

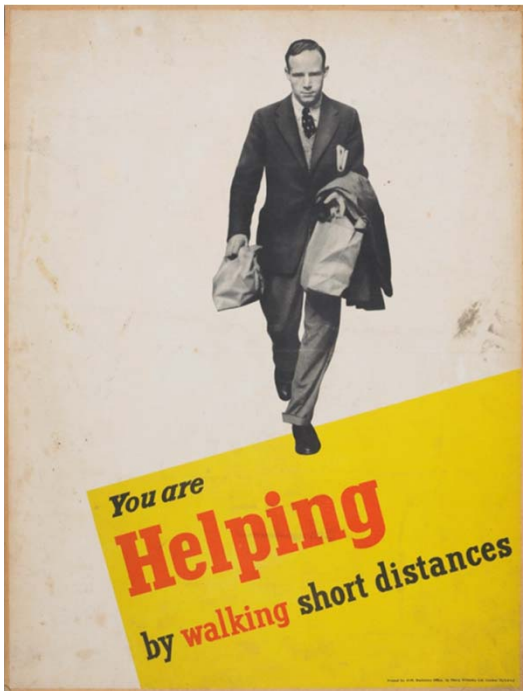
A public health perspective on transport, health and carbon emissions

Dr Caroline Shaw

Senior Lecturer

Department of Public Health

University of Otago Wellington



new zealand centre for

Sustainable Cities

te pokapū rōnaki tāone-nui



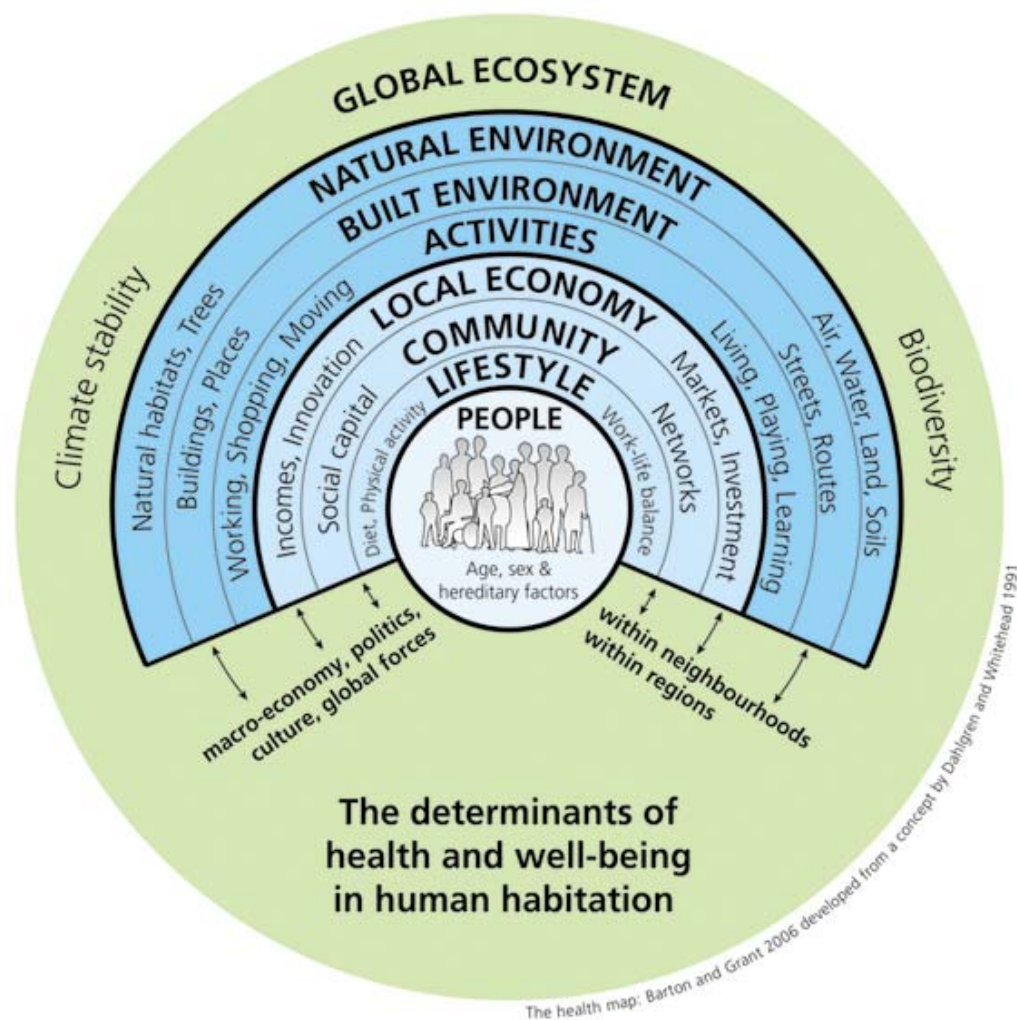
UNIVERSITY
of
OTAGO
Te Whare Wānanga o Ōtago
NEW ZEALAND

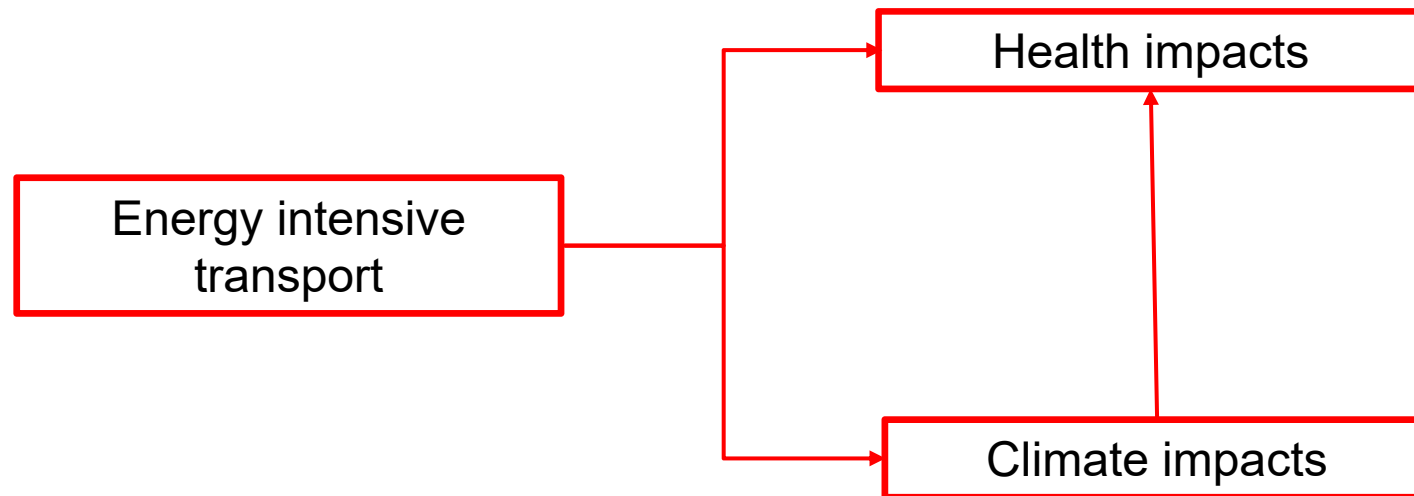
WELLINGTON

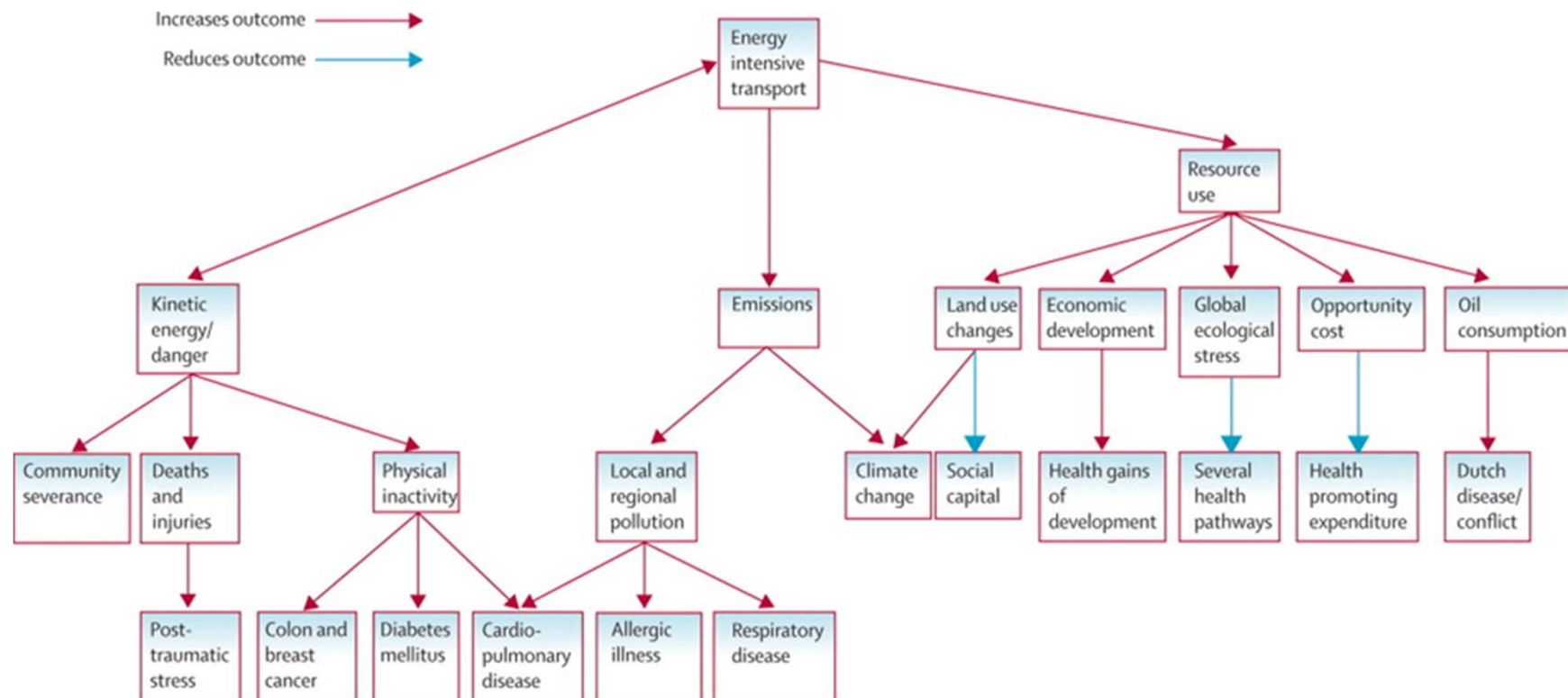
What Determines Health?



Source: McInnis et al, 2002







Woodcock et al, 2009

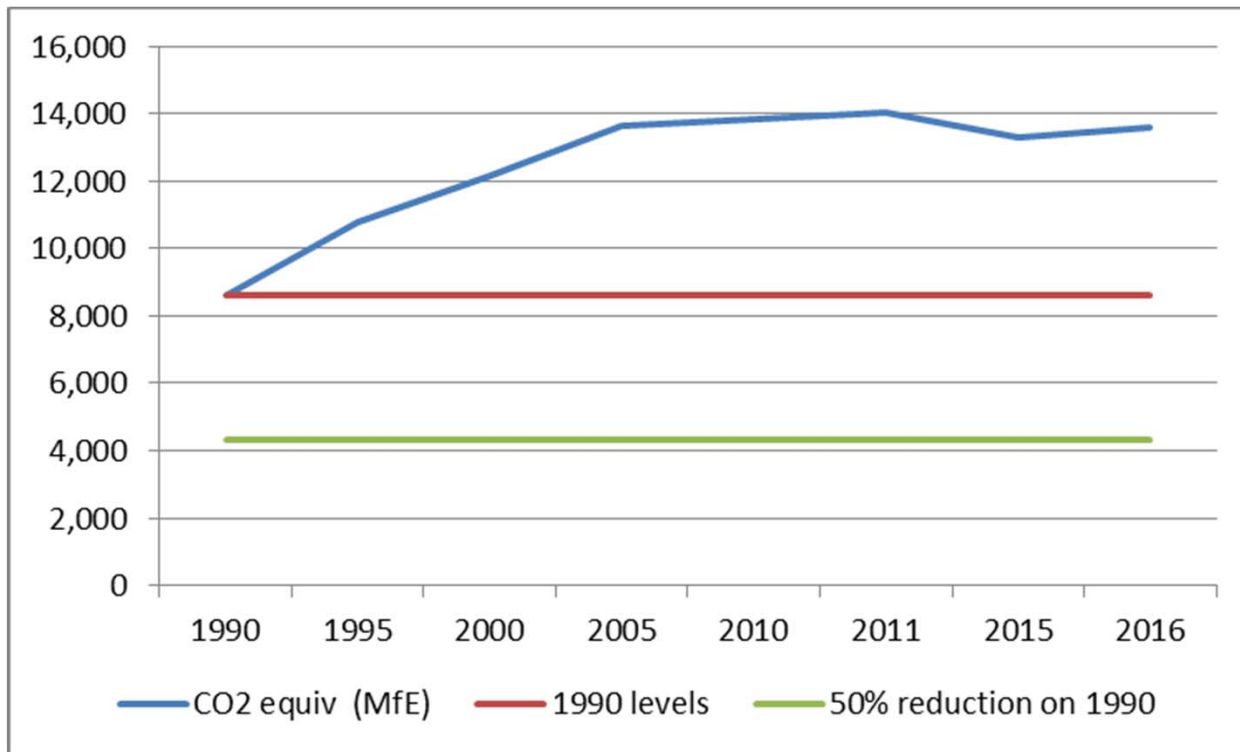


UNIVERSITY
of
OTAGO
Te Whare Wānanga o Ōtago
NEW ZEALAND

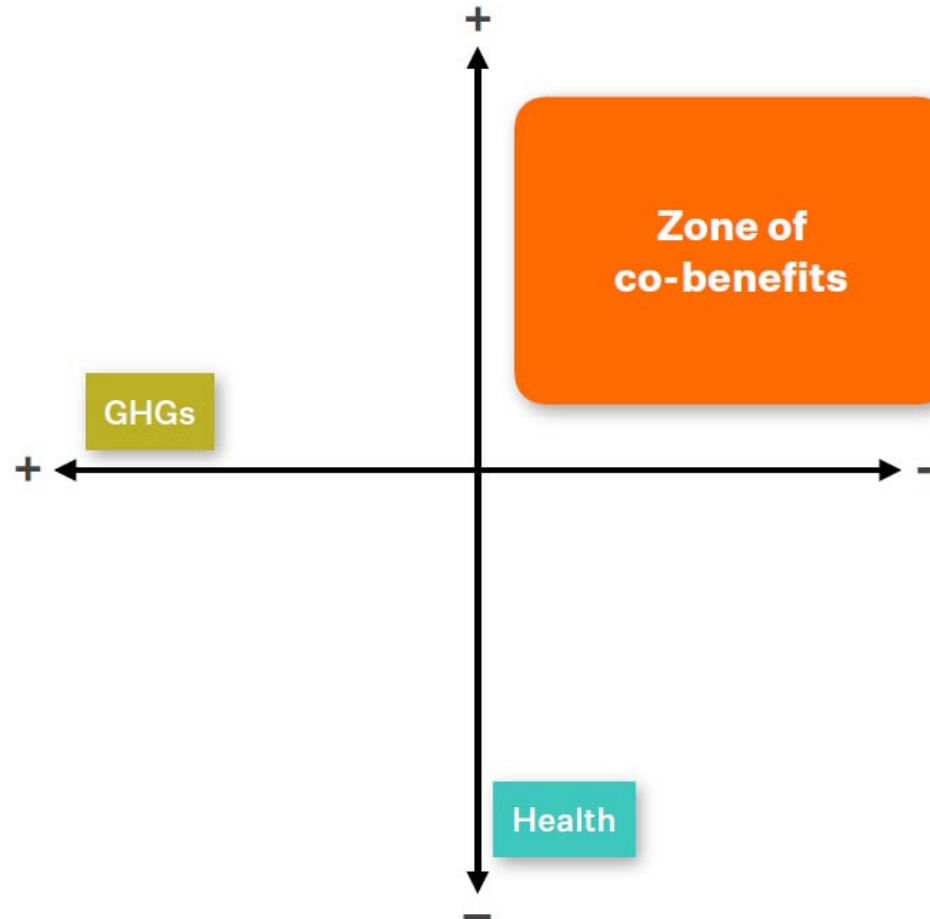
WELLINGTON

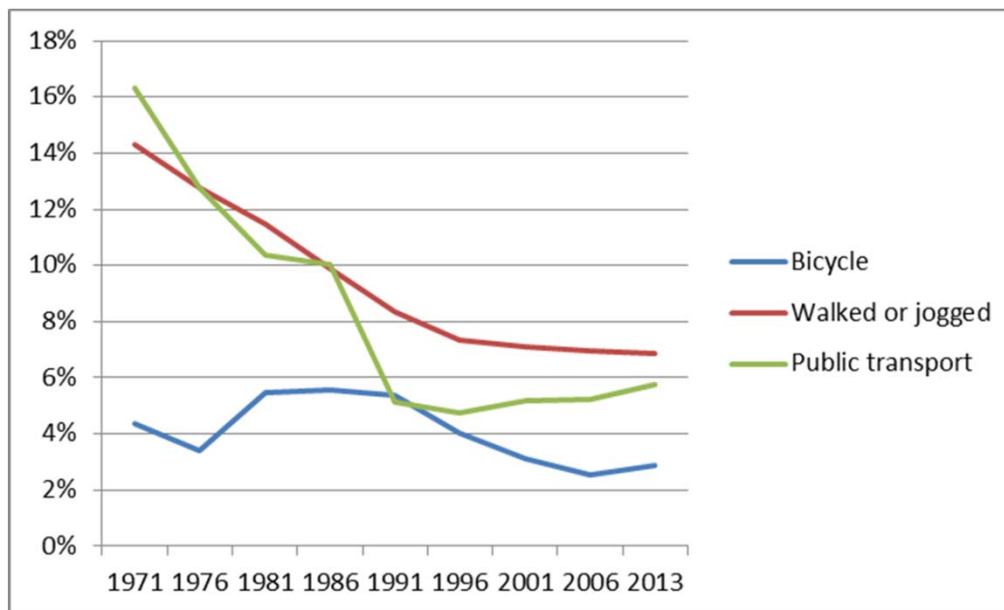


NZ transport emissions

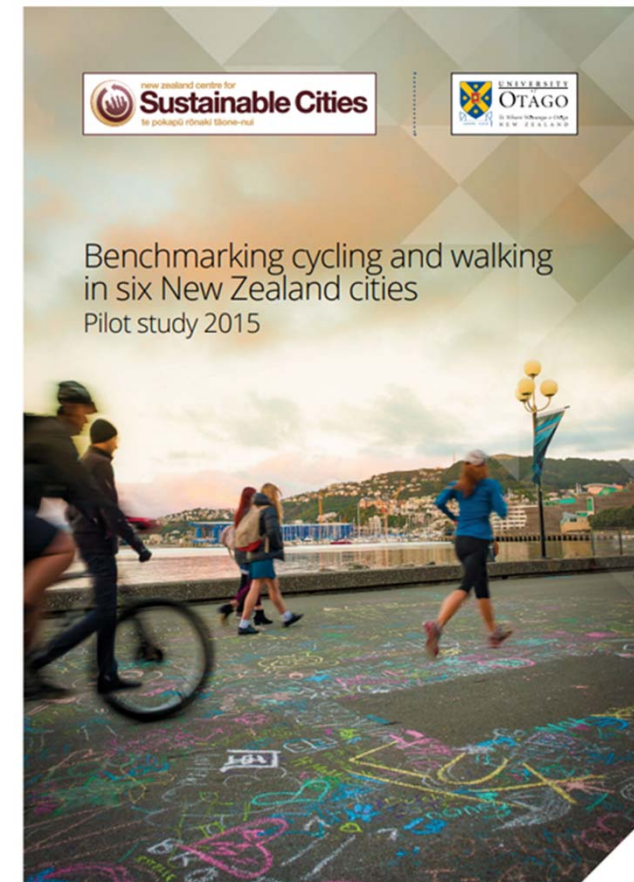


Policy sweet spot





Source: Census 1971- 2013



Current travel patterns in NZ cities

	Population	HH with two or more vehicles (%)	Trips walking (annual %)	Trips cycling (annual %)	Trips by public transport (annual %)	CO ₂ emissions per capita (tonnes/year)
Auckland	1,493,210	55	16.1	0.5	3.3	1.44
Tauranga	119,830	51	14.1	2.1	1.3	1.59
Hamilton	150,180	49	13.8	1.2	1.9	1.68
Wellington	197,460	36	27.5	1.3	6.2	1.15
Christchurch	356,750	53	18.9	3.1	3.3	1.25
Dunedin	123,540	46	23.5	1.3	1.4	1.24



WELLINGTON





WELLINGTON

thebmj Research • Education • News & Views • Campaigns • Archive For authors • Jobs • Hosted Search

Research Health effects of the London bicycle sharing system: health impact modelling study

BMJ 2014;348:doi:https://doi.org/10.1136/bmj.g425 (Published 13 February 2014)
Cite this as: BMJ 2014;348:g425

Article Related content Metrics Responses Peer review

James Woodcock, senior research associate; Alberto Tassin, career development fellow; researcher; James Cheyette, lecturer; Oliver O'Brien, research associate; Anne Goodman, lecturer

Author affiliations

Correspondence to: J Woodcock (jw745@medchi.cam.ac.uk)

Accepted 20 January 2014

Abstract

Objective To model the impacts of the bicycle sharing system in London on the health of its users.

Design Health impact modelling and evaluation, using a stochastic simulation model.

Setting Central and inner London, England.

Data sources Total population operational registration and usage data for the London cycle hire scheme collected April 2011–March 2012; surveys of cycle hire users collected 2011; and London data on travel, physical activity, road traffic collisions, and particulate air pollution (PM2.5, collected 2005–12).

Participants 518 607 users of the London cycle hire scheme, aged 14 years and over, with an estimated 78% of travel time accounted for by users younger than 45 years.

Main outcome measures Change in life expectancy adjusted life years (DALYs) based on one year impacts on incidence of disease and injury, modelled through medium term changes in physical activity, road traffic injuries, and exposure to air pollution.

Results Over the year examined the users made 7.4 million cycle hire trips (estimated 71% of cycling time by men). These trips would mostly otherwise have been made on foot (3190) or by public transport (4476). To date there has been a trend towards fewer fatalities and injuries than expected on cycle hire bicycles. Using these observed injury rates, the population benefits from the cycle hire scheme substantially outweighed harms lost from other modes of transport.

bmj careers
Be the first to apply for jobs

Article tools

- PDF • 3 responses
- Respond to this article
- Data supplement
- Print
- Alerts & updates
- Citation tools
- Request permissions
- Author citation
- Add article to BMJ Portfolio
- Email to a friend

Topics

- air pollution
- environmental issues
- sports and exercise medicine



Baseline –
current
travel

Demographics

Travel patterns
(incl VKT/CO₂
emissions)

Transport- related
health outcomes
(PM_{2.5}, PA, Injury)

Scenario –
“Wellington”

Demographics

Travel patterns
(incl VKT/CO₂
emissions)

Transport- related
health outcomes
(PM_{2.5}, PA, Injury)

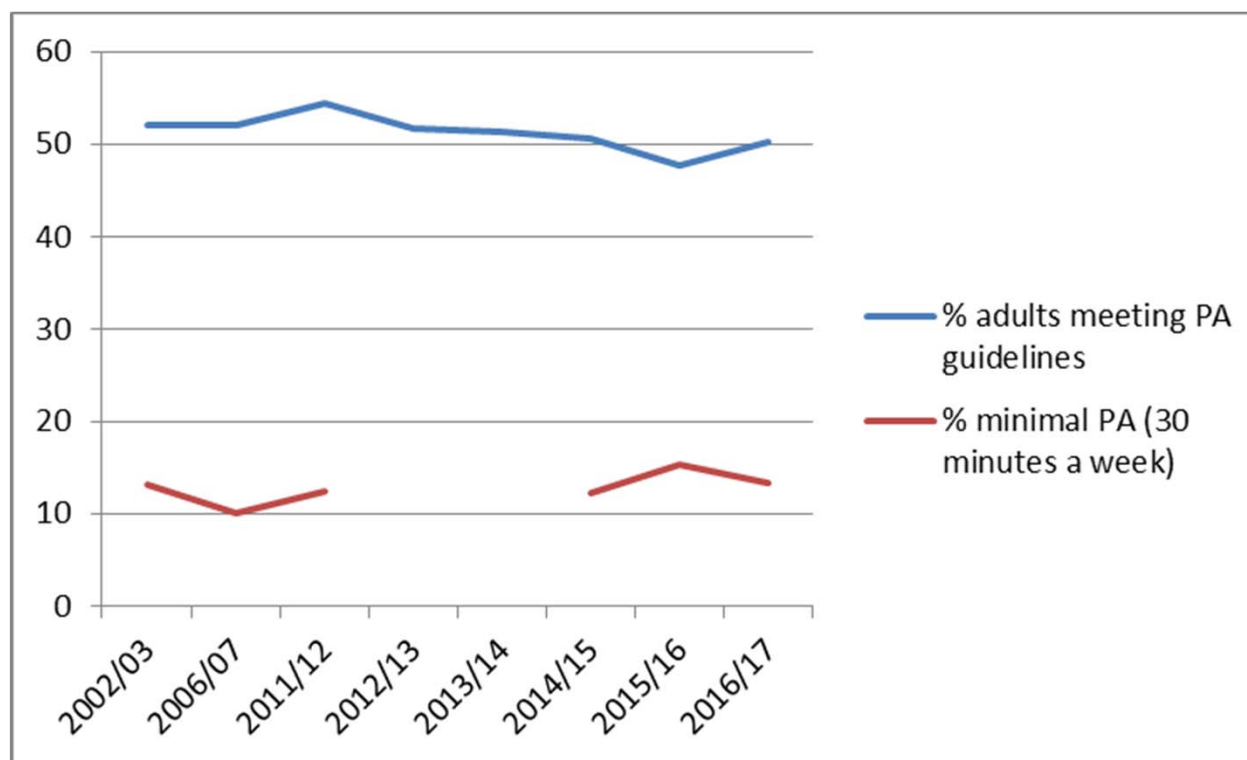
	Premature deaths averted (total)	Deaths averted (Physical activity)	Deaths averted (Injury)	Deaths averted (air pollution)	CO ₂ emission reduction
Auckland	57.3	41.2	15.1	1.0	20%
Tauranga	49.7	46.5	1.8	1.3	27%
Hamilton	51.7	47.2	2.9	1.5	32%
Christchurch	31	29.1	1.5	0.4	8%
Dunedin	12.3	12.3	0.4	0.3	7%



WELLINGTON

What does this research tell us?

- Policies that promote physically active transport will have the most health gain
 - Estimates are conservative



NZ Health Survey

Meeting NZ PA Guidelines (odds ratios)	
AT vs car	PT vs car
1.76 (1.26 - 2.47)	1.15 (0.80 - 1.65)

What does this research tell us?

- Policies that promote physically active transport will have the most health gain
 - Estimates are conservative
- But injury reductions are important too, especially in Auckland
 - Likely to be conservative estimate
 - ITHIM assumes increase in injury from increased cycling and a safety in numbers effect



UNIVERSITY
of
OTAGO
Te Whare Wānanga o Ōtago
NEW ZEALAND

WELLINGTON

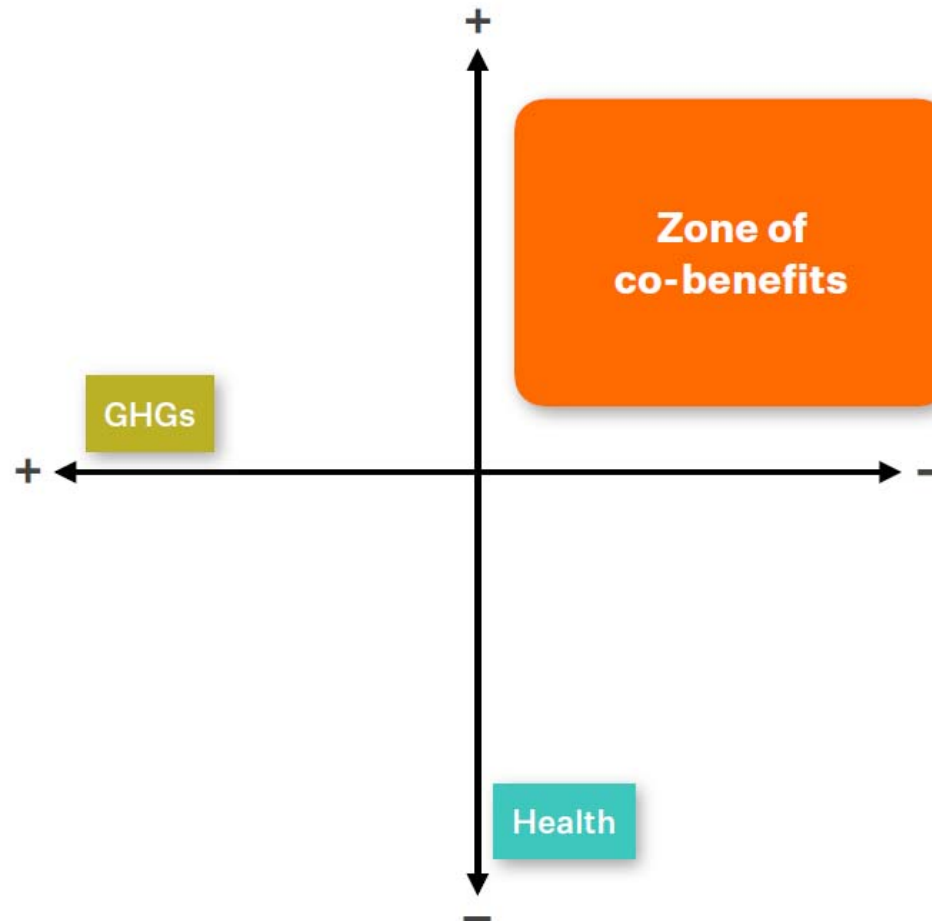


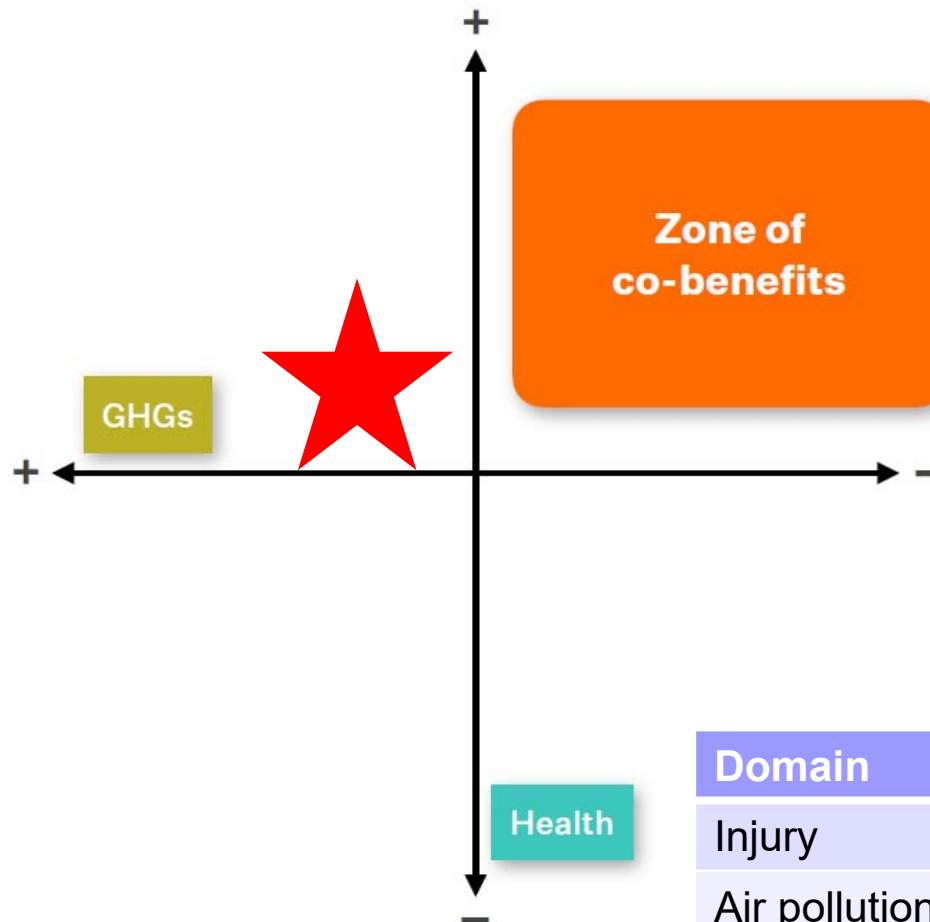
What does this research tell us?

- Policies that promote physically active transport will have the most health gain
 - Estimates are conservative
- But injury reductions are important too, especially in Auckland
 - Likely to be conservative estimate
 - ITHIM assumes increase in injury from increased cycling and a safety in numbers effect
- Emission reductions are surprisingly large
 - Driven by PT

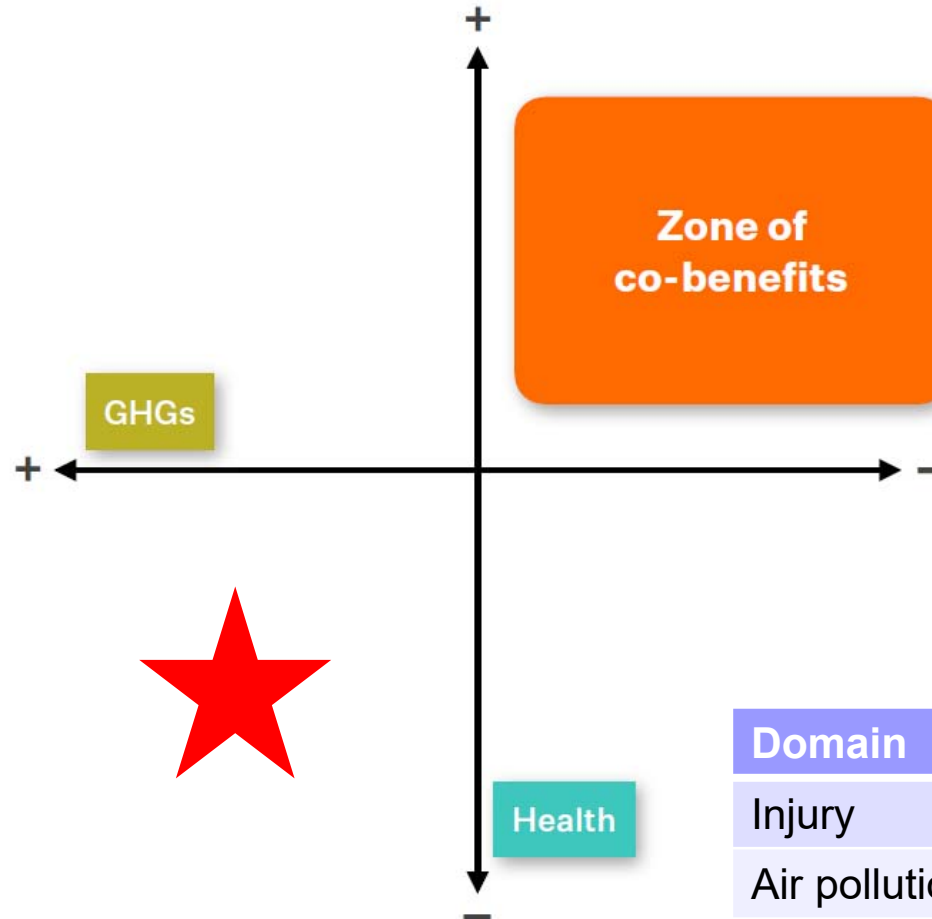
What doesn't this research tell us?

- The specific policies that would be most effective to achieve the change in mode of the 'Wellington' scenario
 - Complex trade offs in some policies that aim to reduce emissions

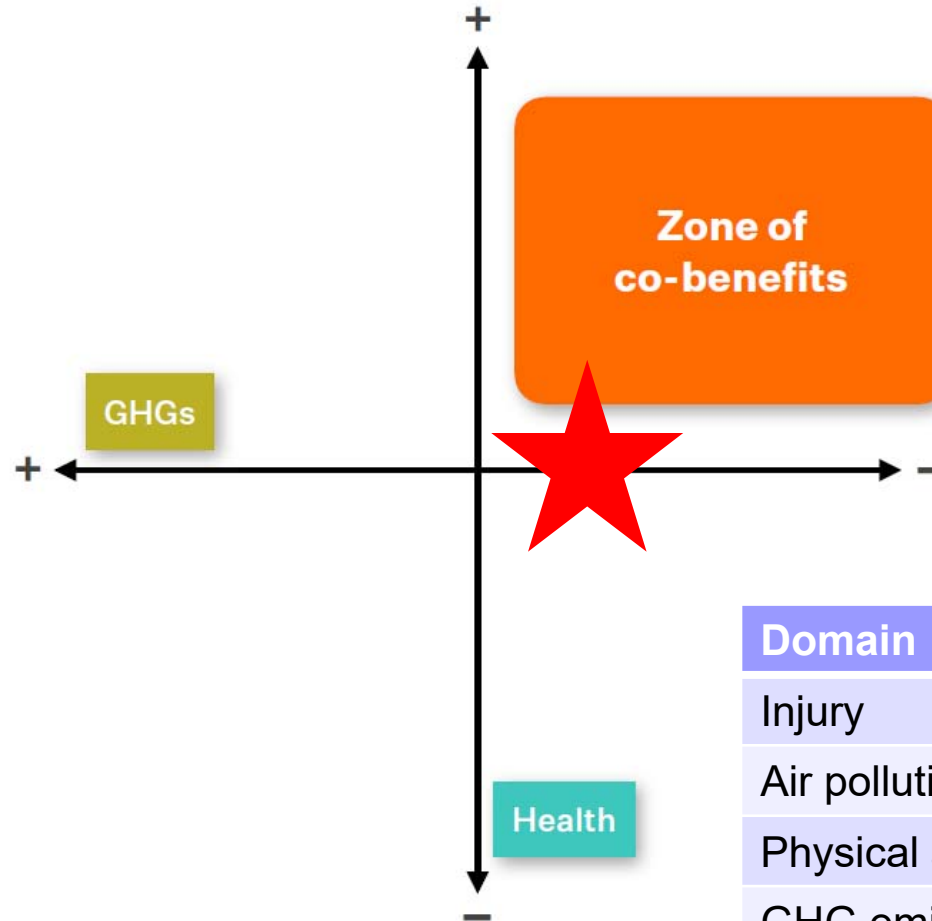
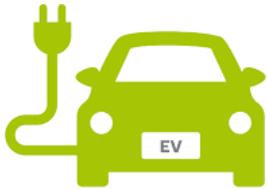




Domain	Impact
Injury	✓
Air pollution	Worse
Physical activity	✓ (?)
GHG emissions	Increase



Domain	Impact
Injury	-
Air pollution	Made it worse
Physical activity	-
GHG emissions	Neutral or made worse



Domain	Impact
Injury	-
Air pollution	✓
Physical activity	-
GHG emissions	Improve (depending on electricity source)

What doesn't this research tell us?

- The specific policies that would be most effective to achieve the change in mode of the 'Wellington' scenario
 - Complex trade offs
- Most cost-effective policies

What doesn't this research tell us?

- The specific policies that would be most effective to achieve the change in mode of the 'Wellington' scenario
 - Complex trade offs
- Most cost-effective policies
- Healthcare cost savings of scenarios





WELLINGTON

Co authors

- Ed Randal (UOW)
- Michael Keall (UOW)
- Alistair Woodward (UA)



UNIVERSITY
of
OTAGO
Te Whare Wānanga o Ōtago
NEW ZEALAND

WELLINGTON



UNIVERSITY
of
OTAGO
Te Whare Wānanga o Ōtago
NEW ZEALAND

WELLINGTON



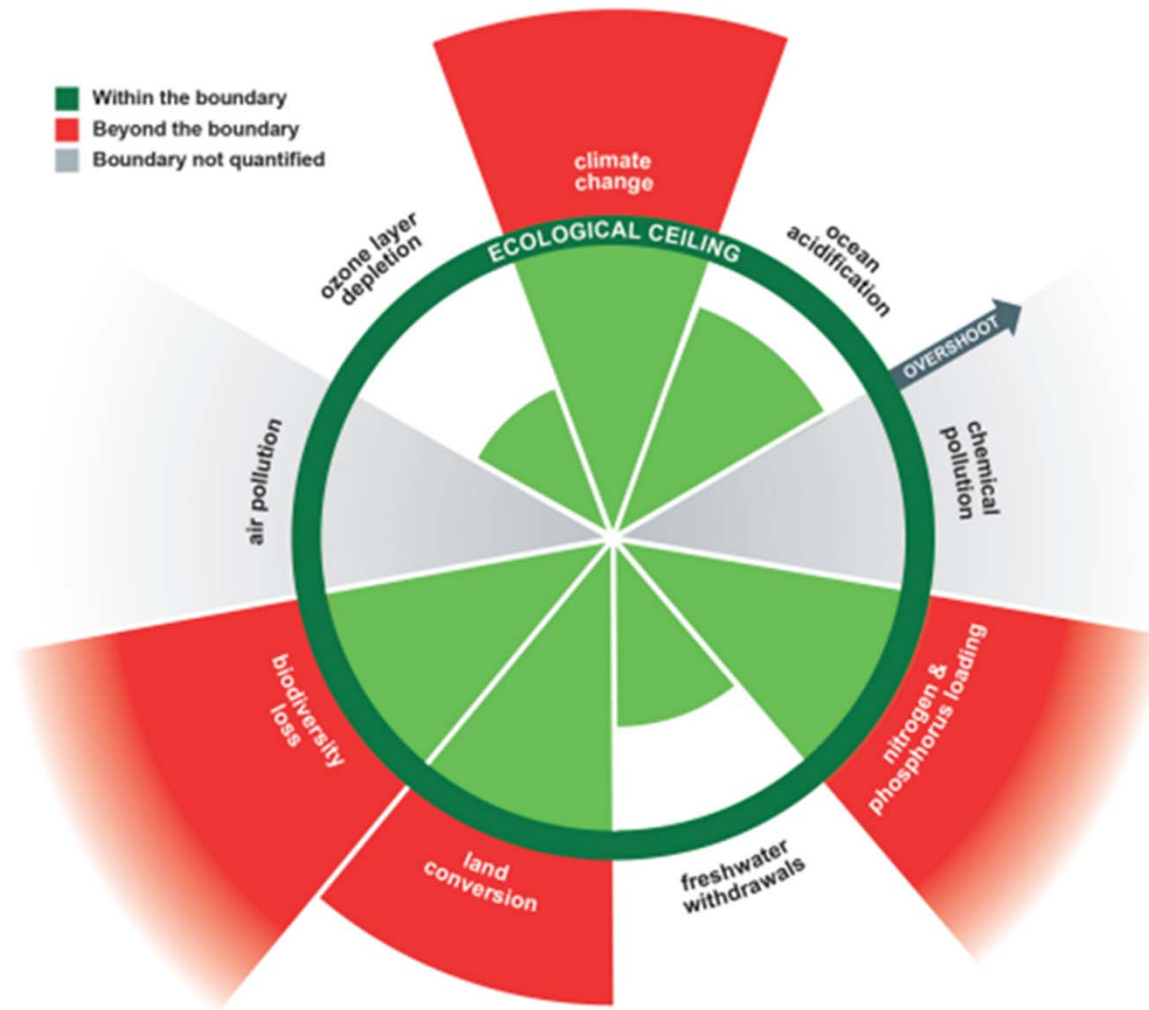


UNIVERSITY
of
OTAGO
Te Whare Wānanga o Ōtago
NEW ZEALAND

WELLINGTON



A doughnut for the Anthropocene



Model issues

- Uncertainty not dealt with
 - Not so relevant in this scenario but very relevant in ‘future modelling’
- Data limitations
 - Due to sparse PM_{2.5} model used airshed and vehicle emissions model from the USA
 - Also domain specific PA from the USA as we don’t know where NZer obtain their PA from
 - Unable to disaggregate travel by road type and speed – injury reductions probably conservative