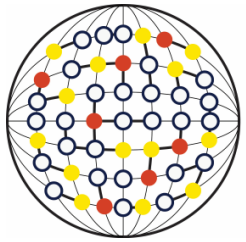
Inequality in Healthy Ageing: How Changes in Lifespan, Health-span, and Work-span Differ by Area Socioeconomic Status in Australia

Rafal Chomik



UNSW
International Centre for
Future Health Systems

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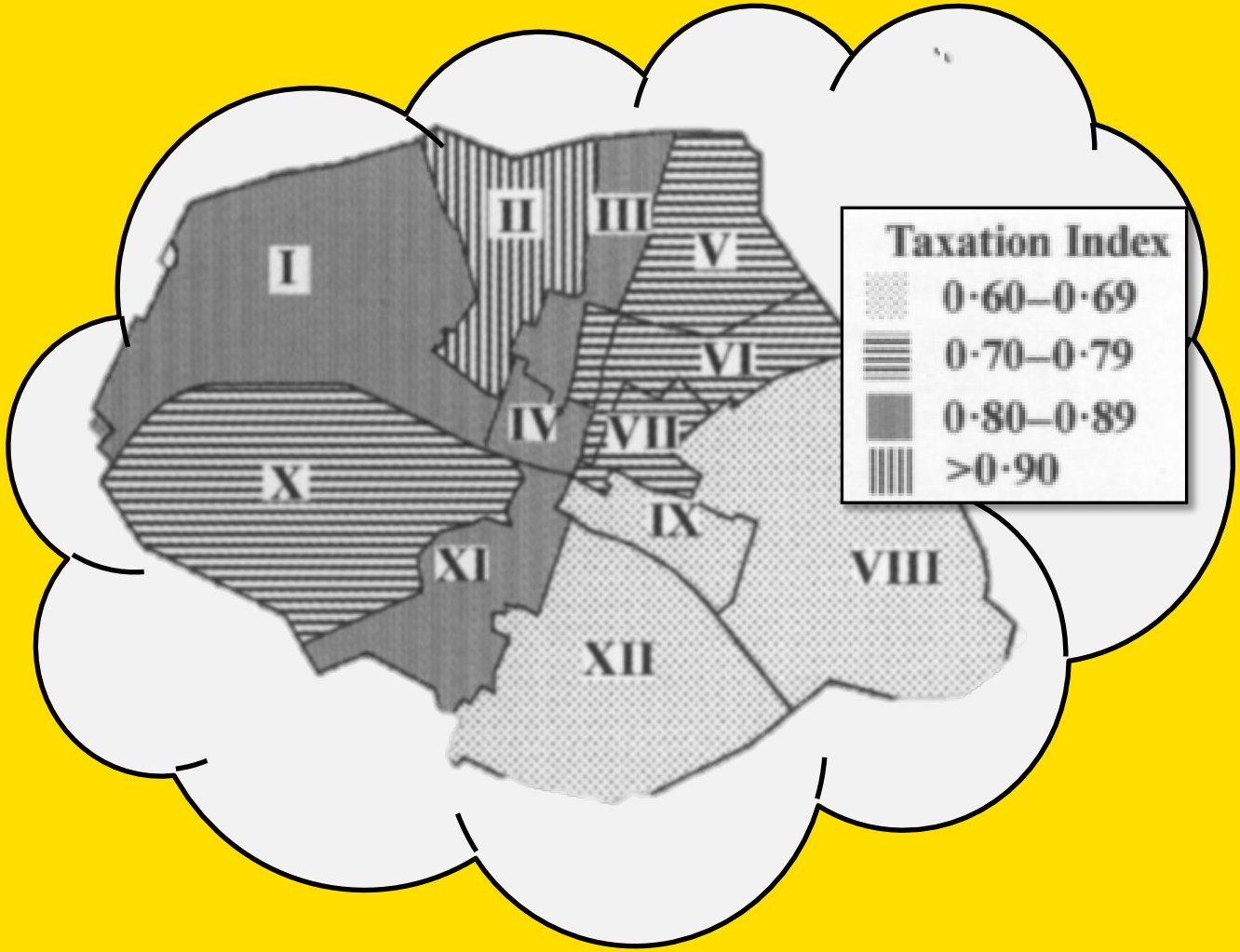
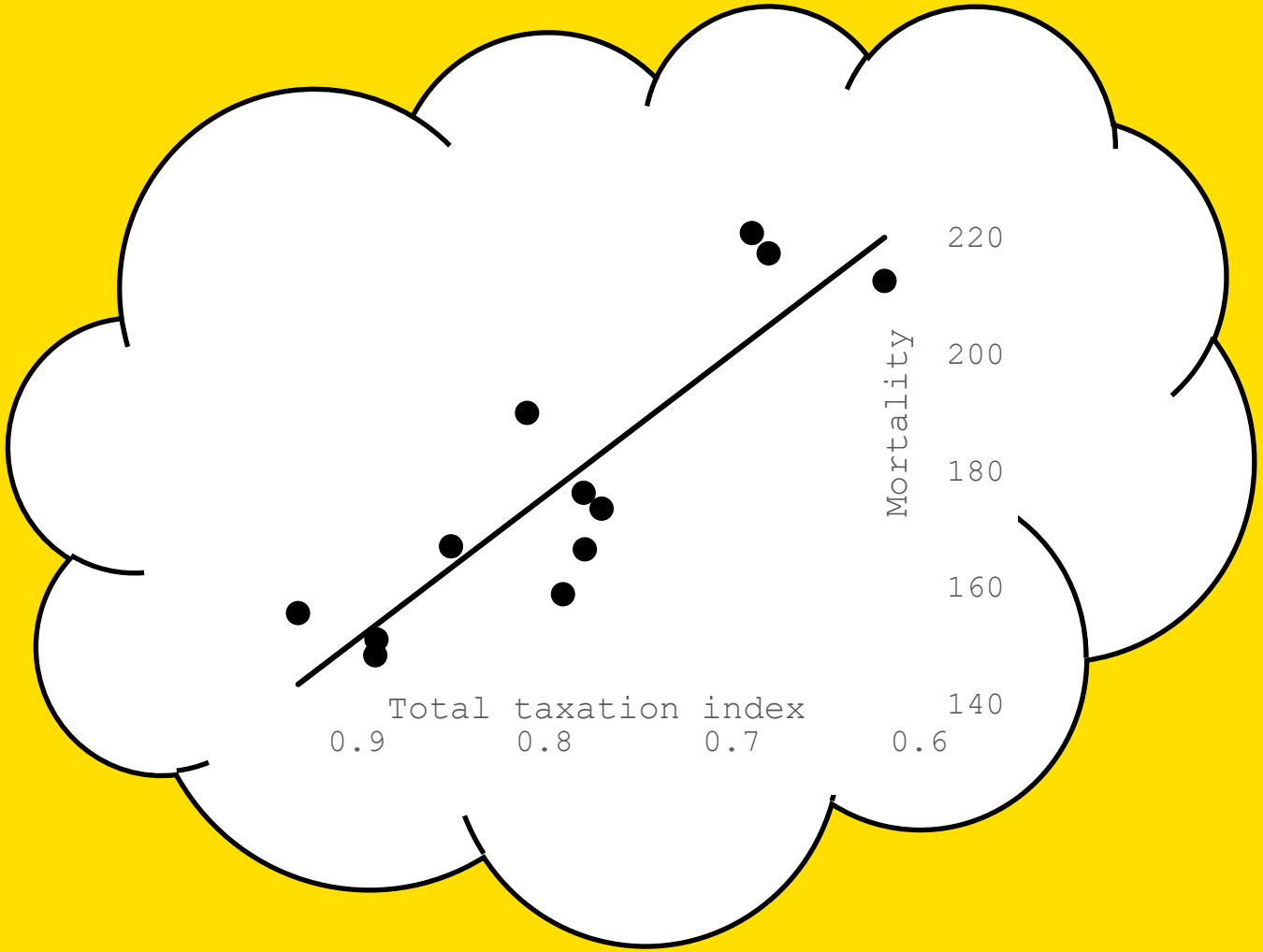
SYDNEY

Part 1

Louis René Villermé



Louis René Villermé



Literature context

Social gradient of health is well established. Explanations include:

- Cultural/behavioural
- Psycho-social
- Selection
- Material

LE by SES is well documented, via different approaches:

- Death certs with social class (e.g. ed, occ)
- Linked admin databases (e.g., tax)
- Surveys
- Ecological, area based

Less on LE trend by SES, less still in Australia:

- *Banham et al. 2011*; 2001-2008 administrative data. Only SA. **Middle doing worse** ← **ONLY ONE STATE AND NOW DATED**
- *Stephens et al. 2017*; 2001-2012 area based. Only NSW. **Stable inequality** ← **ONLY ONE STATE AND NOW DATED**
- *Tawiah et al. 2021, 2022*; Linked HILDA. 2001-2017; At 50, 65. Only tertiles. **Mid doing better** ← **OLDER AGES ONLY**
- *Adair & Lopez 2020* area based. 2006-2011, 2011-2016, changing areas. **Death rate widening** ← **NO LE. INCONSISTENT GEO**

Data and method

Units of analysis

- 325 SA3 in 2001 and 2020 (ASGS 2021). Typical population 30,000-130,000

Mortality data

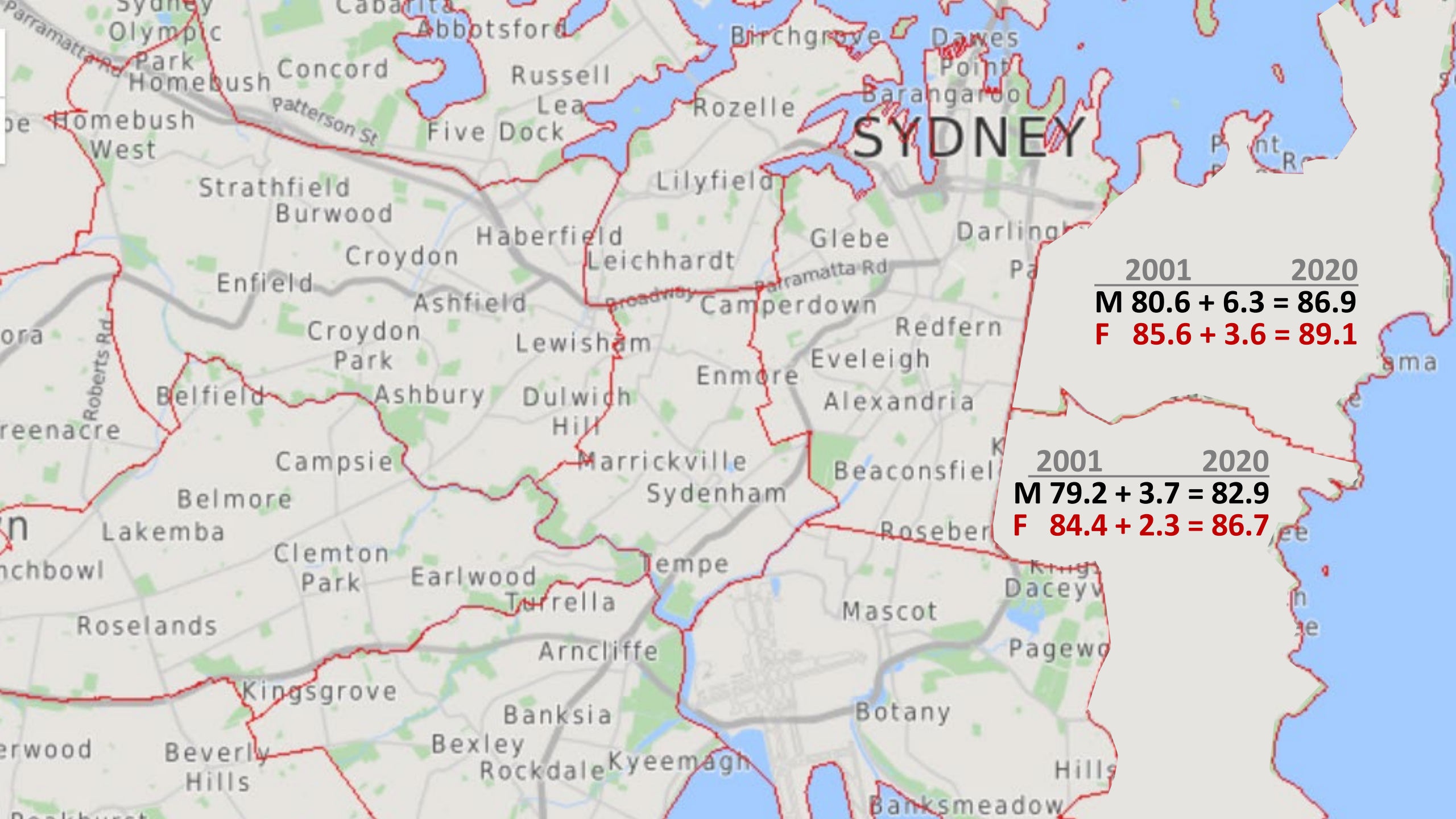
- Deaths for SA3s by 5yr-age groups (top 85+) by sex for 2001-03, 2018-2020
- Tot 135 million person-year observations and 900,000 deaths

Socioeconomic data

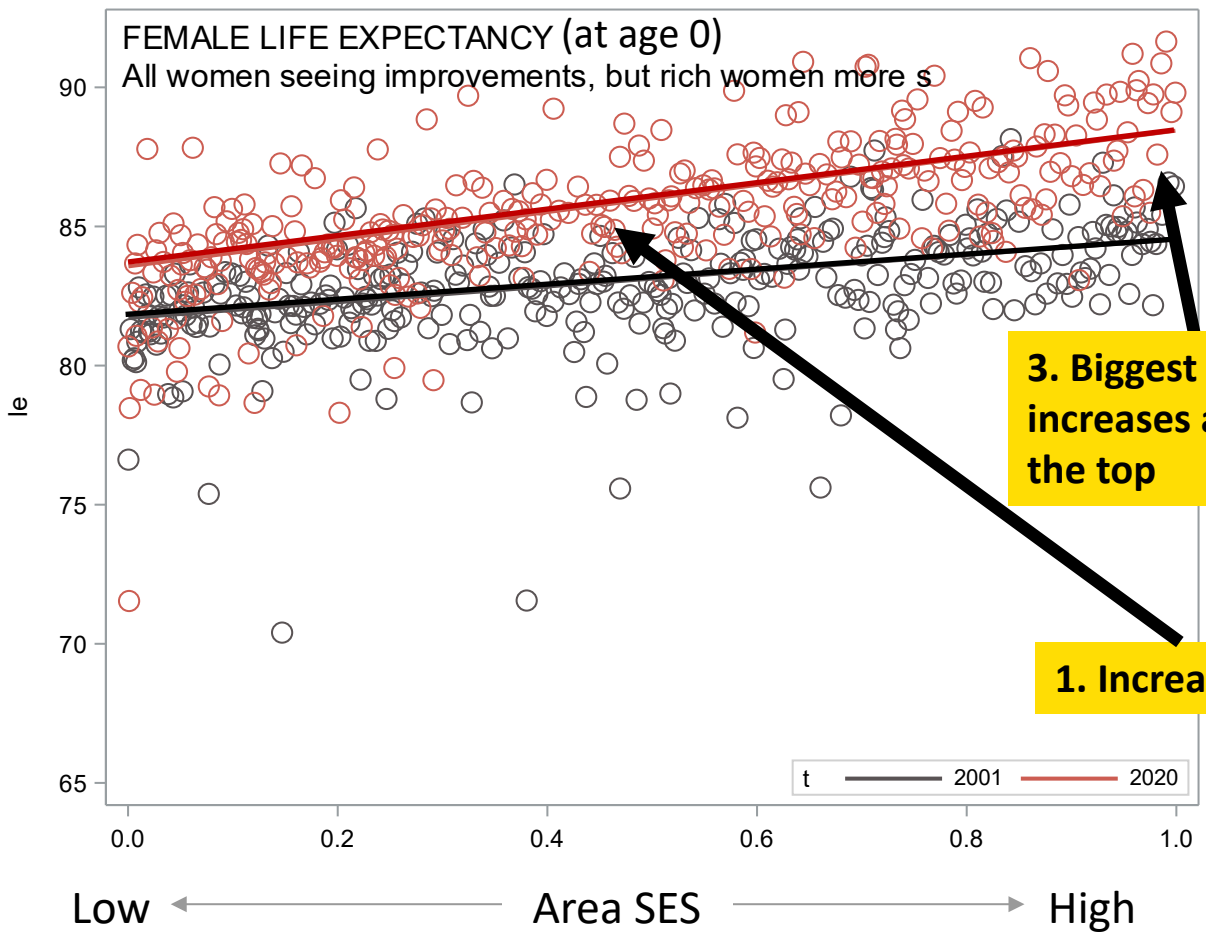
- Census SEIFA IRSAD (comparable, concorded), 2001 and 2021
- Census median equivalised gross hh income, 2001 and 2021

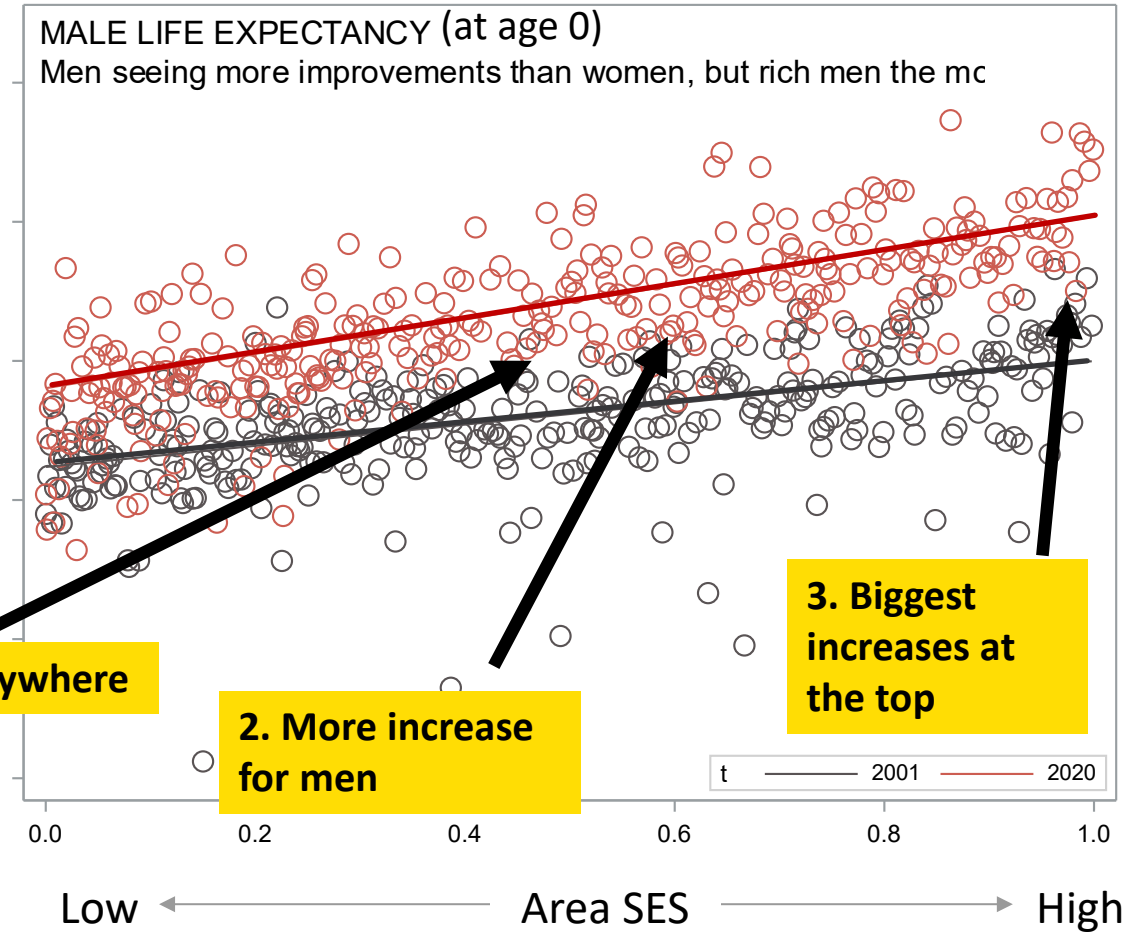
Estimation of gradient change

- Pooled, random, and fixed effects models


SYDNEY
2001 2020
M 80.6 + 6.3 = 86.9
F 85.6 + 3.6 = 89.1
2001 2020
M 79.2 + 3.7 = 82.9
F 84.4 + 2.3 = 86.7
Parramatta Rd
Patterson St
Roberts Rd
Broadway
Parramatta Rd
Sydney Olympic Park
Homebush
Homebush West
Concord
Abbotsford
Russell Lea
Five Dock
Birchgrove
Dawes Point
Barangaroo
Rozelle
Lilyfield
Strathfield
Burwood
Haberfield
Croydon
Enfield
Leichhardt
Glebe
Camperdown
Ashfield
Croydon Park
Lewisham
Redfern
Eveleigh
Enmore
Alexandria
Belfield
Ashbury
Dulwich Hill
Marrickville
Sydenham
Campsie
Belmore
Lakemba
Clemton Park
Earlwood
Tempe
Turrella
Mascot
Roselands
Arncliffe
Kingsgrove
Banksia
Botany
Bexley
Rockdale
Kyeemagh
Beverly Hills
Banksmeadow

LE gradient becoming steeper





3. Biggest increases at the top

1. Increase everywhere

2. More increase for men

3. Biggest increases at the top

Estimating the change in slope

LE in area j in period t

LE at t1 at lowest SES

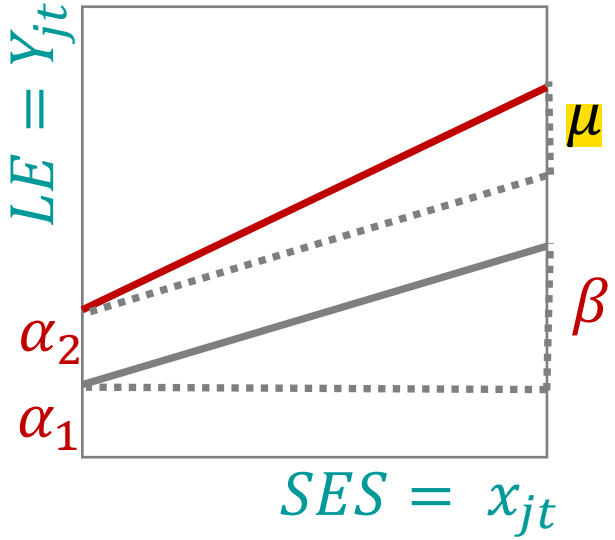
LE change at lowest SES

Slope at t1

Slope chg

Relative SES rank of area j in period t

OLS: $Y_{jt} = \alpha_1 + \beta x_{jt} + e_{jt}$



RE: $Y_{jt} = \alpha_1 + \alpha_2 D_{t=2} + \beta x_{jt} + \mu x_{jt} D_{t=2} + e_{jt} + \gamma_j$

FE: $Y_{jt_2} - Y_{jt_1} = (\alpha_2 - \alpha_1) + \beta(x_{jt=2} - x_{t=1}) + \mu x_{jt=2} + (e_{jt=2} - e_{jt=1})$

Parameter estimates

1. LE increased about 2 years at the bottom

2. Social gradient was already steep; 2-5 years; men more unequal

3. Gradient steepness increased by 1-2 years; more for men

These were the LE at bottom in 2001

Table 1 Parameter estimates

	α_1		α_2		β		μ	
Male								
IRSAD rank								
Pooled	77.2***	(0.1)	1.8***	(0.2)	4.8***	(0.2)	1.2***	(0.4)
RE	76.2***	(0.2)	2.9***	(0.1)	3.5***	(0.3)	2.0***	(0.3)
FE			2.8***	(0.2)			2.1***	(0.3)
Income rank								
Pooled	77.6***	(0.1)	1.8***	(0.3)	4.0***	(0.2)	1.0**	(0.5)
RE	76.7***	(0.2)	3.0***	(0.2)	2.6***	(0.3)	1.8***	(0.3)
FE			2.7***	(0.2)			2.2***	(0.3)
Female								
IRSAD rank								
Pooled	82.3***	(0.1)	1.2***	(0.2)	3.4***	(0.2)	1.0***	(0.3)
RE	81.6***	(0.2)	2.0***	(0.1)	2.6***	(0.3)	1.6***	(0.3)
FE			2.0***	(0.2)			1.6***	(0.3)
Income rank								
Pooled	82.6***	(0.1)	1.3***	(0.2)	2.8***	(0.2)	0.9**	(0.4)
RE	82***	(0.2)	2.0***	(0.1)	1.8***	(0.3)	1.5***	(0.3)
FE			1.9***	(0.2)			1.8***	(0.3)

LE at t1 at bottom

LE chg at bottom

Slope at t1, 2001

Slope chg, 2001-2020

Part 2

Literature on DFLE or HLE

Banham et al. 2011: SA admin data 2001-2008; HLE by area IRSD quint.

M&F HLE years: increasing overall, more for middle → ***STABLE***

M&F HLE%: stable for poor, morbidity expansion for rich → ***MORE EQUAL***

Tawiah et al. 2021*:* HILDA 2001-7 vs 2011-17, DFLE at 50 (GALI, ADL) by area IRSAD tertiles

M DFLE(GALI) years: increasing, more for rich. → ***LESS EQUAL***

F DFLE(GALI) years decrease for poor → ***LESS EQUAL***

M&F DFLE(ADL) years: increasing more for middle and rich → ***LESS EQUAL***

M DFLE(GALI)%:expansion for poor, stable for rich → ***LESS EQUAL***

F DFLE(GALI)%: expansion for poor, less expansion for rich → ***LESS EQUAL***

M DFLE(ADL)%: stable for poor, compression for rich → ***LESS EQUAL***

F DFLE(ADL)%: expansion for poor, compression for rich → ***LESS EQUAL***

- **But not for whole country**
- **Not all dwellings**
- **Not whole lifecycle**

Tawiah et al. 2022

HILDA 2001-7 vs 2011-17, DFLE at age 65 (GALI, ADL SF36, SRH, MHI) by ed, occ, tenure tertiles/halves

M&F DFLE(ADL) years: increasing, more for rich → ***LESS EQUAL***

M&F DFLE(ADL)%: Stable/compression for poor, compression for rich → ***LESS EQUAL***

Data and method

Units of analysis
- 325 SA3 (ASGS-16)

Mortality data
- Deaths, ERP by (i) SA3 (ii) 5yr-age groups (top 85+) (iii) sex (iv) 2006, 2018-20

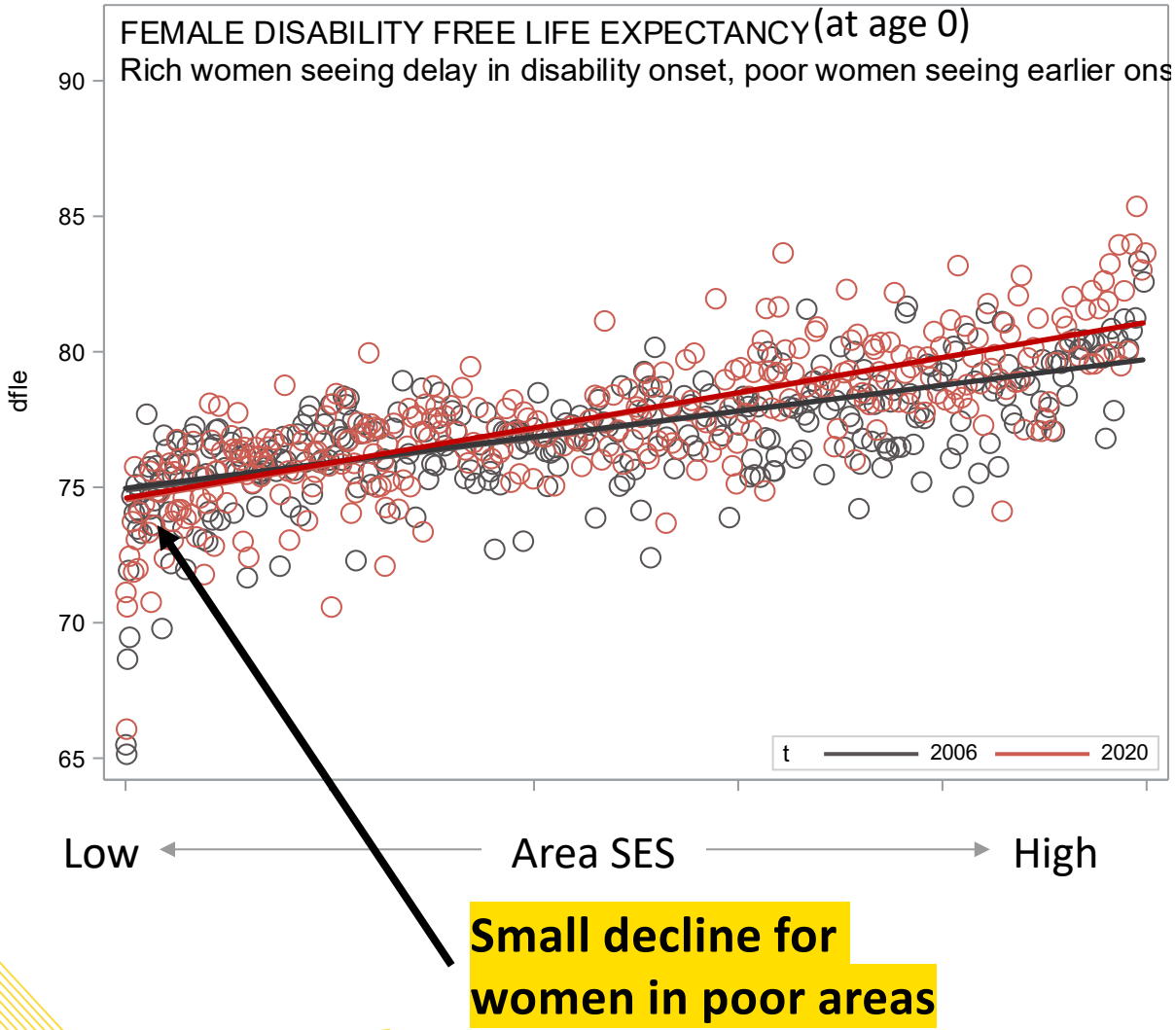
Health status data
- Census questions: need assistance with self-care, mobility, or communication… lasting for 6months+ …because of disability, long term health problem, or effects of old age

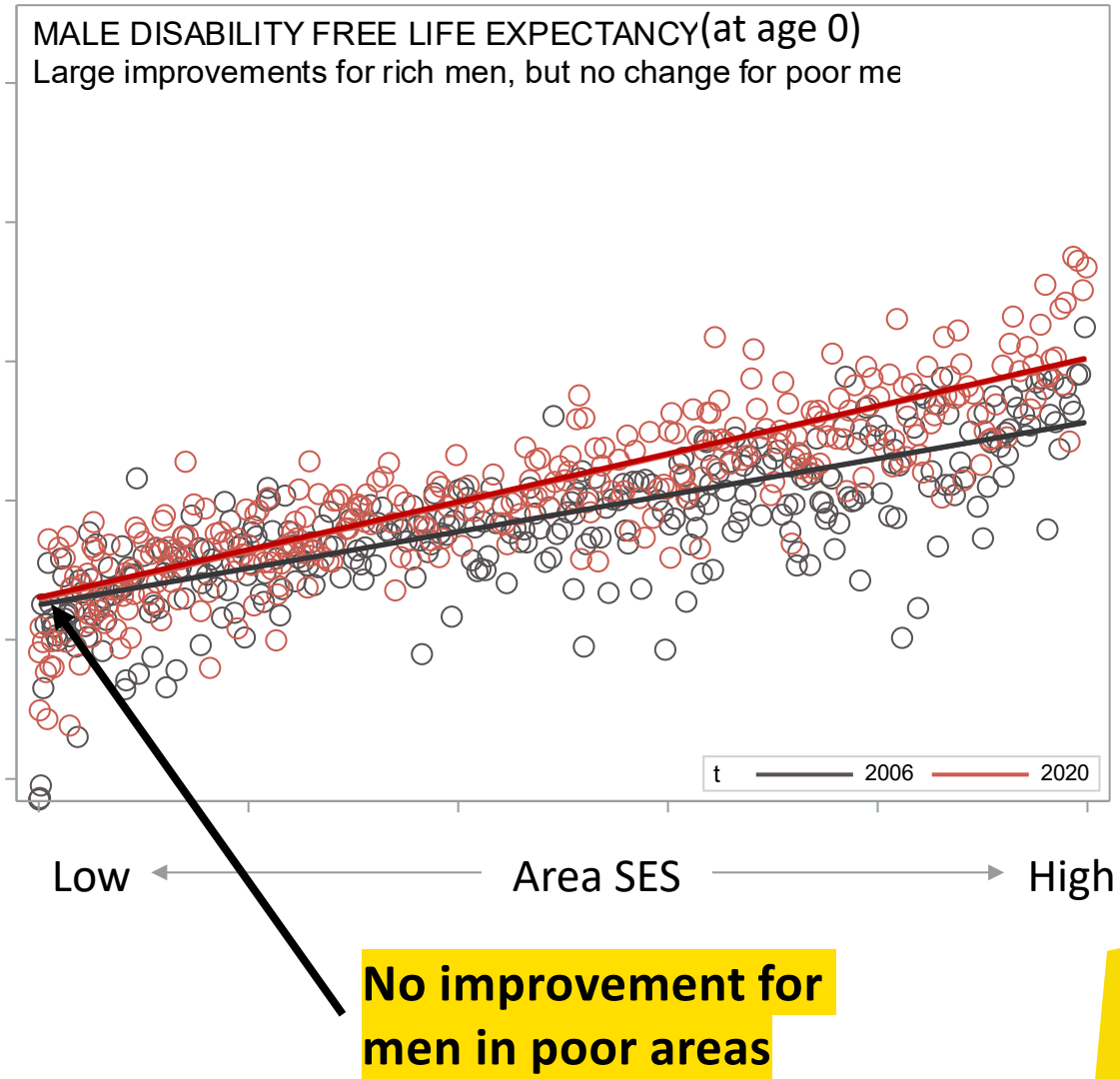
Health expectancy estimation
- Sullivan method: Based on life tables and health state prevalence by age. Based on person years a hypothetical cohort would live without profound/severe disability

Socioeconomic data
- Census-based SEIFA IRSAD (comparable, concorded), 2006 and 2021
- Median gross equivalised income, 2006 and 2021

Estimation
- Pooled, random, and fixed effects models

DFLE is only increasing for the rich





Parameter estimates

1. DFLE stalled for poor men, decreasing for poor women

2. Gradient even higher than for LE; Gradient already up to 7y; men more unequal

3. Gradient increased by about 1.5-2 years; more for men

	α_1		α_2		β		μ	
Male								
IRSAD rank								
Pooled	71.4***	(0.1)	0.0	(0.2)	7.0***	(0.2)	1.7***	(0.4)
RE	71.4***	(0.1)	0.1	(0.1)	6.2***	(0.2)	2.2***	(0.2)
FE	n/a	n/a	0.0	(0.1)	1.9***	(0.7)	2.4***	(0.2)
Income								
Pooled	71.9***	(0.1)	-0.1	(0.3)	6.1***	(0.2)	1.7***	(0.5)
RE	72.2***	(0.2)	0.1	(0.1)	4.7***	(0.3)	2.2***	(0.2)
FE	n/a	n/a	-0.1	(0.1)	1.3**	(0.6)	2.4***	(0.2)
Female								
IRSAD rank								
Pooled	74.9***	(0.1)	-0.4**	(0.2)	5.0***	(0.2)	1.6***	(0.3)
RE	75.1***	(0.1)	-0.4***	(0.1)	4.4***	(0.2)	1.8***	(0.2)
FE	n/a	n/a	-0.4***	(0.1)	1.2*	(0.7)	1.8***	(0.2)
Income								
Pooled	75.2***	(0.1)	-0.3	(0.2)	4.3***	(0.2)	1.4***	(0.4)
RE	75.6***	(0.2)	-0.4***	(0.1)	3.3***	(0.3)	1.7***	(0.2)
FE	n/a	n/a	-0.4***	(0.1)	0.8	(0.6)	1.8***	(0.2)

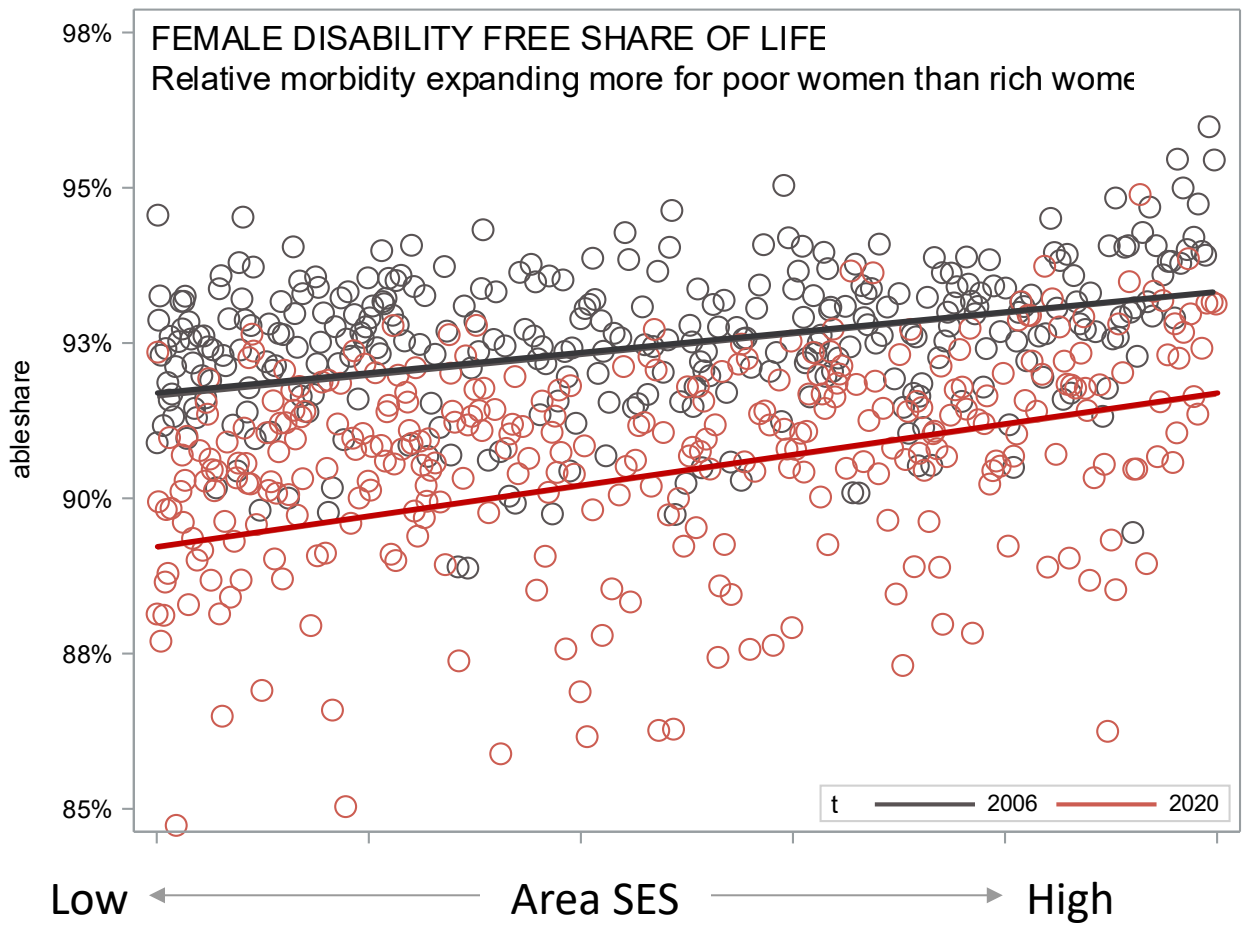
DFLE at t1 at bottom

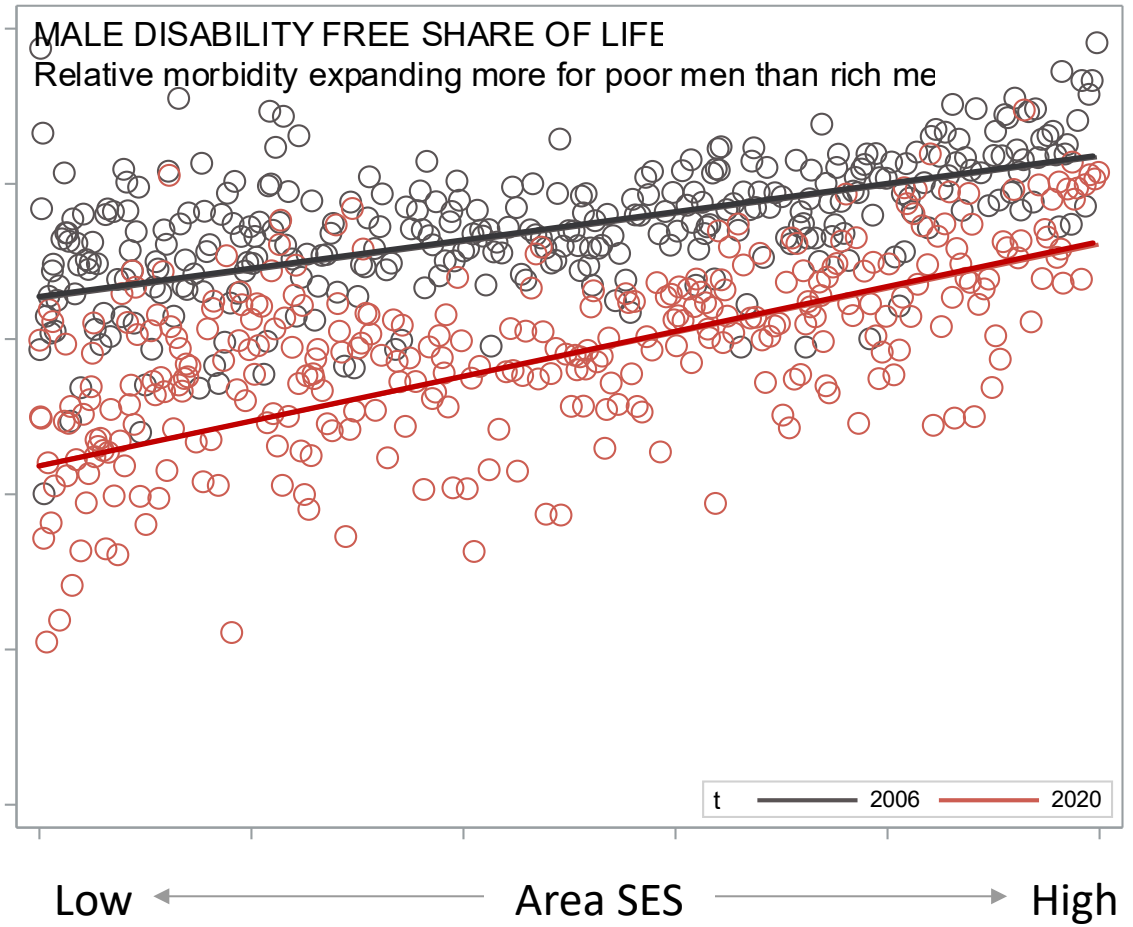
DFLE chg at bottom

Slope at t1

Slope chg

Proportion of life without disability is declining





Part 3

Literature context

van der Noordt 2019

NDL 1992 to 2016: GALI HWLE at 50 by education

Sperlich et al. 2023

Germany 2001 to 2020: SRH HWLE at 50 by education

Hambisa et al. 2023

Aust HILDA 2001-10 to 2011-20: GALI HWLE at 50 by edu *or* sex

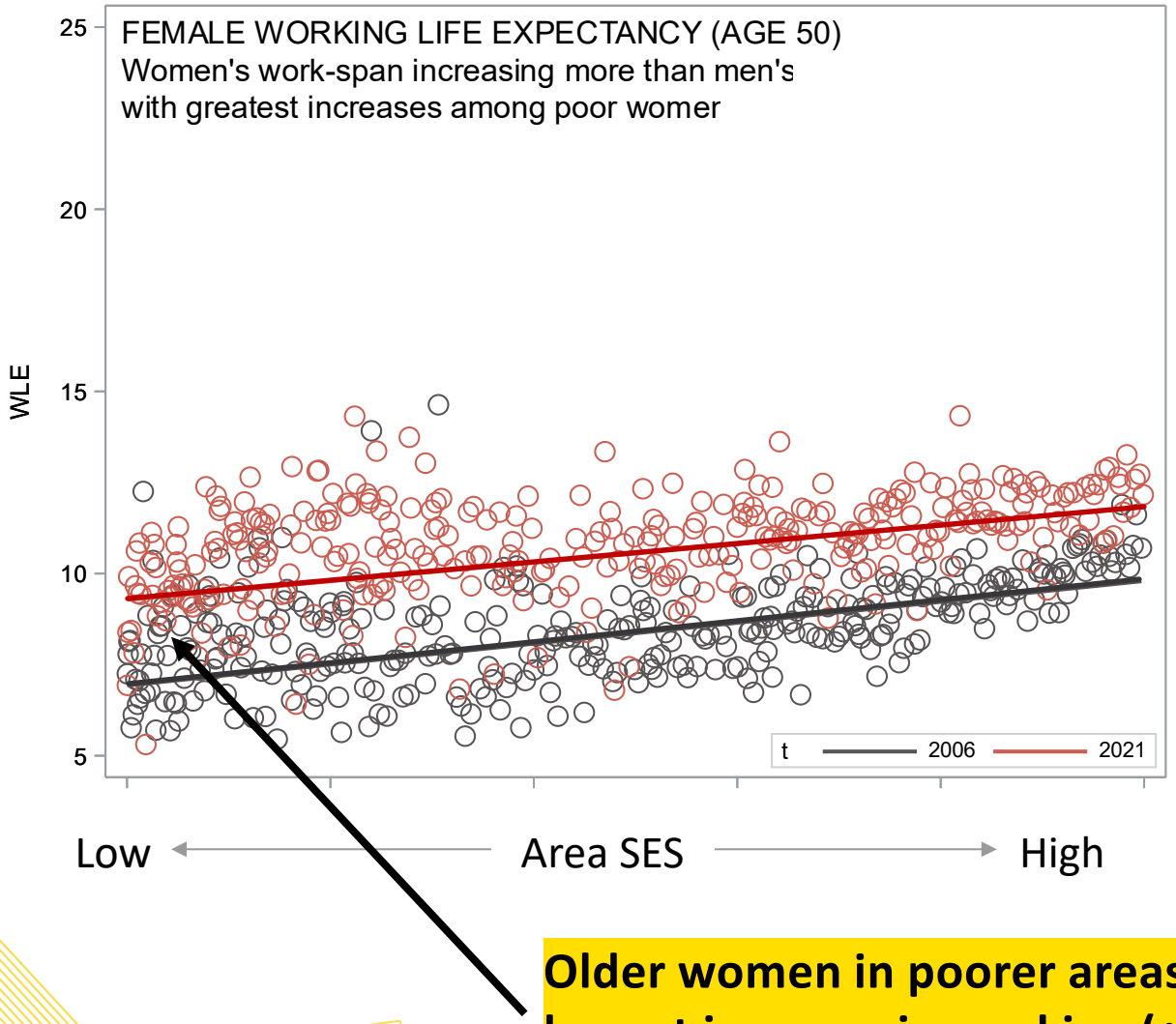
Work years increasing faster than healthy and total life expectancy, so healthy retirement declining

← But unable to stratify by both sex and SES

← No research on job security or physical intensity by area SES

…

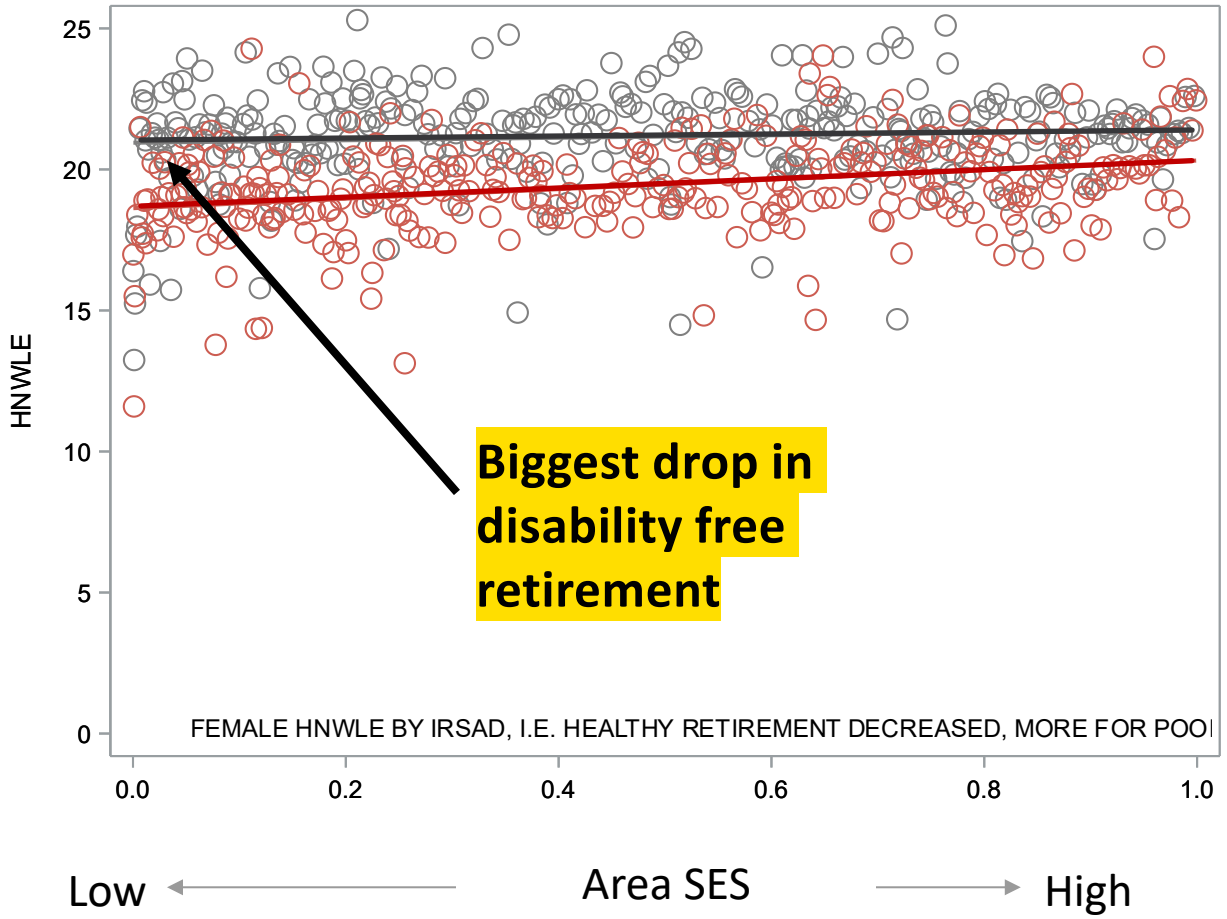
Working life expectancy is increasing

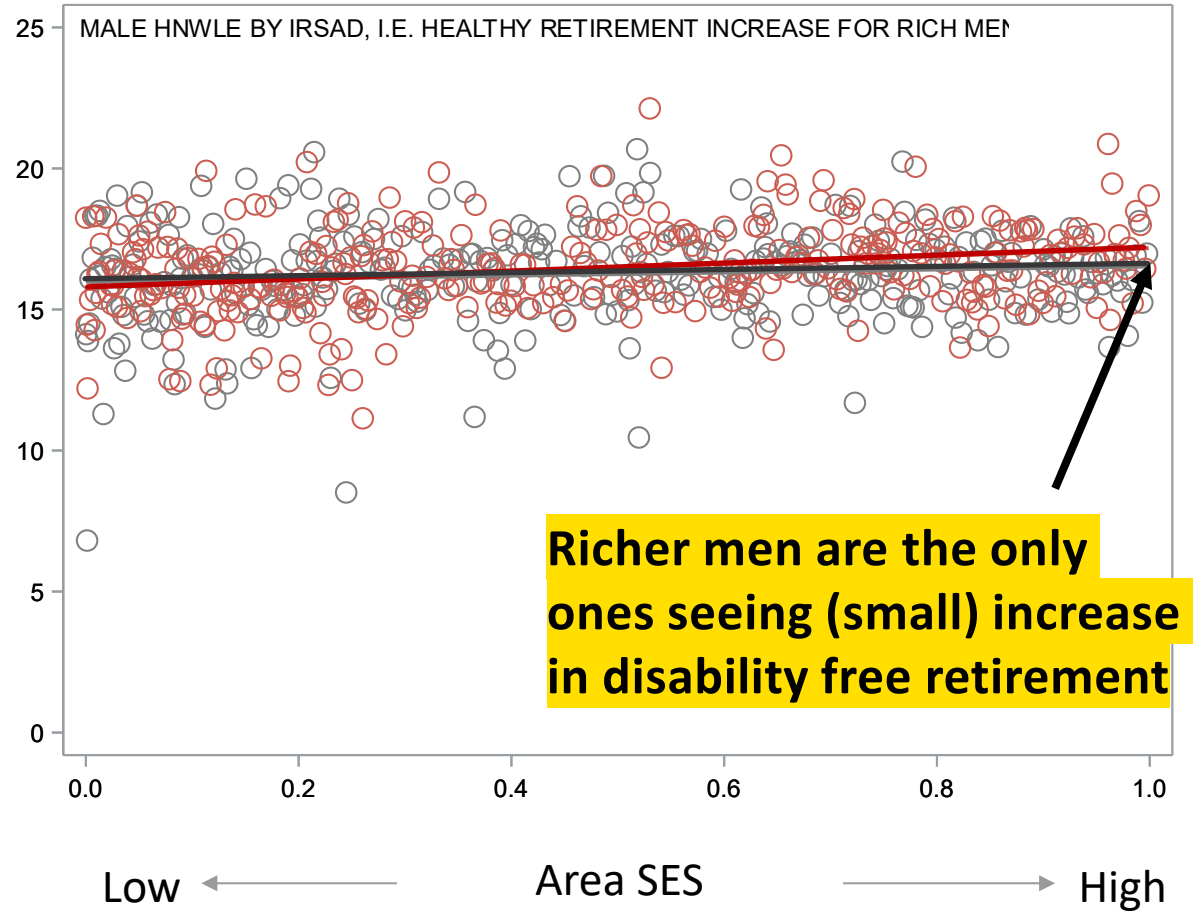


Older women in poorer areas have largest increase in working (+2.3years)

Consistent increase for men (+1 year)

Extra work years are coming from healthy years of retirement, particularly for poor women



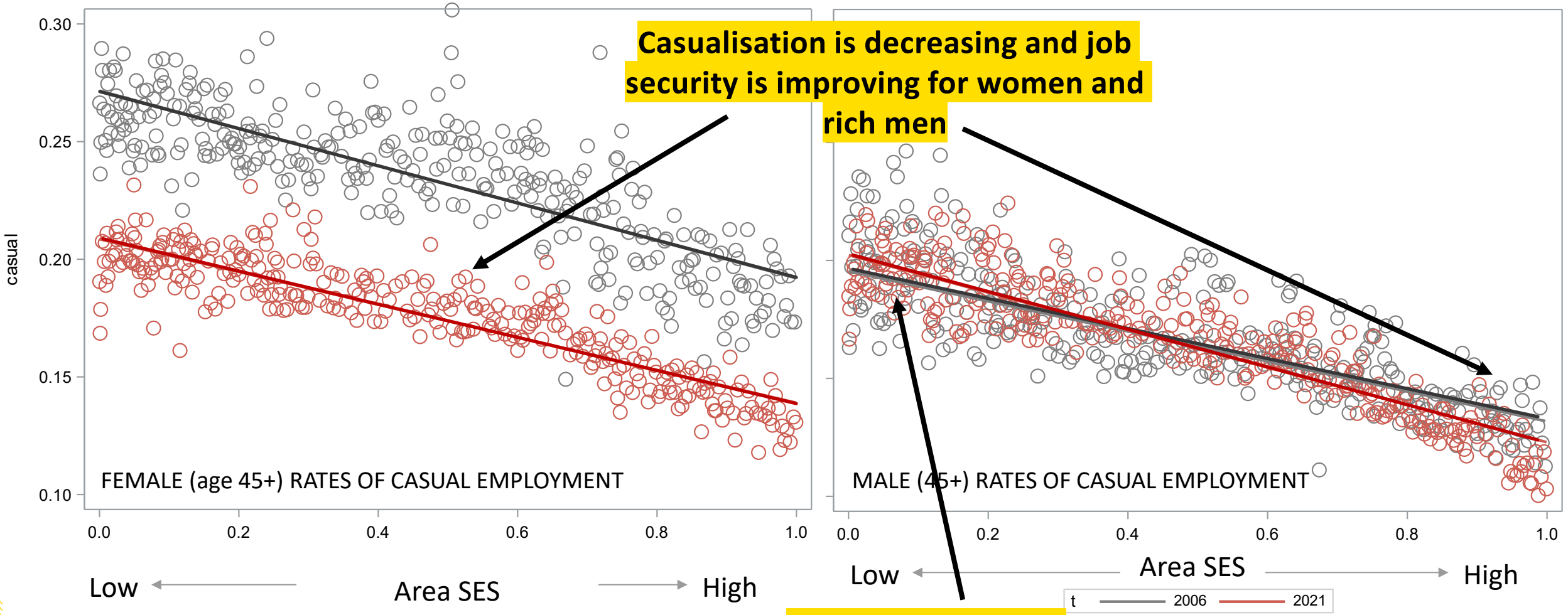


Longer working lives also depends on the work itself.

So how are jobs changing?

Other constraints to working longer: Physical intensity of jobs

Other constraints to working longer: Casualisation of jobs



1. Lifespan:

Increasing for all, but slower for poor.

2. Health-span:

Not increasing for poor men and declining for poor women

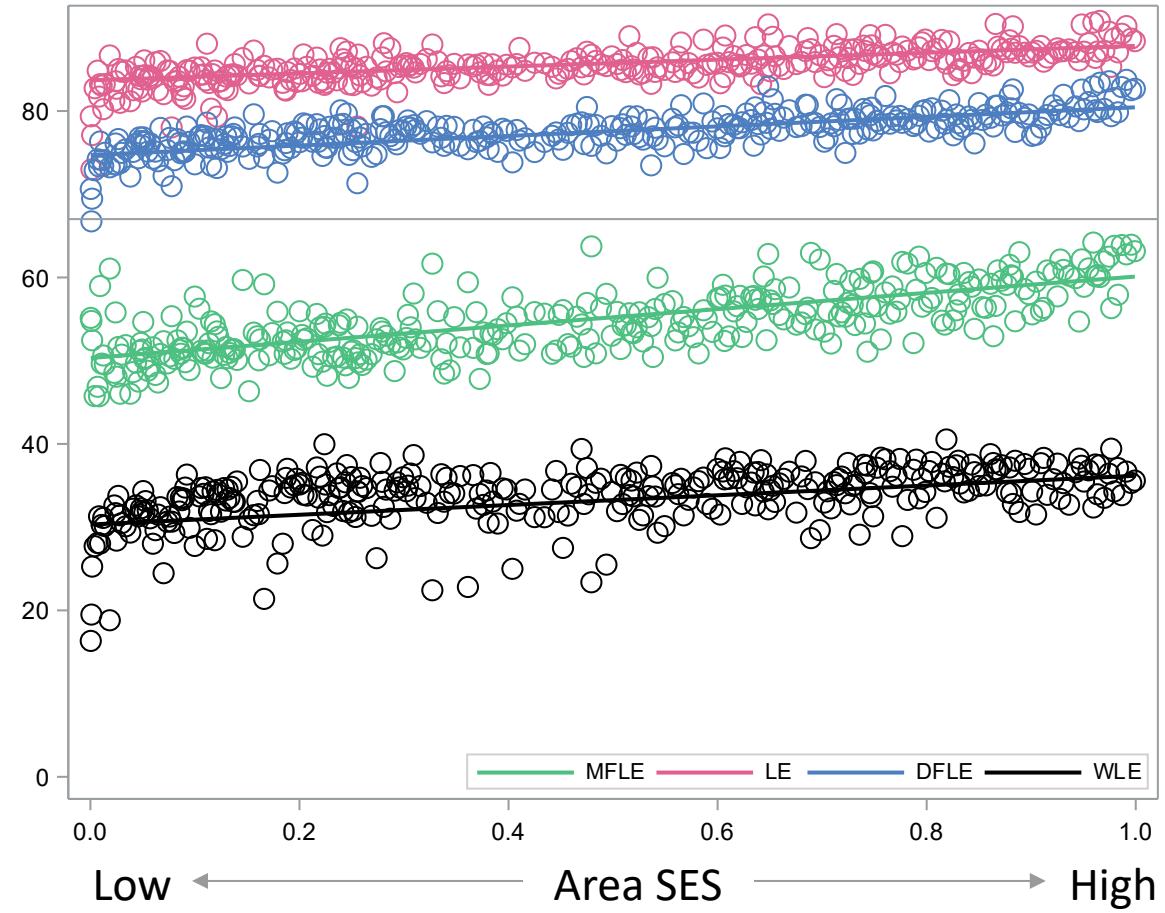
3. Work-span

Increasing most for poor women

No improvement in conducive job characteristics for poor men

End.
Thank you

Life, health, work expectancies, age 0, **women**, Aust, 2021



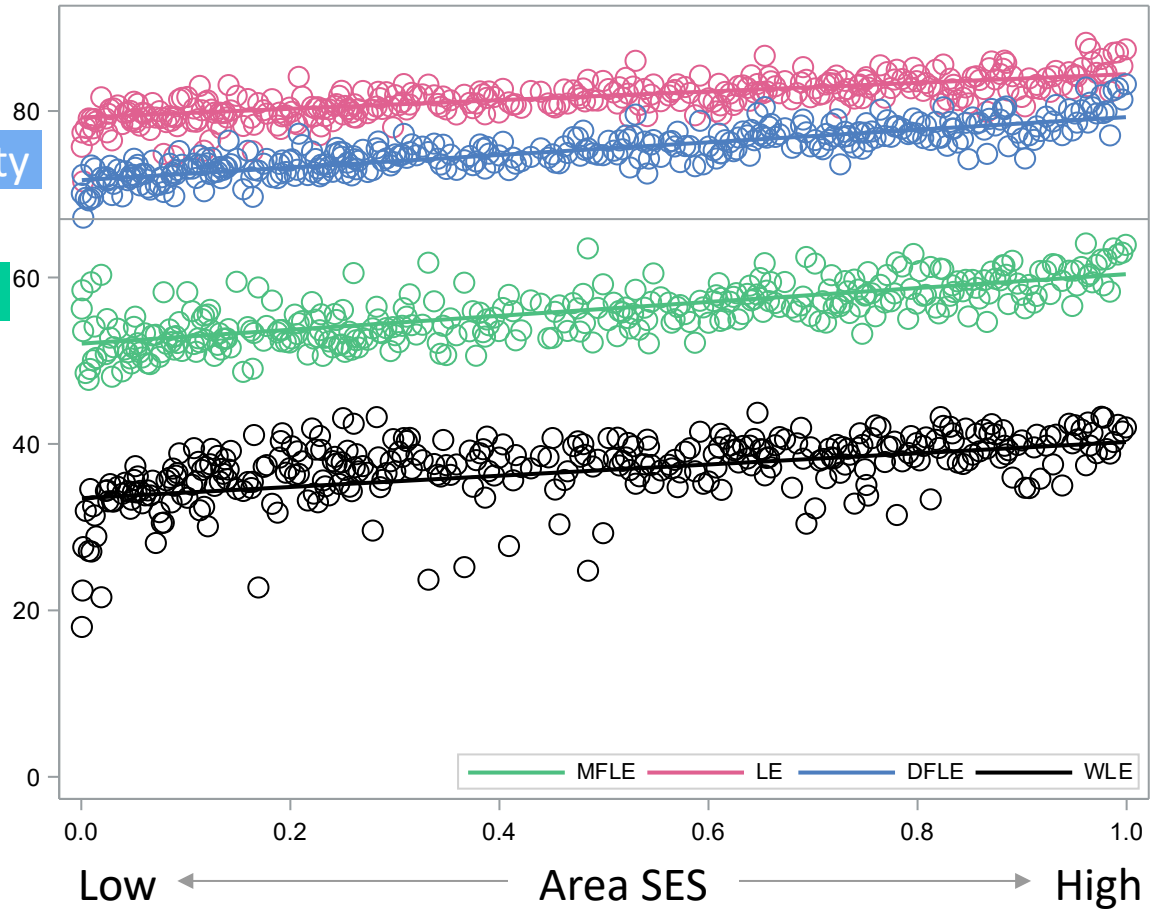
Life

Disability

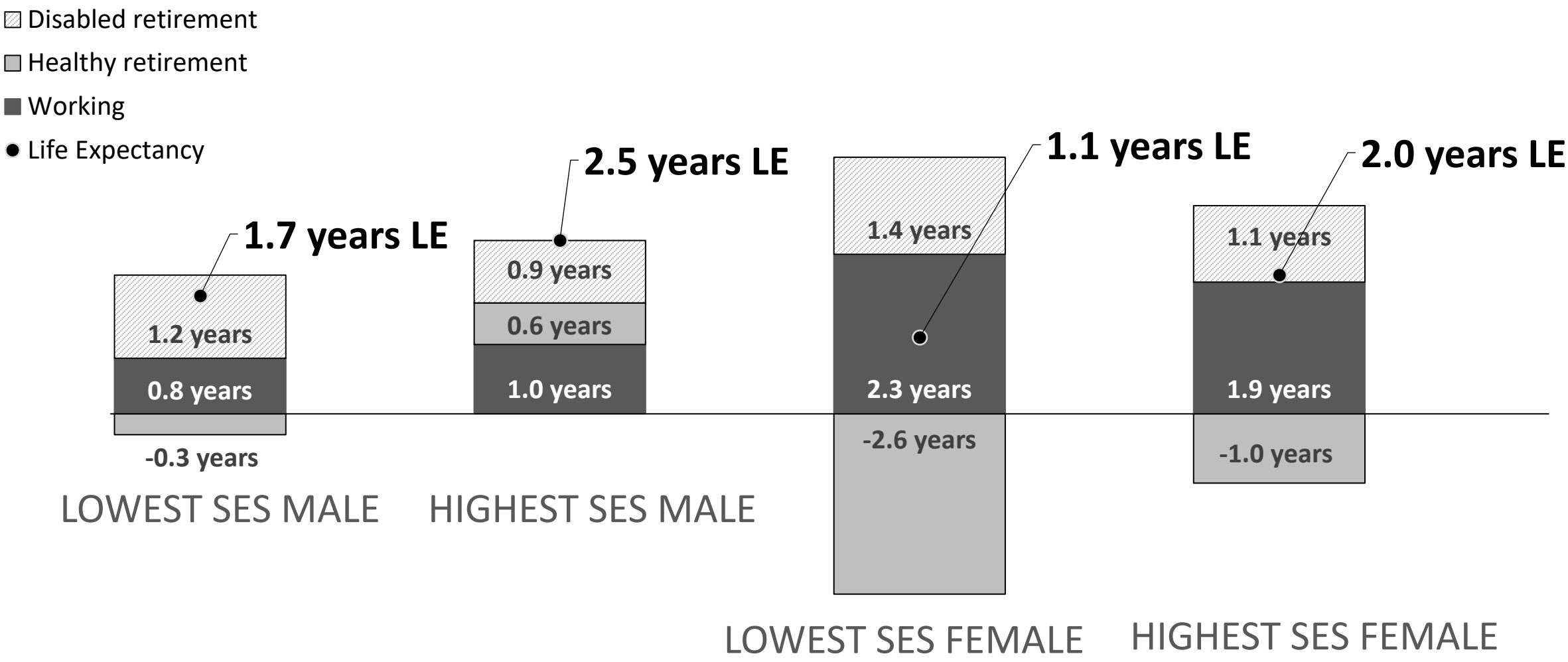
Chronic illness

Work

Life, health, work expectancies, age 0, **men**, Aust, 2021

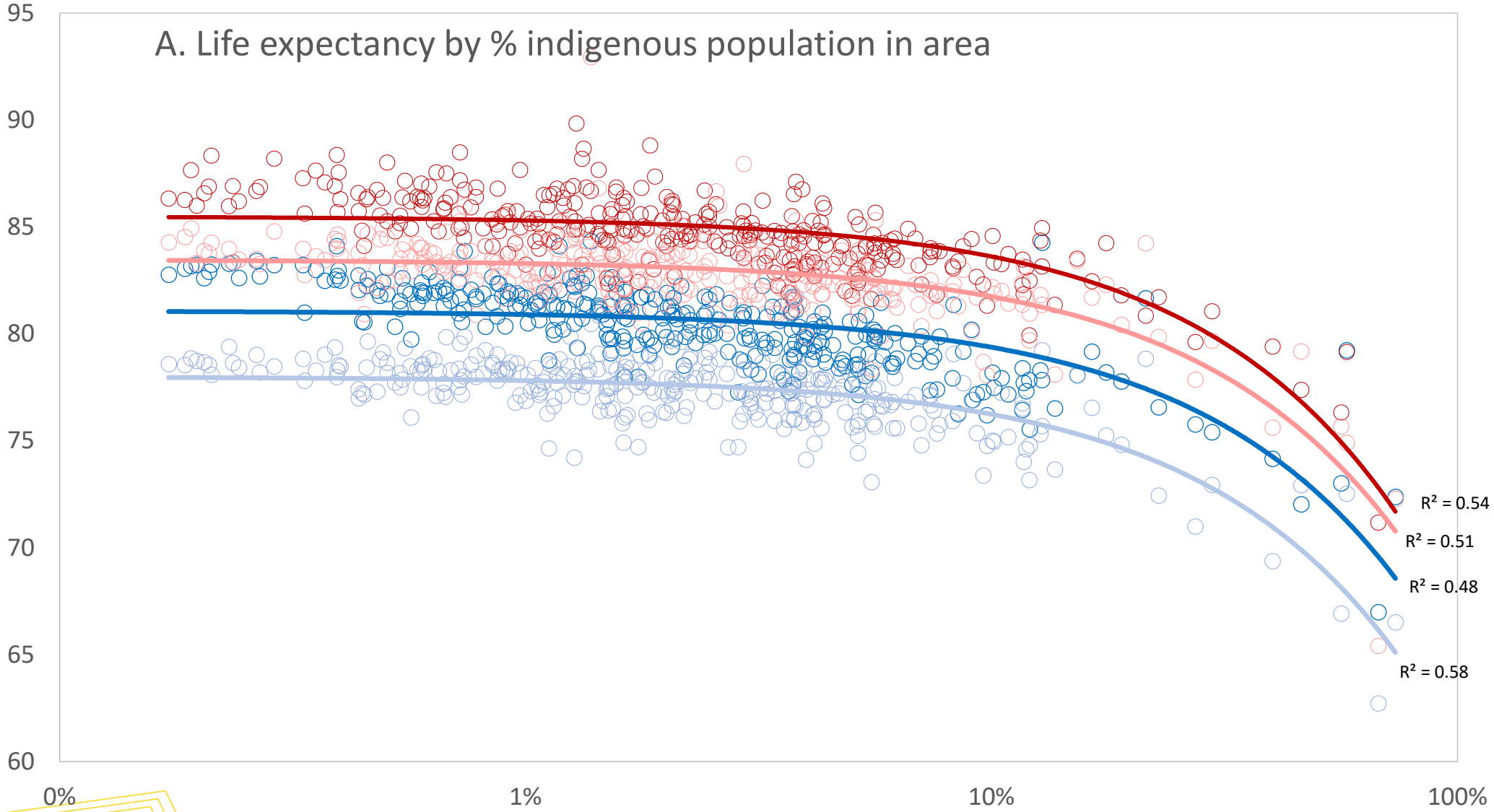


Overall results at age 50



		2001 IEO	2021 IEO		2001 IER	2021 IER		2001 IRSAD	2021 IRSAD		2001 IRSD	2021 IRSD
Ed.	Uni attendance	X	X					X	X			
	Degree	X						X				
	Certificate		X						X			
	Diploma	X	X					X	X			
	No education	X	X					X	X		X	X
	Below year 12	X	X					X	X		X	X
Emp.	Jobless with child								X			X
	Unemployed	X	X					X	X		X	X
Housing	4+ bed house				X	X		X	X			
	High mortgage				X	X			X			
	High rent				X				X			
	Low rent				X	X			X			
	Overcrowded					X			X			X
	Group dwellings					X					X	
	Lone person					X						
	Has mortgage					X						
	Renter in public housing										X	
	Outright owner					X						
Income	High income				X	X		X	X		X	X
	Low income				X	X		X	X			
Occupation	Machinery Op. & Drivers							X	X		X	X
	Labourers	X						X	X		X	X
	Low Skill Pers. Service							X	X			X
	Managers								X			
	Professionals	X						X	X			
	Low Skill Sales							X	X			
	Skill Level 1		X					X				
	Skill Level 2		X									
	Skill Level 3	X										
	Skill Level 4	X	X								X	
	Skill Level 5	X	X								X	
Other	Below 70 has disability								X			X
	No car					X			X		X	X
	Internet							X				
	Lone parent					X		X	X		X	X
	Separated/divorced								X		X	X
	Poor English										X	X
	Indigenous										X	
	Self-employed					X						

% indigenous population in areas is a good univariate predictor of LE variation, but driven by outliers



Gradient related to remoteness