NZDep2006 Index of Deprivation

User's Manual

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The authors

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Acknowledgments

Ethics and confidentiality

Ethical approval for the original NZDep91 project was obtained in May 1995 from the Central Regional Health Authority Wellington Ethics Committee.

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 authors, not Statistics New Zealand.

Introduction

NZDep2006 is an updated version of the NZDep91, NZDep96, and NZDep2001 indexes of socioeconomic deprivation. NZDep2006 combines nine variables from the 2006 census which reflect eight dimensions of deprivation. NZDep2006 provides a deprivation score for each meshblock in New Zealand. Meshblocks are geographical units defined by Statistics New Zealand, containing a median of approximately 87 people in 2006.

The NZDep2006 index of deprivation has two forms—an ordinal scale and a continuous score.

- The NZDep2006 index of deprivation ordinal scale ranges from 1 to 10, where 1 represents the areas with the least deprived scores and 10 the areas with the most deprived scores.

- The NZDep2006 index of deprivation interval variable is the first principal component score, which has been scaled to have mean 1000 index points and standard deviation 100 index points. The NZDep2006 10 point scale is derived from this interval variable.

The NZDep2006 scale of deprivation from 1 to 10 divides New Zealand into tenths of the distribution of the first principal component scores. For example, a value of 10 indicates that the meshblock is in the most deprived 10 percent of areas in New Zealand, according the NZDep2006 scores.

Important points to note:

- NZDep2006 deprivation scores apply to <u>areas</u> rather than individual people.
- The 1 to 10 scale is ordinal not interval.
- First principal component scores may be used, if desired, instead of the 1 to 10 scale.

NZDep2006 combines the following census data (calculated as proportions for each small area):

Dimension of deprivation	Variable description (in order of decreasing weight)
Income	People aged 18-64 receiving a means tested benefit
Income	People living in equivalised* households with income below an income threshold
Owned home	People not living in own home
Support	People aged <65 living in a single parent family
Employment	People aged 18-64 unemployed
Qualifications	People aged 18-64 without any qualifications
Living space	People living in equivalised* households below a bedroom occupancy threshold
Communication	People with no access to a telephone
Transport	People with no access to a car

*Equivalisation: methods used to control for household composition.

Further information regarding NZDep may be obtained in the following reports, methodological articles, and atlases:

Crampton, P., Salmond, C. and Sutton, F. (1997), *NZDep91 Index of Deprivation Instruction Book*, Wellington, Health Services Research Centre.

Crampton, P., Salmond, C. and Sutton, F. (1997), *NZDep91 Index of Deprivation Look Up Directory*, Wellington, Health Services Research Centre.

Crampton, P., Salmond, C. and Sutton, F. (1997), *Research Report No 5: NZDep91 Index of Deprivation*, Wellington, Health Services Research Centre.

Salmond, C., Crampton, P. and Sutton, F. (1998), *NZDep96 Index of Deprivation Instruction Book*, Wellington, Health Services Research Centre.

Salmond, C., Crampton, P. and Sutton, F. (1998), *NZDep96 Index of Deprivation Look Up Directory*, Wellington, Health Services Research Centre.

Salmond, C., Crampton, P. and Sutton, F. (1998), *Research Report No 8, NZDep96 Index of Deprivation*, Wellington, Health Services Research Centre.

Crampton, P., Salmond, C., Kirkpatrick, R., Scarborough, R. and Skelly, C. (2000), *Degrees of Deprivation in New Zealand: An atlas of socioeconomic difference*, Auckland, David Bateman Ltd.

Salmond, C. and Crampton, P. (2001), NZDep96 – What does it measure? *Social Policy Journal of New Zealand*, 17:82-100.

Salmond, C. and Crampton, P. (2002), Heterogeneity of deprivation within very small areas, *Journal of Epidemiology and Community Health,* 56:669-670.

Salmond, C. and Crampton, P. (2002), NZDep2001 Index of Deprivation, Wellington, Department of Public Health, Wellington School of Medicine and Health Sciences.
http://www.moh.govt.nz/moh.nsf/pagesmh/3357?Open

Salmond, C. and Crampton, P. (2002), NZDep2001 Users Manual, Wellington, Department of Public Health, Wellington School of Medicine and Health Sciences.
http://www.moh.govt.nz/moh.nsf/pagesmh/3357?Open

Crampton, P., Salmond, C. and Kirkpatrick, R. (2004), *Degrees of Deprivation in New Zealand: An atlas of socioeconomic difference. 2nd Edition*, Auckland, David Bateman Ltd.

Uses for NZDep2006

NZDep91, NZDep96, NZDep2001, and NZDep2006 have been developed with three principal purposes in mind: resource allocation, research, and advocacy.

1. Indexes of deprivation have application in funding formulas. For example, indexes of deprivation are used in capitation funding formulas for primary health care services, the population-based funding formula for District Health Boards, and in funding formulas for social services in other sectors.

2. Indexes of deprivation have application in research in a variety of settings such as health and other social services. For example, in the health sector, many researchers use small area indexes to describe the relationship between socioeconomic deprivation and health outcomes; increasing levels of deprivation are associated with higher mortality rates, and higher rates of many diseases.

3. Indexes of deprivation are used by community groups and community-based service providers to describe the populations they serve, and to advocate for extra resources for community based services.

File information

The downloadable tab-delimited file (**NZDep2006.txt**)* and the EXCEL97 file (**NZDep2006.xls**) each have 41392 records (one per meshblock) with the following fields (in order) named in the first row:

- 2006 meshblock identification number (**MB_num_2006**) [7 numeric characters]

- 2006 census area unit number (**CAU_num_2006**) [6 numeric characters]

- NZDep2006 deprivation scale, where 1 is least deprived and 10 is most deprived (**NZDep2006**) [the field is blank for the 533 meshblocks omitted from the index]

- NZDep2006 first principal component score standardised to mean 1000 index points and standard deviation 100 index points (**NZDep_score_2006**) [up to 4 numeric characters, and the field is blank for the 533 meshblocks omitted from the index]

- Meshblock usually resident population, randomly rounded to base 3 (**UR_pop_2006**) [up to 4 numeric characters]

*This ASCII (DOS) text file can be read by word processing software (such as Microsoft Word), by spreadsheets (such as Microsoft EXCEL97 and later), and by statistical software (such as SAS). However, the file is too big to be read by some older spreadsheets.

A further downloadable tab-delimited file (**CAU_deprivation_2006.txt**), or EXCEL97 file (**CAU_deprivation_2006.xls**), gives census Area Unit numbers, names, a population weighted average NZDep2006 score for census Area Units (**CAU_average_NZDep_score_2006**), and a 1 to 10 deprivation scale for census Area Unit averages (derived from the distribution of the weighted average scores), where 1 is least deprived and 10 is most deprived (**CAU_average_NZDep2006**). The four fields, named in the first row, are:

- 2006 census area unit number (**CAU_num_2006**) [6 numeric characters]

- 2006 census area unit name (**CAU_name_2006**) [35 alphanumeric characters]

- 2006 census area unit population weighted average NZDep2006 scale (**CAU_average_NZDep2006**) [the field is blank for the 135 Area Units omitted from the index which were comprised totally of small off-shore islands, inlets, etc.]

- 2006 census area unit population weighted average NZDep2006 score (**CAU_average_NZDep_score_2006**) [the field is blank for the 135 Area Units omitted from the index which were comprised totally of small off-shore islands, inlets, etc.]
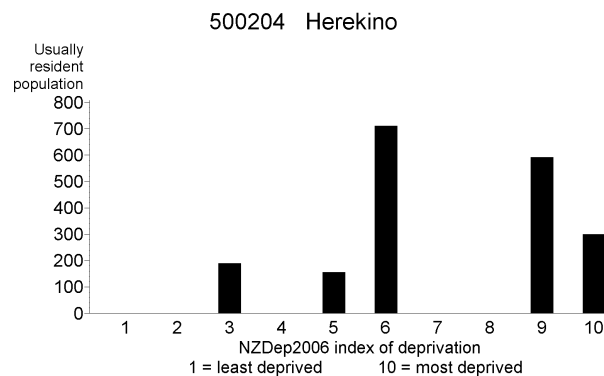
How to use the index

Using the index as a deprivation variable in analysis

1. Clean addresses, ie make sure components of addresses are in the right fields. Note that rural delivery (RD) addresses cannot be geocoded. Address cleaning is done commercially by various organisations, as listed below, for geocoding.

2. Geocode each observation in your outcome dataset (eg mortality, crime events, immunisation status) to meshblock. Automatic geocoding services are provided by various organisations, including:

   - Statistics New Zealand, phone (04) 931 4600 (Wellington), or (09) 920 9100 (Auckland), or (03) 964 8700 (Christchurch)
   - Critchlow Ltd, phone (04) 472 8244 (Wellington)

3. Merge your dataset with the NZDep2006 file (**NZDep2006.txt**) using meshblock number, thus linking each geocoded address with its area deprivation score.

4. Examples of possible analyses include:

   - If you are comparing two (or more) groups (e.g. fully immunised versus not fully immunised; or cot death cases versus control babies) compare the distributions of 10 scale values (or principal component scores) using a non-parametric test (since the scale values are ordinal, and the principal component scores are skewed, and may be more skewed in your dataset).
   - If you are comparing rates of events with deprivation (e.g. mortality rates in a region compared across the ten deprivation scale values) you could calculate a rank correlation coefficient, or simply plot your results. Note that the denominators for your rates can be added up from the usually resident meshblock populations (**UR_pop_2006**) downloadable from this website.

Calculating an average NZDep_score_2006 *value for census Area Units*

Population weighted average scores and their decile scale values for census Area Units should be avoided where possible as they disguise heterogeneity within census Area Units. For example, within Area Unit 500204, Herekino, the NZDep2006 values vary from 3 to 10, as shown in the figure. Yet the single population weighted CAU decile value for Area Unit 500204 is 8. Clearly, this single value inadequately describes the variation in deprivation within the Area Unit.

However, in circumstances where geocoding can only be carried out at the level of census area units then population weighted average scores and their decile scale values have to be used. For convenience these have already been calculated according to the scheme described in the next section, and are provided as a down-loadable file.

Calculating an average NZDep_score_2006 *value for a user defined region*

1. Define the regions in terms of the component meshblocks (**MB_num_2006**).

2. To calculate a score for a region we suggest you take the weighted average of **NZDep_score_2006** values, using population counts (**UR_pop_2006**), across all the meshblocks in the region.

3. A weighted average is obtained by multiplying each meshblock **NZDep_score_2006** value by the meshblock **UR_pop_2006**, adding these over all meshblocks in the region, and dividing this total by the total regional population count (the sum of **UR_pop_2006** for all meshblocks in the region).

$$Weighted\_average = \frac{\sum (NZDep\_score\_2006)*(UR\_pop\_2006)}{\sum UR\_pop\_2006}$$

Please note:

Average deprivation values for user defined regions calculated using the **NZDep2006** scale from 1 to 10 are less accurate than average deprivation values calculated using **NZDep_score_2006** values.

Frequently asked questions

A particular meshblock does not have a value for NZDep2006. Why?

A number of meshblocks (493) have been omitted from the index (most of these meshblocks are oceanic, sea inlets or river estuaries). They contain very few people in total. The values for a further 40 meshblocks have been withheld for technical reasons as explained in *NZDep2006 Index of Deprivation* (Salmond, Crampton & Atkinson, 2007).

The following meshblocks have had their deprivation values withheld:

0172807 0173806 0340500 0364601 0780408 0952022 1104900 1179606 1204924 1204925
1239300 1254505 1867008 1869800 1875001 1883804 2003505 2004101 2216200 2343701
2416402 3138801 3138802 3174400 3174500 3174600 3174700 3174800 3174900 3175000
3175100 3175200 3175300 3175400 3175500 3175700 3175801 3175802 3175803 3175900

How are very small meshblocks handled in NZDep2006?

Meshblocks with populations of less than 100 people have been joined with neighbouring meshblocks to make small-areas with at least 100 people before creating the index. In the file *NZDep2006.txt* (or *NZDep2006.xls)* the small-area scale value has been assigned to each component meshblock. Note that if any meshblock, or joined meshblocks, forming a small-area have more than one proportion (out of nine) based on fewer than 20 people the NZDep2006 value is considered unreliable and has been withheld. These are the 40 meshblocks listed above, which comprised 22 small-areas (out of a total of 23,786 NZDep2006 small-areas).

How are empty meshblocks handled in NZDep2006?

Meshblocks are areas where people live, but not necessarily all the time (such as holiday homes). Meshblocks may also have unoccupied houses which would have been occupied in the past, and may be occupied in the future. Empty meshblocks were agglomerated with connected non-empty meshblocks for the purposes of creating our small areas—for which the index is calculated—on the assumption that

future occupation will, to some extent, mirror the localised small neighbourhoods. The alternative was to remove such meshblocks from the index. This could give rise to a geo-coded address in the future for which no NZDep value at all was available. In this situation the observation would be 'missing' in any analysis, whereas, in the procedure adopted, the observation would be available with the best estimate of a deprivation score. When mapping NZDep in colour by meshblocks, therefore, it may be advisable to leave any empty meshblocks uncoloured.

The distribution of NZDep_score_2006 does not have mean = 1000 and standard deviation = 100. Why?

The first principal component was created from a file of 23,786 small areas with populations (as far as possible) of 100 persons or more. Typically, each small area is one or two meshblocks. In the file of 23,786 small areas the mean is 1000 and the standard deviation is 100. For usage we have provided the file of all meshblocks giving each component meshblock of any small area the small area NZDep_score_2006 value.

The distribution of NZDep2006 does not have exactly 10 percent in each of its 10 categories. Why?

NZDep2006 was created from our small areas, not from meshblocks. See comments about NZDep_score_2006 in the paragraph above.

Can I compare NZDep scores between different censuses?

Comparisons of areas as small as a single meshblock, across time, may not be meaningful. Comparisons of areas at a higher aggregation, such as Territorial Authorities, or Area Units, should be reasonable, although we advise caution in interpreting small changes over time as being practically meaningful.

Comparing relationships between deprivation and another variable, over time, is reasonable.

See the discussion in Appendix five of the report *NZDep2006 Index of Deprivation*.

All the meshblocks on Great Barrier / Matakana / Chatham / Stewart Island(s) have the same value for NZDep. Why?

These islands do not form part of the Primary Sampling Units used by Statistics New Zealand for survey purposes. There is therefore no way to automatically establish any subset of connected meshblocks on any of these islands for NZDep purposes unless *all* of them have usually-resident populations of 100 or more. This was not the case for any of these islands in 2006. Thus, within each of these four islands, all constituent meshblocks have been pooled so that, for example, the score for Great Barrier Island reflects the pooling of information across the whole of Great Barrier Island.

Reference

Salmond, C., Crampton, P. and Atkinson, J. (2007). *NZDep2006 Index of Deprivation*.

This report is available on the Ministry of Health website (http://www.moh.govt.nz) and on the University of Otago, Wellington's website (http://www.wnmeds.ac.nz/NZDep-info.html).