THE 2018 NEW ZEALAND SOCIOECONOMIC INDEX (NZSEI-18): A BRIEF TECHNICAL SUMMARY

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Key points

- NZSEI scores range from 10-90. A higher score indicates a higher socioeconomic position.
- NZSEI scores are assigned to occupations. The scores reflect the average education and income level associated with that occupation - with education given a higher importance than income in the scoring.
- The NZSEI can be used as a continuous variable. There is also the option to use the 4, 6 or 10 category specifications. The appropriate specification for each study will depend on the research question and the size of the sample being analysed.
- Due to a lower response rate for the 2018 Census, missing data for occupation, income and education were supplemented from other data sources. Our analysis indicates that the NZSEI-18 is valid and reliable despite the use of alternative data sources.
- The NZSEI is occupation based and a large proportion of the population is not in the labour force (has no occupation) at any given time. For these people, NZSEI scores can be imputed based on age and education level.

IDI disclaimer

Theoretical framework

The New Zealand Socioeconomic Index (NZSEI) was first developed using 1991 Census data and has since been updated for the 1996, 2001, 2006, 2013 and now the 2018 Census. The NZSEI is an occupation-based measure of socioeconomic position. It is based on the 'returns to human capital' model of socioeconomic position, developed by Ganzeboom et al. (1992) for the International Socioeconomic Index. In this model, it is hypothesised that occupations are the way we transform cultural capital (education) into material rewards (income), adjusted for the influence age has on these relationships. This is shown in the path model below. The NZSEI was constructed on the usually resident population aged 21-69.

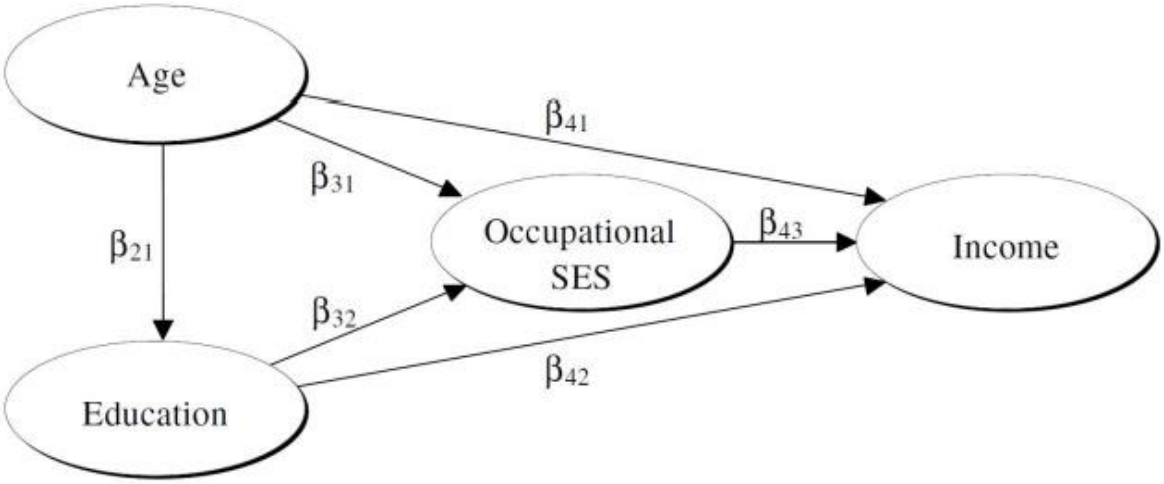

Figure 1. Path model for the NZSEI. Note that β_{42}, the direct path from education to occupational SES, is set to zero, so the effect of education on income is fully mediated by occupation in the model.

How to use the NZSEI

The NZSEI index was constructed using the Australian and New Zealand Standard Classifications of Occupations (ANZSCO) framework. Each occupation is coded to 6 digits in the ANZSCO framework. NZSEI scores have been calculated to the minor group, or 3-digit level (see Appendix). For example, general medical practitioners have the 6-digit code 253111, which is coded to 253, medical practitioners, at the minor group level. NZSEI scores have been placed in the 2018 Census file in the IDI, corresponding to the appropriate ANZSCO occupations to the minor group level.

Each occupation is assigned a socioeconomic score between 10 and 90. A higher score indicates a higher socioeconomic position. The NZSEI can be used as a continuous variable but can also be turned into categorical variables by designating cut-points. The NZSEI-18, like previous iterations of the scale, has been turned into a 10-group version (with each group containing approximately 10% of workers), a 4-group version (where each group contains approximately 25% of workers) and a 6-group version (where the lowest and highest groups contain 10%, the third and fifth groups contain 15% and the middle groups contain 25% each). Suggested cut-points for the 2018 NZSEI are detailed in the Appendix.

The 2018 NZSEI

Effects of the low response rate in the 2018 Census

Due to the low response rate for the 2018 Census, 2018 Census data was supplemented with administrative data, 2013 Census responses, and imputation. The 2018 Census has been the first (and only) Census for which data supplementation for important variables such as occupation, income and education has been undertaken.

Occupation was only available for 79.7% of responses, with CANCEIS imputation used to fill in the remainder (2018 Census External Data Quality Panel, 2019). CANCEIS imputation is a type of nearest neighbour imputation and involves substituting missing data with responses ‘donated’ from individuals with similar characteristics (2018 Census External Data Quality Panel, 2019). The level of imputation was even higher for Māori, Pacific and Asian ethnic groups and for certain territorial authorities (2018 Census External Data Quality Panel, 2019). While the imputation appears to have not biased the overall counts of occupations to the major group level, most imputed occupations for individuals will not be correct, even to the least granular level (2018 Census External Data Quality Panel, 2019).

Highest qualification is composed of two variables: highest secondary qualification and highest post-school qualification, which had 82.4% and 80.7% of responses from the 2018 Census, respectively (2018 Census External Data Quality Panel, 2019). Responses were also sourced from the 2013 Census (7.7% and 6.5% respectively) and administrative data (4.0% and 5.9% respectively) with no information available for the remaining share (5.9% and 7.0% respectively; 2018 Census External Data Quality Panel 2018). Use of alternative data sources and levels of no information were higher for Māori, Pacific and Asian ethnic groups (2018 Census External Data Quality Panel, 2019).

Only 81.2% of responses for personal income were available in the 2018 Census (2018 Census External Data Quality Panel, 2019). While a large share of income responses were sourced from administrative data (16.5%), the use of tax data is reliable and is likely to have resulted in this variable having high quality data (2018 Census External Data Quality Panel, 2019). 2.3% of responses were imputed (2018 Census External Data Quality Panel, 2019).

Overall, this means that the 2018 NZSEI was constructed using variables which differed in important ways from previous Censuses. Importantly, as most missing Census responses were from people who did not complete a Census form, rather than from item non-response, this means that a subset of the population on which the NZSEI was constructed may be very biased.

We examined the impact of these issues by creating NZSEI scales separately for records where occupation and income were available from the 2018 Census (the Census cohort), and those where occupation and/or income were supplemented by alternative sources (the alternative data cohort), split by Level 1 ethnic group. Scales constructed using the alternative data cohort generally had smaller path coefficients than scales constructed using the Census cohort. The correlations with the overall scale were weaker for the alternative data cohort but were still sufficiently large to indicate similar socioeconomic structuring of occupations (all rs > 0.92). Furthermore, all subscales showed expected socioeconomic associations with the two outcomes selected for validation - regular smoking and area deprivation as measured by the NZDep2018 (Atkinson, Salmond, & Crampton, 2019). Overall, this indicates that the NZSEI-18 appears to be valid and reliable despite the extensive use of alternative data sources in the 2018 Census.

Comparison with the 2013 NZSEI

Overall, the 2018 scale is remarkably similar to the 2013 NZSEI. The 2013 NZSEI and 2018 NZSEI scores are correlated at 0.99, indicating that the socioeconomic structuring of occupations is similar in 2013 and 2018. The path coefficients for education to occupation (β_{32}) and occupation to income (β_{43}) were similar for 2018 and 2013 (β_{32}=0.545 and 0.570 respectively and β_{43}=0.306 and 0.313 respectively).

Results from validation tests

Validation tests with smoking behaviour, area deprivation, housing tenure, any record of hospitalisation during 2018, self-rated health and life-satisfaction indicate that the 2018 NZSEI shows expected socioeconomic gradients and is therefore a valid measure of socioeconomic position.

Key limitations of the 2018 NZSEI

One of the key limitations of the NZSEI is that a large proportion of the population is not in the labour force at any given time, and hence cannot be assigned a score based on their current occupation. A method of imputing NZSEI scores based on age and education level, which was developed for NZSEI-06, has been employed to construct imputed scores for NZSEI-18. Imputed scores for NZSEI-18 will be detailed in the forthcoming report.

Notably, the NZSEI was constructed using the 3-digit version of ANZSCO. Within each occupational group at the 3-digit level of ANZSCO, there may be substantial socioeconomic variation, which cannot be captured by the assigned score.

Lastly, it is important to emphasise that a full 20% of occupations were imputed for the 2018 Census. Specific subpopulations have even higher levels of imputed data. While validity checks have indicated the NZSEI-18 performs adequately, users should consider any impact this may have on their particular research question when using the scale.

Further resources

While work on the 2018 NZSEI report is currently underway, information on the NZSEI is available in previous NZSEI reports and papers (please see Davis et al., 2004; Davis, Mcleod, Ransom, & Ongley, 1997; Davis et al., 1999; Fahy, Lee, & Milne, 2017; Galbraith, Jenkin, Davis, & Coope, 2003; Milne, 2012; Milne, Byun, & Lee, 2013).

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Appendix: NZSEI-18 scores and cut-points for categorical measures

The NZSEI-18 scores to the minor group level of ANZSCO are listed in Table 1 below. The suggested cut-points for forming categorical versions of NZSEI-18 are listed in Table 2.

Table 1. NZSEI-18 scores for each ANZSCO 3-digit group.

Occupation (minor group)	ANZSCO	NZSEI-18
Chief Executives, General Managers and Legislators	111	65
Farmers and Farm Managers	121	41
Advertising, Public Relations and Sales Managers	131	66
Business Administration Managers	132	66
Construction, Distribution and Production Managers	133	51
Education, Health and Welfare Services Managers	134	78
ICT Managers	135	77
Miscellaneous Specialist Managers	139	69
Accommodation and Hospitality Managers	141	48
Retail Managers	142	46
Miscellaneous Hospitality, Retail and Service Managers	149	61
Arts Professionals	211	57
Media Professionals	212	70
Accountants, Auditors and Company Secretaries	221	75
Financial Brokers and Dealers, and Investment Advisers	222	69
Human Resource and Training Professionals	223	67
Information and Organisation Professionals	224	76
Sales, Marketing and Public Relations Professionals	225	66
Air and Marine Transport Professionals	231	64
Architects, Designers, Planners and Surveyors	232	71
Engineering Professionals	233	69
Natural and Physical Science Professionals	234	79
School Teachers	241	74
Tertiary Education Teachers	242	88
Miscellaneous Education Professionals	249	71
Health Diagnostic and Promotion Professionals	251	73
Health Therapy Professionals	252	78
Medical Practitioners	253	90
Midwifery and Nursing Professionals	254	75
Business and Systems Analysts, and Programmers	261	73
Database and Systems Administrators, and ICT Security Specialists	262	65
ICT Network and Support Professionals	263	68
Legal Professionals	271	82
Social and Welfare Professionals	272	72
Agricultural, Medical and Science Technicians	311	58
Building and Engineering Technicians	312	56
ICT and Telecommunications Technicians	313	60

Automotive Electricians and Mechanics	321	40
Fabrication Engineering Trades Workers	322	33
Mechanical Engineering Trades Workers	323	47
Panelbeaters, and Vehicle Body Builders, Trimmers and Painters	324	32
Bricklayers, Carpenters and Joiners	331	38
Floor Finishers and Painting Trades Workers	332	29
Glaziers, Plasterers and Tilers	333	29
Plumbers	334	42
Electricians	341	47
Electronics and Telecommunications Trades Workers	342	48
Food Trades Workers	351	34
Animal Attendants and Trainers, and Shearers	361	37
Horticultural Trades Workers	362	40
Hairdressers	391	31
Printing Trades Workers	392	44
Textile, Clothing and Footwear Trades Workers	393	35
Wood Trades Workers	394	37
Miscellaneous Technicians and Trades Workers	399	49
Health and Welfare Support Workers	411	53
Child Carers	421	36
Education Aides	422	40
Personal Carers and Assistants	423	37
Hospitality Workers	431	32
Defence Force Members, Fire Fighters and Police	441	57
Prison and Security Officers	442	42
Personal Service and Travel Workers	451	49
Sports and Fitness Workers	452	52
Contract, Program and Project Administrators	511	59
Office and Practice Managers	512	49
Personal Assistants and Secretaries	521	50
General Clerks	531	50
Keyboard Operators	532	44
Call or Contact Centre Information Clerks	541	49
Receptionists	542	40
Accounting Clerks and Bookkeepers	551	52
Financial and Insurance Clerks	552	57
Clerical and Office Support Workers	561	39
Logistics Clerks	591	47
Miscellaneous Clerical and Administrative Workers	599	57
Insurance Agents and Sales Representatives	611	47
Real Estate Sales Agents	612	61
Sales Assistants and Salespersons	621	38
Checkout Operators and Office Cashiers	631	29
Miscellaneous Sales Support Workers	639	43
Machine Operators	711	28
Stationary Plant Operators	712	40

Mobile Plant Operators	721	27
Automobile, Bus and Rail Drivers	731	39
Delivery Drivers	732	30
Truck Drivers	733	29
Storepersons	741	28
Cleaners and Laundry Workers	811	19
Construction and Mining Labourers	821	31
Food Process Workers	831	28
Packers and Product Assemblers	832	10
Miscellaneous Factory Process Workers	839	27
Farm, Forestry and Garden Workers	841	27
Food Preparation Assistants	851	16
Freight Handlers and Shelf Fillers	891	29
Miscellaneous Labourers	899	23

Table 2. Suggested cut-points for categorical versions of NZSEI-18 (1=most socioeconomically advantaged group).

4-group		6-group		10-group	
1	67–90	1	75–90	1	75–90
2	50–66	2	67–74	2	70–74
3	38–49	3	50–66	3	66–69
4	10–37	4	38–49	4	57–65
		5	28–37	5	50–56
		6	10–27	6	47–49
				7	40–46
				8	34–39
				9	28–33
				10	10–27