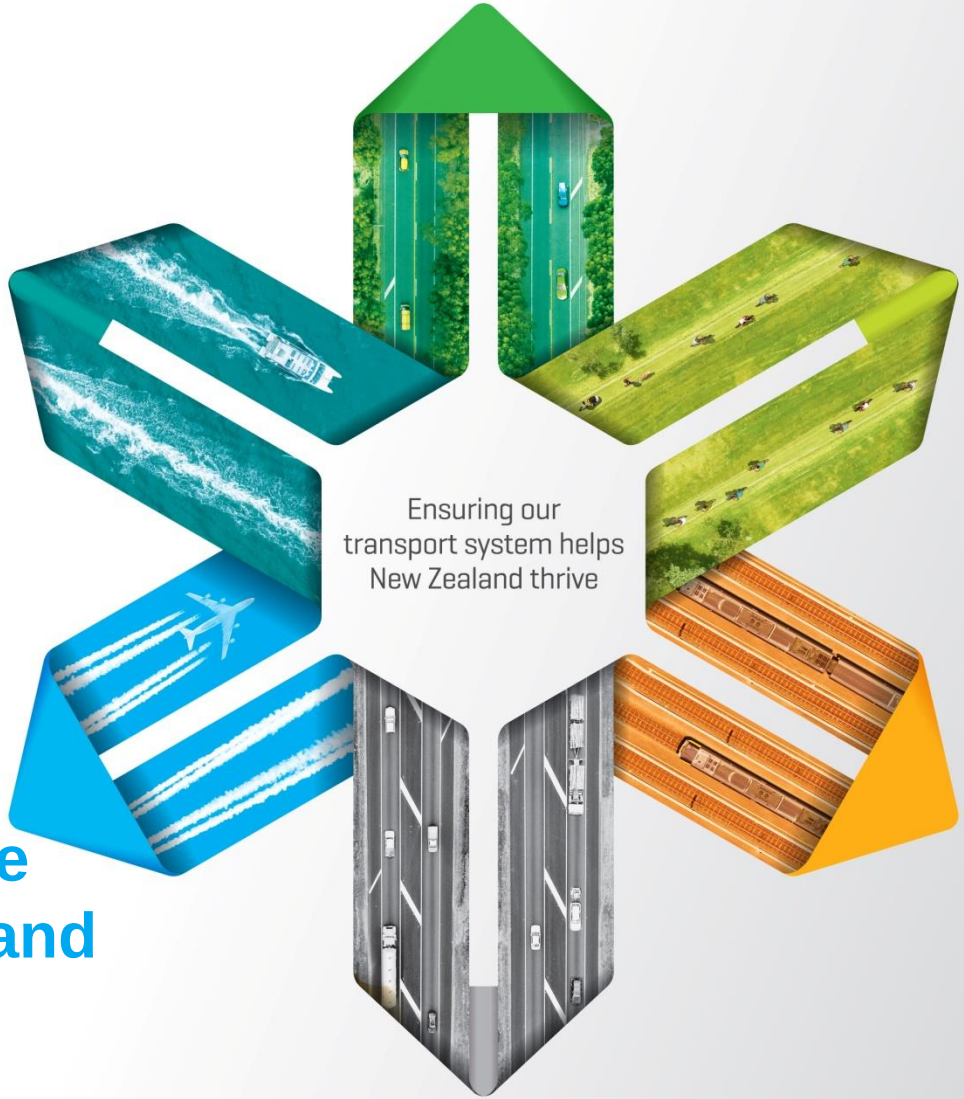


Ministry of Transport
TE MANATŪ WAKA

Impacts of Transport on the Health of New Zealanders and Current Policy Responses

22 February 2018 | Ralph Samuelson

What this presentation is about

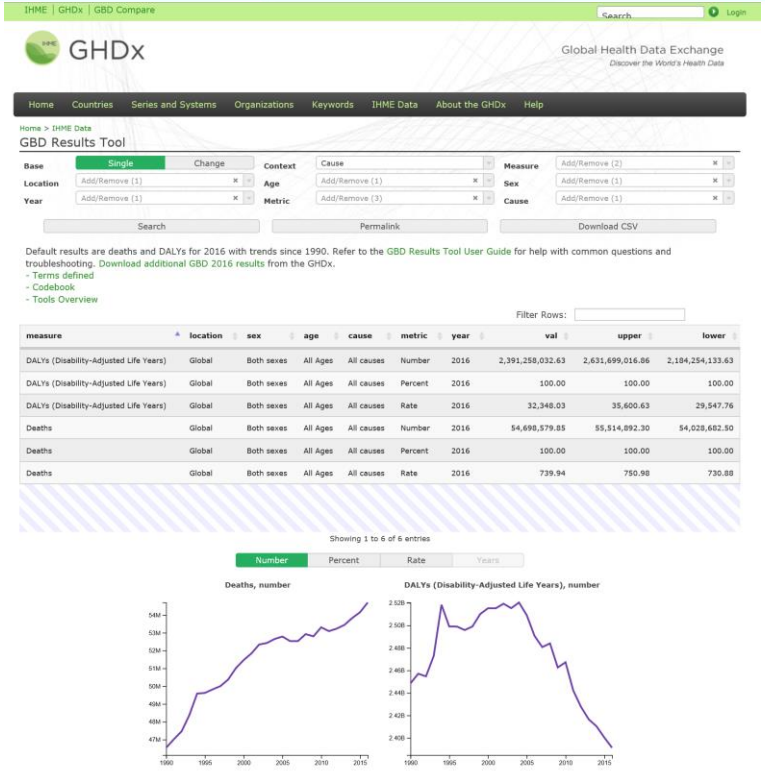
Transport has important impacts on the health of New Zealanders in at least five ways:

- Transport injuries/deaths
- Air quality/pollution
- Diseases of inactivity
- Mental health/isolation
- Transport access to healthcare

This presentation focuses on how the burden of these impacts compares to the policy response in the transport sector

The key conclusion is that all five impacts are heavy burdens on New Zealand society and deserve to be addressed, but transport injuries/deaths gets a disproportionately large share of the transport policy attention and funding

A word about the data…



Much of the data I present here today is from the Global Health Data Exchange or GHDx (http://ghdx.healthdata.org/gbd-results-tool)

- Comprehensive database of health statistics by country, including deaths, YLLs, YLDs, DALYs by cause or by risk factor
- Based on the work of the Global Burden of Disease Study (GBD)
- GBD Study was collected and analyzed by a consortium of more than 2,300 researchers in more than 130 countries
- Supported by WHO, World Bank and Gates Foundation
- Results and methodologies published in the medical journal *Lancet*

…and the risk estimates

Articles

Global, regional, and national comparative risk assessment of 79 behavioural, environmental and occupational, and metabolic risks or clusters of risks in 188 countries, 1990–2013: a systematic analysis for the Global Burden of Disease Study 2013

GBD 2013 Risk Factors Collaborators*

Summary

Background The Global Burden of Disease, Injuries, and Risk Factor study 2013 (GBD 2013) is the first of a series of annual updates of the GBD. Risk factor quantification, particularly of modifiable risk factors, can help to identify emerging threats to population health and opportunities for prevention. The GBD 2013 provides a timely opportunity to update the comparative risk assessment with new data for exposure, relative risks, and evidence on the appropriate counterfactual risk distribution.

Methods Attributable deaths, years of life lost, years lived with disability, and disability-adjusted life-years (DALYs) have been estimated for 79 risks or clusters of risks using the GBD 2010 methods. Risk–outcome pairs meeting explicit evidence criteria were assessed for 188 countries for the period 1990–2013 by age and sex using three inputs: risk exposure, relative risks, and the theoretical minimum risk exposure level (TMREL). Risks are organised into a hierarchy with blocks of behavioural, environmental and occupational, and metabolic risks at the first level of the hierarchy. The next level in the hierarchy includes nine clusters of related risks and two individual risks, with more detail provided at levels 3 and 4 of the hierarchy. Compared with GBD 2010, six new risk factors have been added: handwashing practices, occupational exposure to trichloroethylene, childhood wasting, childhood stunting, unsafe sex, and low glomerular filtration rate. For most risks, data for exposure were synthesised with a Bayesian meta-regression method, DisMod-MR 2.0, or spatial-temporal Gaussian process regression. Relative risks were based on meta-regressions of published cohort and intervention studies. Attributable burden for clusters of risks and all risks combined took into account evidence on the mediation of some risks such as high body-mass index (BMI) through other risks such as high systolic blood pressure and high cholesterol.

Findings All risks combined account for 57·2% (95% uncertainty interval [UI] 55·8–58·5) of deaths and 41·6% (40·1–43·0) of DALYs. Risks quantified account for 87·9% (86·5–89·3) of cardiovascular disease DALYs, ranging to a low of 0% for neonatal disorders and neglected tropical diseases and malaria. In terms of global DALYs in 2013, six risks or clusters of risks each caused more than 5% of DALYs: dietary risks accounting for 11·3 million deaths and 241·4 million DALYs, high systolic blood pressure for 10·4 million deaths and 208·1 million DALYs, child and maternal malnutrition for 1·7 million deaths and 176·9 million DALYs, tobacco smoke for 6·1 million deaths and 143·5 million DALYs, air pollution for 5·5 million deaths and 141·5 million DALYs, and high BMI for 4·4 million deaths and 134·0 million DALYs. Risk factor patterns vary across regions and countries and with time. In sub-Saharan Africa, the leading risk factors are child and maternal malnutrition, unsafe sex, and unsafe water, sanitation, and handwashing. In women, in nearly all countries in the Americas, north Africa, and the Middle East, and in many other high-income countries, high BMI is the leading risk factor, with high systolic blood pressure as the leading risk in most of Central and Eastern Europe and south and east Asia. For men, high systolic blood pressure or tobacco use are the leading risks in nearly all high-income countries, in north Africa and the Middle East, Europe, and Asia. For men and women, unsafe sex is the leading risk in a corridor from Kenya to South Africa.

Interpretation Behavioural, environmental and occupational, and metabolic risks can explain half of global mortality and more than one-third of global DALYs providing many opportunities for prevention. Of the larger risks, the attributable burden of high BMI has increased in the past 23 years. In view of the prominence of behavioural risk factors, behavioural and social science research on interventions for these risks should be strengthened. Many prevention and primary care policy options are available now to act on key risks.

Funding Bill & Melinda Gates Foundation.

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*Collaborators listed at the end of the Article

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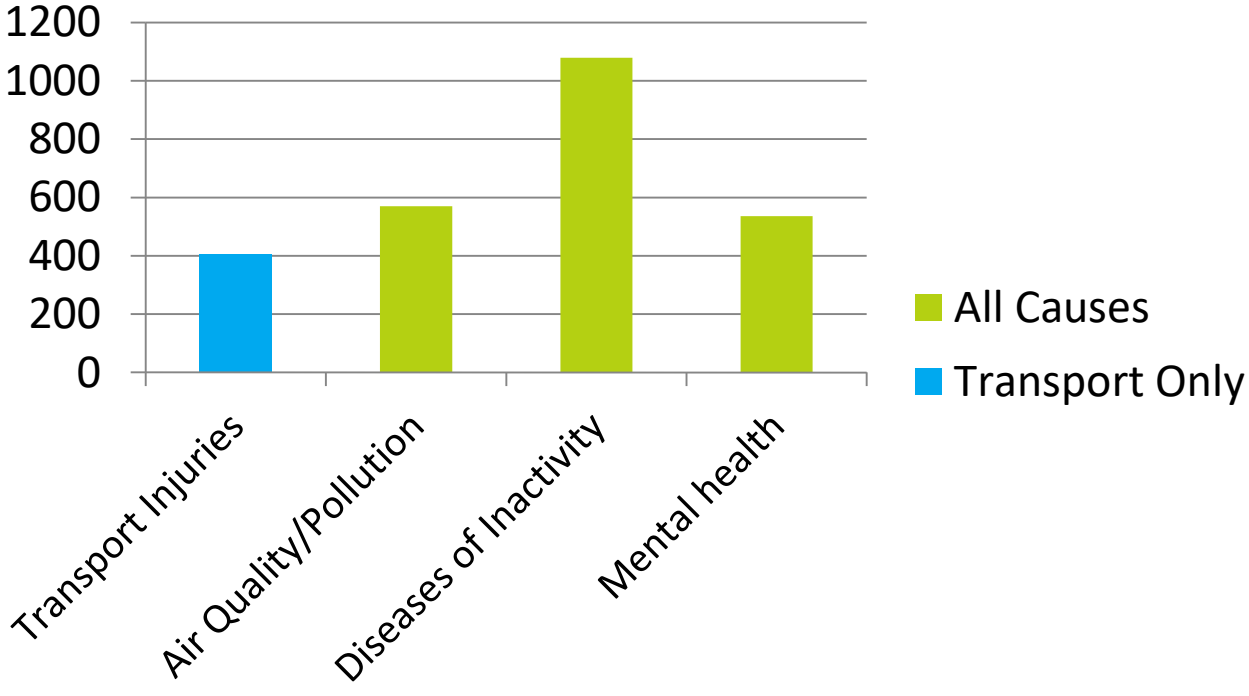
GBD Study has a systematised methods for modelling 79 behavioural, environmental, occupational and metabolic risks, including low physical activity and air pollution

- **Summarised in *Lancet* article with hundreds of co-authors**
- **Estimates of outcomes in each country (deaths, YLL, YLD, DALYs) appear to be based on the same model, but reflecting best available data on risk exposures in each country**
- **Ranges of uncertainty also provided for all outcomes**

How many deaths per year could transport policy potentially impact?



Comments on the previous chart (deaths) p. 1

- All four of the causes shown represent major causes of death in New Zealand
- Statistics vary on deaths due to air pollution; the number cited here (570 deaths in 2016) is from the Global Health Exchange database, which does not break out deaths due to air pollution from transport
  - An alternative source, *Health and Air Pollution in New Zealand (HAPINZ) 2012*, http://www.hapinz.org.nz/HAPINZ%20Update_Vol%201%20Summary%20Report.pdf, Table 6.1 study puts it at 2316 deaths from all causes and 256 deaths from motor vehicle pollution in 2006
- Statistics also vary on deaths due to diseases of inactivity; the number cited here (1079 deaths in 2016) is from the Global Health Exchange database
  - An alternative source, *Wellington Regional Strategy, Waikato Regional Council and Auckland Council, The Costs of Physical Inactivity: Toward a regional full cost accounting perspective, https://www.waikatoregion.govt.nz/assets/PageFiles/25488/The_Costs_of_Physical_Inactivity.PDF*, Table 2.8, puts it at 2121 deaths in 2009 if all ages are counted, but Table 2.9 puts it at 246 deaths in 2009 if only deaths among those under age 65 are counted ('premature deaths')

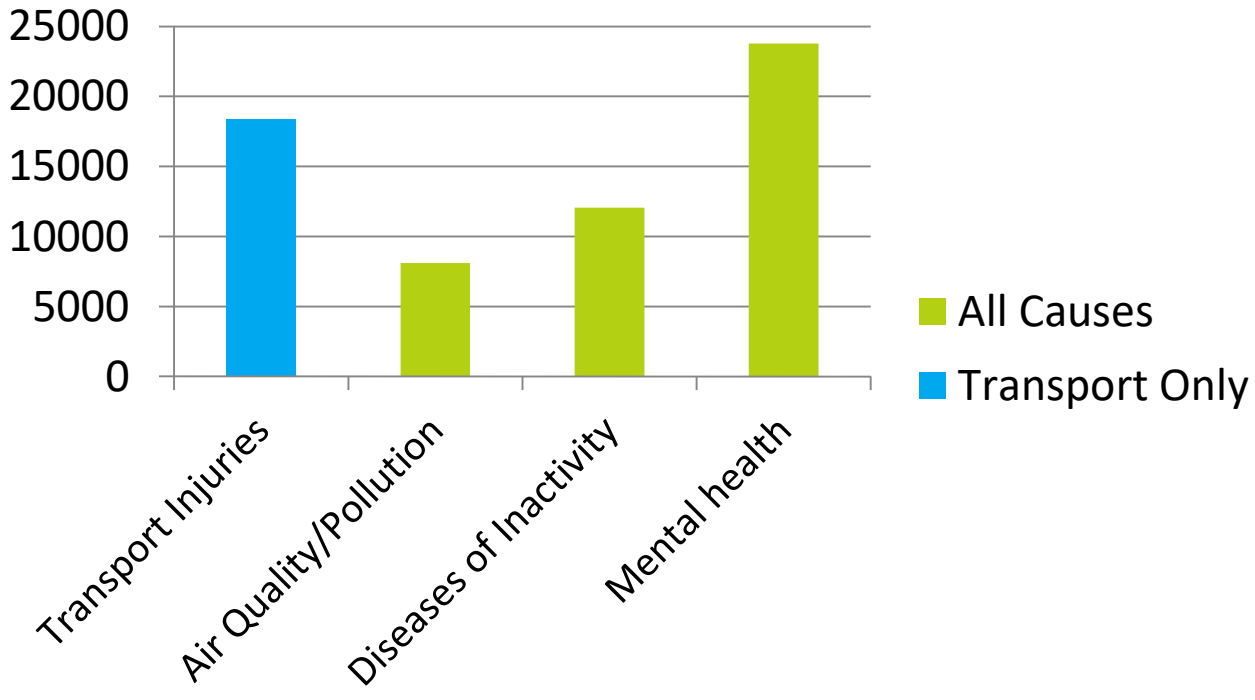
Comments on the previous chart (deaths) p. 2

- Mental health deaths may be understated as the chart includes only deaths due to ‘self harm’
  - There are certainly many additional deaths traceable to mental health/isolation, including those due to substance abuse, accidents and not seeking medical attention when needed
- No statistics have been identified linking lack of transport access to healthcare to deaths, so deaths for this cause are not shown, but could also be significant
  - The New Zealand Health Survey 2016/17 found that 3.2% of the adult population and 2.6% of the children (age 0-14) had an unmet need for GP services in the past 12 months due to lack of transport. It also found that 1.3% of adults and .8% of children (age 0-14) had an unmet need for after-hours healthcare services in the past 12 months due to lack of transport (https://minhealthnz.shinyapps.io/nz-health-survey-2016-17-annual-data-explorer/_w_b856ad87/#!/explore-topics)

References for the previous chart (deaths)

- Transport injuries (406 deaths in 2016) - From http://www.transport.govt.nz/ourwork/tmif/safetyandsecurity/ss004/
  - Global Health Exchange (GHDx) database, *http://ghdx.healthdata.org/gbd-results-tool*, says 409 deaths in 2016
- Air pollution (570 deaths from all causes in 2016) – From Global Health Exchange (GHDx) database, http://ghdx.healthdata.org/gbd-results-tool
- Diseases of inactivity (1079 deaths in 2016) – From Global Health Data Exchange (GHDx) database, http://ghdx.healthdata.org/gbd-results-tool
- Mental health (536 deaths from 'self-harm' in 2016) - From Global Health Data Exchange (GHDx) database, http://ghdx.healthdata.org/gbd-results-tool

How many years of life lost (YLLs) per year could transport policy potentially impact?



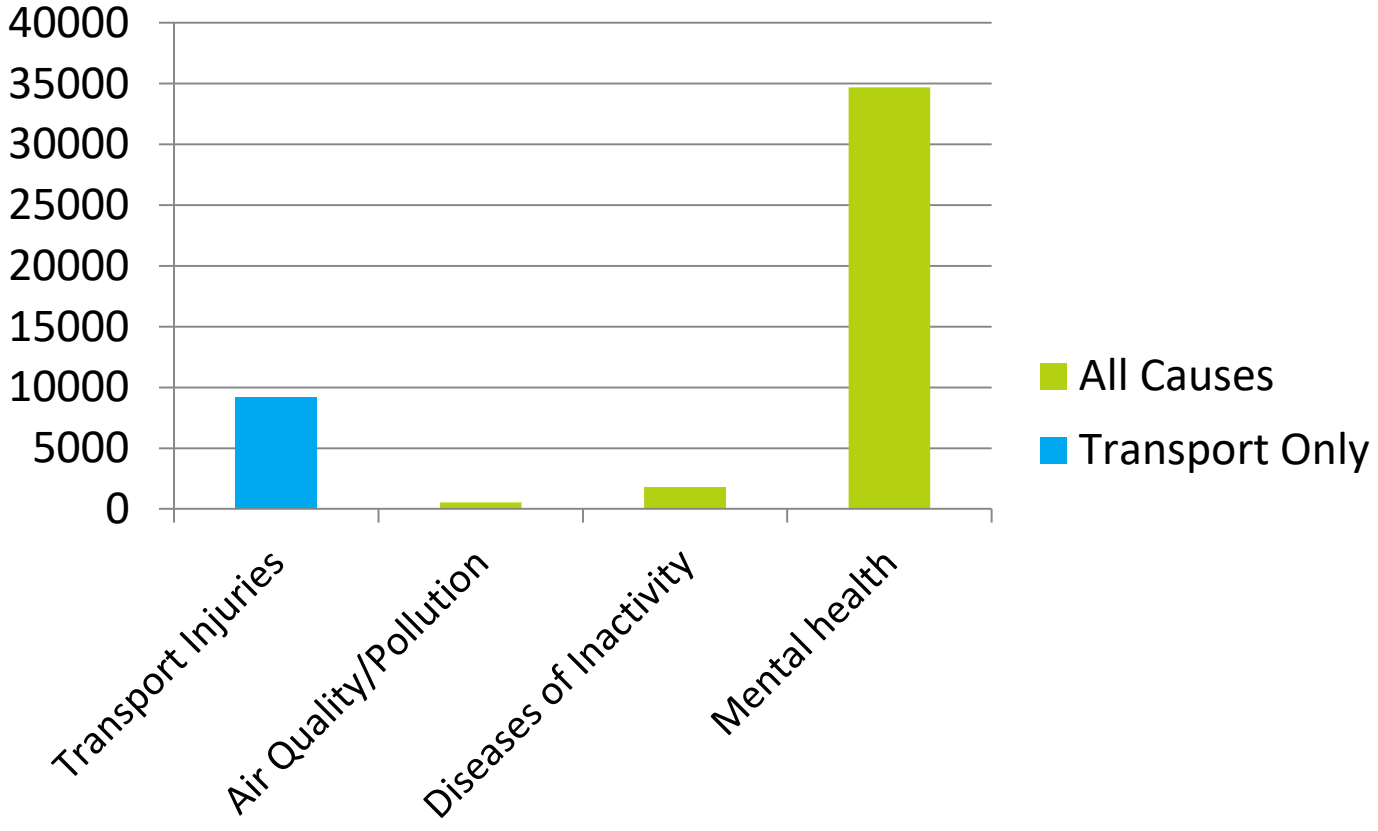
Comments on the previous chart (YLLs)

- Years of life lost (YLLs) are arguably the fairest way to compare the burdens of death from different causes when death from the various causes typically occurs at different ages
  - YLLs count the number of years between when the person died of the given cause and a normal life expectancy
  - Hence, YLLs give greater weight to people who died at a young age
- YLLs also provide a fair comparison because, for this measure, all statistics can be taken from the same database, the Global Health Data Exchange (GHDx)
- By this measure, transport injuries, diseases of inactivity, and mental health are all reasonably comparable
  - Air pollution is the cause of fewer YLLs, but still quite significant
- Mental health YLLs may be understated as the chart includes only deaths due to ‘self harm’
  - There are certainly many additional deaths traceable to mental health/isolation, including those due to substance abuse, accidents and not seeking medical attention when needed

References for the previous chart (YLLs)

- Transport Injuries (18,353 YLLs in 2016) – From Global Health Data Exchange (GHDx) database, http://ghdx.healthdata.org/gbd-results-tool /
- Air quality (8106 YLLs in 2016) – From Global Health Data Exchange (GHDx) database, http://ghdx.healthdata.org/gbd-results-tool
- Diseases of inactivity (12,057 YLLs in 2016) – From Global Health Data Exchange (GHDx) database, http://ghdx.healthdata.org/gbd-results-tool
- Mental health (23,776 YLLs in 2016) - From Global Health Data Exchange (GHDx) database, http://ghdx.healthdata.org/gbd-results-tool

How many years lived with disability (YLDs) could transport policy potentially impact?



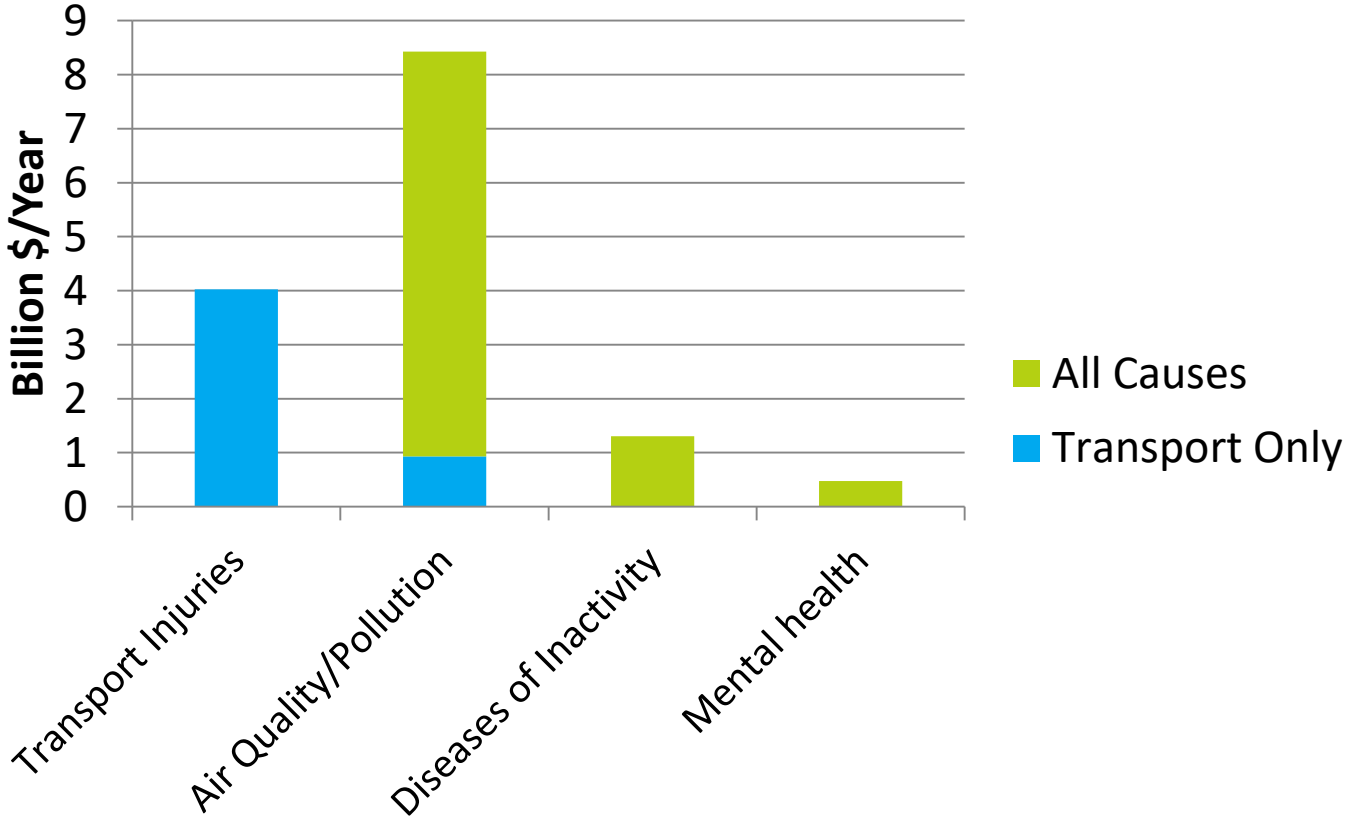
Comments on the previous chart (YLDs)

- Of the four causes of disability, mental health is by far the largest
  - The chart reflects only people suffering from ‘depressive disorders’, which is quite large
- Transport injuries is in second place as a cause of disability
- Although air pollution rates low as a cause of disability, pollution due to motor vehicles was a cause of 352,300 ‘restricted activity days’ (roughly 1000 years of restricted activity) in 2006—days when people could not do what they might have done if pollution had not been present—and air pollution from all sources responsible for 2,926,500 restricted activity days (roughly 8000 years of restricted activity) (http://www.hapinz.org.nz/HAPINZ%20Update_Vol%201%20Summary%20Report.pdf)
- Again, no statistics have been identified linking lack of transport access to healthcare to disability

References for the previous chart (YLDs)

- Transport Injuries (9251 YLDs in 2016) - From Global Health Data Exchange (GHDx) database, http://ghdx.healthdata.org/gbd-results-tool
- Air quality (528 YLDs in 2016) – From Global Health Data Exchange (GHDx) database, http://ghdx.healthdata.org/gbd-results-tool
- Diseases of inactivity (1798 YLDs in 2016)– From Global Health Data Exchange (GHDx) database, http://ghdx.healthdata.org/gbd-results-tool
- Mental health (34695 YLDs from ‘self-harm’ and ‘depressive disorders’ in 2016)- From Global Health Data Exchange (GHDx) database, http://ghdx.healthdata.org/gbd-results-tool

What estimated social costs could transport policy potentially impact?



Comments on the previous chart (social costs) p. 1

- The Global Health Data exchanges does not do social costs, so I have used other sources here
- Air pollution (based on data from HAPINZ) rates as the largest source of social costs, although only a fraction of these costs can be traced to pollution from motor vehicles
- Social costs for air pollution are probably slightly underestimated relative to transport injuries as social costs for air pollution use 2006 health statistics and 2010 value of a statistical life ($3.56 million) (see http://www.hapinz.org.nz/HAPINZ%20Update_Vol%201%20Summary%20Report.pdf, Table 5.2), whereas transport injuries used 2015 statistics and value of a statistical life ($4.06 million) (see http://www.transport.govt.nz/research/roadcrashstatistics/thesocialcostofroadcrashesandinjuries/questionsandanswers-socialcostofroadcrashesandinjuriesreport/)

Comments on the previous chart (social costs) p. 2

- The methodology used to estimate social costs of deaths from diseases of inactivity was a rather complicated average of two methods (see https://www.waikatodhb.health.nz/assets/public-health-advice/project-energize/The-costs-of-physical-inactivity.pdf, p. 44) giving $628 million in social costs (my calculations based on numbers in ibid, Table 3.5 and methodology used in Table 3.4)
  - If a simple average value of statistical life of $3.5 million had been used, the social costs of deaths alone from diseases of inactivity would have been $7.4 billion counting all ages or $860 million counting only deaths among those aged less than 65 (ibid, p. 44)
  - However, the publication questions whether a simple value of statistical life is appropriate for diseases of inactivity, which affect mostly older people, hence their use of an alternative methodology

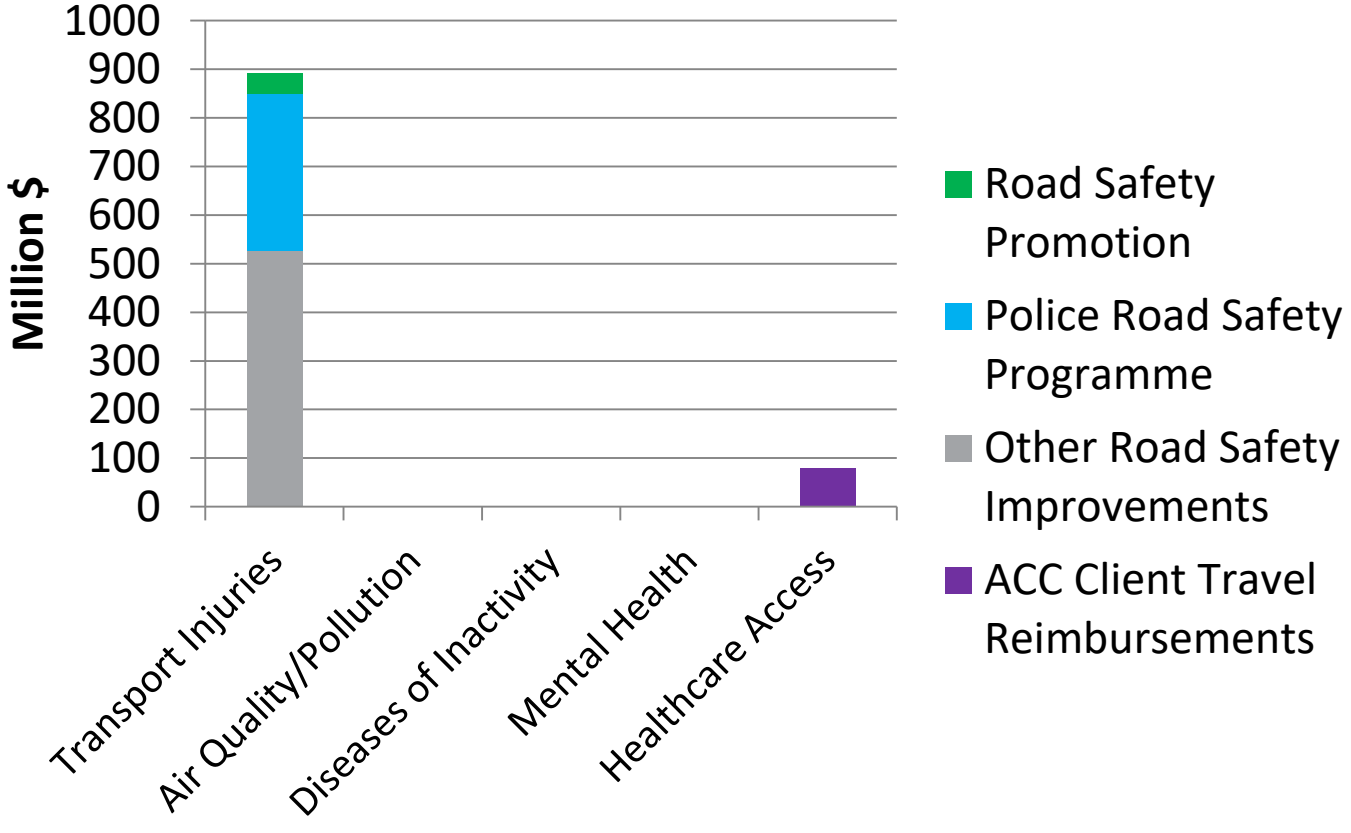
Comments on the previous chart (social costs) p. 3

- Social costs for mental health/isolation were based on estimated costs of depression only
  - Indirect costs of depression were estimated simply as three times direct costs, based on United States studies (see discussion in ibid, p. 36).
  - The indirect costs of depression consist primarily of reduced labour productivity manifested through increased sick days, absenteeism and impaired work performance (ibid, p. 36); this estimate did not consider premature deaths
- Another study by the Royal Australian and New Zealand College of Psychiatrists (2016) placed the cost of all mental illnesses in New Zealand in 2014 at NZ$16.9 billion, of which the cost of premature death was placed at NZ$6.2 billion
  - The latter figure assumed a value of statistical life of $3.95 million, but converted it to NZ$171,000 per statistical life year and then did the calculation based on estimated years of life lost
- Again, no estimates of the social cost of lack of transport access to healthcare appear to be available

References for the previous chart (social costs)

- Transport Injuries ($4,221 million in 2016, data for rail missing) - From http://www.transport.govt.nz/ourwork/tmif/safetyandsecurity/ss009/
- Air quality ($934 million from motor vehicle pollution, $8,429 million from all sources of pollution in 2006 in 2010 dollars) – From http://www.hapinz.org.nz/HAPINZ%20Update_Vol%201%20Summary%20Report.pdf, Table 6.2
- Diseases of inactivity ($1,306 million in 2010) – From From Wellington Regional Strategy, Waikato Regional Council and Auckland Council, *The Costs of Physical Inactivity: Toward a regional full cost accounting perspective,* https://www.waikatodhb.health.nz/assets/public-health-advice/project-energize/The-costs-of-physical-inactivity.pdf, p. ii.
- Mental health ($476 million in 2010) - From Wellington Regional Strategy, Waikato Regional Council and Auckland Council, *The Costs of Physical Inactivity: Toward a regional full cost accounting perspective,* https://www.waikatodhb.health.nz/assets/public-health-advice/project-energize/The-costs-of-physical-inactivity.pdf, indirect costs of depression from Table 3.3 on p. 41, indirect costs estimated at three times direct costs based on discussion on p. 36.

How much transport spending is specifically directed at each of these health impacts?



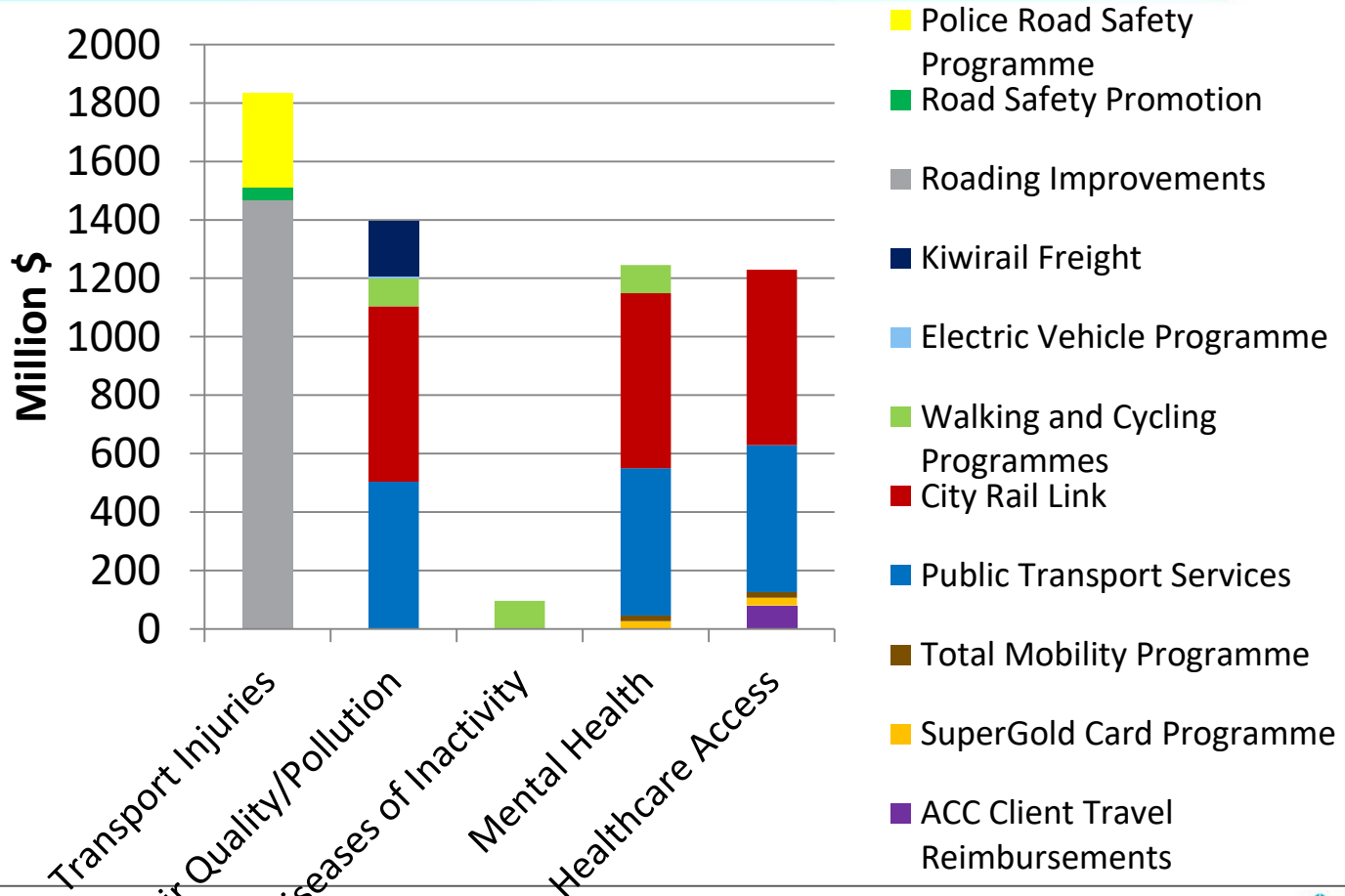
Comments on the previous chart (direct spend)

- The figures shown reflect only transport programs specifically directed at one of the five health impacts discussed here
- My figures for “road safety improvements” is based upon the assertion in the 2016-17 Annual Report of the NZTA that 26% of National Land Transport Fund expenditures were directed at safety outcomes
- No transport programs were identified specifically directed at air pollution, diseases of inactivity or mental health
- Of course, most transport programs are not directed at just one objective; most have multiple objectives, which may include dealing with the five health impacts discussed here

References for the previous chart (direct spend)

- Road Safety Promotion ($42.8 million in 2016/17) - From http://www.nzta.govt.nz/assets/userfiles/transport-data/FundRoadSafetyProgramme.html. Of this, $33.5 million came from NZTA, $9.4 million came from local authorities
- Police Road Safety Programme ($323 million in 2016/17) - From https://nzta.govt.nz/planning-and-investment/2015-18-national-land-transport-programme/about-the-2015-18-national-land-transport-programme/national-land-transport-programme-snapshot-and-tables/snapshot?state=current
- Road Safety Improvements ($527 million in 2016/17) – https://www.nzta.govt.nz/assets/resources/annual-report-nzta/2016-17/nltf-annual-report-2017.pdf, p. 197, “In 2016/17, total investment for the National Land Transport Fund was $3.4 billion,...Of this investment, 50 percent went towards economic growth and productivity, 26 percent towards safety outcomes and 24 percent towards travel choice, health, and environment and resilience outcomes.” I calculate $3,400 million x .26 – Road Safety Promotion $33.5 million and Police Road Safety Programme $323 million, which are included in this figure = $527 million. This figure is conservative, in that it includes NLTF (national) expenditures only.
- ACC Client Travel Reimbursements (estimated $80 million in 2015/16) – From https://www.nzta.govt.nz/assets/resources/annual-report-nzta/2014-15/docs-nltf/section-b-the-land-transport-investment-system.pdf, Figure 3.

How much transport spending is at least partly directed at addressing each of these health impacts?



Comments on the previous chart (multiple spend)

- The additional expenditures shown in this chart include programmes with multiple objectives, which have health impacts as one or more of their objectives
- Some programmes have more than one health objective:
  - *Walking and cycling programme – air pollution, diseases of inactivity, mental health*
  - *Public transport services and City Rail Link – air pollution, mental health, transport access to healthcare*
  - *Total mobility programme (mainly subsidised taxi services for the disabled) – mental health, transport access to healthcare*
  - *SuperGold Card programme – mental health, transport access to healthcare*
- Electric vehicles also receive an exemption from road user charges, which is not included here

References for the previous chart (multiple spend)

- Road Safety Promotion ($42.8 million in 2016/17) - From http://www.nzta.govt.nz/assets/userfiles/transport-data/FundRoadSafetyProgramme.html. Of this, $33.5 million came from NZTA, $9.4 million came from local authorities
- Police Road Safety Programme ($323 million in 2016/17) - From https://nzta.govt.nz/planning-and-investment/2015-18-national-land-transport-programme/about-the-2015-18-national-land-transport-programme/national-land-transport-programme-snapshot-and-tables/snapshot?state=current
- New and improved road infrastructure ($1,467.3 million in 2016/17) - From http://www.nzta.govt.nz/assets/userfiles/transport-data/FundAllActivities.html
- Kiwirail freight ($190 million in 2016/17) - From http://www.treasury.govt.nz/government/expenditure/transport
- Electric vehicle programme ($6 million contestable fund available starting in late 2016) - From http://www.transport.govt.nz/assets/Uploads/Our-Work/Documents/Factsheet-Electric-Vehicles-Programme-Overview.pdf
- Walking and cycling programme ($96 million in 2016/17) - From http://www.nzta.govt.nz/assets/userfiles/transport-data/FundAllActivities.html
- Public transport services ($504 million in 2016/17) - From http://www.nzta.govt.nz/assets/userfiles/transport-data/FundAllActivities.html
- City Rail Link ($600 million in 2017/2018—construction had not started in 2016/17), Table 2.8, which shows $300 million in central government funding, with central government paying 50% of project costs
- Total mobility programme ($18.9 million in 2016/17) – From http://www.nzta.govt.nz/assets/userfiles/transport-data/FundPT.html
- SuperGold card programme ($26.6 million in 2016/17) - From http://www.nzta.govt.nz/assets/userfiles/transport-data/FundPT.html
- ACC Client Travel Reimbursements ($80 million in 2015/16) – From https://www.nzta.govt.nz/assets/resources/annual-report-nzta/2014-15/docs-nltf/section-b-the-land-transport-investment-system.pdf, Figure 3.

Concluding thoughts – p. 1

- At least four of the health impacts examined here (transport injuries, air pollution, diseases of inactivity, and mental health) represent major burdens on New Zealand society by all three measures (deaths, disability, social costs)
  - Given the differing results of the three measures, and the diversity of methods that may be used to measure deaths, disability and social costs, it is difficult to argue that any one of these health impacts is more important than any of the others
  - Little is known about the burden of lack of transport access to healthcare
- However, in the transport sector, the focus of our policy analysis is generally heavily on reducing transport injuries/death, occasionally on air pollution, and hardly ever on diseases of inactivity, mental health or transport access to healthcare
  - Spending demonstrates this same focus, although expenditures on public transport and City Rail Link do help address air pollution, mental health and transport access to healthcare
  - Aside from the relatively small expenditures on walking and cycling, little transport spending addresses diseases of inactivity

Concluding thoughts – p. 2

- The focus on reducing transport injuries/deaths is quite natural, given that transport injuries/deaths are highly visible, easily enumerated and obviously linked to the transport sector
  - Deaths and disability due to the other causes (air pollution, diseases of inactivity, mental health and lack of transport access to healthcare) are less visible and more uncertain, as they must usually be statistically inferred, but no less real
- The opportunities for the transport sector to help mitigate each of the health impacts identified here are significant and deserving of more attention
  - This is most obviously true of diseases of inactivity, for which the transport sector can offer solutions that combine physical activity with convenient and inexpensive transport services

Thank you