

A public health perspective on transport, health and carbon emissions

Caroline Shaw









What Determines Health?



Source: McGinnis et al, 2002

















Woodcock et al, 2009













Current travel patterns in NZ cities

	Populatio n ^a	HH with two or more vehicles (%) ^a	Trips walkin g (annu al %) ^b	Trips cycli ng (annu al%) ^b	Trips by public transpo rt (annual	Light vehicle CO ₂ emissions (tonnes/ye	Anr trans related Death	nual sport l injury DALY
					%) ^b	ar) ^a	5	3
Auckland	1,493,210	55	16.1	0.5	3.3	2,150,000	146	8407
Tauranga	119,830	51	14.1	2.1	1.3	190,000	12	611
Hamilton	150,180	49	13.8	1.2	1.9	253,000	15	878
Wellington	197,460	36	27.5	1.3	6.2	227,000	20	1184
Christchurch	356,750	53	18.9	3.1	3.3	447,000	37	2028
Dunedin	123,540	46	23.5	1.3	1.4	153,000	13	737



 Asked the slightly provocative (if you are not from Wellington) question, what would the health and carbon consequences be if the other 5 largest cities had the same transport patterns as Wellington













If other cities looked like Wellington....

	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%



- Physical activity outcomes are king
 - 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)				









- Physical activity outcomes are king
 - 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















- Physical activity outcomes are king
 - 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







Long term patterns in travel to work

WELLINGTON



Source: Census 1971-2013



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







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
- No indication of most effective or cost-effective ways to achieve the modelled scenario