NZDep2018 analysis of census 2018 variables

June Atkinson, Peter Crampton, Clare Salmond

University of Otago

**31 March 2021**

# Table of contents

[Table of contents 2](#_Toc68884350)

[List of tables 2](#_Toc68884351)

[The authors 3](#_Toc68884352)

[Acknowledgements 3](#_Toc68884353)

[Ethics and confidentiality 3](#_Toc68884354)

[Glossary of abbreviations 4](#_Toc68884355)

[Purpose of this report 4](#_Toc68884356)

[Layout of the report 4](#_Toc68884357)

[Overview of NZDep2018 5](#_Toc68884358)

[Cautions 6](#_Toc68884359)

[The potentially stigmatising effects of language and comparisons 6](#_Toc68884360)

[The indicator becomes the reality 7](#_Toc68884361)

[Area versus individual measures 7](#_Toc68884362)

[Relative versus absolute deprivation 7](#_Toc68884363)

[Apparent simplicity 7](#_Toc68884364)

[Longitudinal comparisons 8](#_Toc68884365)

[Source of data 8](#_Toc68884366)

[Interpreting the graphs 8](#_Toc68884367)

[Resource documents 14](#_Toc68884368)

[References 14](#_Toc68884369)

# List of tables

[Table 1: List of variables included in NZDep2018 6](#_Toc68884370)

[Table 2: List of 2018 Census questions\* and topics 10](#_Toc68884371)

[Table 3: Separate documents of tables and graphs for each of these geographic boundaries 11](#_Toc68884372)

# The authors

**June Atkinson** is a Senior Data Analyst in the Department of Public Health, University of Otago, Wellington. She is an expert user of the statistical software suite (produced by SAS Institute) used in the production of NZDep2018.

**Peter Crampton** is Professor of Public Health in Kōhatu, Centre for Hauora Māori, University of Otago, Dunedin. Peter is a specialist in public health medicine. His research is focused on social indicators and social epidemiology, health care policy, primary health care organisation and funding, and Māori health.

**Clare Salmond** is a former member of the Department of Public Health, University of Otago, Wellington. Clare retired from her position as Senior Lecturer in Biostatistics in that Department in 2004, but has maintained her active association with the NZDep project. Clare has thirty-five years’ experience working as a biostatistician at the Wellington Hospital Epidemiology Unit and at the University of Otago (in both Dunedin and Wellington).

# Acknowledgements

The original NZDep91 project, on which NZDep96, NZDep2001, NZDep2006, NZDep2013 and NZDep2018 are based, was carried out at the Health Services Research Centre at Victoria University of Wellington and was funded by the Health Research Council of New Zealand. We are grateful to the Health Services Research Centre for supporting this work, originally, and to the Ministry of Health for supporting the production of NZDep2001, NZDep2006, NZDep2013 and NZDep2018. Equally important has been the tremendous and consistent support that Statistics New Zealand has provided.

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.

# Glossary of abbreviations

|  |  |
| --- | --- |
| DHB | District Health Board |
| NZDep | New Zealand index of socioeconomic deprivation |
| TA | Territorial Authority |

# Purpose of this report

The purpose of this report is to provide information about Aotearoa’s socioeconomic landscapes using the measurement tool NZDep2018. The report presents data from the 2018 Census as viewed through the lens of NZDep2018.

The uses to which NZDep is put include planning, needs assessment, research, resource allocation and community-based advocacy. We hope that this report provides information that is useful in assisting with these activities.

Navigation of this report is via the Table of Contents. Census information is provided at the national level, and at the District Health Board (DHB) and Territorial Authority (TA) levels.

# Layout of the report

One of the benefits of web-based publication is that we are able to include a very large amount of information using different geographic boundaries (national (total population); District Health Board (DHB); Territorial Authority (TA)).

The Chapter headings in the Table of Contents give guidance as to the contents of the report, along with links to each section.

# Overview of NZDep2018

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

It should be noted that NZDep2018 deprivation scores apply to areas rather than individual people.

NZDep2018 combines the following census data (calculated as proportions for each small area).

Table 1: List of variables included in NZDep2018

|  |  |
| --- | --- |
| **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.

# Cautions

A number of potential practical and ethical problems may arise when using measures of socioeconomic position. The following are of particular importance for NZDep.

#### The potentially stigmatising effects of language and comparisons

Measures of socioeconomic position, depending on the particular method of their construction, attempt to measure just one dimension that relates to individuals, whānau and communities—that is, where they fit into the social ordering of wealth, employment, education, life opportunities and so on. Measures of socioeconomic position do not (perhaps *should not* would be more accurate) carry a moral judgement; they give no indication of the moral or social worth of individuals or communities. Just as there are many forms of wealth, there are many forms of deprivation, socioeconomic deprivation being just one of them. Users of NZDep indexes should refer not to ‘deprivation’ but to 'socioeconomic deprivation as measured by NZDep’.

#### The indicator becomes the reality

The problem of confusing the indicator with the underlying phenomenon is discussed by Carr-Hill and Chalmers-Dixon (2002):

A common problem is to confuse the index with the phenomenon it purports to measure and, as a result, forget that *an index is only a proxy or partial measure*. (Emphasis added)

This common problem is referred to as reification. It is crucial that users of any measure of socioeconomic position recognise this problem and scrutinise both the theoretical basis for, and the construction of, the specific index.

Users of NZDep indexes should refer to 'areas that have the most socioeconomically deprived NZDep scores' rather than 'the most deprived areas'.

#### Area versus individual measures

Please note that NZDep is a small-area measure of deprivation. Caution must be used if the index is applied to individuals. This issue is discussed in greater detail in *NZDep - What does it measure?* (Salmond & Crampton, 2001), in *Heterogeneity of deprivation within very small areas* (Salmond & Crampton, 2002), and in *NZiDep: A New Zealand index of socioeconomic deprivation for individuals* (Salmond et al, 2006).

#### Relative versus absolute deprivation

A view is sometimes expressed in reference to NZDep that 'it is disgraceful that still 10% of areas are most deprived'. Please note that 10% of areas will *always* fall into the most deprived decile of NZDep scores—NZDep is designed to measure *relative* socioeconomic deprivation, not *absolute* socioeconomic deprivation.

#### Apparent simplicity

The NZDep scales (from 1 to 10) have been constructed so that they can be readily used in a variety of contexts. They are easily presented graphically. This simplicity should not be allowed to obscure the underlying complexity of construction, the limitation to components available from the Census, and the underlying theoretical assumptions. This is discussed in the*Atlas of Socioeconomic Deprivation in New Zealand: NZDep2006* (White et al, 2008), in *Development of New Zealand’s Deprivation Index (NZDep) and Its Uptake as a National Policy Tool* (Salmond & Crampton, 2012), and in *A comparison of the NZDep and New Zealand IMD indexes of socioeconomic deprivation* (Crampton et al, 2019).

#### Longitudinal comparisons

Difficulties arise in making comparisons between different NZDep indexes (NZDep91, NZDep96, NZDep2001, NZDep2006, NZDep2013 and NZDep2018). These difficulties are discussed in detail in Appendix five of the NZDep2018 Research Report (Atkinson et al, 2020).

# Source of data

All information in this report is derived from the 2018 Census process. Almost all of the data has been sourced from Stats NZ webpage ‘Statistical area 1 dataset for 2018 Census – updated March 2020’ (<https://www.stats.govt.nz/information-releases/statistical-area-1-dataset-for-2018-census-updated-march-2020>). The information at the Statistical Area 1 (SA1) level used the associated NZDep2018 (SA1 level version). The data have been summarised to the relevant geographical level in the report (All NZ, DHB and TA). Totals in this report therefore may differ slightly from the actual totals due to the use of random rounded SA1 values in the summations.

The question labelled *I08b Birthplace (broad geographic areas)* was not reported by Stats NZ at the SA1 level, therefore SA2 data were used, matched to the weighted average SA2 version of NZDep2018 and then summarised. Totals in this report therefore may differ slightly from the actual totals due to the use of random rounded SA2 values in the summations.

Ethnicity variables by sex (*E\_IM, E\_IP, E\_IA, E\_IE, E\_IL*) were calculated in the data laboratory by the authors at the relevant geographies, random rounded base 3, confidentiality checked and released.

# Interpreting the graphs

The numbers in the stacked bar graphs are rounded to whole numbers. In the line graphs, strictly speaking the data points on the graphs should not be joined by dotted or solid lines, because such lines imply that the underlying NZDep 1-10 scale is a continuous variable, which it is not (it is an ordinal scale). We have included the lines, however, as they make the graphs easier to read and interpret.

The Chapter headings in the Table of Contents give guidance as to the contents of the report, along with links to each section. To assist with navigation, Table 2 below provides a list of Census questions and their respective topics.

Table 2: List of 2018 Census questions\* and topics

|  |  |  |  |
| --- | --- | --- | --- |
| **Census question number** | **Topic** | **Census question number** | **Topic** |
| C00\_ | Population counts | I27 | Number children born |
| I03 | Sex | I28 | Individual home ownership |
| I00 | Unit record data sources | I31 | Highest qualification |
| I02a | Age broad groups | I34 | Sources of income |
| I02b | Age 5 yr groups to 85 | I35 | Grouped personal income |
| I02F | Age 5 yr groups (Females) | I36 | Work and labour force status |
| I02M | Age 5 yr groups (Males) | I37 | Hours worked per week |
| I05 | Years at usual residence | I39 | Status in employment |
| I06c | Usual residence 5 yrs ago | I40a | Occupation (usual residence) |
| I07 | Ethnicity (total responses) | I40b | Occupation (workplace address) |
| E\_IM | Ethnicity (Maori/nonMaori) by sex | I42a | Industry (usual residence) |
| E\_IP | Ethnicity (Pacific/nonPacific) by sex | I42b | Industry (workplace address) |
| E\_IA | Ethnicity (Asian/nonAsian) by sex | I44a | Travel to work (usual residence) |
| E\_IE | Ethnicity (European/nonEuropean) by sex | I44b | Travel to work (workplace address) |
| E\_IL | Ethnicity (MELAA/nonMELAA) by sex | I19a | Travel to education (usual residence) |
| I11 | Maori descent | I19b | Travel to education (educational institute) |
| I08a | Birthplace (NZ/overseas) | I49 | Unpaid activities |
| I08b | Birthplace (broad geographic areas) | D00b | Dwelling occupancy status |
| I09 | Years since arrival in NZ | D02 | Dwelling record type |
| I14 | Usual residence 1 yr ago | D03a | Occupied private dwelling type |
| I15 | Languages spoken (total responses) | D03b | Occupied non-private dwelling type |
| I16 | Religious affiliations | D05 | Tenure of household |
| I18a | Study participation (usual residence) | D06 | Sector of landlord |
| I18b | Study participation (usual residence 5 yrs ago) | D08 | Weekly rent |
| I22a | Difficulty seeing | D10a | Number of rooms in dwelling |
| I22b | Difficulty hearing | D10b | Number of bedrooms in dwelling |
| I22c | Difficulty walking | D11a | Main types of heating in dwelling |
| I22d | Difficulty remembering | D11b | Main fuel types in dwelling |
| I22e | Difficulty washing | D12 | Access to telecommunications |
| I22f | Difficulty communicating | D13 | Motor vehicles available to dwelling |
| I24 | Smoking status | D14 | Dwelling dampness indicator |
| I26a | Legally registered relationship | D15 | Dwelling mould indicator |
| I26b | Partnership status | D16 | Access to basic amenities |

*\*E\_IM, E\_IP, E\_IA, E\_IE, E\_IL calculated by authors in data laboratory. All others sourced from* [*https://www.stats.govt.nz/information-releases/statistical-area-1-dataset-for-2018-census-updated-march-2020*](https://www.stats.govt.nz/information-releases/statistical-area-1-dataset-for-2018-census-updated-march-2020)

Table 3: Separate documents of tables and graphs for each of these geographic boundaries

| **Geography** | **GeoVal** | **Area Label** | **Link to file** |
| --- | --- | --- | --- |
| All | - | Summary for Total NZ | [CensusGraphsOverall](http://hdl.handle.net/10523/12052) |
| DHB | 01 | Northland | [CensusGraphsDHB01](http://hdl.handle.net/10523/11925) |
| DHB | 02 | Waitemata | [CensusGraphsDHB02](http://hdl.handle.net/10523/11926) |
| DHB | 03 | Auckland | [CensusGraphsDHB03](http://hdl.handle.net/10523/11927) |
| DHB | 04 | Counties Manukau | [CensusGraphsDHB04](http://hdl.handle.net/10523/11928) |
| DHB | 05 | Waikato | [CensusGraphsDHB05](http://hdl.handle.net/10523/11929) |
| DHB | 06 | Lakes | [CensusGraphsDHB06](http://hdl.handle.net/10523/11930) |
| DHB | 07 | Bay of Plenty | [CensusGraphsDHB07](http://hdl.handle.net/10523/11931) |
| DHB | 08 | Tairawhiti | [CensusGraphsDHB08](http://hdl.handle.net/10523/11932) |
| DHB | 09 | Taranaki | [CensusGraphsDHB09](http://hdl.handle.net/10523/11935) |
| DHB | 10 | Hawke's Bay | [CensusGraphsDHB10](http://hdl.handle.net/10523/11936) |
| DHB | 11 | Whanganui | [CensusGraphsDHB11](http://hdl.handle.net/10523/11937) |
| DHB | 12 | MidCentral | [CensusGraphsDHB12](http://hdl.handle.net/10523/11938) |
| DHB | 13 | Hutt Valley | [CensusGraphsDHB13](http://hdl.handle.net/10523/11939) |
| DHB | 14 | Capital and Coast | [CensusGraphsDHB14](http://hdl.handle.net/10523/11940) |
| DHB | 15 | Wairarapa | [CensusGraphsDHB15](http://hdl.handle.net/10523/11941) |
| DHB | 16 | Nelson Marlborough | [CensusGraphsDHB16](http://hdl.handle.net/10523/11942) |
| DHB | 17 | West Coast | [CensusGraphsDHB17](http://hdl.handle.net/10523/11943) |
| DHB | 18 | Canterbury | [CensusGraphsDHB18](http://hdl.handle.net/10523/11944) |
| DHB | 19 | South Canterbury | [CensusGraphsDHB19](http://hdl.handle.net/10523/11945) |
| DHB | 22 | Southern | [CensusGraphsDHB22](http://hdl.handle.net/10523/11946) |
| TA | 001 | Far North District | [CensusGraphsTA001](http://hdl.handle.net/10523/11948) |
| TA | 002 | Whangarei District | [CensusGraphsTA002](http://hdl.handle.net/10523/11949) |
| TA | 003 | Kaipara District | [CensusGraphsTA003](http://hdl.handle.net/10523/11950) |
| TA | 011 | Thames-Coromandel District | [CensusGraphsTA011](http://hdl.handle.net/10523/11951) |
| TA | 012 | Hauraki District | [CensusGraphsTA012](http://hdl.handle.net/10523/11952) |
| TA | 013 | Waikato District | [CensusGraphsTA013](http://hdl.handle.net/10523/11953) |
| TA | 015 | Matamata-Piako District | [CensusGraphsTA015](http://hdl.handle.net/10523/11954) |
| TA | 016 | Hamilton City | [CensusGraphsTA016](http://hdl.handle.net/10523/11955) |
| TA | 017 | Waipa District | [CensusGraphsTA017](http://hdl.handle.net/10523/11958) |
| TA | 018 | Otorohanga District | [CensusGraphsTA018](http://hdl.handle.net/10523/11959) |
| TA | 019 | South Waikato District | [CensusGraphsTA019](http://hdl.handle.net/10523/11960) |
| TA | 020 | Waitomo District | [CensusGraphsTA020](http://hdl.handle.net/10523/11961) |
| TA | 021 | Taupo District | [CensusGraphsTA021](http://hdl.handle.net/10523/11970) |
| TA | 022 | Western Bay of Plenty District | [CensusGraphsTA022](http://hdl.handle.net/10523/11971) |
| TA | 023 | Tauranga City | [CensusGraphsTA023](http://hdl.handle.net/10523/11972) |
| TA | 024 | Rotorua District | [CensusGraphsTA024](http://hdl.handle.net/10523/11973) |
| TA | 025 | Whakatane District | [CensusGraphsTA025](http://hdl.handle.net/10523/11974) |
| TA | 026 | Kawerau District | [CensusGraphsTA026](http://hdl.handle.net/10523/11975) |
| TA | 027 | Opotiki District | [CensusGraphsTA027](http://hdl.handle.net/10523/11976) |
| TA | 028 | Gisborne District | [CensusGraphsTA028](http://hdl.handle.net/10523/11977) |
| TA | 029 | Wairoa District | [CensusGraphsTA029](http://hdl.handle.net/10523/11978) |
| TA | 030 | Hastings District | [CensusGraphsTA030](http://hdl.handle.net/10523/11979) |
| TA | 031 | Napier City | [CensusGraphsTA031](http://hdl.handle.net/10523/11980) |
| TA | 032 | Central Hawke's Bay District | [CensusGraphsTA032](http://hdl.handle.net/10523/11981) |
| TA | 033 | New Plymouth District | [CensusGraphsTA033](http://hdl.handle.net/10523/11982) |
| TA | 034 | Stratford District | [CensusGraphsTA034](http://hdl.handle.net/10523/11983) |
| TA | 035 | South Taranaki District | [CensusGraphsTA035](http://hdl.handle.net/10523/11984) |
| TA | 036 | Ruapehu District | [CensusGraphsTA036](http://hdl.handle.net/10523/11986) |
| TA | 037 | Whanganui District | [CensusGraphsTA037](http://hdl.handle.net/10523/11987) |
| TA | 038 | Rangitikei District | [CensusGraphsTA038](http://hdl.handle.net/10523/11988) |
| TA | 039 | Manawatu District | [CensusGraphsTA039](http://hdl.handle.net/10523/11989) |
| TA | 040 | Palmerston North City | [CensusGraphsTA040](http://hdl.handle.net/10523/11990) |
| TA | 041 | Tararua District | [CensusGraphsTA041](http://hdl.handle.net/10523/12017) |
| TA | 042 | Horowhenua District | [CensusGraphsTA042](http://hdl.handle.net/10523/12028) |
| TA | 043 | Kapiti Coast District | [CensusGraphsTA043](http://hdl.handle.net/10523/12039) |
| TA | 044 | Porirua City | [CensusGraphsTA044](http://hdl.handle.net/10523/12046) |
| TA | 045 | Upper Hutt City | [CensusGraphsTA045](http://hdl.handle.net/10523/12047) |
| TA | 046 | Lower Hutt City | [CensusGraphsTA046](http://hdl.handle.net/10523/12048) |
| TA | 047 | Wellington City | [CensusGraphsTA047](http://hdl.handle.net/10523/12049) |
| TA | 048 | Masterton District | [CensusGraphsTA048](http://hdl.handle.net/10523/12050) |
| TA | 049 | Carterton District | [CensusGraphsTA049](http://hdl.handle.net/10523/12051) |
| TA | 050 | South Wairarapa District | [CensusGraphsTA050](http://hdl.handle.net/10523/12018) |
| TA | 051 | Tasman District | [CensusGraphsTA051](http://hdl.handle.net/10523/12019) |
| TA | 052 | Nelson City | [CensusGraphsTA052](http://hdl.handle.net/10523/12020) |
| TA | 053 | Marlborough District | [CensusGraphsTA053](http://hdl.handle.net/10523/12021) |
| TA | 054 | Kaikoura District | [CensusGraphsTA054](http://hdl.handle.net/10523/12022) |
| TA | 055 | Buller District | [CensusGraphsTA055](http://hdl.handle.net/10523/12023) |
| TA | 056 | Grey District | [CensusGraphsTA056](http://hdl.handle.net/10523/12024) |
| TA | 057 | Westland District | [CensusGraphsTA057](http://hdl.handle.net/10523/12025) |
| TA | 058 | Hurunui District | [CensusGraphsTA058](http://hdl.handle.net/10523/12026) |
| TA | 059 | Waimakariri District | [CensusGraphsTA059](http://hdl.handle.net/10523/12027) |
| TA | 060 | Christchurch City | [CensusGraphsTA060](http://hdl.handle.net/10523/12029) |
| TA | 062 | Selwyn District | [CensusGraphsTA062](http://hdl.handle.net/10523/12030) |
| TA | 063 | Ashburton District | [CensusGraphsTA063](http://hdl.handle.net/10523/12031) |
| TA | 064 | Timaru District | [CensusGraphsTA064](http://hdl.handle.net/10523/12032) |
| TA | 065 | Mackenzie District | [CensusGraphsTA065](http://hdl.handle.net/10523/12033) |
| TA | 066 | Waimate District | [CensusGraphsTA066](http://hdl.handle.net/10523/12034) |
| TA | 067 | Chatham Islands Territory | [CensusGraphsTA067](http://hdl.handle.net/10523/12035) |
| TA | 068 | Waitaki District | [CensusGraphsTA068](http://hdl.handle.net/10523/12036) |
| TA | 069 | Central Otago District | [CensusGraphsTA069](http://hdl.handle.net/10523/12037) |
| TA | 070 | Queenstown-Lakes District | [CensusGraphsTA070](http://hdl.handle.net/10523/12038) |
| TA | 071 | Dunedin City | [CensusGraphsTA071](http://hdl.handle.net/10523/12040) |
| TA | 072 | Clutha District | [CensusGraphsTA072](http://hdl.handle.net/10523/12041) |
| TA | 073 | Southland District | [CensusGraphsTA073](http://hdl.handle.net/10523/12042) |
| TA | 074 | Gore District | [CensusGraphsTA074](http://hdl.handle.net/10523/12043) |
| TA | 075 | Invercargill City | [CensusGraphsTA075](http://hdl.handle.net/10523/12044) |
| TA | 076 | Auckland | [CensusGraphsTA076](http://hdl.handle.net/10523/12045) |

# Resource documents

**Atkinson, J., Salmond, C., & Crampton, P.** (2019). NZDep2018 Index of Deprivation User's Manual. Wellington: University of Otago. <http://www.wnmeds.ac.nz/NZDep-info.html>

**Atkinson, J., Salmond, C., & Crampton, P.** (2020). NZDep2018 Index of Deprivation, Final Research Report, December 2020. Wellington: University of Otago. <http://www.wnmeds.ac.nz/NZDep-info.html>

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

# References

**Atkinson, J., Salmond, C. & Crampton, P.** (2020) *NZDep2018 Index of Deprivation, Final Research Report, December 2020*. Wellington: University of Otago.

**Carr-Hill, R. & Chalmers-Dixon, P.** (2002) *A review of methods for monitoring and measuring social inequality, deprivation, and health inequality*, 2002. Available online: [www.sepho.org.uk/HealthInequalities/carrhill/empty.htm](file:///C:\Users\User\AppData\Local\Temp\www.sepho.org.uk\HealthInequalities\carrhill\empty.htm)

**Crampton, P., Salmond, C. & Atkinson, J.** (2019) A comparison of the NZDep and New Zealand IMD indexes of socioeconomic deprivation. *Kōtuitui: New Zealand Journal of Social Sciences Online*.

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

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

**Salmond, C. & Crampton, P.** (2012) The development of New Zealand’s deprivation index (NZDep) and its uptake as a national policy tool. *Canadian Journal of Public Health*, 103 (Suppl 2), S7-S11.

**Salmond, C., King, P., Crampton, P. & Waldegrave, C.** (2006) NZiDep: A New Zealand index of socioeconomic deprivation for individuals. *Social Science & Medicine*, 62, 1474-1485.

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