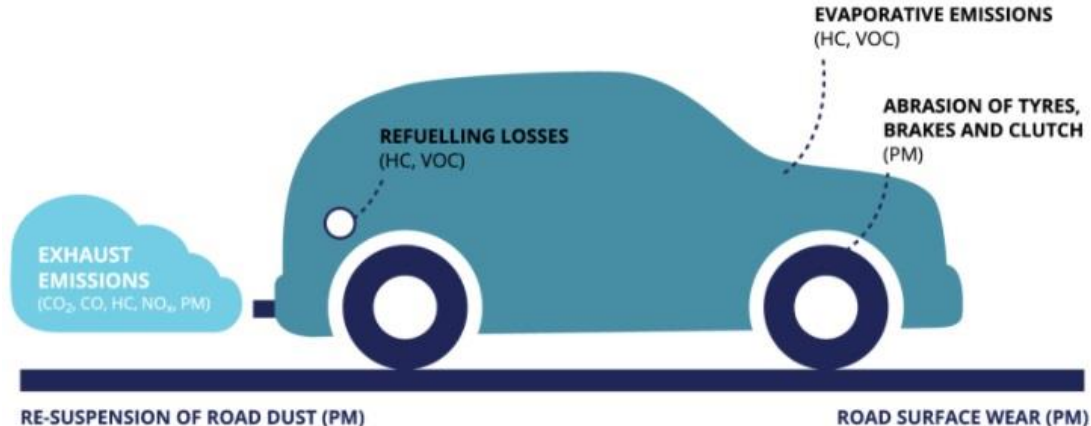


HOW TRANSPORT AFFECTS HEALTH

Air pollution from motor vehicles

Transport is a key source of air pollution

- Particulate matter (PM₁₀, PM_{2.5})
- Nitrogen oxides (NO_x)
- Carbon monoxide (CO)
- Sulphur oxides (SO_x)
- Carbon dioxide (CO₂)
- Ozone (ground-level)
- Volatile organic compounds (VOCs)
- Hydrocarbons (HC)
- Polycyclic aromatic hydrocarbons (PAHs), eg benzo(a)pyrene (BaP)



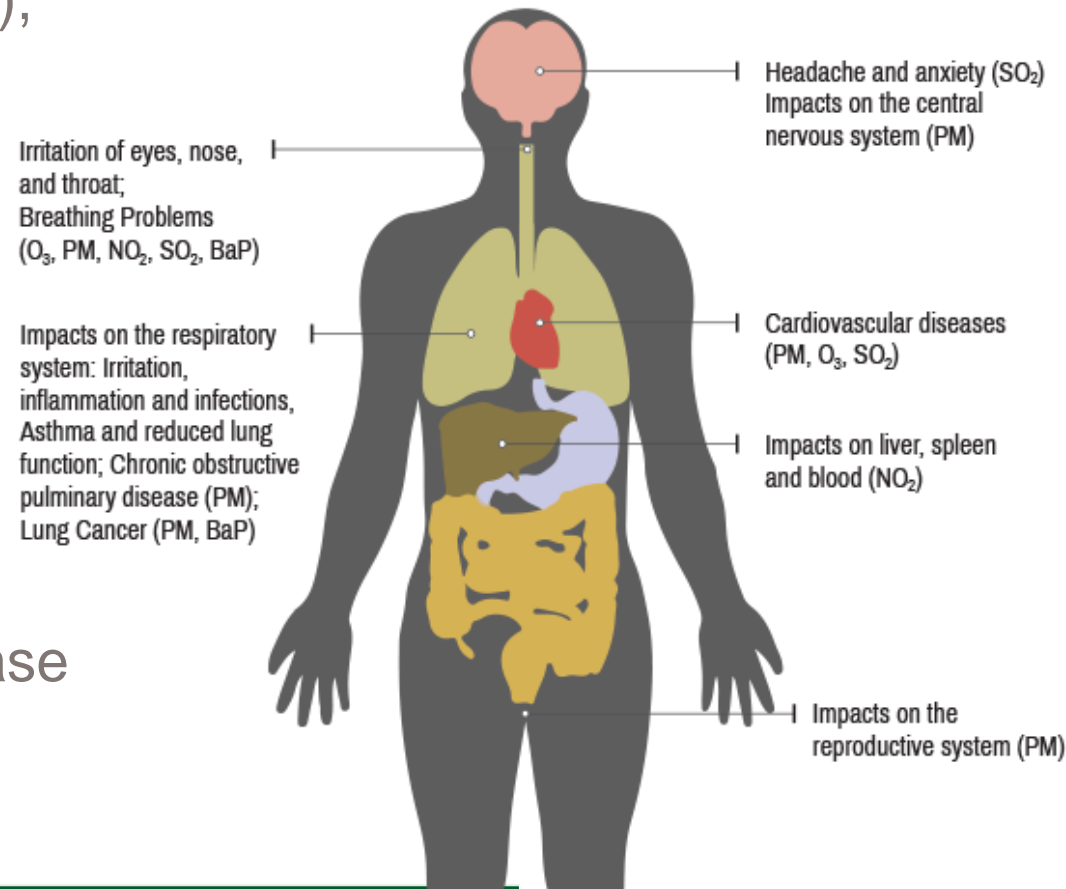
HOW TRANSPORT AFFECTS HEALTH

Health effects from air pollution

Health effects mainly from:
particulate matter (PM_{2.5}, PM₁₀),
but also NO₂, CO, others


Health effects include:

- Premature death
- Lung (respiratory) diseases
- Heart (cardiovascular) disease
- Some cancers

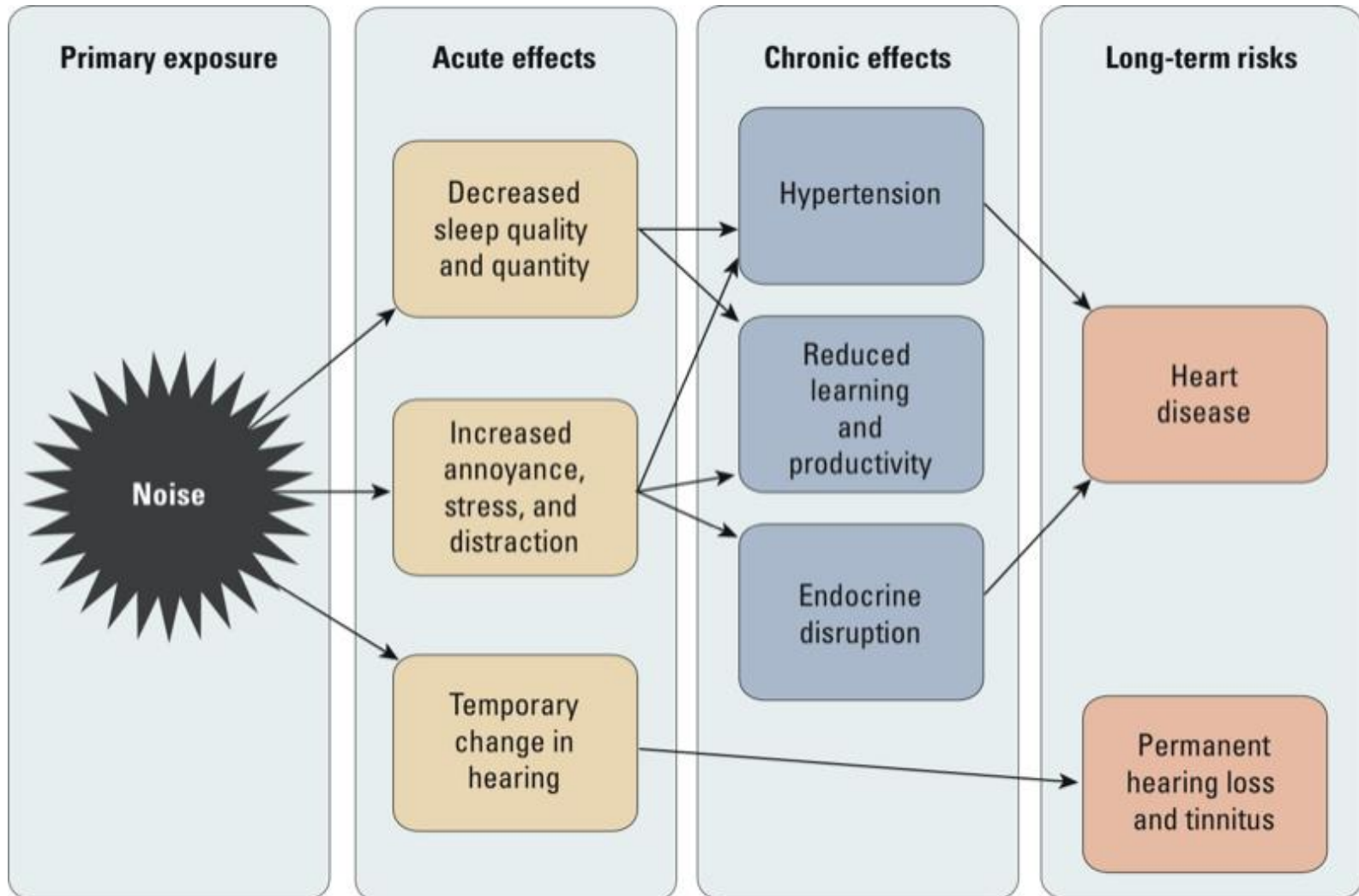


HOW TRANSPORT AFFECTS HEALTH

Air pollution: All cars and roads are not equal

- **Diesel vehicles** produce
 - more particulate matter (PM)
 - but less CO, hydrocarbons
 - Diesel exhaust fumes cause lung cancer
- 
- **Busy roads** have higher air pollution levels
 - Higher health risk within 300–500m of state highways

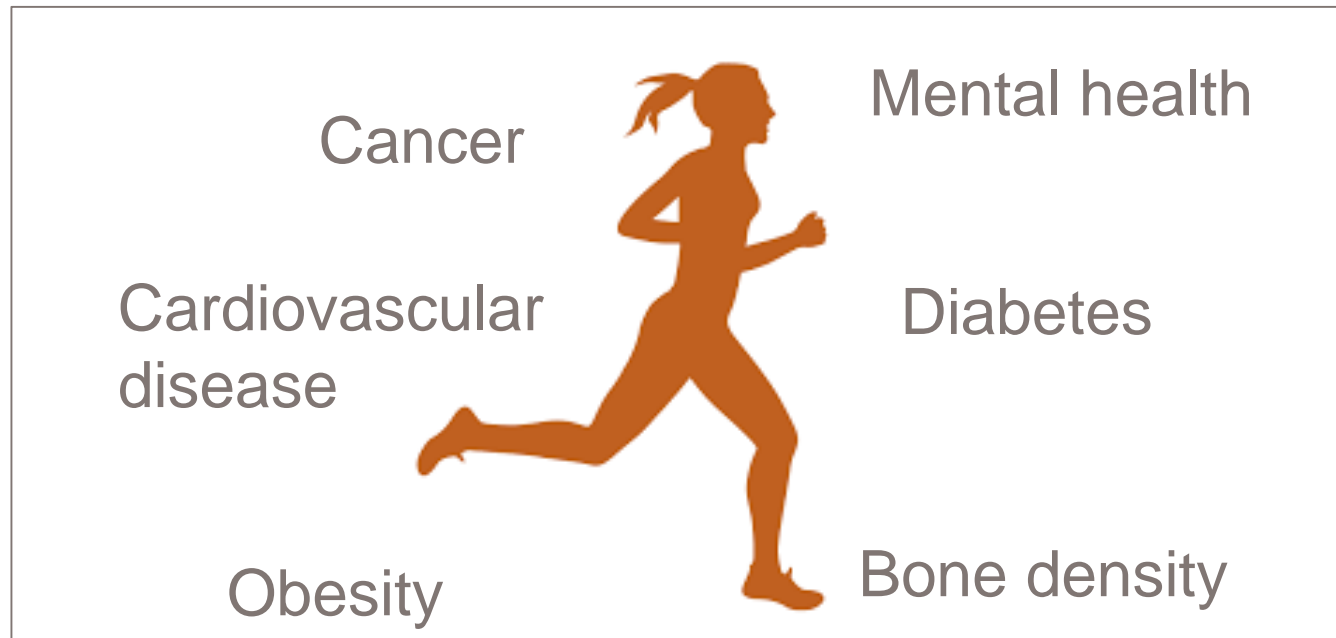
Noise pollution



Source: Hammer MS, Swinburn TK, Neitzel RL. 2014. Environmental noise pollution in the United States: developing an effective public health response. *Environ Health Perspect* 122:115–119.

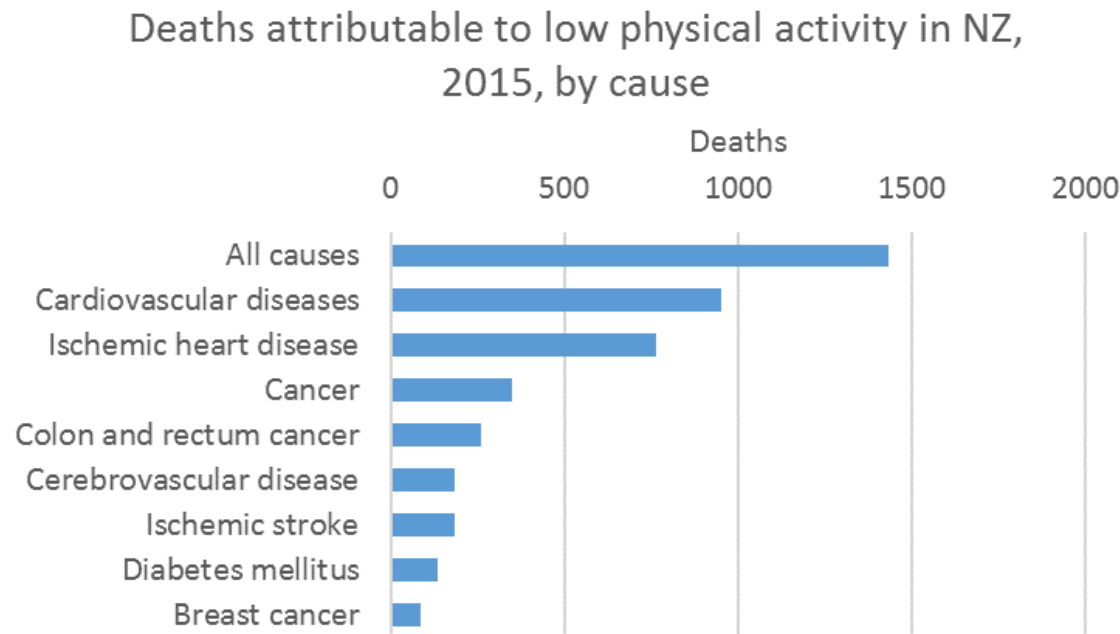
Physical activity – active and public transport

- Produces no air/noise pollution, greenhouse gases
- Physical activity reduces the risk of many health issues:



Low physical activity – the health burden

- An estimated 1435 deaths were attributable to low physical activity in New Zealand in 2015



Note: DALY = disability-adjusted life year, and is the sum of years of life lost (YLL) and years lived in disability/ill-health (YLD)

Source: Global Burden of Disease Study 2015

Other health impacts from transport

Lack of transport

- Barriers to accessing services and goods, eg
 - Healthcare services
 - Shops and healthy food
- Social isolation and loneliness
 - Associated with increased mortality, depression, high blood pressure, dementia

Greenhouse gas emissions from transport sector

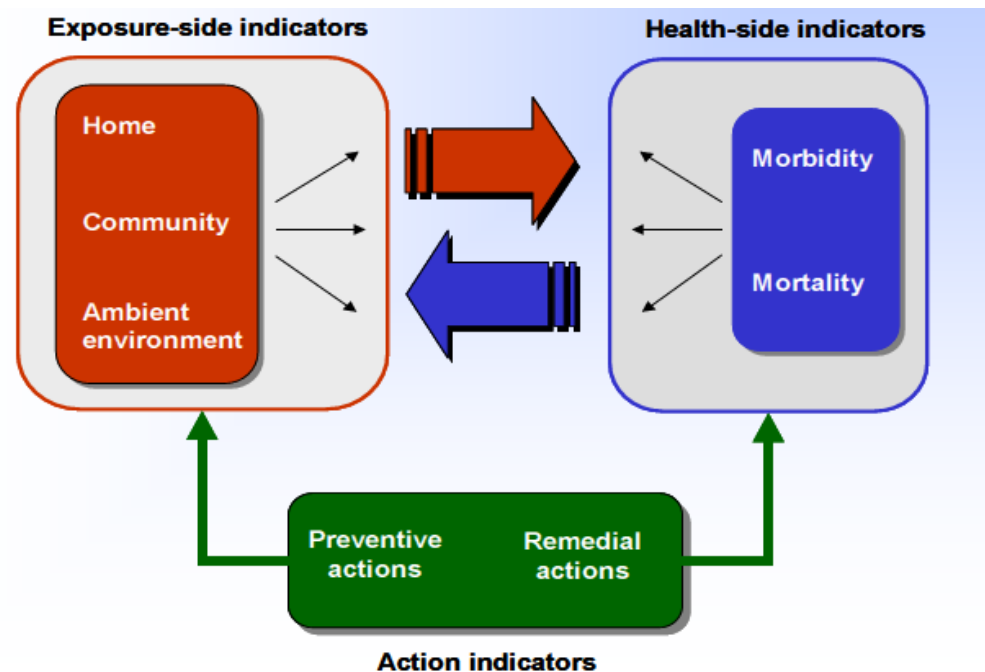
- 20% of NZ's total GHG emissions

Environmental Health Indicators for transport:

What is the data telling us?

What is an environmental health indicator?

- Describes the link between the environment and human health



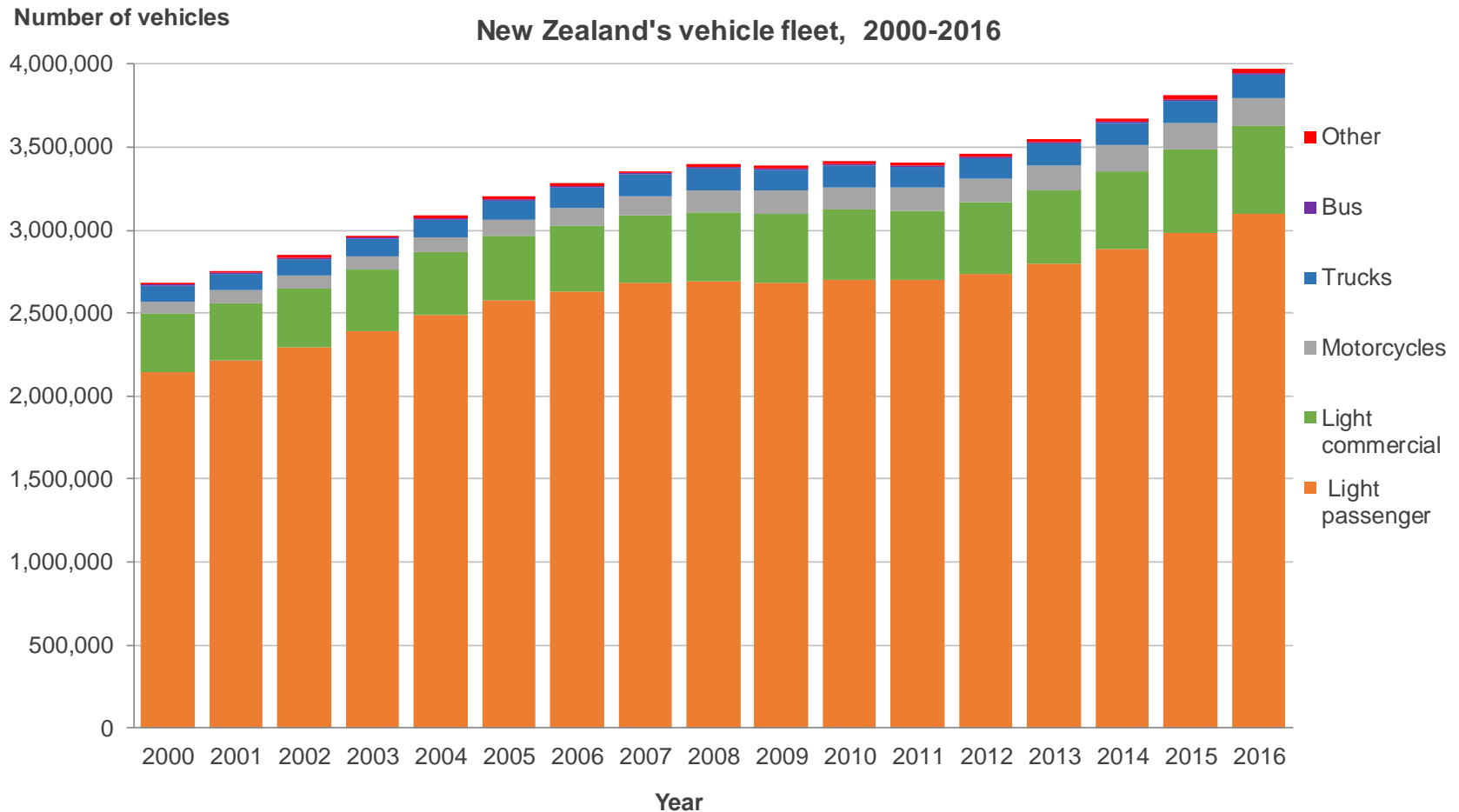
- Provides information for action

EHI transport indicators

- Number of motor vehicles
 - Active transport to and from school
 - Main mode of transport to work on Census day
 - Household travel time by mode of transport
-
- Unmet need for GP services due to a lack of transport
 - Road traffic injury deaths
 - Road traffic injury hospitalisations



The number of motor vehicles is increasing



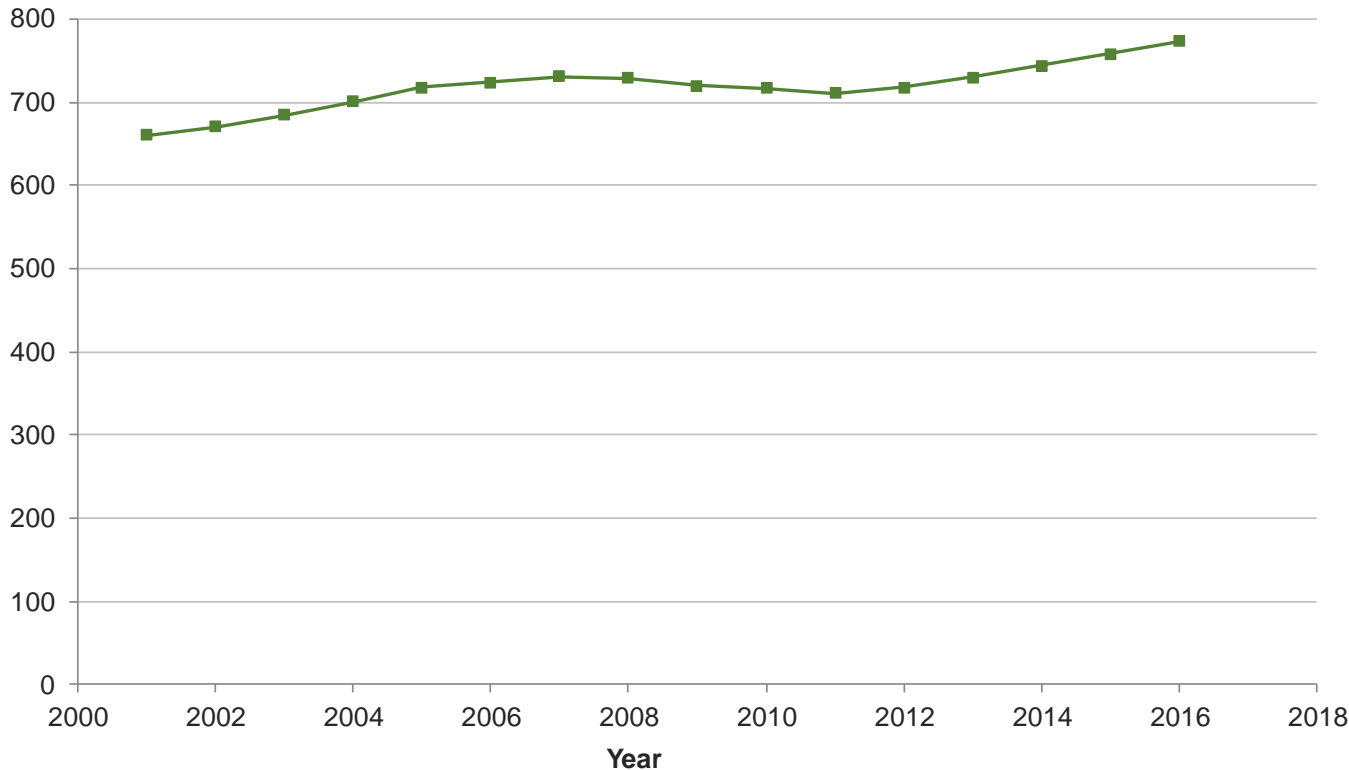
Source: Ministry of Transport

EHI TRANSPORT INDICATORS

Car ownership rate per capita is also increasing

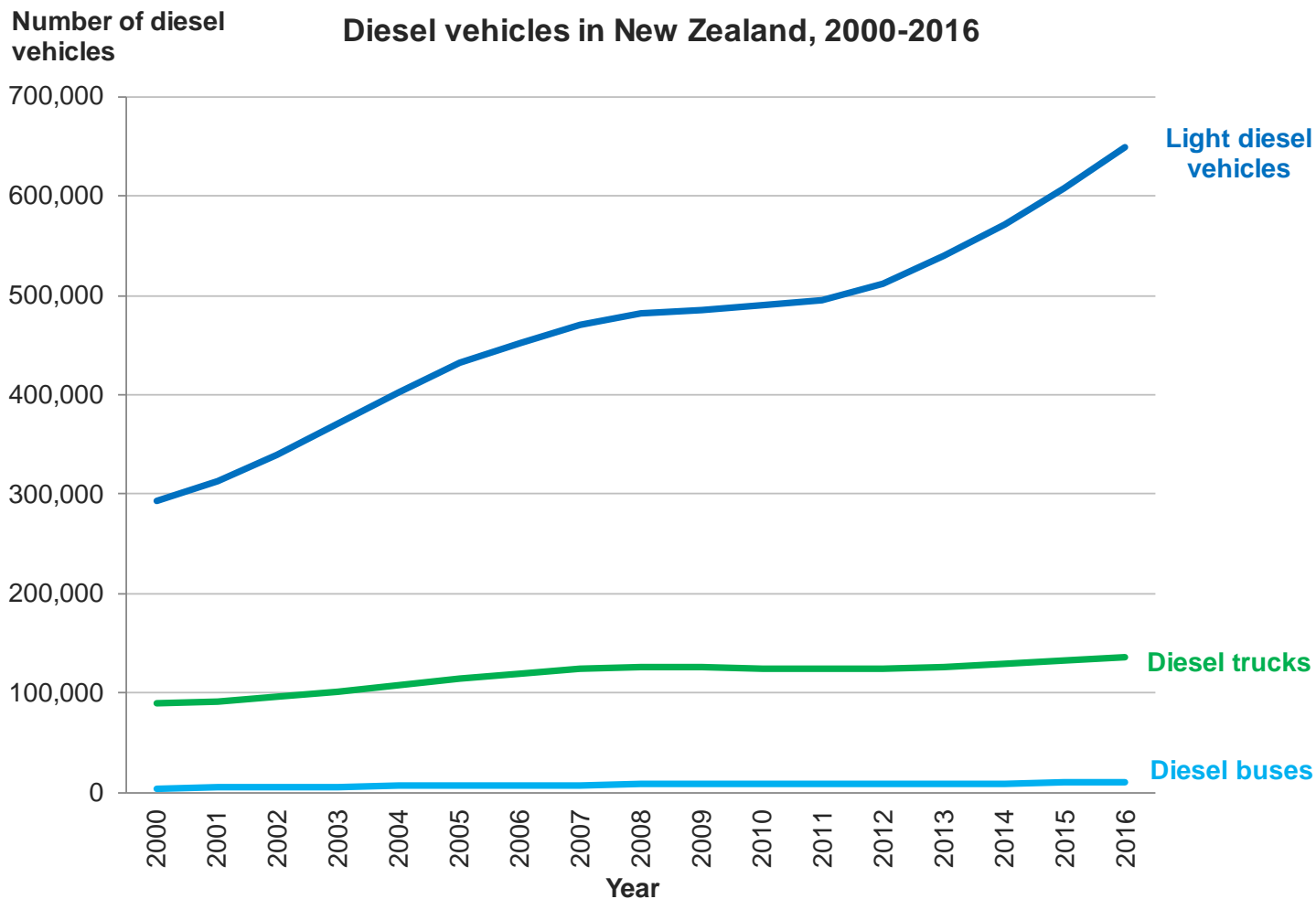
Number of light
vehicles per 1000
people

Light vehicles per 1,000 population,
New Zealand, 2001-2016



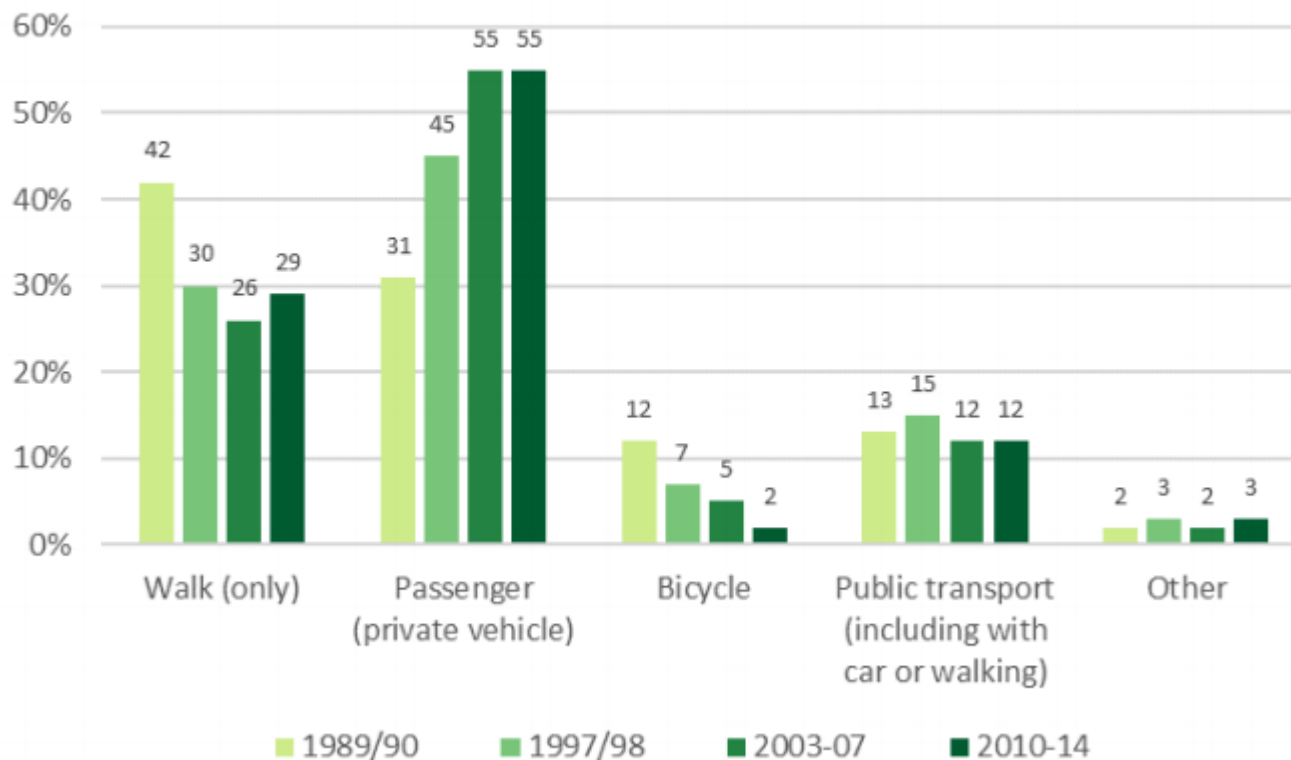
In 2014,
New Zealand
had the
highest car
ownership rate
per capita
in the OECD

Diesel vehicle numbers continue to climb



Children's mode of transport to school

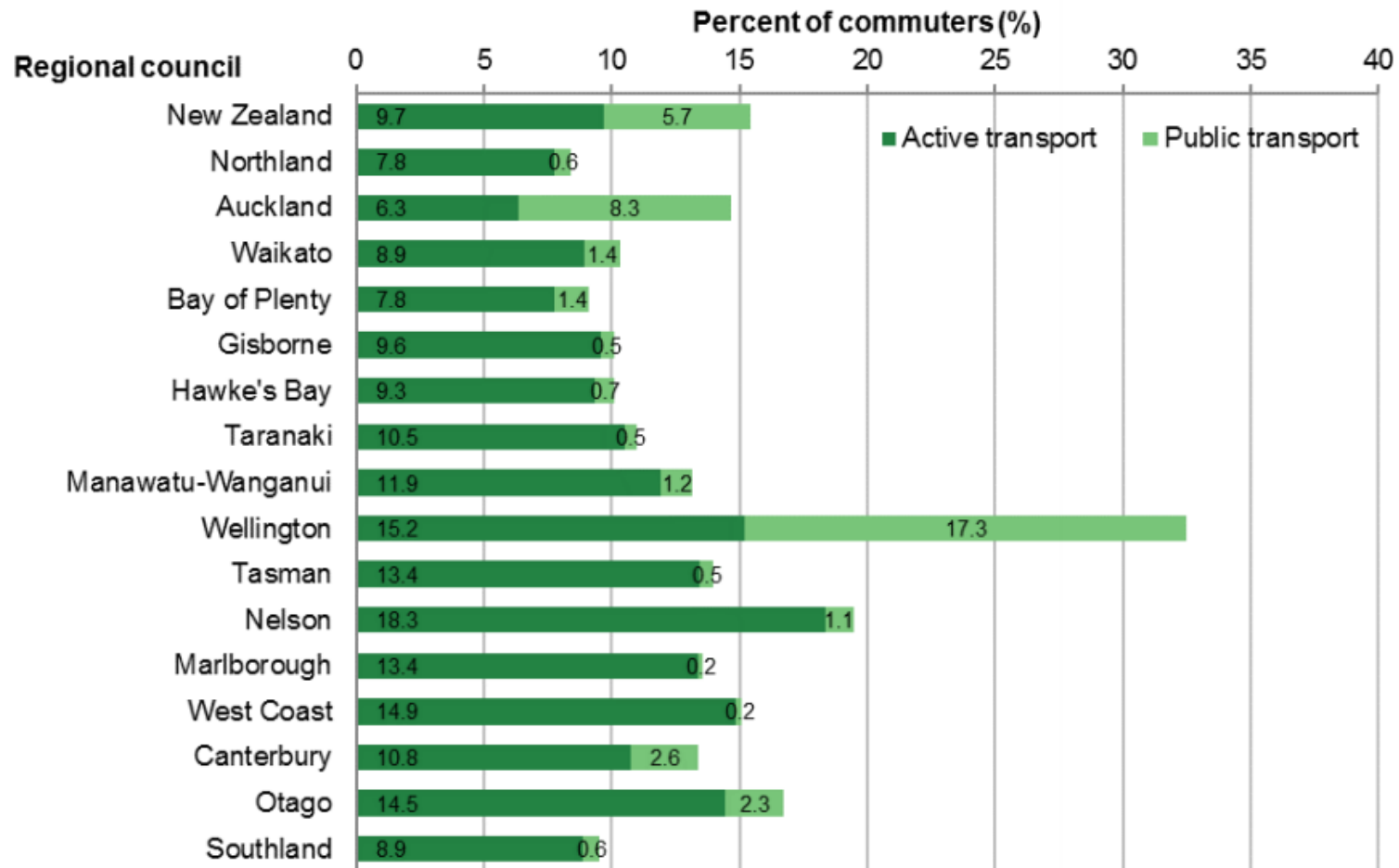
Figure 1: Mode of transport used to get to school, children aged 5–12 years, 1989/90 – 2010–14 (unadjusted prevalence)



Source: New Zealand Household Travel Survey, Ministry of Transport (2014)

Main mode of transport to work on Census day

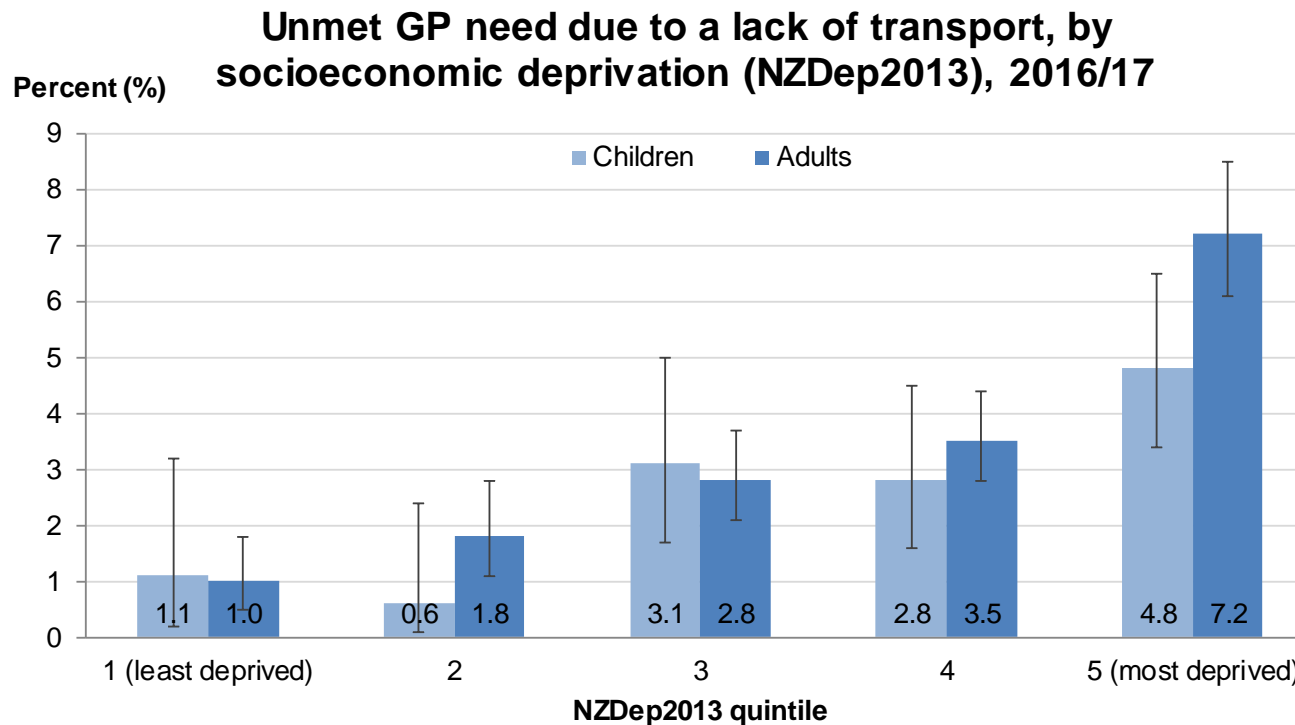
Figure 4: Use of active or public transport among commuters, by regional council, 2013 (percentage of commuters)



Source: Census 2013

Unmet GP need due to a lack of transport

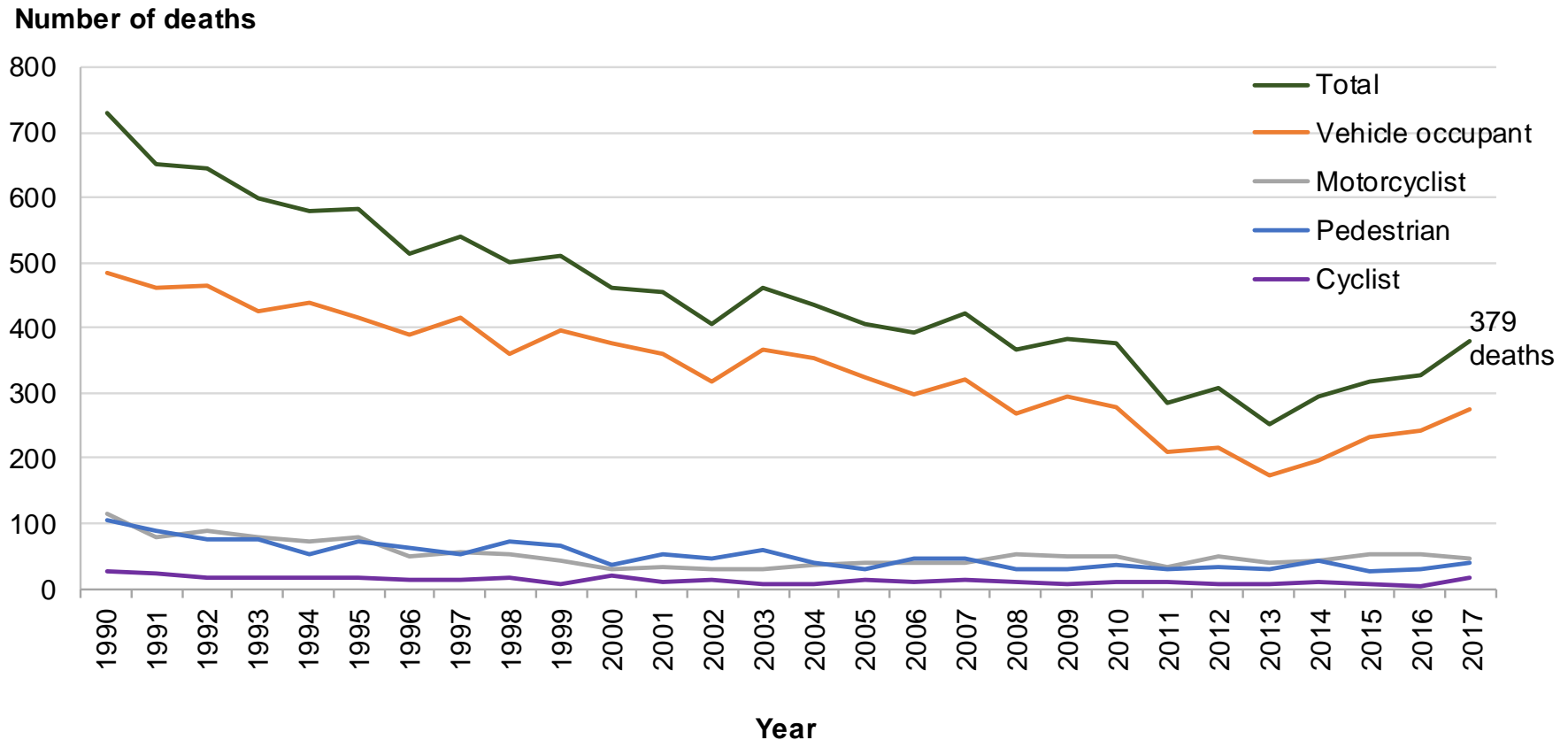
- Affected 148,000 New Zealanders in 2016/17 (~3%)
- More than 7% of Māori and Pacific adults affected



Source: New Zealand Health Survey

Traffic crash deaths: An increasing road toll since 2013

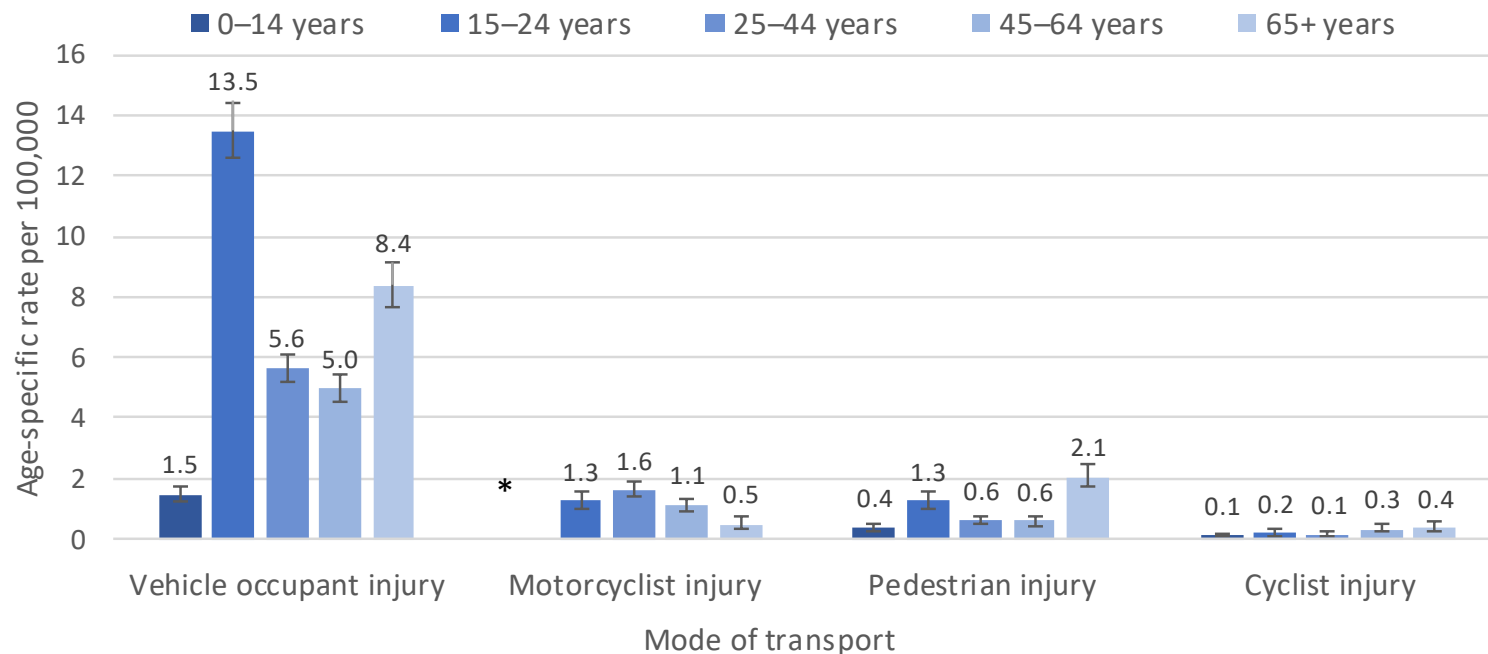
Annual road toll in New Zealand, by transport mode, 1990-2017



Source: Ministry of Transport

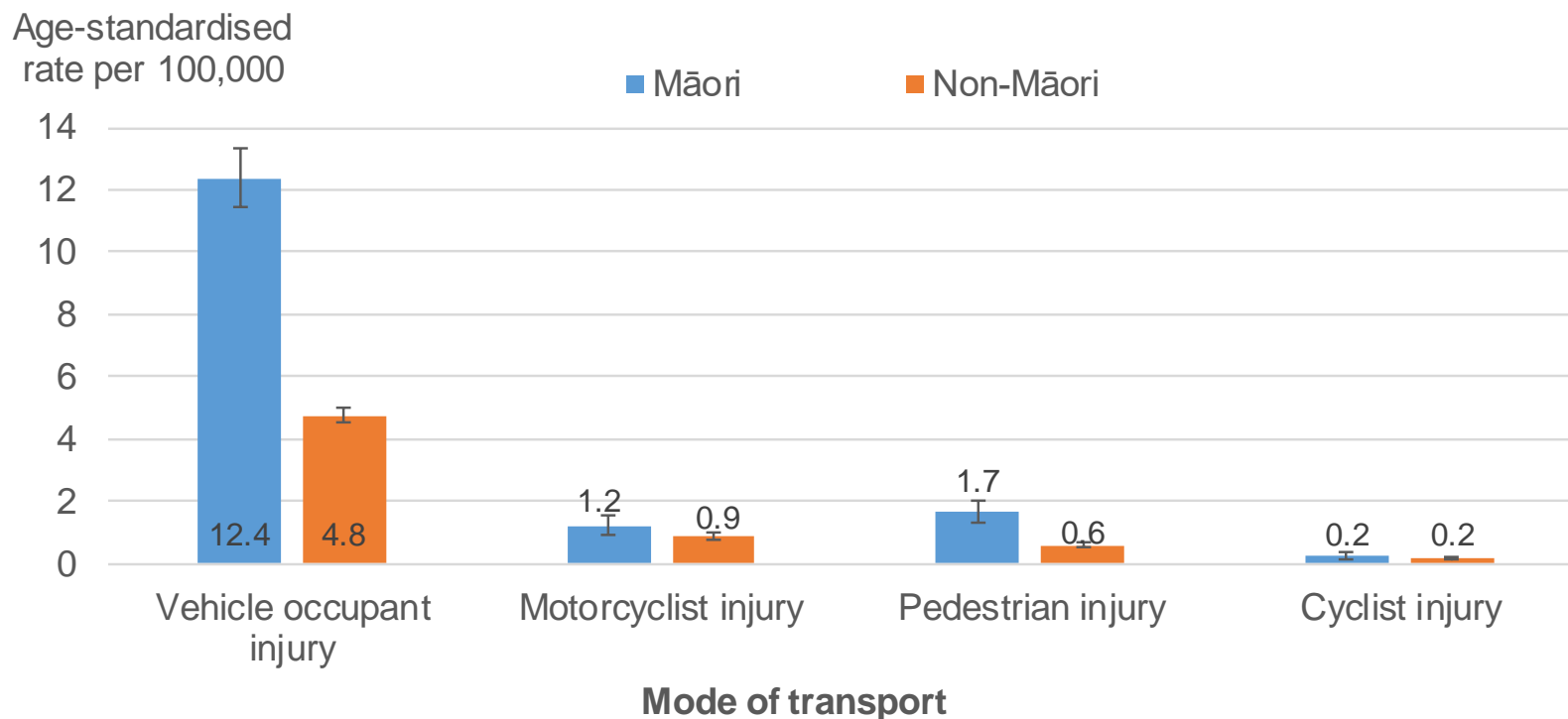
Age group patterns in mortality rates vary by mode of transport

Road traffic injury deaths, by age group and mode of transport,
2005-2014



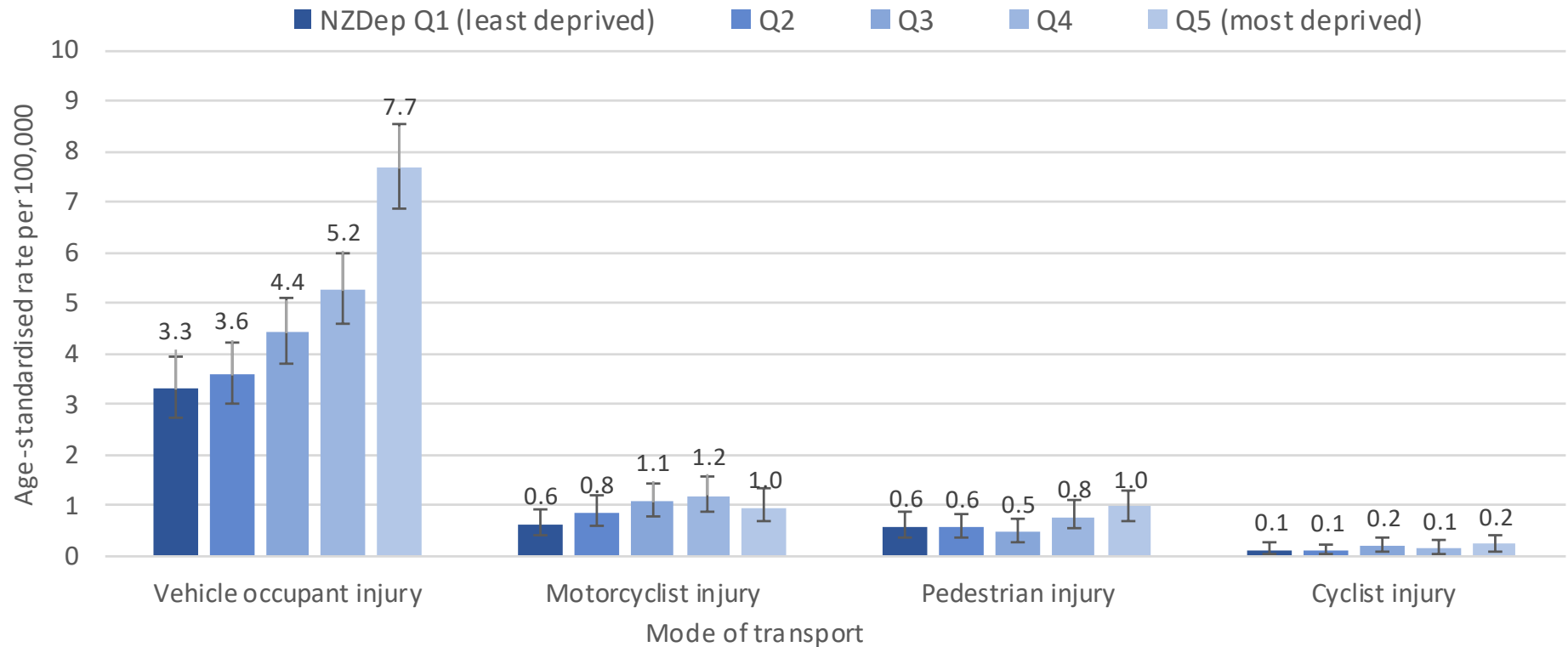
Traffic injury death rate is higher for Māori than non-Māori

Road traffic injury deaths, by Māori/non-Māori and mode of transport, 2005–2014



Highest rate of traffic injury deaths in most deprived areas

Road traffic injury deaths, by NZDep2013 quintiles and mode of transport, 2010-2014



Motorcyclists at more risk of death, per time spent travelling

Mortality risk per ten million hours travelled, by mode of transport, 2011-2013

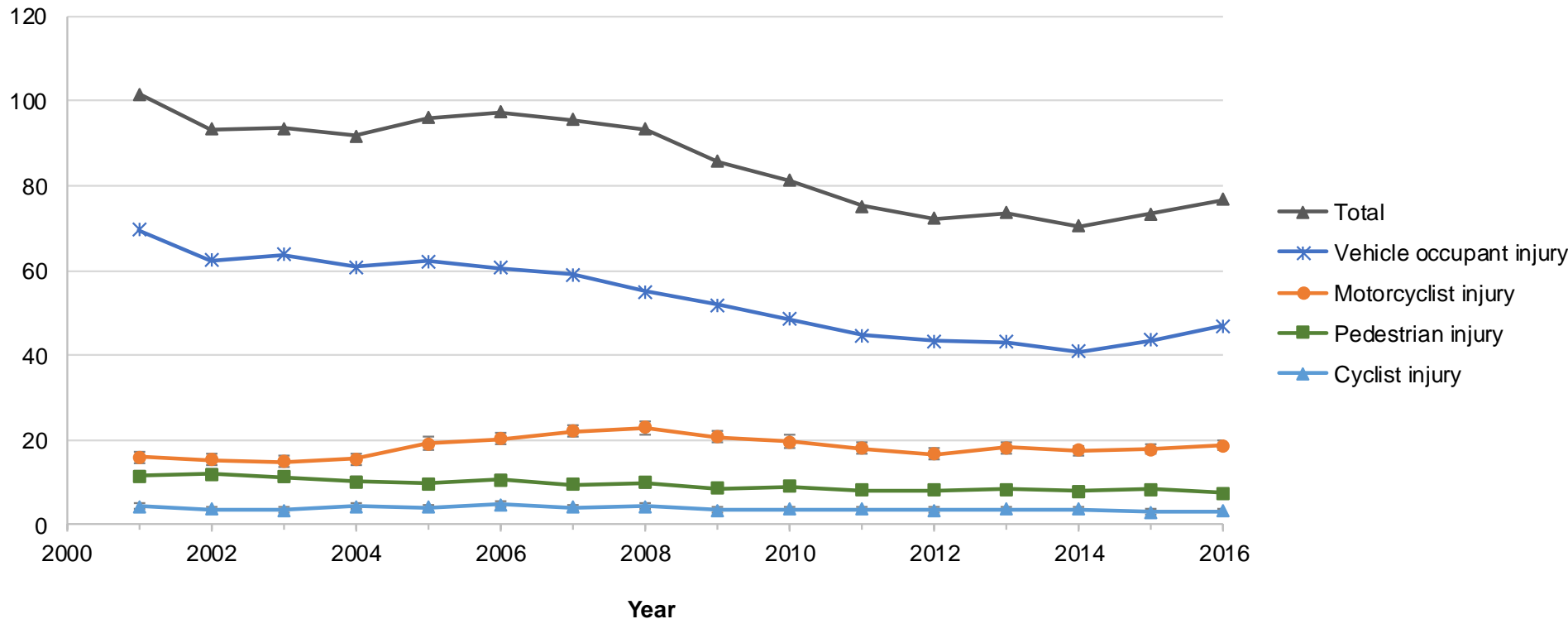


Source: New Zealand Mortality Collection Dataset & New Zealand Household Travel Survey

Transport injury hospitalisations increased from 2014 to 2016

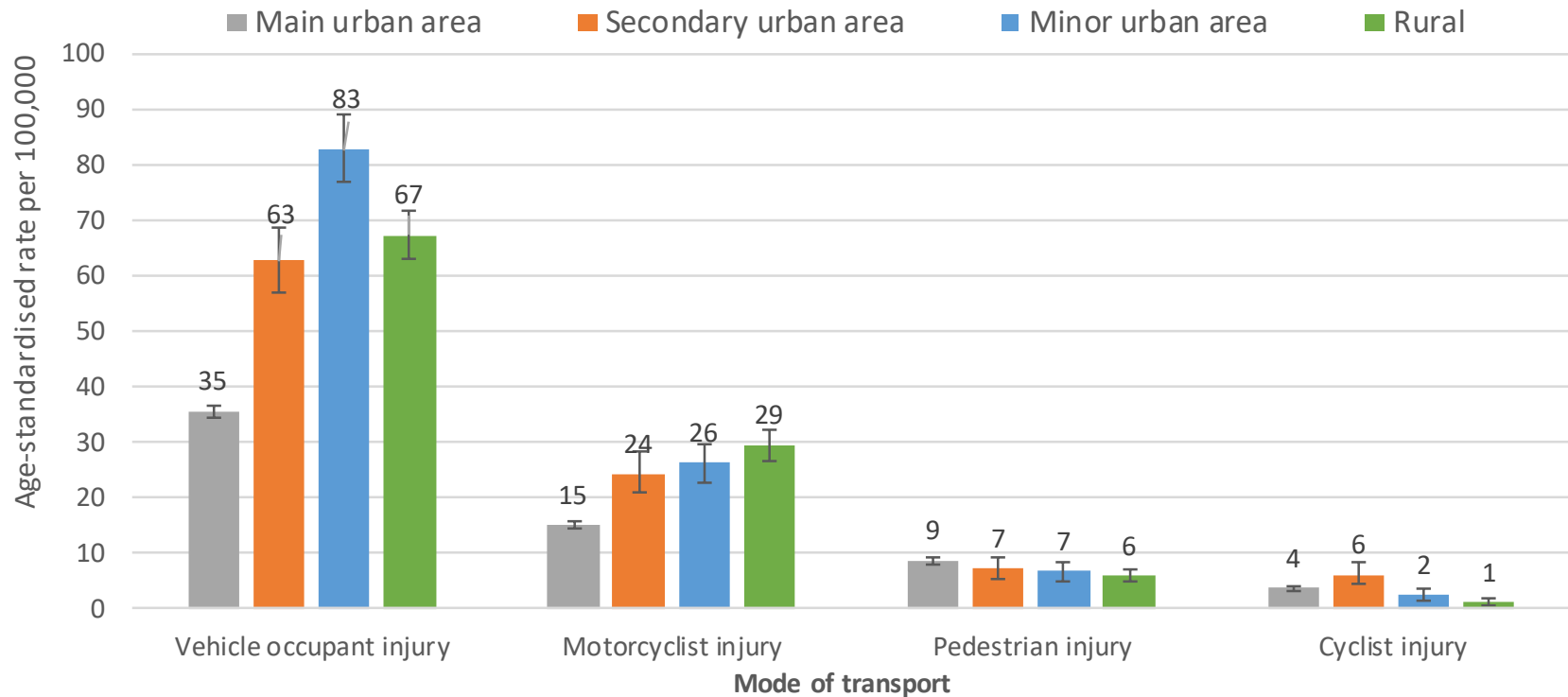
Road traffic injury hospitalisations by mode of transport, 2001–2016

Age-standardised rate per
100,000



Higher hospitalisation rates outside of major towns and cities

Road traffic injury hospitalisation rate, by urban/rural classification, 2014-16



Note: Urban/rural classification is for 2013. Main urban areas refer to major towns and cities with a population of 30,000 or more. Secondary urban areas are smaller towns with a population of 10,000–29,999 people. Minor urban areas are towns with a population of 1,000–9,999 people. Rural areas include rural centres, and rural areas outside of these.

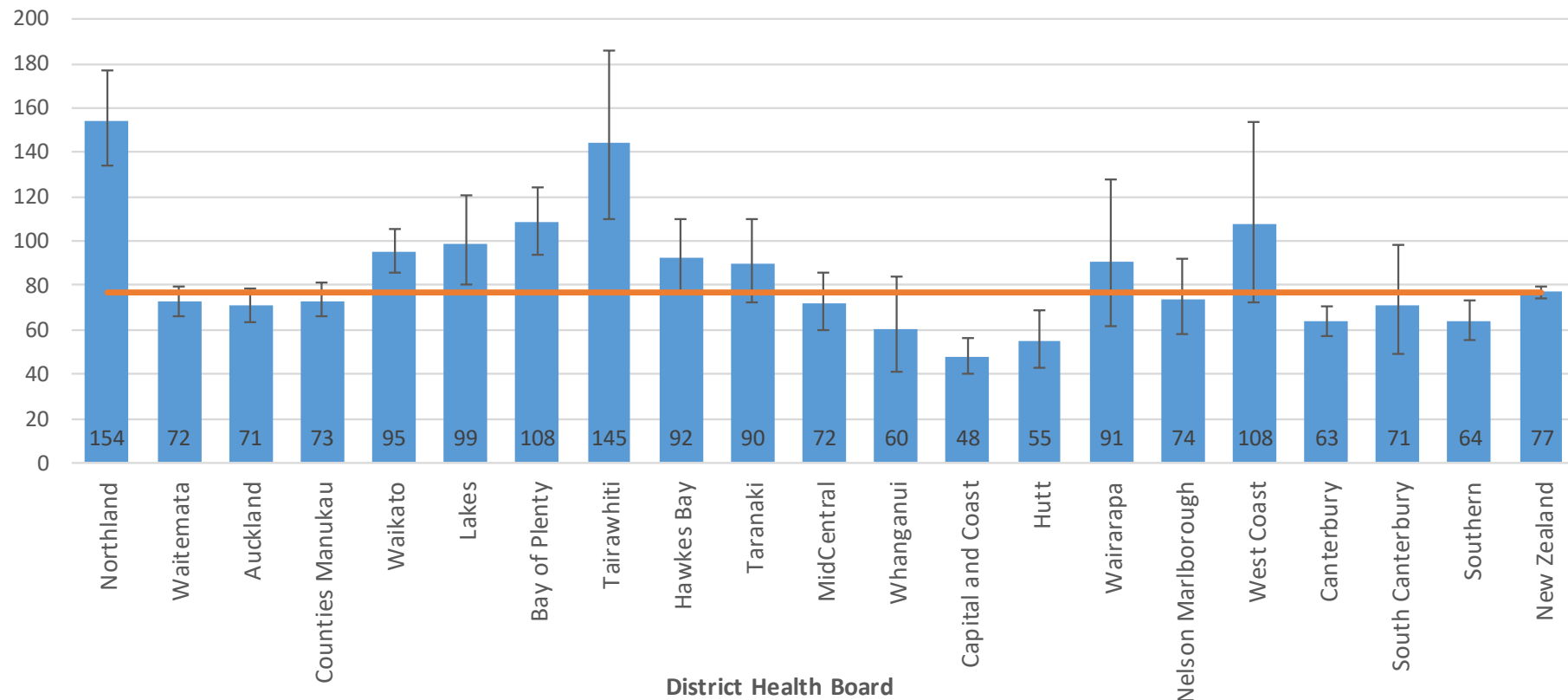
Source: National Minimum Dataset

Regional differences in transport injury hospitalisation rate

Road traffic injury hospitalisation rate, by District Health Board, 2016

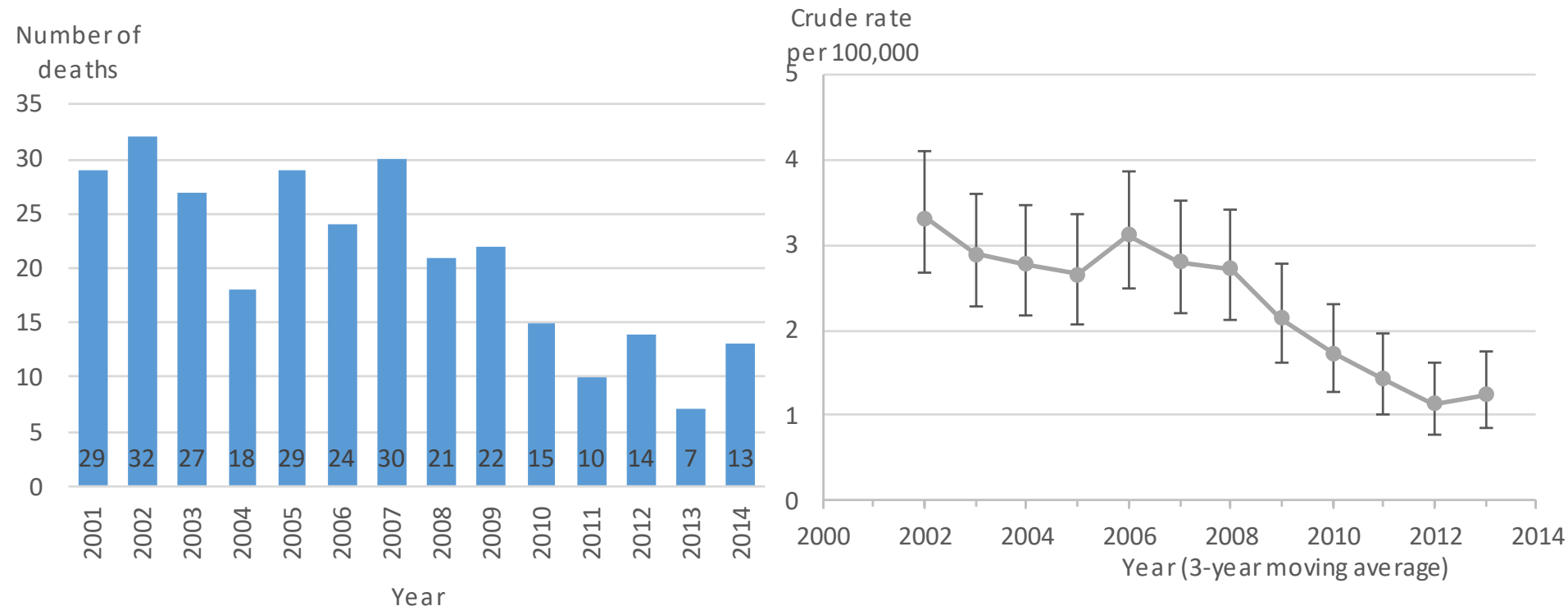
Age-standardised rate per

100,000



Children's road traffic injuries (0-14 years)

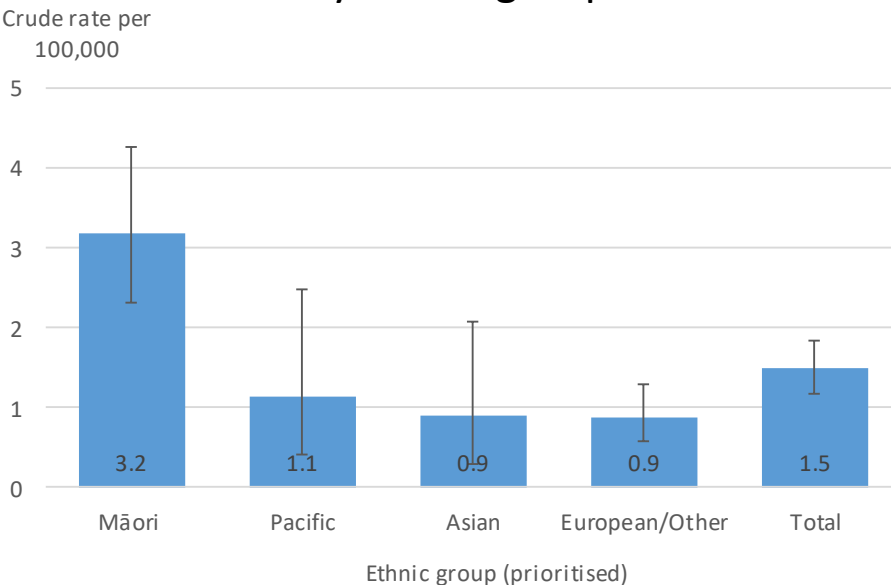
Children's traffic injury deaths (among children aged 0-14 years), 2001-2014, numbers and crude rate per 100,000



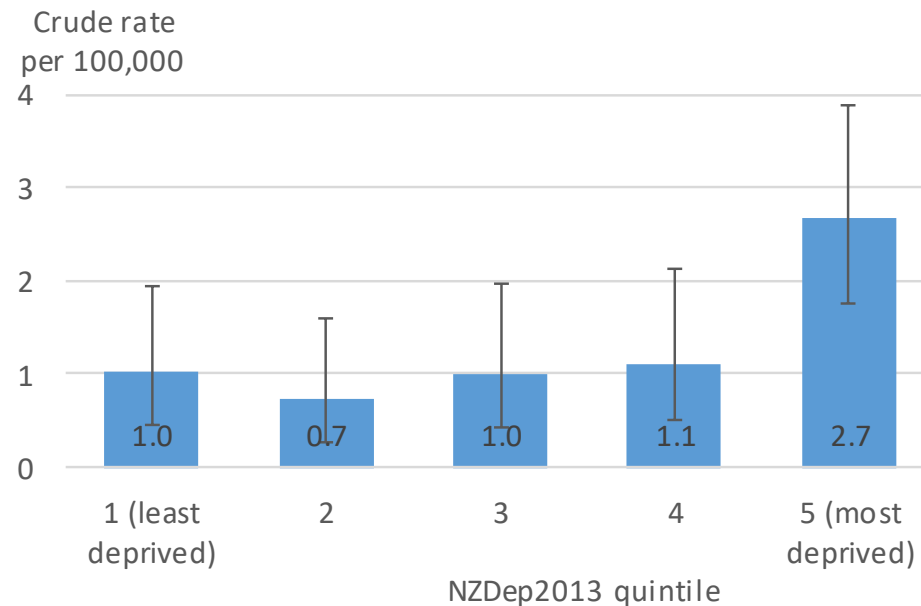
Unequal impacts seen for children as well

Children's traffic injury deaths by ethnic group (2009-2014) and NZDep2013 quintiles (2010-14), (crude rate per 100,000)

By ethnic group



By NZDep2013 quintiles

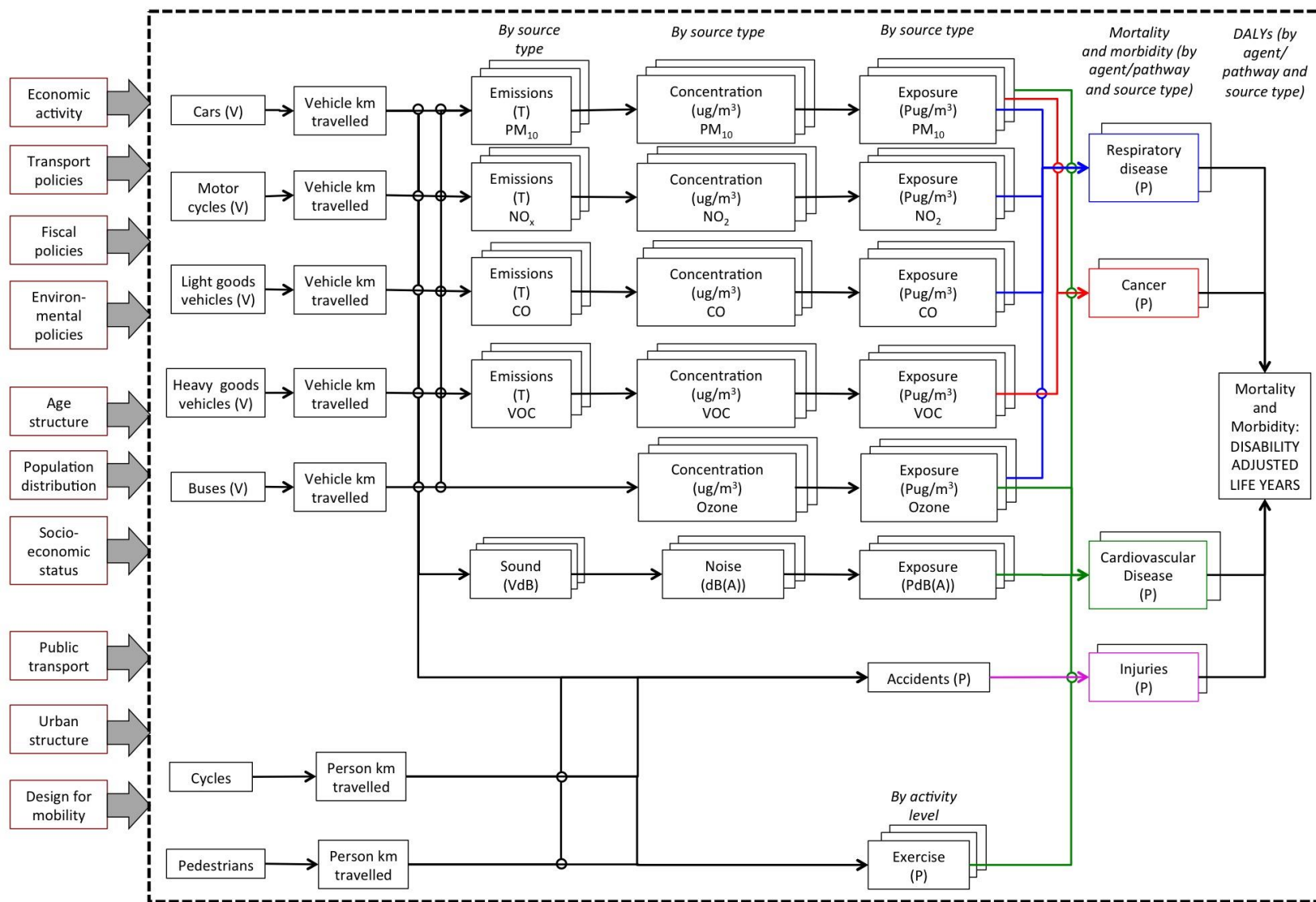


What is the overall health impact of road transport in New Zealand?

Our approach – a ‘rapid assessment’

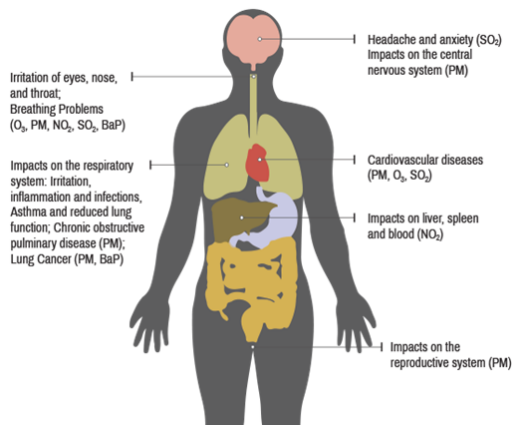
- Aims to answer the question: ‘How many deaths in NZ are attributable to road transport?’
- Estimated the health burden from:
 - Motor vehicle traffic crashes
 - Air pollution (PM₁₀, NO₂)
 - Noise pollution
- Used an ‘environmental burden of disease’ method
 - Used by the World Health Organization
- Co-authors of the study: Professor David Briggs and Professor Barry Borman

Conceptual framework



P = persons; V = vehicles; km = kilometres; T = tonnes; dB = decibels of sound; db(A) = perceived noise levels in decibels

Environmental burden of disease method



1. Identify the diseases caused by each exposure

2. Identify % of NZ population exposed to each exposure

4. Get the number of deaths for identified diseases

PM_{10} : All-cause mortality
 NO_2 : All-cause mortality
Road traffic noise: ischaemic heart disease, stroke, hypertensive diseases

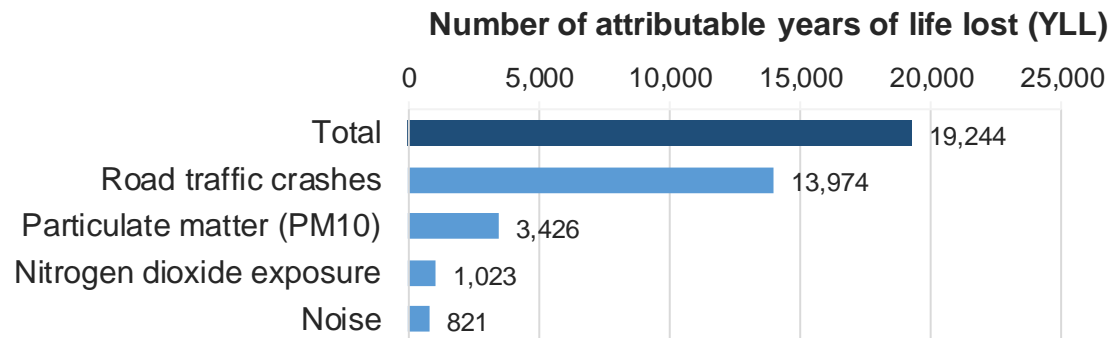
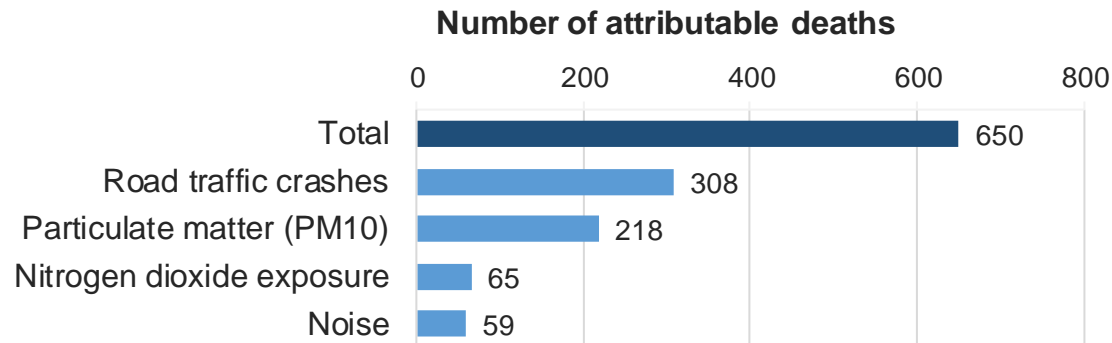
3. Calculate % of deaths attributable to exposure ('population attributable fraction', PAF)

5. Calculate number of attributable deaths

HEALTH BURDEN OF ROAD TRANSPORT

Health burden of road transport in New Zealand

Road transport accounted for an estimated 650 deaths in 2012



Briggs, D., Mason, K., Borman, B. (2016). Rapid Assessment of Environmental Health Impacts for Policy Support: The Example of Road Transport in New Zealand. *International Journal of Environmental Research and Public Health*, 2016; 13(1): 61

Comments from this study

Lack of exposure/monitoring data in New Zealand

- We estimated:
 - population exposed to high nitrogen dioxide levels
 - population exposed to road traffic noise
- Our study excluded exposure to ozone, VOC, CO

NZ results were comparable internationally

- But higher health loss from road traffic crashes

Showed importance of considering health impacts outside of road crashes

Summary: What does it all mean?

Key messages

- High reliance on cars in New Zealand
- Road transport has a substantial impact on health in NZ
 - Traffic crashes, air pollution, noise pollution, barriers to accessing services
- Unequal impacts of transport on health
 - Motorcyclists, and to a lesser extent, cyclists
 - Māori and Pacific peoples, people living in high deprivation areas
 - People living close to busy roads

Key messages

Evidence supports encouraging more use of active and public transport

- Move away from reliance on car use and fossil fuels



Active and public transport have multiple benefits

- less air pollution, noise pollution, greenhouse gases
- more physical activity

➡ improvement in the health and wellbeing of NZers

To find out more

Home

Monitoring New Zealand's Environmental Health

Our Environmental Health Indicators give you information and statistics on how the environment affects the health of New Zealanders. Our team is part of the Centre for Public Health Research, Massey University, and offers research, training and consultancy services.

Environmental Health Indicators



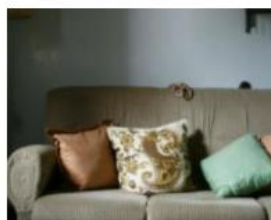
AIR QUALITY



RECREATIONAL WATER



DRINKING-WATER QUALITY



INDOOR ENVIRONMENT



TRANSPORT



HAZARDOUS SUBSTANCES



Latest News

Updated factsheets for transport

24/01/2018

In 2016/17, 2.6% of children and 3.2% of adults had an unmet GP need due to a lack of transport (about 148,000 New Zealanders). About 45% of children used active transport (walking, cycling etc) to get to school in 2016/17. For more information, see the [transport indicators webpage](#).

HSSS 2017 report released

12/01/2018

This latest report (2017) on the adverse health effects of exposure to hazardous substances in New Zealand has been released and can be found [here](#)

Christmas Newsletter (13th) released

07/12/2017

We have released our 13th EHI newsletter. To find out more about our recent work, [click here](#).

Tweets by @EHI_NewZealand



EHINZ @EHI_NewZealand

Launch of new online health data website - healthspace - Massey University: [massey.ac.nz/massey/about-m...](https://massey.ac.nz/massey/about-massey)



Jan 30, 2018



EHINZ @EHI_NewZealand

This latest report (2017) on the adverse health effects of exposure to hazardous substances in New Zealand has been released and can be found here bit.ly/2mXpoiX

Download the PDF here: [https://bit.ly/2mXpoiX](#)

Indicators

- ▶ About the indicators
- ▶ Air quality
- ▶ Recreational water
- ▶ Drinking-water quality
- ▶ Indoor environment

▶ Transport

- ▶ About transport and health
- ▶ Indicators at a glance - Transport
- ▶ Motor vehicles
- ▶ Main mode of transport to work on Census day
- ▶ Household travel time by mode of transport
- ▶ Active transport to and from school
- ▶ Unmet need for GP services due to a lack of transport
- ▶ Road traffic injury mortality
- ▶ Road traffic injury hospitalisations
- ▶ Health burden of road transport

Transport

This section provides data and statistics on transport and health in New Zealand. Find out about how transport affects health, types of transport used by New Zealanders, and how a lack of transport affects people's access to healthcare.



About transport and health

Information about how transport impacts on human health in New Zealand.



Indicators at a glance - Transport

This section summarises the latest Environmental Health Indicators about transport and health in New Zealand.



Motor vehicles

Statistics on motor vehicle numbers and average ages of vehicles in New Zealand.



Main mode of transport to work on Census day

Statistics on the main mode of transport that people used to get to work on Census day.





Household travel time by mode of transport

Statistics on the percentage of household travel time spent travelling by



Useful links

 [Transport indicators - Ministry of Transport](#)
Indicators for transport, prepared by the Ministry of Transport.

 [Transport policy statement - NZCPHM](#)
A policy statement about transport and health, supporting the development of a sustainable transport environment. Prepared by the New Zealand College of Public Health Medicine.

 [Benchmarking cycling and walking in six New Zealand cities](#)
A pilot study on cycling and walking in New Zealand's six largest cities. Published by the NZ Centre for Sustainable Cities in August 2016.

 [2014 Air Domain Report - Ministry for the Environment](#)
The Ministry for the Environment's 2014 report on air quality monitoring, including vehicle emission data.

Briggs D, Mason K, Borman B. (2016). [Rapid Assessment of Environmental Health Impacts](#)

About transport and health

HIGHLIGHTS:

- Transport can impact injuries and deaths, air activity. Transport act emissions. A lack of tr social interaction and
- New Zealanders are he and have the highest c
- Road transport was es Zealand in 2012 (308 fr and 59 from noise pol
- Active forms of transp range of health benefi

This factsheet provides info complements the new set of in May 2017.

Transport plays an import

Transport plays an important around, get to work, and for education, family, communit Cars are the main form of tra in the OECD (OECD 2012). In vehicles, with much less trav

How transport impacts on

Transport can impact on our pollution, as well as providing fuels, which contribute to gre and barriers to accessing serv Active transport (such as wal health benefits, including for A recent study estimated that traffic accidents, 283 as a res estimated 40 deaths were av

www.ehinz.ac.nz

Road traffic injury hospitalisations in New Zealand

- Traffic injury hospitalisations have decreased from 2000 to 2015.
- Motorcyclists per time spent
- Males had high
- Young people i hospitalisation
- Māori, Pacific i hospitalisation
- People living in
- West Coast an significantly hi

The health impact

Traffic-related deat Zealand Burden of Zealand in 2006 (Mi Traffic injuries affec tend to suffer more protected by the ve

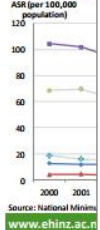
Data for this indi

This indicator exam mode of transport, well as per time spe for this indicator in stays in Emergency 'All traffic injuries' is injury, pedestrian i

Traffic injury hos

In 2015, there were (60%), with a small From 2000 to 2015, population (Figure 1 the 16 years, the AS

Figure 1: Traffic injury



Source: National Mili

www.ehinz.ac.nz

About 144,000 New Zealanders missed out on a GP visit due to no transport in 2015/16

In 2015/16 about 3% of New Zealanders had a medical problem but did not visit a GP due to a lack of transport, in the past 12 months (adults: 3.2%, 95% confidence interval 2.9–3.5; children: 2.8%, 2.3–3.4). This is about 119,000 adults and 25,000 children.

There has been no significant change in the percentage of people with unmet need for a GP due to a lack of transport between 2011/12 and 2015/16, for either adults or children (Figure 1), even when adjusting for age differences (Ministry of Health 2016).

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Unmet need for GP services due to a lack of transport

HIGHLIGHTS:

- In 2015/16, about 144,000 New Zealanders (or about 3% of the population) had missed out on a GP visit due to a lack of transport in the previous 12 months. There has been no significant change in the prevalence of this unmet need since 2011/12.
- Women were almost twice as likely as men (4.1% vs 2.3%) had an unmet GP need due to a lack of transport in the months.
- Lack of transport was a significant barrier to accessing GP for Māori and Pacific peoples, with 5–9% of people in th
- People living in the most deprived areas had much high (6.7%) than people in the least deprived areas (<1%).
- Hawke's Bay DHB and Hutt DHB had higher rates of unmet

How a lack of transport can affect health

Access to transport is important for accessing health services and 2002). Not having access to transport when it is needed (either v be an important barrier to accessing health services, and can lead healthcare when it is needed), and a potential worsening of health

Data for this indicator

The data for this indicator come from the New Zealand Health Sur defined as having had a medical problem but not visiting a GP due Health 2014). The results are presented for children (aged 0–14 ye

Figure 1: Unmet months, children



Source: Ministry of

Road traffic injury mortality in New Zealand

- In 2015, there were 319 traffic deaths. This included 232 vehicle occupant deaths, 54 motorcyclist deaths, 25 pedestrian deaths and 6 cyclist deaths.
- The number of traffic deaths has decreased substantially from 1990 to 2015.
- Motorcyclists and cyclists were at higher risk of traffic injury mortality per time spent travelling.
- Males had higher death rates of traffic injury than females.
- Young people aged 15–24 years had the highest rate of traffic injury mortality.
- Māori had a higher traffic injury mortality rate than non-Māori.
- People living in more deprived areas had higher mortality rates of traffic injury.
- West Coast DHB had the highest traffic injury mortality rate in 2004–2013, followed by Northland DHB.

The health impact of road transport accidents

Traffic-related deaths and injuries are the main health impact of road transport in New Zealand (Briggs et al 2016). Each year 200–400 people die on New Zealand roads. Traffic injuries affect all types of road users. However, pedestrians and cyclists can be considered particularly vulnerable, as they tend to suffer more severe injuries from collisions, due to lack of personal protection. By comparison, vehicle occupants are protected by the vehicle and safety features (such as seatbelts).

Data for this indicator

This factsheet includes two sources of data on road transport mortality. Data are firstly presented for the annual road toll statistics (1990–2015), from the Ministry of Transport. More in-depth data are then presented from the New Zealand Mortality Collection (2000–2013). We have pooled data from the Mortality Collection across years to enable us to examine pedestrian and cyclist deaths (which have small numbers).

The data are presented by mode of transport, to show how users of different forms of transport are affected. The rates are presented per capita, as well as by time spent travelling, which takes into account the different amounts of time spent travelling by different modes of transport.

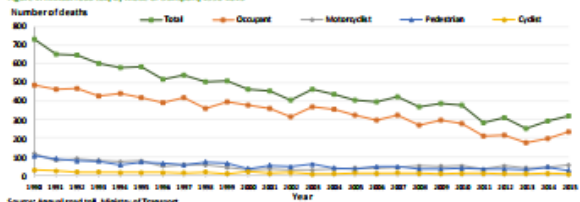
'All traffic injuries' include occupant injury (injuries of driver or passenger of three or four-wheeled motor vehicles), motorcyclist injury, pedestrian injury, cyclist injury, other injury and unspecified injury.

The road toll has decreased substantially from 1990 to 2015

In 2015, there were 319 road deaths due to traffic injuries. The majority of these deaths were due to vehicle occupant injury (232 deaths, 73%), with a smaller percentage due to motorcyclist (54 deaths, 17%), pedestrian (25 deaths, 8%) and cyclist injuries (6 deaths, 2%).

The road toll has decreased from 1990 (730 deaths) to 2015 (319 deaths) for all modes of transport.

Figure 1: Annual road toll, by mode of transport, 1990–2015



Source: Annual road toll, Ministry of Transport.

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July 2017

Household travel time by mode of transport

HIGHLIGHTS:

- About 79% of total travel time by New Zealanders was spent in motor vehicles in 2011–14. There has been very

Active transport to and from school

HIGHLIGHTS:

Main mode of transport to work on Census day

HIGHLIGHTS:

- More than four in five commuters (82%) used a car, van or truck as their main mode of transport to get to work on Census day in 2013.
- In 2013, the use of walking/jogging (6.8%) and cycling (2.9%) for commuting

1% and 3.1% respectively).

Increased a little from 2001 to

Active transport (19.6% of

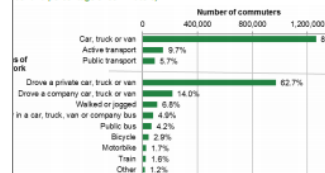
on (18.3%) and Wellington

of public transport (17.3%).

human health and the environment. These benefits include increased on or greenhouse gases. Studies have shown that active commuting 11% reduction in cardiovascular risk (Hamer & Chida, 2008). Use of air pollution (by not taking a private vehicle), is safer than travelling by Medical Association, 2012).

ffects the main means of travel to work that adults used to travel the day (for example, by bicycle, bus, walking or jogging). The indicator resident population aged 15+ years who were employed and who to did not go to work or who worked from home). In this factsheet, van; driving a company car, truck or van; and being a passenger in a s walking, jogging and cycling. 'Public transport' includes public bus

Figure 1: Main means of travel to work on Census day, among commuters, 2013



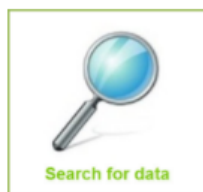
Car, truck or van' includes (i) driving a private car, truck or van, (ii) driving a company car, truck or (iii) being a passenger in a car, truck, van or company bus. 'Active transport' includes walking, jogging. 'Public transport' includes public bus and train.

2013 New Zealand Census of Population and Dwellings

Page 1

EHI, May 2017

HealthSpace – an online mapping tool for exploring regional health data



Welcome to healthspace

Healthspace provides data and information, in the form of interactive maps, graphs and tables for a wide range of health indicators. New Zealand data is presented at a range of sub-national levels including: Regional Council, District Health Board, Territorial Authority, Local Area Ward and Census Area Unit levels.

View online maps and profiles:

Do I need to log in?

Most healthspace atlases are publicly available to view and access.

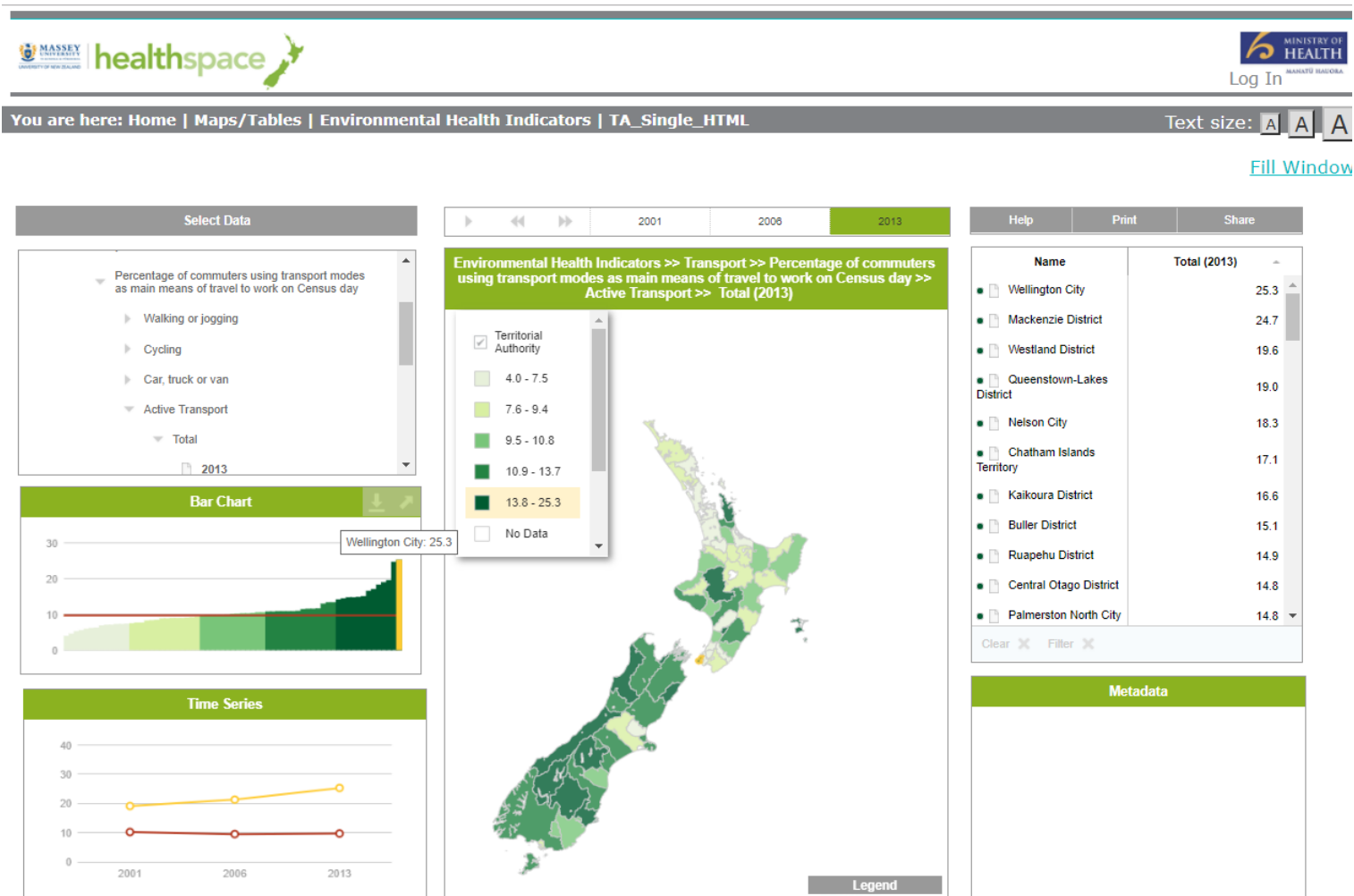
Some atlases are only available to authorised users and require a log-in.

[Log in here](#)

| | | | | |
|----------------------------------|---|--|--|-------------------------------|
| Alcohol Related Harm | Cancer | Child and Youth | How healthy is my DHB? | Education |
| Environmental Health Indicators | Hauora Online | Hazardous Substance Surveillance | Healthy Families NZ authorised users only | Hospital use |
| Māori health statistics online | NZ Census Population demographic indicators | NZ Census Population Economic Indicators | NZ Index of deprivation | NZ Census Population Pyramids |
| New Zealand Health Survey Adults | NZ Health survey Children | Notifiable diseases | Oral health of children | Pacific Health Statistics |
| Risk behaviour | Self-harm statistics | | | |

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HealthSpace example: Using active transport to work, by territorial authority, 2013



Thank-you for your time!

For more info,
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