

# *A City of Cycles: What can stop it happening?*

Prof Simon Kingham

Professor of Geography & Director of the GeoHealth Laboratory

University of Canterbury - Te Whare Wananga O Waitaha, Christchurch, NZ

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Keynote presentation to CAN-Do 2015, Christchurch

March 28<sup>th</sup> 2015



# Who am I?

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- University Professor
  - Teacher and Researcher
- Local Transport involvement
  - Regional Transport Committee
- Christchurch resident for 15 years
- Commuter & utility cyclist
- Husband and father

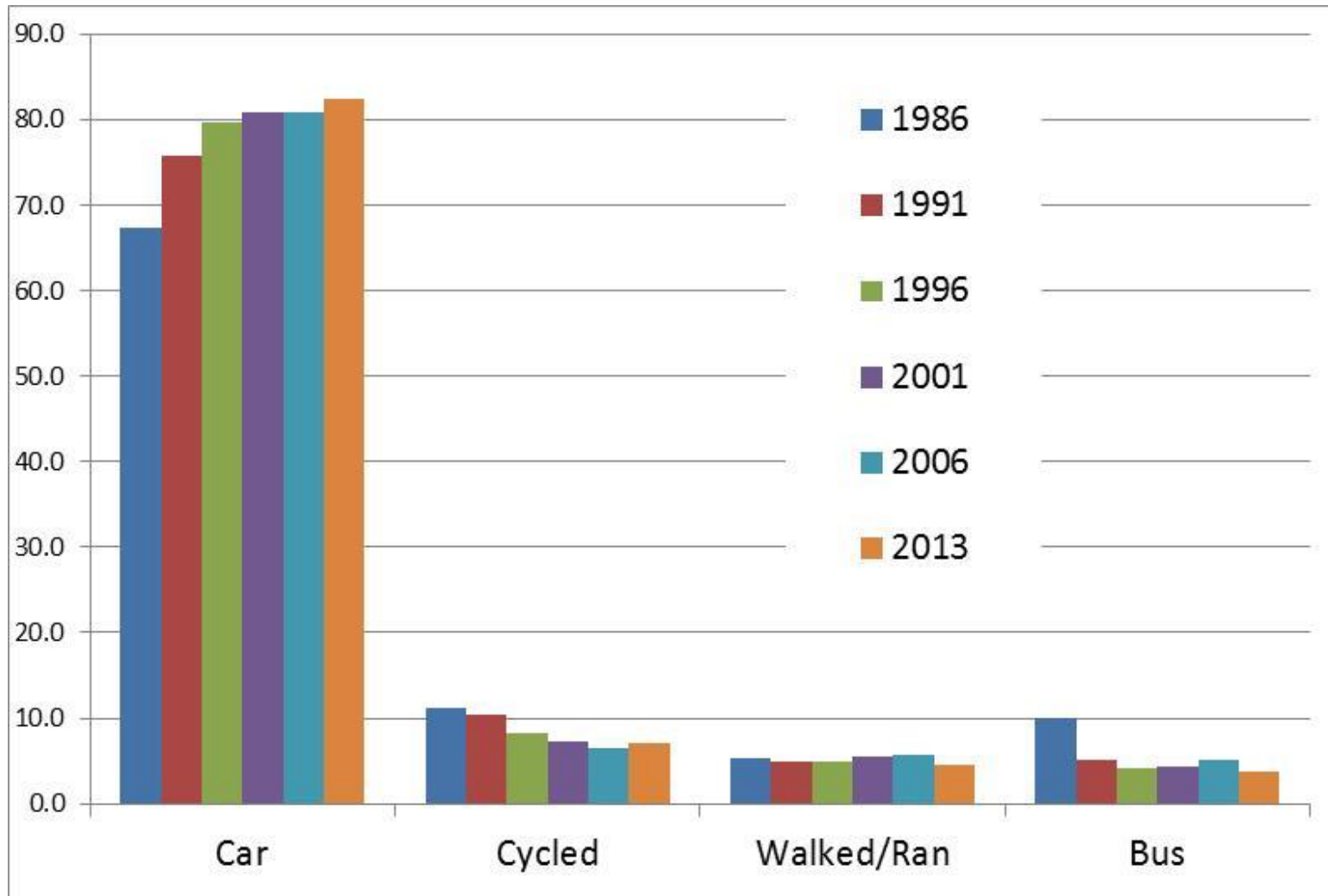
# Talk today

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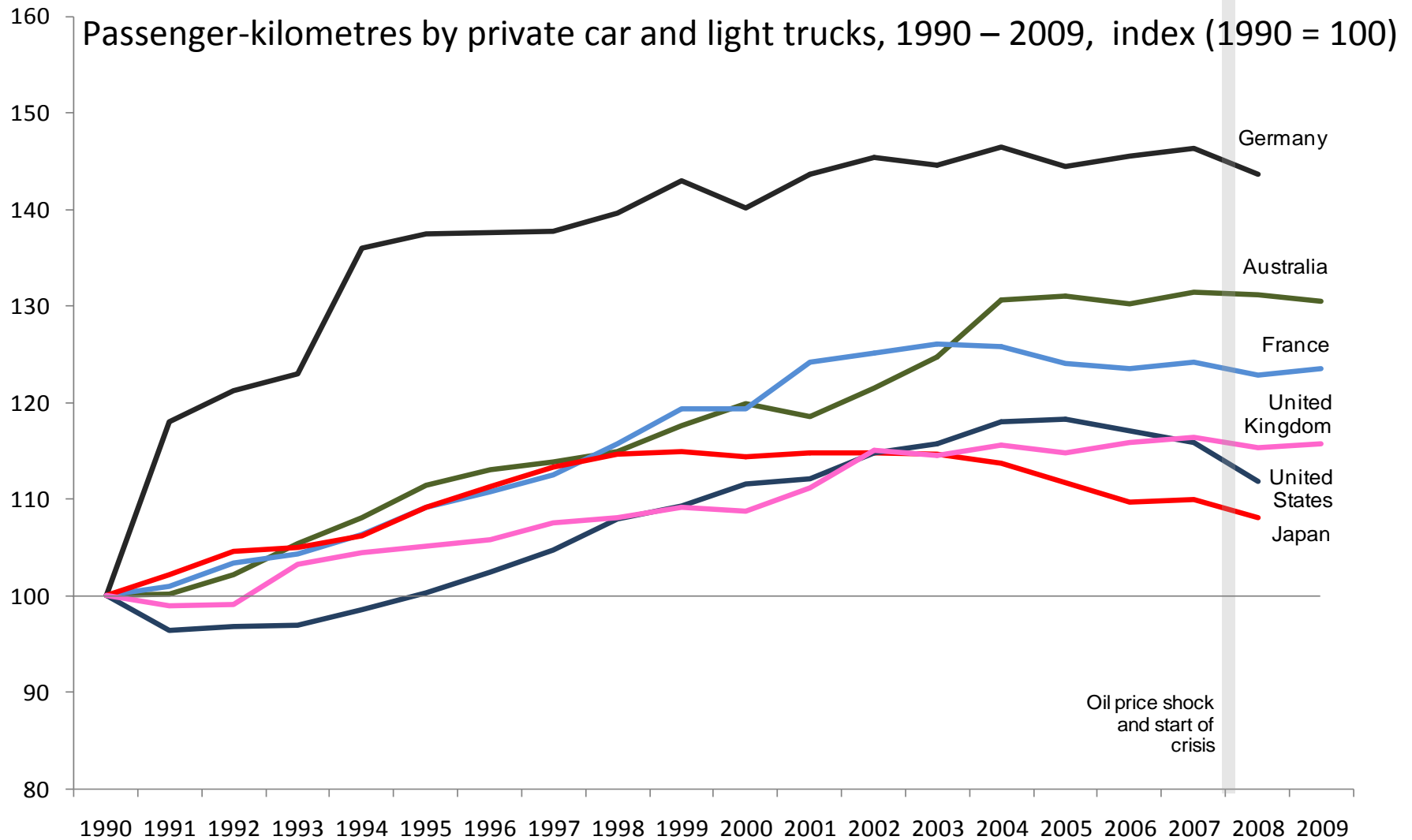
1. Trends and assumptions
2. Impacts of cycling
3. Why don't people cycle
4. A cycling city
5. Possible barriers to success
6. Summary

# TRENDS AND ASSUMPTIONS

# Transport mode to work - Christchurch



# Peak car



# Peak car

## The New Zealand Herald

Search keywords...



National

World

Business

Sport

Technology

Entertainment

Life & Style



### Brian Rudman's Opinion

Email Brian

Brian Rudman is a NZ Herald feature writer and columnist.

## Brian Rudman: End of the road for the sacred car?

9:30 AM Friday Jun 6, 2014

89 comments

Auckland Region

Brian Rudman on Auckland

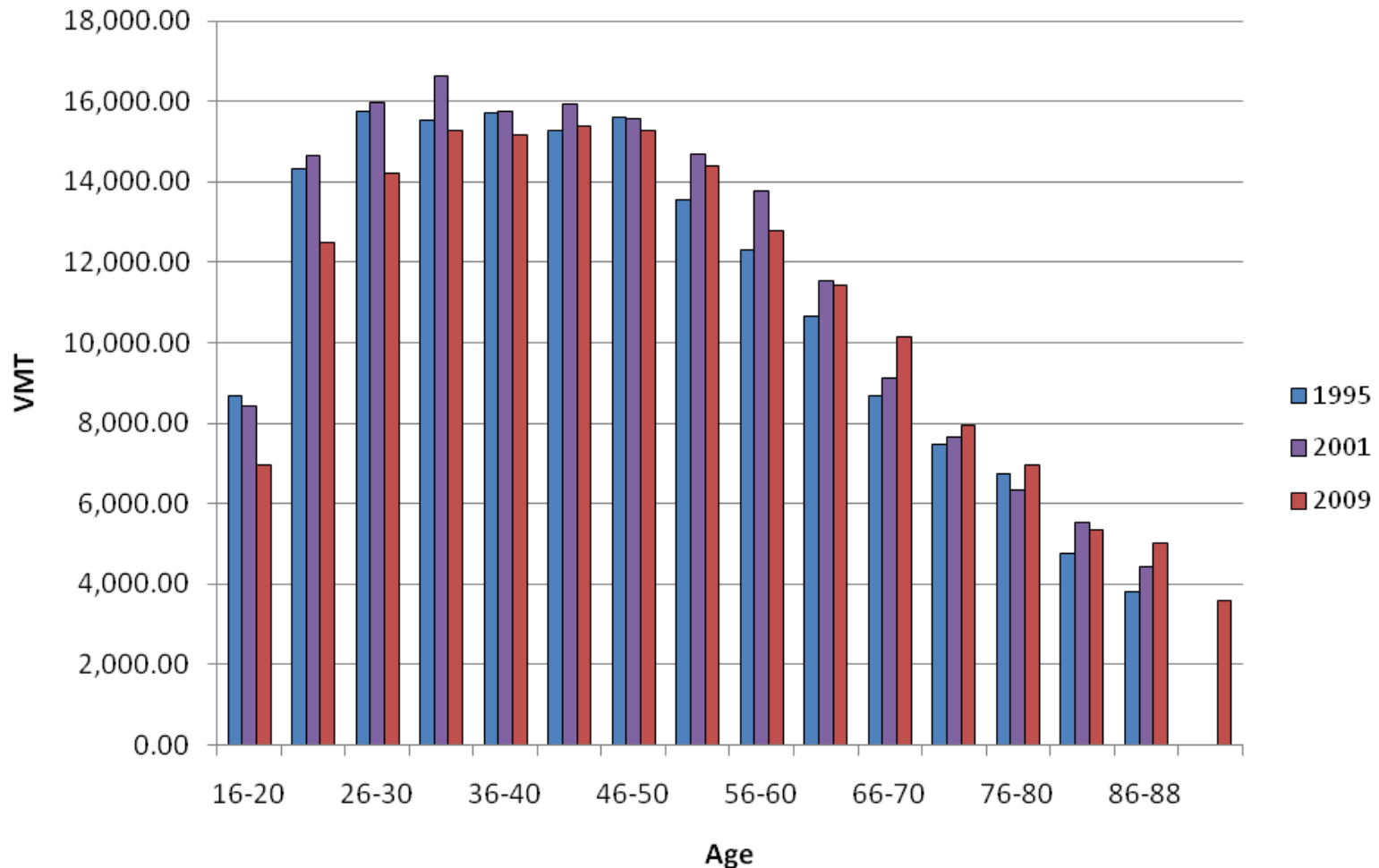
Motoring



As New Zealand's largest roading project roars ahead, people are using their vehicles less and their legs more

# Peak car and age

Annual vehicle miles per driver by age, USA, 1995, 2001, 2009





# Congestion isn't all bad!

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- Congestion suppresses latent travel demand
- Congestion encourages less travel or use of alternative modes
  - Strongest when good alternatives
- Congestion-free roads don't result in pollution as low as the models tell us

# Congestion isn't all bad!

Cheonggyecheon, Seoul, Korea



**Before** (<http://www.kcet.org/socal/departures/landofsunshine/la-river/from-freeways-to-waterways-what-los-angeles-can-learn-from-seoul.html>)

# Congestion isn't all bad!



<http://www.kcet.org/social/departures/landofsunshine/la-river/from-freeways-to-waterways-what-los-angeles-can-learn-from-seoul.html>

# Congestion isn't all bad!

1970



2005



# Congestion isn't all bad!



# Congestion isn't all bad!



# Where did the traffic go?

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*“It just disappeared”* - Prof Jeff Kenworthy

Build it and they will come

- Works with cycling too!
- How much do you need to build?
  - Not much
  - Small amount encourages cyclists
    - Portland (Roger Geller, 2012)
    - Brisbane (Michael Langdon, 2013)
    - Many others

# Types of people

**Strong &  
fearless**



**Interested but concerned**  
~ 50 - 60%

**Not able or not  
interested ~33%**



**Enthusied &  
confident**

Roger Geller's 4 types of cyclist

<http://www.portlandoregon.gov/transportation/44597?a=237507>





# IMPACTS OF CYCLING

# Obesity

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**Belfast**  
**Telegraph.co.uk** Friday 27 March 2015

[News](#) [Sport](#) [DebateNI](#) [Business](#) [Opinion](#) [Entertainment](#) [Life](#) [Galleries](#) [Arch](#)

[Home](#) [UK](#)

## Active commuters 'have lower BMI'

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*Flint et al, 2014, Associations between active commuting, body fat, and body mass index: population based, cross sectional study in the United Kingdom. BMJ 349, 4887*

# Obesity

## The New Zealand Herald

Search keywords...



National

Video

Opinion

Business

Technology

World

Sport

Entertain

### 30% of the world is obese, cost is skyrocketing - report

9:40 AM Friday Nov 21, 2014

- Global obesity costs \$2 trillion p.a.
- 2.1 billion people (30% of the global population) are overweight
- 15 % of health care costs in developed economies
- *Obesity isn't just a health issue... it's a major economic and business challenge*

McKinsey Global Institute, 2014

# Obesity

The New Zealand Herald

Search keywords...



Home National World Business Sport Technology Entertainment **Life & Style**

## Obesity epidemic reaching crisis levels

By Patrice Dougan

7:09 PM Thursday May 29, 2014

Health Health & Wellbeing Obesity

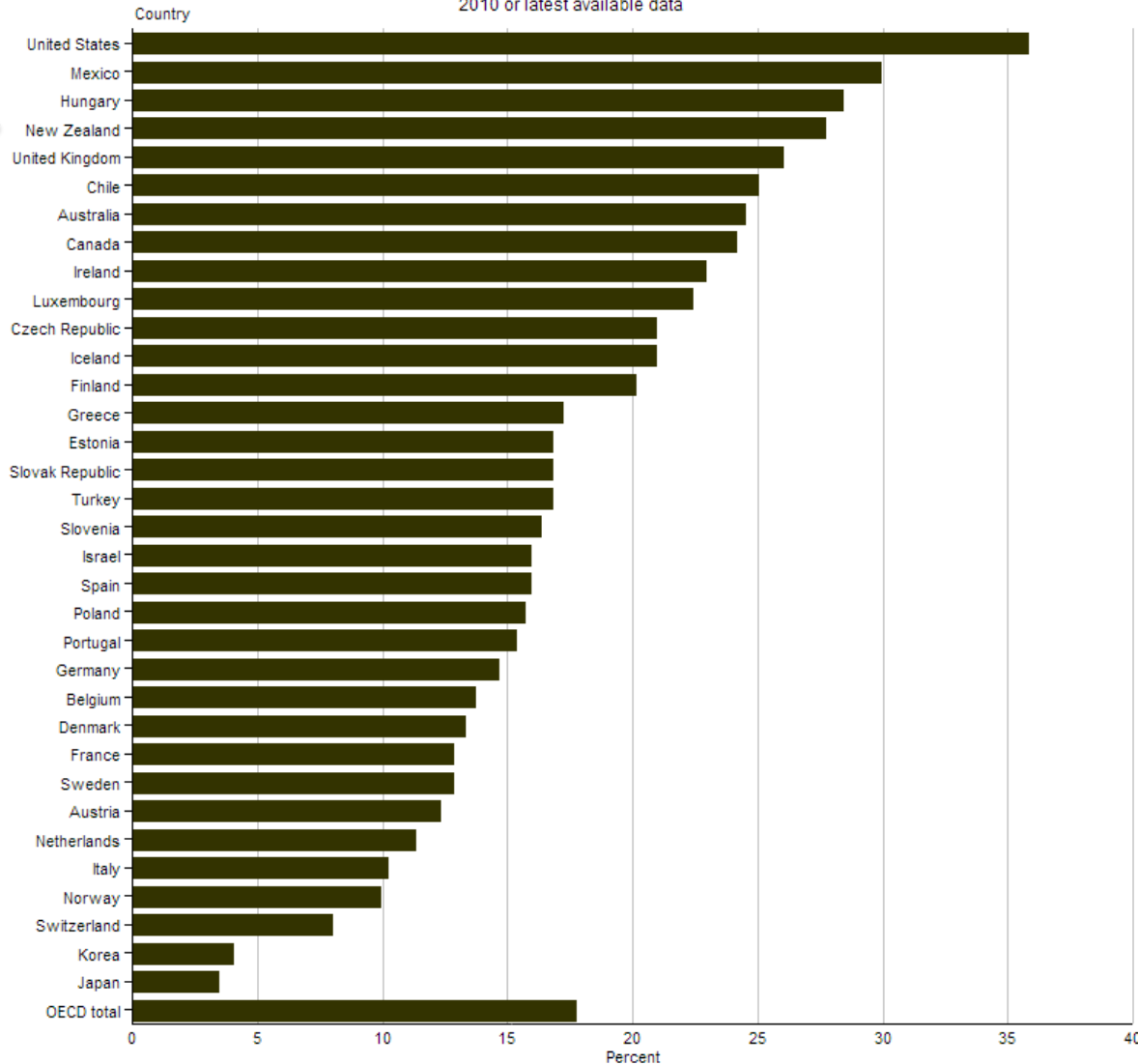


*"New Zealand is in the grip of a global obesity epidemic, the future costs of which will be enormous, potentially unaffordable for the health system."*

- Professor Norman Sharpe, New Zealand Heart Foundation medical director, Sept 2011  
[www.nzherald.co.nz/nz/news/article.cfm?c\\_id=1&objectid=10752121](http://www.nzherald.co.nz/nz/news/article.cfm?c_id=1&objectid=10752121)

# Obesity

Obesity rates – OECD  
By country  
2010 or latest available data



# Obesity

Obesity costs NZ \$622m per year\* in health costs alone (+ \$98-\$222m lost productivity)#

If NZ's obesity rates dropped from 33% to:

- 11.4% (NL); we'd save over \$600m p.a. (Chch \$50m p.a.)
- 20% - we'd save over \$400m p.a. (Chch \$30m p.a.)
- 25% - we'd save over \$300m p.a. (Chch \$20m p.a.)

\* Based on 2006 figures

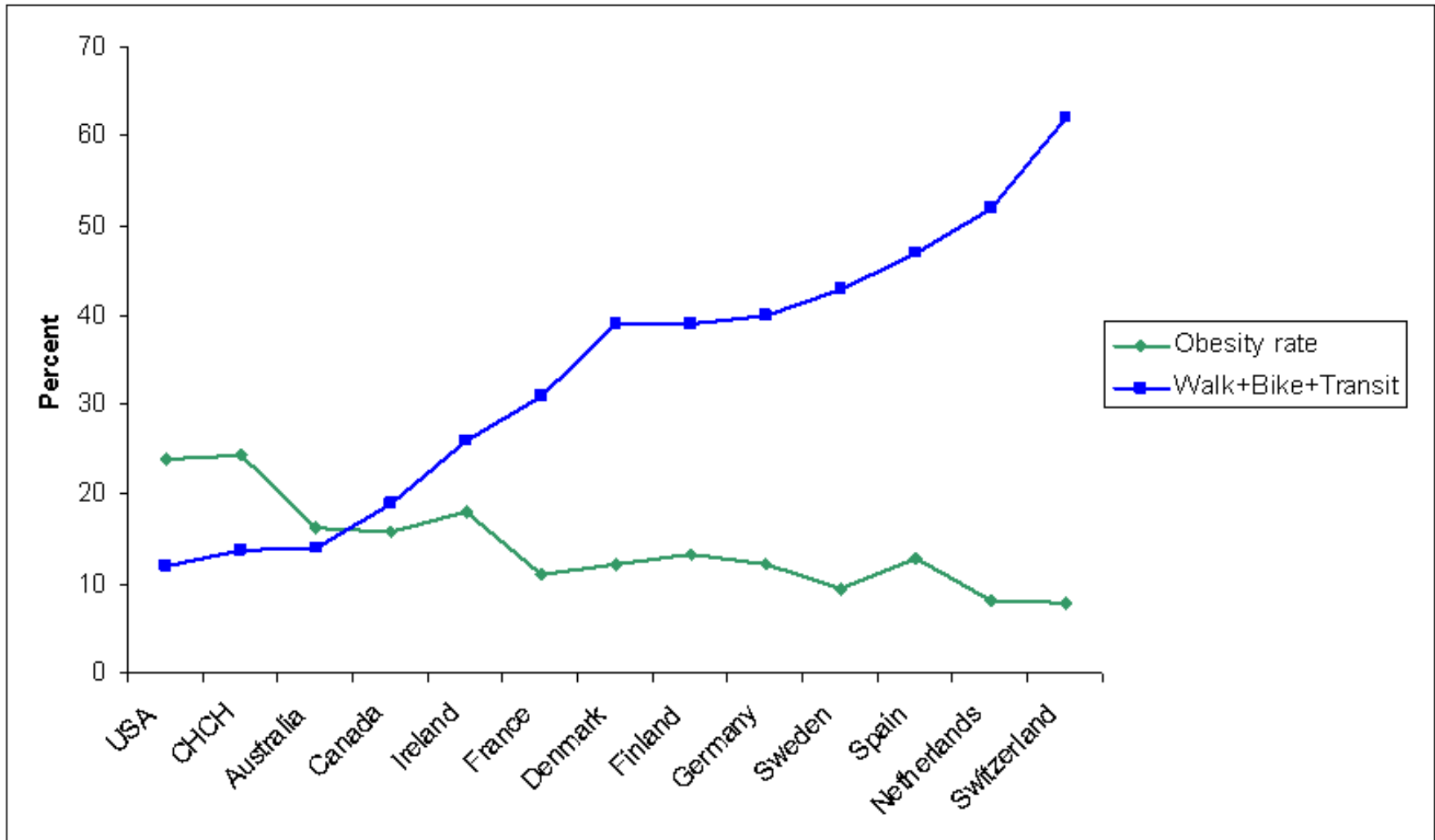
# Lal et al, 2012, Health care and lost productivity costs of overweight and obesity in New Zealand. *Aust NZ J Public Health*. 2012; 36:550-6

## **Declining Walkability Plays a Big Role in China's Obesity Problem**

- Over 20% of all overweight or obese people in the world are Chinese
- Walkable urban design tied to walking for commuting, non-commuting and exercise

Source: Alfonzo et al, Walking, obesity and urban design in Chinese neighborhoods. Preventive Medicine, 2014

# Obesity



Adapted from Bassett et al, 2008, Walking, Cycling, and Obesity Rates in Europe, North America, and Australia. *Journal of Physical Activity & Health* 5 (6):795-814.



# Air pollution

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## Traffic pollution in NZ per year:

- Kills 259 adults
- Causes 327,800 restricted activity days
- PM<sub>10</sub> costs \$942m

Source: Kuschel et al, Updated Health and Air Pollution in New Zealand Study Volume 1: Summary Report, 2012, Prepared for HRC, MoT, MfE and NZTA.

# Congestion



# Cost effectiveness

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- Review of 16 economic evaluations of health effects of transport interventions found benefit-cost ratio of 5:1 (Cavill et al, 2008)
- NZ research: *“transforming urban roads over the next 40 years, using best practice physical separation on main roads and bicycle-friendly speed reduction on local streets, would yield benefits 10–25 times greater than costs”* (Macmillan et al, 2014)

# Business

**35%** decrease in injuries to all street users (8th Ave)

**58%** decrease in injuries to all street users (9th Ave)

Up to **49%** increase in retail sales (Locally-based businesses on 9th Ave from 23rd to 31st Sts., compared to 3% borough-wide)



NYC Dept of Transportation,  
Measuring the Street: New Metrics for 21st Century Streets  
[www.nyc.gov/html/dot/downloads/pdf/2012-10-measuring-the-street.pdf](http://www.nyc.gov/html/dot/downloads/pdf/2012-10-measuring-the-street.pdf)

# Business

## Average Customer Expenditures by Mode of Travel and Type of Establishment

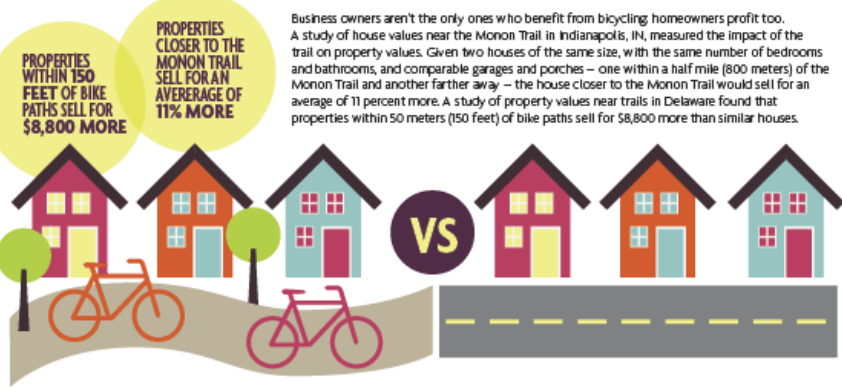
Mode	Establishment	Trips per Month	\$ per Trip	\$ per Month	N
Auto	Bar	1.6	25.55	40.21	88
	Convenience	9.9	7.98	79.37	543
	Restaurant	2.2	18.74	41.16	409
	Total	4.5	13.70	61.03	1,040
Bike	Bar	4.9	14.08	68.56	42
	Convenience	14.5	7.30	105.66	63
	Restaurant	3.5	12.08	42.52	48
	Total	7.1	10.66	75.66	153
Transit	Bar	1.8	19.54	35.35	13
	Convenience	10.9	6.91	75.62	53
	Restaurant	3.5	11.52	40.68	36
	Total	5.7	10.15	58.16	102
Walk	Bar	3.1	22.17	68.42	53
	Convenience	12.6	6.13	77.34	254
	Restaurant	2.6	16.74	43.77	131
	Total	5.9	11.25	66.22	438
Total	Bar	2.5	21.78	53.59	196
	Convenience	10.9	7.36	80.40	913
	Restaurant	2.4	17.39	41.78	624
	Total	5.0	12.60	63.46	1,733

NOTE: N = number of respondents.

Clifton K, 2012, Business Cycles: Catering to the Bicycling Market, TRB 280, 26

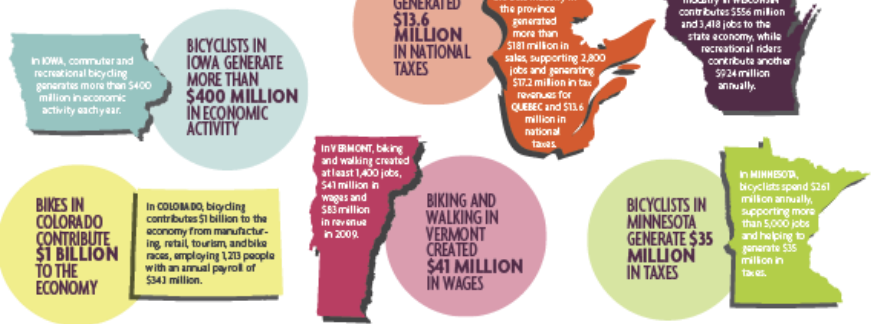
# Community

## CYCLING AND HOUSE SALES



## ROLLING UP REVENUE

At the local level, the economic benefits of bicycling are striking. Add up the impact across an entire state and the results can be staggering. Here are just a few recent studies on the economic impact of biking at the state and provincial level.



## NYC CAR-CENTRIC STREETS VS



## NYC BIKE-FRIENDLY STREETS



\* Aggregate totals of survey respondents. SOURCE: "Sequestered Revenue," "Self-Storage Systems, Inc." URL: <http://www.self-storage.com/press/010711112.pdf>  
New York City Department of Transportation, "Measuring the Impact: New Metrics for 2nd Century Street." URL: <http://www.nyc.gov/html/dot/downloads/pdf/2012-measuring-the-impact.pdf>

# Social capital

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Communities that promote sustainable and active can:

- Reduce disparities between the rich and poor
- Promote good neighbourhood
- Enable poor to gain better access to healthy food
- Lead to decreased crime

Source: OECD, 2000, Environmentally sustainable transport. Futures, strategies and best practices.

# Happiness

News ▾

Medical ▾

Experts ▾

Lifestyle ▾

Tools ▾

Multimedia

W

[Home](#) > [Fitness](#) > [Leisure](#)

04 JUNE 2014

## Bicycling the 'happiest' form of transport

*A study found that people are in the best mood while they are bicycling, compared to any other mode of transportation.*

Morris EA and Guerra E, 2014, Mood and mode: does how we travel affect how we feel? *Transportation* 42, 25-43.



# Longer life



THE INDEPENDENT FRIDAY 27 MARCH 2015

**NEWS** | **VIDEO** | **PEOPLE** | **VOICES** | **SPORT** | **TECH** | **LIFE** | **PROPERTY** | **ARTS + ENTS** | **TRAVEL** | **M**

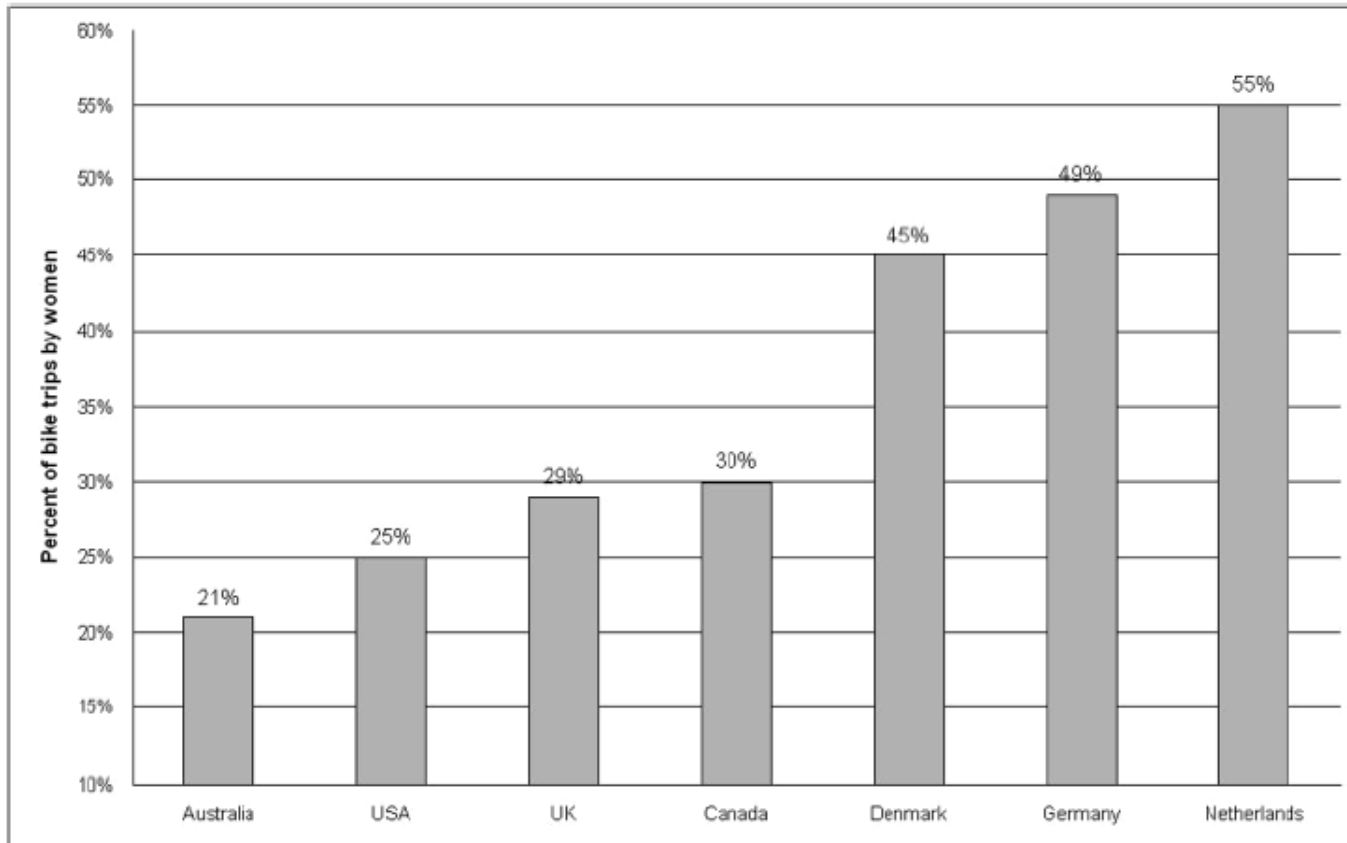
Football ▾ / Six Nations / Rugby Union ▾ / Cricket / Tennis / Rugby League / Golf / Motor Racing / Racing / Boxir

Sport > Others > Cycling

## The secret of eternal youth: skin-tight Lycra and a bicycle

Pollock et al, 2015, An investigation into the relationship between age and physiological function in highly active older adults. *The Journal of Physiology* 593, 3, 657

# Gender



Source: Pucher and Buehler. 2008. Making Cycling Irresistible: Lessons from the Netherlands, Denmark and Germany. *Transport Reviews* 28 (4).

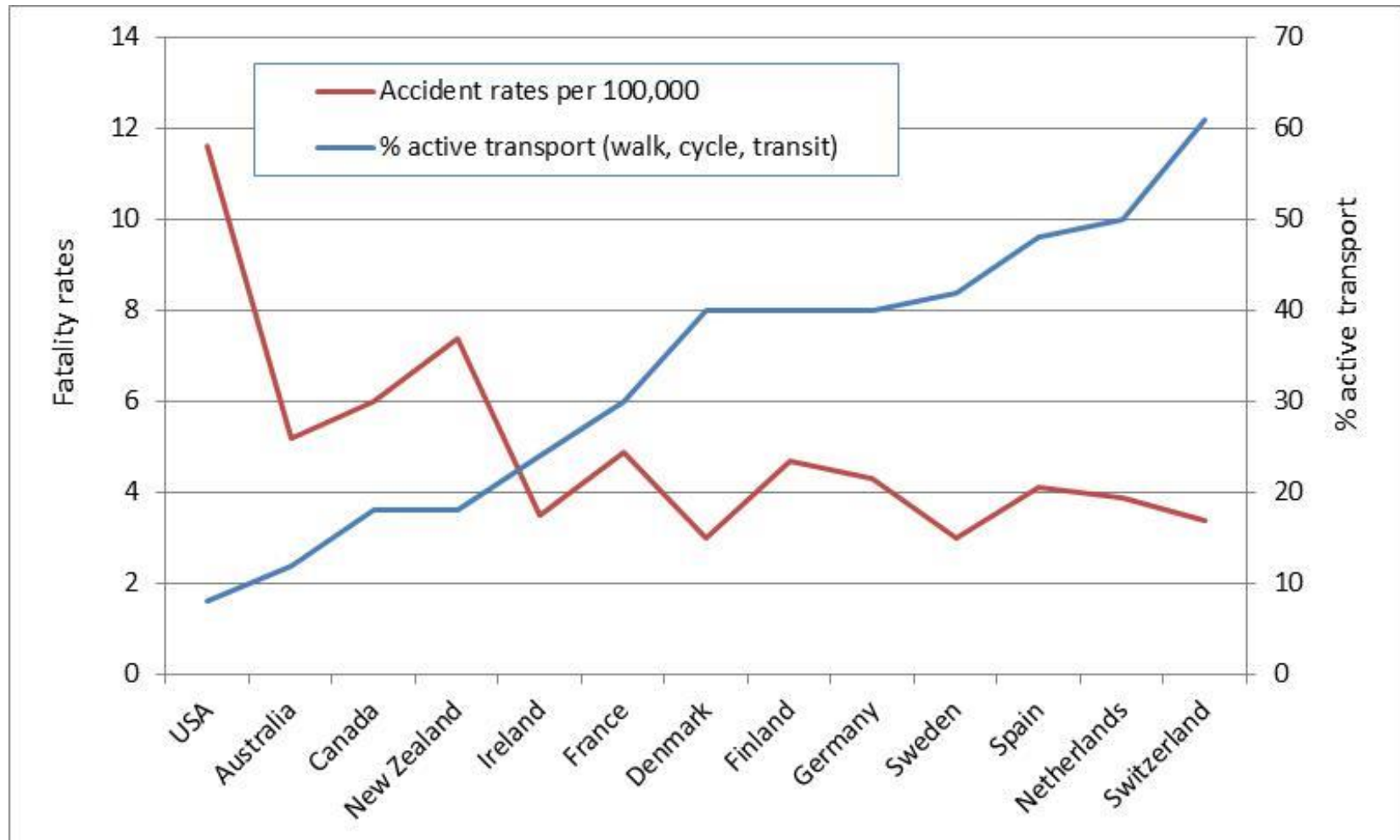
Sources: German Federal Ministry of Transport (2003); U.S. Department of Transportation (2003); Danish Ministry of Transport (2005); Statistics Netherlands (2005); Australian Bureau of Statistics (2007); Department for Transport (2007) and information provided directly by bike planners in Canadian provinces and cities

**Figure 8.** Women's share of total bike trips in Australia, the USA, the UK, Canada, Denmark, Germany and the Netherlands (2000–2005).

# Woman, children & older people



# Safety

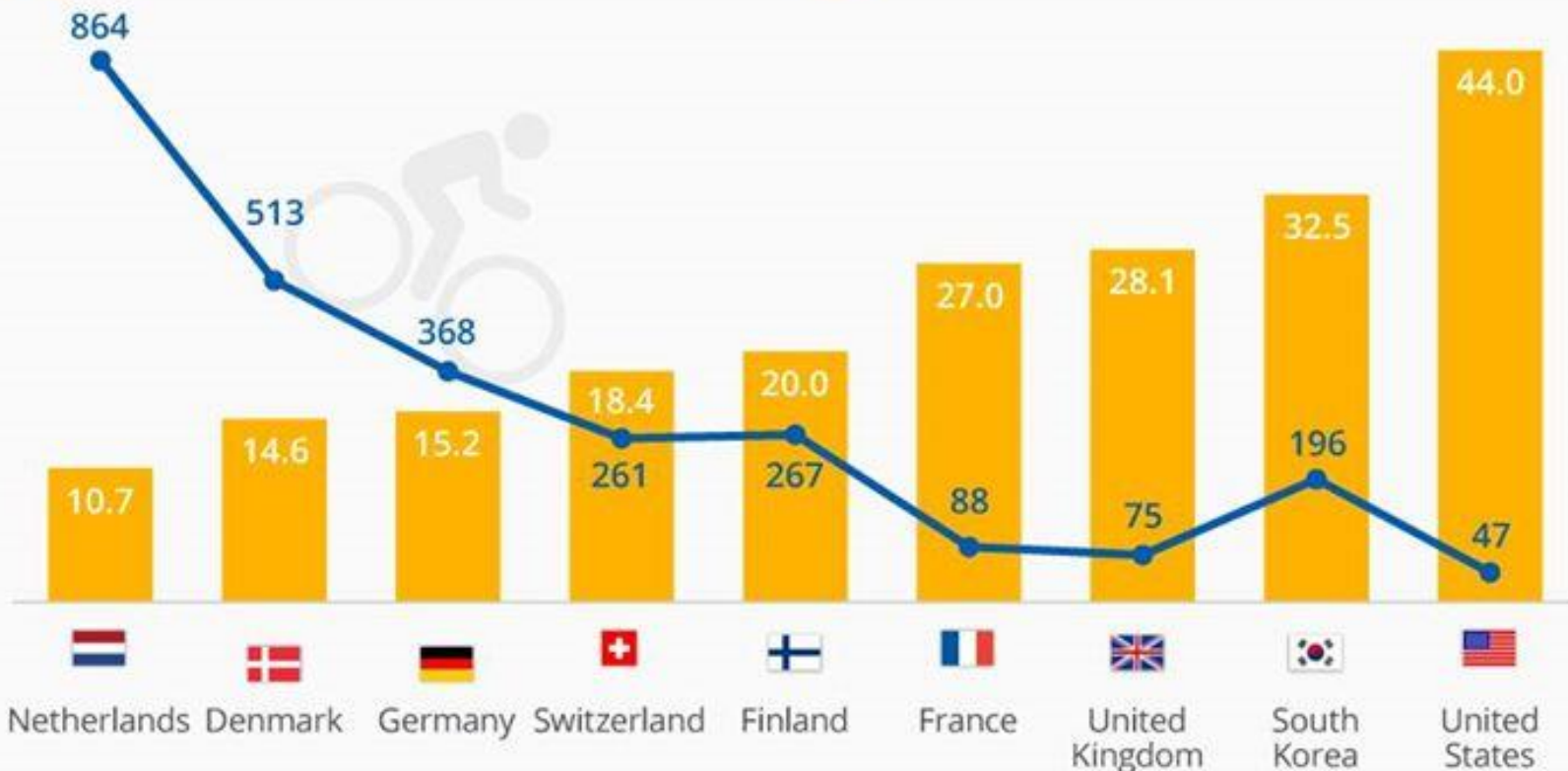


# Safety

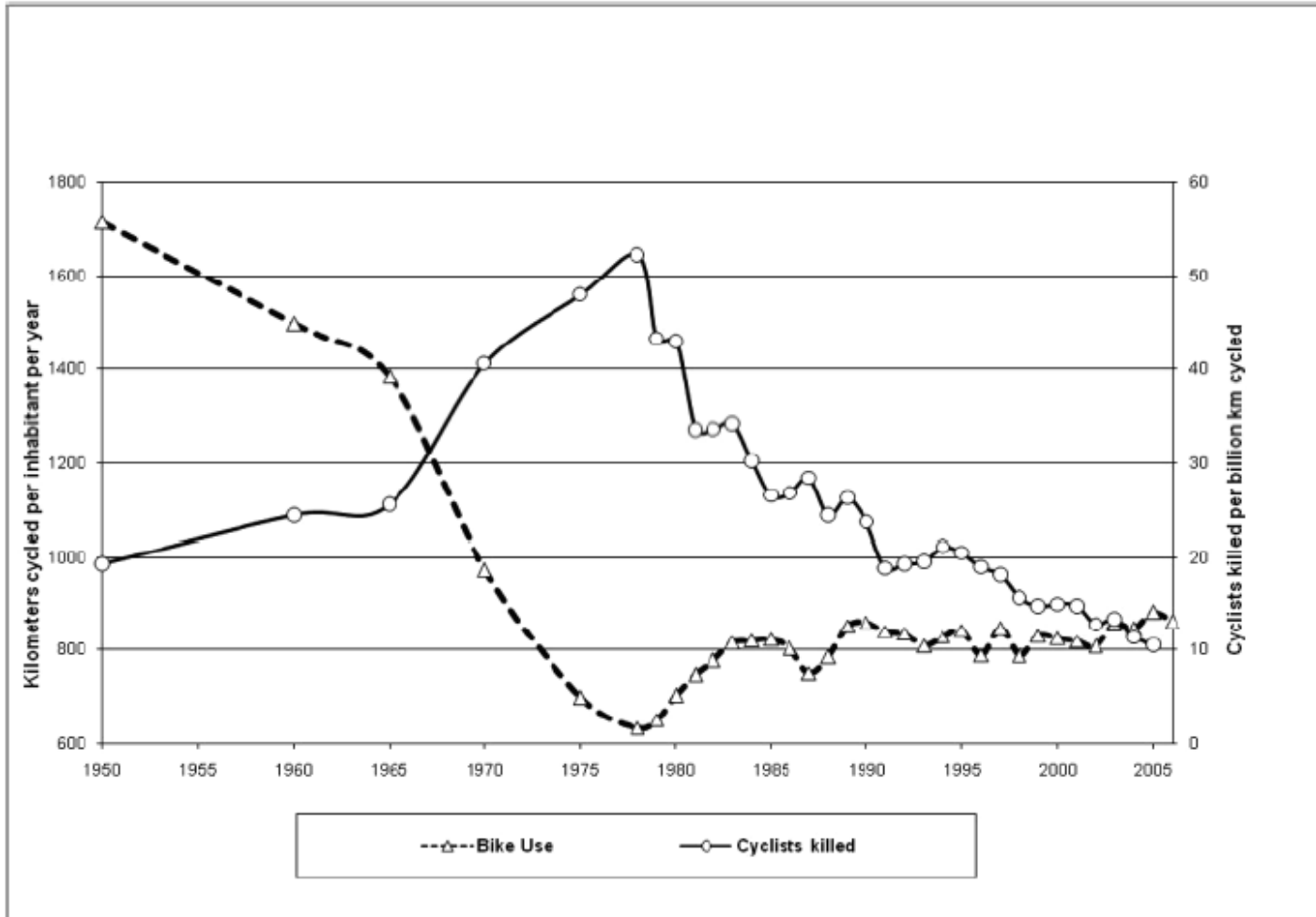
## More Cyclists In A Country Means Fewer Fatal Crashes

Bicycle travel per inhabitant per year (km) and number of cyclists killed per billion km\*

■ Bicycle travel per inhabitant per year (km)    ■ Cyclists killed per billion km of bicycle travel



# Safety



Source: Netherlands Ministry of Transport (2007)

Source: Pucher and Buehler. 2008. Making Cycling Irresistible: Lessons from the Netherlands, Denmark and Germany. *Transport Reviews* 28 (4).

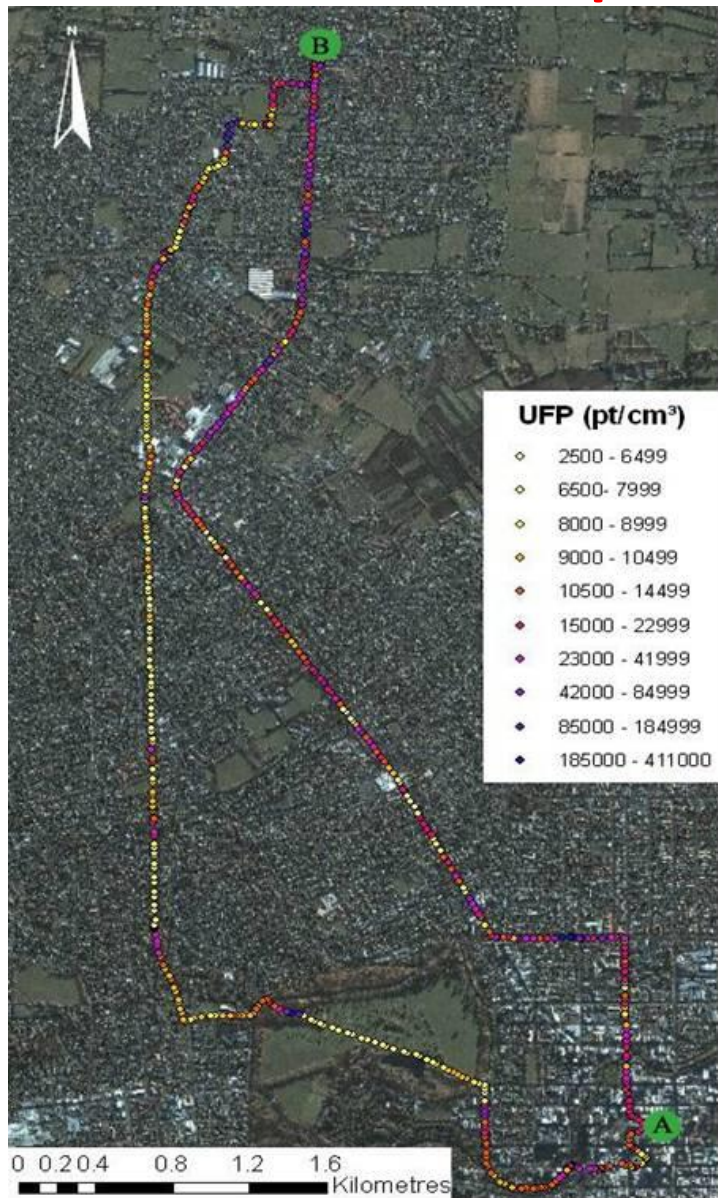
**Figure 12.** Inverse trends in cycling fatality rates and annual kilometres cycled per inhabitant in the Netherlands (1950–2005).

# Pollution exposure

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- Car drivers are consistently exposed to the highest CO levels
  - >50% higher than cyclists
- Car drivers & bus passengers are exposed to higher average levels of UFP than cyclists
- However for very short acute exposures (few secs) on-road cyclists can be exposed to higher peaks
- On-road cyclists are exposed to higher levels than off-road cyclists
  - CO (60%), PM1 (20%) & UFP (over 100%)

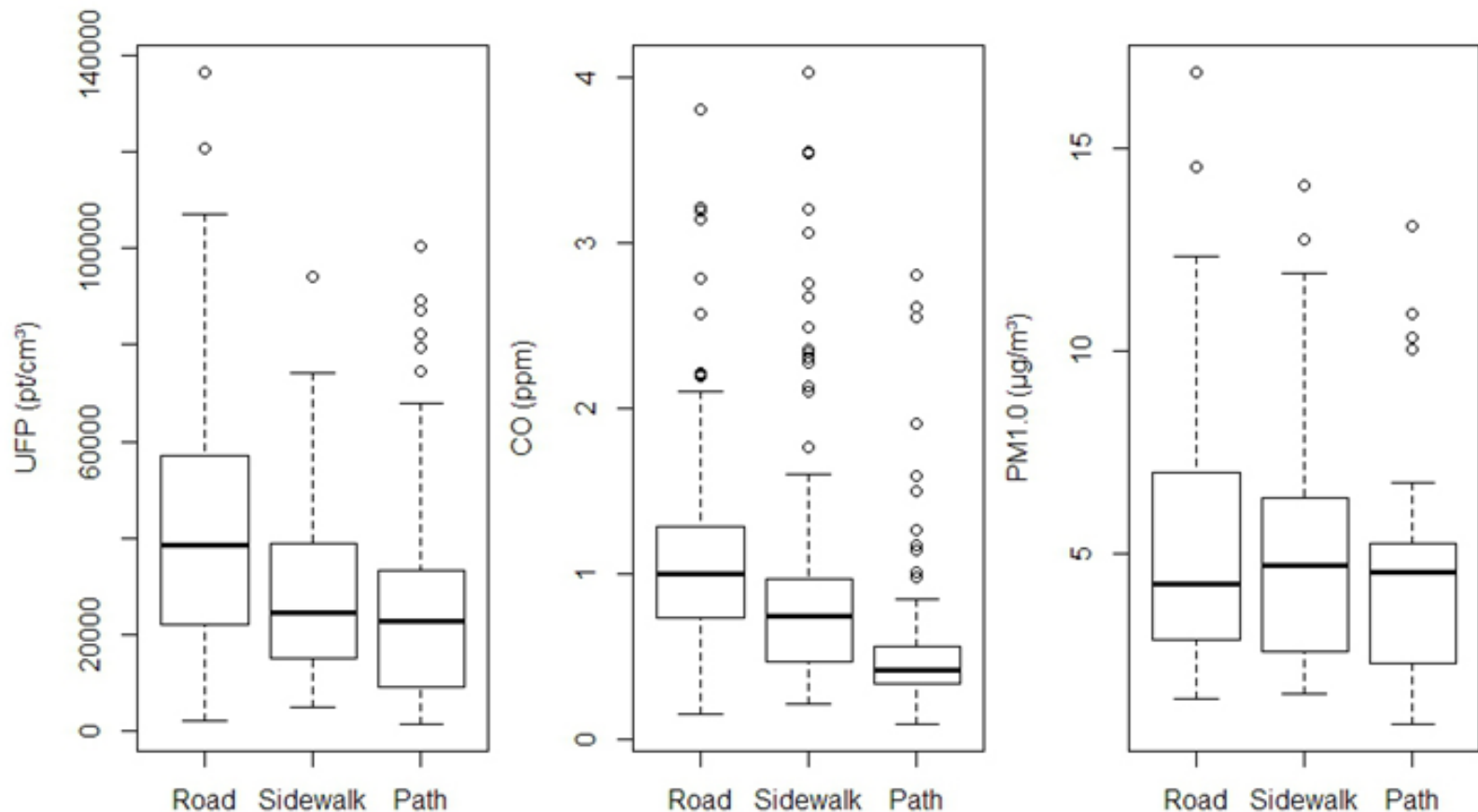
# Pollution exposure



Source: Simon Kingham and Woodrow Pattinson



# Cyclist exposure



**Figure 4.** Box plots showing exposure differences between cyclist positions: road, sidewalk (7 m) and path (19 m). The central line represents the median, the boxes the 25<sup>th</sup> to 75<sup>th</sup> percentile and the whiskers represent 1.5 times the interquartile range.

# Public support

What is share an idea? ▼

Before & After

Sign up to receive updates

You Tube

FACEBOOK

twitter

share  
an idea

Move

Market

Space

Life

Christchurch  
City Council



Central  
City Plan



move

Here's a summary of all the ideas we've received and analysed relating to market. Keep checking back as we continue to analyse all the ideas.

**Want to view the original ideas? Click [here](#) to see what people said**

Pedestrian focused Central City; make walking an enjoyable experience with integrated green walkway networks with wider footpaths, good lighting, street crossings, footbridges and covered walkways. ■ Integrated and separated off-road, cycle lane network with safety a major focus. ■ Cycle network connecting the Central City to the suburbs. ■ Good facilities for cyclists with safe/plentiful cycle parking; cycle hire for locals. ■ Car-free Central City or restricted access and slow speed zones; must consider accessibility for people with mobility issues. ■ Tram (or light rail) extended as part of the public transport network to suburbs; not just a tourist tram; must be affordable. ■ Central City free of big buses; smaller shuttles that are less polluting, quieter and take up less space. ■ Integrated, affordable public transport network with central hub for buses and trams/light rail (e.g. Moorhouse Ave railway station). ■ Rethink location of bus exchange. ■ One-way versus two-way roading network. ■ Free or affordable park-and-ride system on periphery of Central City. ■ No parking buildings in the heart of the Central City. ■ Different parking options depending on day/night, weekday/weekends.

“If you plan cities for cars and traffic, you get cars and traffic.  
If you plan for people and places, you get people and places.”

Fred Kent

# WHY DON'T PEOPLE CYCLE

# How?

## *Assessment of the type of cycle infrastructure required to attract new cyclists*

- Type of infrastructure needed to attract **‘new’** cyclists
- Investigate the barriers and motivations for cycling
  - Perceived danger is main barrier!
  - Physical separation was key

Source: Kingham S, Koorey G and Taylor K, 2011, Assessment of the type of cycle infrastructure required to attract new cyclists. NZTA Research Report 449.

# How?

## If you build it, they will come: New study shows that bike lanes increase ridership



[Lloyd Alter \(@lloydalter\)](#)  
[Transportation / Bikes](#)  
June 3, 2014

Share on Facebook

Austin, TX: Barton Springs Road

*One-way protected bike lane on the south side of the road*



Bluebonnet Lane

*Two-way protected bike lane on a two-way street*



Rio Grande Street

*Two-way protected bike lane on one-way street*



Monsere et al, 2014 Lessons from the Green Lanes: Evaluating Protected Bike Lanes in the US. NITC Final report NITC-RR-583, June 2014.

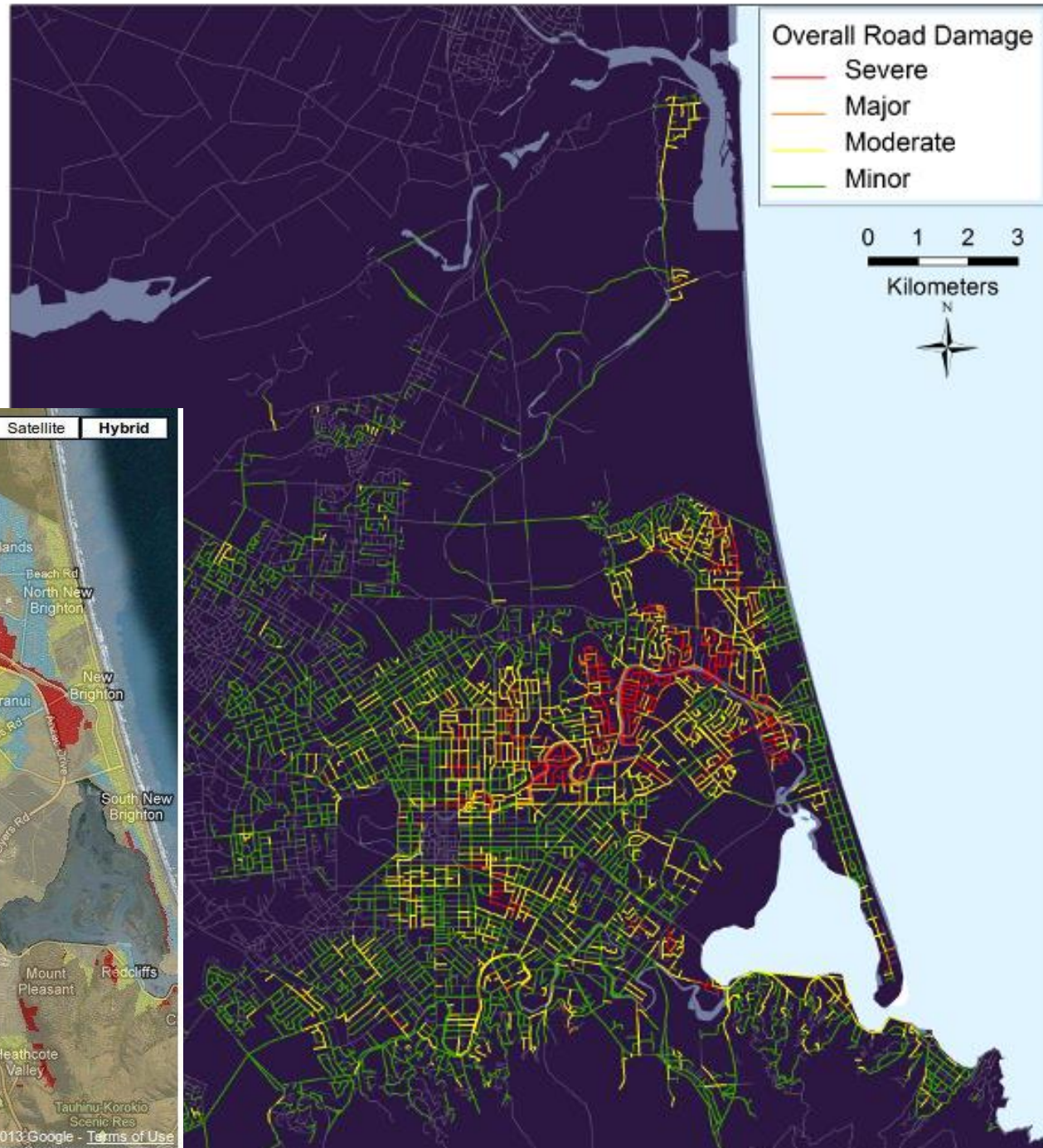
# Other barriers



# A CYCLING CITY



# Opportunity





*Matai Street*



*Burnside Cycleway*

# We're Not Starting from Zero...



*Southern Motorway*



*Railway Cycleway*

# Ilam Rd

- Finished mid 2013



# Open Streets

- September 2013



# Transition Initiatives

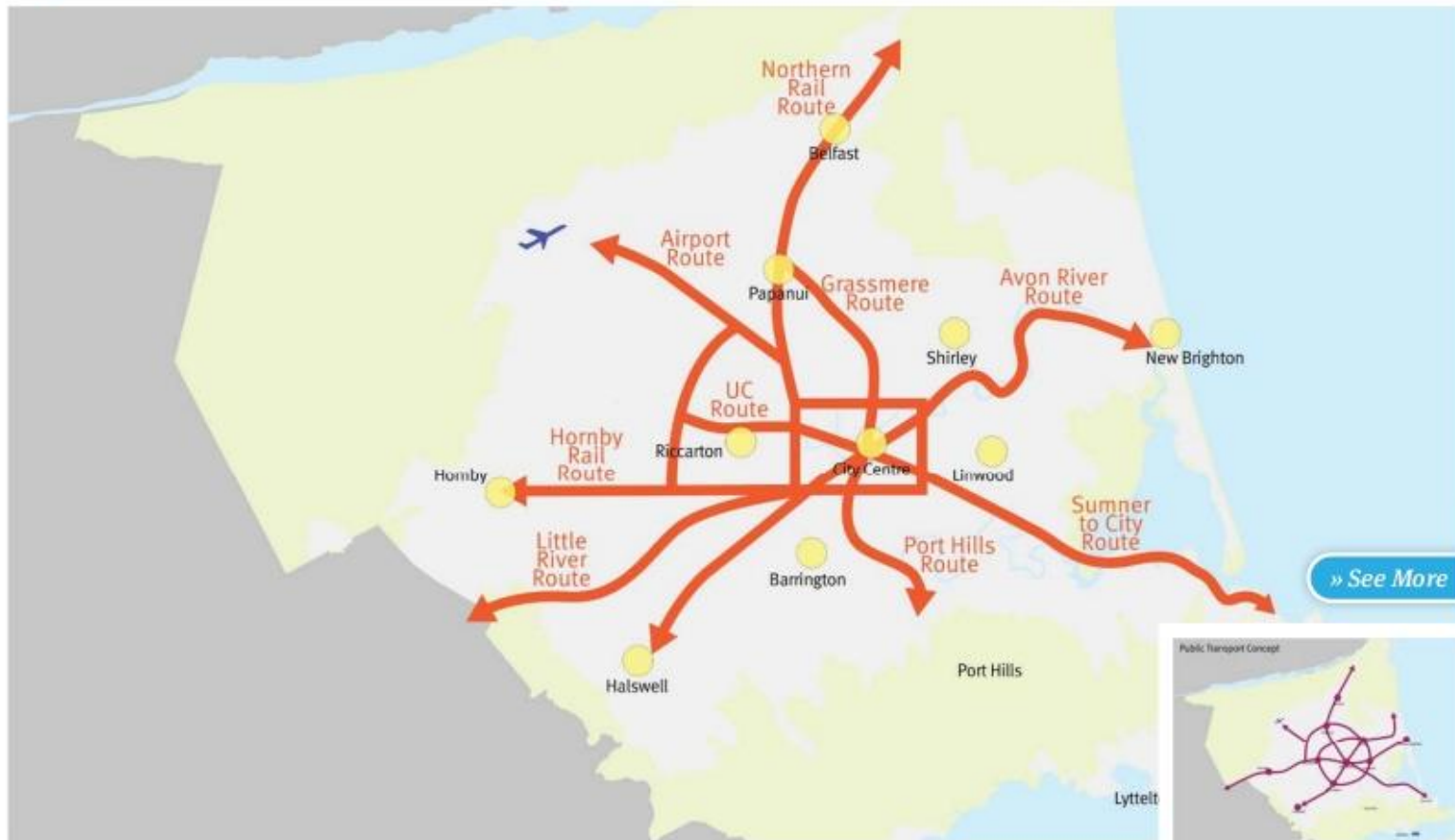
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- Recycle a Dunger
- ICE cycles
- Christchurch Otautahi Cargo Bike Annual Rally (CHOCBAR)

# Christchurch Transport Strategic Plan 2012-42

## Cycle network

- » Creating exemplary cycle routes that are separated from vehicles.
- » Making Christchurch the cycling city.



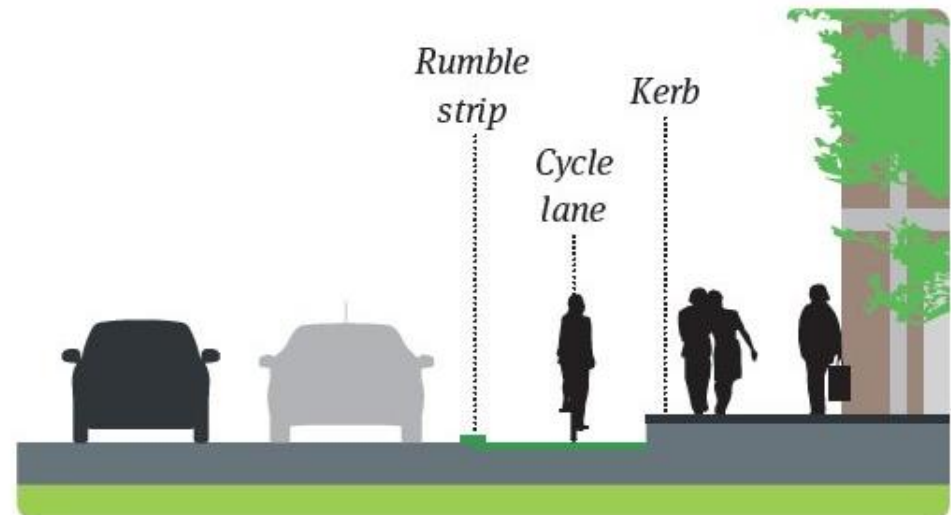
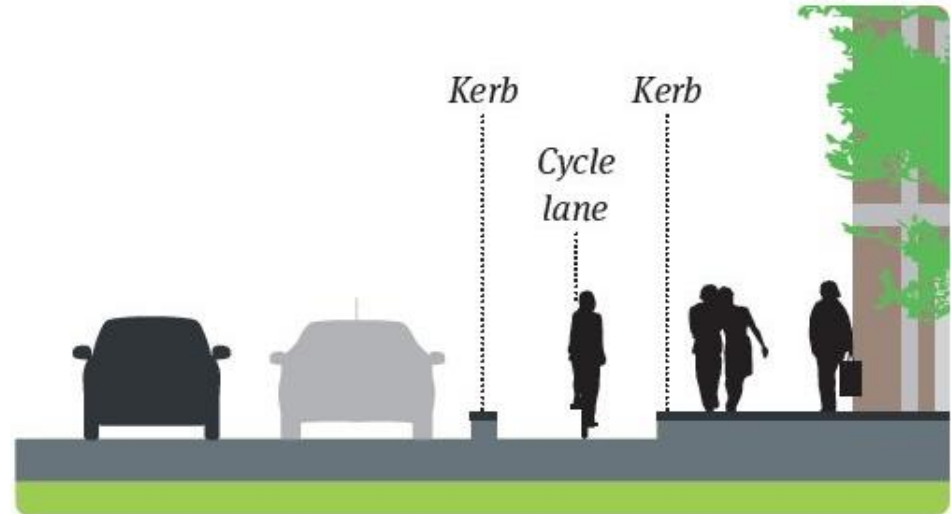
Public Transport

# Christchurch Central Recovery Plan: An Accessible City

## Cycling

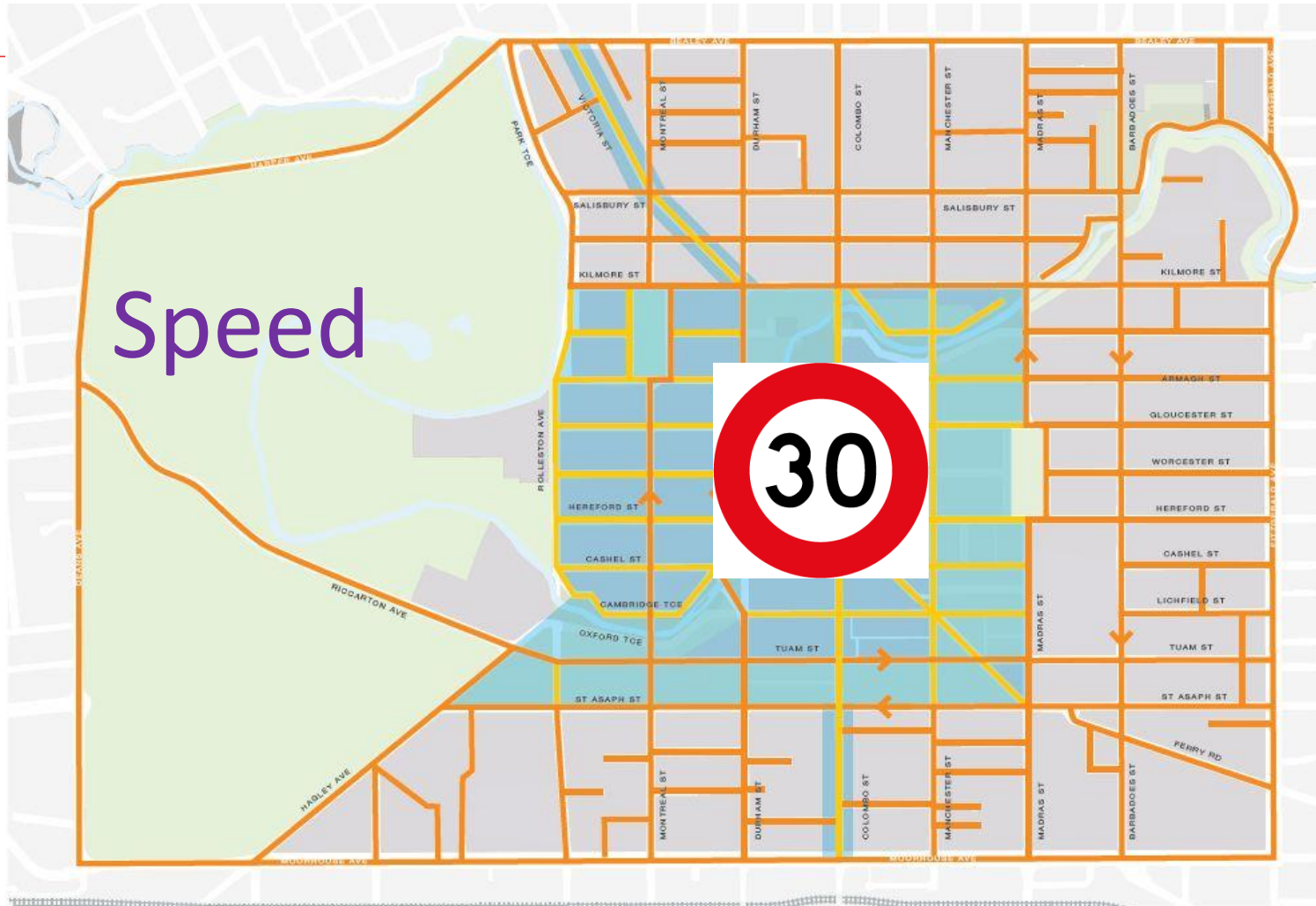
### Eke paihikara

*Cycling will be encouraged in the central city. Routes for both commuter and recreational cyclists will offer good connections from the wider city into the central city and the Core.*



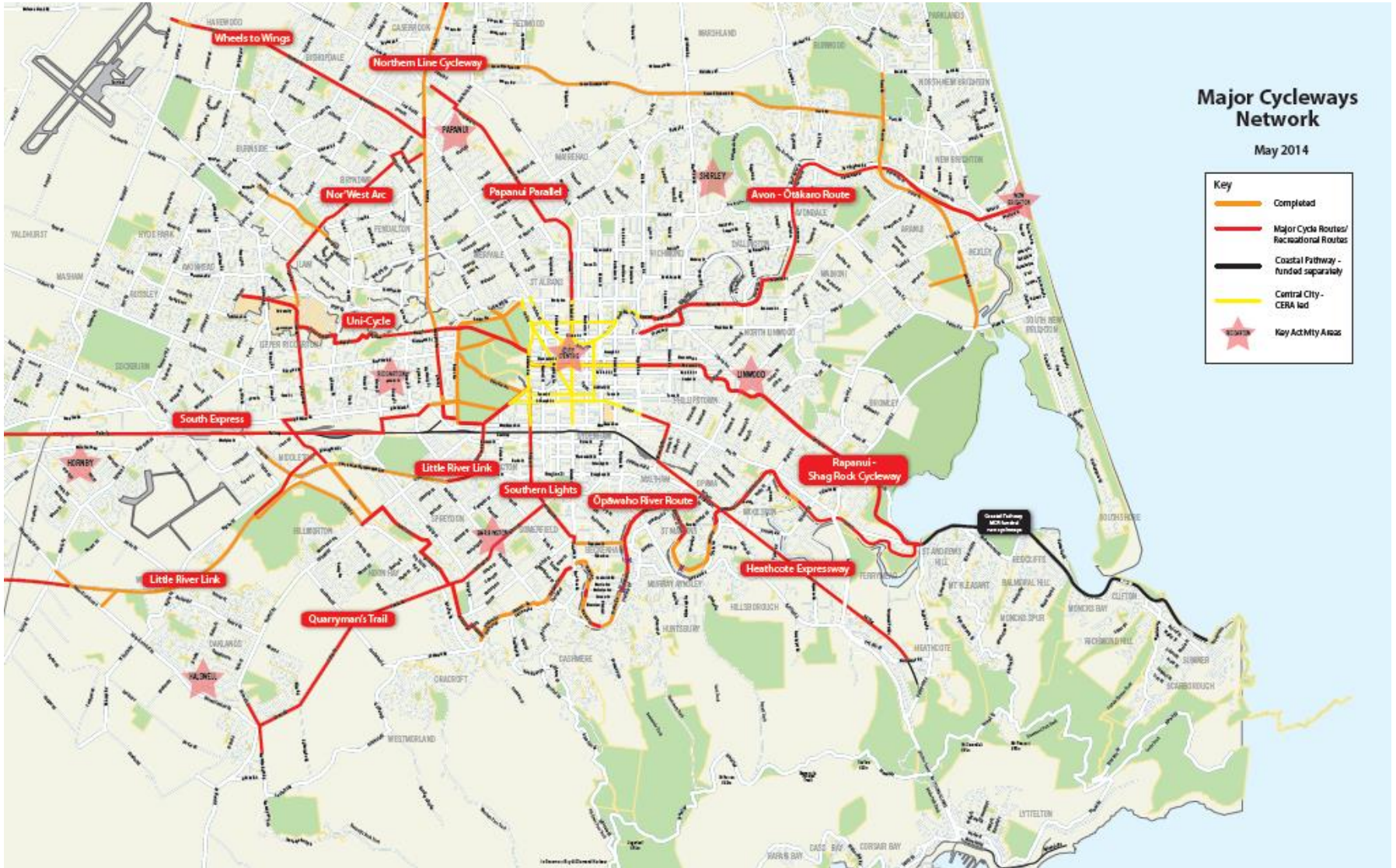
Possible cycle lane options

# Christchurch Central Recovery Plan: An Accessible City - Oct 2013



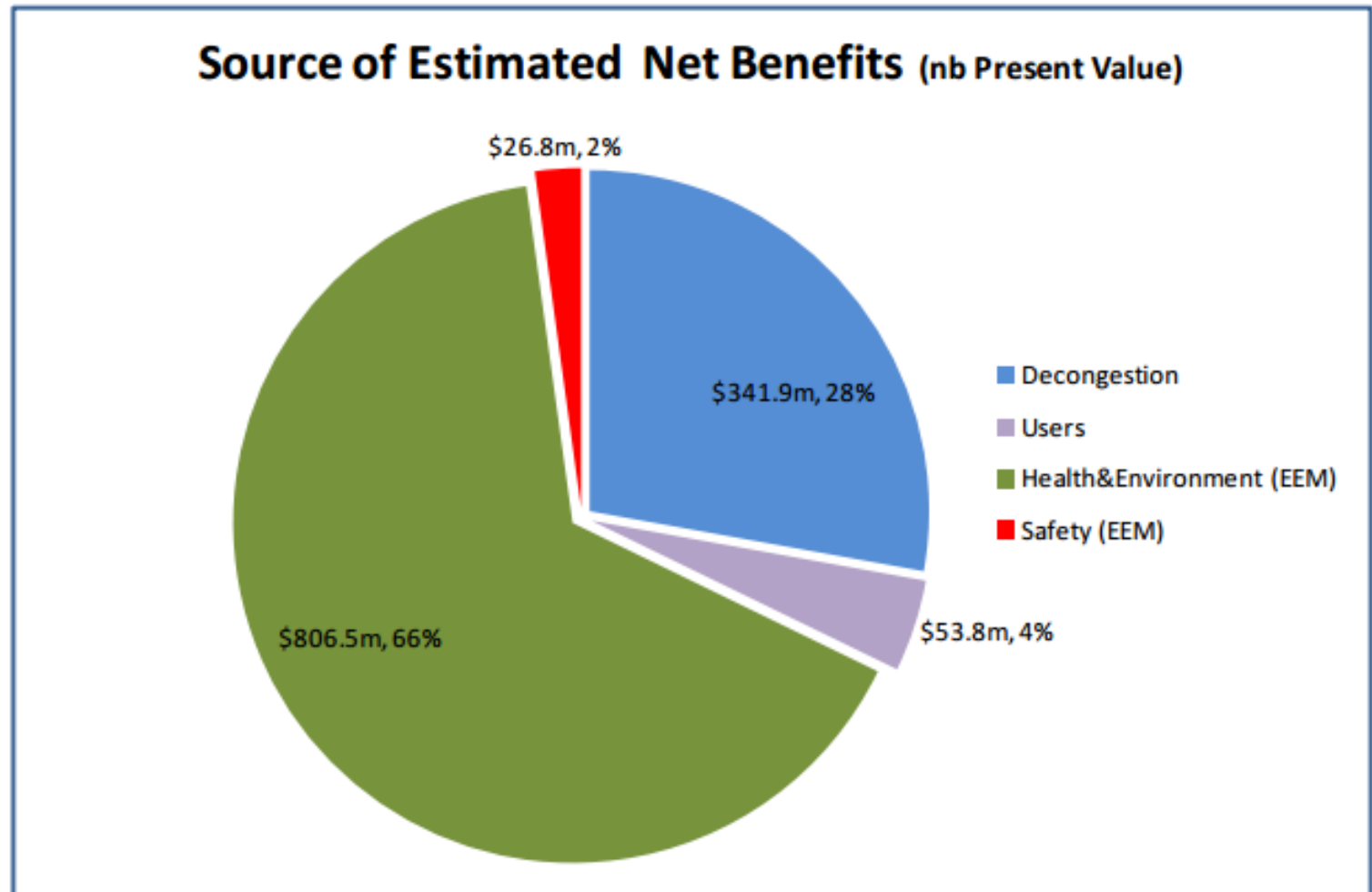


# Major Cycleways



# Christchurch Major Cycleways

Benefit  
cost ratio  
of 8!



# Roads of National Significance

Table 3: BCRs of the roads of national significance, 2011

Project	BCR	BCR plus WEBs*
1. Puhoi to Wellsford	0.8	1.1
2. Auckland Western Ring route	2.1	2.7
3. Victoria Park Tunnel	3.2	n/a
4. Waikato Expressway	1.4	1.8
5. Tauranga Eastern Link	1.4	1.8
6. Wellington Northern Corridor	1.1	1.4
7. Christchurch Motorways	2.0	2.4
Simple average (all)	1.7	n/a
Simple average (all except 3.)	1.5	1.9

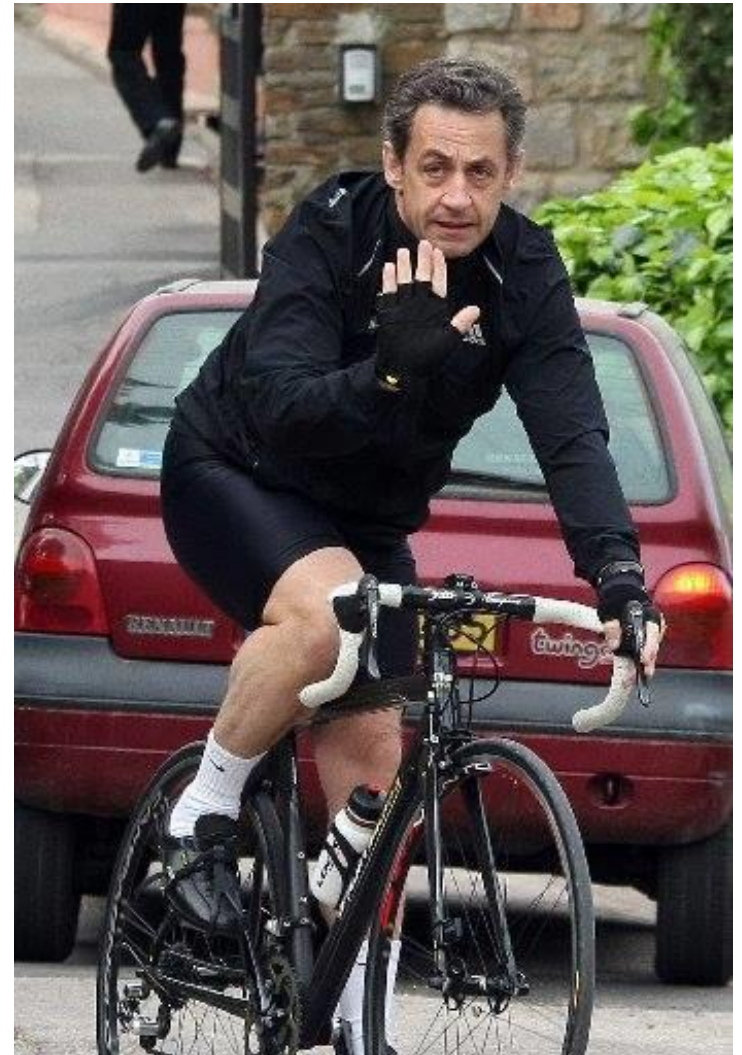
\* wider economic benefits

Pickford M, 2013, State highway investment in New Zealand. The decline and fall of economic efficiency. Policy Quarterly 9, 3, 28.

# POSSIBLE BARRIERS TO SUCCESS

# Lack of role models

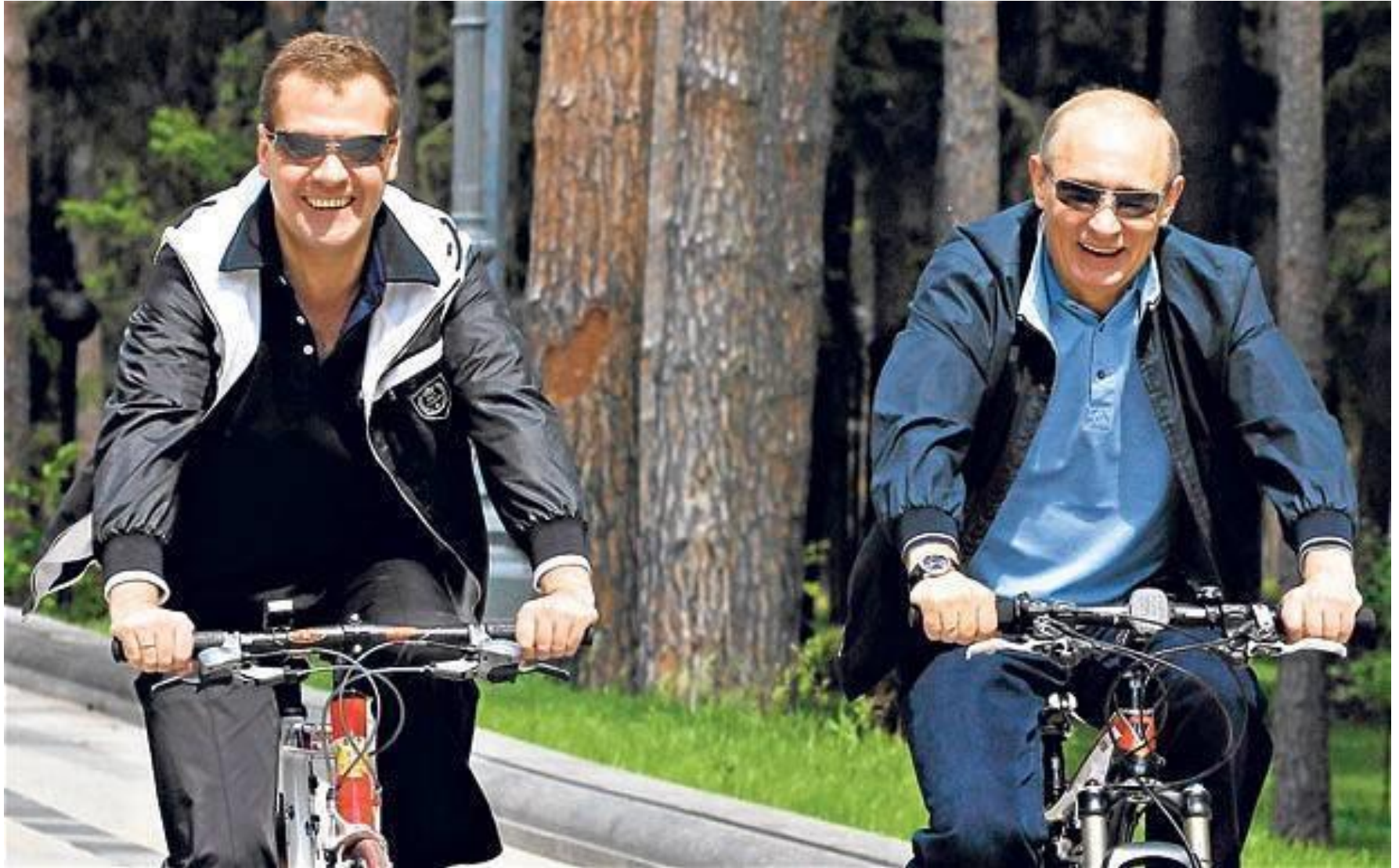
...France



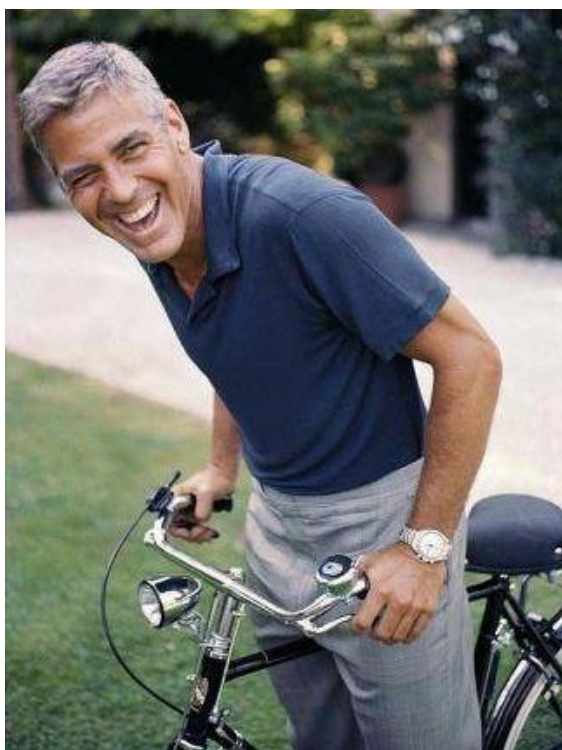
# UK and friends



# Russia

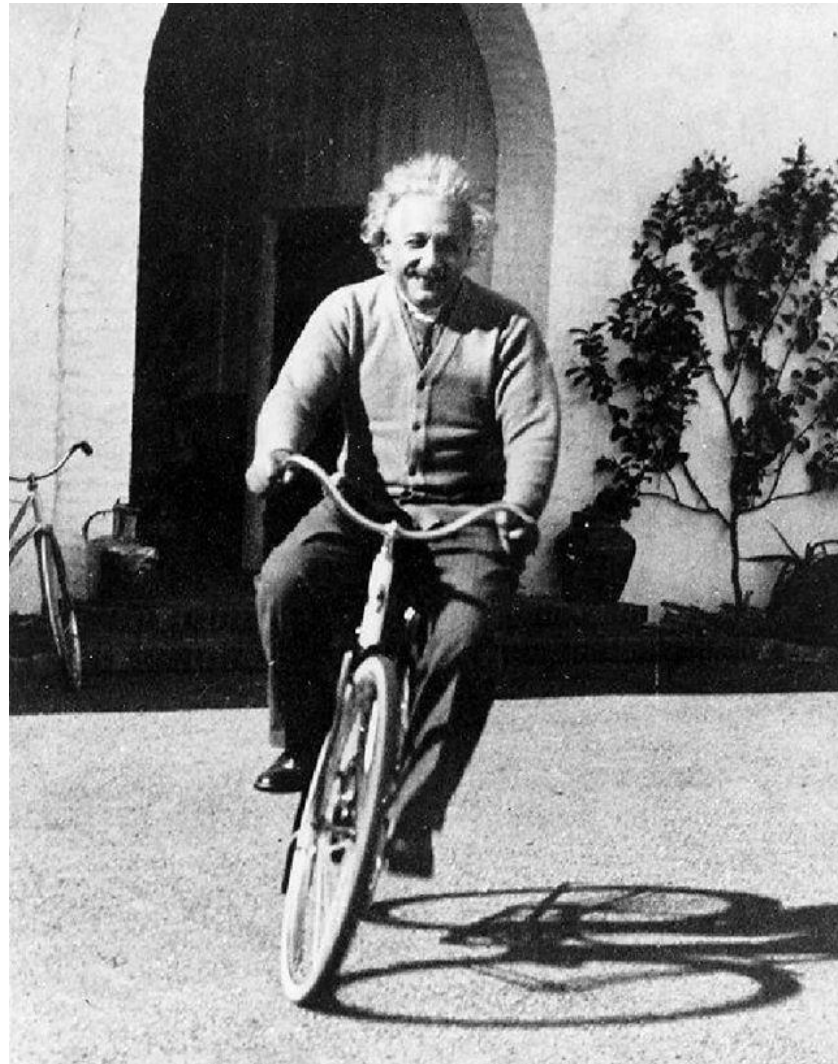


# Hollywood

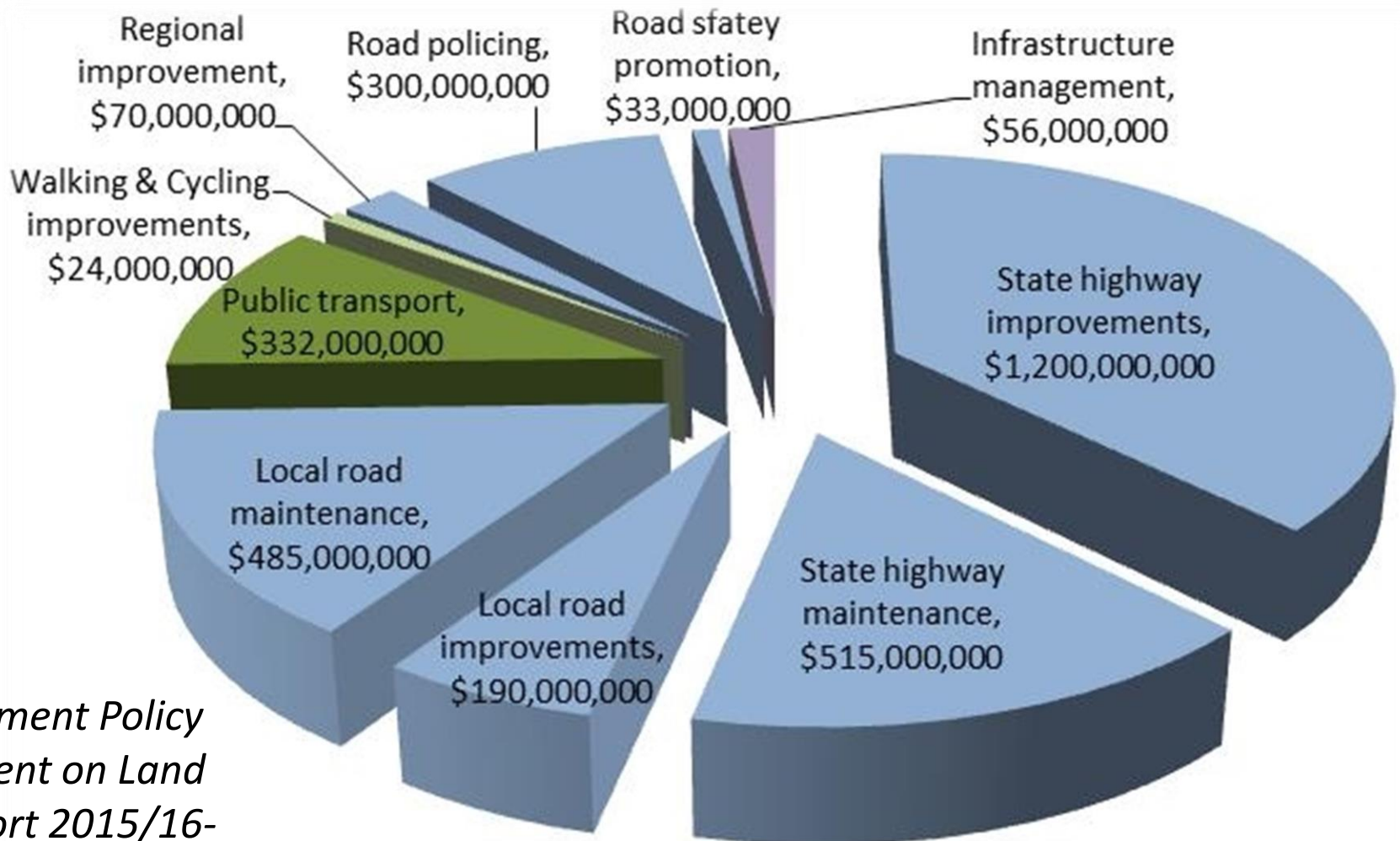




# Others



# Money!



*Government Policy  
Statement on Land  
Transport 2015/16-  
2024/25*

# Money!

## GPS on Land Transport 2015/16-2024/25

- Roads especially new state highways (Roads of National Significance)
- 0.4% for walking & cycling
- National's extra \$100m adds extra 0.7%!
- little except roads - Christchurch Transport Plan states *“this means the funding available for public transport, cycling and walking networks as outlined in this Plan will be heavily constrained for much of the early recovery period”*.

# Lack of leadership and guts!

## The bike revolution and its From bike lanes to Citi Bike and beyond, how the two- other social uprisings

BY LIONEL BEEHNER / NEW YORK DAILY NEWS / Friday, May 10, 2013,

f 119 t 16

The New York Times

WORLD U.S. N.Y. / REGION BUSINESS

### Expansion of Bike L



Taking the bicycle lane on Ninth Avenue. New York has added everyone is pleased.

By J. DAVID GOODMAN  
Published: November 22, 2010

Transportation Commissi  
York City's bike share pr

The  
the  
poli

Over the last four years, the streets of New York have undergone a transformation: More than 250 miles of traffic lanes for bicycles have been created, and several laws

# Calls for calm as bike lane backlash gains momentum

TIM WILLIAMS  
CITY EDITOR

14 NEWS

THE parents killed national left are pleading City Council no growing campaign arated bike lane Councillor I will push for the way to be ripped of a backlash and traders over fic lanes and pa A backflip would be a moment for the co partner in the national cyclin the Conventio month. Mary Safe, v Amy Gillett wa

TIM WILLIAMS

TRAFFIC lanes cut for the Frome St bikeway will be reinstated at peak times if Adelaide City councillor Anne Moran has her way.

Two traffic lanes have been reduced to one in each direction to allow for kerbside bike lanes. They are separated from traffic by wide concrete blocks and planter beds that motorists will be able to park between.

Cr Moran said the blocks and planter beds should be removed to create peak hour clearway lanes for cars, where parking would be allowed the rest of the day.

The kerbside bike lane would remain separated from cars at all times by a thin concrete strip.

"It gives the cyclists a dedicated bike lane and preserves

**WHAT WOULD YOU DO TO END THE WAR BETWEEN CARS AND BIKES?**

Share your ideas with us. Go to [facebook.com/theadvertiser](https://www.facebook.com/theadvertiser)

the project is causing major delays, while traders have objected to a loss of parking spaces because of the concrete blocks. Bike SA chief executive Christian Haag said Cr Moran's idea "feasibly could function" but would mean scrapping the new trees and landscaping that were an important part of the project. Mr Haag said traffic light



## Sea search for swimm

POLICE will resume an underwater search for a man who went missing while swimming at Encounter Bay yesterday. The man was spotted at The Bluff just before 3. He was reportedly being pulled by waves against rocks

SATURDAY M

# Total focus on smart solutions



# Final Conclusions

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- Investing in cycling is very cost effective
  - Blindingly obvious
- We know what to do
  - Make ‘potential’ people on bikes *feel* safe
- Opportunity for a *Cycling City*
  - Plans and *Major Cycleways*
- Barriers
  - Money, leadership, political will and guts