NZDep2013 Index of Deprivation User's Manual

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While the contents of this report have benefited considerably from the assistance of colleagues, the responsibility for this report remains solely with the authors.

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

NZDep2013 is an updated version of the NZDep91, NZDep96, NZDep2001 and NZDep2006 indexes of socioeconomic deprivation. NZDep2013 combines nine variables from the 2013 census which reflect eight dimensions of deprivation. NZDep2013 provides a deprivation score for each meshblock in New Zealand. Meshblocks are geographical units defined by Statistics New Zealand, containing a median of approximately 81 people in 2013.

The NZDep2013 index of deprivation has two forms—an ordinal scale and a continuous score.

- The NZDep2013 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 NZDep2013 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 NZDep2013 10-point scale is derived from this interval variable.

The NZDep2013 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 NZDep2013 scores.

Important points to note:

- NZDep2013 deprivation scores apply to areas rather than individual people.
- The 1 to 10 scale is ordinal not interval.
- Deprivation scores may be used, if desired, instead of the 1 to 10 scale.

NZDep2013 combines the following census data (calculated as proportions for each small area):

Dimension of deprivation	Description of variable (in order of decreasing weight in the index)
Communication	People aged <65 with no access to the Internet at home
Income	People aged 18-64 receiving a means tested benefit
Income	People living in equivalised* households with income below an income threshold
Employment	People aged 18-64 unemployed
Qualifications	People aged 18-64 without any qualifications
Owned home	People not living in own home
Support	People aged <65 living in a single parent family
Living space	People living in equivalised* households below a bedroom occupancy threshold
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 methodological papers, research reports and atlases.

Methodological papers

Crampton, P., Salmond, C. and Sutton, F. (1997), NZDep91: a new index of deprivation, *Social Policy Journal of New Zealand*, 9, 186-193.

Crampton, P., Salmond, C. and Sutton, F. (1997*), The NZDep91 index of deprivation*, in Crampton, P. and Howden-Chapman, P. (eds.), *Socioeconomic Inequalities and Health - Proceedings of the Socioeconomic Inequalities and Health Conference, Wellington, December 9-10, 1996*, Wellington, Institute of Policy Studies, Victoria University of Wellington.

Salmond, C., Crampton, P. and Sutton, F. (1998), NZDep91: a new index of deprivation, *Australian and New Zealand Journal of Public Health*, 22, 95-97.

Crampton, P. and Davis, P. (1998), Measuring deprivation and socioeconomic status: why and how, *The New Zealand Public Health Report*, 5, 81-84.

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. E., and Crampton, P. (2012), Development of New Zealand's Deprivation Index (NZDep) and Its Uptake as a National Policy Tool, *Can J Public Health*, 103(Suppl. 2), S7-S11.

Salmond, C., and Crampton, P. (2012), Measuring socioeconomic position in New Zealand, *J Prim Health Care*, 4(4), 271-280.

NZDep research reports and most recent user's manual

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), *Research Report No. 8, NZDep96 Index of Deprivation*, Wellington, Health Services Research Centre.

Salmond, C. and Crampton, P. (2002), *NZDep2001 Index of Deprivation*, Wellington, Department of Public Health, Wellington School of Medicine and Health Sciences, http://www.otago.ac.nz/wellington and http://www.moh.govt.nz.

Salmond, C., and Crampton, P. (2007), *NZDep2006 Index of Deprivation*, Wellington, Department of Public Health, University of Otago, Wellington, http://www.otago.ac.nz/wellington and http://www.moh.govt.nz.

Salmond, C. and Crampton, P. (2007), *NZDep2006 Users' Manual*. Wellington, Department of Public Health, University of Otago, Wellington, http://www.otago.ac.nz/wellington and http://www.moh.govt.nz.

Atlases

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.

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.

White, P., Gunston, J., Salmond, C., Atkinson, J., and Crampton, P. (2008), *Atlas of Socioeconomic Deprivation in New Zealand NZDep2006*, Wellington, Ministry of Health.

Uses for NZDep2013

NZDep91, NZDep96, NZDep2001, NZDep2006 and NZDep2013 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 have a long history of being 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 (**NZDep2013.txt**)[1] and the EXCEL97 file (**NZDep2013.xls**) each have 44,211 records (one per meshblock)[2]. Of these, 221 meshblocks had NZDep2013 values omitted or withheld (see FAQ section). The files have the following fields (in order) named in the first row:

- 2013 meshblock identification number (**MB_2013**) [7 numeric characters]

- 2013 census area unit number (**CAU_2013**) [6 numeric characters]

- NZDep2013 deprivation scale, where 1 is least deprived and 10 is most deprived (**NZDep2013**) [the field is blank for the 221 meshblocks omitted from the index]

- NZDep2013 first principal component score standardised to mean 1000 index points and standard deviation 100 index points (**NZDep_score_2013**) [up to 4 numeric characters, and the field is blank for the 221 meshblocks omitted from the index]

- Meshblock usually resident population, randomly rounded to base 3 (**UR_pop_2013**) [up to 4 numeric characters]

[1] 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.

[2] There are 46,629 meshblocks in total. The extra 2,418 meshblocks (46,629 - 44,211) are described mostly as Inland Water, Inlet and Oceanic and contained no usual resident population in 2013.

A further downloadable tab-delimited file (**CAU_deprivation_2013.txt**), or EXCEL97 file (**CAU_deprivation_2013.xls**), has 1867 data records, one for each occupied census Area Unit. (An additional 145 Area Units, comprised of small off-shore islands, inlets, etc. and unoccupied, were omitted from the file.) Each record gives the census Area Unit number, the name, the population weighted average NZDep2013 score for census Area Units (**CAU_average_NZDep_score_2013**), 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_NZDep2013**). The four fields, named in the first row of the file, are:

- 2013 census area unit number (**CAU_20113**) [6 numeric characters]

- 2013 census area unit name (**CAU_name_2013**) [34 alphanumeric characters]

- 2013 census area unit population weighted average NZDep2013 scale (**CAU_average_NZDep2013**)

- 2013 census area unit population weighted average NZDep2013 score (**CAU_average_NZDep_score_2013**)

How to use the index

Using the index as a deprivation variable in analysis

1. Clean addresses, i.e. 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 (e.g. mortality, crime events, immunisation status) to meshblock. Self-geocoding can be accomplished with the free tool provided by Statistics New Zealand (see *Where can I find a tool for geocoding addresses*? under *Frequently asked questions*). Alternatively, geocoding services are available commercially, for example from Critchlow Ltd, phone (04) 472 8244 (Wellington).

3. Merge your geocoded dataset with the NZDep2013 file (**NZDep2013.txt**) using meshblock number, thus linking each geocoded address with its area deprivation score.

Examples of possible analyses include:

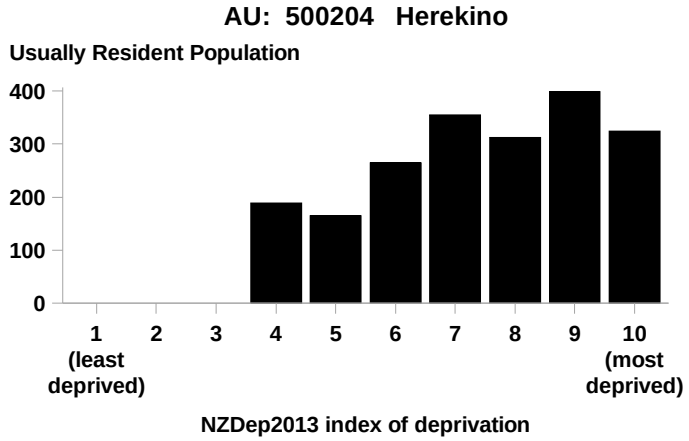
- If you are comparing two (or more) groups (e.g. fully immunised versus not fully immunised; or cot death cases versus control babies) compare the distributions of 10 scale values (or principal component scores) using a non-parametric test (since the scale values are ordinal, and the principal component 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_2013**) downloadable from this website.

Calculating an average **NZDep_score_2013** *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 NZDep2013 values vary from 4 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_2013 *value for a user-defined region

1. Define the regions in terms of the component meshblocks (**MB_2013**).

2. To calculate a score for a region we suggest you take the weighted average of **NZDep_score_2013** values, using population counts (**UR_pop_2013**), across all the meshblocks in the region.

3. A weighted average is obtained by multiplying each meshblock **NZDep_score_2013** value by the meshblock **UR_pop_2013**, adding these over all meshblocks in the region, and dividing this total by the total regional population count (the sum of **UR_pop_2013** for all meshblocks in the region).

$$Weighted\_average = \frac{\sum (NZDep\_score\_2013) * (UR\_pop\_2013)}{\sum UR\_pop\_2013}$$

Please note:

Average deprivation values for user defined regions calculated using the **NZDep2013** scale from 1 to 10 are less accurate than average deprivation values calculated using **NZDep_score_2013** values.

Frequently asked questions

A particular meshblock does not have a value for NZDep2013. Why?

Either the meshblock contained no usual residents in 2013 or the value for the meshblock has been withheld for technical reasons, as explained in *NZDep2013 Index of Deprivation* (Atkinson et al., 2014).

The following 112 meshblocks have had their deprivation values withheld:

0053404, 0061802, 0133411, 0133412, 0133428, 0171911, 0172807, 0173120, 0176414, 0178511, 0178607, 0180870, 0180871, 0180873, 0180875, 0290800, 0304300, 0364601, 0393702, 0394000, 0466104, 0468802, 0496102, 0589205, 0625400, 0681209, 0681210, 0681319, 0687001, 0711743, 0759514, 0767812, 0769040, 0812304, 0825105, 0896002, 0952121, 1053600, 1161903, 1179608, 1183203, 1183204, 1183205, 1192226, 1192229, 1192233, 1193215, 1204924, 1204925, 1254505, 1288100, 1288900, 1289102, 1371300, 1371400, 1402503, 1419100, 1556312, 1707100, 1744901, 1814302, 1867008, 1883804, 1943701, 1944702, 1944703, 1944705, 1997104, 1999732, 1999733, 1999734, 1999735, 1999736, 1999737, 1999740, 2003505, 2004104, 2004106, 2004108, 2004110, 2036303, 2052300, 2052900, 2053000, 2053105, 2053106, 2056617, 2056618, 2056619, 2126000, 2127500, 2159801, 2171005, 2171300, 2178801, 2304505, 2343701, 2346702, 2359718, 2365504, 2365710, 2448604, 2454200, 2485709, 2654600, 2654802, 2784801, 2965805, 2965807, 2965808, 2978200, 3138802.

How are very small meshblocks handled in NZDep2013?

Meshblocks with populations of less than 100 people have been joined with neighbouring meshblocks to make small-areas with at least 100 people (where possible) before creating the index. In the file *NZDep2013.txt* (or *NZDep2013.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 NZDep2013 value is considered unreliable and has been withheld. These are the 112 meshblocks listed above, which comprised 82 small-areas (out of a total of 23,751 NZDep2013 small-areas).

How are empty meshblocks handled in NZDep2013?

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. There are a further 2,418 meshblocks, described mostly as Inland Water, Inlet and Oceanic, which also contained no usual resident population in 2013. These meshblocks were not part of Statistics New Zealand's internal primary sampling unit file used in the creation of the NZDep small areas (see Atkinson et al., 2014, page 18). As they are not part of NZDep, these empty meshblocks are not included in the text and excel files.

The distribution of NZDep_score_2013 does not have mean = 1000 and standard deviation = 100. Why?

The first principal component was created from a file of 23,751 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 23,751 small areas the mean is 1000 and the standard deviation is 100. For usage we have provided the file for all meshblocks, giving each component meshblock of any small area the small area NZDep_score_2013 value.

The distribution of NZDep2013 does not have exactly 10 percent in each of its 10 categories. Why?

NZDep2013 was created from our small areas, not from meshblocks. See comments about NZDep_score_2013 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 *NZDep2013 Index of Deprivation* (Atkinson et al., 2014).

The meshblocks on Great Barrier / Matakana / Chatham / Stewart Island(s) are apparently treated differently. 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. Therefore small areas were created for these islands manually using Statistics New Zealand's Geographic Boundary Viewer.

What happens if people choose not to own one or more of a house, a car or a phone?

We are restricted to information available from the census forms, which do not include information about *choice* for these items. However, the NZDep index includes information from six deprivation variables which are unlikely to be relevant to people who make such choices, such as some people living in inner-city apartments, so the index-value for a small area is unlikely to be substantively affected by the lack of choice information for the other three index variables.

Where can I find a tool for geocoding addresses?

Geocoding is required if a researcher needs to attach an NZDep code to a survey response or an administration dataset.

Statistics New Zealand (SNZ) has a free tool for doing classification coding, including geocoding streets to meshblock. The program will code most of the addresses and then the user can go through the program manually for the ones it couldn't resolve straight away. Google Maps or SNZ's interactive Geographic Boundary Viewer may be helpful if there is doubt as to which possibility is the correct one.

SNZ's Classification Coding System Tool can be found at http://www.stats.govt.nz/surveys_and_methods/methods/classifications-and-standards/classification-related-stats-standards/download-the-classification-coding-system.aspx. The tool can be used directly at http://www.stats.govt.nz/tools_and_services/ClassificationCodeFinder.aspx . E-mail coding@stats.govt.nz if there are any difficulties getting the software to work.

The SNZ Geographic Boundary Viewer can be found at: http://www.stats.govt.nz/StatsMaps/Home/Advanced/geographic-boundary-viewer.aspx .

Is NZDep available by postcodes?

No.

Postcodes are not a Statistic New Zealand (SNZ) geographical unit. There were 1062 postcodes in 2006, a little over half the number of SNZ's populated Area Units (N = 1867 in 2013). Each Area Unit is made up of groups of SNZ's smallest geographical unit, the meshblock (N = 44,211 in 2013). We developed NZDep to be a small-area measure of deprivation, based on just one meshblock or a few neighbouring small ones (in terms of population). Roughly, only 30 percent of our small-areas (in 2013) have more than 200 people usually resident, whereas nearly 90 percent of the postcodes had more than 200 residents in 2006. An NZDep value based on an Area Unit – a decile of the distribution of Area Unit population-weighted average NZDep scores – is available. However, an Area Unit NZDep decile score may mask considerable unevenness in the preferred NZDep small-area values. This masking would be exacerbated for larger areas, such as a postcode area or an SNZ Territorial Authority (N = 73 prior to the formation of the Auckland Super City, but 67 since then). This is illustrated in Figure 2 in the research report for NZDep2013 (Atkinson et al., 2014).

Reference

Atkinson, J., Salmond, C. and Crampton, C. (2014), *NZDep2013 Index of Deprivation* [available on the website of the University of Otago, Wellington (http://www.otago.ac.nz/wellington), and on the website of the Ministry of Health (http://www.health.govt.nz)]