

**GeoHealth Laboratory**  
*Te tai whenua o te hau ora*

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# **GeoHealth Laboratory**

## **Annual Report 2010-11**

June 2011



**Health & Disability Intelligence**

**Dept. of Geography**



*GIS Expertise & High Quality Research for Public Health*

# GeoHealth Laboratory

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# Executive Summary

This report describes the activities undertaken during the 2010/11 year. The report describes the infrastructure, work plan, milestones, achievements and key events in the fifth year of operation of the Laboratory; as well as setting out the aims and work plan in detail for year six.

## • 2010/11 Key Achievements

An integral component of the GeoHealth Laboratory's strategic aims is to undertake ground breaking and policy-relevant research in the area of health and health services.

Some of the projects have been funded directly with core GeoHealth Laboratory funding and others from other external sources through opportunities which have arisen due to the rising profile of the Laboratory

Research projects have continued to add value to existing Ministry of Health data sources such as the 2006/07 New Zealand Health Survey, mortality, cancer registration, hospital admissions/discharge data collections and the New Zealand Health Tracker.

Key projects this year have been:

- Using Geospatial mapping to inform the Long Term Health Sector Plan
- Assessing the impact of smoking cessation services: a geographical analysis of the Quitline data
- Geographic access to alcohol outlets and serious violent crime in New Zealand
- Identifying and understanding the paradox of good health despite high social and environmental deprivation

During 2010/11 the Laboratory had 17 Health related research articles published, and 2 under review and 3 in press. A large number of these publications were outputs of planned projects agreed between the Laboratory and MoH and directly fed into health reports and were used as health advice

In 2010/11 2 students successfully completed their Masters and one students successfully completed their PHD – all funded by Geohealth Laboratory Scholarships

## • Plans for 2011/12

This year the lab intends to increase its collaboration with the MoH, by undertaking projects that reflect issues that have been highlighted by the MoH or that are of high interest to specific policy groups. For example, this year we plan to investigate trends in infant mortality, a major indicator of the health of a nation. We are looking into the effectiveness of Healthline at demand management, using linked hospital data. Also we plan to examine resilience in Maori communities.

# Introduction

The GeoHealth Laboratory was established in 2005 as a partnership between Health & Disability Intelligence (HDI) (formerly Public Health Intelligence (PHI)), in the Ministry of Health, and the Department of Geography, University of Canterbury. It was launched by the then Minister of Health, the Hon Annette King MP, in November 2004 at the *GeoHealth 2004* Conference in Wellington, and formally opened on the 18<sup>th</sup> February 2005.

The Laboratory seeks to advance Ministry of Health policy and the University of Canterbury's health sciences research agenda for the mutual benefit of the New Zealand health sector. Its aims are to:

- build a strategic partnership around health geography, spatial epidemiology and Geographical Information Systems (GIS)
- increase research capacity and research outputs in health and GIS.

## 1.1 Why have a GeoHealth Laboratory?

The Laboratory is driven by the desire to exploit the potential of GIS (computer systems for integrating and analysing geographically referenced data) and Geographical Information Sciences (GIScience - the combination of GIS and associated spatial statistics and spatial thinking applied to the analysis of geographically distributed data) for practical health research. By linking health outcomes and environmental and socioeconomic determinants, the application of GIScience provides powerful tools for studying population characteristics, the provision of health services and the spatial distribution of disease.

In this respect the GeoHealth Laboratory provides a unique resource for the southern hemisphere. The research focus of the Laboratory is practical application. By drawing on the leading geo-health research and teaching experience of the Department of Geography, combined with the policy focused epidemiology expertise of the Ministry of Health, the Laboratory provides access to the most up to date expertise for the practical deployment of GIScience and geo-health research for the benefit of the New Zealand health sector.

## 1.2 Fifth Annual Report of the GeoHealth Research Laboratory

This is the fifth annual report of the GeoHealth Laboratory and describes the activities undertaken during the 2010/11 year. The report describes the infrastructure, work plan, milestones, achievements and key events in the fifth year of operation of the Laboratory; as well as setting out the aims and work plan in detail for year six.

After Section 1 introduces the Laboratory and sets the scene, Section 2 outlines how the Laboratory is structured including information about funding, personnel, infrastructure, equipment, data and management. Sections 3 and 4 describe the work plan of the Laboratory broken down into its two constituent parts, research and scholarships. Section 5 covers the important publicity and promotional activities undertaken to increase awareness and publicise the Laboratory; whilst Section 6 outlines the immediate goals for next year and the strategic direction beyond.

The Laboratory has continued to function well over past year despite the major disruption resulting from the Christchurch earthquakes and aftershocks. Staff and

students were personally affected from damage and loss of property and the University of Canterbury was closed on three occasions and had to be progressively reopened over extended periods of time, the Department of Geography building being one of the last buildings to reopen from the February earthquake. This required staff and students associated with the Laboratory to work from home as best as they were able.

## 2 GeoHealth Research Laboratory Infrastructure

The structure of the Laboratory is explained under the following five sub-headings:

1. Funding
2. Personnel
3. Facilities
4. Equipment
5. Management.

### 2.1 Funding

The Laboratory has two principal funding streams, one directly provided by the Ministry of Health and the other indirectly provided by the Department of Geography. In addition, over the past 12 months the GeoHealth Laboratory has provided the critical mass to successfully obtain funding from a range of external sources including the Health Research Council (HRC), Foundation for Research Science and Technology (FRST) and other organisations.

#### 2.1.1 Ministry of Health Direct Funding

The funding from the Ministry of Health is set out in the contract between the Ministry of Health and the University of Canterbury dated 17<sup>th</sup> July 2009.

#### 2.1.2 University of Canterbury Indirect Funding

The University of Canterbury provides indirect funding to the Laboratory through the Department of Geography in the form of staff time and associated resources.

#### 2.1.3 Additional Funding

The Laboratory also attracts additional funding beyond that provided as part of the GeoHealth Laboratory contract and from the University. In the past year this has included grants from the University of Canterbury Summer Student Scholarship Program. In addition there have been related grants from FRST and the New Zealand Transport Agency. The GeoHealth Laboratory is part of the team that has received funding and is developing the Ministry of Health's Environmental Health Indicators (EHI) programme. This involves updating existing indicators and developing new ones. The Laboratory was also involved in tendering for two substantial Health Research Council Request for Tenders (Bowel cancer research and Palliative care). We were short listed and submitted a full proposal which was peer reviewed and we responded to comments but unfortunately were unsuccessful in the final outcome.

## 2.2 Personnel

The Laboratory has three full-time researchers; Peter Day and Dr Amber Pearson are based in the Laboratory in Christchurch, and Ed Griffin is located in the Ministry of Health in Wellington. As part of the partnership, the time and associated costs of

the management team (two permanent posts) is provided and funded by the Ministry of Health and the Department of Geography external to the contract costs. The Laboratory also funds Masters and PhD Scholarships (detailed in section 4 below). These students are located in, and contribute to the work of, the Laboratory. The Laboratory is able to draw upon the wider expertise of Department of Geography staff. In this respect the Laboratory also hosts a number of Department of Geography postgraduate students and Research Assistants. Similarly, the Laboratory is also able to access the expertise of the wider Ministry of Health group. An outline of Laboratory personnel is given in table 1.

Part of the budget (amounting to approximately 3% of salary of the Laboratory Researcher posts) is allocated for training and conference attendance to enable staff development and lift the profile of the work of the GeoHealth Laboratory.

The flexible hosting arrangement of the Laboratory affords access to a larger pool and greater diversity in expertise than the funding permits, and is one of the main direct advantages to the Ministry of Health. This means that in practice for the funding of three posts, the Laboratory is able to draw upon the expertise of in excess of 40 people. This number can be added to by including the visitors to the University of Canterbury who are attracted by the presence of the Geohealth Laboratory. These have included:

- Prof. Mike Emch (University of North Carolina, US, 2011)
- Prof. Ian McKendry (University of British Columbia, Canada, 2011)
- Prof. Graham Bentham (University of East Anglia, UK, 2010)
- Prof. Bob Haining (University of Cambridge, UK 2009)
- Prof. Danny Dorling (University of Sheffield, UK, 2005 and 2009)
- Assoc. Prof. Howard Bridgman (University of Newcastle, Aus, 2009)
- Prof. Rich Mitchell (University of Glasgow, UK, 2007)
- Prof. Peter Brimblecombe (University of East Anglia, UK, 2007)
- Prof. Graham Moon (University of Southampton, UK, 2006)
- Prof. Robin Flowerdew (University of St Andrews, UK, 2006)
- Dr. Iain Lake (University of East Anglia, UK, 2006)
- Prof. Robin Haynes (University of East Anglia, UK, 2006).

**Table 1. GeoHealth Research Laboratory Personnel 2010-11**

Post	Location	Name
Directors	Dept of Geog Uni of Edinburgh	Assoc Prof Simon Kingham Assoc Prof Jamie Pearce <sup>1</sup>
Postdoctoral Research Fellow	Laboratory	Dr Amber Pearson
Researchers	Laboratory Ministry of Health Laboratory	Peter Day Ed Griffin Catherine Tisch (funded by EHI project)
Masters students	Laboratory	Sam Valentine (completed May 2011) Chris Bowie (completed May 2011) Matt Willoughby (started Feb 2011)
PhD students	Laboratory	Francis Ayuka Owuor (completed March 2011) Frances Graham (part time, started 2006) Ibrahim Alkhalidy (started 2010)
Dept of Geog academic staff	Dept of Geog	Prof Ross Barnett Dr Gregory Breetzke Dr David Conradson
Dept of Geog technical staff	Dept of Geog	John Thyne Paul Bealing Marney Brosnan

## 2.3 Facilities

The Laboratory is located in a dedicated room situated within the Department of Geography. The Laboratory room is fitted out with nine partitioned workstations, and two additional computer carrels. In addition there is a large meeting table and white board. The laboratory is locked and has swipe-card protected entry. The Laboratory layout was carefully considered to provide a conducive working and research environment with extra capacity beyond initial requirements to allow for growth.

## 2.4 Equipment

The GeoHealth Laboratory has been refurbished to provide desk space and computer terminals for up to twelve people. At present there are nine networked PCs each with 19 inch screens. There is also a dedicated GeoHealth network drive for the storage of data files which are regularly backed up.

Each PC has ArcGIS software, together with a number of statistics applications as well as standard PC word processing and numerical software tools. These applications are updated and maintained through University of Canterbury site licenses. Technical support is provided by Department of Geography GIS specialists and manager, and University of Canterbury central IT services.

<sup>1</sup> Jamie Pearce was previously on the permanent staff at the University of Canterbury. He is now an Adjunct Associate Professor, and remains actively involved in the GeoHealth laboratory.

## **2.5 Management**

The directorship and management of the Laboratory is undertaken primarily by Simon Kingham of the Department of Geography. Additional research guidance and support is provided by Jamie Pearce. Simon and Jamie are in regular phone and email contact. The two directors are responsible for the work activities of the Laboratory.

Oversight and governance are provided by Yvonne Galloway and Jackie Fawcett at the Ministry of Health. The Directors and they are responsible for generating and agreeing the Laboratory work plan.

## 3 Work plan Core Activity: Research

The Laboratory work plan is centred on three core activities: research, scholarships and training. As these three programmes form the bulk of the Laboratory work they are outlined in detail in the separate sections that follow.

### 3.1 Introduction

An integral component of the GeoHealth Laboratory's strategic aims is to undertake ground breaking and policy-relevant research in the area of health and health services. A key driver of our research has been the New Zealand Health Strategy, and that has assisted us in developing policy-relevant research projects which are of key strategic importance to the Ministry of Health. Our approach has been to develop projects which are not only of great policy relevance but also lend themselves to high quality research in line with the Department of Geography's research strategy. As a result, a number of academic and research staff have been heavily involved in developing and undertaking these projects.

Following on from the progress made in the first four years, we have continued to undertake joint and individual projects. Some of projects are ongoing from previous years, whilst others are new, just commencing or in the pipeline. The quality and value of the work undertaken to date has been excellent. The projects have been funded from a range of sources and employed a number of different researchers and academic staff located in New Zealand and internationally affiliated with the Laboratory. Some of the projects have been funded directly with core GeoHealth Laboratory funding and others from other external sources through opportunities which have arisen due to the rising profile of the Laboratory. In this section we list publications from Laboratory staff and students and associated academic staff. We also provide a brief synopsis of all of the key projects which people have been working on in the Laboratory.

Research projects have continued to add value to existing Ministry of Health data sources such as the 2006/07 New Zealand Health Survey, mortality, cancer registration, hospital admissions/discharge data collections and the New Zealand Health Tracker. For example, regression modelling techniques have allowed us to explore the relationships between individual health status and behaviours from routine surveys (such as BMI, diet, physical activity) and neighbourhood level contextual measures affecting health status (such as access to food shopping facilities, green space, exercise facilities and neighbourhood socioeconomic deprivation).

#### 3.1.1 Publications 2010-11

##### 2010 Publications

- **Barnett JR** and Malcolm L. 2010. GP practice variation in hospitalisation rates – a study of Partnership Health enrolled patients for the two years ending June 2007. *Journal of Primary Care*, 2, 111-117.
- **Barnett JR.** and Malcolm L. 2010. Practice and ethnic variations in avoidable hospital admission rates in Christchurch. *New Zealand. Health and Place*, 16, 199-208.
- **Barnett JR.** and **Pearce J.** 2010. Ethnic differences in smoking cessation and cancer survival in New Zealand Nga Kete a Rehua Inaugural Maori Research Symposium Te Waipounamu 4–5 September. *Proceedings Book Aotahi:*

*School of Maori and Indigenous Studies*. (Christchurch: University of Canterbury). 145-150.

- **Fukuda K**, Hider P, Epton M, Jennings L and **Kingham S**. 2010, Including viral infection data supports an association between particulate air pollution and respiratory admissions. *Australian and New Zealand Journal of Public Health*, 35, 2, 163–169.
- Moon G, **Barnett R**. and **Pearce J**. 2010. Ethnic spatial segregation and tobacco consumption: a multi-level repeated cross-sectional analysis of smoking prevalence in urban New Zealand., 1981-1996. *Environment and Planning A* 42, 469-486.
- **Pearce, J** and **Day, P**. 2010. Neighbourhood Histories and Health: Social Deprivation and Food Retailing in Christchurch, New Zealand, 1966 to 2005. In A. Lake, T.G. Townshend, and S. Alvanides (Ed.), *Obesogenic Environments: complexities, perceptions, and objective measures*. (183-198). Chichester, UK: Wiley-Blackwell.
- **Rind E** and **Pearce J**, 2010. The spatial distribution of campylobacteriosis in New Zealand, 1997-2005. *Epidemiology and Infection*, 138, 10, 1359-1371.
- Wilson J, **Kingham S** and **Pearce J**, 2010, Temporal variations in PM<sub>10</sub> and restricted activity days among school age children in Christchurch, New Zealand. *International Journal of Environment and Pollution*, 41, 1/2, 140-154.

## 2011

- **Day P** and **Pearce J**, 2011. Obesity-promoting food environments and the spatial clustering of food outlets around schools. *American Journal of Preventive Medicine*, 40, 2 , 113-121
- **Day, P** and **Pearce, J**, 2011. Obesity-promoting food environments and the spatial clustering of food outlets around schools. [Web site]. M. Brosnan, R. Stowell and S. Kingham, Department of Geography, University of Canterbury. (Film/Video).
- de Nazelle A, Nieuwenhuijsen M, Antó J, Brauer M, Briggs D, Braun-Fahrländer C, Cavill C, Cooper A, Desqueyroux H, Fruin S, Hoek G, Int Panis L, Janssen N, Jerrett M, Joffe M, Jovanovic Andersen Z, van Kempen E, **Kingham S**, Kubesch N, Leyden K, Marshall J, Matamala J, Mellios G, Mendez M, Nassif H, Ogilvie D, Peiró R, Pérez K, Rabl A, Ragetti M, Rodríguez D, Rojas D, Ruiz P, Sallis J, Terwoert J, Toussaint J-F, Tuomisto J, Zurbier M, Lebret E, 2011, Improving health through policies that promote active travel: a review of evidence to support integrated health impact assessment. *Environment International*, 37, 766-777.
- **Kingham S** and Dorset W, 2011, Assessment of exposure approaches in air pollution and health research in Australia and New Zealand. *Air Quality and Climate Change*, 45, 2, 28-38.
- **Kingham S**, 2011, How important is urban air pollution as a health hazard? (editorial) *New Zealand Medical Journal* 124, 1330, 5-7.
- **Kingham S**, Sabel C and Bartie P, 2011, The impact of the 'school run' on road traffic accidents. *Journal of Transport Geography*, 19, 705-711.
- **Miller L**, Willis JA, **Pearce J**, **Barnett R**, Darlow B. and Scott R. 2011. Urban–rural variation in childhood type 1 diabetes incidence in Canterbury, New Zealand, 1980–2004. *Health and Place*, 17, 248–256.

- Richardson EA, **Pearce J** and **Kingham S**, 2011, Is particulate air pollution associated with health and health inequalities in New Zealand? *Health and Place*, available online.
- Witten K, **Pearce J**, and **Day P**, 2011. Neighbourhood Destination Accessibility Index: A GIS tool for measuring infrastructure support for neighbourhood physical activity. *Environment and Planning A*, 43(1) 205 – 223.

### 2011 Under review

- Brewer N, Borman B, **Day, P** and Pearce, N. 2011. Travel time and distance to health care, and inequalities in cervical cancer screening, stage at diagnosis and mortality in New Zealand. *Australian and New Zealand Journal of Public Health*.
- **Day P**, **Breetzke G**, and **Kingham S**. 2011. Geographic access to alcohol outlets and serious violent crime in New Zealand. *Australian and New Zealand Journal of Public Health*.

### 2011 In press

- **Barnett JR**, Moon G, and **Pearce J**. 2011. Socio-spatial inequalities in health-related behaviours: pathways linking place and smoking. *Progress in Human Geography* (forthcoming).
- **Graham F**, White P, **Kingham S**, Harte D, 2011, Changing Epidemiological Trends of Legionellosis in New Zealand, 1979-2009. *Epidemiology and Infection*, (forthcoming)
- Moon G, **Barnett JR**. and **Pearce J**. 2011. Smoking, Ethnic Residential Segregation and Ethnic Diversity: a spatio-temporal analysis. *Annals Association of American Geographers* (forthcoming).

## 3.1.2 Projects 2010-11

### 1. Public health and alcohol related crime

Alcohol is a major contributor to crime, anti-social behaviour and victimisation in New Zealand and is responsible for a range of social problems directly affecting the health and well-being of both offenders and victims. This study examined the association between geographic access to alcohol outlets and serious violent crime in New Zealand. There were significant negative associations between distance (access) to licensed outlets and the incidence of serious violent offences with greater levels of violent offending recorded in areas with close access to any licensed premise compared to those areas with least access. Alcohol availability and access promoted under the current licensing regime are important contextual determinants of alcohol-related harm and health inequalities within New Zealand communities. A paper has been submitted to the *Australian and New Zealand Journal of Public Health*.

#### 1.1 Submissions to Alcohol Reform Bill

(a.) Submission to the Select Committee Alcohol Reform Bill, Peter Day, GeoHealth Laboratory, Department of Geography, University of Canterbury (online submission 17<sup>th</sup> February 2011). The objective of this submission was to provide

additional empirical evidence about alcohol-related harms and outlet access and the need to include more specific legislative directives in the Alcohol Reform Bill regarding the granting of licenses by taking into consideration the physical and geographic location of alcohol outlets related to outlet densities.

- (b.) Submission to the Select Committee Alcohol Reform Bill, Professor Ross Barnett and Francis Ayuka PhD Candidate GeoHealth Laboratory, Department of Geography, University of Canterbury (postal submission 3<sup>rd</sup> January 2011). The objective of this submission was to highlight the findings of Francis' PhD research that firstly there has been overall increase in alcohol-related mortality and hospitalisations over time. Secondly there is greater availability of alcohol outlets in the most deprived areas which incidentally also have a higher number of minority ethnic groups. Thirdly access to, as well as the density of, alcohol outlets explained alcohol-related behaviour in some sub-populations. Finally the density of alcohol outlets had an independent influence upon patterns of crime and alcohol related hospitalisation.

## 2. Assessing the impact of smoking cessation services: a geographical analysis of the Quitline data.

Smoking cessation policies have seldom examined the geographical and social contexts and the role they play in promoting or retarding smoking cessation. The Quit Group is a charitable trust set up in 1999 and funded solely by the Ministry of Health. The Quit Group provides support for smokers to make quit attempts via providing free telephone calls to the telephone support group, Quitline. The present study provides an analysis of new calls made to Quitline in New Zealand between April 2005 and March 2009. Two key results emerged from the study: (1) even after controlling for smoking prevalence, deprivation and ethnicity, there were fewer calls to the Quitline from rural areas when compared to urban areas (1% of smokers in the most rural areas contacted Quitline compared to 2.9% in urban areas); (2) smokers in high deprivation areas were less likely to ring the Quitline, this effect of deprivation was however much greater for Maori smokers, the group with the highest smoking rates. To illustrate this, the table below shows rate ratios for deprivation between all callers and just Maori callers. For all calls there is little significant difference between call rates for different deprivation groups. For Maori the call rate reduces as deprivation increases. Thus the results suggest that while Quitline has encouraged many people to give up smoking it is still not being used by the most vulnerable group.

Census Area Unit	All Calls	Maori Calls
	Dep 06	Dep 06
Quintile 1 (Low)	1.00	1.00
Quintile 2	0.97	0.81
Quintile 3	1.06	0.72
Quintile 4	1.14	0.55
Quintile 5 (High)	1.06	0.24

### **3. Understanding obesogenic environments: access to food outlets around schools**

The increasing prevalence of overweight and obesity in school aged children is potentially linked to contextual influences such as the food environment around schools. The proximity of fast-food and convenience stores to schools may enhance access to unhealthy foods and negatively impact on diet and contribute to inequalities in health. This study “Obesity-promoting food environments and the spatial clustering of food outlets around schools” was published in the *American Journal of Preventive Medicine* in February 2011. The key finding of this research is that food environments in walking proximity of New Zealand schools are characterised by a high density of fast-food outlets and convenience stores, particularly in more socially deprived settings<sup>2</sup>.

As a consequence of interest generated by this project a further smaller research project is being undertaken -“The spatial clustering of food outlets around schools 1966 to 2006: A longitudinal study of school food environments”. This study found that over a forty year period there has been the emergence of high densities (greater clustering) of obesity-promoting food outlets particularly fast-food and convenience outlets within walking proximity of schools and around the most socially deprived schools. A paper reporting these findings will be prepared for submission to the *American Journal of Preventive Medicine*.

### **4. Spaces of resilience: identifying and understanding the paradox of good health despite high social and environmental deprivation in New Zealand**

This research aimed to: 1) characterise ‘resilient’ communities in New Zealand, by calculating a Resilience Index New Zealand (RINZ), in deprived CAUs using smoothed, all-cause mortality data from 2005-2007; and 2) explore correlations between resilience and aspects of the neighbourhood built environment in New Zealand. In this research, we defined resilient areas as those with lower mortality than expected, given levels of social deprivation (NZDep). We used standardised residuals to calculate the RINZ, assigning CAUs a value from 1 to 5 given their distance from the mean. For example, residuals more than 2 standard deviations from the mean were assigned the highest resilience category (5). Using this definition of resilience, we were able to detect a statistically significant difference in mortality between resilient and non-resilient areas, even among the 30% most deprived CAUs in New Zealand.

Using RINZ, we also examined correlations with access to aspects of the built environment, to identify neighbourhood characteristics which might bolster resilience. For variables related to healthy living, educational facilities, and health care, we characterised access by calculating the distance from population-weighted centroids for meshblocks, forming quintiles in access (where 5 presents the best access) and then aggregated to CAU-level. For variables related to unhealthy living, we characterised access by calculating the distance from population-weighted centroids for CAUs (higher numbers indicate increased distance). We found a gradient in access to aspects of healthy living (supermarkets, fresh fruit and veg, and sports and leisure facilities), educational facilities (kindergartens and pre-schools, primary, and secondary schools), and health care (Plunket, GPs, ambulance, A&E, and fire stations), with the steepest gradient in access to unhealthy living facilities (gambling, on and off license alcohol outlets).

<sup>2</sup> In addition, at the special invitation of the Journal Editors, we submitted a video podcast on the research which is posted on the journal website. The research generated a great deal of media attention and was featured in national newspapers, radio and on the TV1 Breakfast show.

From this work, we conclude that factors beyond those in NZDep are needed to better understand health inequalities in New Zealand. This research provides evidence of the potential to bolster neighbourhood-level resilience, even in very deprived areas, by increasing access to important aspects of healthy living, education and health care services.

## **5. Environmental influences on obesity and related behaviours in New Zealand**

The prevalence of obesity in New Zealand is high and rising leading to escalating health care costs, especially for associated conditions such as Type II diabetes. Currently the evidence-base in New Zealand for guiding the design of interventions in obesogenic environments is sparse. This study is examining the association between important obesity-promoting/negating environmental factors and obesity, physical activity and diet reported in the 2006/07 New Zealand Health Survey.

Currently the project is underway with assistance from HDI in providing the Health Survey data and linking this to the environmental data. We expect results to be submitted to a peer-reviewed journal in December 2011.

## **6. Crime, Social deprivation and health**

This project (on-going) reviewed the literature about the relationship between crime, social deprivation, and health status and explored these relationships using ecological data on reported offences, area level deprivation and health outcomes which has not been thoroughly explored in the New Zealand context. The first stage of the analysis examined the relationship between alcohol availability, hospital admissions related to alcohol harms and area-level deprivation across Canterbury province. The results of this ecological study, consistent with the international literature, indicate that there were small but significant positive associations between the number of alcohol outlets per 1000 people, the number of late night closing premises per 1000 people and the number of hospital admissions per 1000 people even after adjusting for area-level deprivation. There was a notable association between late night closing rates of outlets per 1000 people and hospital admissions per 1000 people, with a regression coefficient of 1.6 ( $p < 0.009$ ), thus an increase of 1 late night closing outlet per 1000 people translates to increase of 1.6 in hospital admissions.

The second stage of the analysis will use newly available individual point level crime data from the NZ Police to explore in detail the relationship between specific health outcomes, area-level deprivation and crime. This study aims to identify the extent to which living in a neighbourhood with high crime levels and social deprivation impacts upon the health of individuals living in those neighbourhoods, particularly the fear of crime and cardiovascular events. This research is significant as it aims to quantify the risk to individual and community health outcomes of living in an area that is unsafe that may justify specific interventions from both a policing perspective and a public health perspective. The results will be reported at the end April 2012 with a seminar at the Ministry of Health and journal article to be submitted by June 2012.

## **7. Air pollution and health inequalities**

Air pollution can increase mortality risk and may also exacerbate socioeconomic inequalities in health outcomes. This study investigated whether exposure to particulate air pollution (PM<sub>10</sub>) varied by socioeconomic status, and was associated with mortality and health inequalities. Annual mean PM<sub>10</sub> estimates for urban Census

Area Units (CAUs) were linked to cause-specific mortality data. A dose-response relationship was found between PM<sub>10</sub> and respiratory disease mortality, including at concentrations below the existing guideline value of 20 µg.m<sup>-3</sup>. This suggests that establishing and enforcing a lower guideline value is likely to have population health benefits. There was little evidence that socioeconomic health inequalities were accentuated in communities with high PM<sub>10</sub> exposure. Results are being published in *Health and Place*.

## **8. Geospatial health care planning: using GIS as a part of the health care planning toolset**

The dynamics of a health system are complex. Understanding the determinants and consequences of geographical access to health services is an important advancement for the health sector. For example, previous research in the Geohealth Laboratory has identified geographical inequalities in access to health services between deprived and non-deprived neighbourhoods<sup>3</sup>. There are still many aspects of the health service provision that warrant further investigation particularly in the context of geographical access. This project aims to investigate some of the relationships and develop some techniques to assist health planners to address utilisation and access problems. The project is championed by the Ministry of Health's National Health Board and uses a variety of data and software, including hospitalisation data and the national road network data using ESRI's ArcView network analyst. The main focus of this project is to use geographical information systems (GIS) to advance health sector planning. A number of analyses have been completed to support this work and a variety of new GIS techniques for MOH planning have been developed. For example, GIS has been used to support the debate around placement of neurosurgeons in the South Island through looking at hospital utilisation. Also through this work we have developed an official list of hospitals which can be distributed and used across the sector. The most recent piece of work has been to assist in developing new models of care for the New Zealand Health system. This has involved using population data and patient event data to investigate the best configuration of hospitals in NZ

List of developments and outputs:

- An official list of hospitals their spatial location and their complexity levels
- Updated travel time network
- Travel times from Census Area Units to all Hospitals in NZ lookup table
- Input into the NZIER macro economic model for the Long Term Health Sector Plan

### **3.1.3 Ad-hoc Tasks Completed for the Health Sector in 2010/11**

GIS is gaining prominence across the health sector, however GIS capability varies greatly among DHBs. In addition to the research outlined above GIS technicians and GeoHealth Laboratory staff in the Department of Geography and the Ministry of Health, continue to play a hugely important role in providing GIS ad-hoc services for the Ministry of Health (Table 2). These range in sophistication from email and telephone advice, simple geocoding and mapping tasks to more advanced analytical support.

<sup>3</sup> Pearce J, Witten K, Hiscock R and Blakely T, 2007, Are socially disadvantaged neighbourhoods deprived of health-related community resources? *International Journal of Epidemiology* 36, 2, 348-355.

**Table 2. Ad-hoc services provided 2010/11**

Title	Client	Team	Business Unit
Map of DHB/TA overlapping boundaries	Dan Kilpatrick	Planning & Analysis	National Health Board (NHB)
Lookup table showing time from Census Area Units to all NZ hospital facilities	Mark Jackson		
Hospital Catchment Areas – using population data and network analyst to look at different scenarios for models of care	Lindsey Lawton		
Hospital Catchment Areas II - using hospital event data and network analyst to look at different scenarios for models of care	Lindsey Lawton		
Key Geographic population distributions – series of maps for the National Health Board	Rachel Haggerty		
Analysis of Hospital utilisation in Whakatane	Rachel Haggerty		
GIS Animation to show the ageing of New Zealand 2006 to 2041	James Hogan	Health Workforce NZ	
TA/DHB population maps/tables	Michael Batson		
Map of Breast Screen Aotearoa provider boundaries	Emma Woods	National Screening Unit	
Create Taranaki rural/NZdep profile	Caroline Hornibrook	National Services Purchasing	
Map of DHB boundaries and NASC boundaries	Rachel Daysh		
Asset Snapshot Document – series of maps showing location of hospitals by their complexity levels		Capital and Operating Team	
Movement of Canterbury Students to different areas in NZ - daily updates	Martin Davis	Emergency Management Team	
Series of Maps showing the best locations for Integrated Family Health Centred (IFHC)	Devon Diggle	Primary Health Care Team	
School X and Ys to Mesh Block	Janine Mardani	Communicable disease Team	Clinical Leadership Protection & Regulation (CLPR)
Liquefaction map of Christchurch and incidence of legionnaires disease	Frances Graham	Environmental Health Team	
Rheumatic fever maps, 8 maps/4 regions, plus 1 map at a national scale.	Janine Mardani	Communicable Disease Team	
Residential housing by size and type in ChCh City	Geoffrey Thompson	Provider Regulation	
Identifying MB survey areas in Christchurch and if they are located in damaged areas	Robert Templeton	Health and Disability Intelligence	Policy
NZDep Scores for mortality events	Li-Chia Yeh		
Geocode residential housing for Health Survey	Robert Templeton		
Geocode all GP addresses, table join with fees, growth rate and enrolled population	Nikolai Minko	Business Services	Sector Capability and Implementation (SCI)
Geocoding for the Evaluation of the Taranaki DHB Enhanced Healthline Pilot	Craig Reynolds	Health Outcomes International	Non-MoH
Map of major trauma national clinical network for NZ	Alaina Campbell	Waikato DHB	
Hospitals/GPs/Health Survey Data – LINZ online maps	Scot Tansley	Explorer Graphics Ltd	

## 4 Work plan Core Activity: Scholarships

### 4.1 Introduction

A core driver of the Laboratory 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' in the emerging areas of geo-health research. To meet this aim the Laboratory provides two Masters Degree scholarships per year, and one PhD scholarship. The scholarships have two aims, firstly for undertaking multidisciplinary research of practical benefit to the New Zealand health sector; and secondly providing a gateway to the health sector that is of direct benefit to the student and health sector employers.

The Laboratory welcomes innovative scholarship research proposals from recipients from wide background across a broad spectrum of geo-health, environmental and public health areas including:

- Neighbourhoods and health
- Built environment and health
- National inequalities in health outcomes
- Air pollution and health
- Social inequality and smoking
- Hospital admissions and access to primary care
- Social dimensions of cancer incidence
- Spatio-temporal modelling of road traffic accidents
- Crime and health
- Environmental health indicators
- Healthy resilient populations
- Hospital admissions prediction
- Environmental determinants of overweight and obesity
- Alcohol related behaviours and harms.

Each Masters scholarship covers domestic tuition fees and provides a \$10,000 living allowance. For PhD scholarships this covers tuition fees and provides a \$20,000 living allowance. The GeoHealth Laboratory has also endeavoured to cover research costs associated with the student's research and, for example, is contributing towards the cost of attending conferences or other associated training.

#### 4.1.1 Masters Students

**1. Chris Bowie (completed May 2011)** (GeoHealth scholarship)

Subject: A study on youth access to tobacco products and smoking cessation services.

**2. Sam Valentine (completed May 2011)** (GeoHealth scholarship)

Subject: A study on privatisation and healthcare reform.

**3. Matt Willoughby (commenced Feb 2011)** (GeoHealth scholarship)

Subject: Neighbourhood level impact of crime on community health outcomes

#### 4.1.2 PhD Students

**4. Francis Ayuka Owuor (completed in March 2011)** (GeoHealth scholarship)

Title: Examining place influence on alcohol-related behaviour and health outcomes New Zealand.

**5. Frances Graham (on-going 2011)** (self-funded)

Title: An assessment of the potential human health effects of Legionellosis and other bio-aerosols from composting in New Zealand.

**6. Ibrahim Alkhalidy (on-going 2011)** (funded by Saudi Arabian government)

Title: The impact of environmental Dengue Fever in Jeddah, Saudi Arabia: The application of spatial analysis and modelling using GIS.

## 5 GeoHealth Laboratory Promotion

During the past year we have adopted a number of strategies to raise the profile of the Laboratory particularly within Australasia but also overseas. These are listed below.

### 5.1 Conferences and other presentations

The work of GeoHealth Laboratory staff has been presented at a range of international conferences in the period 2011-11.

2010 Joint Conference of International Society of Exposure Science & International Society for Environmental Epidemiology Seoul, Korea, 28<sup>th</sup> Aug - 1<sup>st</sup> Sept 2010.

- **Kingham S**, Pattinson W, Longley I and Salmond J, 2010, Traffic exposure and modal choice: a New Zealand case study.
- **Kingham S**, Richardson E and Pearce J, 2010, A Geographical Approach to Assessing the Contribution of Domestic Woodsmoke PM<sub>10</sub> to Respiratory and Cardiovascular Mortality.

New Zealand Geographical Society Conference, Christchurch, NZ, July 5<sup>th</sup>-8<sup>th</sup> 2010.

- **Day, P., Breetzke, G. and Kingham, S.** (2010) Geographic access to alcohol outlets and serious violent crime in New Zealand.
- Dirks K, Dirks V, Salmond JA, **Kingham S**, Longley I, 2010, Vehicle air pollution exposure – the role of individual physiology on the uptake of carbon monoxide in the body.
- **Pearson AL.** 2010. Vulnerability of Ugandan pastoralist communities bordering Lake Mburo National Park.<sup>4</sup>

2010 American Association of Geographers, Washington, DC, USA, April 2010.

- **Pearson AL.** 2010. Health and vulnerability: Placing economic development in southwestern Uganda.<sup>4</sup>

2010 EcoHealth Conference, London, UK, August 2010.

- **Pearson AL.** 2010. Economic development on the periphery: health and social conditions of Ugandan pastoralist communities bordering Lake Mburo National Park.<sup>4</sup>

Other presentations

- **Simon Kingham** presented a seminar to the Department of Epidemiology and Biostatistics, Imperial College, University of London, UK, 18<sup>th</sup> May 2011. Traffic exposure and modal choice: what happens in less congested environments.
- **Simon Kingham** presented a seminar to the Department of Geography, University of Sheffield, UK, 29<sup>th</sup> June 2010. Effect of travel mode choice on personal pollution exposure.

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<sup>4</sup> Based on work completed before Amber joined the GeoHealth Laboratory.

- **Simon Kingham** presented a seminar to the School of GeoSciences, University of Edinburgh, UK, 17<sup>th</sup> June 2010. Commuter pollution exposure: can modal choice affect your health?
- **Simon Kingham** presented a seminar to the Department of Geography, University of Cambridge, UK, 9<sup>th</sup> June 2010. The impact of choice of transport mode on personal pollution exposure.
- **Sam Valentine** presented a seminar to the Ministry of Health, 9 May 2011. Privatisation and public elective surgery wait times in New Zealand.
- **Chris Bowie** presented a seminar to the Ministry of Health, 9 May 2011. Youth and at-risk communities: Inequalities in access to tobacco products and cessation services, a Christchurch case study.
- **Amber Pearson** presented a paper at the University of Canterbury Development Symposium, February 2011. Assessing drinking water contamination in resource poor settings.
- **Edward Griffin** Delivered a series of presentations on the results of the Quitline research to interested Ministry of Health teams and the Quitgroup

## 5.2 Web Pages

A comprehensive set of web pages outlining the GeoHealth Laboratory activities are available and are regularly updated by Peter Day (GeoHealth Laboratory) and Paul Bealing (Department of Geography, Web Administrator).

See [www.geohealth.canterbury.ac.nz/](http://www.geohealth.canterbury.ac.nz/). The site:

- outlines the aims and objectives for the Laboratory
- gives an overview of Laboratory activities
- provides details of the various GeoHealth research projects
- provides details of the available scholarships
- provides a list of recent staff publications
- provides an overview of all staff members and postgraduate students
- has regular news items

## 6 Plans for 2011/12

The Laboratory will continue with the three stream core work programme that underpins the Laboratory. The Directors will also aim to further increase their network of contacts and raise awareness of the Laboratory particularly across the health sector.

### 6.1 Research

The following research projects listed in section 2 will be continued during the 2011/12 year:

1. Environmental influences on obesity and related behaviours in New Zealand
2. Spaces of resilience: identifying and understanding the paradox of good health despite high social and environmental deprivation in New Zealand
3. Geospatial health care planning using GIS as a part of the health care planning toolset
4. Crime, Social deprivation and health

Additional research projects for 2011/12 are yet to be finalised but will be selected from the following list - an indication is given for their inclusion in this years work programme:

<b>1</b>	<b>Geographic, socio-economic and ethnic effects in bowel cancer incidence and survival in New Zealand</b>		
<b>Status:</b> New	<b>Duration:</b> 1 year	<b>Going ahead:</b> Likely	
<p>Bowel cancer is the third most common cancer in men and the second in women worldwide. In New Zealand, the bowel cancer is the most frequently diagnosed (non-skin) cancer overall, and has the third highest bowel cancer death rate in the OECD for women, the sixth highest for men and has a low rate of early-stage diagnosis by international comparisons which are an important factor in these high mortality rates (MoH, 2010; Samson et al, 2009). Within New Zealand it has been shown that there are significant disparities in bowel cancer incidence, mortality, stage at diagnosis, and survival between Māori and non-Māori, Pacific and non-Pacific people, deprivation levels, rural/urban localities, and geographic places. This research will determine whether or not various area-level neighbourhood measures as well as individual characteristics are significant in disease extent at diagnosis by using logistic regression to identify the variables (predictors) associated with whether or not the disease was advanced at the time of diagnosis. Secondly, using all incident cases which had died, Cox proportional hazard models will then be used to examine adverse influences on survival and to calculate the relative risk of death associated with each of the predictor variables, with and without adjustment for extent of the disease at diagnosis. The analysis would be conducted at DHB and a national level to enable regional comparison.</p>			

<b>2</b>	<b>Geographical trends in infant mortality: New Zealand 1980 to 2008</b>		
<b>Status:</b> New	<b>Duration:</b> 1 year	<b>Going ahead:</b> Likely	
<p>The level of infant mortality can be seen as a major indicator of the health of a nation with the focus on infant mortality rates remaining high on public health and policy agendas within New Zealand and throughout the world. Despite declines experienced over the last few decades,</p>			

internationally New Zealand's infant death rate remains high, with a current ranking of seventeenth out of 19 OECD countries for which information is available. A range of social and biological factors are associated with high infant mortality. Despite ongoing reductions in infant mortality rates in New Zealand there remain sub-national variations in infant mortality. The aim of this project is to draw out these geographical patterns and investigate whether the trends in infant mortality rates were uniform geographically by specific geographies (TLA, DHB) and by area types (Urban/rural, area-level deprivation), with a particular focus on the relationship between infant mortality and area deprivation.

<b>3</b>	<b>Does isolation decrease resilience? The dual influence of social deprivation and isolation on mental health in New Zealand</b>	
<b>Status:</b> New	<b>Duration:</b> 1 year	<b>Going ahead:</b> Definitely
<p>In New Zealand, area-level social deprivation has been shown to have an independent effect on increased prevalence of cardiovascular disease<sup>5</sup>, fatal colorectal cancer<sup>6</sup>, lower life expectancy<sup>7</sup>, and increased cervical cancer<sup>8</sup>, sudden infant death<sup>9</sup>, diabetes in New Zealand Europeans<sup>10</sup> and mental health<sup>11</sup>. Still, not all areas of high deprivation experience poor health outcomes. A number of theories exist about why these areas are more 'resilient' despite high levels of deprivation such as community cohesion, lack of racism and sense of control over one's life. In New Zealand, racism and discrimination have been shown to influence health outcomes. In theory, living in a deprived neighbourhood and in close proximity to advantaged neighbourhoods may increase the potential to experience racism and discrimination. In this research, we investigate whether areas which are deprived and also socially isolated experience increased stress, anxiety, and mental health issues compared to other areas, including other deprived areas. This work may highlight resilient, deprived places where mental health outcomes are better than expected. We can use these findings to improve urban planning decisions and to pinpoint isolated places which need increased mental health outreach.</p>		

<b>4</b>	<b>Evaluating the relevance of multiple environmental health indicators in New Zealand</b>	
<b>Status:</b> New	<b>Duration:</b> 2 years	<b>Going ahead:</b> Definitely
<p>Environmental Health Indicators (EHIs) are primarily used for monitoring inter-related aspects of the environment and human health to guide policy development and national-level disease prevention and resource management decision-making in many countries. A preliminary review of EHIs has been undertaken. The aims of this review were to: 1) identify existing EHI programmes worldwide, determine the common themes and gaps and to draw relevant conclusions related to future indicator development in New Zealand; and 2) descriptively examine these indicators in light of New Zealand's current burden of disease report. Development of new EHI programmes and modification of existing ones must take into account national attributable burdens of disease associated with environmental health risks and must</p>		

<sup>5</sup> Chan, W. C., C. Wright, et al, 2008, Ethnic and socioeconomic disparities in the prevalence of cardiovascular disease in New Zealand. *New Zealand Medical Journal* 121, 1285, 11-20.

<sup>6</sup> Haynes, R., J. Pearce, et al, 2008, Cancer survival in New Zealand: Ethnic, social and geographical inequalities. *Social Science and Medicine* 67, 928-937.

<sup>7</sup> Tobias, M. I. and J. Cheung, 2003, Monitoring health inequalities: life expectancy and small area deprivation in New Zealand. *Population Health Metrics* 1, 1-11.

<sup>8</sup> McFadden, K., D. McConnell, et al, 2004, Socioeconomic deprivation and the incidence of cervical cancer in New Zealand: 1988-1998. *New Zealand Medical Journal* 117, 1206.

<sup>9</sup> Mitchell et al. 2000

<sup>10</sup> Joshy, G., T. Porter, et al, 2009, Prevalence of diabetes in New Zealand general practice: The influence of ethnicity and social deprivation. *Journal of Epidemiology and Community Health* 63, 386-390.

<sup>11</sup> Muntaner, C., W. W. Eaton, et al, 2004, Socioeconomic position and major mental disorders. *Epidemiologic Reviews* 26, 53-62.

also be flexible and dynamic as the place-specific effects of climate change and other environmental exposures become more apparent. This evaluation will continue and be submitted as a publication.

<b>5</b>	<b>Is resilience to social deprivation associated with a healthy social environment?</b>	
<b>Status:</b> New	<b>Duration:</b> 2 years	<b>Going ahead:</b> Definitely
<p>As we know, social deprivation is not a perfect predictor of a variety of health outcomes in New Zealand. Resilient communities exist where mortality rates are low despite high levels of social deprivation. Also in New Zealand, social factors, participation in community, social cohesion, and access to cultural capital may bolster resilience and protect health despite high levels of deprivation. It is the aim of this research to investigate whether previously identified resilient areas are also areas which experience social environments which may bolster health and resilience. These results may indicate that improving aspects of the community-level social environment in deprived areas may lower mortality in those areas to levels of more advantaged areas.</p>		

<b>6</b>	<b>Resilience in Maori communities: Understanding the role of Maori-relevant Environmental Health Indicators (EHIs) and health</b>	
<b>Status:</b> New	<b>Duration:</b> 2 years	<b>Going ahead:</b> Definitely
<p>Maori conceptualisations of human-environment relationships are different from Pakeha notions. For this reason, we must consider unique EHIs which are relevant to Maori communities. In addition, Maori communities tend to suffer higher levels of social deprivation and higher mortality rates compared to other ethnic groups. Some Maori groups remain resilient. It is the aim of this research to examine the relationship between the conditions of Maori-relevant EHIs and resilience.</p>		

<b>7</b>	<b>The relationships of geographical variations in health outcome and earthquake impact</b>	
<b>Status:</b> New	<b>Duration:</b> 2 years+	<b>Going ahead:</b> Possibly
<p>This research will test whether there is a relationship between the extent of physical damage from the earthquake on communities and health outcomes (non-injury). The hypothesis is that some health outcomes (possibly cardio and related) might be greater among people who have experienced greater physical damage to their communities and homes than other health outcomes (possibly psycho-social stress related). This would be done using GIS to compare spatial patterns. As the physical damage varies at quite a fine spatial scale, so we will need fine spatial health data (ideally point data). We are hoping to start by using Healthline and hospital ED attendance data.</p>		

<b>8</b>	<b>Greenspace and mental health</b>	
<b>Status:</b> New	<b>Duration:</b> 1 year	<b>Going ahead:</b> Possibly
<p>A previous GeoHealth Laboratory project examined whether there was a socio-economic gradient in usable and non-usable green space exposure and whether green space exposure was associated with cause-specific mortality (lung cancer and cardio-vascular disease) in the New Zealand context. The study found no evidence of green space influence on cardiovascular mortality and that variation in green space availability may have less relevance for the health of New Zealanders given its abundance and less variable social and spatial availability than in other settings. A key part of the green space research is whether the space is usable and</p>		

therefore facilitates exercise or whether the benefits are more psychological. In this project we will examine the impact of green space on mental health using landuse data from LINZ and mental health data on hospital attendance and calls to Healthline related to anxiety.

<b>9</b>	<b>Blue space and health</b>		
<b>Status:</b> New	<b>Duration:</b> 2 years	<b>Going ahead:</b> Possibly	
<p>This project also builds on the research that looks at green space and health (mentioned in project 9 above). There has been some discussion<sup>12</sup> on the possible role of blue space (water) but this has not yet been researched. Blue space is particularly relevant in New Zealand where a large proportion of the population live on/near the coast. This project will examine the impact of proximity to blue space on health. It will separately look at sea, lakes and other blue space. It will initially use the same approaches as used in the green space work.</p>			

<b>10</b>	<b>Effectiveness of Healthline at demand management: measuring call outcomes using linked hospital data</b>		
<b>Status:</b> New	<b>Duration:</b> 1 year	<b>Going ahead:</b> Definitely	
<p>Healthline, a telephone triage service has been available nationally since July 2005, after a successful four year pilot in four regions of New Zealand. Callers telephone a free-dial number that is available 24 hours per day, 7 days per week for symptom triage and general health information. Healthline acts as a gate keeper for health services. Often people cannot judge for themselves the urgency or severity of their symptoms. Demand management through decision-support software means registered nurses can direct callers to the correct service for their needs – without adversely affecting the health of callers. This project will link Healthline triage data with national hospital inpatient and A+E data to look at whether callers actually adhere to Healthline advice and if geographic location affects their decision to go to Hospital.</p>			

<sup>12</sup> Richardson EA, Pearce J, Mitchell RJ, Day P and Kingham S, 2010, The association between green space and cause-specific mortality in urban New Zealand: an ecological analysis of green space utility. BMC Public Health, 10, 240.

## 6.2 Scholarships

Scholarships will continue to be awarded to the most promising candidates with innovative research proposals.

## 6.3 Training

There are four undergraduate and four graduate GIS courses offered by the Department of Geography at University of Canterbury, and one undergraduate and one graduate course in Health Geography. In 2011 the new Masters in GIS (MGIS) programme, primarily developed at the University of Canterbury, commenced. This included a newly developed *Geographic Information Systems (GIS) in Health* course which included substantial contributions by GeoHealth Laboratory staff. This new course provides a unique forum for those working or interested in working in the health sector to learn GIS and how this is utilised within a health context in research. This course will run again in 2012.

## 6.4 Promotion and Publication

### 6.4.1 Planned Conference Attendance for 2011/12

These are conferences we currently anticipate attending to present GeoHealth related research (*not* all funded by the GeoHealth contract):

- International Clean Air and Environment Conference, Auckland, July 2011.
- International Medical Geography Symposium, Durham, UK, July 2011.
- ISEE 2011. Conference of International Society for Environmental Epidemiology, Barcelona, August 2011.
- Australasian Epidemiological Association, Perth, Australia Sept 2011.
- Asia-Pacific Cycle Congress, Brisbane, Sept 2011.
- Velo-City 2012, Vancouver, June 2012.
- Seminars in Ministry of Health, Medical Schools and Geography Departments in New Zealand and around the world.

- **Appendix A: Previous GeoHealth Laboratory Students**

**Masters students**

**Catherine Tisch (completed September 2006)** (GeoHealth scholarship)

Title: Has mortality become geographically polarised in New Zealand? A case study: 1981-2000.

On completion of her Masters Catherine worked at the Institute of Environmental Science and Research (ESR) as a Health Information Analyst in the Population and Environmental Health team. Catherine has recently joined the GeoHealth Laboratory working on the MoH Environmental Health Indicators project.

**Katrina McPherson (completed December 2006)** (GeoHealth scholarship)

Title: Food insecurity and the food bank industry: A geographical analysis of food bank use in Christchurch.

On completion of her Masters Katrina joined the Christchurch City Council as a Research Assistant.

**Erin Holmes (completed March 2007)** (GeoHealth scholarship)

Mandatory disease notification and under-ascertainment: A geographical perspective.

On completion of her Masters Erin joined the Ministry of Health as a full time Research Analyst and is now an Advisor in Epidemiology.

**Esther Rhind (completed June 2007)** (GeoHealth scholarship)

Title: Investigating the spatial distribution of campylobacteriosis in New Zealand.

Esther began her PhD at the University of Norwich, UK.

**Paul Moth (completed July 2008)** (GeoHealth scholarship)

Title: Examining the environmental justice of sea-level rise and storm tides.

Paul completed a four month internship with the MoH and is now teaching at a High School in the US.

**Michael Brown (completed February 2009)** (funded by FRST)

Title: The health effects of PM<sub>10</sub> air pollution in Reefton, South Island, New Zealand.

Michael is working with Watercare Services in Auckland as an Environmental Analyst.

**Anjeela Kumar (completed June 2010)** (GeoHealth scholarship)

Title: The effect of the neighbourhood built environment on obesity in Christchurch.

Anjeela is now working at the Christchurch School of Medicine.

**PhD students**

**Jeff Wilson (completed in April 2006)** (funded by University of Canterbury doctoral scholarship)

Title: Spatial variability of intra-urban particulate air pollution: epidemiological implications and applications.

Jeff is now in on the academic staff at the University of Texas, Brownsville, USA.

**Laura Miller (completed in April 2008)** (GeoHealth scholarship)

Title: Population mixing and the geographical epidemiology of childhood leukaemia and type 1 diabetes in New Zealand.

Laura is now working as a Spatial Analysis Research Officer with Child and Adolescent Community Health, Western Australian Department of Health.