NZDep2018 Index of Deprivation

User's Manual

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Acknowledgments

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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

NZDep2018 is an updated version of the NZDep91, NZDep96, NZDep2001, NZDep2006 and NZDep2013 indexes of socioeconomic deprivation. NZDep2018 combines nine variables from the 2018 census which reflect eight dimensions of deprivation. NZDep2018 provides a deprivation score for each Statistical Area 1 and its constituent meshblocks, in New Zealand.

Meshblocks are the smallest geographical units defined by Statistics New Zealand. They are the building blocks for their new small geographical areas, called Statistical Area 1 [SA1], which generally contain between 100 and 200 people. These new areas, and sometimes combinations of them, were used as the basis from which NZDep2018 was calculated.

The NZDep2018 index of deprivation has two forms—an ordinal scale and a continuous score.

- The NZDep2018 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 NZDep2018 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 NZDep2018 10-point scale is derived from this interval variable.

The NZDep2018 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 SA1 (or meshblock) is in the most deprived 10 percent of our small areas in New Zealand, according the NZDep2018 scores.

Important points to note:

- NZDep2018 deprivation scores apply to areas 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.

NZDep2018 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 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
Living condition	People living in dwellings that are always damp and/or always have mould greater than A4 size

*Equivalisation: methods used to control for household composition.

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

Atkinson J, Salmond C and Crampton P (2019). *NZDep2018 Index of Deprivation, Research Report*. Wellington, Department of Public Health, University of Otago, Wellington, www.moh.govt.nz and www.otago.ac.nz.

Crampton P, Salmond C and Atkinson J (2019). A comparison of the NZDep and New Zealand IMD indexes of socioeconomic deprivation. *Kōtuitui: New Zealand Journal of Social Sciences Online*. https://www.tandfonline.com/doi/full/10.1080/1177083X.2019.1676798

Atkinson J, Salmond C and Crampton P (2014). *NZDep2013 Index of Deprivation*. Wellington, Department of Public Health, University of Otago, Wellington, www.moh.govt.nz and www.otago.ac.nz.

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

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.

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). Heterogeneity of deprivation within very small areas. *Journal of Epidemiology and Community Health*, 56:669-670.

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

C**rampton 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, Crampton P and Sutton F (1998). *Research Report No 8, NZDep96 Index of Deprivation*. 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.

Uses for NZDep2018

NZDep91, NZDep96, NZDep2001, NZDep2006, NZDep2013 and NZDep2018 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

There are three files associated with NZDep2018, each one in both comma-delimited [csv] and EXCEL [xlsx] forms. The CSV files can be read easily by NOTEPAD, by spreadsheets (such as Microsoft EXCEL), and by statistical software (such as SAS).

1. The downloadable comma-delimited file (**NZDep2018_SA1.csv**) and the EXCEL file (**NZDep2018_SA1.xlsx**) each have 29,889 records (one per Statistical Area 1 (SA1)) with the following six fields (in order) named in the first row:

    - 2018 Statistical Area 1 code (**SA12018_code**) [7 numeric characters]
    - NZDep2018 deprivation scale, where 1 is least deprived and 10 is most deprived (**NZDep2018)** [the field is blank for the 290 SA1s omitted from the index]
    - NZDep2018 first principal component score standardised to mean 1000 index points and standard deviation 100 index points (**NZDep2018_Score**) [up to 4 numeric characters, and the field is blank for the 290 SA1s omitted from the index]
    - Usually Resident population in the Statistical Area (**URPopnSA1_2018**) randomly rounded to base 3 by Statistics NZ.
    - 2018 Statistical Area 2 code (**SA22018_code**) [6 numeric characters]
    - 2018 Statistical Area 2 name (**SA22018_name**) [44 alphanumeric characters]

2. For assistance for those people using meshblocks we have produced a downloadable comma-delimited file (**NZDep2018_MB2018.csv**), or EXCEL file (**NZDep2018_MB2018.xlsx**), with the SA1 NZDep deciles and score values given to all the meshblocks (2018 version) within each SA1. There are 53,589 records (one for each meshblock), with 868 records having no NZDep2018 value (corresponding to the 290 SA1s with no values). The four fields on the file are:

    - 2018 Meshblock code (**MB2018_code**) [7 numeric characters, no leading zeros]
    - NZDep2018 deprivation scale for the SA1, where 1 is least deprived and 10 is most deprived (**NZDep2018**) [the field is blank for the 290 SA1s omitted from the index which equates to 868 meshblocks]

- NZDep2018 first principal component score for the SA1, standardised to mean 1000 index points and standard deviation 100 index points (**NZDep2018_Score**) [up to 4 numeric characters, and the field is blank for the 290 SA1s omitted from the index which equates to 868 meshblocks]
- 2018 Statistical Area 1 code (**SA12018_code**) [7 numeric characters]

3. A further downloadable comma-delimited file (**NZDep2018_WgtAvSA2.csv**), or EXCEL file (**NZDep2018_WgtAvSA2.xlsx**), gives Statistical Area 2 numbers and names, a population weighted average NZDep2018 score for SA2s (**SA2_average_NZDep2018_score**), and a 1 to 10 deprivation scale for SA2 averages (derived from the distribution of the weighted average scores), where 1 is least deprived and 10 is most deprived (**SA2_average_NZDep2018**). There are 2,253 records, one for each of the SA2s. One hundred and twenty-four of these have no NZDep2018 value. The five fields, named in the first row, are:

   - 2018 SA2 code (**SA22018_code**) [6 numeric characters]
   - 2018 SA2 name (**SA22018_name**) [44 alphanumeric characters]
   - 2018 SA2 population weighted average NZDep2018 scale (**SA2_average_NZDep2018**) [the field is blank for the 124 SA2s omitted from the index which were comprised mainly of small off-shore islands, inlets, etc.]
   - 2018 SA2 population weighted average NZDep2018 score (**SA2_average_NZDep2018_score**) [the field is blank for the 124 SA2s omitted from the index which were comprised mainly of small off-shore islands, inlets, etc.]

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 often done commercially by various organisations, along with geocoding.

2. Geocode each observation in your outcome dataset (e.g. mortality, crime events, immunisation status) to SA1 or meshblock. Automatic geocoding services are provided by various organisations or various websites.

3. Merge your dataset with the NZDep2018 file (**NZDep2018_SA1.csv** using SA1 number, or **NZDep2018_MB2018.csv** 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 SA1 populations.

Calculating an average NZDep_score_2018 *value for SA2 areas*

Population weighted average scores and their decile scale values for Statistics New Zealand's 'Statistical Area 2' geographies (SA2) should be avoided where possible as they disguise heterogeneity within those areas.

However, in circumstances where geocoding can only be carried out at the level of SA2s 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 in a downloadable file (**NZDep2018_WgtAvSA2.csv** or **NZDep2018_WgtAvSA2.xlsx**) described in the previous *File Information* section (page 10).

Calculating an average NZDep_score_2018 *value for a user defined region*

1. Define the regions in terms of the component SA1s (**SA12018_code**).

2. To calculate a score for a region we suggest you take the weighted average of **NZDep2018_score** values, using population counts obtainable from the Statistics New Zealand website or the usually resident population **URPopnSA1_2018** on **NZDep2018_SA1.csv**, across all the SA1s in the region.

3. A weighted average is obtained by multiplying each SA1 **NZDep2018_score** value by the SA1 population, adding these over all the SA1s in the region, and dividing this total by the total regional population count (the sum of the populations for all SA1s in the region).

Please note:

Average deprivation values for user defined regions calculated using the **NZDep2018** scale from 1 to 10 are less accurate than average deprivation values calculated using **NZDep2018_score** values.

Frequently asked questions

A particular SA1 or meshblock does not have a value for NZDep2018. Why?

SA1s were the building blocks for creating NZDep2018. Sixty-two SA1s, made up from 293 meshblocks, have been omitted from the index. The values for 50 of these SA1s have been withheld (see next FAQ). The remaining 12 SA1s had no information and were not included in the development of NZDep2018.

How are very small SA1s handled in NZDep2018?

SA1s with populations of less than 100 people have been joined with neighbouring SA1s within an SA2 to make small-areas with at least 100 people before creating the index. In the file *NZDep2018_SA1.csv* (or *NZDep2018_SA1.xlsx)* the small-area scale value has been assigned to each component SA1. Note that if any SA1, or joined SA1s, forming a small-area have more than one proportion (out of nine) based on fewer than 20 people the NZDep2018 value is considered unreliable and has been withheld.

How are empty SA1s handled in NZDep2018?

SA1s are areas where people live, but not necessarily all the time (such as holiday homes). SA1s may also have unoccupied houses which would have been occupied in the past, and may be occupied in the future. Empty SA1s were agglomerated with connected non-empty SA1s 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 SA1s 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 SA1s, therefore, it may be advisable to leave any empty SA1s uncoloured.

The distribution of NZDep2018_score does not have mean = 1000 and standard deviation = 100. Why?

The first principal component was created from a file of 25,939 small areas with populations (as far as possible) of 100 persons or more. Typically, each small area is one or two SA1s. In the file of 25,939 small areas the mean is 1000 and the standard deviation is 100. For usage we have provided the file of all SA1s giving each component SA1 of any small area the small area NZDep2018_score value.

The distribution of NZDep2018 does not have exactly 10 percent in each of its 10 categories. Why?

NZDep2018 was created from our small areas, not from SA1s or meshblocks. See comments about NZDep2018_score in the FAQ above.

Can I compare NZDep scores between different censuses?

Comparisons of areas as small as a single meshblock or a single SA1, across time, may not be meaningful. Comparisons of areas at a higher aggregation, such as Territorial Authorities, or SA2s, 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 *NZDep2018 Index of Deprivation* (2019).

Reference

Atkinson J, Salmond C and Crampton P (2019). *NZDep2018 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).