

The GeoHealth Laboratory



UC GEOHEALTH LABORATORY

TE TAI WHENUA O TE HAU ORA





The GHL team. From right: Prof. Simon Kingham (GHL Director), Dr Matt Hobbs (postdoc), Dr. Malcolm Campbell (Deputy Director), Jesse Wiki (PhD candidate), Dr. Lukáš Marek (postdoc), Denise Hutana (Ministry of Health), Dr. Melanie Tomintz (GHL Research Manager) and Dr. John McCarthy (Ministry of Health). Administrative aspects of the GHL are supported by the GRI; oversight and governance are provided by Denise Hutana and Dr. John McCarthy at the MoH.

Introduction

In 2004, the GHL was launched as a joint enterprise between the University of Canterbury and the Ministry of Health. The collaboration Between the Ministry of Health and the University of Canterbury has provide a resource of research in health that is unique in the Southern hemisphere. In 2017, The GHL joined the Geospatial Research Institute (GRI) of the University of Canterbury, creating a large multi-disciplinary research group in the field of geospatial analysis.

The research focus of the GHL is applied research in key areas such as health geography, spatial epidemiology and GIS. In particular, the work developed in the GeoHealth Laboratory is centered in understanding how the local and national contexts shape health outcomes and health inequalities and how both micro and macro level processes have help defining New Zealanders' health. Currently, our research work has been developed using mostly national registries and official statistics together with other national data sources. Throughout 2018, we have been working towards developing open-access web map applications based on publicly available data. These

resources will allow the public to directly explore data related to relevant public health topics such as childhood immunization trends over time, across New Zealand.

Throughout these years, based on the Ministry of Health strategy, the GeoHealth Lab has developed a significant body of work in key areas of relevant health issues in the country. Together with the immunization research, some of our most prominent current research work has been developed in areas such as: childhood Ambulatory Sensitive Hospitalisation, obesity and dental health. Alongside with these projects we have started to explore the use of new technologies in health, such as virtual reality, which currently we are using to asses peoples' behavior and perceptions related to the use of electronic cigarettes (this project has been developed with external funding). In this way, the GHL continues to innovate and promote the analysis and mapping of health related data in New Zealand. In this way, the lab is steadily becoming a strong regional referent in the area.

Summary of outcomes 2018

Research Highlights

The activities at the GeoHealth Laboratory are driven by two major aims:

- ◆ To undertake innovative and policy-relevant research in the areas of health geography, spatial and social epidemiology, and Geographic Information Systems (GIS) and
- ◆ To increase research capacity and research outputs in the health and GIS academic sectors.

The GeoHealth Laboratory has centred its working plan on three main core activities: **research, scholarships and training**.

Here, we provide a brief summary of the main outcomes in research, promotion and work dissemination at the GHIL in 2018.

The GHIL has two principal funding streams, one directly provided by the Ministry of Health (MoH) and the other indirectly provided by the Geospatial Research Institute and the Department of Geography at the University of Canterbury (UC). These are supplemented by additional funding sources.

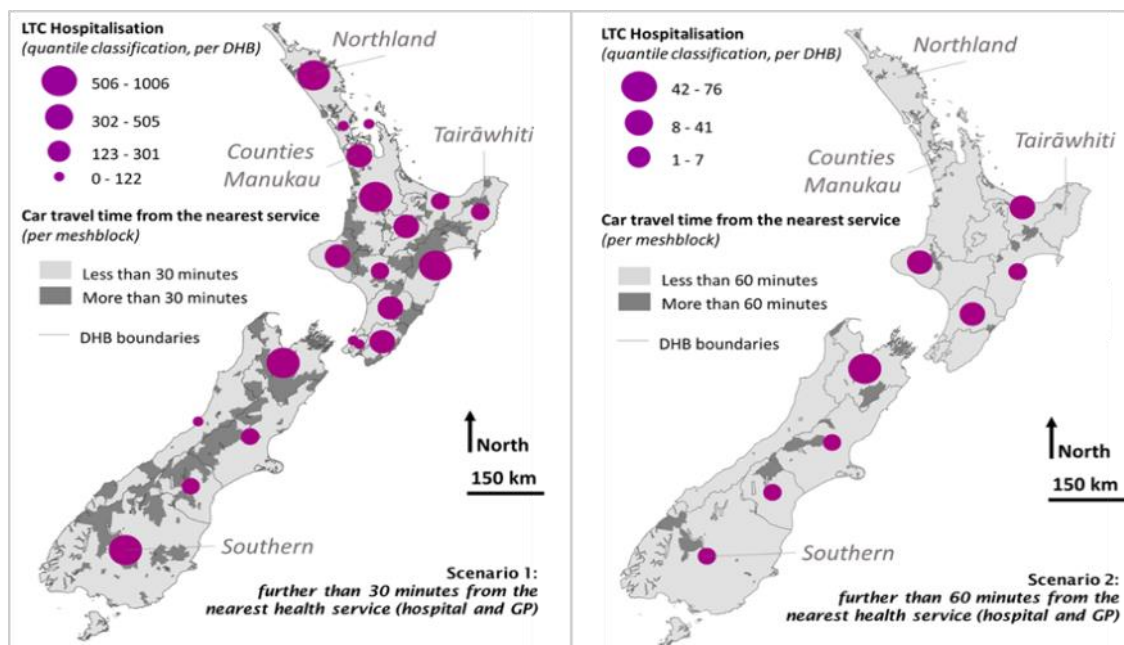
The research developed at the GHIL is centred on the Ministry of Health strategy. The research model between the MoH and the GHIL, is focused in developing a specific research work programme for each year. Research projects mostly use MoH data sources such as the New Zealand Health Surveys, location data, National Minimum Data set, Primary, Health Care Enrolments, hospital admissions/discharge data collections, and other administrative data sets, as well as the Christchurch District Health Board (CDHB), the City Council and the Institute of Environmental Science and Research.

Analysis of Long Term Condition (LTC) rates and the spatial distribution of LTC hospital admissions for Northland, Counties Manukau, Tairāwhiti, and Southern District Health Board areas

Team

Dr. Clémence Vannier (GHL, UC)
 Prof. Simon Kingham (GHL, UC)
 Dr. Melanie Tomintz (GHL, UC)

Kanchan Sharma (MoH)
 Alison Randall (MoH)
 Dr. John McCarthy (MoH)



Number of LTC hospital admissions for people living further than thirty minutes (scenario 1) or sixty

Aim

To examine the spatial accessibility to General Practitioners (GPs) and hospitals for people who were hospitalised between 2011 and 2016 with one or more long term condition (LTC), specifically cancer, cardiovascular disease, diabetes, renal and respiratory disease. First, age-standardised LTC rates are calculated and compared across DHB areas. Second, spatial analyses are applied to identify individuals living further than thirty and further than sixty minutes car drive from their nearest hospital and/or GP.

Conclusion

People under the age of 24 have the lowest LTC hospital admission rate (3.4%) and people between the age of 25 and 49 the highest (5.2%). People between the age of 50 and 65 have the highest LTC rates (19%), followed by people over the age of 65 (15.6%). People living in Southern DHB have the longest travel time to a health service. All people with a LTC living in Tairāwhiti, Counties Manukau and Northland are less than one hour driving time from the nearest health service. the majority of people with LTC conditions have access to a GP or hospital in less than 60 minutes driving time. Cardiovascular conditions and cancer have the highest number of hospital admissions for both scenarios (30 and 60 minutes driving time).

Modelling policy relevant small area smoking simulations at neighbourhood level to add new insights and information

Team

Dr. Melanie Tomintz (GHL, UC)
Dr. Malcolm Campbell (GHL, UC)
Dr. John McCarthy (MoH)



Aim

The **aim** of this project was to use a geospatial simulation methodology to model three different scenarios, i.e.:

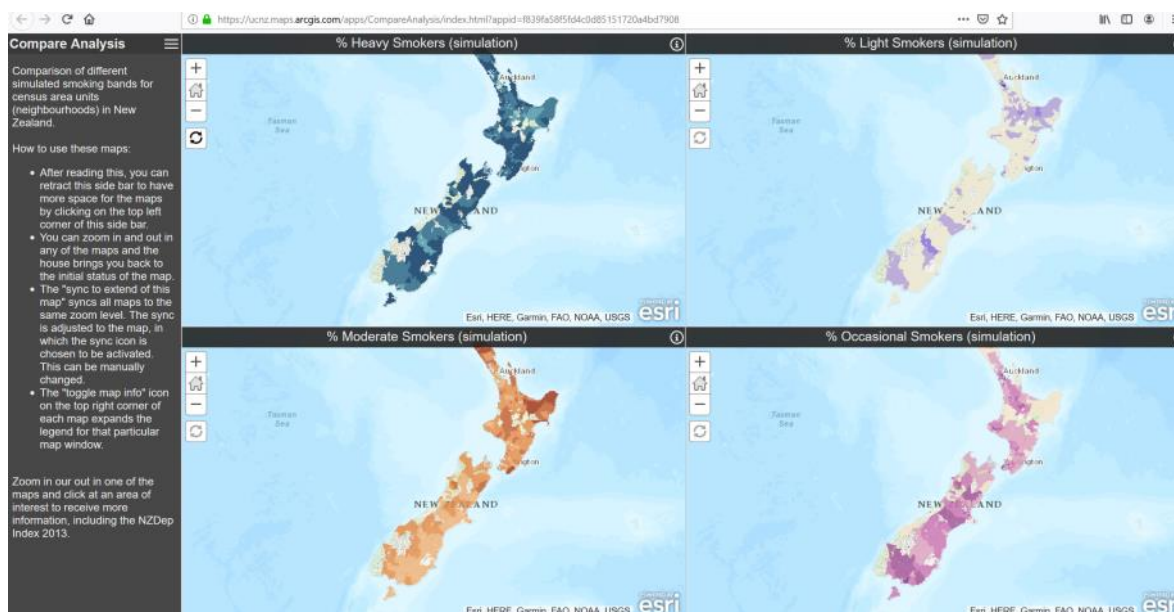
- **Scenario 1:** Number of Māori smokers
- **Scenario 2:** Smoking behaviour expressed as smoking bands
Occasional smoker: less than one cigarette per day
Light smoker: smokes between 1 and 5 cigarette per day
Moderate smoker: smokes between six and 15 cigarettes daily
Heavy smokers: smokes 16 or more cigarettes daily
- **Scenario 3:** People who quit smoking for more than a week.

Conclusion

There are neighbourhood variations for different types (occasional, light, moderate, heavy) of smokers. Highest variations are found for light (13.6% - 32.2%) and heavy (12.5% - 30.0%) smokers, i.e. in some neighbourhoods there are only around 13 percent of heavy smokers and in some it increases to almost a third, of all smokers in each area.

Stronger relationships between deprivation and smoking bands at neighbourhood level are found for occasional and moderate smokers. Areas with higher rates of occasional and heavy smokers are found more often for less deprived areas compared to the most deprived areas. The opposite is true for light and moderate smokers.

Neighbourhoods with higher rates of smokers, who deliberately tried to quit for at least a week or successfully quit after that, varied between 30 and 47 percent in each area. A urban rural divide was noticed, with lower rates in more rural areas, meaning that people from rural areas were less likely to try to quit smoking for at least a week.



Available at:

<https://ucnz.maps.arcgis.com/apps/CompareAnalysis/index.html?appid=f839fa58f5fd4c0d85151720a4bd7908>

Geospatial analysis of childhood immunisation in New Zealand

Authors

Dr. Lukáš Marek
Prof. Simon Kingham
Dr. Melanie Tomintz

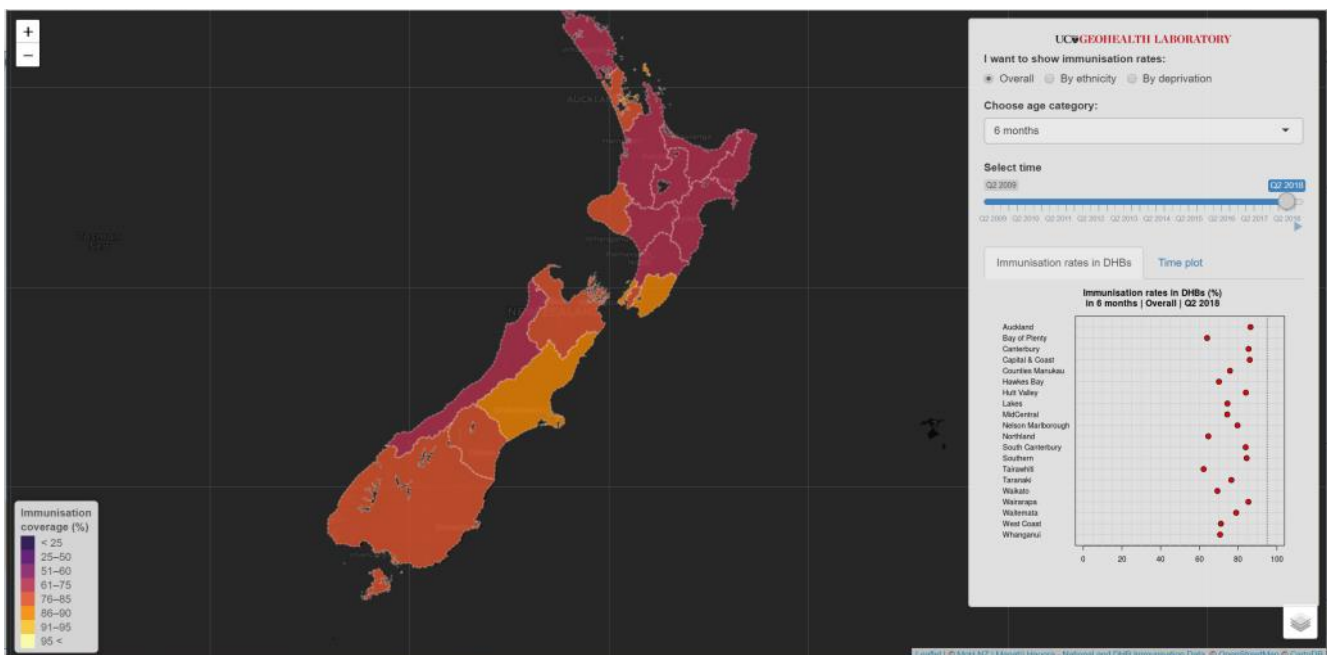


Aim

To help policymakers and relevant stakeholders to better understand the distribution and spatial variation of childhood immunisation within New Zealand.

Projects' contribution

- Provides evidence based on national registries and official statistics that may be further used by relevant stakeholders in order to improve immunisation related policy and outreach activities.
- The development of an open-access web map application based on publicly available data allows to explore time trends of immunisation for DHBs over time and by milestone age, ethnicity or socio-economic deprivation.

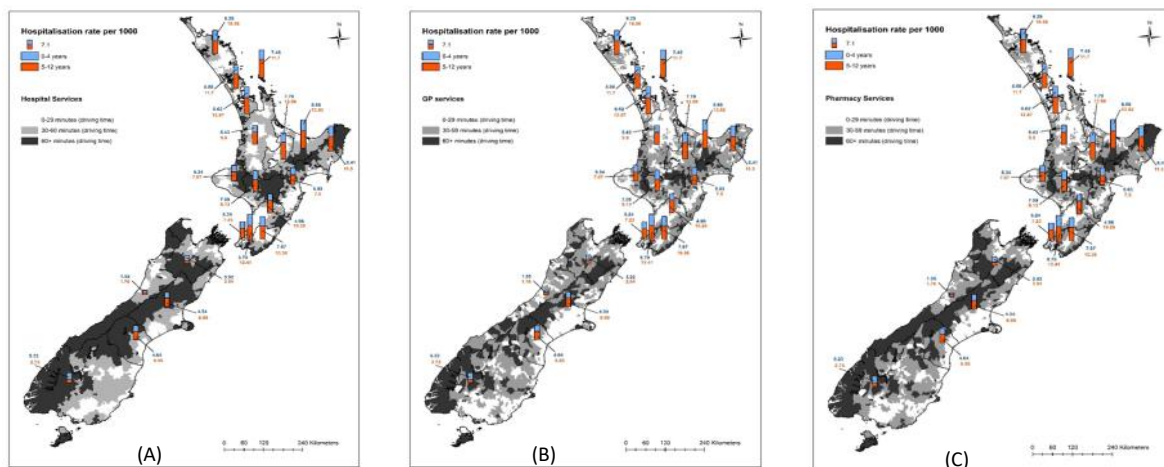


<https://chchairquality.shinyapps.io/Immunisation/>

Investigating the rates and spatial distribution of childhood ambulatory sensitive hospitalisations in New Zealand

Authors

Dr. Matthew Hobbs
Dr. Melanie Tomintz
Prof. Simon Kingham



Access to hospitals (A), general practices (B) and pharmacies (C) and dermatological ASH rates for children (0-4 5-12 years)

Aim

To help policymakers understand the distribution of childhood ambulatory sensitive hospitalisations (ASHs) within New Zealand. This report supports actions 6 and 8 of the New Zealand Health Strategy: ensuring the right services are delivered at the right location in an equitable, clinically and financially sustainable way, and increasing the effort on prevention, early intervention, rehabilitation and wellbeing.

Conclusion

This report uses several nationwide cross-sectional surveys and registries to add novel findings to current evidence regarding ASH rates within New Zealand. It identifies spatial variation in both health service availability and ASH rates by age group (under 5 and under 13 years) and demonstrates evidence that ASH rates were also affected by wider factors such as water fluoridation, vaccination and enrolment in PHOs. There was also notable variation by area-level deprivation and ethnicity.

Additional project with external funding

Virtual Environments to Study Preventive Health Attitudes - "VESPHA" Case Study: Vaping

Team

Dr. Melanie Tomintz
 Dr. Simon Hoermann
 MSc. Nawan Karki
 Dr. Maria C Vega Corredor

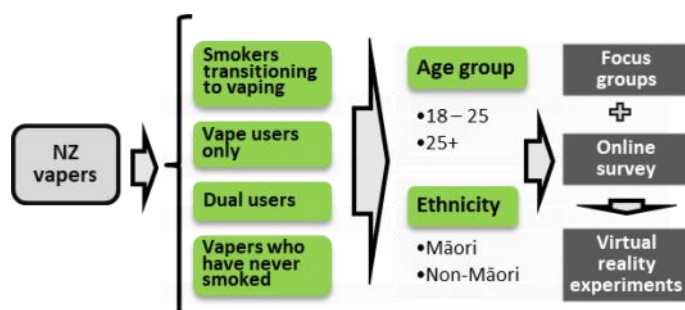


Aims

- To study peoples' experiences and behaviour in virtual environments related to vaping;
- To contribute to the knowledge regarding of situations and environments in which people vape in New Zealand; and
- To use the advance technology of virtual reality to eliciting craving for vaping using specifically developed virtual environments.

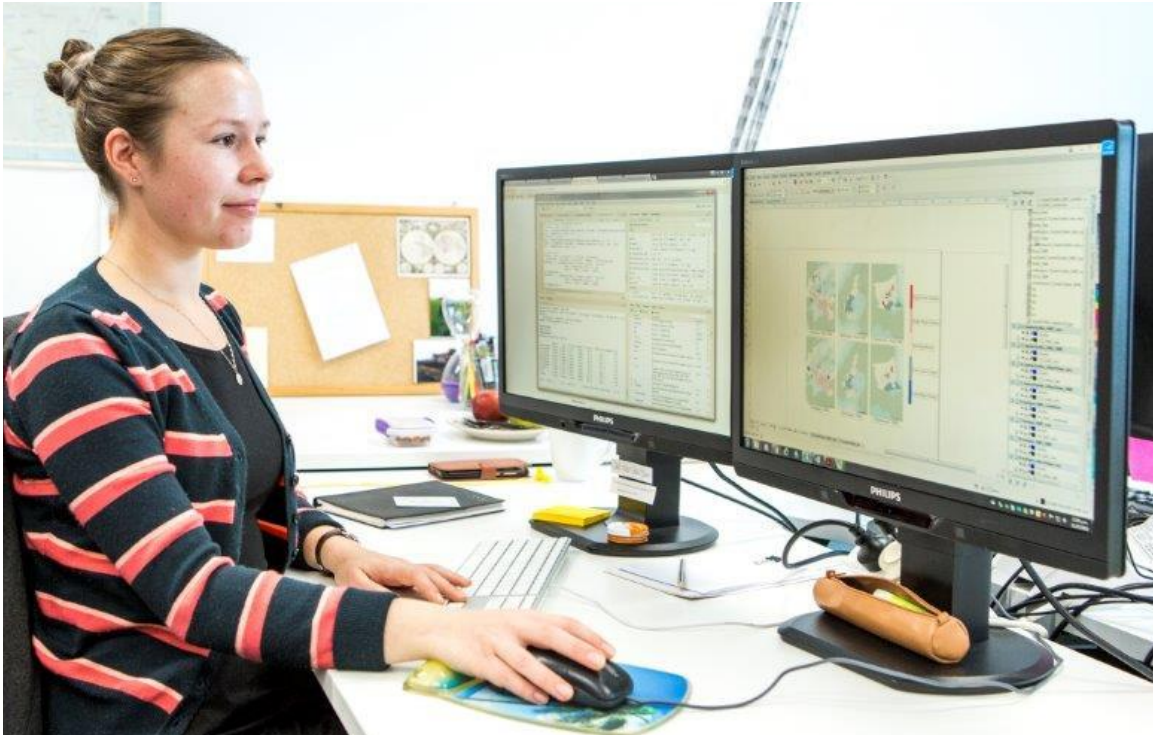


Data collection



Projects' contribution

Virtual reality has been used to study peoples' behaviour related to smoking. However, there is not enough evidence or data related to eliciting craving for vaping using virtual reality, nor sufficient information related to situations or environments in which people commonly vape in New Zealand. With this project we expect to contribute to expand the knowledge regarding vaping and how to use advanced technology to enable new research pathways to help studying health issues individually and collectively.



Training

Several courses in areas related to health geography such as spatial epidemiology, public health or Geographical Information Systems have been given through the GHIL as well as through the Geography Department program.

Masters in Geospatial Analysis for Public health

A new masters program in Geospatial Analysis in Public Health started in 2018 at the University of Canterbury. This academic program designed in consultation with the MoH, has been created with the aim of helping to increase geospatial capability and capacity in New Zealand

Scholarships

A core driver of the GHIL is to ensure that the New Zealand health sector has access to a pool of young and talented individuals that are amongst the 'best and the brightest' and have

practical GIS skills in the emerging areas of geohealth research. To meet this aim the GHIL provides two Master's Degree scholarships per year, and one PhD scholarship.

PhD Students 2018

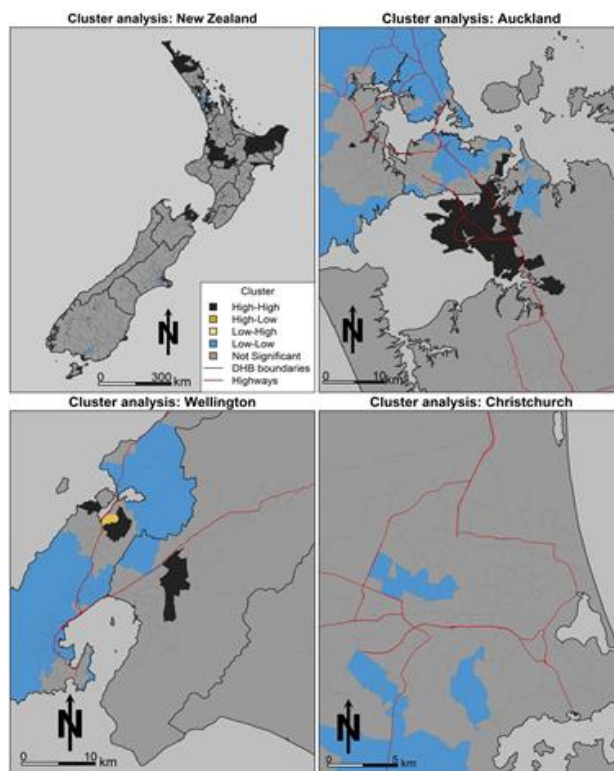
PhD student Alison Watkins, successfully defended her PhD thesis: *Exploring the social and spatial context of adult obesity in Aotearoa New Zealand: a spatial microsimulation approach*, from which a brief summary is given in the next page.

PhD student Jesse Wiki is also developing her research, which is planned to be completed in 2019.

PhD Thesis

Exploring the social and spatial context of adult obesity in Aotearoa New Zealand: a spatial microsimulation approach

Author: Alison Watkins



Local Moran's I analysis, showing areas with significant clusters of high or low obesity areas

Aim

To put population level adult obesity in New Zealand into a spatial context using spatial microsimulation modelling (SMSM). SMSM is a technique that combines detailed microdata from the New Zealand Health Survey (NZHS) with small area census data to generate obesity estimates at a neighbourhood level.

Conclusion

The SMSM outputs will be useful for operational policy decisions as well as informing policy more broadly. Collectively, the work presented here extends the understanding of the geography of obesity in Aotearoa New Zealand.

