Assessing socio-economic status through occupation

AN UPDATE OF THE NEW ZEALAND SOCIOECONOMIC INDEX (NZSEI)

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COMPASS COLLOQUIUM, AUG 2012

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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
  o 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
  o Can investigate SES stability and mobility, both within one’s life and inter-generationally

• Describing populations

• Funding allocation
  o Social and health services are sometimes funded (in-part) based on the socio-economic characteristics of the areas that they serve.
SES Measures

- All measures have their advantages and drawbacks
  - Income – face validity, often recorded administratively; often reluctantly reported, known under-reporting
  - 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?
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.
  - Developed by Ganzeboom (1992); used previously in NZ, Australia and internationally
NZSEI – Theory

Representation of the NZSEI path model

Age

β_{21}

Education

β_{31}

Occupational SES

β_{32}

β_{41}

β_{42}

Income

β_{43}
NZSEI – Construction

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

\begin{align*}
(1) \quad i &= \beta_{41} a + \beta_{42} e + \beta_{43} o + \varepsilon \\
(2) \quad o &= \beta_{31} a + \beta_{32} e + \varepsilon \\
(3) \quad e &= \beta_{21} a + \varepsilon
\end{align*}

\(i, e\) 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.

- Optimally weight age-corrected education & income
- Set \(\beta_{42}\) to zero
- Vary values of ‘o’ until the summed residual sum of squares of equations 1 & 2 are minimised.
NZSEI – Construction

- Scale scores to be from 10 (low SES) – 90 (high SES)
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
  - Annual income for full-time workers
  - Part-time workers included, with annual income “equalised” to a full-time equivalent
Scores for full-time workforce and with part-time workers added very similar

- $R > 0.99$
- Most occupations change <1-2 points
- Very few rank-order changes

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## NZSEI-06 – Results

<table>
<thead>
<tr>
<th>High SEI Scores</th>
<th>2006</th>
<th>Low SEI Scores</th>
<th>2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical Practitioners</td>
<td>90</td>
<td>Food Preparation Assistants</td>
<td>10</td>
</tr>
<tr>
<td>Tertiary Education Teachers</td>
<td>85</td>
<td>Cleaners and Laundry Workers</td>
<td>14</td>
</tr>
<tr>
<td>Legal Professionals</td>
<td>80</td>
<td>Packers and Product Assemblers</td>
<td>23</td>
</tr>
<tr>
<td>Natural and Physical Science Professionals</td>
<td>76</td>
<td>Miscellaneous Factory Process Workers</td>
<td>27</td>
</tr>
<tr>
<td>Education, Health and Welfare Services Managers</td>
<td>74</td>
<td>Miscellaneous Labourers</td>
<td>27</td>
</tr>
<tr>
<td>Health Therapy Professionals</td>
<td>74</td>
<td>Mobile Plant Operators</td>
<td>29</td>
</tr>
<tr>
<td>Accountants, Auditors and Company Secretaries</td>
<td>73</td>
<td>Food Process Workers</td>
<td>29</td>
</tr>
<tr>
<td>School Teachers</td>
<td>72</td>
<td>Machine Operators</td>
<td>29</td>
</tr>
<tr>
<td>ICT Managers</td>
<td>71</td>
<td>Truck Drivers</td>
<td>30</td>
</tr>
<tr>
<td>Information and Organisation Professionals</td>
<td>71</td>
<td>Farm, Forestry and Garden Workers</td>
<td>28</td>
</tr>
</tbody>
</table>

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## NZSEI-06 – Results

<table>
<thead>
<tr>
<th>ANZSCO major group</th>
<th>NZSEI06 Score (Mean)</th>
<th>NZSEI06 score (range)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Manager</td>
<td>52</td>
<td>36 - 74</td>
</tr>
<tr>
<td>2. Professional</td>
<td>70</td>
<td>49 - 90</td>
</tr>
<tr>
<td>3. Technician and Trades Workers</td>
<td>40</td>
<td>28 - 58</td>
</tr>
<tr>
<td>4. Community and Personal Service Workers</td>
<td>38</td>
<td>26 - 52</td>
</tr>
<tr>
<td>5. Clerical and Administrative Workers</td>
<td>44</td>
<td>36 - 52</td>
</tr>
<tr>
<td>6. Sales Workers</td>
<td>39</td>
<td>28 - 55</td>
</tr>
<tr>
<td>7. Machinery Operators and Drivers</td>
<td>26</td>
<td>23 - 37</td>
</tr>
<tr>
<td>8. Labourers</td>
<td>21</td>
<td>10 - 30</td>
</tr>
</tbody>
</table>

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NZSEI-06 – Results

- Path weights in line with Australian (ANU4 [1996] & AUSEI06) and international (ISEI88) scales

<table>
<thead>
<tr>
<th></th>
<th>NZSEI91</th>
<th>NZSEI96</th>
<th>NZSEI06</th>
<th>ANU4</th>
<th>AUSEI06</th>
<th>ISEI88</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\beta_{32}$ Education-Occupation</td>
<td>0.23</td>
<td>0.25</td>
<td><strong>0.57</strong></td>
<td>0.63</td>
<td>0.65</td>
<td>0.58</td>
</tr>
<tr>
<td>$\beta_{43}$ Occupation-Income</td>
<td>0.79</td>
<td>0.79</td>
<td><strong>0.30</strong></td>
<td>0.30</td>
<td>0.35</td>
<td>0.47</td>
</tr>
</tbody>
</table>

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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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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
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

<table>
<thead>
<tr>
<th>Qualifications</th>
<th>Age (years)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>21-30</td>
</tr>
<tr>
<td>Doctorate Degree</td>
<td>68.1</td>
</tr>
<tr>
<td>Masters Degree</td>
<td>60.1</td>
</tr>
<tr>
<td>Post-Graduate and Honours Degree</td>
<td>61.3</td>
</tr>
<tr>
<td>Bachelor Degree and Level 7 Qualification</td>
<td>57.3</td>
</tr>
<tr>
<td>Level 6 Diploma</td>
<td>50.4</td>
</tr>
<tr>
<td>Level 5 Diploma</td>
<td>45.1</td>
</tr>
<tr>
<td>Level 4 Certificate Gained Post-school</td>
<td>40.9</td>
</tr>
<tr>
<td>Level 3 Certificate Gained Post-school</td>
<td>39.7</td>
</tr>
<tr>
<td>Level 2 Certificate Gained Post-school</td>
<td>38.3</td>
</tr>
<tr>
<td>Level 1 Certificate Gained Post-school</td>
<td>38.5</td>
</tr>
<tr>
<td>Overseas Secondary School Qualification</td>
<td>36.9</td>
</tr>
<tr>
<td>Level 3 or 4 Certificate Gained at School</td>
<td>42.5</td>
</tr>
<tr>
<td>Level 2 Certificate Gained at School</td>
<td>40.8</td>
</tr>
<tr>
<td>Level 1 Certificate Gained at School</td>
<td>37</td>
</tr>
<tr>
<td>No school qualification</td>
<td>32.3</td>
</tr>
</tbody>
</table>

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Conclusions

- NZSEI-06 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.
  o Utility requires occupation data to be readily available
• Only 97 occupations coded (level of detail to which Statistics NZ releases occupation data)
  o Likely heterogeneity among some of these groups
  o 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

- Produce report for discussion
Thanks!

- Any questions?
- Thanks to Alan Lee, Brian Byun, Peter Davis, Statistics NZ