Valuing the benefits of cycling

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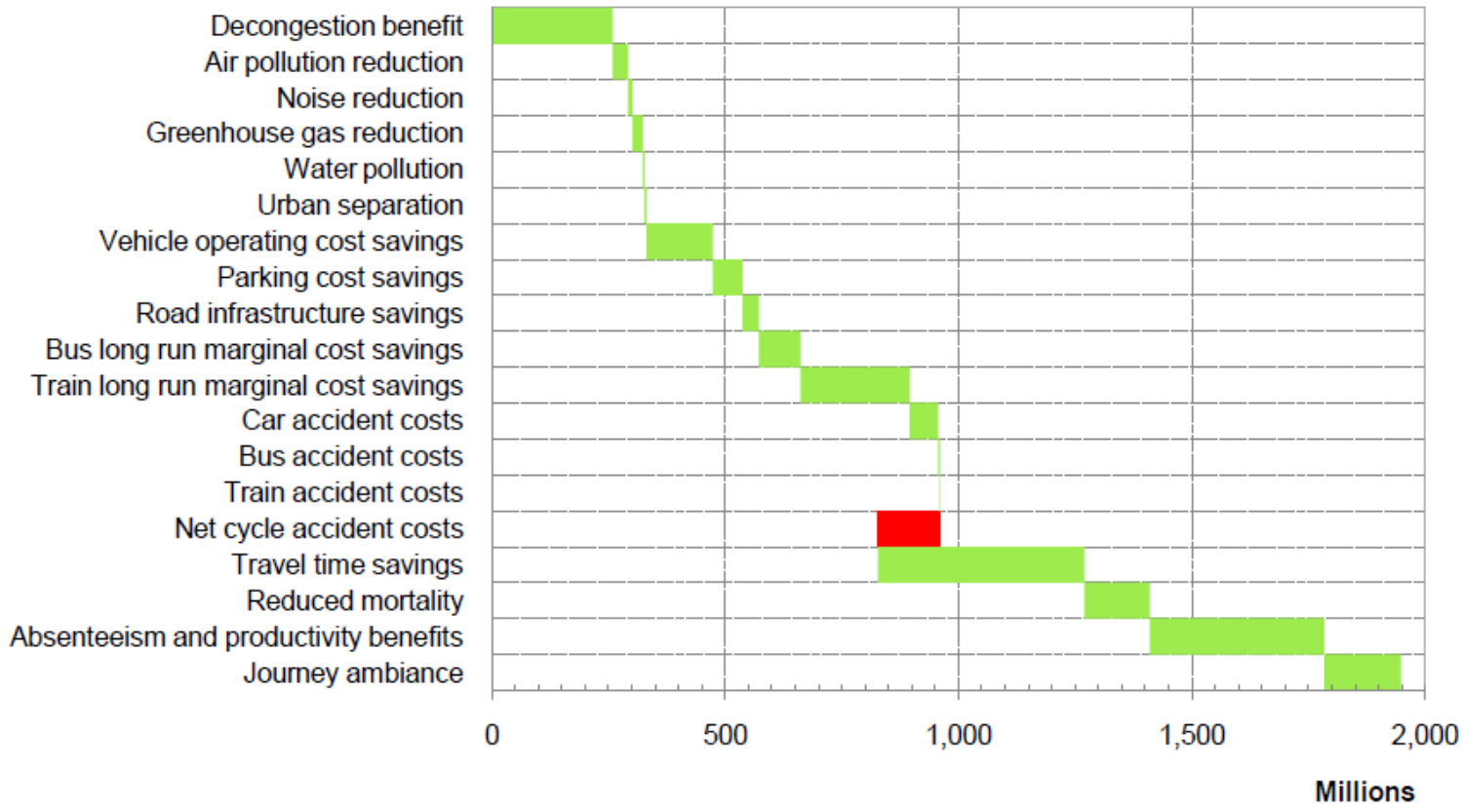
AECOM 2010 Inner Sydney plan

(66% increase from ~1% to ~ 1.66%)

Figure 7.6: Breakdown of Benefits Under Policy Target Scenario



QLD transport / PWC 2011

■ **Table EX.1: Benefits summary**

Benefit	Value (2010$/km)	Sensitivity testing	
		Lower bound	Upper bound
Health			
- Walking	$1.68	$1.23	$2.50
- Cycling	$1.12	$0.82	$1.67
Decongestion	$0.207	$0.060 (off-peak)	$0.340 (peak)
Vehicle operating costs	$0.350		
Injury costs			
- Walking	-$0.24		
- Cycling	-$0.37		
Noise reduction	$0.0091	$0.0065	$0.0117
Air quality	$0.0281	$0.0275	$0.0288
Greenhouse gas emissions	$0.0221	$0.0196	$0.0248
Infrastructure (roadway) provision	$0.052		
Parking cost savings	$0.016		

Note: Negative values imply a disutility or increased costs.

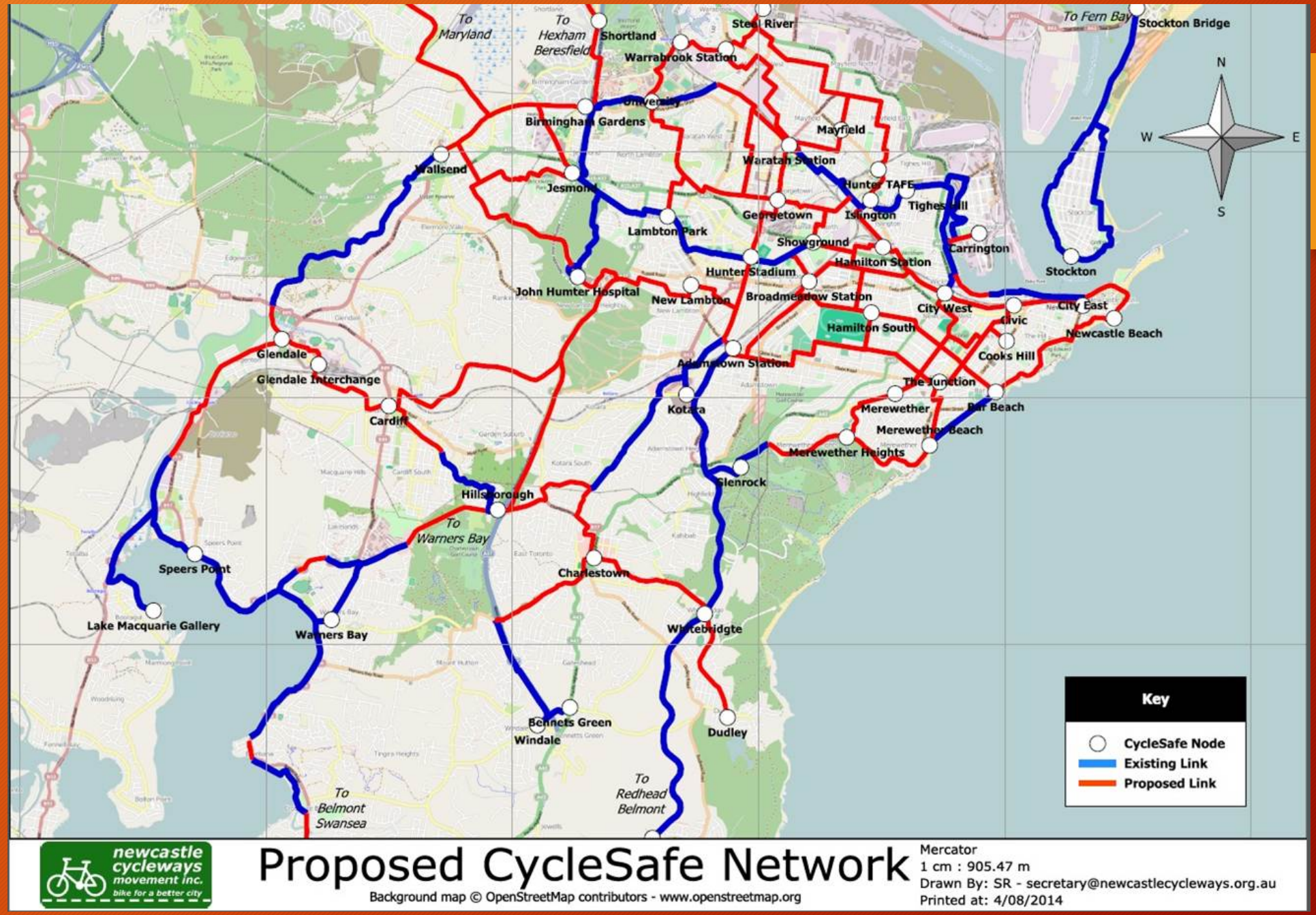
HEAT Health Economic Assessment Tool http://www.heatwalkingcycling.org/

- Data inputs:
- Single point in time, or before/after
- Distance cycled. Days per year, number of people.
- Proportion attributable to your cycleway.
- Age profile (average, younger, older) mortality risk (offers values)
- The value of a statistical life (4.2)
- Time period you wish to assess. (10 years)
- Discount rate (5%)

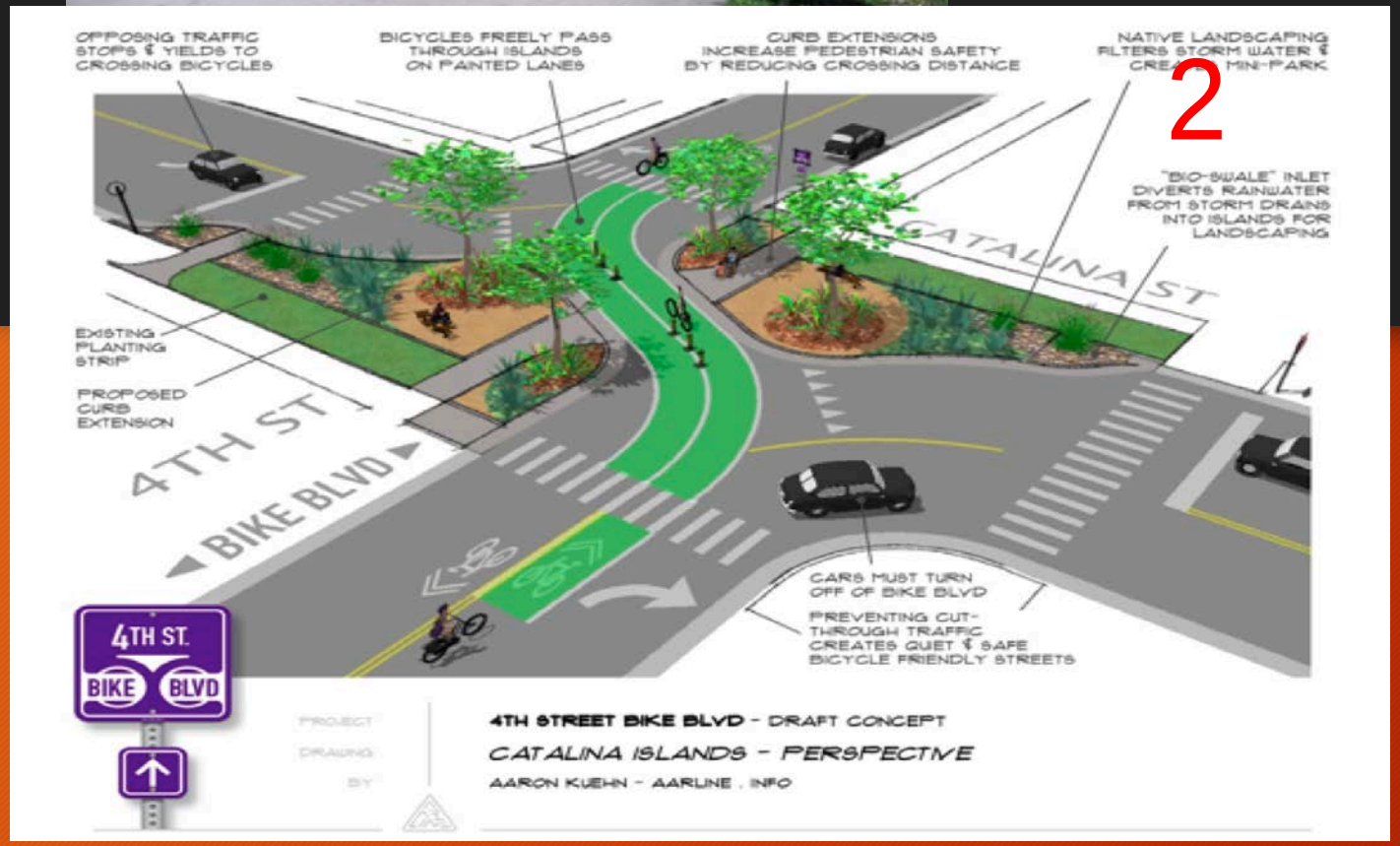
Values the benefits for adults aged 20 to 64.

CSN Cycle Safe Network

- Connects destinations at a constant level of safety
- Links everywhere to everywhere
- Safe enough for a primary school child to use unaccompanied
- Designed as one large transport infrastructure project

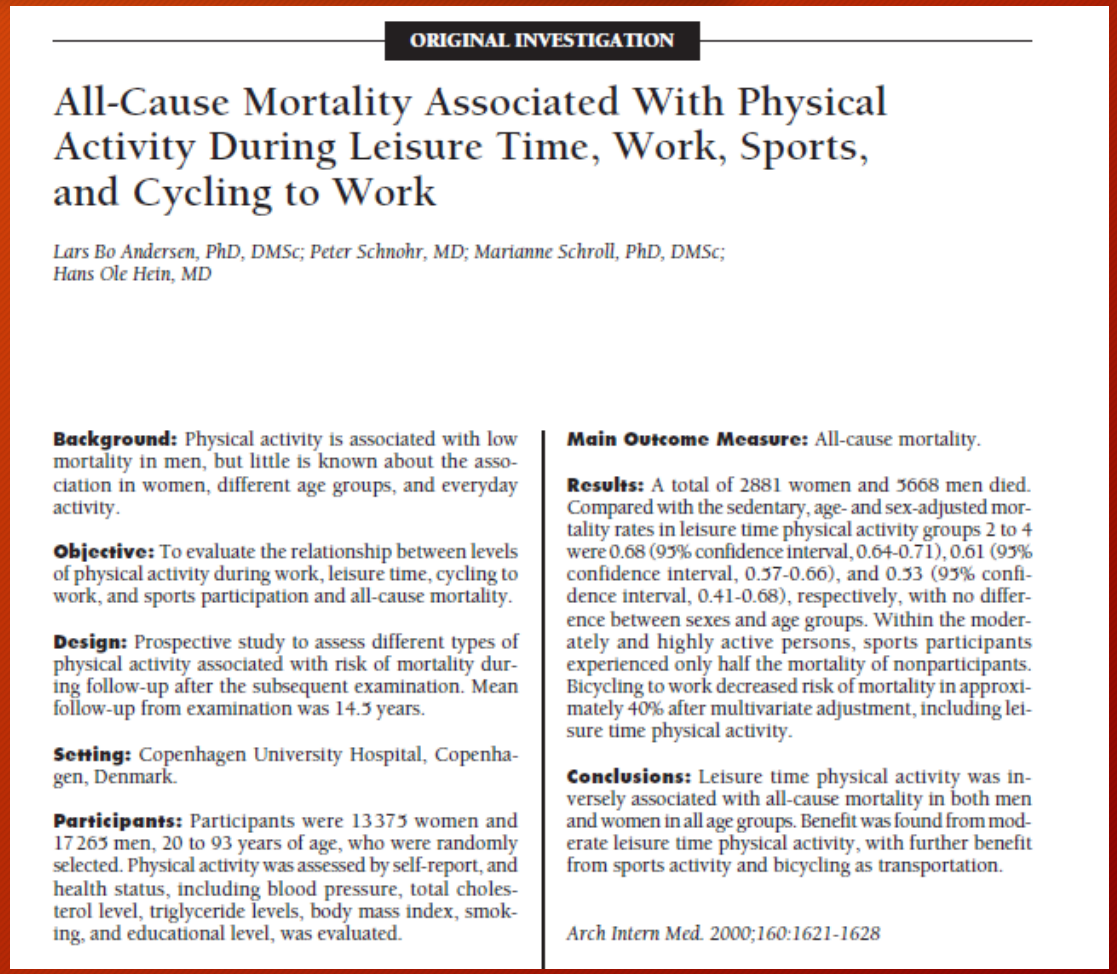

To Maryland
To Hexham Beresfield
Shortland
Steel River
To Fern Bay
Stockton Bridge
Warrabrook Station
University
Birmingham Gardens
Mayfield
Waratah Station
Wallsend
Jesmond
Hunter TAFE
Tighes Hill
Georgetown
Islington
Lambton Park
Showground
Carrington
Hamilton Station
Hunter Stadium
Stockton
John Hunter Hospital
New Lambton
Broadmeadow Station
City West
City East
Civic
Hamilton South
Newcastle Beach
Glendale
Glendale Interchange
Adamstown Station
Cooks Hill
The Junction
Cardiff
Kotara
Merewether
Bar Beach
Merewether Beach
Merewether Heights
Glenrock
Hillsborough
To Warners Bay
Speers Point
Charlestown
Lake Macquarie Gallery
Warners Bay
Whitebridgte
Bennets Green
Windale
Dudley
To Belmont Swansea
To Redhead Belmont
N
W
E
S
Key
CycleSafe Node
Existing Link
Proposed Link
newcastle cycleways movement inc.
bike for a better city
Proposed CycleSafe Network
Background map © OpenStreetMap contributors - www.openstreetmap.org
Mercator
1 cm : 905.47 m
Drawn By: SR - secretary@newcastlecycleways.org.au
Printed at: 4/08/2014

CSN treatments



Does commuter cycling really have the health benefit used in HEAT ?

- A big cohort followed for 14.5 years
- Cycling to work gave a 28% reduction in mortality
- Unchanged by adjustment for age, sex, educational level, lipids, smoking, BMI, blood pressure and leisure time physical activity!



ORIGINAL INVESTIGATION

All-Cause Mortality Associated With Physical Activity During Leisure Time, Work, Sports, and Cycling to Work

Lars Bo Andersen, PhD, DMSc; Peter Schnohr, MD; Marianne Schroll, PhD, DMSc; Hans Ole Hein, MD

Background: Physical activity is associated with low mortality in men, but little is known about the association in women, different age groups, and everyday activity.

Objective: To evaluate the relationship between levels of physical activity during work, leisure time, cycling to work, and sports participation and all-cause mortality.

Design: Prospective study to assess different types of physical activity associated with risk of mortality during follow-up after the subsequent examination. Mean follow-up from examination was 14.5 years.

Setting: Copenhagen University Hospital, Copenhagen, Denmark.

Participants: Participants were 13 375 women and 17 265 men, 20 to 93 years of age, who were randomly selected. Physical activity was assessed by self-report, and health status, including blood pressure, total cholesterol level, triglyceride levels, body mass index, smoking, and educational level, was evaluated.

Main Outcome Measure: All-cause mortality.

Results: A total of 2881 women and 3668 men died. Compared with the sedentary, age- and sex-adjusted mortality rates in leisure time physical activity groups 2 to 4 were 0.68 (95% confidence interval, 0.64-0.71), 0.61 (95% confidence interval, 0.37-0.66), and 0.33 (95% confidence interval, 0.41-0.68), respectively, with no difference between sexes and age groups. Within the moderately and highly active persons, sports participants experienced only half the mortality of nonparticipants. Bicycling to work decreased risk of mortality in approximately 40% after multivariate adjustment, including leisure time physical activity.

Conclusions: Leisure time physical activity was inversely associated with all-cause mortality in both men and women in all age groups. Benefit was found from moderate leisure time physical activity, with further benefit from sports activity and bicycling as transportation.

Arch Intern Med. 2000;160:1621-1628

Confirmed: UK Biobank 2017

Huge cohort of 263 540 people in the UK followed for 5 years.
Commuting by bicycle had an adjusted 41% reduction in all cause mortality
45% reduced cancer incidence
40% reduced cancer mortality
52% reduced CVD mortality
Commute walking also showed a 36% reduced CVD mortality

OPEN ACCESS

Association between active commuting and incident cardiovascular disease, cancer, and mortality: prospective cohort study

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Additional material is published online only. To view please visit the journal online.

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ABSTRACT

OBJECTIVE
To investigate the association between active commuting and incident cardiovascular disease (CVD), cancer, and all cause mortality.

DESIGN
Prospective population based study.

SETTING
UK Biobank.

PARTICIPANTS
263 540 participants (106 674 (52%) women; mean age 52.6), recruited from 22 sites across the UK. The exposure variable was the mode of transport used (walking, cycling, mixed mode *v* non-active (car or public transport)) to commute to and from work on a typical day.

MAIN OUTCOME MEASURES
Incident (fatal and non-fatal) CVD and cancer, and deaths from CVD, cancer, or any causes.

RESULTS
2430 participants died (496 were related to CVD and 1126 to cancer) over a median of 5.0 years (interquartile range 4.3-5.5) follow-up. There were 3748 cancer and 1110 CVD events. In maximally adjusted models, commuting by cycle and by mixed mode including cycling were associated with lower risk of all cause mortality (cycling hazard ratio 0.59, 95% confidence interval 0.42 to 0.83, P=0.002; mixed mode cycling 0.76, 0.58 to 1.00, P<0.05), cancer incidence (cycling 0.55, 0.44 to 0.69, P<0.001; mixed mode cycling 0.64, 0.45 to 0.91, P=0.01), and cancer mortality (cycling 0.60, 0.40 to 0.90, P=0.01; mixed mode cycling 0.68, 0.57 to 0.81, P<0.001). Commuting by cycling and walking were associated with a lower risk of CVD incidence (cycling 0.54, 0.33 to 0.88, P=0.01; walking 0.73, 0.54 to 0.99, P=0.04) and CVD mortality (cycling 0.48, 0.25 to 0.92, P=0.03; walking 0.64, 0.45 to 0.91, P=0.01). No statistically significant associations were observed for walking commuting and all cause mortality or cancer outcomes. Mixed mode commuting including walking was not noticeably associated with any of the measured outcomes.

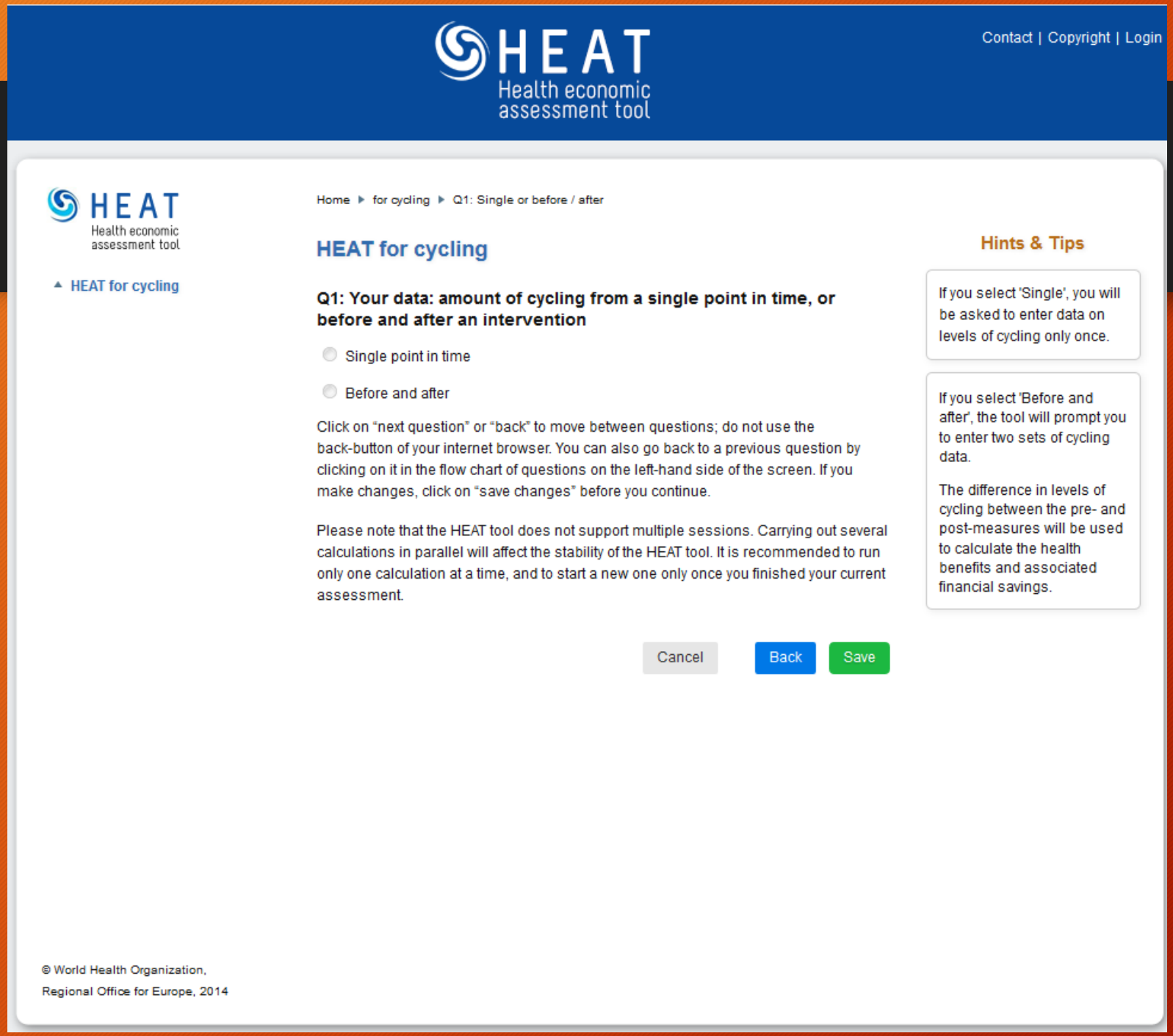
CONCLUSIONS
Cycle commuting was associated with a lower risk of CVD, cancer, and all cause mortality. Walking commuting was associated with a lower risk of CVD independent of major measured confounding factors. Initiatives to encourage and support active commuting could reduce risk of death and the burden of important chronic conditions.

Introduction
Physical activity is declining worldwide, partly owing

Statistical value of a life

- Is it a valid concept?
- Source: Dept Prime Minister and Cabinet, 2014.
- SVL = $4,200,000
- SVYL = $ 182,000

SA2 n= 13 NEWCASTLE LGA 2011	Total population	5-19 yrs	20-64 yrs	65+ yrs	Total in workforce	% trips to work by bicycle
Newcastle-Cooks Hill	10135	1066	7509	1172	6117	2.5
Merewether- the Junction SA2	13396	2271	8506	1915	7563	2.9
Hamilton-Broadmeadow SA2	11738	1790	7396	1844	5863	2.7
Wickham-Carrington	7668	960	5312	848	4182	4.5
Stockton/fern bay	6121	833	3587	1406	2465	1.2
Wallsend-Ellermore Vale	19027	3501	10905	3487	8844	-
Adamstown-Kotara	15045	2738	8593	2705	7732	1.6
Beresfield Hexam	8362	1683	4731	1383	3560	-
Lambton- New Lambton	16407	3182	9555	2586	8334	1.9
Maryland-Fletcher-Minmi	11213	2827	6715	831	5940	-
Mayfield Warrabrook	14642	2189	9243	2296	7165	1.8
Shortland-Jesmond	10083	1818	6083	1626	4127	-
Waratah- North Lambton	11859	1837	7054	2218	5603	1.7


HEAT
Health economic assessment tool
Contact | Copyright | Login
HEAT
Health economic assessment tool
HEAT for cycling
Home ▸ for cycling ▸ Q1: Single or before / after
HEAT for cycling
Q1: Your data: amount of cycling from a single point in time, or before and after an intervention
Single point in time
Before and after
Click on "next question" or "back" to move between questions; do not use the back-button of your internet browser. You can also go back to a previous question by clicking on it in the flow chart of questions on the left-hand side of the screen. If you make changes, click on "save changes" before you continue.
Please note that the HEAT tool does not support multiple sessions. Carrying out several calculations in parallel will affect the stability of the HEAT tool. It is recommended to run only one calculation at a time, and to start a new one only once you finished your current assessment.
Cancel
Back
Save
Hints & Tips
If you select 'Single', you will be asked to enter data on levels of cycling only once.
If you select 'Before and after', the tool will prompt you to enter two sets of cycling data.
The difference in levels of cycling between the pre- and post-measures will be used to calculate the health benefits and associated financial savings.
© World Health Organization,
Regional Office for Europe, 2014

Results from HEAT for first 9 CSN segments

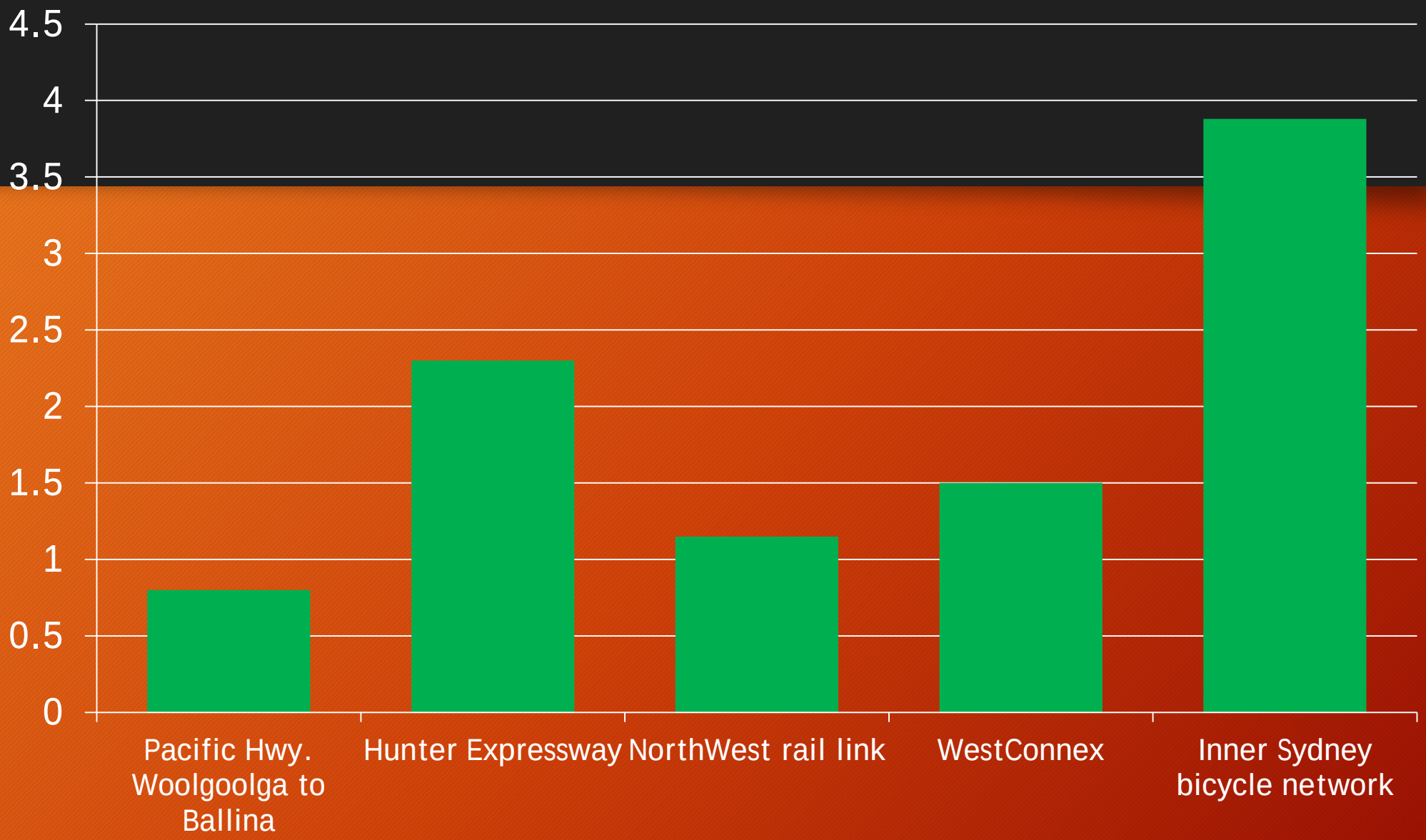
- The first 9 segments, 29.7 km, of the CSN links a population of 181,895 people, of whom 128,241 are aged 20 to 64. (ABS 2011, SA2 level) 104,433 are in the workforce.

- Assumptions: 5% mode shift to cycling, beyond current level = 5222 people
- 10 Km / day on weekdays only. Ie easy 15 minute commute. Cumulative distance of 13.58 million Km / year.
- Annual value of health gains = $19.5 million. At construction cost of $1 million/Km, the payback time is 18 months.

- 10 year benefits discounted at 5% has present value of $150.4 million
- Benefit : cost ratio = 5.06:1

- Ignoring the benefits for people not in the workforce, ie children, non employed, retired.

Benefit Cost Ratios

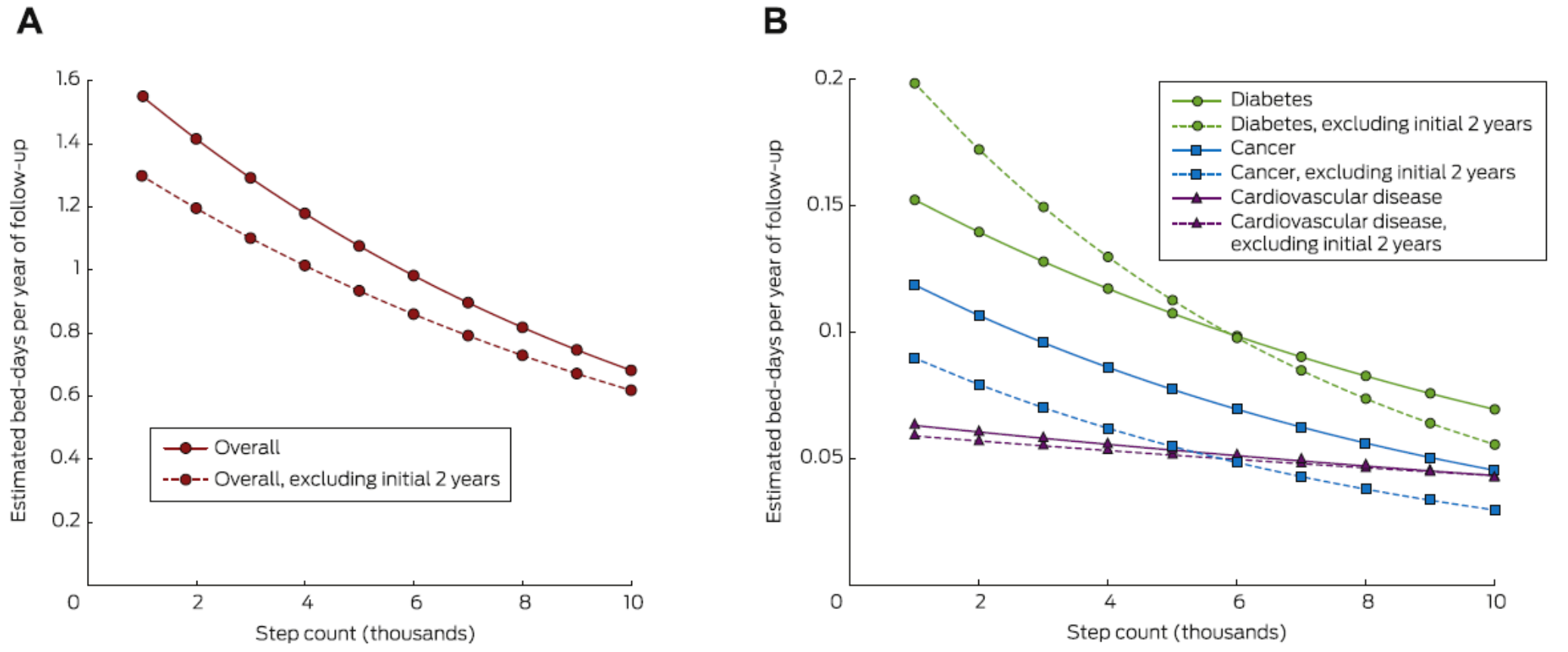


Perspective

- Does an annual health gain of $19.5 million actually put money in anyone’s bank account?

Local data: How does being active affect the need for hospital care? Ewald MJA Feb 2017

4 Estimated numbers of bed-days per year of follow-up, by step count: A. overall; B. disease-specific



Hospital costs perspective:

- 4300 steps per day reduces hospital admissions by 0.29 bed days per year in people aged over 55 , in Newcastle.
- 4300 steps is equivalent exercise to cycling 10 Km.
- If this is done every day, 3,650 Km per year reduces hospital costs by 0.29 bed days = $549 or 15.05 cents per Km.
- The 13.58 million Km from slide 13 is worth $2.1 million / year.
- Payback time of 14 years
- These are real government treasury savings in reduced health expenditure.

summary

- Cycling, particularly commuter cycling, has large health benefits which have been precisely measured in population cohort studies.
- Using conventional economic evaluation methods, building a city in which people choose to cycle has benefits greatly outweighing the cost.
- The HEAT tool makes these methods available to everyone.

- http://www.heatwalkingcycling.org/index.php

Useful resources

- http://stat.abs.gov.au/itt/r.jsp?databyregion#/
- http://www.censusdata.abs.gov.au/census_services/getproduct/census/2011/quickstat/111031229?opendocument&navpos=220

- http://www.healthstats.nsw.gov.au/Indicator/bod_projdth/bod_dth_agerate_trend
- http://chartingtransport.com/2014/01/27/census-cycling-to-work/