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Deprivation in New Zealand: Regional Patterns and Changes

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Abstract

This paper presents an analysis of the distribution of socio-economic deprivation throughout New Zealand. The analysis focuses on the three census years 1986, 1991, and 1996. A summary deprivation measure is constructed which approximates NZDep96 using standard regression techniques. The paper extends a static analysis of deprivation by examining changes to the deprivation profile across time on a regional basis. Differences in the incidence of deprivation for different ethnic groups are emphasised. Maori and Pacific people are more likely to live in deprived meshblocks than their European counterparts. We also touch on the role isolation plays in determining the distribution of deprivation.

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1. INTRODUCTION

This paper analyses socio-economic deprivation in New Zealand. The paper's purpose is to act as an input into Treasury's work on the inclusive economy. In particular the paper presents an empirical picture of the distribution of deprivation within New Zealand. This empirical picture has been used to illustrate Treasury's work on the regional aspect of the inclusive economy, which focuses on the importance of the economics of geography.

An inclusive economy is about directing policy at a broader objective than simply growth in GDP. The broader objective is to maximise New Zealander's well-being. An important step towards obtaining an inclusive economy is to know who or which communities may be excluded at present. This is where this paper comes in; by looking at which communities are deprived we aim to get a sense of which groups and areas are likely to be excluded from the wider economy and thus where effort may need to be focused to achieve an inclusive economy.

The paper is structured so that we begin in section 2 by looking at what we mean by the term "deprivation". Once this is established, section 3 moves on to looking at how we measure deprivation in this study. Basically this involves constructing a measure that approximates NZDep96 but which is available for multiple census years. NZDep96 is a measure of relative socio-economic deprivation. It is described in more detail in Section 2. The basic geographical unit for which a deprivation score was developed is the meshblock.

Next there is a section focusing on each of the following key questions:

- Where is deprivation located in New Zealand? (section 4)

We show which areas (for ease of presentation we focus on regional councils) have either large numbers of people living in deprived meshblocks or have large proportions of their population living in deprived meshblocks.

- Who lives in the deprived meshblocks? (section 5)

This section focuses on the extent to which particular ethnic groups are disproportionately represented amongst the people living in deprived meshblocks.

- What is happening to deprivation over time? (section 6)

This section expands on the static focus of the first question by looking at what has happened across the three census years 1986, 1991 and 1996. We look at:

- Which areas have been getting better and which areas worse in terms of the proportion of an area's population living in deprived meshblocks?
- How have the different ethnic groups fared during this time?
- Do deprived areas remain deprived? (Does deprivation persist?)

- How does isolation influence deprivation? (section 7)

This section presents evidence on the link between a measure of isolation and deprivation.

Before providing some suggestions for future research in section 9 and presenting the main conclusions of our research in section 10, there is a small section (section 8) looking at within-region income inequality.

2. WHAT DO WE MEAN BY "DEPRIVATION"?

An often quoted definition defines deprivation as "a state of observable and demonstrable disadvantage relative to the local community or the wider society or nations to which an individual, family or group belongs." (Townsend, 1987)

Deprivation is a multi-dimensional concept. In the literature a distinction is often made between 'material' and 'social' deprivation. For example Townsend (1987) states: "People may not have the material goods of modern life or the immediately surrounding material facilities or amenities. On the other hand, they may not have access to ordinary social customs, activities and relationships. The latter are more difficult to establish and measure and the two sets of conditions may be difficult in practice to separate." (Townsend, 1987, p.127) Operational measures of social deprivation are much less developed than are measures of material deprivation.

Even within the two general strands of 'material' and 'social' deprivation there are a number of sub-categories. Subsequently, people can experience one or more forms of deprivation without necessarily being in poverty.

For our purposes we are ideally interested in a broader concept: well-being. Well-being comes from more than material consumption – it comes also from a good job, good health, security, education, enjoying family and friends, and participating in a fair, tolerant and well-functioning community. However these sorts of things are difficult to measure directly, so in order to approximate well-being we use a measure of deprivation, which collects together some of the indicators we think are relevant. Income, for example, is correlated with well-being to the extent that it affords people choices and allows them to pursue lives that they value. Employment, as well as providing income, enables participation in society. Education has been shown to be a risk factor correlated with other outcomes. There are other indicators such as health status that are likely to be important. Composite measures of deprivation are better than any one indicator alone, but it is important to keep in mind that what we are measuring is not well-being, but an imperfect and limited proxy.

Probably the most comprehensive summary measure of deprivation in the New Zealand context is known as NZDep96. Clare Salmond, Peter Crampton and Frances Sutton at the Health Services Research Centre developed NZDep96. NZDep96 is a measure of *relative* deprivation that provides a deprivation score for each meshblock in New Zealand. The higher the score the more deprived a meshblock is. Based on these scores it also places meshblocks into deprivation deciles. A meshblock is the smallest geographical area for which Statistics New Zealand collects and analyses data. In an urban setting a meshblock is roughly equivalent to an urban block. Meshblocks have a median population of 90 persons. Meshblocks do vary both in the size of their population and the physical area that they cover.

The NZDep96 score combined nine variables to obtain a summary deprivation measure. These variables are shown in the table below (Salmond, Crampton and Sutton, 1996):

Table 1: Factors incorporated in NZDep96

Dimension of Deprivation	Variable description
Communication	People with no access to a telephone
Income	People aged 18-59 receiving a means tested benefit
Employment	People aged 18-59 unemployed
Income	People living in equivalised households with income below an income threshold
Transport	People with no access to a car
Support	People aged <60 living in a single parent family
Qualifications	People aged 18-59 without any qualifications
Owned home	People not living in own home
Living Space	People living in equivalised households below a bedroom occupancy threshold

NZDep96 doesn't include indicators of health status because it was developed in order to test the correlation between indicators of deprivation and health outcomes. The correlations were high – health is related to other measures of well-being and deprivation.

NZDep96 summarises how deprived a meshblock is based on the prevalence of individuals living in the meshblock lacking the dimensions stated in Table 1. That is it says how deprived a meshblock is based on differences in income, employment, education, housing, etc. It does not say how deprived a meshblock is controlling for these factors.

NZDep96 is a measure that relates to a meshblock and not to an individual. An individual who moves from a decile 10 (the most deprived decile) meshblock to a decile 1 (the least deprived decile) meshblock is not necessarily improving their lot, as they may be just as likely to be unemployed and low-skilled regardless of the physical location they live in (putting aside contextual effects of residential area).

Section 2 – Summary

> **Deprivation**: a state of observable and demonstrable disadvantage relative to the local community or the wider society or nations to which an individual, family or group belongs.

3. HOW WE MEASURED DEPRIVATION IN THIS STUDY

NZDep96 provides deprivation scores based only on 1996 census data[1]. In this study we want to look at how the deprivation story is changing over time and therefore need deprivation scores for multiple years. To do this we construct a deprivation measure for the three census years 1986, 1991 and 1996.

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[1] The Health Services Research Centre developed an earlier deprivation measure known as NZDep91. This was constructed using different variables to NZDep96 and consequently the two measures are not strictly comparable.

Rather than starting completely from scratch in creating our deprivation measure, we decided to leverage off the substantive work that had been done in constructing NZDep96. NZDep96 was constructed using individual record data obtained under a special agreement with Statistics New Zealand. We do not have access to this data and given our limited timeframe for completing this project decided to use data contained in the Treasury/Motu Regional Database. This database provides data for 1986, 1991 and 1996 disaggregated down to meshblock level.

Our aim was to construct a deprivation measure with the following key features:

- It has a good fit with NZDep96 when using 1996 data;
- It utilises meshblock level data rather than individual data;
- It is obtainable for 1986, 1991, and 1996.

We called our deprivation measure ProxyDep as it is a proxy for a more carefully constructed deprivation measure.

The first step in producing ProxyDep was to estimate the following equation using linear regression techniques.

Equation 1:

$$\ln NZDep96_i = \alpha + \beta_1 UE_i + \beta_2 \ln Medinc_i + \beta_3 NoQ_i + \beta_4 Popl15_i + \beta_5 Pop15\_24_i$$
$$+ \beta_6 Pop25\_34_i + \beta_7 Pop35\_44_i + \beta_8 Pop45\_54_i + \beta_9 Popp65_i + \beta_{10} Par_i + \varepsilon_i$$

Where:

NZDep96 = the NZDep96 score.

UE = the proportion of a meshblock's population (aged 15 and over) who are unemployed.[2]

Medinc = the median personal income in a meshblock (in 1996 dollars terms).

NoQ = the proportion of a meshblock's population (aged 15 and over) with no formal qualification[3] divided by the proportion of a meshblock's population with a qualification.

Popl15 = the proportion of a meshblock's population aged less than 15.

Pop15_24 = the proportion of a meshblock's population aged between 15 and 24 (inclusive).

Pop25_34 = the proportion of a meshblock's population aged between 25 and 34 (inclusive).

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[2] Note that this measure differs from the usual unemployment rate measure, which is expressed as a proportion of the labour force rather than as a proportion of the working age population.
[3] Either school or industry based qualifications.

Pop35_44 = the proportion of a meshblock's population aged between 35 and 44 (inclusive).

Pop45_54 = the proportion of a meshblock's population aged between 45 and 54 (inclusive).

Popp65 = the proportion of a meshblock's population aged 65 years and over.

Par= the percentage of households in a meshblock with at least one one-parent family[4].

The subscript i denotes meshblock i.

The first three explanatory variables represent the 3 deprivation factors we are using to try and approximate NZDep96. They are an approximation of a subset of the variables used in constructing NZDep96 and we have data available for these variables for the three census years being investigated in this study.[5]

The age variables have been included to try and control for differing age-profiles between meshblocks. For example, income tends to follow an inverted "U" shape across an individual's lifetime (particularly for males)[6] so variations in income levels across meshblocks may be due to one meshblock having predominantly middle aged people while another has younger people.

When trying to measure deprivation it is common practice to use equivalised incomes. Equivalisation involves adjusting income levels to take into account different household compositions. For example, a two person household requires less than twice the income of a one person household to be equally well off. We were unable to equivalise the income data we had using standard techniques and therefore included the Par variable as an attempt to at least partly control for differences in family composition.[7]

The summary results from the regression are shown below (Table 2).

The regression results show that all the coefficients are highly significant[8]. The coefficients of the 3 explanatory variables, UE, ln Medinc, and NoQ all take the signs one would expect. The unemployment rate is positively related to the deprivation score so an increase in a meshblock's unemployment rate would mean that a meshblock is more deprived. Median income is negatively related to the deprivation score so an increase in the median income of a meshblock would see the meshblock becoming less deprived. The no qualifications measure is positively related to the deprivation score, meaning that an increase in the proportion of a meshblock's population without a qualification would translate into increased deprivation.

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[4] A household may contain more than one family. For multiple family households if one of the families was a sole parent family then the household would have been included in the Par measure.

[5] NZDep96 used, for example, an income threshold and not median income; hence the 3 variables are only an approximation of those used in NZDep96.

[6] See for example Coleman (1999)

[7] The Par variable also approximates the NZDep96 single parent variable (referred to as 'Support' in Table 1).

[8] By this we mean that for each coefficient we can reject the null hypothesis that the coefficient is equal to 0. This can be done at virtually any significance level for all the coefficients except for the coefficient on Pop35_44, which is significant at the 5% level.

Table 2: Summary of Regression Results

Variable	Coef.	Std.Err	t	P>|t|	95% Conf. Int	
UE	0.404	0.004	93.8	0	0.396	0.412
ln Medinc	-0.065	0.001	-55.5	0	-0.067	-0.063
NoQ	0.206	0.002	85.9	0	0.201	0.211
Popl15	0.082	0.006	14.4	0	0.071	0.093
Pop15_24	0.065	0.006	11.2	0	0.053	0.076
Pop25_34	0.146	0.006	24.3	0	0.134	0.158
Pop35_44	-0.014	0.007	-2.1	0.04	-0.027	-0.001
Pop45_54	-0.033	0.007	-4.7	0	-0.047	-0.019
Popp65	0.029	0.006	4.8	0	0.017	0.041
Par	0.002	0.000	70.7	0	0.002	0.002
Constant	7.351	0.013	580.4	0	7.326	7.375

The regression's R^2 was 0.76 meaning that 76 percent of the variation in the log of the NZDep96 scores was explained by the explanatory variables included in our model. This is a reasonable level of fit without being outstanding.

Using the coefficients from the regression results as weights we were able to construct a deprivation score for each meshblock for 1986, 1991 and 1996. This was done by inserting values for each of the variables in the following equation.

Equation 2:

$$\ln \Pr oxyDep_{ij} = 7.351 + 0.404 UE_{ij} - 0.065 \ln Medinc_{ij} + 0.206 NoQ_{ij} + 0.082 Popl15_{ij}$$
$$+ 0.065 Pop15\_24_{ij} + 0.146 Pop25\_34_{ij} - 0.014 Pop35\_44_{ij} - 0.033 Pop45\_54_{ij}$$
$$+ 0.029 Popp65_{ij} + 0.002 Par_{ij}$$

The subscripts, ij, denote meshblock i in year j.

To aid in presenting our results on deprivation for each year we divided the meshblocks into deciles of deprivation. This was done by allocating each meshblock a deprivation decile marker. These deprivation decile markers ranged from 1 to 10, with 10 being the most deprived and 1 being the least deprived. The decile markers were allocated in such a way that if you sum up the population living in all the meshblocks with a particular marker score, you would get 10 percent of New Zealand's population. So, for example, the most deprived decile (decile 10) contains the 10% of New Zealand's population who live in those meshblocks with the highest deprivation scores.

We therefore have both a proxy deprivation score and a deprivation decile for each meshblock for which we had data on the variables included in our proxy deprivation measure. With this information we are able to begin looking at the questions of interest.

It should be emphasised that our ProxyDep scores relate to areas (meshblocks) rather than to individual people. In each meshblock there will be a range associated with the extent to which individuals experience deprivation. For example, not every one living in decile 10 meshblocks would be classified as deprived if one were to do a study of deprivation amongst individuals. Conversely there may be some relatively deprived individuals living in the least deprived meshblocks.

Section 3 – Summary

Our proxy deprivation measure (ProxyDep) is based on:

- Income
- Educational attainment
- Employment status.

It controls for differences in age composition and household composition.

ProxyDep like NZDep96 relates to meshblocks and <u>not</u> individuals. ProxyDep is available for 1986, 1991 and 1996.

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4. WHERE IS DEPRIVATION LOCATED IN NEW ZEALAND?

In this section we focus on showing where in New Zealand deprivation was located in 1996 (the most recent year for which we have data).

Figure 1 plots the location of the most and least deprived meshblocks in New Zealand based on our ProxyDep (1996) measure. A moving average technique (see Figure 1 note) has been used to remove the noise associated with simply plotting each meshblock. This technique allows patterns to show up more clearly. As is noted in "Degrees of Deprivation in New Zealand – An atlas of socio-economic difference"[9], meshblocks are difficult for the eye to compare principally because of large variation in the physical size of meshblocks. Consequently the large sparsely populated rural meshblocks tend to be more visually obvious than the smaller urban meshblocks. This point is emphasised when looking at the expanded maps of the Auckland and Wellington regions. When one drills down to this more detailed scale, pockets of both deprived and non-deprived meshblocks become apparent.

The most deprived areas (shown in black) are broadly the same areas as showed up in the national map in "Degrees of Deprivation in New Zealand – An atlas of socio-economic difference" (pages 30-31), namely parts of Northland, the East Cape and Buller. This gives us at least some assurance that our measure is behaving similarly to NZDep96 on which the atlas is based.

The fact that we have proxy deprivation scores and deciles for in excess of 30,000 meshblocks means that it is possible to conduct analysis of these results for any geographical area that can be formed by aggregating meshblocks. For presentational reasons the analysis that follows has been conducted at the regional council level. The deprivation measures that we have constructed could, however, be used to conduct analysis on a smaller scale provided the area of interest can be constructed by aggregating meshblocks. The advantage of using large units, such as regional councils, is that there are only 16 and so results can be readily presented by using tables. A disadvantage is that you can lose some of the detail due to variations that occur on a smaller scale and smaller area factors such as neighbourhood effects cannot be investigated.

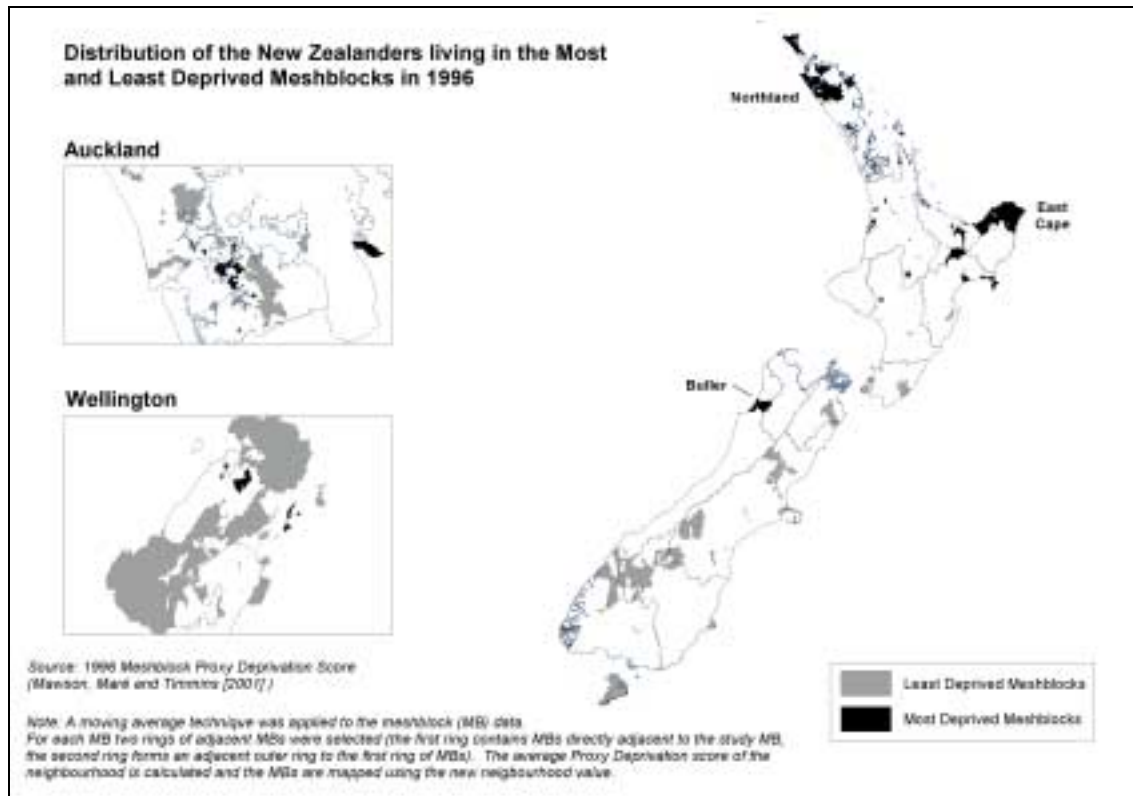[9] Crampton, Salmond, Kirkpatrick, Scarborough and Skelly (2000).

Figure 1:

Table 3: Number of People in Each Deprivation Decile (1996)

Region	1	2	3	4	5	6	7	8	9	10	total
NORTHLAND	2,880	6,774	7,206	10,314	11,754	9,615	16,971	18,732	19,869	32,724	136,839
AUCKLAND	132,471	127,617	112,671	104,667	92,208	90,237	80,961	93,738	100,974	131,862	1,067,406
WAIKATO	23,049	32,019	31,977	30,333	31,962	35,550	34,323	39,843	47,340	43,362	349,758
BAY OF PLENTY	9,741	18,870	17,739	21,927	21,924	25,104	25,599	24,546	29,064	29,571	224,085
GISBORNE	2,868	2,673	2,259	2,940	4,083	4,377	4,485	5,019	5,904	11,091	45,699
HAWKE'S BAY	7,116	9,309	13,677	15,081	15,267	15,483	15,780	14,280	19,206	17,346	142,545
TARANAKI	4,788	7,038	9,243	13,158	12,822	12,579	12,855	15,042	11,268	7,737	106,530
MANAWATU-WANGANUI	13,113	17,139	21,339	21,096	23,247	23,979	28,146	27,669	29,739	22,731	228,198
WELLINGTON	101,184	53,178	41,604	35,259	33,273	32,850	31,350	30,867	25,083	29,103	413,751
WEST COAST	765	1,026	2,532	2,379	4,458	3,993	5,091	4,998	4,095	3,066	32,403
CANTERBURY	38,805	48,951	56,640	59,196	55,395	55,053	55,251	47,388	34,659	16,188	467,526
OTAGO REGION	12,432	18,954	19,383	19,470	23,379	22,104	23,061	16,761	19,959	9,378	184,881
SOUTHLAND	5,040	8,085	10,278	9,831	9,840	12,120	11,841	14,283	10,188	5,283	96,789
TASMAN	1,371	3,168	4,983	6,618	8,445	5,598	4,875	2,163	654	69	37,944
NELSON	3,141	3,519	5,229	5,391	5,862	6,189	4,962	3,216	1,587	1,179	40,275
MARLBOROUGH	2,556	2,940	4,605	3,768	7,206	6,615	5,580	2,727	1,692	582	38,271
TOTAL	361,320	361,260	361,365	361,428	361,125	361,446	361,131	361,272	361,281	361,272	3,612,900

Table 3 shows the number of people living in meshblocks that have particular deprivation decile ranking in 1996 broken down by regional council. Remember that decile 1 is the least deprived decile while decile 10 is the most deprived. For example

it shows that in the Wellington region 101,184 people live in meshblocks characterised as decile 1 (the least deprived decile). The data in this table are the raw data used to develop Tables 4 and 5 below.

Table 4: Each Region's Percentage Share of the National Population for Each Decile (1996)

Region	1	2	3	4	5	6	7	8	9	10	total
NORTHLAND	0.8	1.9	2.0	2.9	3.3	2.7	4.7	5.2	5.5	9.1	3.8
AUCKLAND	36.7	35.3	31.2	29.0	25.5	25.0	22.4	25.9	27.9	36.5	29.5
WAIKATO	6.4	8.9	8.8	8.4	8.9	9.8	9.5	11.0	13.1	12.0	9.7
BAY OF PLENTY	2.7	5.2	4.9	6.1	6.1	6.9	7.1	6.8	8.0	8.2	6.2
GISBORNE	0.8	0.7	0.6	0.8	1.1	1.2	1.2	1.4	1.6	3.1	1.3
HAWKE'S BAY	2.0	2.6	3.8	4.2	4.2	4.3	4.4	4.0	5.3	4.8	3.9
TARANAKI	1.3	1.9	2.6	3.6	3.6	3.5	3.6	4.2	3.1	2.1	2.9
MANAWATU-WANGANUI	3.6	4.7	5.9	5.8	6.4	6.6	7.8	7.7	8.2	6.3	6.3
WELLINGTON	28.0	14.7	11.5	9.8	9.2	9.1	8.7	8.5	6.9	8.1	11.5
WEST COAST	0.2	0.3	0.7	0.7	1.2	1.1	1.4	1.4	1.1	0.8	0.9
CANTERBURY	10.7	13.6	15.7	16.4	15.3	15.2	15.3	13.1	9.6	4.5	12.9
OTAGO REGION	3.4	5.2	5.4	5.4	6.5	6.1	6.4	4.6	5.5	2.6	5.1
SOUTHLAND	1.4	2.2	2.8	2.7	2.7	3.4	3.3	4.0	2.8	1.5	2.7
TASMAN	0.4	0.9	1.4	1.8	2.3	1.5	1.3	0.6	0.2	0.0	1.1
NELSON	0.9	1.0	1.4	1.5	1.6	1.7	1.4	0.9	0.4	0.3	1.1
MARLBOROUGH	0.7	0.8	1.3	1.0	2.0	1.8	1.5	0.8	0.5	0.2	1.1
TOTAL	100	100	100	100	100	100	100	100	100	100	100

Note: shaded cells contain a disproportionately <u>large</u> share of the population in the decile

Table 4 above provides a different representation of the data in Table 3. It shows what percentage of the people living in meshblocks in each deprivation decile live in a particular region. For example, of those people living in decile 10 (the most deprived) meshblocks, 36.5% live in the Auckland region. Obviously the size of a region's population is a major determinant in what share of each decile's New Zealand population a region has, so the finding that a large proportion of decile 10 New Zealanders live in Auckland is not a surprise.

If there were no regional variation in the distribution of New Zealanders living in each decile of deprivation then we would expect that for each region (or row in the table) the entries would just replicate the percentage of the nation's population that live in a region. The percentage of the nation's population that live in a region is shown in the far right column. This is clearly not the case. Auckland, for example, has 29.5% of New Zealand's population but over 36% of New Zealanders living in both the most deprived (decile 10) and least deprived (decile 1) meshblocks.

Table 5 cuts the information contained in Table 3 in a way that shows what percentage of a region's population live in meshblocks with the different decile rankings. For example it shows that, of all the people living in Northland, 23.9% live in decile 10 (the most deprived decile) meshblocks.

Table 5: The Percentage of a Region's Population Living in Each Deprivation Decile (1996)

Region	1	2	3	4	5	6	7	8	9	10	total
NORTHLAND	2.1	5.0	5.3	7.5	8.6	7.0	12.4	13.7	14.5	23.9	100
AUCKLAND	12.4	12.0	10.6	9.8	8.6	8.5	7.6	8.8	9.5	12.4	100
WAIKATO	6.6	9.2	9.1	8.7	9.1	10.2	9.8	11.4	13.5	12.4	100
BAY OF PLENTY	4.3	8.4	7.9	9.8	9.8	11.2	11.4	11.0	13.0	13.2	100
GISBORNE	6.3	5.8	4.9	6.4	8.9	9.6	9.8	11.0	12.9	24.3	100
HAWKE'S BAY	5.0	6.5	9.6	10.6	10.7	10.9	11.1	10.0	13.5	12.2	100
TARANAKI	4.5	6.6	8.7	12.4	12.0	11.8	12.1	14.1	10.6	7.3	100
MANAWATU-WANGANUI	5.7	7.5	9.4	9.2	10.2	10.5	12.3	12.1	13.0	10.0	100
WELLINGTON	24.5	12.9	10.1	8.5	8.0	7.9	7.6	7.5	6.1	7.0	100
WEST COAST	2.4	3.2	7.8	7.3	13.8	12.3	15.7	15.4	12.6	9.5	100
CANTERBURY	8.3	10.5	12.1	12.7	11.8	11.8	11.8	10.1	7.4	3.5	100
OTAGO REGION	6.7	10.3	10.5	10.5	12.6	12.0	12.5	9.1	10.8	5.1	100
SOUTHLAND	5.2	8.4	10.6	10.2	10.2	12.5	12.2	14.8	10.5	5.5	100
TASMAN	3.6	8.3	13.1	17.4	22.3	14.8	12.8	5.7	1.7	0.2	100
NELSON	7.8	8.7	13.0	13.4	14.6	15.4	12.3	8.0	3.9	2.9	100
MARLBOROUGH	6.7	7.7	12.0	9.8	18.8	17.3	14.6	7.1	4.4	1.5	100
TOTAL	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	100

Note: shaded cells contain a disproportionately <u>large</u> share of the region's population

If there were no regional variation in the distribution of deprivation we would expect to see every entry under the decile 1-10 headings in Table 5 being 10.0. This is clearly not the case. In terms of the percentage of their population living in the most deprived meshblocks (decile 10), Northland and Gisborne have high rates of deprivation with about 24% of their population living in these deprived meshblocks.

Deprivation appears to be predominantly a North Island problem with all South Island regions having less than 10% of their population living in the most deprived deciles[10]. Interestingly the Southern regions also have relatively low proportions of their population living in the least deprived (Decile 1) meshblocks. Only Auckland and Wellington have over 10% of their population living in the least deprived meshblocks. The high rate of Wellingtonians living in the least deprived meshblocks is particularly striking with 1 in 4 people in the Wellington region living in these least deprived meshblocks.

What comparing the information in Tables 3, 4 and 5 highlights is that how the question "where is deprivation located in the New Zealand context?" is asked will influence the answer. If the question is "in which regions are the greatest numbers of deprived people?" then the answer is Auckland (by a long way) and then Waikato and Northland. On the other hand if we are interested in knowing which regions have high proportions of their population living in the most deprived decile, the answer is that Gisborne and Northland stand out by a long way.

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[10] This statement does not imply that there aren't deprived South Islanders, only that a smaller proportion of South Islanders live in the most deprived decile compared to North Islanders.

Figure 2 (next page) visually shows how different regions are emphasised depending on whether one is concerned with numbers of people living in the most deprived meshblocks or the rate at which a region's population is located in these meshblocks. Panel A shows where the greatest numbers of New Zealanders living in the most deprived meshblocks are located. The regional shapes have been distorted to emphasise those regions with large numbers of people living in deprived meshblocks. Therefore in this map the Auckland region is shown as a lot larger than normal. In Panel B the regional shapes are distorted to emphasise those regions that have a large proportion of their population living in the most deprived meshblocks. In this case the Northland and Gisborne shapes are a lot larger than normal.

Section 4 - Summary

Whether you are concerned with absolute numbers of people living in deprived meshblocks or the proportion of a region's population living in deprived meshblocks alters your conclusion on which regions are most deprived.
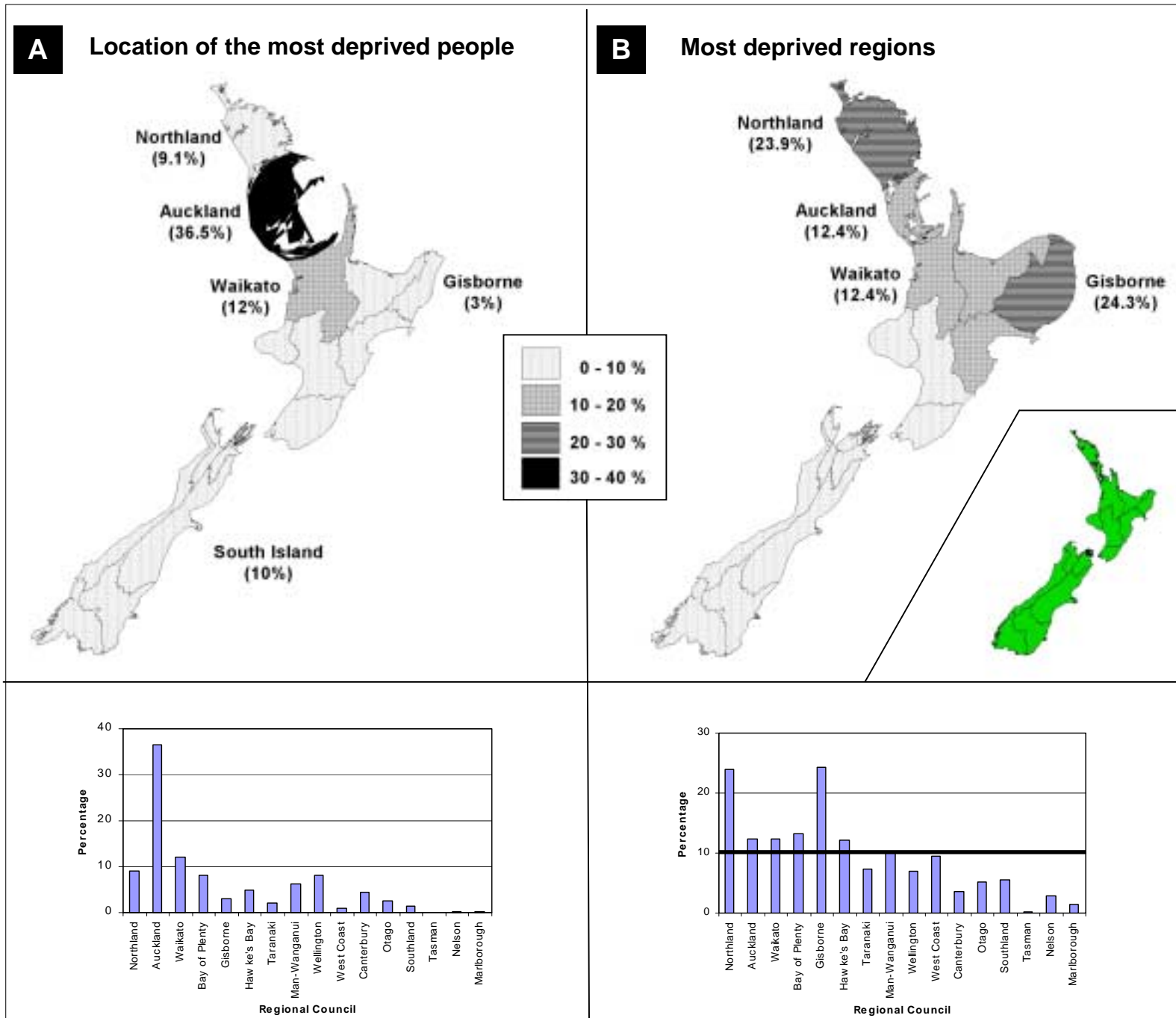
The 3 regions with the most people living in the most deprived decile meshblocks are:

- Auckland (by far)
- Waikato
- Northland

The 3 regions with the highest percentages of their population living in the most deprived decile meshblocks are:

- Gisborne
- Northland
- Bay of Plenty

Figure 2. The Bottom 10% of New Zealanders Ranked by Deprivation (1996)

A | **Location of the most deprived people**

Northland (9.1%)

Auckland (36.5%)

Waikato (12%)

Gisborne (3%)

South Island (10%)

Legend:
- 0 - 10 %
- 10 - 20 %
- 20 - 30 %
- 30 - 40 %

B | **Most deprived regions**

Northland (23.9%)

Auckland (12.4%)

Waikato (12.4%)

Gisborne (24.3%)

Note: The maps of NZ have been distorted to reflect the percentage rates within the adjoining tables. The cartogram algorithm was developed by Charles Jackel and cited as Jackel, C. (1997)

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5. WHO LIVES IN THE LEAST AND MOST DEPRIVED MESHBLOCKS?

In this section we answer the question of whether any ethnic groups are either over-represented or under-represented amongst those living in the least and most deprived meshblocks.

As a first step, consider figures 3 and 4 below.

Figure 3: Percentage of Regional Ethnic Group in the Most Deprived Meshblocks (1996)
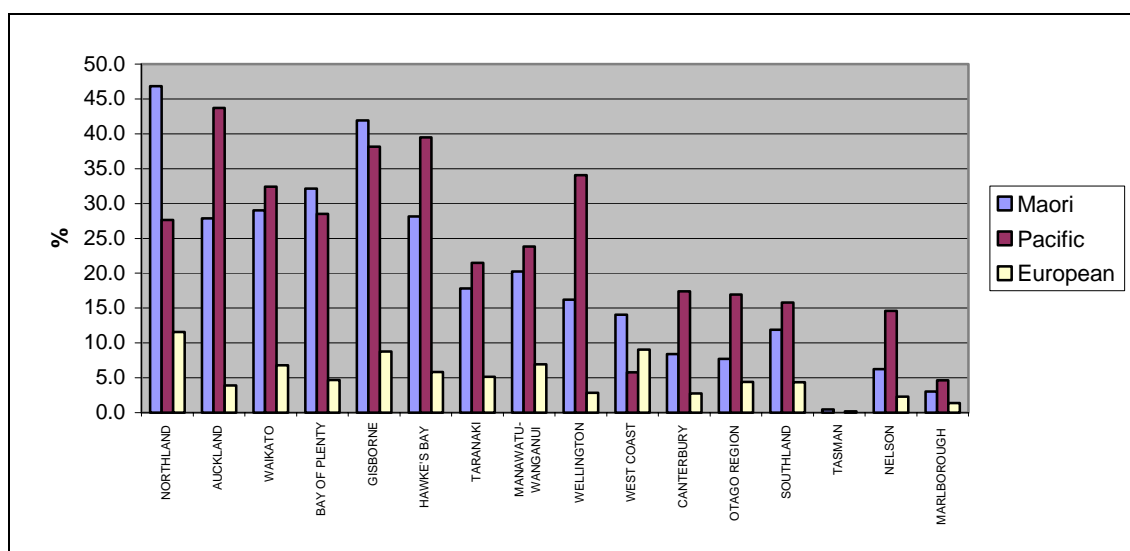

Figure 3 shows what percentage of a region's population who identify as one of the three different ethnic groups (Maori, Pacific People, and New Zealand Europeans) live in the most deprived meshblocks. For all regions the proportion of Maori living in the most deprived meshblocks is higher than for New Zealand Europeans. This is also the case in most regions for Pacific people. In 10 out of the 16 regions the percentage of Pacific people in the most deprived meshblocks is higher than the percentage of Maori. There is, however, considerable regional variation in the proportion of an ethnic population that lives in the most deprived meshblocks.

Figure 4 shows for each region the percentage of each ethnic group that lives in the *least* deprived meshblocks. In all regions a larger percentage of Europeans live in the least deprived meshblocks than is the case for Maori. This is also the case for most regions when comparing the percentage of Europeans in the least deprived meshblocks with the percentage of Pacific People. Once again there is significant regional variation in the percentage of each ethnic group that live in the least deprived meshblocks.

Figure 4: Percentage of Regional Ethnic Group in the Least Deprived Meshblocks (1996)
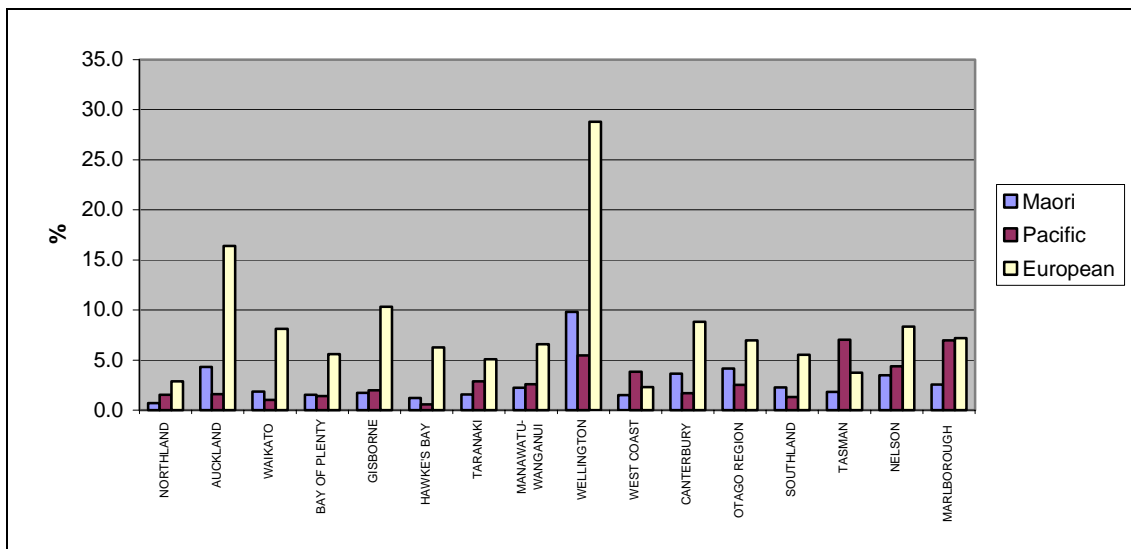
The patterns displayed in figures 3 and 4 are the result of multiple factors. Firstly, as shown in section one, there are regional variations in the distribution of people living in deprived meshblocks. Some regions have relatively high rates of people living in deprived meshblocks while others have relatively low rates. Second, the ethnic composition of the regions differs. For example Maori make up about 42% of Gisborne's population but less than 6% of Otago's. Therefore what we want to know is: to what extent is the apparent over representation of Maori (and Pacific people) just due to the fact that Maori happen to live in those regions that perform relatively poorly in terms of the proportion of their population living in the most deprived meshblocks?

By looking at what proportion people of the different ethnic groups make up of all the people living in the most deprived meshblocks in a region we are able to control for differences in the proportion of a region's population that live in decile 10 across the country. For each region the different ethnic groups (Maori, New Zealand European, Pacific, Asian, Other Ethnicity and Ethnicity not specified) will make up 100% of the people in that region who are living in decile 10 meshblocks.

For each region we also know what percentage of the region's population is of a particular ethnicity. This is the percentage of the region's decile 10 population[11] we would expect each ethnic group to take if there were no variation in the proportion of each ethnic group living in a particular meshblock decile, that is if there were no ethnic dimension to the deprivation story. Dividing the actual percentage of a region's decile 10 population that are Maori by the percentage of the region's total population that are Maori gives us a measure of the extent to which Maori are over or under represented in the most deprived decile. We call this a deprivation rate multiplier. A value greater than 1 means that Maori are over represented compared to what the case would be if there were no ethnic variation in deprivation outcomes. A value less than 1 signals under representation. We did these same calculations for the three ethnic groups Maori, New Zealand European and Pacific peoples. Table 6 shows the deprivation rate

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[11] Those individuals living in decile 10 meshblocks.

multiplier for Maori and Pacific people living in the most (decile 10) and least (decile 1) deprived meshblocks divided by the European deprivation rate multiplier factor. That is, the values in the table show the extent to which Maori and Pacific people are either over or under represented compared to Europeans, taking into account differing ethnic compositions across regions.

Table 6: Maori and Pacific Deprivation Rate Multipliers (Number of times the European multiplier)

| | Decile 1 | | Decile 10 | |
	Maori	Pacific	Maori	Pacific
NORTHLAND	0.2	0.5	4.0	2.3
AUCKLAND	0.3	0.1	7.2	11.2
WAIKATO	0.2	0.1	4.3	4.8
BAY OF PLENTY	0.3	0.3	6.9	6.1
GISBORNE	0.2	0.2	4.8	4.4
HAWKE'S BAY	0.2	0.1	4.8	6.8
TARANAKI	0.3	0.6	3.5	4.2
MANAWATU-WANGANUI	0.3	0.4	2.9	3.4
WELLINGTON	0.3	0.2	5.7	12.0
WEST COAST	0.7	1.7	1.6	0.6
CANTERBURY	0.4	0.2	3.1	6.4
OTAGO REGION	0.6	0.4	1.7	3.8
SOUTHLAND	0.4	0.2	2.7	3.6
TASMAN	0.5	1.9	2.7	0.0
NELSON	0.4	0.5	2.7	6.4
MARLBOROUGH	0.4	1.0	2.2	3.4

The proportion of Maori living in the most deprived meshblocks is 1.6 to 7.2 times the European rate. The Pacific people's rate is up to 12 times the European rate. This is after controlling for the ethnic composition of regions. The under representation of Maori and Pacific people in the least deprived meshblocks is also highlighted (multipliers generally less than 1).

An interesting point to note is that the over-representation of Maori in the most deprived decile is sufficiently large to mean that in absolute number terms there are more Maori in the most deprived meshblocks than Europeans even though Maori only made up 14.5% of New Zealand's population while New Zealand Europeans made up 71.7%. Table 7 shows the number of Maori, Pacific people and New Zealand Europeans living in the most deprived meshblocks broken down by region as well as nationally.

This conclusion that there are more Maori living in the most deprived meshblocks also holds if one uses the NZDep96 deprivation measure.

Table 7: Number of Maori, Pacific and European People Living in the Most Deprived Meshblocks

Region	Maori	Pacific	European
NORTHLAND	19,416	432	9,720
AUCKLAND	35,223	51,417	25,866
WAIKATO	20,772	2,169	16,959
BAY OF PLENTY	20,151	858	6,888
GISBORNE	8,100	174	1,998
HAWKE'S BAY	8,892	1,005	5,832
TARANAKI	2,682	156	4,407
MANAWATU-WANGANUI	8,100	831	11,844
WELLINGTON	8,025	8,745	8,463
WEST COAST	390	9	2,517
CANTERBURY	2,601	1,179	10,944
OTAGO REGION	840	381	7,074
SOUTHLAND	1,257	180	3,555
TASMAN	12	0	57
NELSON	189	60	786
MARLBOROUGH	117	12	444
Nationwide	136,767	67,608	117,354

Section 5 – Summary

Both Maori and Pacific People are over-represented amongst those living in the most deprived meshblocks. Conversely these groups are under-represented amongst those living in the least deprived meshblocks.

The over-representation of Maori and Pacific people cannot just be explained by these groups being over-represented (compared to a national average) in the population of those regions with the greatest rates of deprivation. The extent to which Maori and Pacific people are over-represented in the most deprived meshblocks shows substantial regional variation.

There are more Maori living in the most deprived meshblocks than there are New Zealand Europeans.

6. WHAT IS HAPPENING TO DEPRIVATION OVER TIME?

We created proxy deprivation scores for the three census years 1986, 1991 and 1996. This enables us to answer the question of what has been happening to deprivation over this time.

6.1 How did the regions fare?

Table 8 shows what percentage of a region's total population lived in the least deprived (decile 1) and most deprived (decile 10) meshblocks in 1986, 1991 and 1996.

Table 8: Percentage of a Region's Population in the Least and Most Deprived Meshblocks (1986-1996)

	Region	Least Deprived Decile			Most Deprived Decile		
		1986	1991	1996	1986	1991	1996
✗	NORTHLAND	5.7	2.8	2.1	10.1	18.4	23.9
✗	AUCKLAND	16.1	14.0	12.4	7.3	10.3	12.4
	WAIKATO	5.0	5.6	6.6	10.2	11.2	12.4
	BAY OF PLENTY	4.5	3.9	4.3	16.9	17.2	13.2
✔	GISBORNE	2.0	2.6	6.3	29.5	25.8	24.3
✔	HAWKE'S BAY	3.7	4.6	5.0	19.8	16.8	12.2
✔	TARANAKI	2.9	3.7	4.5	11.1	8.4	7.3
✔	MANAWATU-WANGANUI	4.5	4.8	5.7	15.4	11.0	10.0
	WELLINGTON	23.4	24.8	24.5	8.5	7.2	7.0
	WEST COAST	0.7	1.7	2.4	9.1	9.5	9.5
✔	CANTERBURY	6.0	7.4	8.3	7.4	5.1	3.5
	OTAGO REGION	5.4	6.3	6.7	9.2	4.8	5.1
	SOUTHLAND	3.2	4.5	5.2	9.8	10.2	5.5
✔	TASMAN	1.5	2.9	3.6	2.0	1.4	0.2
	NELSON	7.3	7.1	7.8	5.2	4.2	2.9
	MARLBOROUGH	4.2	4.0	6.7	2.6	3.5	1.5
	NATIONALLY	10.0	10.0	10.0	10.0	10.0	10.0

The two regions with a cross next to their name (Northland and Auckland) had a decreasing percentage of their population living in the least deprived meshblocks in each consecutive census year while the percentage of their population living in the most deprived meshblocks increased in each consecutive census year. This can be viewed as consistently worsening performance. Northland's performance was particularly bad. In 1986 only 10.1% of Northland's population lived in the most deprived decile of meshblocks. This is pretty much on par with the national average of 10%. By 1996, however, nearly 1 in 4 (23.9%) Northlanders lived in the most deprived

meshblocks. This is almost identical to Gisborne that has had the highest rate of its population living in the most deprived meshblocks in each of the three census years.

The regions with a tick next to their names on the other hand have performed quite well in terms of the changing percentage of their population living in the least and most deprived meshblocks over the period 1986 to 1991. These regions have seen the percentage of their population living in the least deprived meshblocks increase in each consecutive census year and the percentage of their population in the most deprived meshblocks decrease.

Throughout the study period Gisborne had a large percentage of its population living in the most deprived meshblocks. This percentage has been falling although Gisborne still has the misfortune of having the highest percentage of its population in the most deprived meshblocks in New Zealand.

Different regions have had different fortunes with respect to deprivation within their communities in the period 1986-1996.

6.2 How did the ethnic groups fare?

Firstly, a word of warning. The analysis that this paper presents was based on census data. Ethnicity represents the socio-cultural affiliations people identify with or feel they belong to. Thus ethnicity is self reported and people can, and increasingly do, identify to more than one category.[12] Statistics New Zealand notes that the 1991 ethnic data are closely comparable with the 1996 ethnic data. However, there have been extensive changes in social perceptions and attitudes in this area which affects the data. Wording and ordering changes to the census ethnicity question may have had some effect. Comparison with the 1986 ethnic data is less reliable as a different concept of "ethnic origin" was used.[13]

We proceed with an analysis of how deprivation has changed for the three ethnic groups (Maori, Pacific people and New Zealand European) but the data issues above should be borne in mind when interpreting the results.

Figure 5 (below) shows what percentage of each ethnic group's national population lived in the most deprived meshblocks in the three census years. For Maori we see that the percentage of Maori living in the most deprived meshblocks first increased between 1986 and 1991 and then declined between 1991 and 1996. Overall the percentage of Maori in the most deprived meshblocks declined. The percentage of Pacific people living in the most deprived meshblocks increased in each consecutive census year while the converse was true for New Zealand Europeans.

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[12] The rules used by Statistics New Zealand to assign an individual to an ethnic group meant that any person specifying New Zealand Maori would go into that category, followed by Pacific Island, Asian etc with European last to be assigned.

[13] Interestingly a Statistics New Zealand study (Coope and Piesse) found that 4.8% of the 1991 Maori descent population changed from Maori descent in 1991 to non-Maori descent in 1996 and 1.4% of the 1991 non-Maori descent population changed from non-Maori descent in 1991 to Maori descent in 1996. From 1991 to 1996 there was a net gain in the four main ethnic groups of Maori (+17.7%), Pacific Island (+11.8%), Asian (+15.8%) and European (+1.5%). This net gain is partly explained by the tendency of more people in 1996 than in 1991 to tick two or more ethnic groups in the Census ethnicity question.

Figure 5: Percentage of Ethnic Group Living in the Most Deprived Meshblocks
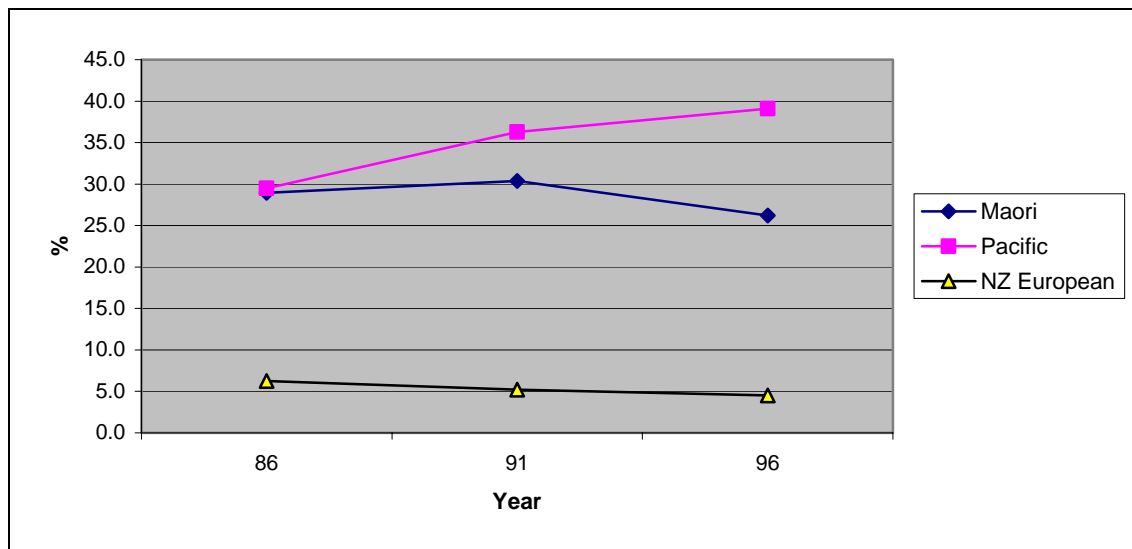
The national picture is, however, not consistently reflected across the regions as can be seen in Table 9. The percentage of an ethnic group's population in decile 10 meshblocks (the most deprived) increased in each census year for all ethnic groups in Northland. For Hawke's Bay, Manawatu-Wanganui, Wellington and Southland the percentage of each ethnic group's population living in the most deprived meshblocks fell in each census year.

Table 9: Percentage of Maori, Pacific People and NZ Europeans Living in Decile 1 and 10 Meshblocks (1986-1991)

	Maori						Pacific						European					
	Decile 1			Decile 10			Decile 1			Decile 10			Decile 1			Decile 10		
RC Name	86	91	96	86	91	96	86	91	96	86	91	96	86	91	96	86	91	96
NORTHLAND	1.6	0.6	0.7	26.2	41.9	46.8	5.6	0.3	1.5	10.4	25.1	27.6	7.0	3.6	2.9	4.5	8.7	11.6
AUCKLAND	4.2	3.4	4.3	23.1	28.0	27.9	2.1	1.3	1.6	27.2	37.9	43.7	19.5	17.8	16.4	2.6	3.5	3.9
WAIKATO	1.3	1.3	1.8	26.8	30.2	29.0	1.2	0.9	1.0	30.4	29.4	32.4	6.0	6.6	8.1	6.2	6.2	6.8
BAY OF PLENTY	0.9	1.0	1.5	39.6	42.1	32.1	1.1	1.4	1.4	38.6	38.6	28.5	5.6	5.0	5.6	8.7	7.7	4.7
GISBORNE	0.5	0.6	1.7	53.2	47.4	41.9	1.2	0.0	2.0	35.4	34.3	38.2	2.7	3.8	10.3	15.3	11.0	8.8
HAWKE'S BAY	0.6	0.7	1.2	45.2	41.3	28.2	0.7	0.7	0.6	56.1	52.2	39.5	4.4	5.6	6.3	12.9	9.6	5.8
TARANAKI	0.7	0.9	1.6	28.6	23.6	17.8	1.4	1.9	2.9	16.4	19.0	21.5	3.1	4.0	5.1	8.8	6.4	5.2
MANAWATU-WANGANUI	1.8	1.7	2.2	32.4	26.8	20.3	2.8	2.1	2.6	33.9	25.3	23.8	5.0	5.5	6.6	12.1	8.0	6.9
WELLINGTON	7.8	8.5	9.8	24.3	19.9	16.2	4.4	4.6	5.5	37.0	36.0	34.0	26.4	28.5	28.8	4.6	3.2	2.8
WEST COAST	0.5	1.1	1.5	11.3	14.4	14.1	0.0	0.0	3.8	5.0	7.3	5.8	0.7	1.7	2.3	8.9	9.1	9.0
CANTERBURY	2.8	2.5	3.6	18.4	14.5	8.4	2.1	1.6	1.7	25.3	25.9	17.4	6.2	7.7	8.8	6.7	4.2	2.7
OTAGO REGION	3.1	3.3	4.2	14.6	9.8	7.7	1.3	1.6	2.5	28.0	19.0	16.9	5.5	6.7	7.0	8.5	4.2	4.4
SOUTHLAND	1.1	1.3	2.3	21.7	23.4	11.9	0.9	0.7	1.3	32.3	31.6	15.8	3.4	5.0	5.5	8.4	8.4	4.3
TASMAN	0.8	1.7	1.8	4.7	4.7	0.5	2.3	2.6	7.0	4.5	7.9	0.0	1.6	3.0	3.8	1.9	1.2	0.2
NELSON	2.3	1.9	3.5	13.2	12.6	6.2	2.8	9.8	4.4	11.3	13.1	14.6	7.8	7.1	8.3	4.9	4.0	2.3
MARLBOROUGH	3.2	2.4	2.6	5.7	7.3	3.0	12.8	4.0	7.0	7.7	6.0	4.7	4.3	4.3	7.2	2.6	3.2	1.4
TOTAL	2.7	2.5	3.2	28.9	30.4	26.2	2.5	1.8	2.2	29.5	36.3	39.1	11.4	11.6	11.9	6.3	5.2	4.5

Table 10 shows how the deprivation rate multipliers (first discussed in section 5) have changed over time for Maori and Pacific people. The deprivation rate multipliers compare the proportion of Maori and Pacific people in the most deprived meshblocks with the New Zealand European group. It takes into account differences in the proportion of people in the most deprived meshblocks that occur across regions as well as differences in the ethnic composition of regions.

Table 10: Maori and Pacific People's Deprivation Rate Multipliers (1986-1991) for the Most Deprived Meshblocks (Number of times the European multiplier)

	Maori			Pacific		
Region	**1986**	**1991**	**1996**	**1986**	**1991**	**1996**
NORTHLAND	5.8	4.8	4.0	2.3	2.9	2.3
AUCKLAND	8.7	7.9	7.2	10.3	10.8	11.2
WAIKATO	4.3	4.9	4.3	4.9	4.7	4.8
BAY OF PLENTY	4.5	5.4	6.9	4.4	5.0	6.1
GISBORNE	3.5	4.3	4.8	2.3	3.1	4.4
HAWKE'S BAY	3.5	4.3	4.8	4.4	5.5	6.8
TARANAKI	3.3	3.7	3.5	1.8	3.0	4.2
MANAWATU-WANGANUI	2.7	3.4	2.9	2.8	3.2	3.4
WELLINGTON	5.3	6.1	5.7	8.1	11.1	12.0
WEST COAST	1.3	1.6	1.6	0.6	0.8	0.6
CANTERBURY	2.8	3.4	3.1	3.8	6.2	6.4
OTAGO REGION	1.7	2.3	1.7	3.3	4.5	3.8
SOUTHLAND	2.6	2.8	2.7	3.8	3.8	3.6
TASMAN	2.4	3.9	2.7	2.3	6.5	0.0
NELSON	2.7	3.2	2.7	2.3	3.3	6.4
MARLBOROUGH	2.2	2.3	2.2	3.0	1.9	3.4
Nationally	4.6	5.8	5.8	4.7	7.0	8.6

The deprivation rate multiplier for Pacific people has increased in each census year for just over half of the regions. Both Auckland and Wellington (the two regions with the largest Pacific populations) are included in these regions where the over-representation is increasing. Nationally the over-representation of Pacific people has increased in each census year from 4.7 times the European rate in 1986 to 8.6 times the European rate in 1996. For Maori the over-representation in the most deprived meshblocks has increased from 4.6 times the European rate in 1986 to 5.8 times the European rate in 1996. In each census year there has been considerable variation between regions in the size of the deprivation rate multiplier for Maori and Pacific people in the most deprived decile.

6.3 Are the most deprived meshblocks a better or worse place to be in 1996 than was the case in 1986?

By comparing the average[14] deprivation score for the meshblocks in the most deprived decile for different years we can get a sense of whether on average these meshblocks were absolutely more or less deprived in one year compared to another. In fact we can do this for each decile of deprivation. Figure 6 does just this and shows the percentage change in deprivation score between 1986 and 1996 for the average meshblock in each deprivation decile nationally.

Figure 6: Percentage Change in Deprivation Score (1986-1996)
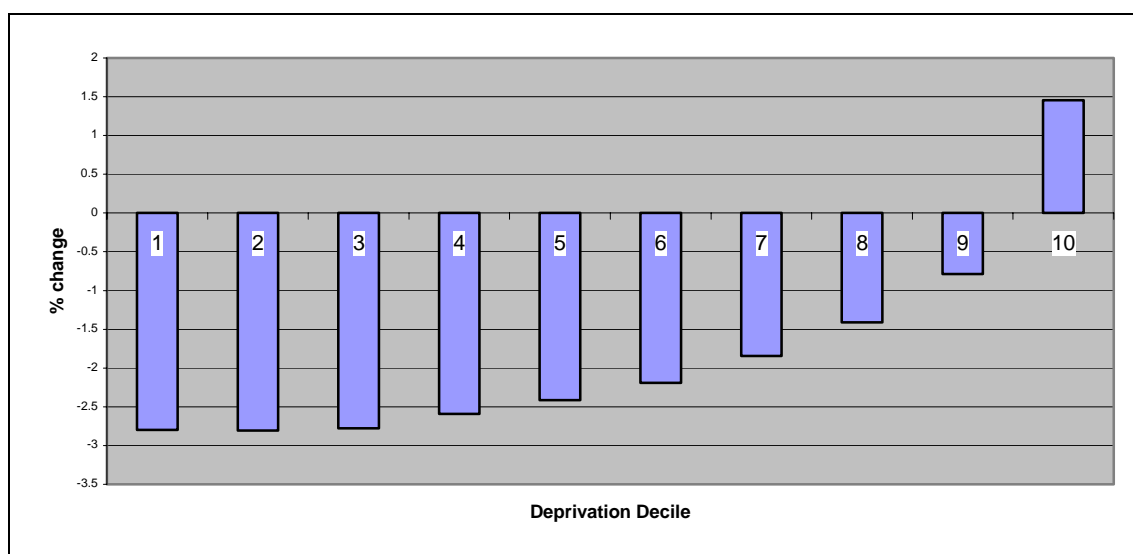
A negative percentage change shows that the average deprivation score is getting smaller and therefore on average deprivation is less severe in 1996 than was the case in 1986. For all but the most deprived decile, this was the case. The average deprivation score for those living in the most deprived meshblocks, however, increased between 1986 and 1996 signalling that things were worse in 1996 on average than was the case in 1986 for those with the misfortune of living in these meshblocks.

This conclusion depends on whether one accepts that measures for the 3 factors in our deprivation score (median income, percentage unemployed and percentage with no qualifications) are comparable across the different years. The fact that we used median income expressed in 1996 dollar terms means this is the case for median income. Is this the case for either the percentage unemployed or the percentage with no qualifications? If we say it is then we are basically accepting the assumption that not having a job or a qualification was an equally big set-back in each census year. Some may argue, however, that having no qualification in later periods is more of a disadvantage since the proportion of people leaving school with qualifications has generally increased over time.

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[14] A population weighted average was used. A meshblock with a population of 100 was given twice the weight of one with a population of 50.

To give a sense of what it means to have an x% change in deprivation score, a 1% increase would require:

- unemployment to change by 2.5 percentage points (e.g. from 5% to 7.5%) keeping all other factors constant; or
- median personal income to fall by approximately 15% (e.g. from $20,000 to $17,000) keeping all other factors constant; or
- the percentage of the population with no qualifications to increase by nearly 5 percentage points (e.g. from 20% to 25%), keeping all other factors constant.

Table 11 presents the percentage change in mean deprivation score for each deprivation decile on a regional basis. There is some regional variation to the overall pattern. In every region the mean deprivation score of those meshblocks in deprivation deciles 1 – 9 decreased. For those meshblocks in decile 10 (the most deprived decile) the average deprivation score increased for most regions. However, decreases were seen in the South Island regions of Canterbury, Otago, Nelson and Marlborough. The percentage increase in the average decile 10 deprivation score in Northland was over twice that of any other region at 4.21%.

Table 11: Percentage Change in Mean Deprivation Score (1986-96)

Region	1	2	3	4	5	6	7	8	9	10	All Deciles
NORTHLAND	-2.03	-2.81	-2.77	-2.50	-2.36	-2.14	-1.83	-1.32	-0.62	4.21	3.44
AUCKLAND	-2.83	-2.82	-2.75	-2.60	-2.36	-2.21	-1.82	-1.25	-0.74	1.73	0.20
WAIKATO	-2.82	-2.90	-2.75	-2.60	-2.42	-2.22	-1.85	-1.39	-0.70	2.06	-0.95
BAY OF PLENTY	-2.97	-2.86	-2.86	-2.51	-2.36	-2.25	-1.88	-1.56	-0.95	1.53	-2.26
GISBORNE	-3.07	-2.78	-3.13	-2.44	-2.57	-2.11	-1.94	-1.49	-0.37	1.24	-2.18
HAWKE'S BAY	-3.22	-2.93	-2.81	-2.61	-2.38	-2.15	-1.87	-1.64	-0.84	0.08	-3.28
TARANAKI	-2.88	-2.80	-2.83	-2.59	-2.29	-2.16	-1.89	-1.37	-0.62	0.53	-2.89
MANAWATU-WANGANUI	-2.75	-2.84	-2.74	-2.53	-2.52	-2.11	-1.84	-1.54	-0.84	0.25	-2.96
WELLINGTON	-2.83	-2.76	-2.81	-2.56	-2.45	-2.14	-1.88	-1.29	-0.86	1.17	-2.35
WEST COAST	-0.66	-2.22	-2.89	-2.52	-2.42	-2.28	-1.91	-1.79	-0.73	1.44	-2.45
CANTERBURY	-2.68	-2.78	-2.78	-2.67	-2.42	-2.18	-1.82	-1.52	-0.92	-0.34	-3.63
OTAGO REGION	-2.62	-2.74	-2.85	-2.58	-2.47	-2.17	-1.88	-1.39	-0.96	-1.34	-3.20
SOUTHLAND	-2.65	-2.79	-2.71	-2.58	-2.43	-2.22	-1.89	-1.49	-0.73	0.04	-3.47
TASMAN	-2.48	-2.87	-2.59	-2.68	-2.70	-2.35	-1.66	-1.11	-0.65	1.53	-4.02
NELSON	-3.18	-2.73	-2.74	-2.65	-2.52	-2.34	-1.72	-1.15	-1.19	-2.20	-3.19
MARLBOROUGH	-2.66	-3.28	-2.82	-2.63	-2.40	-2.17	-1.78	-1.58	-1.24	-0.34	-3.92
Nationwide	-2.80	-2.81	-2.78	-2.59	-2.41	-2.19	-1.85	-1.41	-0.79	1.46	-1.70

We can separate the impacts of the two sub periods 1986-1991 and 1991-1996 on the overall change in deprivation scores that occurred between 1986 and 1996. The changes in mean deprivation scores for these sub periods are shown in Tables 12 and 13.

Table 12: Percentage Change in Mean Deprivation Score (1986-1991)

Region	1	2	3	4	5	6	7	8	9	10	All Deciles
NORTHLAND	-1.55	-1.86	-1.93	-1.62	-1.52	-1.17	-1.02	-0.36	0.33	1.93	2.16
AUCKLAND	-1.94	-1.90	-1.87	-1.69	-1.50	-1.31	-0.99	-0.43	0.04	1.86	0.15
WAIKATO	-2.11	-1.92	-1.83	-1.63	-1.46	-1.31	-0.98	-0.65	0.07	1.37	-0.68
BAY OF PLENTY	-2.46	-1.97	-1.89	-1.69	-1.39	-1.28	-1.01	-0.63	-0.06	0.81	-0.90
GISBORNE	-1.94	-1.60	-2.01	-1.70	-1.70	-1.19	-0.95	-0.39	0.12	1.60	-0.82
HAWKE'S BAY	-1.82	-2.07	-1.87	-1.68	-1.53	-1.29	-1.05	-0.74	0.19	0.87	-1.50
TARANAKI	-1.92	-2.07	-1.92	-1.70	-1.47	-1.25	-1.02	-0.41	-0.04	0.89	-1.34
MANAWATU-WANGANUI	-2.16	-1.87	-1.88	-1.71	-1.54	-1.18	-0.98	-0.50	-0.07	0.15	-1.97
WELLINGTON	-2.01	-1.85	-1.91	-1.58	-1.53	-1.18	-1.00	-0.50	0.08	0.67	-1.80
WEST COAST	-0.43	-1.45	-1.76	-1.76	-1.64	-1.14	-1.02	-0.87	0.11	0.79	-1.06
CANTERBURY	-1.81	-1.87	-1.85	-1.74	-1.54	-1.31	-0.99	-0.64	-0.06	-0.02	-2.15
OTAGO REGION	-2.42	-1.85	-1.89	-1.62	-1.52	-1.34	-1.12	-0.70	-0.26	0.39	-2.00
SOUTHLAND	-1.65	-1.75	-1.79	-1.68	-1.54	-1.29	-0.98	-0.54	-0.24	-0.47	-1.39
TASMAN	-2.53	-1.94	-1.80	-1.61	-1.59	-1.33	-1.03	-0.54	-0.29	-0.03	-2.63
NELSON	-1.85	-2.02	-1.71	-1.57	-1.58	-1.12	-0.89	-0.61	-0.60	0.78	-1.78
MARLBOROUGH	-2.13	-2.36	-1.77	-1.72	-1.51	-1.08	-1.02	-0.74	0.13	0.82	-2.01
Nationwide	-1.99	-1.89	-1.87	-1.67	-1.51	-1.27	-1.01	-0.56	0.01	1.10	-1.00

More of the changes in mean deprivation scores occurred in the period 1986-1991 (Table 12). In this period the mean deprivation scores for deciles 1 to 8 decreased both nationally and on a regional basis. Nationally decile 9 increased very slightly and decile 10 (the most deprived meshblocks) increased by over 1%. The mean deprivation score for meshblocks in decile 9 increased in half the regions and decreased in half the regions. The mean deprivation score for the most deprived meshblocks increased in all but 3 South Island regions.

We investigated what was driving the changes as the perceived wisdom suggests that things generally got worse in the 1980s and then improved slightly in the 1990s. The major factor contributing to the reductions in deprivation scores for deciles 1-8 and also playing a significant role in reducing the increases for deciles 9 and 10 was the reduction in the percentage of people without a qualification. Increases in unemployment rates offset some of the reduction in deprivation scores for deciles 1-8 and was the primary cause of the increased deprivation scores in deciles 9 and 10. The income variable had the effect of reducing deprivation scores for the least deprived half of the deciles (deciles 1-5) and increased deprivation scores due to a fall in median income for the most deprived four deciles (deciles 7-10).

Table 13: Percentage Change in Mean Deprivation Score (1991-1996)

| RC Name	1	2	3	4	5	6	7	8	9	10	All Deciles
NORTHLAND	-0.49	-0.97	-0.86	-0.89	-0.85	-0.98	-0.82	-0.97	-0.95	2.24	1.26
AUCKLAND	-0.90	-0.94	-0.90	-0.92	-0.87	-0.91	-0.83	-0.83	-0.79	-0.13	0.05
WAIKATO	-0.73	-0.99	-0.94	-0.98	-0.98	-0.93	-0.88	-0.74	-0.77	0.69	-0.27
BAY OF PLENTY	-0.51	-0.91	-1.00	-0.83	-0.98	-0.99	-0.87	-0.94	-0.89	0.71	-1.37
GISBORNE	-1.16	-1.20	-1.14	-0.75	-0.89	-0.93	-0.99	-1.11	-0.48	-0.35	-1.37
HAWKE'S BAY	-1.42	-0.88	-0.96	-0.94	-0.86	-0.87	-0.83	-0.91	-1.03	-0.78	-1.81
TARANAKI	-0.98	-0.75	-0.92	-0.90	-0.83	-0.92	-0.89	-0.96	-0.58	-0.36	-1.57
MANAWATU-WANGANUI	-0.60	-0.99	-0.88	-0.84	-0.99	-0.94	-0.87	-1.04	-0.77	0.10	-1.01
WELLINGTON	-0.84	-0.93	-0.92	-0.99	-0.94	-0.97	-0.89	-0.79	-0.94	0.49	-0.57
WEST COAST	-0.23	-0.79	-1.15	-0.77	-0.80	-1.15	-0.90	-0.92	-0.84	0.65	-1.41
CANTERBURY	-0.89	-0.93	-0.94	-0.94	-0.90	-0.88	-0.84	-0.88	-0.86	-0.32	-1.51
OTAGO REGION	-0.20	-0.92	-0.98	-0.98	-0.97	-0.85	-0.77	-0.69	-0.70	-1.72	-1.22
SOUTHLAND	-1.02	-1.06	-0.94	-0.91	-0.91	-0.94	-0.92	-0.96	-0.49	0.51	-2.11
TASMAN	0.05	-0.95	-0.80	-1.09	-1.13	-1.03	-0.64	-0.57	-0.36	1.56	-1.43
NELSON	-1.36	-0.73	-1.04	-1.10	-0.96	-1.23	-0.83	-0.54	-0.59	-2.96	-1.44
MARLBOROUGH	-0.54	-0.94	-1.07	-0.92	-0.91	-1.10	-0.77	-0.85	-1.37	-1.16	-1.95
Nationwide	-0.82	-0.93	-0.93	-0.93	-0.92	-0.93	-0.85	-0.86	-0.80	0.35	-0.71

The period 1991 to 1996 (Table 13) saw less change in mean deprivation than was the case in 1986-1991. For all regions the mean deprivation score in deciles 1-9 decreased. For the most deprived meshblocks (decile 10) the mean deprivation score increased in half the regions and decreased in the other half. Nationally there was a small increase in the mean deprivation scores for meshblocks in the most deprived decile.

Reductions in unemployment rates were the predominant contributor to the reductions in the deprivation scores experienced by deciles 1-9 during the period 1991 to 1996. Interestingly, an increase in the average unemployment rate amongst those meshblocks in the most deprived decile was a major contributor to the increase in deprivation scores experienced by this decile. Changes in the percentage of people without a qualification were less significant in this period with the exception of the most deprived decile which would have experienced a significantly greater increase in deprivation were it not for improvements in this variable.

6.4 Does Deprivation persist?

To get a sense of whether deprived meshblocks remain so, we looked at those meshblocks that were in decile 10 (the most deprived decile) in 1986 and asked what percentage of these meshblocks were still in the most deprived decile of meshblocks in 1996. Figure 7 shows the results. Nationally just over half of the meshblocks that were in decile 10 in 1986 were also in decile 10 in 1996. In terms of conclusive evidence of persistence this result is in the glass half-empty/ half full league. While nearly half of those meshblocks that were in the most deprived decile have remained there, it is also true that nearly half have improved.

Figure 7: Percentage of Meshblocks That Were in the Most Deprived Decile in 1986 and Remained so in 1996
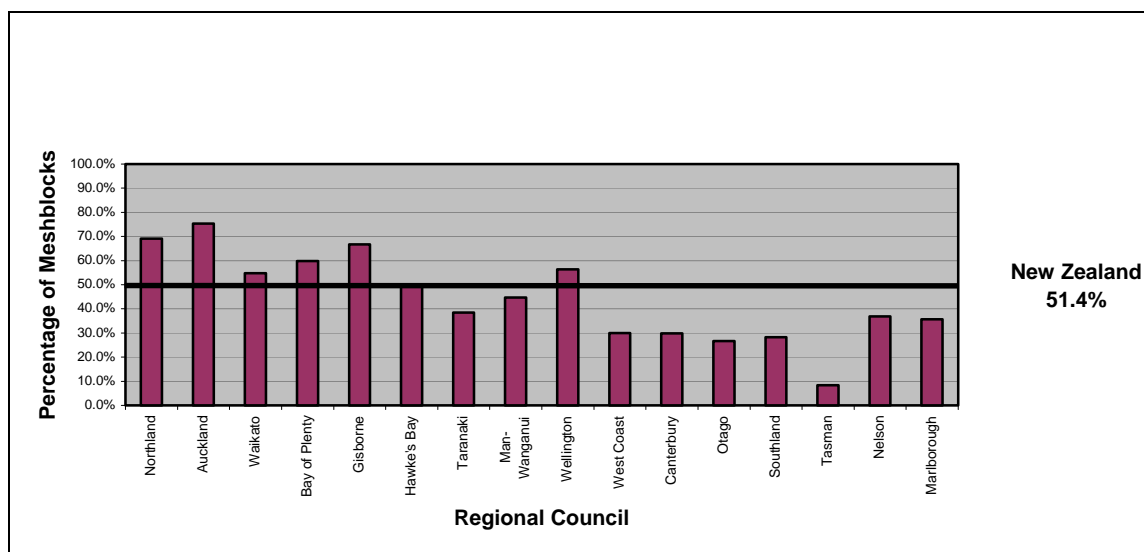
There is considerable regional variation in the degree of persistence. For example, nearly 75% of the meshblocks that were in decile 10 in Auckland in 1986 remained so in 1996 compared to less than 30% in Otago. In general those regions that performed reasonably poorly between 1986 and 1996 or have higher than average deprivation rates tended to also have higher degrees of persistence.[15]

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[15] A couple of factors could be causing our persistence measure to appear lower than it actually is. The first is that a number of meshblocks may just be boundary hopping. That is the deprivation score in one period may just be sufficiently high for it to be categorised as a decile 10 meshblock. A slight reduction in the score may result in the meshblock being decile 9 (albeit a decile 9 meshblock with a high score). The impact of boundary hopping meshblocks on the persistence measure is, however, very small. When boundary hopping meshblocks are included in the calculation of the persistence measure (i.e. relabelled as remaining in a decile between 1986 and 1996) for decile 10, the increase in persistence is only 0.05% (1 meshblock!). When all boundary hoppers are considered across all ten decile borders, the increase in persistence of meshblocks between 1986 and 1996 is only 1%

A second factor is that Figure 7 just displays whether or not a meshblock that was in decile 10 in 1986 was also in decile 10 in 1996. In this calculation all meshblocks are treated equally regardless of their population size. It is likely that a greater proportion of the meshblocks that have escaped decile 10 are smaller population meshblocks. This is because our ProxyDep measure was more accurate for larger meshblocks than smaller ones.

Section 6 – Summary

Northland was a particularly poor performer with the percentage of its population in the most deprived meshblocks increasing from 10.1% in 1986 to 23.9% in 1996.

Throughout the study period Gisborne has had a high proportion of its population in the most deprived meshblocks. There has, however, been some improvement between 1986 and 1996.

Northland and Auckland were the only two regions to have both an increasing proportion of their population in the most deprived meshblocks and a decreasing proportion in the least deprived meshblocks in each consecutive census year.

The proportion of Maori and Europeans in the most deprived decile meshblocks was lower nationally in 1996 than in 1986. The proportion of Pacific people who live in the most deprived meshblocks increased in each census year (1986-1996).

Deprivation scores decreased on average in deprivation deciles 1-9. The average deprivation score in the most deprived decile increased between 1986 and 1996.

There is considerable regional variation in the extent of persistence of deprivation.

7. HOW DOES ISOLATION AFFECT DEPRIVATION?

Does isolation influence whether a community is deprived or not? To investigate this question we constructed a crude measure of physical isolation. For each meshblock a community was defined by capturing the nearest 10,000 people. The population of 10,000 was chosen as equating to a small town. The land area required to capture 10,000 people was used as a measure of how isolated the meshblock was from its surrounding community. The greater the land area, the more isolated a meshblock is assumed to be.

Table 14 displays for each deprivation decile the average land area (in hectares) required to capture 10,000 people (averaged over all meshblocks within a decile). The pattern observed in all three periods is of greater isolation among the most deprived deciles. Between 1986 and 1996 the population within the five least deprived deciles becomes more isolated, whereas the inverse is observed for the most deprived five deciles.

Table 14: The Average Land Area by Deprivation Decile for 1986, 1991 and 1996

Deprivation Decile	Average Land Area (10,000 Hectares)		
	1986	1991	1996
1	7.70	8.09	8.09
2	6.74	8.52	8.52
3	7.39	8.95	8.95
4	9.39	10.28	10.28
5	9.98	10.47	10.47
6	10.88	10.07	10.07
7	11.55	10.73	10.73
8	11.39	10.13	10.13
9	11.18	9.15	9.15
10	10.60	10.25	10.25

The results suggest that sparsely populated (rural) areas are becoming less deprived between 1986 and 1996, compared with denser population (urban) areas, which appear to be getting worse. When the meshblocks are classified into either urban or rural areas (using Statistics New Zealand classification), a similar picture is observed.

In 1986 rural areas were more deprived than urban areas. However, rural areas showed a dramatic reduction in deprivation and finished the study period with a lower deprivation score than urban areas.

What this suggests is that the isolation measure is possibly only capturing small-scale isolation, or within-region isolation. For example, a meshblock in Gisborne is isolated from the rest of the country regardless of whether it is classed as rural or urban. It is also likely that the difference in fortunes between rural and urban communities is partly due to differences between their respective economies.

The study period, 1986-1996, was a time of significant economic reform in New Zealand.[16] Unemployment rates steadily increased between 1985 and 1991. In 1985 the unemployment rate was 4%. It peaked in 1991 at over 10%.

The rural sector in particular experienced significant decline in the first half of the study period. The removal of farm subsidies (announced in 1984) significantly reduced farming profitability. A number of farmers experienced bankruptcy and farm land prices fell by as much as 50%. Industries supplying inputs to agriculture followed agriculture's decline. The second half of the study period coincided with higher farm incomes in the 1990s that have led to a recovery in farm land prices.

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[16] Evans, Grimes, Wilkinson and Teece (1996) provide a summary of the reforms and their effect on economic performance.

8. A QUICK ASIDE: INCOME INEQUALITY WITHIN REGIONS

We constructed Gini coefficients for each region on the basis of the average income of each meshblock weighted by population. The Gini coefficients are therefore a measure of inequality amongst meshblocks rather than individuals for the relevant region. Figure 8 displays the Gini coefficients for each region. For each region the Gini coefficients are increasing over time. This represents increasing income inequality between meshblocks within a region.

Figure 8: Within Region Income Inequality Between Meshblocks (1986-1996)
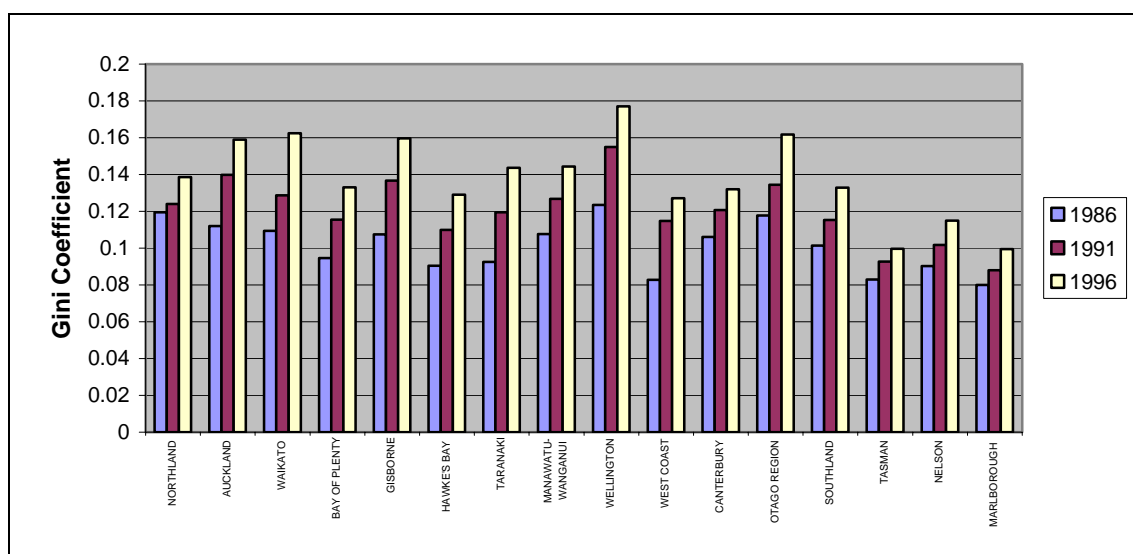
The Gini coefficients are all relatively small (ranging from 0.10 to 0.18 in 1996). This is probably due to the use of *average* personal incomes for each meshblock removing a lot of the variation that we see between individuals. Gini coefficients measuring income inequality nationwide between individual households have been presented in a number of studies. O'Dea (2000) presents results from several recent studies. The years to which the Ginis relate vary but for the years 1995 and onward the Ginis vary from 0.32 to 0.47, much higher than the 0.17 Gini coefficient we got across meshblocks nationally in 1996.

This suggests that income inequality within meshblocks is a large determinant of overall income inequality.

9. POLICY LINKS

We have seen that there are clear differences in our proxy deprivation score between regions, in level differences, trends over time, and ethnic group outcomes. What does this mean for policy? Are differences between regions always a problem? Do differences in outcomes between regions mean that we need place-based policies to address them?

Not all differences in deprivation scores are problems; there are lots of reasons why we would expect to see differences across space. Regions have different characteristics, people and firms have different preferences, and the choices made by people and firms in response to these varying regional characteristics will inevitably make some places more popular and prosperous than others. Furthermore, the picture of location choice is a dynamic one – from time to time region-specific shocks occur, which change the relative attractiveness of certain areas to people and firms. Over time, people and firms move in response to changes in economic and social opportunities. This adjustment is a necessary and desirable process; it is what allowed people and economic activity to move from former West Coast gold rush towns to areas with greater opportunities, for example. Observed differences may represent one point in a necessary process of regional adjustment.

Some regional differences are good for New Zealand. Cities provide benefits to both producers and consumers and are important for New Zealand's economic performance. US evidence has shown that if the density of an area doubles, labour productivity increases by 6% and total factor productivity by 4%.[17] Furthermore, there is a wage premium of over 20% in US cities and there is evidence that this is related to higher human capital accumulation.[18] Whilst we don't have New Zealand evidence, we draw from the international literature that Auckland, in particular, is likely to be a critical force in economic development for New Zealand. The force of agglomeration is felt even more keenly when we take an international perspective. Agglomeration forces can operate across national boundaries: many New Zealand firms and people are drawn to Sydney, for example. The costs of assisting struggling non-urban regions may be to offset the positive impacts of agglomeration in Auckland. Furthermore, policies that divert resources from our major cities to more rural regions may, in effect, be promoting Sydney. Whatever their other objectives, policy makers need to think carefully about putting sand in the wheels of agglomerating forces.

Regional differences, however, are of particular concern in two cases: neighbourhood effects, and high costs of adjustment. Similar sorts of people tend to choose to live in similar sorts of places, whether because they can afford similar housing, need similar social services, identify personally or culturally with others in the area, or can provide each other community support, etc. However, when groups of low well-being people live together there may be negative spillovers or 'neighbourhood effects' that perpetuate social problems and result in even poorer outcomes for these groups. There are likely to be fewer educational opportunities, poorer quality of education, poor local infrastructure, difficulty in establishing businesses, and lack of access to information-rich networks for example. It is these sorts of interactions that may lead to cycles of disadvantage, urban ghettos and dysfunction in remote communities.

Despite the intuitive appeal of neighbourhood effects, research has found it very difficult to document empirically, in large part because of the difficulty of working out whether disadvantaged communities appear because disadvantaged people choose to live together, or because living together also worsens their prospects. While this makes it difficult to prove that spillovers exist, their possible existence suggests policy for the disadvantaged should focus at least partly on deprived neighbourhoods.

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[17] Ciccone and Hall (1996)
[18] Glaeser and Maré (2001)

The second reason government may be concerned about regional differences is when adjustment costs are so high that people who are unable to find work locally do not relocate to areas where there are jobs because of the high costs of moving. Differences in housing prices between regions, for example, may mean people become stuck in rural declining regions. There are, of course, some who are not stuck, but choose to remain in deprived regions for non-economic reasons. These people face a difficult trade-off between the well-being gained from moving (the benefits of income and a job) and the well-being gained from staying (existing social ties and connections to place). The government can help ease adjustment and improve people's choices as far as possible, but they will not be able to resolve the trade-off. In the end the government needs to decide to what degree it is prepared to bear the costs of intervening to sustain declining communities, particularly if, in doing so, it is discouraging adjustment.

When drawing policy implications from the patterns presented in this paper, we must bear in mind that the measure of socioeconomic deprivation that we have used is a composite measure of individual and household outcomes. It remains an important question as to whether policies to address deprivation should be targeted at locations with high deprivation scores or at the factors that contribute to the deprivation score. For instance, a regional policy such as infrastructure investment may do nothing for deprivation if the primary driver of deprivation is low educational attainment.

A case for place-based policies can be built on evidence of spillovers or barriers to adjustment. An important area of future research, therefore, is the extent to which it is selection or regional factors that give rise to regional differences in relative deprivation.

10. IDEAS FOR FUTURE RESEARCH

The work on which this paper is based has enabled a high level picture of deprivation across regions for the period 1986-1996 to be developed. It does not provide an exhaustive analysis of all that is possible in this area.

We note at least two significant avenues down which this work could be further developed and enhanced.

In section 7 we touched on a quick analysis of the impact of isolation on deprivation. The results were not conclusive which we believe may be largely due to the unsophisticated approach used. One possibility for further work would be to further investigate the role of isolation. Physical isolation, for example, could be more accurately assessed by using a road network on which to base isolation calculations.

A second interesting area for future work would be to incorporate factors such as differences in housing costs that occur across areas into the analysis. There are two primary reasons for doing this. The first is basically to adjust income for differences in the costs of living that occur both across and within regions. As the analysis currently stands two meshblocks with a median income of $15,000, one on the West Coast and the other in Auckland, will both get the same deprivation score provided they are identical on the other factors. This is despite housing being more expensive in the Auckland region. The second reason is that differences in housing costs may in themselves provide information on the differences in opportunities in a region. For example, housing costs on the West Coast may to some extent be lower due to lower (or a narrower range) of opportunities being available to people in this region compared to Auckland. How you separate these two effects out would require further thought.

Perhaps the most striking finding of this paper has been the worsening performance of the Northland region. A case study approach could be applied to the Northland region as well as some other regions with differing fortunes in order to try and assess the major causes of Northland's poor performance.

11. CONCLUSION

This paper has presented a simple summary measure of deprivation across New Zealand. The analysis has focused on the 3 census years 1986, 1991 and 1996.

The results presented in this paper suggest there is considerable variation in both the absolute numbers of people living in deprived meshblocks and the rate of deprivation within regional communities. There has also been considerable variation in the fortunes regions have experienced over the three census periods with respect to deprivation.

The Auckland region has by far the greatest population of all the regions and consequently the greatest number of people living in deprived meshblocks. Any intervention aimed at assisting people living in deprived communities will therefore need to include an Auckland focus if it is to capture a significant number of the New Zealanders living in deprived meshblocks.

The regions of Northland and Gisborne have very high rates of their population living in the most deprived meshblocks. This negative characteristic has always been seen in Gisborne during the years covered by the study (although Gisborne did see some improvement over the study period). Northland on the other hand has experienced significant growth in the proportion of its population that live in the most deprived meshblocks over the study period.

The Maori and Pacific ethnic groups are over-represented in the most deprived meshblocks and under-represented in the least deprived meshblocks. There is, however, significant regional variation in the extent of this over and under representation. At a national level the over-representation of Maori is such that there are more Maori than New Zealand Europeans living in the most deprived meshblocks. This results in New Zealand Europeans being a minority group in the most deprived decile meshblocks – an unexpected result given the majority of individuals in the lowest income decile are New Zealand European.

Over the period 1986-1996 deprivation became less severe for most meshblocks with average deprivation scores falling for deciles 1-9. For the most deprived decile deprivation increased.

Further work on deprivation could focus on the role of isolation on deprivation and take into account differences in costs of living across regions.

BIBLIOGRAPHY

Ciccone, A. and Hall, R. (1996), 'Productivity and the Density of Economic Activity', *American Economic Review*, Vol 86 #1 Pp 54-70

Coleman, A. (1999), 'The Life-Cycle Model, Demographic Change, Savings and Growth', mimeo, New Zealand Treasury.

Coope, P. and Piesse, A. (No date) '1991-1996 Inter-Censal Consistency Study', mimeo, Statistics New Zealand.

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

Evans, L., Grimes, A., Wilkinson, B., and Teece, D. (1996), 'Economic Reform in New Zealand 1984-95: The Pursuit of Efficiency', *Journal of Economic Literature*, *Vol. XXXIV* (December 1996), pp.1856-1902.

Glaeser, E. and Maré, D. (2001), 'Cities and Skills', *Journal of Labour Economics*, Vol 19, # 2 Pp 316-342

Jackel, C. (1997), 'Using Arcview to Create Contiguous and Noncontiguous Area Cartograms', *Cartography and Geographic Information Systems,* 24(2):101-109.

O'Dea, D. (2000), 'The Changes in New Zealand's Income Distribution', Treasury Working Paper 00/13.

Salmond, C., Crampton, P., and Sutton F. (1991) *'NZDep91 Index of Deprivation',* Wellington, Health Services Research Centre.

Salmond, C., Crampton, P., and Sutton F. (1996) *'NZDep96 Index of Deprivation',* Wellington, Health Services Research Centre.

Statistics New Zealand (No Date) 'Census of Population and Dwellings 1996'.

Townsend, P. (1987), 'Deprivation', *Journal of Social Policy*, 16, 125-146.