Life-course predictors of mortality inequalities

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Outline

1. Introduction
2. Longitudinal Census and NZCMS
3. Life-Course Hypotheses
4. Selecting Hypotheses
5. Key Observations
6. Limitations and Next Steps

Disclaimer: Access to the data used in this study was provided by Statistics New Zealand under conditions designed to give effect to the security and confidentiality provisions of the Statistics Act 1975. The results presented in this study are the work of the author, not Statistics New Zealand.

University of Auckland Human Participants Ethics Committee (UAHPEC) approval number 012400

Introduction

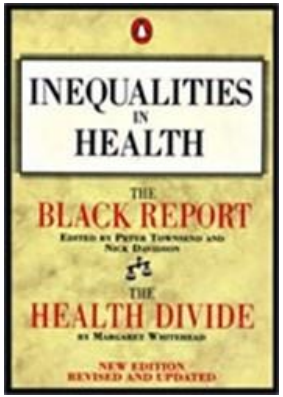
Project Context

This research is part of my PhD project, examining life-course predictors of mortality inequalities across ethnic groups in Aotearoa New Zealand.

Wish to acknowledge the support of:

- Health Research Council Grant [14/167]
- University of Auckland Doctoral Health Research Scholarship

Poverty is bad for your health.



- What measures of social and economic position are useful?
- Is it worse to be in poverty at one time of life or another?
- Does exposure to low social or economic position build up across your life?
- What about slipping into, our climbing out of, poverty?

Socioeconomic Position (SEP)

Aims

- Model life-course SEP association with mortality

- Test and compare life-course hypotheses
- Suggest which hypothesis explains the data best

Big thank you to June & Tony and Stats NZ team!

Longitudinal Census and NZCMS

The Data

Longitudinal Census and NZCMS

- The New Zealand Longitudinal Census (NZLC) deterministically and probabilistically links records for the the 1981, 1986, 1991, 1996, 2001 and 2006 New Zealand Censuses of Populations and Dwellings.
- The New Zealand Census-Mortality Study probabilistically links mortality records to census records.
- Both have linkage bias, weights have been created to help address this.

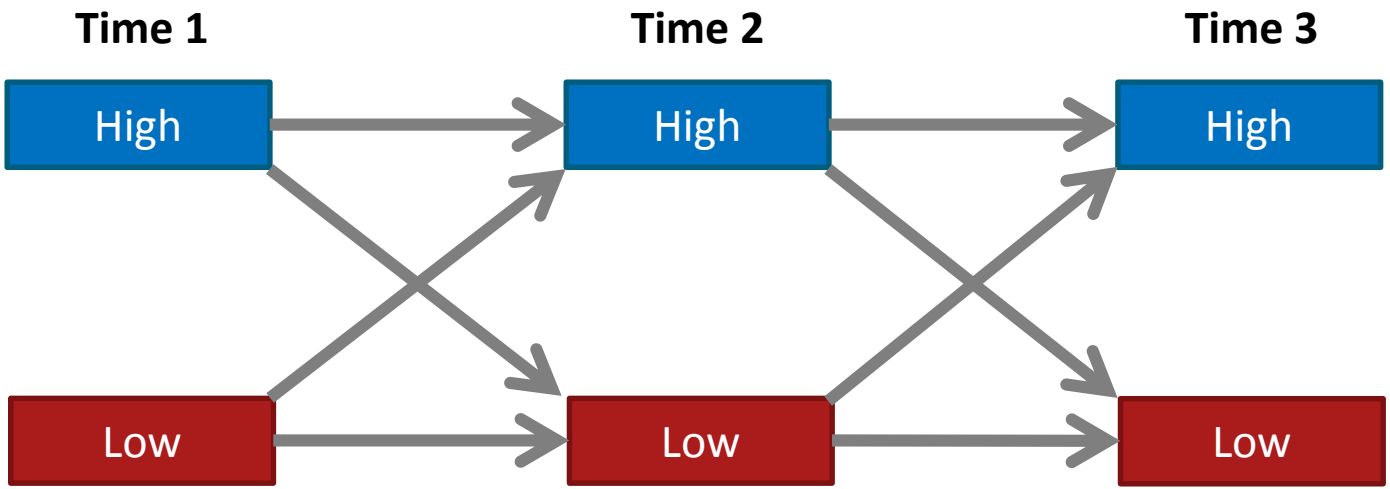
Census Linkage Summary

Cohort	Number of Censuses	1981	1986	1991	1996	2001	2006	% linked
06-01	2					2,311,000		70.3
01-96	2				2,171,000			69.5
96-91	2			2,174,000				72.0
91-86	2		2,220,000					75.9
86-81	2	2,078,000						72.1
06-01-96	3				1,592,000			54.5
01-96-91	3			1,571,000				56.2
96-91-86	3		1,603,000					59.4
91-86-81	3	1,581,000						59.4
06-01-96-91	4			1,173,000				45.4
01-96-91-86	4		1,177,000					47.5
96-91-86-81	4	1,154,000						47.5
06-01-96-91-86	5		882,000					38.6
01-96-91-86-81	5	850,000						38.3
06-01-96-91-86-81	6	647,000						31.5

Source: Statistics New Zealand

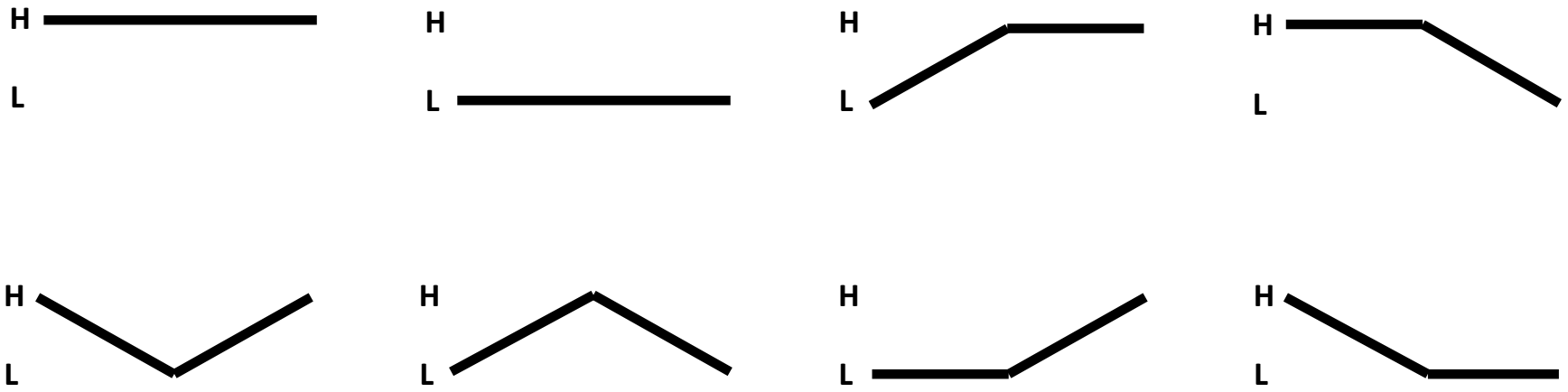
Life-Course Hypotheses

Socioeconomic Trajectories

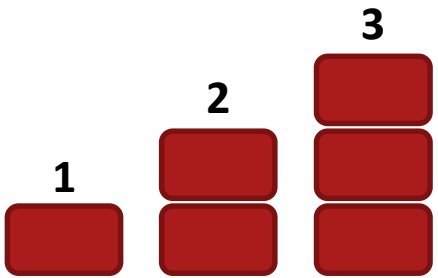
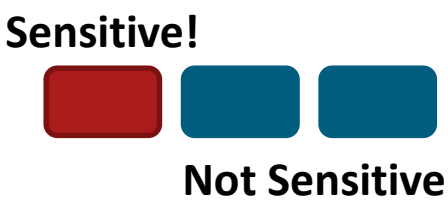
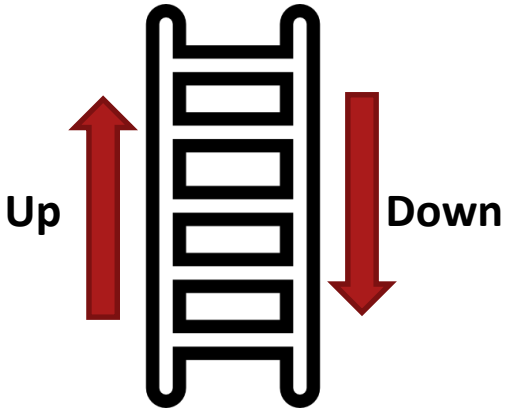


Death?

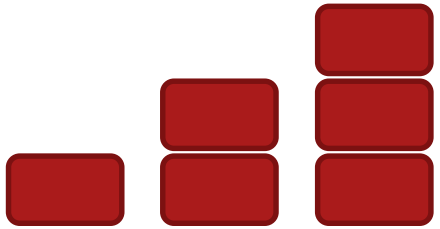
8 Possible Trajectories

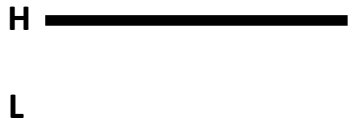
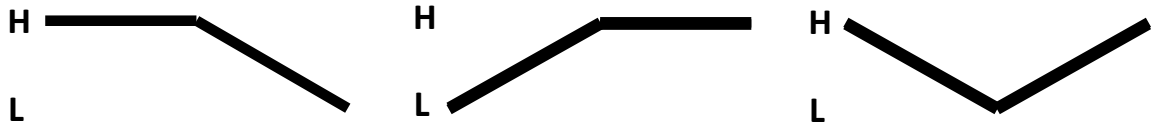
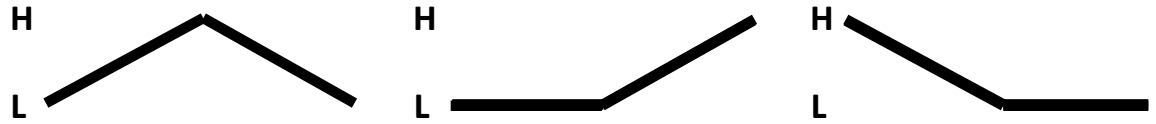


Life-Course Hypotheses

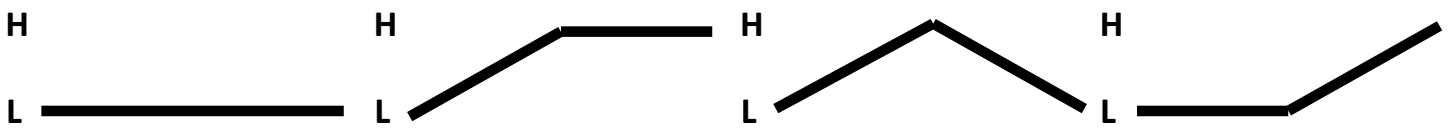
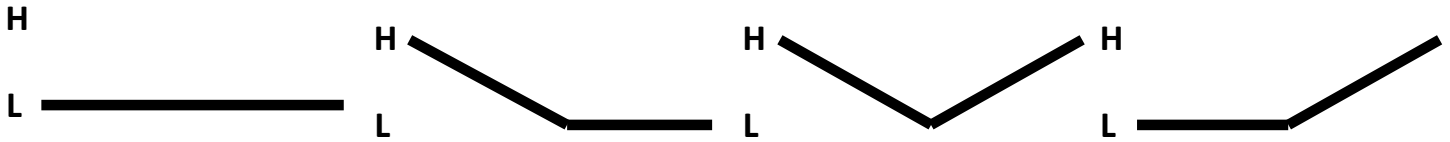
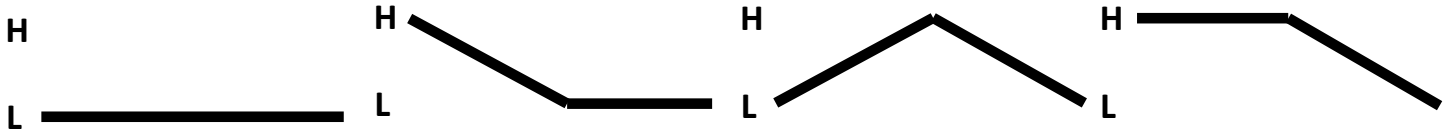
Accumulation	Sensitive Period	Social Mobility
		
Cumulative exposure to low SEP	Exposure to low SEP at specific time	Movement out of or into low SEP

Accumulation

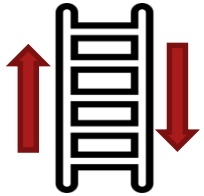


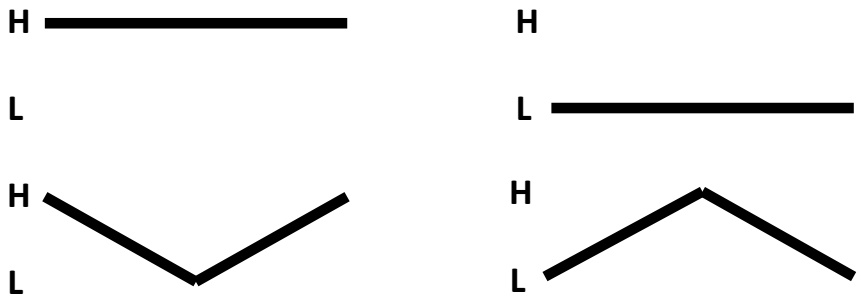
Number of census times at risk	Trajectories
0	
1	
2	
3	

Sensitive Periods

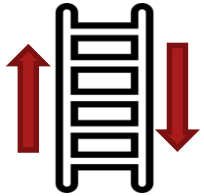
Sensitive Period	Trajectories
Time 1	
Time 2	
Time 3	

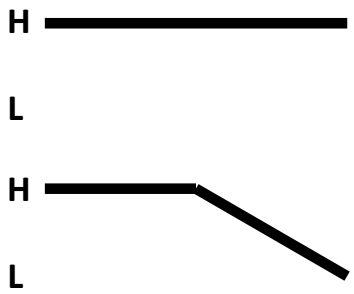
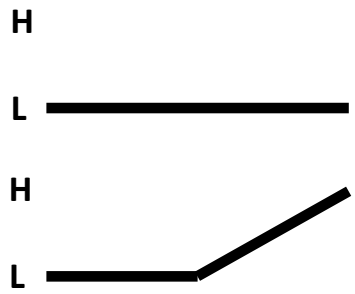
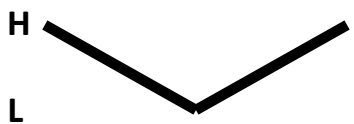
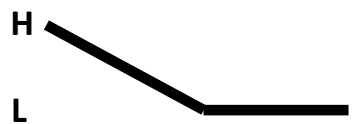
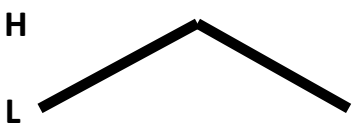
Overall Mobility (Time 1 to Time 3)



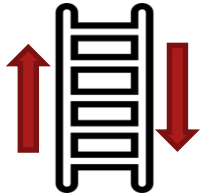
Mobility Type	Trajectories
Stable	
Down	
Up	

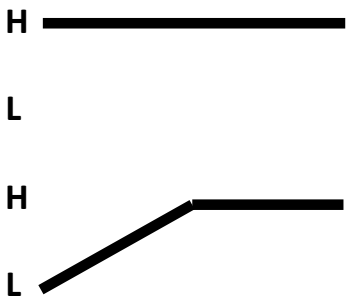
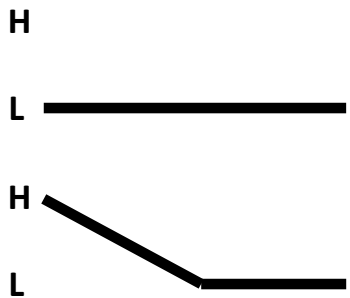
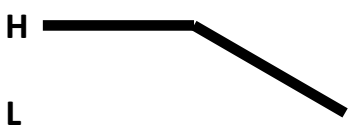
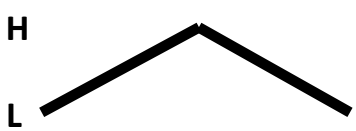
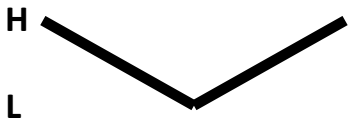
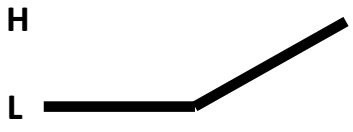
Mobility 1 (Time 1 to Time 2)



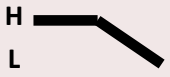
Mobility Type	Trajectories
Stable	
Stable	
Down	
Down	
Up	
Up	

Mobility 2 (Time 2 to Time 3)

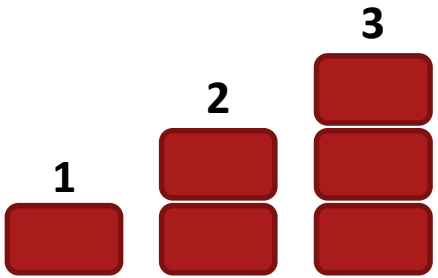
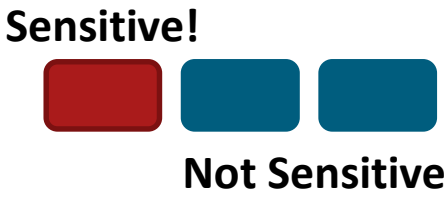
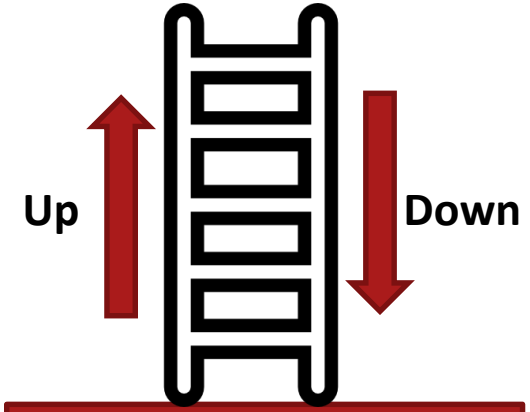


Mobility Type	Trajectories	
Stable		
Stable		
Down		
Up		

Summary of Hypotheses

	Accumulation	SEP Risk (T1)	SEP Risk (T2)	SEP Risk (T3)	Mobility Overall	Mobility 1 (T1- T2)	Mobility 2 (T2 – T3)
	0	0	0	0	Stable	Stable	Stable
	1	0	0	1	Down	Stable	Down
	1	0	1	0	Stable	Down	Up
	2	0	1	1	Down	Down	Stable
	1	1	0	0	Up	Up	Stable
	2	1	0	1	Stable	Up	Down
	2	1	1	0	Up	Stable	Up
	3	1	1	1	Stable	Stable	Stable

Implications for Intervention

Accumulation	Sensitive Period	Social Mobility
		
Intervene at any age, aim to reduce times in low SEP	Intervene before or at a specific age	Intervene to promote beneficial mobility, reduce detrimental mobility

Examples of Life-Course Results

Author	Female	Male	Outcome	SEP Indicator	Country
Murray et al., 2011	Accumulation	Childhood sensitive period	CVD	Occupational social class	UK
Mishra et al., 2009	Accumulation		BMI	Manual / non-manual	UK
Gustafsson et al., 2011	Accumulation; Adolescent sensitive period	Accumulation; Current sensitive period	Allostatic load	Occupation	Sweden
Padyab, et al., 2013	Accumulation	Accumulation	All-cause mortality	SEI, Hollingshead Index of Social Position	Sweden

Selecting Hypotheses

The Method

SEP Indicators Considered

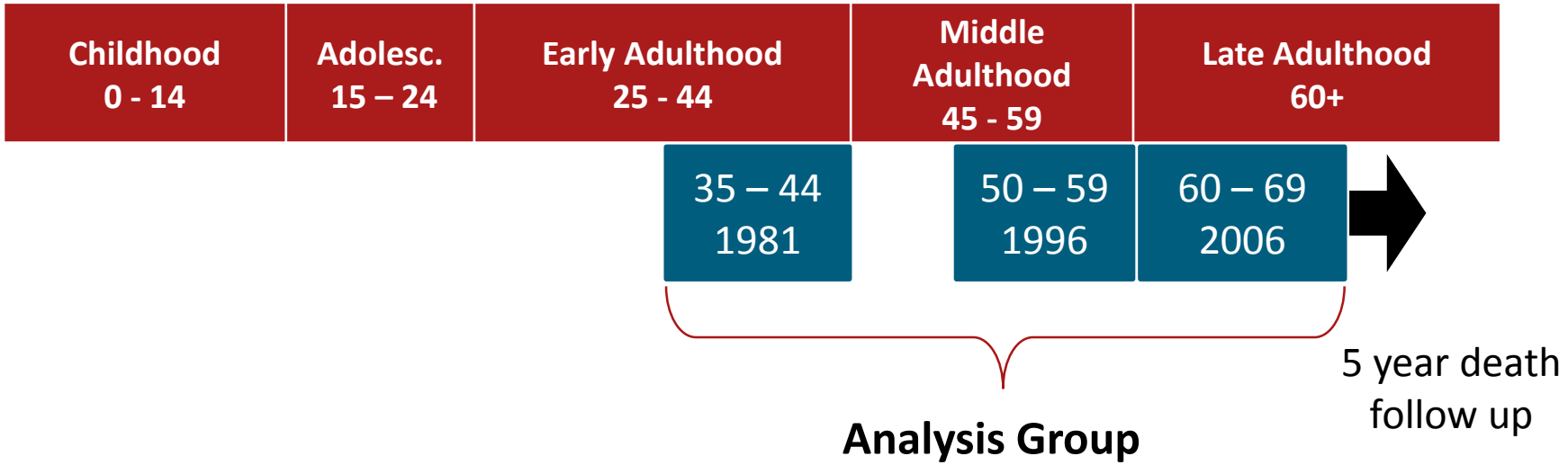
NZSEI

Household Income

Unemployment

Welfare Receipt

Life-Courses Considered



Selecting Hypotheses

1. Derive variables that respresent our hypotheses
2. Seperate males and females
3. Use likelihood ratio test to pick hypotheses

Likelihood Ratio Test

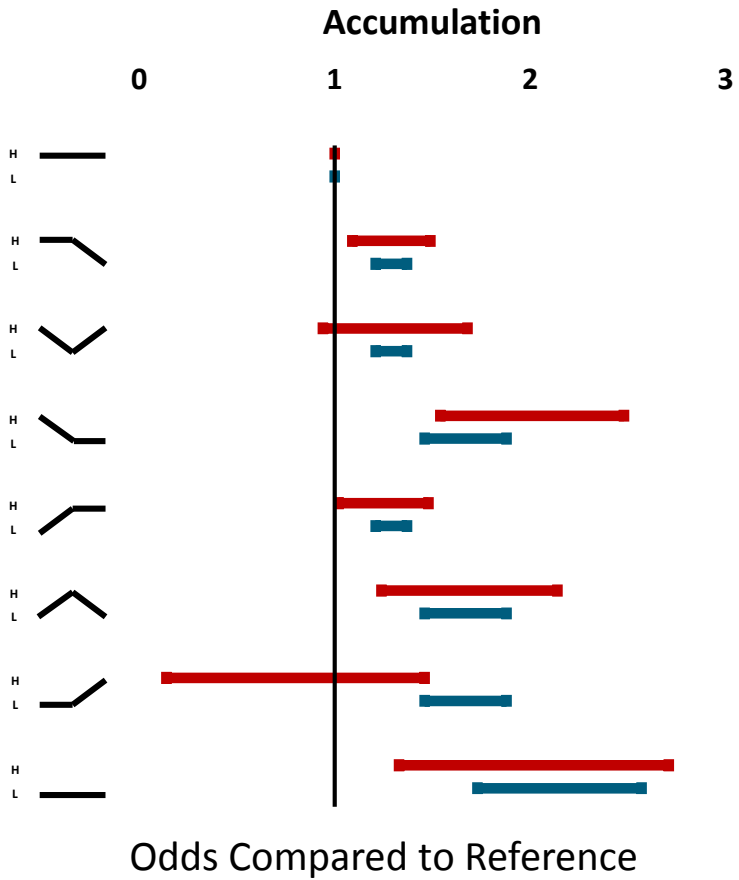
Likelihood Ratio Test Statistic / Deviance

$$D = -2(\ln(likelihood\ of\ hypothesised\ model) - \ln(likelihood\ of\ saturated\ model))$$

$$D \sim \chi^2(df\ saturated\ model - df\ hypothesised\ model)$$

Looking for non-significant results – no evidence against fit

Household Income – Female



Key Observations

The Results

Key Observations

- **Asians** and **Europeans** are consistently at **lower risk of mortality** than non-Asians and non-Europeans
- **Māori** are consistently at **higher risk of mortality**
- Pacific males are sometimes more at risk and sometimes less at risk than non-Pacific males and this variation may be due to small sample size
- **Accumulation** seems to be the best hypothesis

Limitations and Next Steps

Limitations

- Limited to 25 year period
- Census variables do not perfectly represent the variables we wish we could measure
- Premature mortality rare so models using childhood unstable

Next Steps – HRC Grant

HRC Project Aims:

1. Testing life-course hypotheses
2. Protective effects of social and cultural capital
3. Understanding ethnic disparities
4. Testing hypotheses among discordant siblings

Next Steps – My Thesis

- Instability as a life-course hypothesis
- Protective effects of social and cultural capital
- Understanding ethnic disparities
  - Life-course trajectory differences
  - Social and cultural capital differences

References

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- Smith, A., Heron, J., Mishra, G., Gilthorpe, M.S., Ben-Shlomo, Y., Tilling, K., 2015. Model Selection of the Effect of Binary Exposures over the Life Course. Epidemiology 26, 719–26. doi:10.1097/EDE.0000000000000348

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- NZCMS

Questions and Comments?