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Toward a more nuanced understanding of the deprivation-childhood obesity relationship in NZ

A presentation at the **COMPASS Seminar Series**

Daniel Exeter, Jinfeng Zhao, Arier Lee,
Sue Crengle, Michael Browne, Nichola Shackleton

d.exeter@auckland.ac.nz



**MEDICAL AND
HEALTH SCIENCES**

Outline

- A brief introduction to data zones and the IMD
- How does the IMD compare with NZDep?
- Exploring the association between childhood obesity and deprivation

Developing the NZ Index of Multiple Deprivation (NZIMD)

Two phases:

1. Zone design

- Design zones that are suitable for health and social analyses
- Population range 500 to 1,000 with a mean of 712 residents
- 2013 Census MBs used as the 'building blocks'

2. Index creation

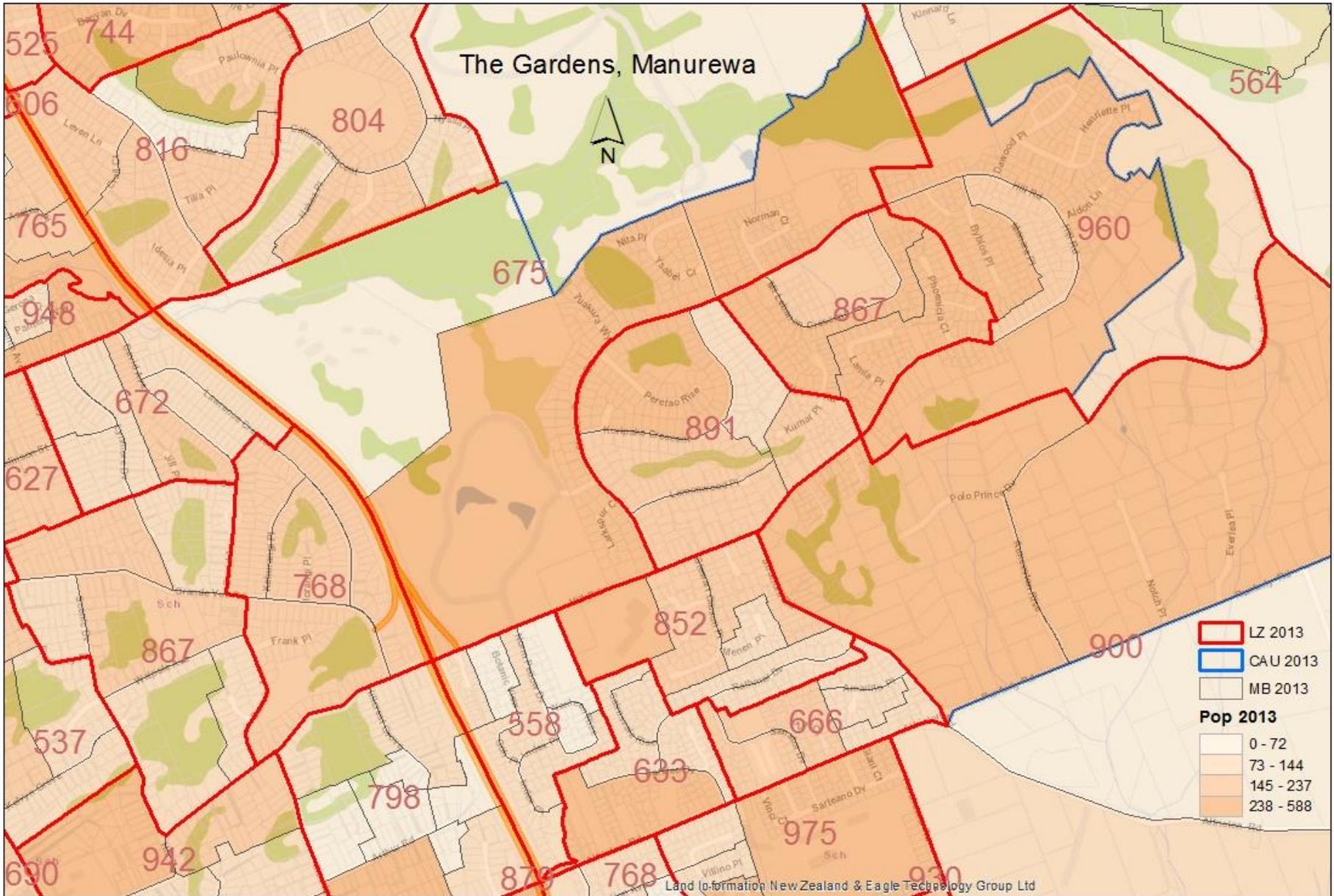
- Identify potential indicators
- Identify potential data sources
- Select indicators that measure key aspects of deprivation robustly
- Develop individual Domains and an overall Index

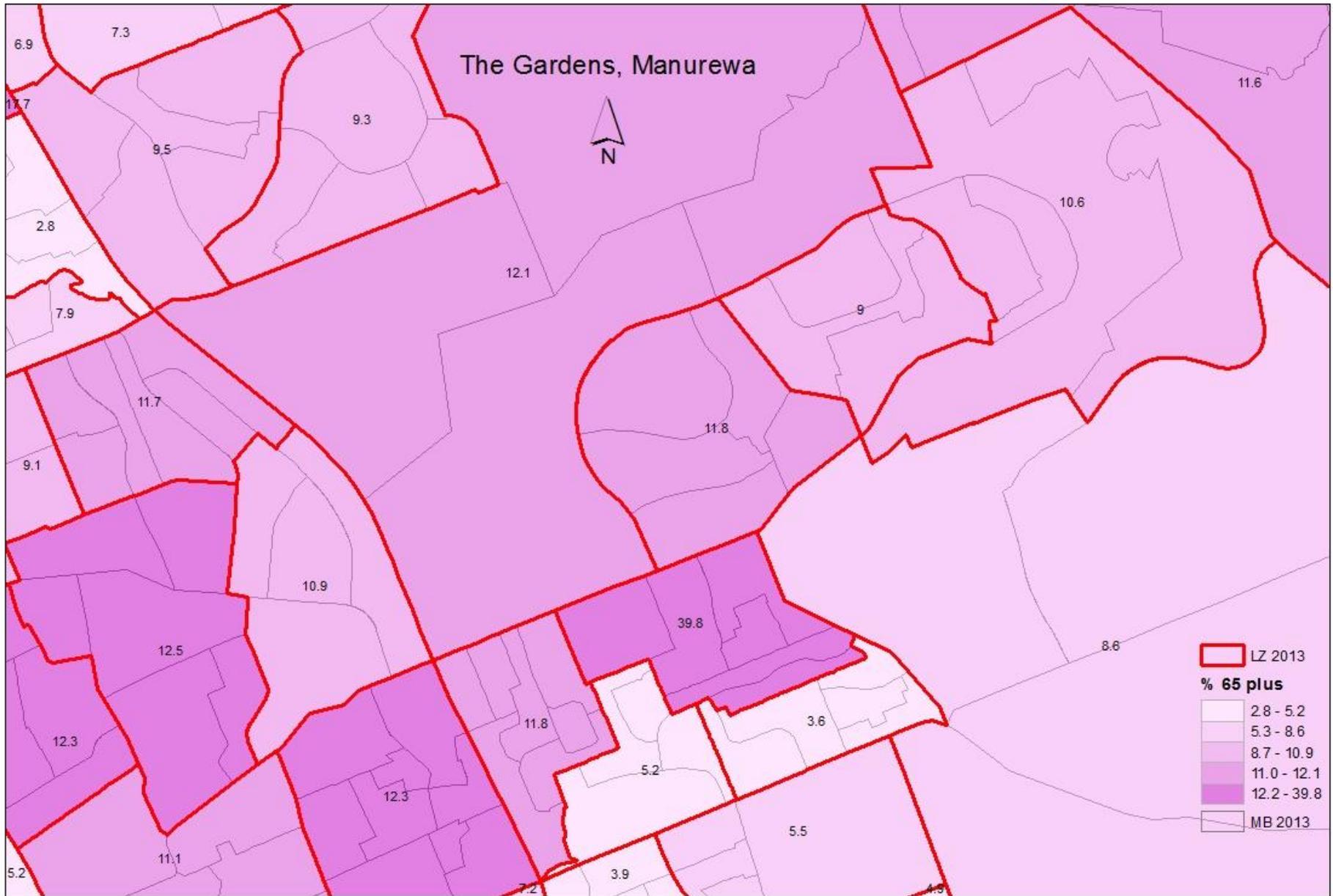
Statistical comparison of three geographic scales

Levels of Geography	Number of Areas	Population		Compactness (P ² A)	
		Mean	STD	Mean	STD
Census Meshblock	45,921	91	73.46	26.77	13.43
Data Zones	5,958	712	129.57	28.83	26.08
Census Area Unit	1,911	2,108	1,658.68	40.79	48.90

- 5958 Data Zones were constructed for New Zealand
- They do not include coastal and inland waters
- Data Zones comprise approximately 8 Meshblocks each

The Gardens, Manurewa





16 data zones (0.3%) in NZ with null for % 65+

Compared with 7.2% of CAUs and 18.6% of MBs.

The benefits of mapping data by data zone

- Zones are custom designed for social and health research.
- Reduces the degree of suppression in your data.
 - e.g. for smoking rates
 - 9% of MBs (4501/46629) are suppressed
 - Only 0.4% of LZs (21/5958) are suppressed
- Know your neighbourhood:
 - Data zone summaries of gender, age, ethnicity and socioeconomic homogeneity, as well as seven domains of deprivation.
- Report, share and access data at a standard geographical level
 - Zones are independent of police districts, school districts etc, but do nest within DHBs and Territorial Authorities

Creating the IMD

Indicators were selected if they were:

- Domain-specific and appropriate for the purpose
 - as direct as possible measures for that particular form of deprivation
- Measuring major features of that aspect of deprivation
 - not conditions experienced by a very few people or areas
- Up-to-date and could be updated regularly
- Were statistically robust
- Available for the whole of New Zealand at a small area level in a consistent form

Dozens of potential indicators were investigated but only 28 met the criteria.

Acknowledgements & Disclaimer Statement

Access to the data presented was managed by Statistics New Zealand under strict micro-data access protocols and in accordance with the security and confidentiality provisions of the Statistic Act 1975. Our findings are not Official Statistics. The opinions, findings, recommendations, and conclusions expressed are those of the researchers, not Statistics NZ, or the University of Auckland.

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Census boundaries used in this analysis are Crown Copyright

Data providers



**MINISTRY OF SOCIAL
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TE MANATŪ WHAKAHIATO ORA



The Royal New Zealand
College of General Practitioners
Te Whare Tohu Rata o Aotearoa

The New Zealand Index of Multiple Deprivation 2013

Employment

- Number of working age people receiving the Unemployment Benefit
- Number of working age people receiving the Sickness Benefit

Neighbourhood working age population

Income

- Weekly Working For Families payments (\$ per 1000 population)
- Weekly payments (\$ per 1000 population) in the form of income related benefits

Neighbourhood total population

Crime

Victimisation rates for:

- Homicide and Related Offences
- Assault
- Sexual Assault
- Abduction and Kidnapping
- Robbery, Extortion and Related Offences
- Unlawful Entry With Intent/Burglary, Break and Enter
- Theft and Related Offences

Neighbourhood total population

Housing

- 0.40 Number of persons in households which are rented
- 0.60 Number of persons in households which are overcrowded

Neighbourhood household population

Health

- 0.08 Standardised Mortality Ratio
- 0.19 Hospitalisations related to selected infectious diseases
- 0.28 Hospitalisations related to selected respiratory diseases
- 0.42 Emergency admissions to hospital
- 0.04 People registered as having selected cancers

Indicators are ranked, transformed to a normal distribution and then combined using weights generated by factor analysis to create the domain Score.

Education

- 0.25 School leavers <17 years old
- 0.30 School leavers Without NCEA L2
- 0.06 School leavers not enrolling into tertiary studies
- 0.26 Working age people without qualifications
- 0.13 Youth not in Education Employment or Training

Access

- Distance to 3 nearest:
 - 0.26 GPs or A&Ms
 - 0.20 Supermarkets
 - 0.23 Service stations
 - 0.15 Primary or intermediate schools
 - 0.15 Early Childhood Education Centres

Indicator counts are summed and divided by the population denominator to create the domain score for each neighbourhood.

The domain score is ranked to create a domain rank. Each domain rank is standardised and transformed to an exponential distribution and these values are combined using the weights below.

28%

28%

5%

9%

14%

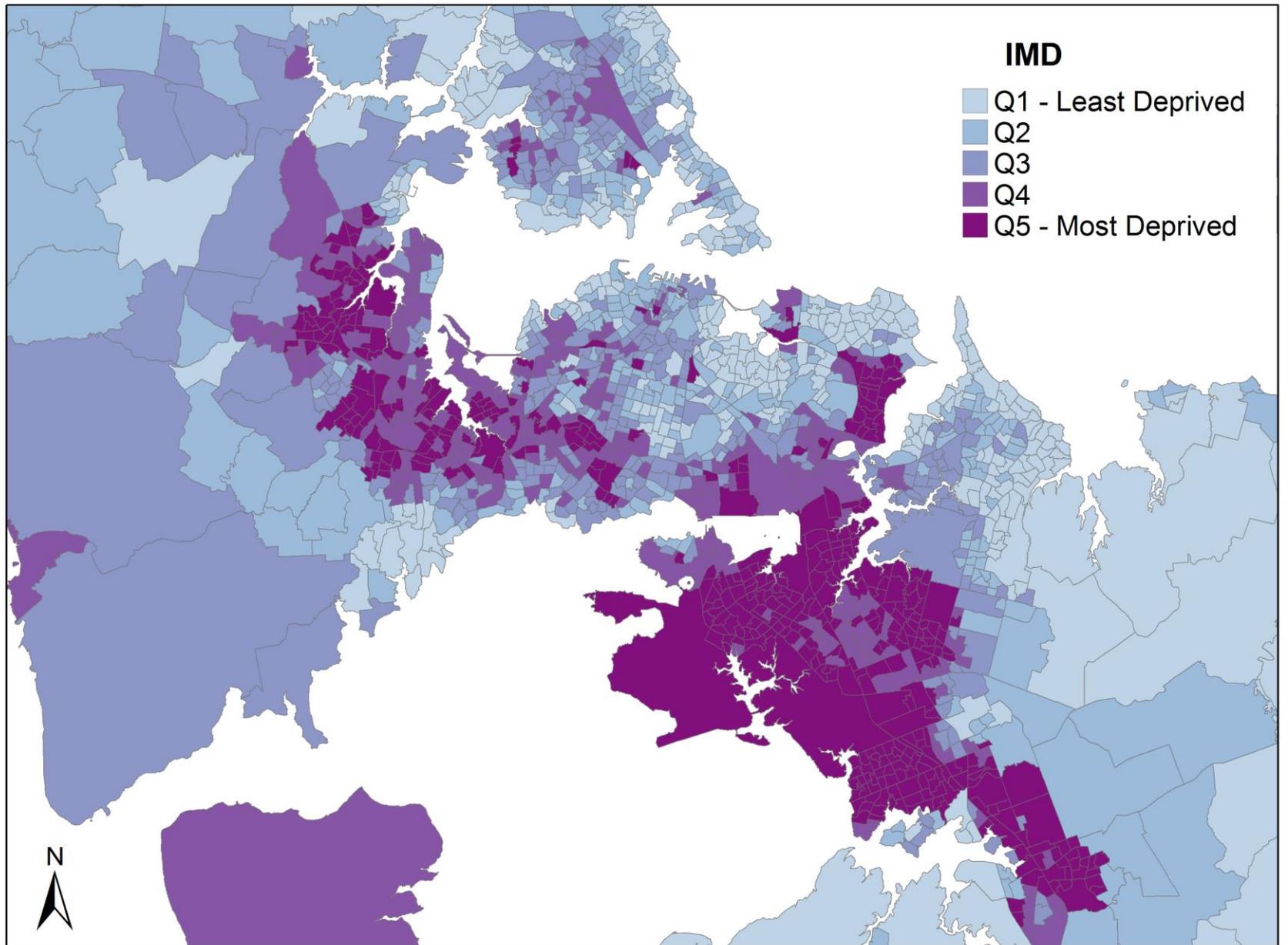
14%

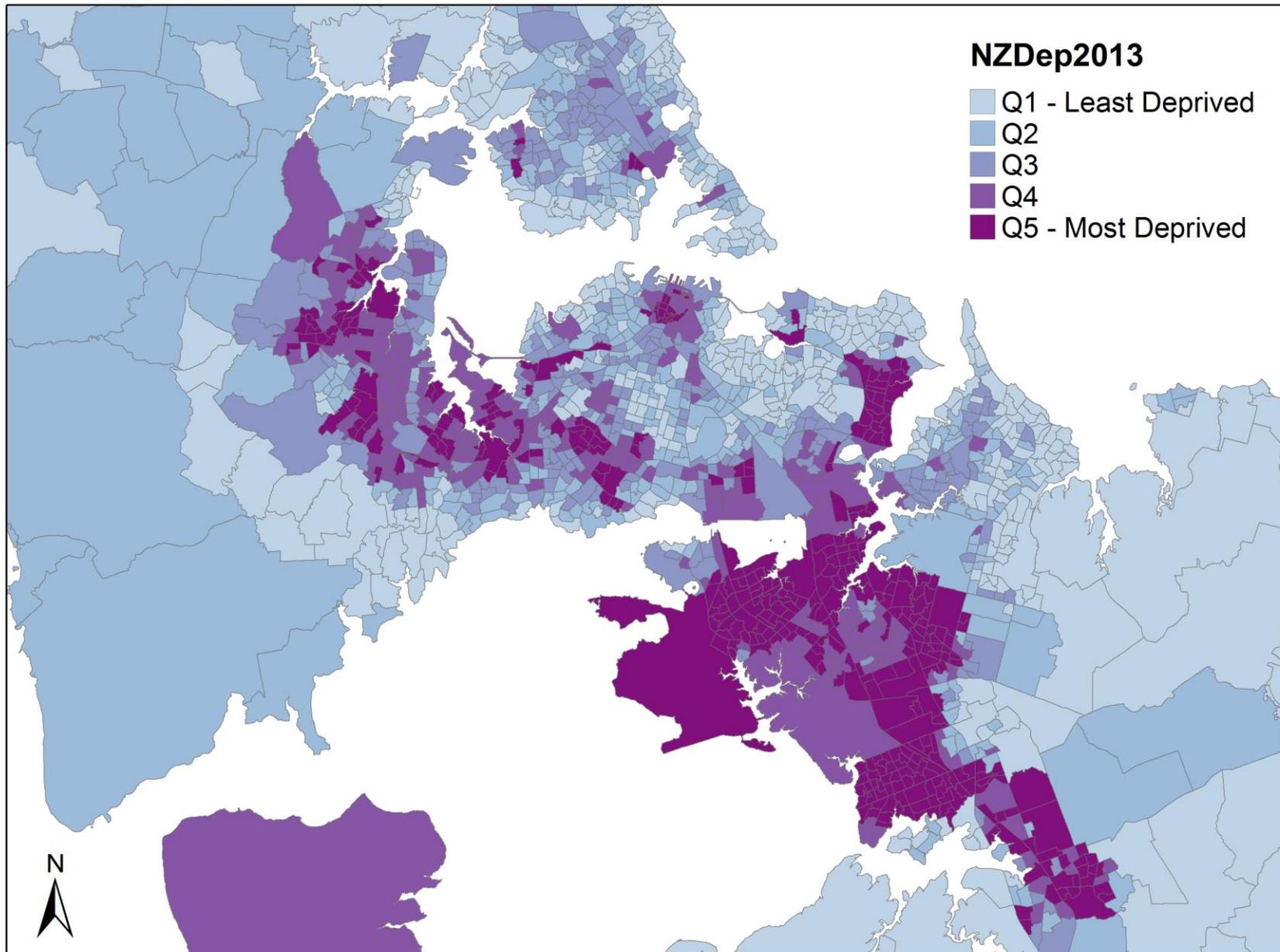
2%

This creates the overall NZIMD score for each neighbourhood, which is ranked to create the overall NZIMD rank

The New Zealand Index of Multiple Deprivation

- Provides a **series** of deprivation measures that can be used individually or combined
- Provides a more nuanced, robust and accurate measure of deprivation circumstances in NZ
- Measures key aspects of deprivation:
 - e.g. the level of income support payments going into neighbourhoods,
 - Levels of student achievement and retention,
 - Hospitalisations for infectious and respiratory diseases
 - Household overcrowding
 - Crime victimisations





Variables included in NZDep2013

Dimension of Deprivation	Description	Weight
Communication	People aged <65 with no access to the Internet at home	0.372
Income	People aged 18-64 receiving a means tested benefit	0.364
Income	People living in equivalised* households with income below an income threshold	0.356
Employment	People aged 18-64 unemployed	0.338
Qualifications	People aged 18-64 without any qualifications	0.332
Owned Home	People not living in own home	0.322
Support	People aged <65 living in a single parent family	0.317
Living space	People living in equivalised* households below a bedroom occupancy threshold	0.303
Transport	People with no access to a car	0.286

IMD compared to NZDep13

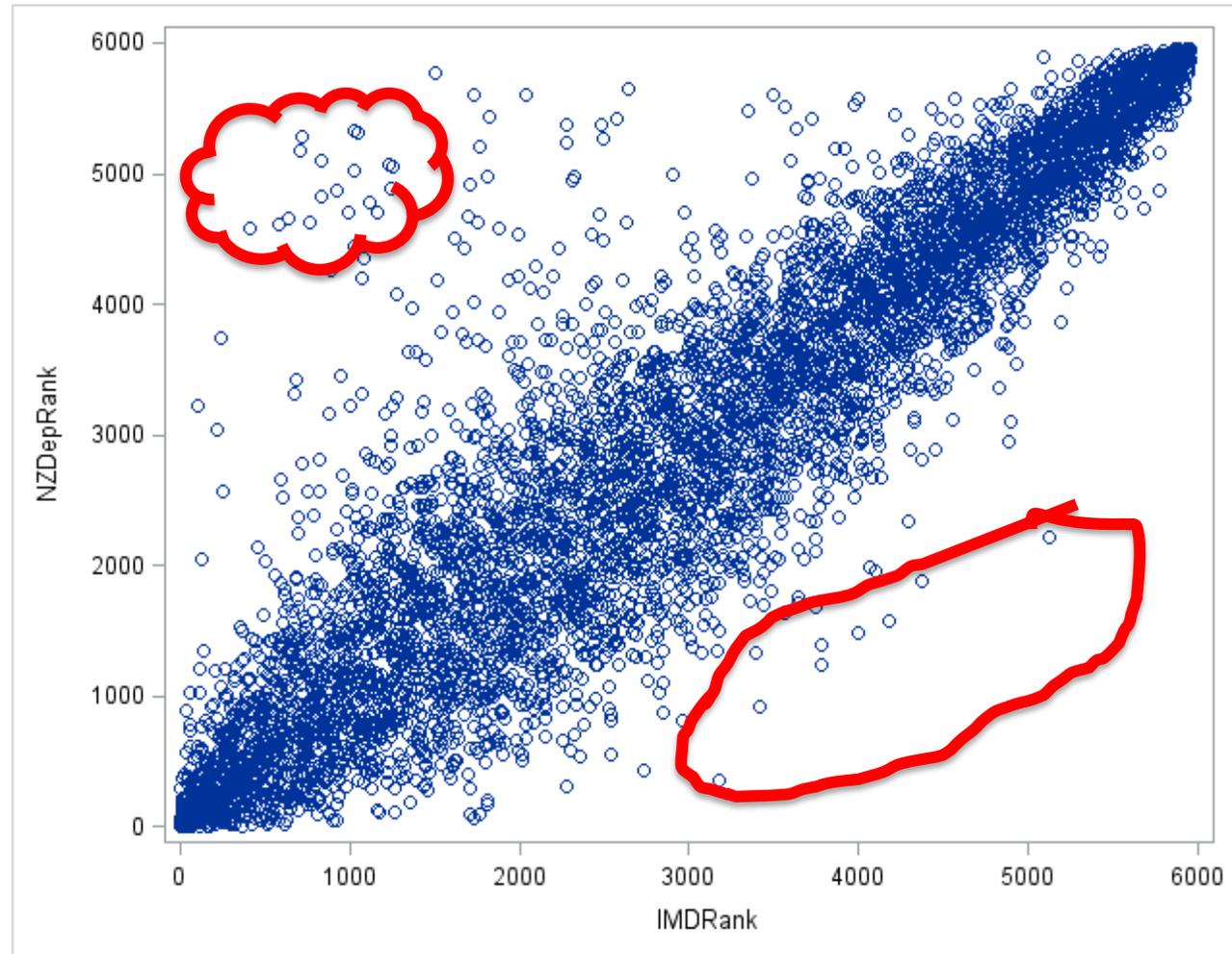
We calculated the population weighted average NZDep13 rank for each data zone

We excluded 86 (1.4%) data zones with MBs without an NZDep13 score

Spearman Correlation Coefficient:

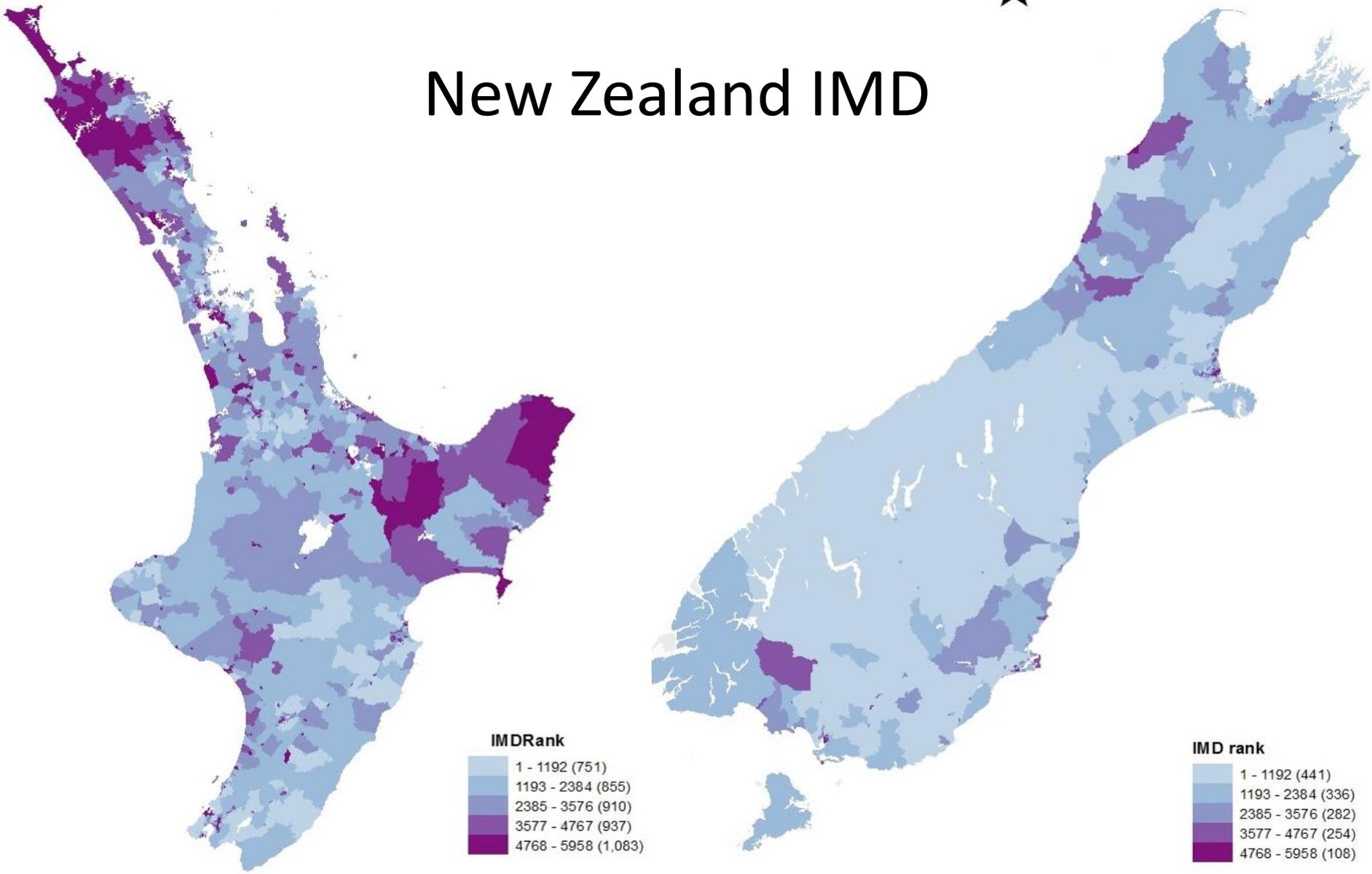
0.92

($p < .0001$)





New Zealand IMD



IMDRank

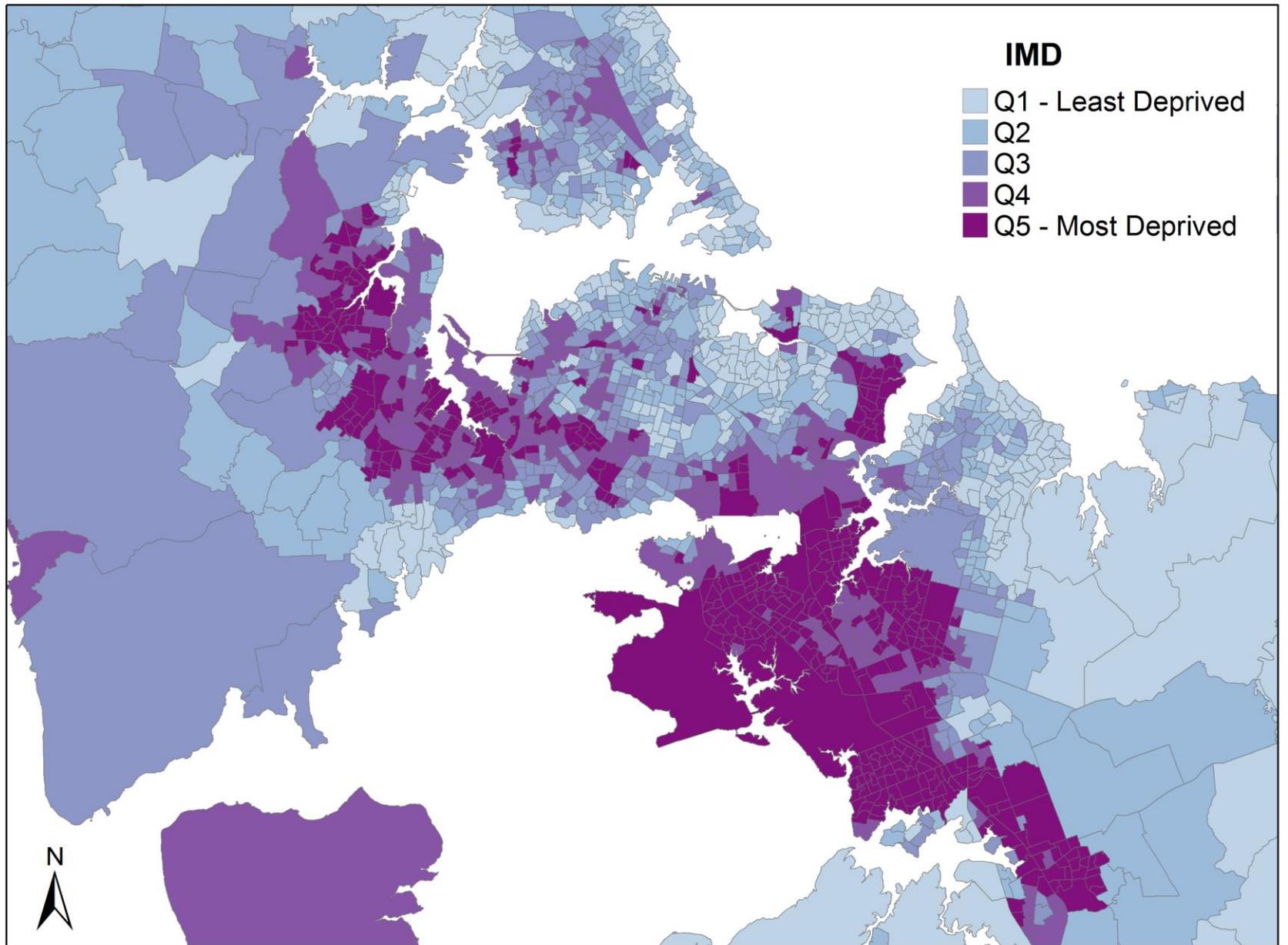
1 - 1192 (751)
1193 - 2384 (855)
2385 - 3576 (910)
3577 - 4767 (937)
4768 - 5958 (1,083)

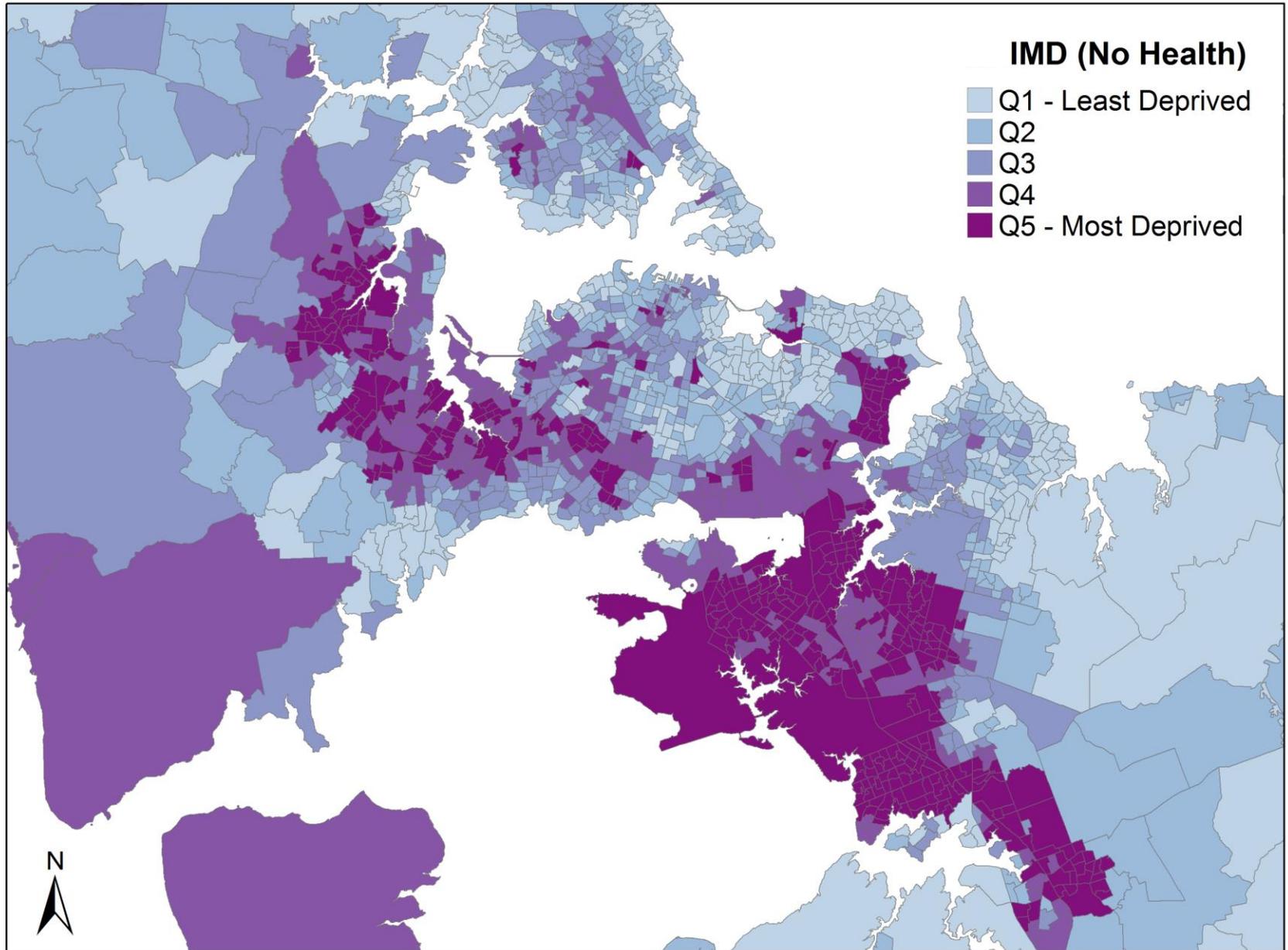
IMD rank

1 - 1192 (441)
1193 - 2384 (336)
2385 - 3576 (282)
3577 - 4767 (254)
4768 - 5958 (108)

How the IMD may help improve outcomes and reduce inequalities

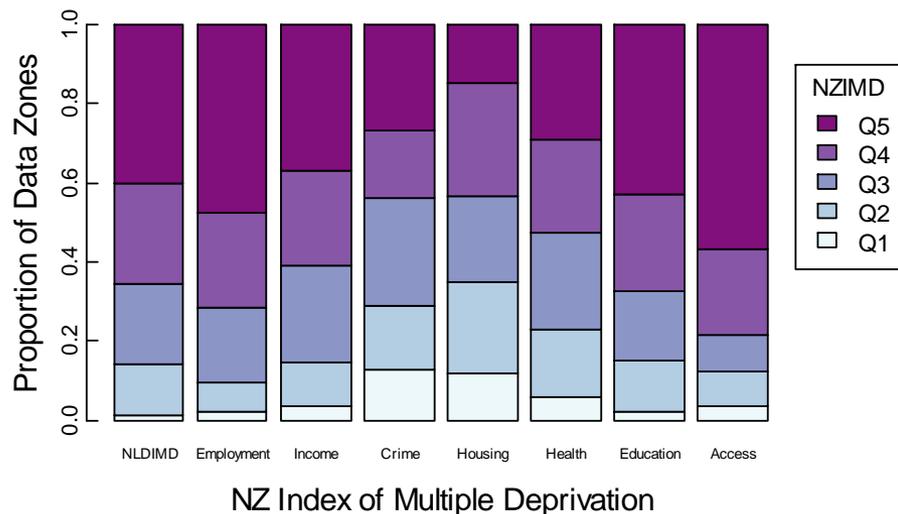
- A more comprehensive, nuanced and flexible index will help users understand neighbourhoods better. Each neighbourhood is unique and faces a different set of challenges and may have different drivers of deprivation.
- Users might:
 - Identify and focus on the most deprived neighbourhoods
 - Identify neighbourhoods with similar characteristics and design interventions to suit
 - Remove one of the domains to address potential circularity
e.g. an analyst at the DHB may choose to remove the Health Domain



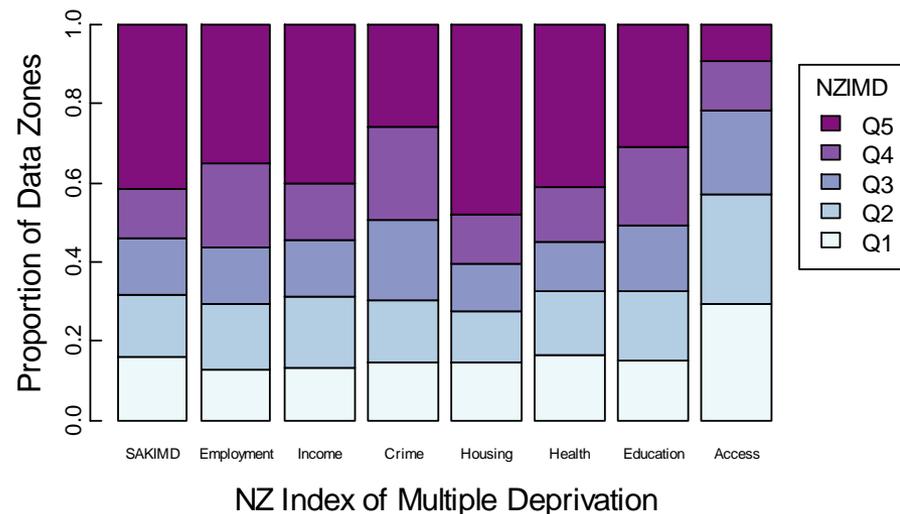


The deprivation profiles of selected DHBs

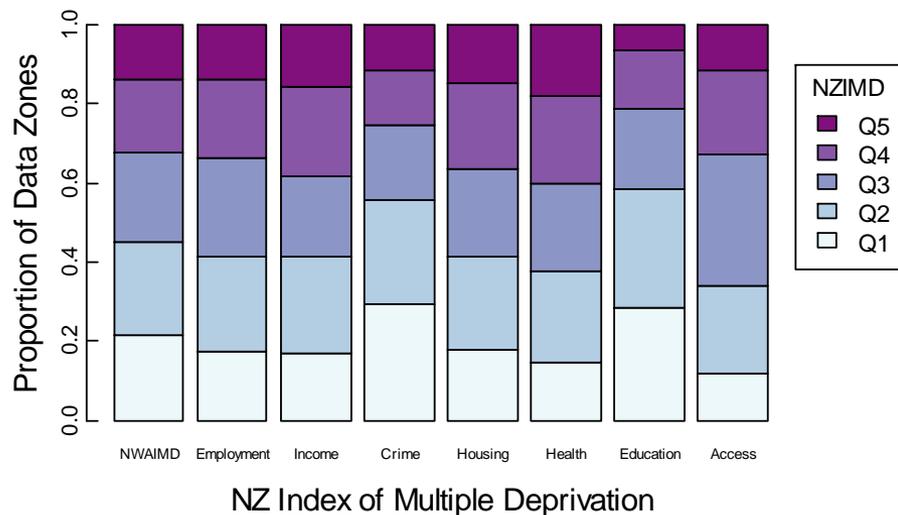
Northland



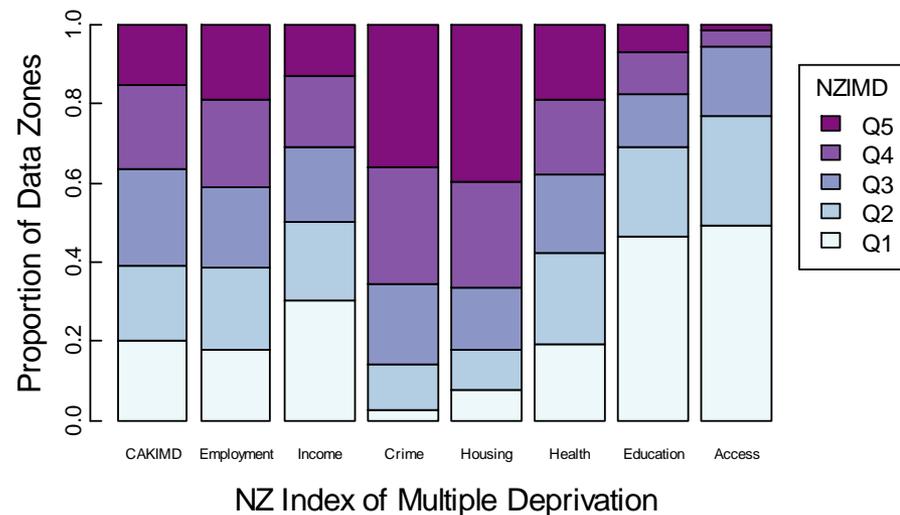
Counties



Waitemata



Auckland



Case Study: Childhood Obesity

- The Before School Check (B4SC)
 - Universal programme offered to all families in New Zealand with four year old children.
 - Implemented nationwide in September 2008
 - Covers assessments of hearing, vision, oral health, growth, behavioural problems and developmental issues.
 - We included data from 2010-2016 due to low participation rates prior to the 2010 fiscal year
- Māori
 - 27% of the sample identified as Māori
 - 21% of Māori children were obese
($\geq 95\%$ percentile of BMI for age and sex)

How is the IMD different to NZDep?

Unadjusted odds of a child being obese, at 4 years (2010-2016)

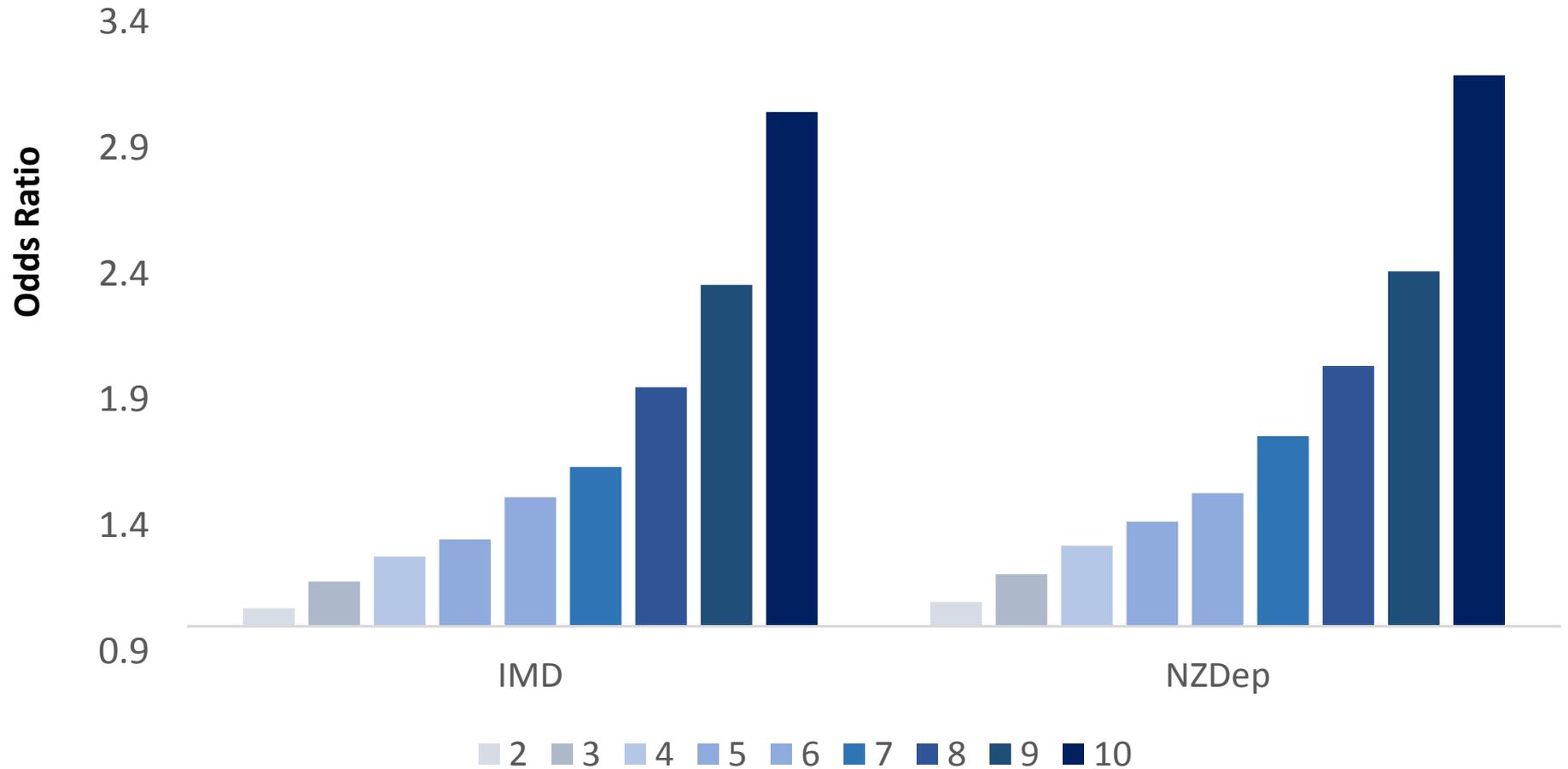


Figure note: These are unadjusted odds ratios

However, with it's 7 domains, the IMD can provide a richer picture

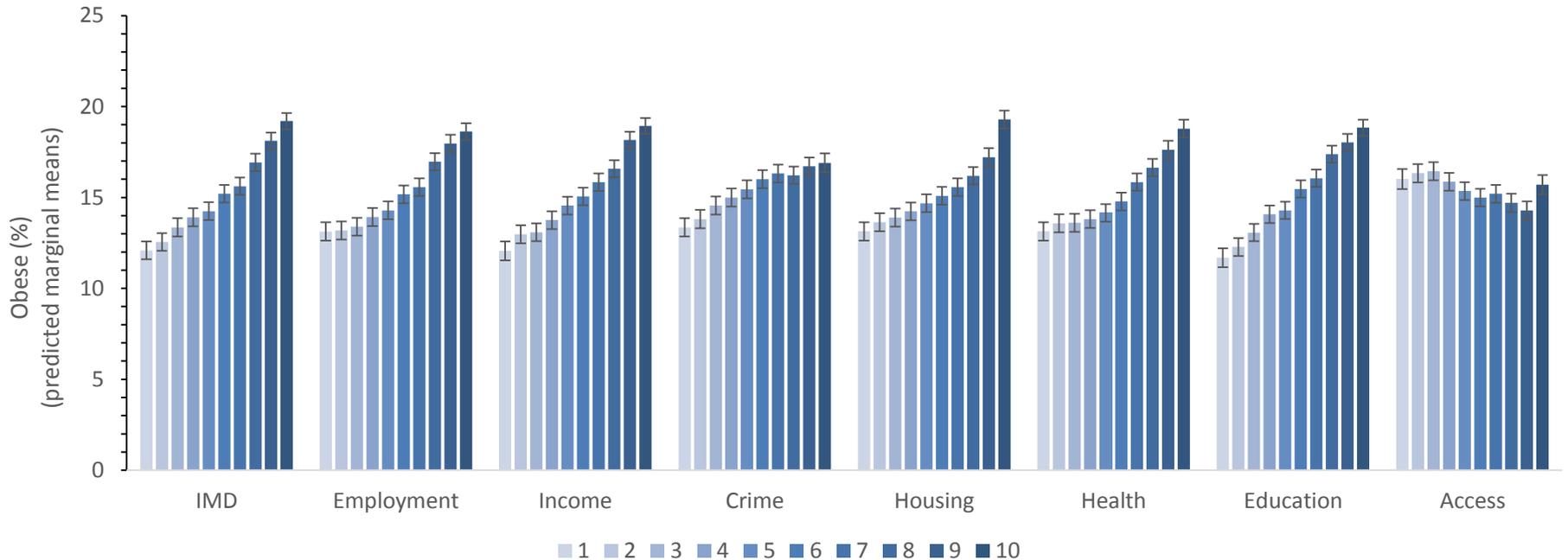
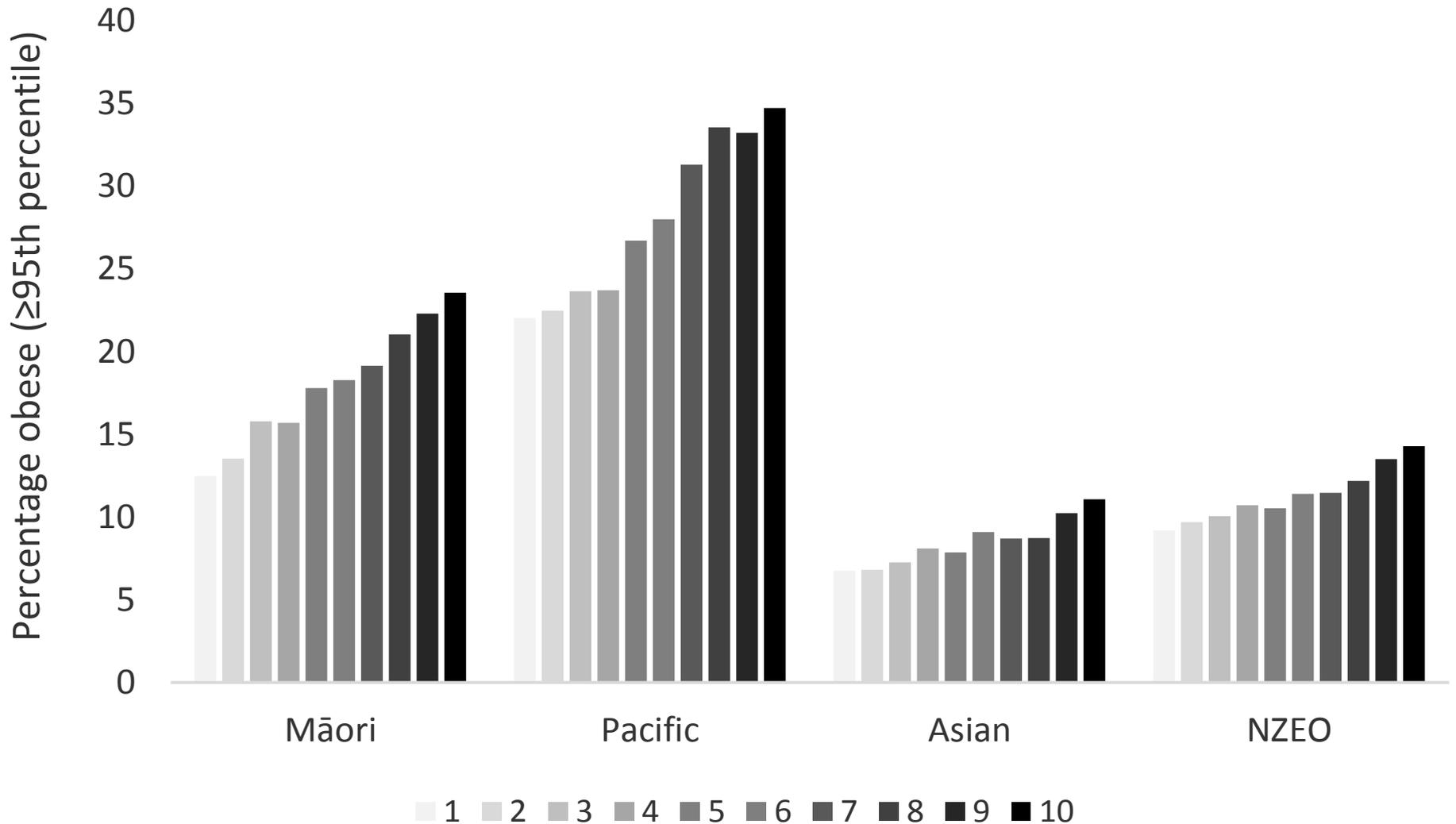


Figure note: These marginal means are adjusted for age, sex and ethnicity, data source: B4SC 2010-2016

Conclusions

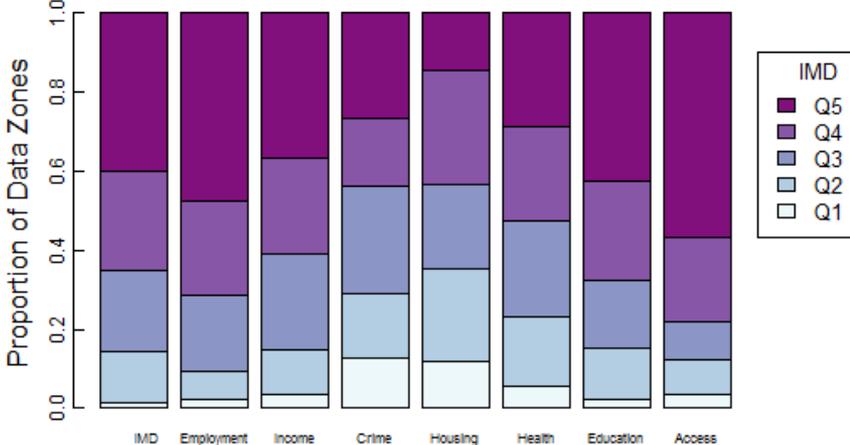
- Data zones are a robust geographical scale to analyse health and social data
- Overall, the IMD is broadly consistent with NZDep2013
- The IMD has the flexibility to show the effects different domains of deprivation have on health outcomes
 - Odds increase steadily as income and education deprivation increase
 - Odds increase exponentially as employment, housing and health deprivation increase
 - In some cases, allocation of resources according to one domain of deprivation may be appropriate

Ethnic differences in childhood obesity by IMD, 2010-2016

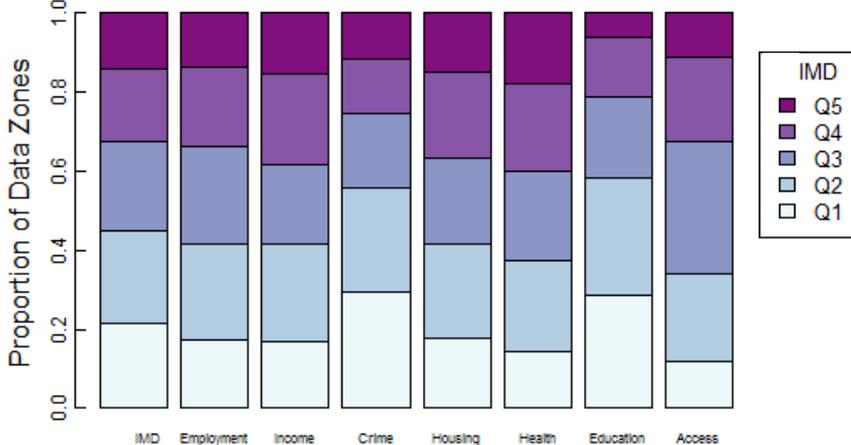


These predicted probabilities, modelling the interaction of ethnicity and deprivation, adjusted for age, and sex, source: B4SC data, 2010-2016

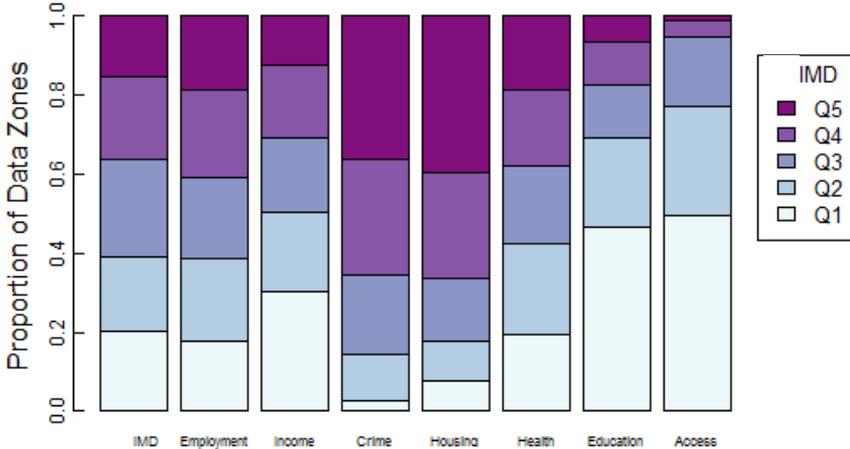
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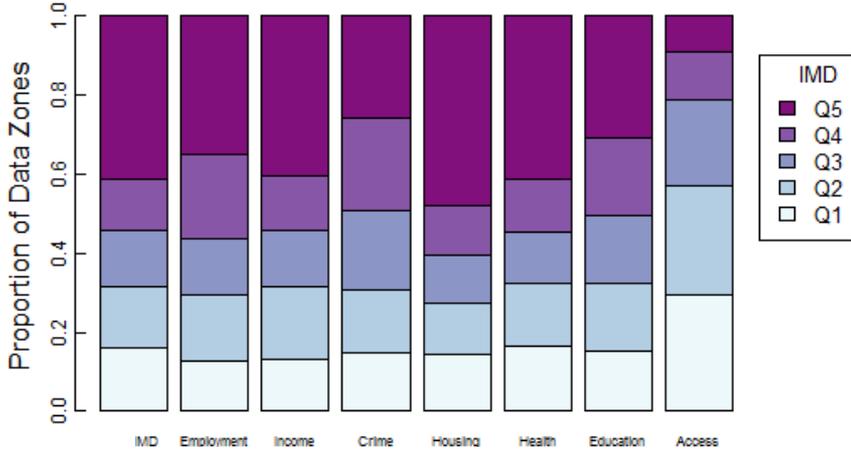
Northland DHB



Waitemata DHB



Auckland DHB



Counties-Manukau DHB