Assessing socio-economic status through occupation

AN UPDATE OF THE NEW ZEALAND SOCIOECONOMIC INDEX (NZSEI)

BARRY MILNE
BRIAN BYUN, ALAN LEE, PETER DAVIS

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Outline

- Socio-economic status (SES)
  - What is it? Why measure it? How to measure it?
- Theory and construction of NZSEI
- Validation
  - Smoking and other socio-economic correlates
- Conclusions

Socio-economic status (SES)

- Also called socio-economic position (SEP)
- Not claiming it is the same as 'class'
  - CLASS
    - "A group of people who share a common economic situation, based upon their relationship to the means of production, and whose interests inevitably clash with those of others"
  - SOCIO-ECONOMIC STATUS
    - "The patterned unequal distribution of opportunities, advantages, resources and power among the population. Distinct 'socio-economic groups' may thus be said to exhibit different life chances, living standards and associated cultural practices"
- Interested in measuring stratification in SES, without making assumptions about class

Why measure SES?

- Research
  - Can test hypotheses about the impact of unequal distribution of opportunities, advantages, resources and power on
    - Health, wellbeing, life choices, use of services, crime
    - Moderating the impact of other risk factors
  - Can investigate SES stability and mobility, both within one's life and inter-generationally
- Describing populations
- Funding allocation
  - Social and health services are sometimes funded (in-part) based on the socio-economic characteristics of the areas that they serve.

How to measure SES

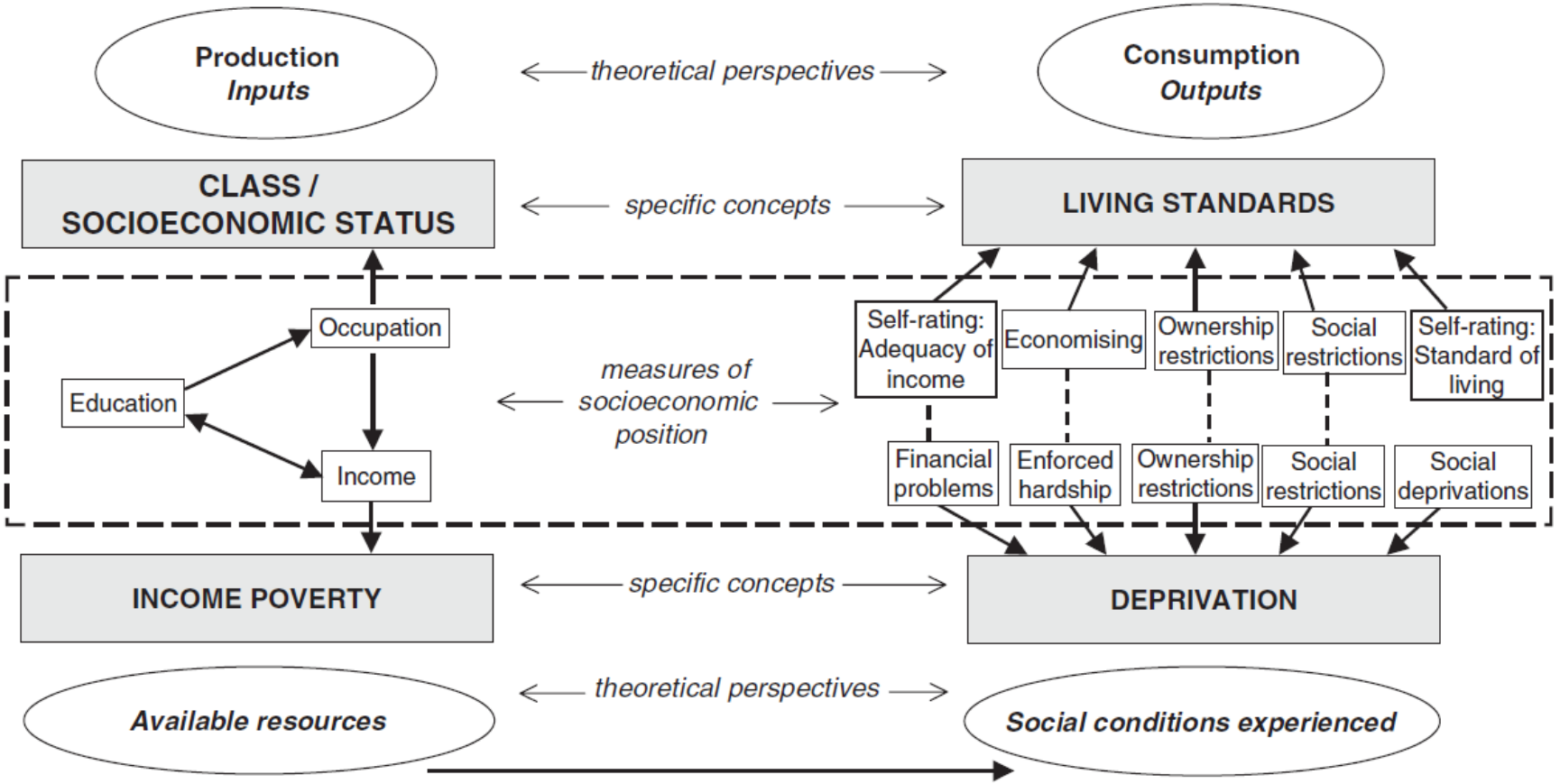


Fig. 1. Some approaches to measuring socioeconomic position.

Salmond et al., 2006, *Soc Sci Med, 62, 1474-85*

SES Measures

- All measures have their advantages and drawbacks
  - Income – face validity, often recorded administratively; often reluctantly reported, known under-reporting (self-employed)
  - Education – stable past a certain age; but inversely associated with age
  - Deprivation measures
    - Area-based – proven validity, easily coded, summarises multiple adversities; individuals within area may differ, address may mislead
    - Individual-based – proven validity, summarises multiple adversities; need specific questionnaire, focus on deprived end
  - Occupation –readily recalled, often recorded, proven validity; coding not straightforward, how to code those not in workforce?

SES Measures

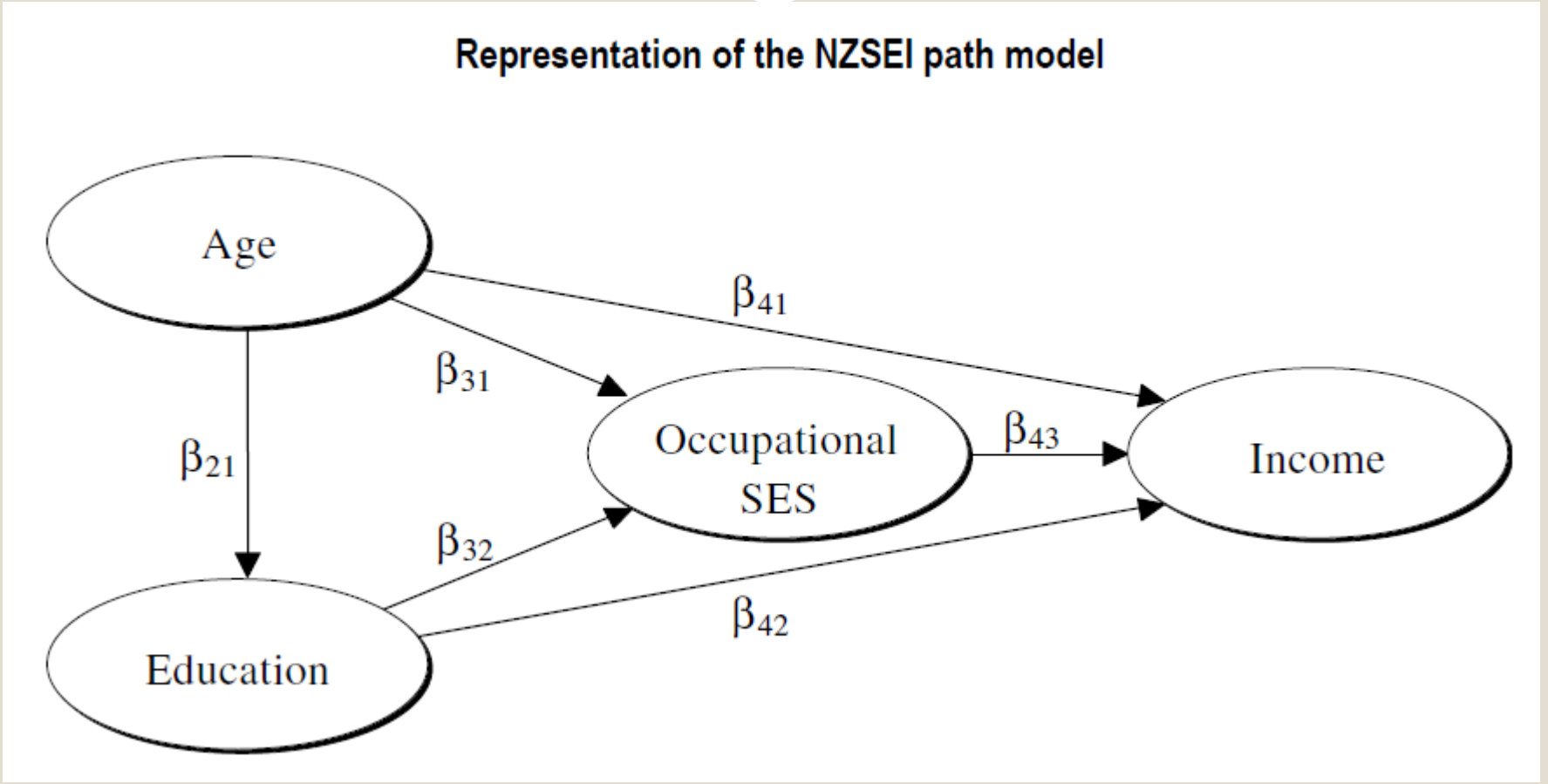
- Not the case that one 'best' captures SES; each might be seen as complementary to others
  - No reason to just focus on one
  - Some do draw from different sources

- Will describe theory, construction and properties of the NZSEI, an occupation-based measure of SES
  - Long history – Elley-Irving scales, previous NZSEIs
  - Update overdue – last version based on 1996 census
    - Job structure changed (and new classification system)
    - Anomalous aspects to previous versions

NZSEI – Theory

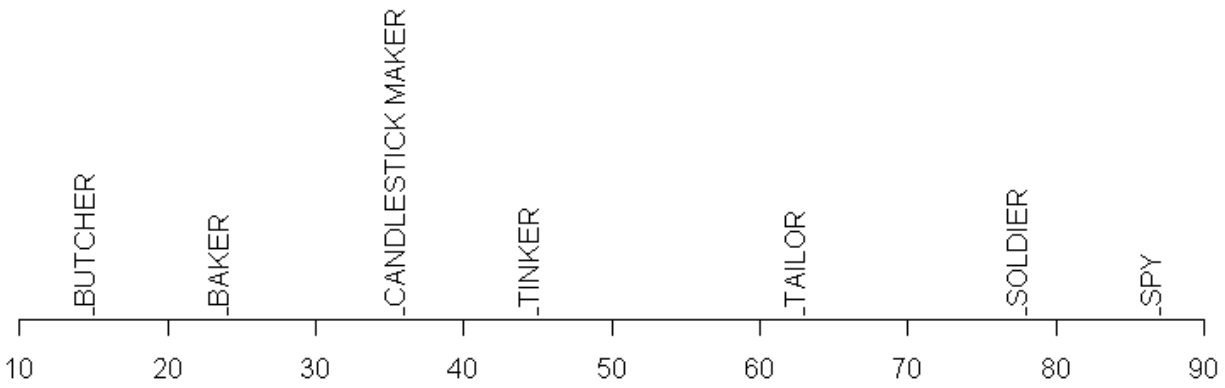
- ‘Returns to human capital’ model
  - The relationship between cultural capital or resources (education) and access to material rewards (income) is mediated through occupational structure.
  - In capitalist societies, division of labour is “the kernel of social inequality” and occupation, by implication, is a pivotal factor underpinning socio-economic stratification.
  - Thus, variations in occupational order translate into variations in social stratification and differentiation in lifestyles and life chances.

NZSEI – Theory



NZSEI – Construction

- Use statistical (path analytic) techniques to derive SES scores which equate to an optimal weighting of education and income, corrected for age
- Scale scores to be from 10 (low SES) – 90 (high SES)



NZSEI – Construction

- E.g., the NZSEI-96:

High SEI Scores	1996	Low SEI Scores	1996
Senior business administrators	90	Textile machinery operators	10
Health professionals	89	Labourers	18
Legal professionals	83	Housekeeping and restaurant workers	18
Mathematicians/statisticians	71	Packers and freight handlers	19
Senior government administrators	69	Glass and ceramic plant operators	19
Tertiary teaching professionals	69	Professional service workers	19

Davis et al., 2003

NZSEI – Construction

- In previous NZSEIs (1991 & 1996), education weakly associated with occupational SES, but occupational SES strongly associated with income
- Opposite pattern in Australia (AUSEI96 & AUSEI06) and internationally (ISEI88)

	NZSEI91	NZSEI96	AUSEI96	AUSEI06	ISEI88
β_{32} Education-Occupation	0.23	0.25	0.63	0.65	0.58
β_{43} Occupation-Income	0.79	0.79	0.30	0.35	0.47

Davis et al., 2003

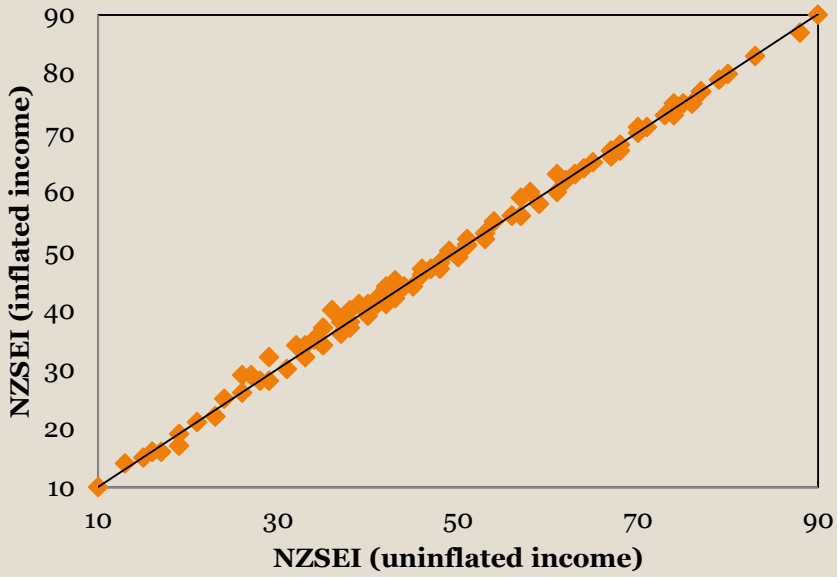
- For NZSEI-06, adopt methods more closely in line with AUSEI to see if pattern changes.

NZSEI-06 - Data

- Data from 2006 Census
  - Restricted to full- and part-time workers aged 21-69 (n≈1,700,000)
- Education
  - Highest qualification converted into years of education
- Occupation
  - Grouped into 97 occupations (ANZSCO classification – same used in Australia)
- Income
  - Four measures: annual or hourly income (to assess impact of part-time workers) x inflated or not-inflated income for self-employed workers (to account for known under-reporting)

NZSEI-06 – Results

- Scores affected - esp at lower end - by adjustments for part-time work (by using hourly income)
- Scores hardly affected by adjustments for self-employment (by inflating income for the self-employed)



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NZSEI-06 – Results

High SEI Scores	2006	Low SEI Scores	2006
Medical Practitioners	90	Truck Drivers	10
Tertiary Education Teachers	87	Mobile Plant Operators	14
Legal Professionals	83	Miscellaneous Factory Workers	15
Natural and Physical Science Professionals	80	Cleaners and Laundry Workers	16
Health Therapy Professionals	79	Packers and Product Assemblers	16
Education, Health and Welfare Services Managers	77	Food Preparation Assistants	16
Accountants, Auditors and Company Secretaries	77	Food Process Workers	17
School Teachers	77	Miscellaneous Labourers	19
Miscellaneous Education Professionals	75	Machine Operators	21
Information Professionals	75	Storepersons	22

NZSEI-06 – Results

ANZSCO major group	NZSEI06 Score (Mean)	NZSEI06 score (range among occupations)
1. Manager	55.0	40-77
2. Professional	74.7	59-90
3. Technician and Trades Workers	42.1	28-63
4. Community and Personal Service Workers	41.2	28-56
5. Clerical and Administrative Workers	48.1	39-56
6. Sales Workers	43.0	34-60
7. Machinery Operators and Drivers	20.0	10-37
8. Labourers	19.9	15-29

NZSEI-06 – Results

- Path weights in line with Australian (AUSEI96 & AUSEI06) and international (ISEI88) scales

	NZSEI91	NZSEI96	NZSEI06	AUSEI96	AUSEI06	ISEI88
β_{32} Education-Occupation	0.23	0.25	**0.58**	0.63	0.65	0.58
β_{43} Occupation-Income	0.79	0.79	**0.21**	0.30	0.35	0.47

NZSEI-06 – Results

- SEI scores split into six groups (1=high, 6=low)

Group	Mean income ($)		Difference		Years of education		Difference	
	non-Maori	Maori	%	$ (1000s)	non-Maori	Maori	%	years
Males								
1	82,600	64,000	29.0	18.6	16.0	15.0	6.8	1.0
2	72,200	59,500	21.2	12.6	14.2	13.7	4.3	0.6
3	53,900	46,600	15.6	7.3	13.5	12.7	6.2	0.8
4	43,100	39,500	9.3	3.7	12.6	12.1	4.7	0.6
5	35,700	33,500	6.5	2.2	12.2	11.5	6.1	0.7
6	33,000	31,900	3.6	1.1	11.7	11.1	5.3	0.6
Females								
1	56,700	50,000	13.2	6.6	15.6	14.7	6.1	0.9
2	47,200	42,200	11.9	5.0	14.5	14.0	3.9	0.6
3	40,700	38,500	5.7	2.2	14.1	13.4	5.0	0.7
4	32,700	31,200	4.7	1.5	12.6	12.2	3.3	0.4
5	22,900	22,600	1.1	0.2	12.3	11.8	3.9	0.5
6	19,200	20,500	-6.2	-1.3	11.8	11.2	5.3	0.6

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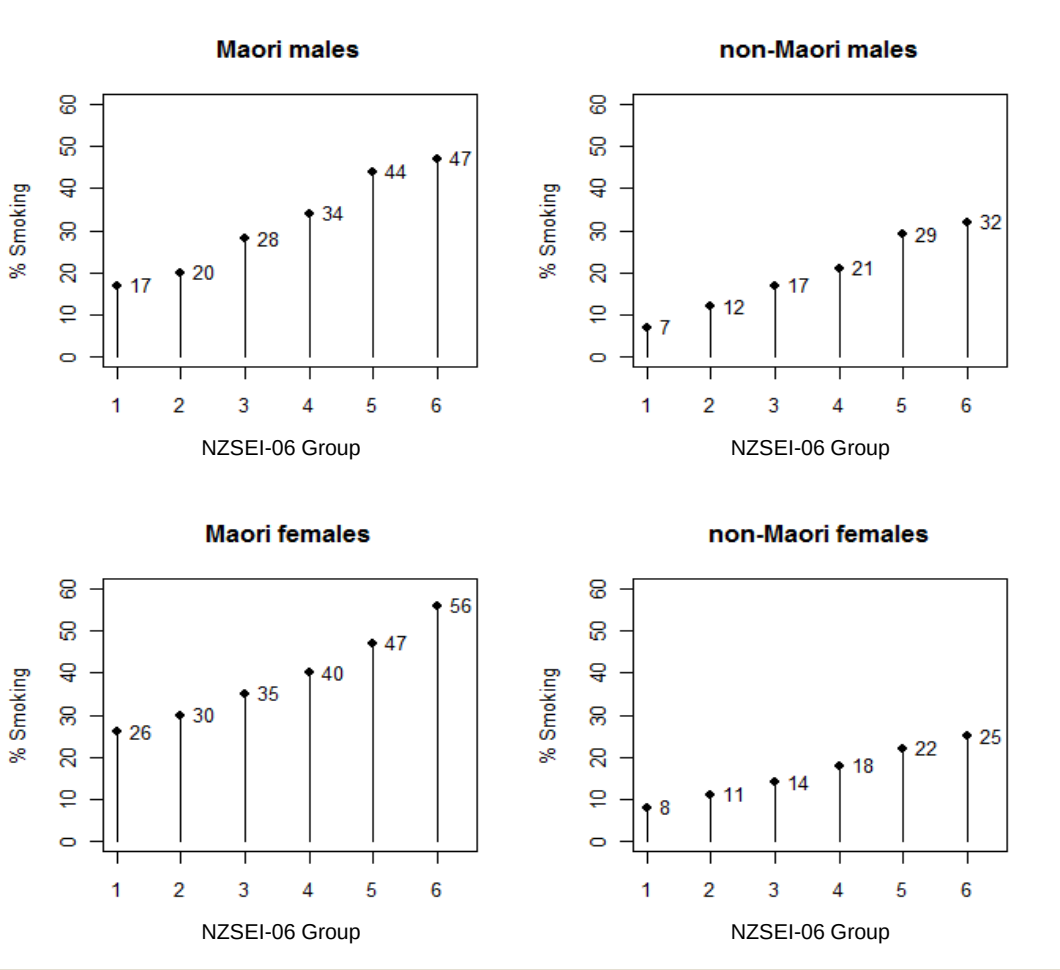
NZSEI – Validation

- Does the NZSEI-06 replicate known socio-economic patterns for health and other socio-economic indicators?
  - Smoking prevalence (%)
  - Home ownership (%)
  - Motor vehicle access (% access to 2 or more cars)
  - Neighbourhood deprivation (NZDep scores: 1=least deprived; 10=most deprived)
- Based on 2006 data for 21-69 year olds in the workforce (n≈1,700,000)

NZSEI-06 – Validation - Smoking



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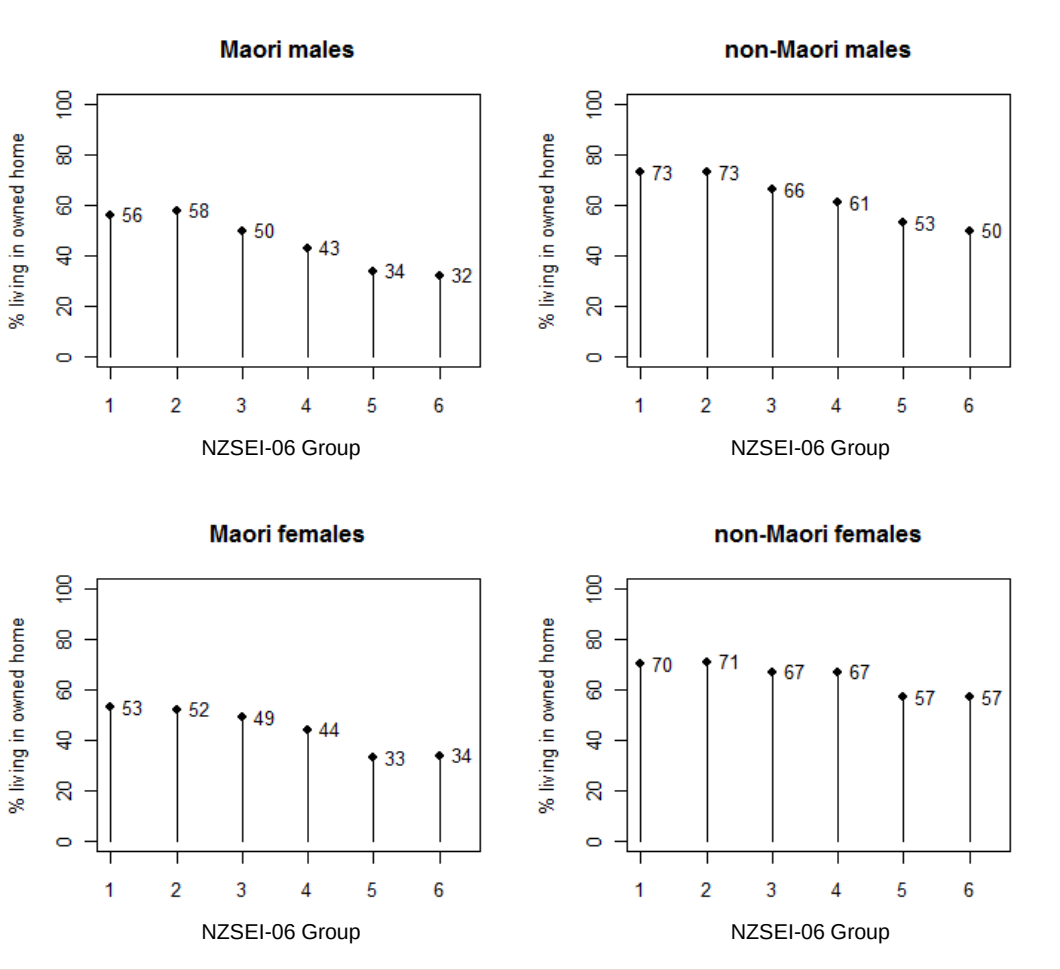
NZSEI-06 – Validation – Home ownership



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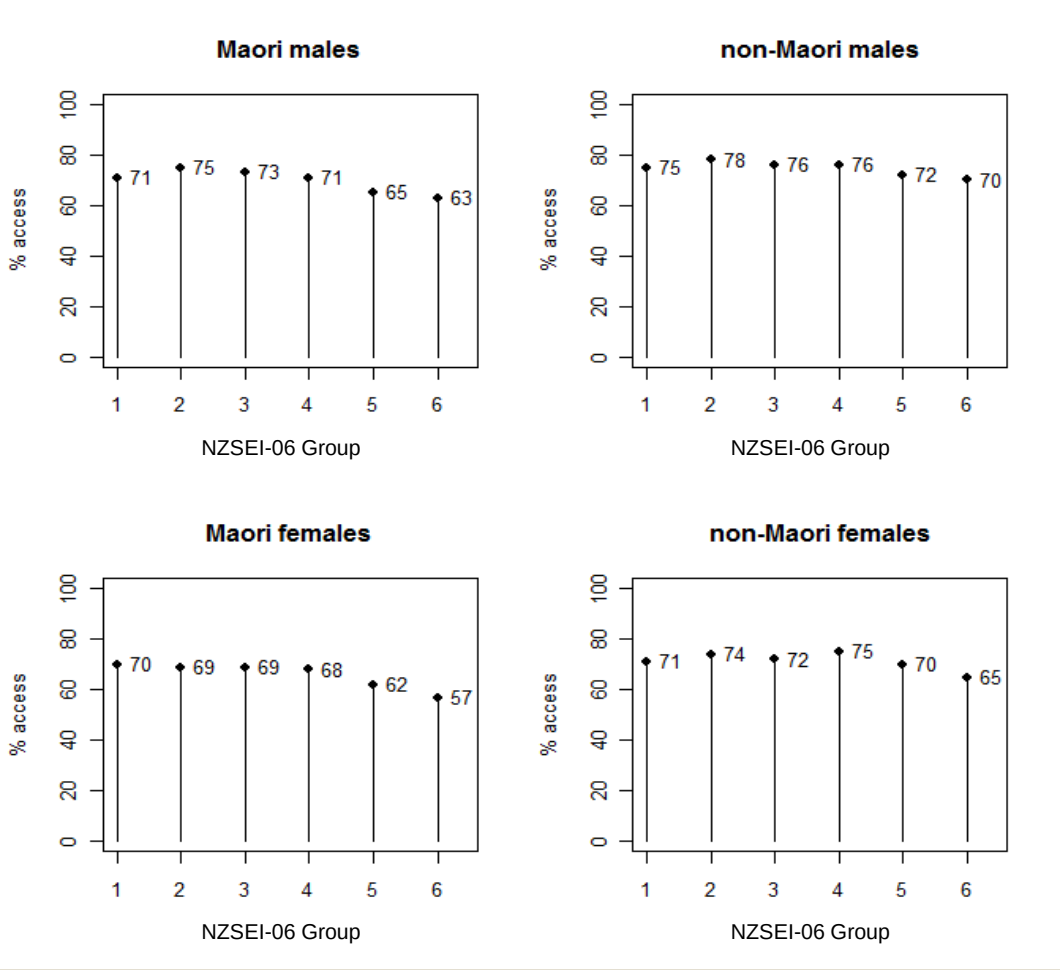
NZSEI-06 – Validation – Vehicle access



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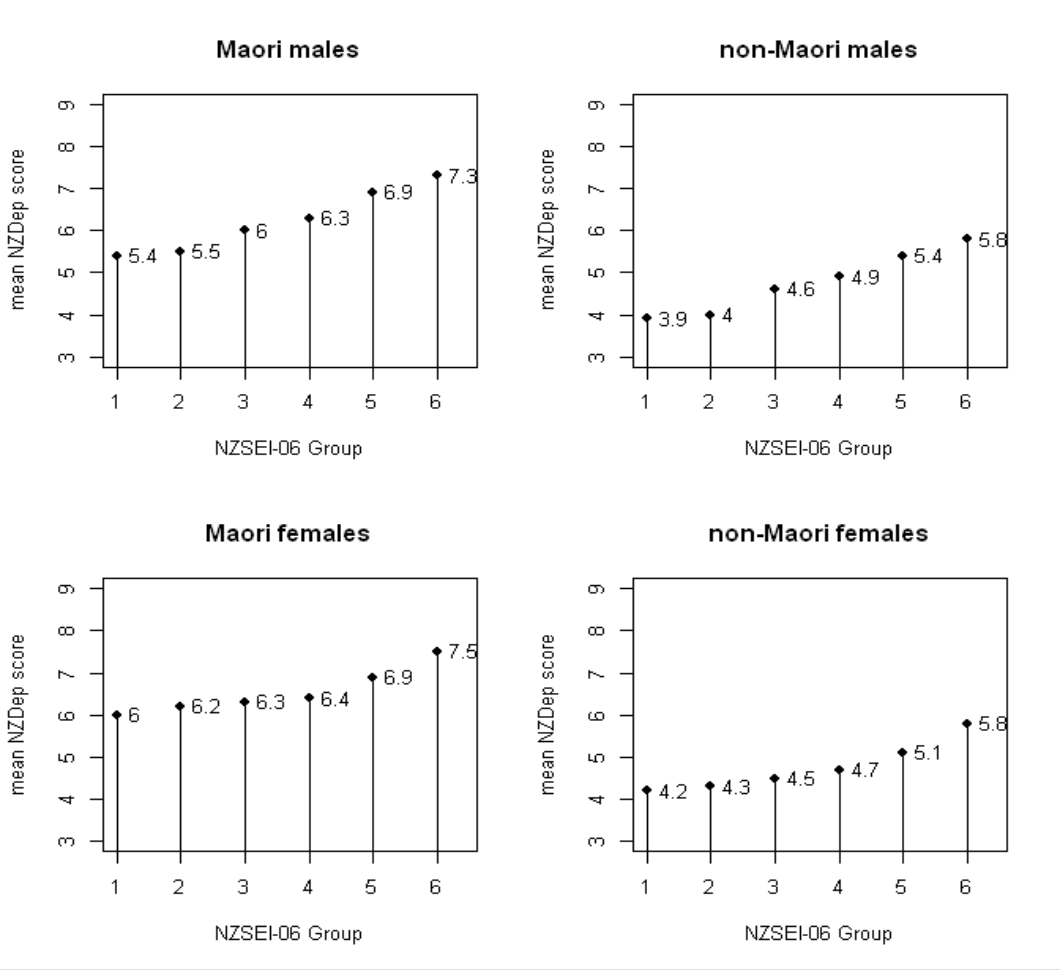
NZSEI-06 – Validation – Deprivation



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NZSEI-06 – Coding those not in workforce

- A problem with occupation-based SEI measures is how to classify those outside the workforce
- A number of solutions have been suggested
  - Treat household as unit of analysis and assign SEI scores to all household members on the basis of occupation of one (or more) household members
    - Necessarily done with children
    - Anachronistic? (coding wife based on husband's occupation)
    - What if no-one in workforce?
  - Previous occupation
    - Considered suitable proxy measure, especially for retirees or those taking break from employment

NZSEI-06 – Coding those not in workforce

- A number of solutions have been suggested
  - Separate category(ies) for those not in the workforce
    - E.g., unemployed category, homemakers category
    - Long-term unemployed might be considered separate 'underclass'
    - But … heterogeneity in short-term unemployed, homemakers
  - 'Occupational potential': use model developed to assign SES on the basis of known association between SEI, age and education (income affected by being out of workforce so cannot be used)
    - Consistent - assigns scores using essentially the same algorithm
    - Still just 'potential', which might be fulfilled, unmet or exceeded
    - Results of this approach shown here…

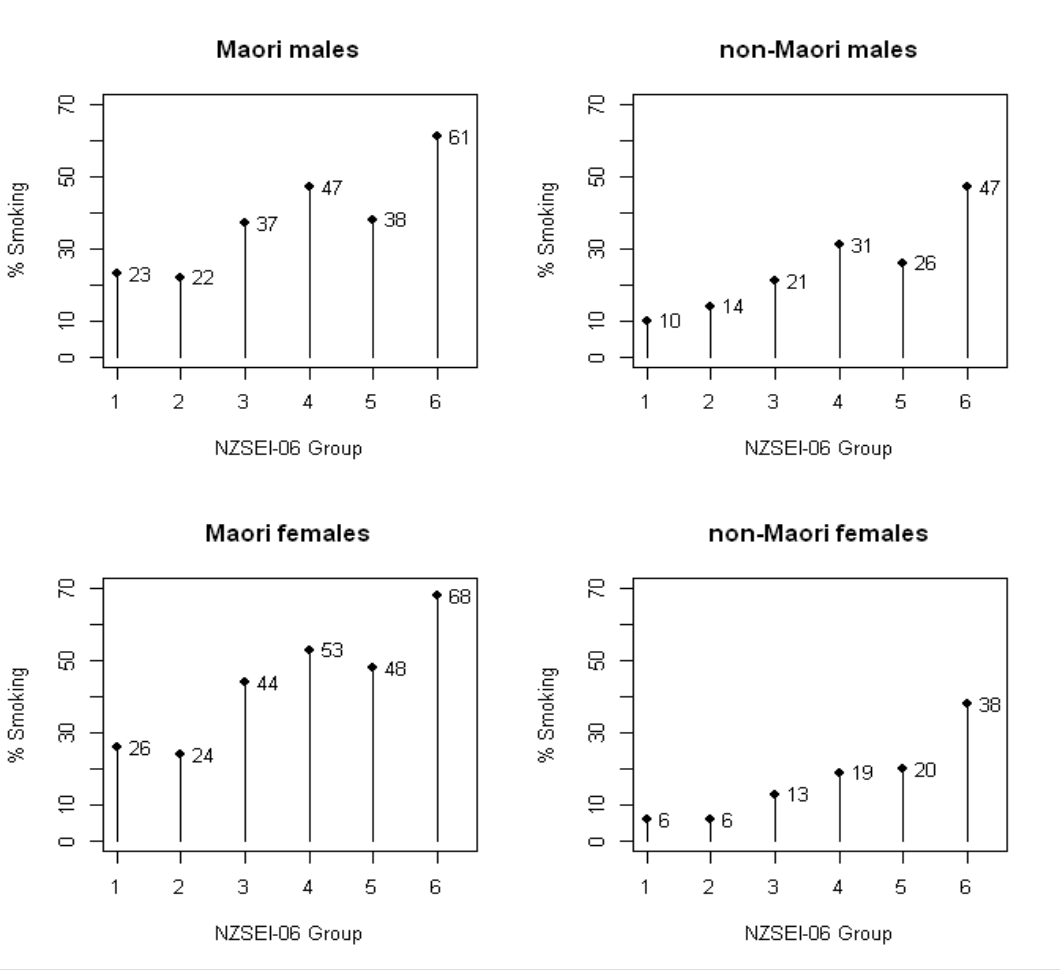
NZSEI-06 – Coding those not in workforce

Qualifications	Age (years)				
	21-30	31-40	41-50	51-60	61-69
Doctorate Degree	69.8	70.8	72.1	73.4	74.5
Masters Degree	65.3	66.4	67.7	68.9	70.1
Post-Graduate and Honours Degree	60.8	62.0	63.3	64.5	65.7
Bachelor Degree and Level 7 Qualification	56.3	57.6	58.9	60.2	61.4
Level 6 Diploma	49.8	51.1	52.4	53.6	54.8
Level 5 Diploma	49.7	51.1	52.3	53.6	54.8
Level 4 Certificate Gained Post-school	45.4	46.7	48.0	49.3	50.4
Level 3 Certificate Gained Post-school	45.3	46.6	48.0	49.2	50.4
Level 2 Certificate Gained Post-school	41.0	42.3	43.6	44.9	46.0
Level 1 Certificate Gained Post-school	36.6	37.9	39.2	40.5	41.7
Overseas Secondary School Qualification	38.8	40.2	41.4	42.7	43.8
Level 3 or 4 Certificate Gained at School	43.0	44.4	45.8	47.1	48.2
Level 2 Certificate Gained at School	38.8	40.1	41.4	42.6	43.9
Level 1 Certificate Gained at School	34.4	35.8	37.0	38.3	39.5
No school qualification	30.0	31.4	32.7	34.0	35.1

NZSEI – Validation (those not in workforce)

- Does the IMPUTED NZSEI-06 replicate known socio-economic patterns for health and other socio-economic indicators for those not in the workforce?
  - Smoking prevalence (%)
  - Home ownership (%)
  - Motor vehicle access (% access to 2 or more cars)
  - Neighbourhood deprivation (NZDep scores: 1=least deprived; 10=most deprived)
- Based on 2006 data for 21-69 year olds NOT in the workforce (n≈500,000)

Validation - Smoking - Non-workers



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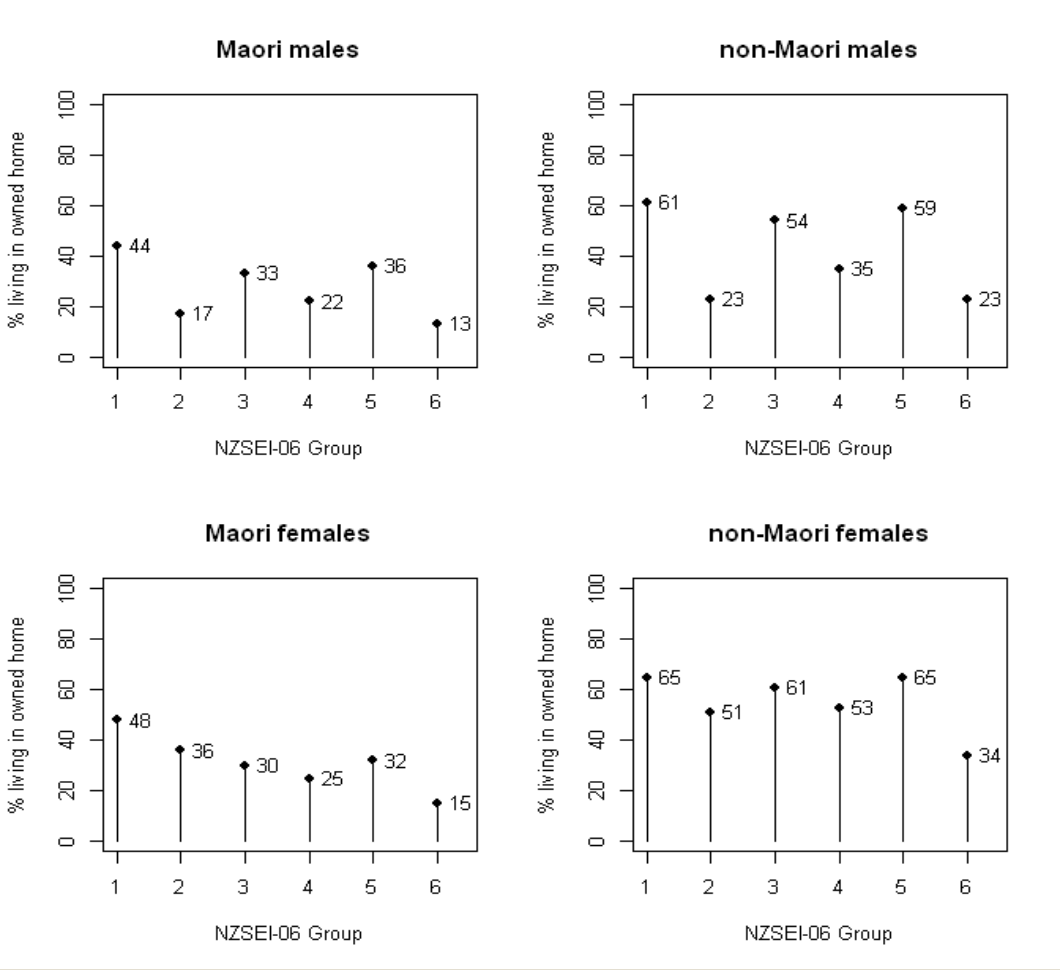
Validation - Housing tenure - Non-workers



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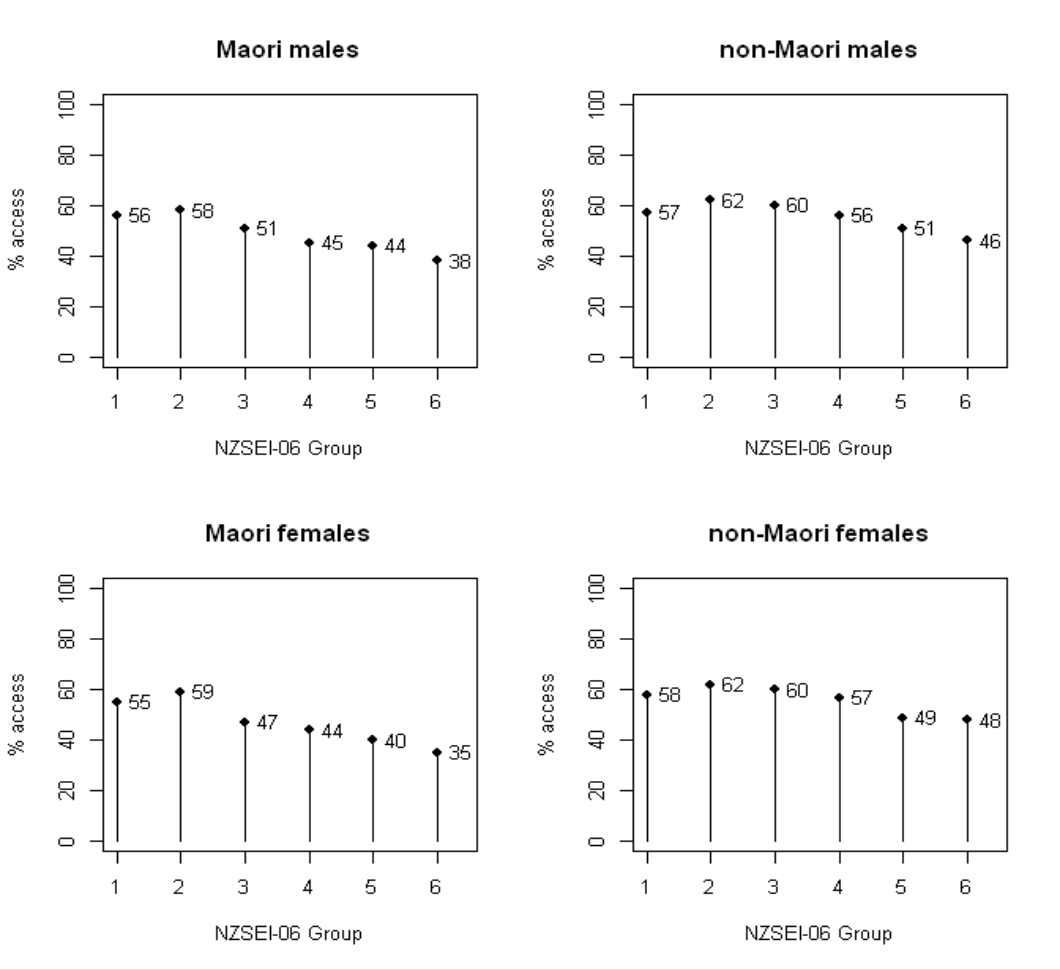
Validation - Vehicle access - Non-workers



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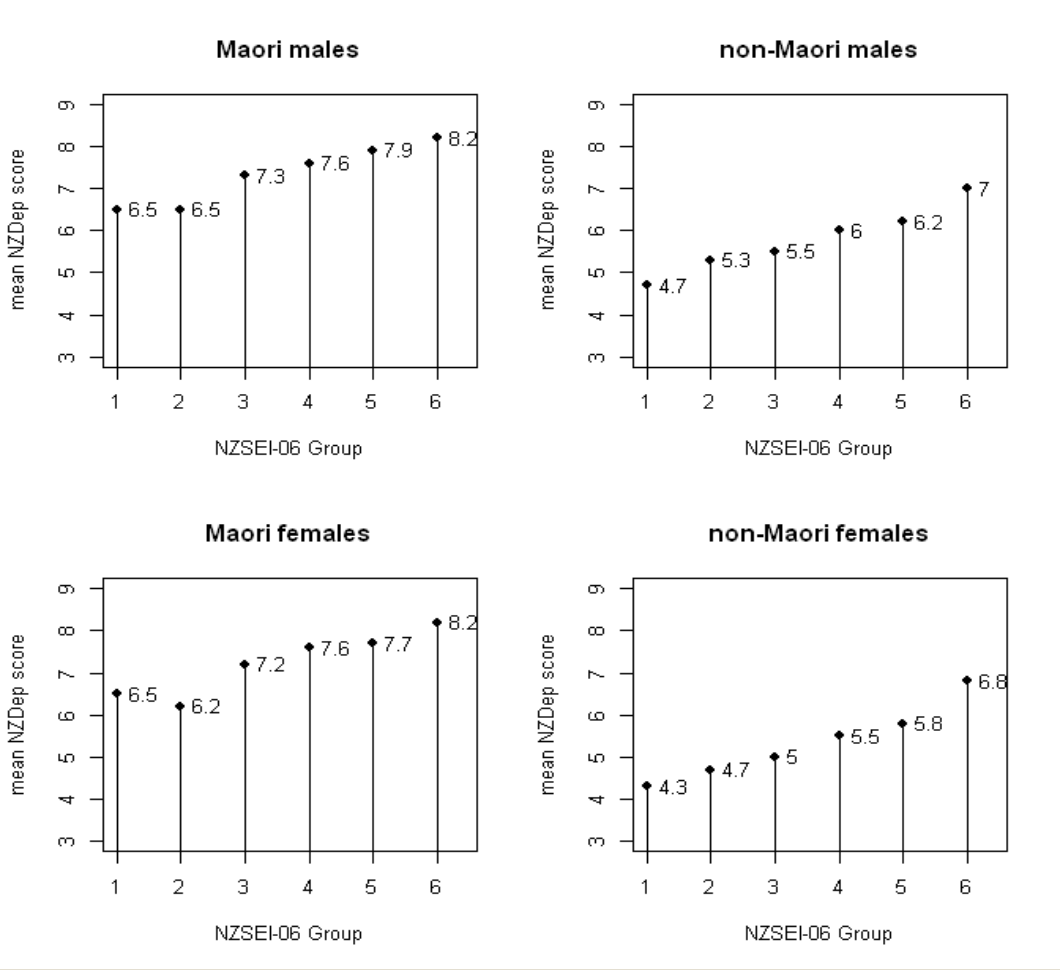
Validation - Deprivation - Non-workers



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Conclusions

- Updated the NZSEI scale for the 2006 Census
- Classifies occupations as expected
- Path weights (education-occupation; occupation-income) differ from earlier versions, now more in line with international scales
- Correlates with smoking and socio-economic correlates as expected
- Classification of those not in workforce also has reasonable construct validity

Issues

- Occupation being coded less frequently on national surveys.
  - Utility requires occupation data to be readily available
- Only 97 occupations coded (level of detail to which Statistics NZ releases occupation data)
  - Likely heterogeneity among some of these groups
  - Would a more fine-grained classification produce a better scale or just more noise?
    - 358 groups if next level was made available, 998 if finest level of detail was made available
    - Harder for user: coding more difficult for finer-grained classification

Future work

- More validation
  - Is the construct the same across different ethnic and gender groups (calculate separately and compare)?
  - Additional health measures. Another sample required - only data on smoking in Census
  - Children. Lots of work on socioeconomic disparities in children. If NZSEI-06 is a good measure of SES, it should also differentiate children in terms of health and other outcomes
  - Household SES
- Compare performance against other SES measures
  - NZDep, NZiDep, Education, Income, Living Standards
- Wait for 2013 Census …

Thanks!

- Any questions?

Statistics

The path model can be represented by three linear regression equations.

(1) $i = \beta_{41} a + \beta_{42} e + \beta_{43} o + \varepsilon$

(2) $o = \beta_{31} a + \beta_{32} e + \varepsilon$

(3) $e = \beta_{21} a + \varepsilon$

i, e and a are normalised income, education and age variables, and o is our unknown occupational SES variable, also normalised. The beta coefficients represent the arrows on the path diagram.

- Set β_{42} to zero
- Vary values of 'o' until the summed residual sum of squares of equations 1 & 2 are minimised.