GeoHealth Laboratory
Research & Applications

Te tai whenua o te hau ora

GeoHealth Laboratory
Research & Applications

Second Annual Report
2006/07

June 2007

MINISTRY OF HEALTH
MANATU HAUORA

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Dept. of Geography
Health and Environment Research Group

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Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND

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Executive Summary

This annual report outlines the work successfully undertaken during the *GeoHealth Laboratory's* second year of operation. We have achieved a great deal and clearly demonstrated the added value that the *GeoHealth Laboratory* brings through its partnership between Public Health Intelligence in the Ministry of Health and the Department of Geography at the University of Canterbury.

Public health is inherently multidisciplinary, yet academic endeavour in medical geography does not routinely inform public health policy, despite the obvious association and considerable potential. The *GeoHealth Laboratory* bridges this gap. The *GeoHealth Laboratory* is a 'force multiplier' achieving real benefits for health research and health policy formulation from the critical mass and range of perspectives that the two partners bring.

The work programme outlined in this report, which centres on the three core themes of research, scholarships and training, is producing deliverables of direct practical benefit to the health sector and health research environment of New Zealand. For example, in terms of capacity building, it is essential for the long term strategic growth that we attract high quality recruits into the health sector (research and work environments), and in this respect we have been tremendously successful. The scholarship programme has proved excellent for the training and recruitment of new graduates in the GIS and health area. *GeoHealth Laboratory* Masters students completing their studies in the last 12 months have entered the health sector workforce in organisations including government ministries, local councils and CRIs. In addition, we have continued to offer our short course training programmes with over 60 participants from across government, the District Health Boards and Public Health Units.

GeoHealth Laboratory research has also been highly visible and is making an important contribution to public health research in New Zealand. Research has included work on neighbourhood determinants of obesity, spatial inequalities in health outcomes, problem gambling and geographical explanations of suicide. Our work has appeared a range of outlets including numerous publications in peer reviewed international academic journals, presentations at local, national and international conferences as well as in key Ministry of Health publications directly aimed at informing policy formulation.

The past 12 months have been a great success and the *GeoHealth Laboratory* is rapidly establishing itself as an important component of the health research landscape in New Zealand. The Lab's reputation for cutting edge GIS and Health research is growing on the national and international stage, and we continue to attract high quality postgraduate students into our program. The foundations for long term success are well established and we look forward to continuing to lead the way in geographical health research in New Zealand.

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Introduction

The GeoHealth Laboratory (Research & Applications) was established in 2005 as a partnership between Public Health Intelligence (PHI), the epidemiology group of the Ministry of Health, and the Health and Environment Research Group of the Department of Geography, University of Canterbury (UoC).

The aims of the laboratory 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

Funded in the first instance for three years, the Laboratory will 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.

The GeoHealth Laboratory was launched by the then Minister of Health, the Hon Annette King MP, in November 2004 at the *GeoHealth 2004* Conference in Wellington. The Laboratory was formally opened on the 18th February 2005 by Dr Don Matheson, Deputy Director General, Public Health, Ministry of Health and Professor Roy Sharp, Vice Chancellor, University of Canterbury.

Why have a GeoHealth Research Laboratory?

The Laboratory is driven by the desire to exploit the potential of GIS (computer systems for integrating and analyzing 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 geohealth research and teaching experience of the Department of Geography, combined with the policy focused GIS and spatial epidemiology expertise of PHI provides access to the most up to date expertise for the practical deployment of GIScience and geohealth research for the benefit of the New Zealand health sector.

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Second Annual Report of the GeoHealth Research Laboratory

This is the second annual report of the Laboratory. The report describes the infrastructure, workplan, milestones, achievements and key events in the second year of operation of the Laboratory; as well as setting out the aims and work plan in detail for year three.

Section 1 outlines the key funding stream of the Laboratory for its first three years of operation, together with details of the personnel, infrastructure, equipment, data and management of the Laboratory. Sections 2, 3 and 4 describe the workplan of the Laboratory broken down into its three constituent parts, research, scholarships and training. 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 year two and the strategic direction beyond.

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Comments from the Management Team

Paul White – Reflections on Year two
The Laboratory is well and truly established. In this second year we have built on the success of the preceding year. The hard work of establishing the Laboratory is now paying off. There are now more combined projects between the Laboratory and PHI, and overall the benefits of the Laboratory to the work programme of PHI, to the Ministry of Health and the wider health sector are apparent and becoming more clearly defined with every project we undertake.

A good example of practical benefits to the NZ health sector of the Laboratory is the *Small Area Health Needs Assessment* (SAHNA) project. This project, just commencing, is based on the leading research of Graham Moon and involves Jamie and Paul from the Laboratory (UoC and PHI respectively), Martin Tobias from PHI and Graham who, though based in the UK (Portsmouth/Southampton universities), is also a Laboratory board member. This project is hugely important for two reasons: Firstly, Graham's methodology allows PHI to undertake small area analysis using data from the collection of PHI national health surveys. PHI undertakes the largest set of health, nutrition and risk factor behaviour surveys undertaken in New Zealand grouped together under the banner the *New Zealand Health Monitor* (NZHM). The NZHM is an immensely rich source of data. However, the surveys were/are not designed for sub-national, and most especially small area analysis, and consequently the data have not been used in PHI for anything other that providing national snapshots. Secondly, this local analysis is of direct value to the Ministry of Health and more especially the 21 District Health Boards (DHBs), and will be of increasing value to the 84 or so Primary Health Organisations (PHO). Every 4/5 years the 21 DHBs undertake an assessment of health needs for their area. Increasingly the DHBs will be tasking their PHOs to undertake some of this work. The PHOs are not geared up for local data collection or analytical work of this sort and so PHI is able to provide specialist expertise and, through this project, small area data to assist both DHBs and PHOs. Therefore, this project has huge potential for PHI (and the Laboratory) to exploit NZHM data at the small area local level (that hitherto has not been possible) to meet clearly defined Ministry and health sector information needs. In addition this project has wider spin offs, and will serve as a catalyst for more exploratory research that will undoubtedly make a valuable contribution to our understanding of the interaction between 'health and place' – one of the prime drivers underpinning the creation of the Laboratory.

Other highlights of the last year include the internships of two Laboratory Masters students (Erin and Esther) who undertook excellent work on surveillance during their two week spell in PHI. In my view this was extremely successful, and I understand, rewarding for both Erin and Esther. It is aimed to continue this practice and the feedback provided by both Erin and Esther should help Jamie and I maximise the benefits for all concerned for the Laboratory's next students. It is also extremely pleasing to note that Catherine Tisch the Laboratory's first Masters student will be awarded the University of

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Canterbury's Jobberns Prize for best Masters dissertation at her graduation ceremony in April. Well done and congratulations to Catherine.

Irfon was able consolidate his position as a PHI research assistant hosted by the Laboratory by coming up to PHI on a number of occasions, participating in a PHI 'planning' and team building day, and the first MoH pandemic influenza preparedness exercise, Exercise Makgill. Irfon made a valuable contribution working in a team on a shift basis throughout the day during this unique and occasionally pressurised event.

Finally, we were able to roll out the Basic and Intermediate Public Health Geographical Data Analysis training. Two successful training events have been held. The first Basic course hosted by the Laboratory and using UoC facilities was in August, and the second Basic and first Intermediate course following in December. These health specific short courses are unique to NZ. In addition, we have continued to run the only spatial epidemiology short course in NZ. These courses are on the way to establishing themselves as an invaluable asset to the New Zealand public health community.

These are just some of projects and means that clearly demonstrate the value of the Laboratory and the 'jointry' between PHI and the Dept of Geography via the Laboratory.

The big ticket item for the year was undoubtedly the *GeoHealth 2006* conference *Methods in Practice* held in sunny Nelson at the Rutherford Hotel in December. PHI has hosted all three *GeoHealth* events and judging by the continued excellent turnout the series now has a clearly established footprint as *the* southern hemisphere conference to promote the exchange of ideas and sharing of experiences in the application of health geographical sciences to public health research and practice. With four excellent internationally renowned guest speakers and nearly forty papers the conference brought together people from the many different fields in the broad area of public health. One of the direct and tangible benefits of the conference was the germination of an idea that has lead to the SAHAN work with Graham Moon outlined above.

The Laboratory was also able to welcome Peter Day and Jinny Gunston to the team. They have both already made valuable contributions, with Peter working with Jamie, Dyfed and myself on the multilevel modelling obesogenic landscape project, amongst others, and Jinny working with myself and others on a couple of notable projects including the small area melanoma estimates (presenting at *GeoHealth 06* only a matter of months after joining us), and undertaking most of PHI's health sector ad-hocs.

As we gained two people, we also lost two. The only real disappointments to the year were both Irfon and Kurt leaving. They have both in the two years they have been with us made substantial contributions. We wish them both well in their new positions, Irfon with the Geography Dept. Antarctic research group, and Kurt with the Ministry for the Environment.

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Year two has been very good, so what of year three? Building on the success of the conference, our aim for year three is the continued promotion and raised awareness of the Laboratory across the health sector. In this respect I have five goals:

- strengthen the Laboratory's geohealth research focus around 'risk behaviour/risk environments' to meet the practical needs of the health sector and strategic direction of the Ministry of Health.
- host a one day health sector focused symposium based on Laboratory, Dept. Geography and PHI research around the area of obesity, targeted towards the Ministry *HEHA* (Health Eating, Health Action) programme.
- attract a health sector (eg a DHB) representative, preferably to the Board, to act as both advisor to the Laboratory on health sector research needs and act a champion of the Laboratory across the health sector.
- strengthen the links between the Laboratory and PHI and continue to work towards achieving a greater degree of integration and alignment between our two work programmes.
- work towards securing a future of the Laboratory beyond year three.

From PHI's perspective I am happy with the way things have progressed and look forward to exploiting opportunities the Laboratory affords during the next year.

Paul White
Co-director GeoHealth Laboratory
March 2007

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Section 1. GeoHealth Research Laboratory Infrastructure

The Laboratory infrastructure is largely unchanged.

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

1. Funding

The Laboratory has two principal funding streams, one directly provided by PHI and the other indirectly provided by the Department of Geography.

PHI Direct Funding

The direct funding schedule from PHI is set out in the contract between PHI and the UoC dated 14th December 2004. The contract has been subject to variations that have increased the funding to the UoC. These additional payments relate to direct funding streams for personnel seconded to PHI and joint projects that have attracted third party funding from the MoH. In addition the contract has been extended by six months expiring on June 30th 2008

UoC Indirect Funding

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

2. Personnel

The Laboratory funds one full time (for the duration of the contract) research assistant post. In addition the contract and subsequent variations fund a further three equivalent positions as secondments to PHI, with the one that was placed in the Laboratory in Christchurch moving to join the two located in PHI in Wellington.

As part of the partnership the time and associated costs of the management team (two permanent posts) is provided and funded by PHI and the Department of Geography external to the contract costs. The Laboratory also funds Masters and PhD Scholarships (detailed in section 3 below) that are located in, and contribute to the work of, the Laboratory. The Laboratory is able to draw upon the wider expertise of the Department of Geography. In this respect the Laboratory also hosts a number of Department of Geography postgraduate students and Research Assistants. Similarly, but less

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observable, the Laboratory is also able to access the expertise of the wider PHI group. An outline of Laboratory personnel is given in table 2.

Part of the budget allocation, amounting to approximate three percent of salary of the Laboratory Research Assistant posts is provided for training to encourage staff development.

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 PHI of the Laboratory. This means that in practice for the funding of four posts the Laboratory is able to draw upon the expertise of in excess of 46 people. This number can be added to by including the research groups of Board members, for example that of Professor Graham Moon. Finally the contributions from both the Department of Geography's and PHI's other relationships can also be included, most notably from PHI relationships with the Centre for Public Health Research Massey University; the Epidemiological Centre, Massey University, and the School of Mathematics and Applied Statistics, University of Wollongong. Such a large virtual group forms by far the largest applied spatial and environmental epidemiology research group in the Southern Hemisphere.

The first Laboratory Research Assistant, Matthew Faulk, resigned in December 2005 and has been replaced by Peter Day. In addition Irfon Jones the Laboratory hosted PHI position, resigned in December 2006. Recruitment of a replacement position is underway. The position will move from the Laboratory to PHI.

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Table 2. Current GeoHealth Research Laboratory Personnel

Post	Location	Name
Core funded Research Assistant	Laboratory	Peter Day
PHI seconded posts: Research Assistant level	Laboratory to PHI	Replacement for Irfon Jones sought
	PHI	Jinny Gunston Kylie Mason
Masters scholarships	Laboratory	Catherine Tisch: Finished Sept 06* Katrina McPherson: Finished Dec 06 Erin Holmes: Finished Mar 07 Esther Rhind: Finishing Jun 07
PhD scholarships	Laboratory	Francis Ayuka Owuor: Mar 2010
Board	Dept Geog	Prof. Eric Pawson (joint chair)
	UoC	Prof. Andrew Hornblow
	PHI	Dr. Barry Borman (joint chair)
	UK	Prof. Graham Moon
	Australia	Assoc. Prof. Laurie Brown
Management team	Dept Geog	Dr. Jamie Pearce
	PHI	Dr. Paul White
Dept Geog postgraduates and research assistants	Laboratory	Ionara Wilson Phil Bartie Katie McPherson
Dept Geog staff	Dept Geog	Prof. Ross Barnett Prof. Andrew Sturman Assoc. Prof. Simon Kingham Dr Peyman Zawar-Reza
Dept Geog technical support staff	Dept Geog	John Thyne Paul Bealing
PHI GeoHealth staff	PHI	Dyfed Thomas
PHI Staff	PHI	20+ personnel

*Catherine will be awarded the Jobberns Prize for best Masters dissertation at the graduation ceremony in April.

3. Facilities

The Laboratory is located in a dedicated room situated adjacent to the Department of Geography. The Laboratory room is fitted out with three partitioned workstations, bench space for a further five workstations and eight reading carrels. In addition there is a large table and white board. The laboratory is locked and has passcode 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.

GeoHealth Laboratory team

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4. Equipment

The GeoHealth Laboratory has been refurbished to provide deskspace and computer terminals for up to 13 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 text and numerical software tools. These applications are updated and maintained through UoC site licenses. Technical support is provided by Department of Geography GIS specialists and manager, and UoC central IT services.

5. Management

Laboratory Directors

The Laboratory has a two tier management structure. The directorship and management of the Laboratory is undertaken jointly by Jamie Pearce of the Department of Geography and Paul White of PHI. Jamie and Paul are in weekly phone and email contact and meet regularly in Christchurch and Wellington.

The two directors are responsible for the work activities of the Laboratory and for generating the Laboratory workplan.

Laboratory Board

Oversight and governance are provided by the GeoHealth Laboratory Board. The Board alternates locations between Wellington and Christchurch, with the Chair rotating between Eric Pawson of the Dept of Geog and Barry Borman of PHI. Wider expertise is drawn from three further Board members; Andrew Hornblow from the Health Sciences Centre, UoC; Laurie Brown (National Centre for Social and Economic Modelling), University of Canberra; and Graham Moon (Health Services Research), University of Portsmouth. The two directors sit on, and report to, the Board.

The Board met twice in the 06/07 year.

In September 2006 Jamie and the two Laboratory based Research Assistants came up to Wellington to meet with the four PHI geohealth and spatial epidemiology group members, following the practice established a year earlier. Given the close working relationship of these two groups this meeting was a tremendous success for fostering closer working relations. It is hoped that this practice can continue with possibly the PHI team visiting the Laboratory.

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Section 2. Workplan Core Activity: Research

The Laboratory workplan is centred around 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: 2, 3 and 4.

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 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 are 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 the developing and undertaking these projects.

Following on from the excellent start made in year one, we have continued to undertake joint and individual projects. Some of projects are ongoing from the first year, 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. 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 Lab. In this section we provide a brief synopsis of all of the key projects which people have been working on in the Laboratory.

Research Projects 2006-07

1. The role of neighbourhood context in explaining patterns of problem gambling in New Zealand.

Research Summary

This study is funded by PHI for 12 months (Sept 06 to Sept 07) and will examine whether geographical access to a range of opportunities for gambling in local neighbourhoods across New Zealand have an effect upon problem gambling incidence, which is independent of individual socio-demographic characteristics. To realise this aim we will pursue two objectives:
i. Use Geographical Information Systems technology to measure geographical accessibility for 38,254 small areas (or neighbourhoods) across New Zealand to a range of gambling locations.
ii. Use this neighbourhood measure of access to the location of gambling opportunity outlets juxtaposed with the 2002/03 New Zealand Health Survey

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to examine whether there is a neighbourhood effect which is independent of individual characteristics such as age, sex, socioeconomic position and ethnicity.

2. *Neighbourhood access to community resources and health*

Research Summary

The Neighbourhoods and Health project aims to determine neighbourhood and community variations in mortality and morbidity, and how much of that variation might be explained by access to community resources. In stage one of the analysis we developed an innovative methodology to measure geographical access to a range of community resources that have been empirically linked to health. Geographical Information Systems (GIS) were applied to develop precise measures of community resource accessibility for small areas at a national scale. Locational access to shopping, education, recreation and health facilities was established for all 38,350 census meshblocks across New Zealand. The construction of access indices for specific community resources will enable health researchers to examine with greater precision, variations in the material characteristics of neighbourhoods and the pathways through which neighbourhoods impact on specific health outcomes. In stage two of the project we are currently examining the effects of community resource accessibility on a range of health outcomes. The community resource access index has been attached to the New Zealand Health Survey and a multilevel modelling approach has been adopted to consider whether there are independent neighbourhood effects once individual sociodemographic characteristics have been controlled for.

Publications

Pearce J, Witten K, Hiscock R, Blakely T, 2007. Geographical inequalities in health-related community resource accessibility: a national study. Environment and Planning A. In Press.

Pearce J, Witten K, Hiscock R, Blakely T, 2007. The contextual effects of neighbourhood access to supermarkets and convenience stores on individual fruit and vegetable consumption. Journal of Epidemiology and Community Health. In Press.

Pearce J, Blakely T, Witten K, Bartie P, 2007. Neighborhood deprivation and access to fast food retailing: a national study. American Journal of Preventive Medicine. In Press.

Pearce J, Witten K, Hiscock R, Blakely T, 2007. Are socially disadvantaged neighbourhoods deprived of health-related community resources? International Journal of Epidemiology. In Press.

Pearce J, Witten K and Bartie P, 2006, Neighbourhoods and health: a GIS approach to measuring community resource accessibility, Journal of Epidemiology and Community *Health* 60, 389-395.

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3. Spatial inequalities in suicide in New Zealand, 1980-2001

Research Summary

This research evaluates whether urban/rural inequalities in suicide have grown for males and females during the 1980s and 1990s, a period of rapid social and economic change to New Zealand society. Using consistent geographical areas, we calculate age standardised suicide rates for urban and rural areas. To assess whether socioeconomic factors underlie any urban/rural inequality in suicide, we investigate whether urban/rural status had an effect upon rates of suicide independently of socioeconomic deprivation for the time periods 1990-92 and 1999-2001.

Publications

Ministry of Health. 2006. New Zealand Suicide Trends: Mortality 1921–2003, hospitalisations for intentional self-harm 1978–2004. Monitoring Report No 10. Wellington: Ministry of Health.

Pearce J, Barnett R, Collings S, Jones I, 2007. Did geographical inequalities in suicide among males aged 15 to 44 in New Zealand increase during the period 1981-2001? *Australian and New Zealand Journal of Psychiatry* 41, 359-365.

Pearce J, Barnett R, Jones I, 2007. Yet more inequality? Have socio-economic and urban/rural inequalities in suicide in New Zealand grown during the period 1980-2001? *Social Science and Medicine*. Under Review.

4. Project Title: Monitoring geographical inequalities in health in New Zealand, 1980–2001

Research Summary

Recent studies have noted widening health inequalities between rich and poor areas in a number of OECD countries. These papers examine whether health in New Zealand has become more geographically polarized during the period 1980–2001, a time of rapid social and economic changes in New Zealand society. Mortality records for each year between 1980 and 2001 were extracted for consistent geographical areas: the 21 District Health Boards operating in New Zealand in 2001 and used to calculate male and female life expectancies for each area. The geographical inequalities in life expectancy were measured for each year between 1980 and 2001. Although overall life expectancy has increased during the period of study, New Zealand has experienced increased spatial polarization in health, with a particularly sharp rise in inequality during the late 1980s and early 1990s. Since the mid-1990s regional inequality has remained at stable but high levels. The polarization in mortality was mirrored by a growth in income inequality during the 1980s and 1990s. Health inequalities as expressed geographically in New Zealand have reached historically high levels and show little sign of abating.

Publications

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Pearce J, Dorling D, Wheeler B, Barnett R, Rigby J, 2006. Geographical inequalities in health in New Zealand, 1980-2001: the gap widens. *Australian and New Zealand Journal of Public Health* 30, 461-466.

Pearce J, Dorling D, 2006, The place of population change in explaining geographical inequalities in health in New Zealand, *International Journal of Epidemiology* 35, 1099-1100.

Pearce J and Dorling D, 2006, Increasing geographical inequalities in health in New Zealand, 1980-2001, *International Journal of Epidemiology* 35, 597-603.

5. Environmental disparities and health in New Zealand

Research Summary

Research has established that many socially deprived, low income and ethnic minority communities are exposed to disproportionately high levels of outdoor air pollution. Whilst there is a burgeoning literature documenting these environmental disparities, most previous studies have taken place in North America and few researchers have examined local scale variations across an entire country. Further, there has been little work systematically evaluating disparities in the local exposure to air pollution from different sources. In this New Zealand research we use mean annual estimates of outdoor particulate air pollution for different sources for neighbourhoods across urban New Zealand to evaluate whether air pollution varies between local areas of differing socioeconomic circumstances.

Publications

Pearce J, Kingham S and Zawar-Reza P, 2006, Every Breath You Take? Environmental Justice and Air Pollution in Christchurch, New Zealand, *Environment and Planning* A, 38, 919-938.

Kingham S, Pearce J, Zawar-Reza P, 2007. Driven to injustice? Environmental justice and vehicle pollution in Christchurch, New Zealand. *Transportation Research D: Transport and Environment*. In Press.

Pearce J, Kingham S, 2007. Environmental inequalities in New Zealand: a national study of air pollution and environmental justice. *Local Environment*. Under Review.

6. PHIOnline

Research/Project Summary

PHIOnline is a powerful visualisation tool that provides an alternative way to access health information through a mapping interface rather than traditional text-based documents. Following the successful launch and uptake by the sector of the initial pilot version, PHIOnline has been re-developed and

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upgraded. The new version will be launched by the Minister of Health in June 2007.

PHIOnline has been developed to meet the information requirements of the health sector, with data available at the DHB and now Territorial Authority levels. IN this respect PHIOnline will:

- Aid local agencies to achieve their desired health outcomes
- Aid Local Authorities and health providers to fullfil their responsibilities under the Local Government Act 2001
- Reduce cost of information dissemination
- Make government information more easily available, with a greater reach to a wider audience

The web interface provides a multidimensional view of data through linked maps, charts, graphs and tables. Data included on the site are now sourced from beyond the health sector and include:

- Routine Hospitalisation, Mortality and Incidence collections
- NZ Health Survey data
- Oral Health
- Get Checked Diabetes
- Water Quality

7. Understanding Obesogenic Environments: Access to Food Outlets

Research Summary

Previous studies have concentrated on the role of individual parental and child responsibility in relation to diet. While these are still important factors, focus must be given to the environment we live in and its 'obesogenic' aspects. Previously we have found an association between fast food location and socio-economic status nevertheless, the relationships are many and complex. Building on this work we have begun to explore in more detail socio-economic and environmental factors that contribute to the obesogenic landscape. In particular we have looked at other food outlet types such as dairies, four square type stores and supermarkets in the Counties Manukau region. We have found that clustering of four square type stores are more likely than other outlet types in areas of high deprivation. This project is on-going.

8. Data access for Researchers

This is ongoing work from 2005/06. See the First Annual report for more on this project. PHI is currently developing protocols for survey data access based on best practice from across NZ and internationally.

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9. Problem Gambling Geography of New Zealand 2005

This report was ongoing from 2005/06. The final document was released in August 2006. See the First Annual report for more on this project

10. Problem Gambling in New Zealand: Analysis of the 2002/03 New Zealand Health Survey

This report was ongoing from 2005/06. The final document was released in August 2006. See the First Annual report for more on this project

11. Alcohol Use survey analysis

Kylie worked with another PHI statistician in carrying out the analysis of the surveys, *2004 Health Behaviours Survey – Alcohol Use*. From August 2006 onwards, Kylie has worked on writing the report for this survey. See the First Annual report for more on this project The document *Alcohol Use in New Zealand: Analysis of the 2004 Health Behaviours Survey – Alcohol Use* was released in March 2007.

12. Drug Use survey analysis

In addition to the statistical analyses carried out on the survey data from the *2003 Health Behaviours Survey – Drug Use*, Kylie is currently working on the report of the drug use survey findings, which is due to be released mid-2007. See the First Annual report for more on this project

13. NSU – HIV antiretroviral prescribing specialists

This short project involved geocoding and mapping the locations of HIV antiretroviral prescribing specialists, and carrying out GIS network analysis to investigate which areas in New Zealand were located furthest from a service. This work was requested from the National Screening Unit (NSU), and was prepared for a presentation that we gave to NSU and PHI.

14. Sentinel Surveillance

Research Summary

Current world wide interest in the threat posed by emergent infectious diseases such as Highly Pathogenic Avian Influenza has generated a great deal of interest in sentinel syndromic surveillance. To meet such time critical information needs PHI is exploring the timeliness value found in novel data sources as part of the Ministry's pandemic preparedness planning.

Near real time data sources that will provide an indication of an emerging outbreak are of two primary types, direct and indirect. The direct sources result from a clinical coded interface with health services, most notably (but not exclusively) primary care (General Practice) consultations. The indirect

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sources are from non-clinically diagnosed transactions that act as a good barometer of population health, perception and anxiety and can include: pharmacy over the counter sales, school absenteeism and usage of national phone helplines for example. Clinical coding of direct sources offer the advantage of a standardised and systematic dataset, whilst indirect methods offer the advantage of earlier and increased coverage (as not all potential cases will result in, or will, access direct medical intervention) compared to direct sources.

During the recent winter influenza 'season' PHI has accessed direct data sources from primary care GP consultations derived from the 'HealthStat' application of CBG Health Research Limited. 'HealthStat' electronically interrogates GP practice management systems (PMS) for clinically coded ILI syndrome groups. The indirect data sources come from 'HealthLine', the national 0800 free 24 hour a day telephone health advice line. Healthline calls are triaged (by registered nurses) through electronic (computer) form prompted questions, ensuring a standardised, systematic and complete record of transactions.

Temporal analysis of the data is based on the Cumulative Summation methodology as part of the Early Aberration Reporting Systems (EARS) application developed by US Centres for Disease Control and Prevention. However, one of the unique characteristics of the PHI NZ approach is to go beyond temporal analysis to include the spatio-temporal dimension.

15. Urban-rural health comparisons

Research Summary

The report *Urban-Rural Health Comparisons: Key results of the 2002/03 New Zealand Health Survey*, compares the health status of New Zealand adults living in urban and rural areas. In particular, this report compares the following aspects of health for urban and rural dwellers: prevalence of selected chronic diseases; prevalence of risk and protective factors; the use of health services; and self-reported health status. The report examines differences between population subgroups, defined by type of urban/rural area, sex and socioeconomic deprivation.

A draft of this document was completed by a contractor mid-2006. Kylie finalised the document, by making changes according to peer review and editors comments, and took the document through publication process. This document was released in March 2007

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16. Targeting Small Area Health Needs: integrating multilevel synthetic estimation and geographical data

Research Summary

Identifying the extent to which health needs vary across small areas has long been a concern of public health and health promotion. Centrally the focus has been on uncovering highly localised manifestations of health inequality within larger communities, thus enabling resources to be targeted more subtly. Methodological approaches to this task have ranged considerably in their level of sophistication. Some assume national inequalities are replicated uniformly at a local level; others place great emphasis on proxy measures. Most are highly data dependent, being constrained by the quality and availability of appropriate data and the spatial units for which it is produced.

This project aims to use the multilevel synthetic estimation methodology developed by Graham Moon. This focus in the first instance on small-area needs in relation to chronic respiratory illness using data from the 2002/03 NZ Health Survey and 2001 census, followed by the 2006 Tobacco Use Survey and the 2006 census. The outcome is a development of a very large spatial interaction model enabling health needs estimates to be linked to all NZ general practices.

17. Creating robust small area estimates of malignant melanoma for targeted health promotion

Research Summary

Malignant Melanoma is one of the leading cancers in New Zealand, and the most common cancer in adolescence (Sneyd & Cox, 2006). It is also one of the easiest to prevent as the aetiology (exposure to ultra-violet radiation) is well understood. However, current health protection messages such as 'slip, slop, slap' are not having the desired effect of reducing incidence. Driven by key health policy objectives this research seeks to assess the usefulness of routine data sources to create robust small area estimates that will allow health promoters to more accurately target local communities with tailored sun-smart campaigns.

The most robust quality data is found post introduction of the cancer registry in 1995. Therefore we have analysed 10 years of data. There has been a reduction in registrations in those under 20 years of age, despite an overall increase in incidence. The sun-smart campaigns began in the mid 1980's, therefore it is only this younger age category who reveal the potential effectiveness of health promotion messages. Anyone over the age of 25 could have received higher doses of UV radiation before this date and therefore still register with melanoma despite taking heed of the warnings. There is a variation in age/gender profiles, with high numbers of older males registering. It is surmised that melanoma incidence is dependent on a number of key spatially variable factors such as increased disposable income leading

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to increased holidays abroad/leisure activities in certain socio-economic sectors, and local variation in solar radiation.

Geographically empirical Bayes estimation techniques were used to address the inherent small number problems, and spatial patterning tested using global and local Moran's I.

The results provide a means for local health promoters by categorizing neighbourhoods into high, medium, or low risk areas. However, the complex nature of the cancer, including confounding factors such as high intra-NZ migration, global rather than local exposure, occupational exposure, and pre mid 1980's exposure resulted in unclear spatial patterns between melanoma and the key covariates. Further work using small area geographically weighted regression methods and adjusting for population movement are in progress and will be reported.

18. Environmental Health Indicators Monitoring Report 2008

Research Summary
This project is just commencing. The aim is to produce a set of environmental indicators useful for monitoring exposure to health risk factors, and to present these indicator data in a way that they are easily useable in conjunction with health data to explore possible relationships. The report (possibly updated on an annual basis must be useful in aiding strategic planning and health impact assessment of DHBs and other central government agencies.

19. GeoHealth2006: Methods in Practice
28th – 30th November 2006, Rutherford Hotel, Nelson, New Zealand

Whilst not research as such *GeoHealth2006* was nevertheless a major undertaking of the geohealth and spatial epidemiology team in PHI. In addition the conference show cased a good deal of PHI, Dept Geog and Laboratory work.

The aim of *GeoHealth 2006* is to promote the exchange of ideas and sharing of experiences in the application of Health Geographical Information Sciences to public health research and practice.

The conference is designed to be inclusive and of interest to people from many different fields in the broad area of public health that include those involved in policy, research, information analysis and implementation, and includes public health practitioners, academic researchers, epidemiologists (human and veterinary), GIS and data analysts, decision-makers and interested colleagues.

GeoHealth 2006: Methods in Practice is going to focus on the broad theme of how GIS and spatial epidemiological methods are of practical benefit to public

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health. There were 40 papers, arranged into six different themes, covering a broad spectrum of topics from spatial epidemiological research and methods to information for public health policy. Providing thought-provoking insight throughout the conference was a distinguished line-up of international experts, commencing with our opening keynote address from Dr Neil McGlashan (University of Tasmania, Aus), followed by Professor Graham Moon (University of Portsmouth, UK), Professor Tord Kjelstrom (Australian National University, Aus), and Professor Danny Dorling (University of Sheffield, UK).

GeoHealth is unique. What started with *GeoHealth 2002* has grown into the largest (and only!) geospatial science conference series dedicated to public and environmental health applications in the southern hemisphere. There is clearly a demand for a meeting of this sort, evidenced in part by other epidemiological meetings failing to appreciate the value of GIS and spatial epidemiology. *GeoHealth* is successful because we cater for a specific audience (both geographically and professionally).

Full details of the conference can be found at the GeoHealth website:
http://www.moh.govt.nz/GeoHealth2006

Section 3. Workplan Core Activity: Scholarships

Introduction

The Laboratory aims to three Masters scholarships per year, or two Masters and one PhD scholarship. Each scholarship covers tuition fees and provides a $10,000 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. All GeoHealth Laboratory-funded students will undertake a short internship (2-3 weeks) at PHI in Wellington at some point during their studies. As was noted in the introduction this has been a notably success so far.

We have also advertised one PhD scholarship both within New Zealand and overseas but to date have only received limited interest.

Masters Scholarships

1. Catherine Tisch (completed September 2006)

2. Erin Holmes (completed March 2007)

3. Esther Rhind (to complete June 2007)

4. Kate McPherson (completed December 2006)

On completion of her Masters Erin joined PHI as a full time Training Fellow.

PhD Students

Francis Ayuka Owuor (to complete in 2010)

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Section 4. Workplan Core Activity: Training

Introduction

The third core work activity of the Laboratory is specialised capacity building for the New Zealand Health sector. As the use of GIS based tools increases beyond academic sectors and across into the practical health settings it is important that appropriate support is available to encourage use and exploit advances and current best practice. This is inline with one of PHIs primary drivers of its sector engagement strategy, to increase specialised analytically capability to help deliver better GIS based analytical solutions directed towards meeting the District Health Board (DHB) and Public Health Service policy targets.

The important focus of these courses is on *Public Health Specific* GIS training. The courses are not general introductions to GIS rather problem centred using public health tasks as the basis for a scenario of the sort that might typically be undertaken in a practical setting.

Each of the courses included instructional sessions, a workbook, and accompanying CD-ROM containing all the data required for the exercises contained in the workbook.

There are currently three course that have been successfully delivered in the last year

Introduction to Spatial Epidemiology

The aim of this 2½-day course is to gain an understanding of the value, tools and techniques used in spatial, ecological and environmental epidemiology. The course is designed to provide background information and practical assistance for public health research and practice.

GIS is increasingly being used within the NZ health sector. This course will help you gain the most out of using these systems by covering some of the important geographical concepts, statistical methods and corresponding potential sources of error that are part and parcel (though frequently overlooked) of using such systems.

Topics covered include:
- Introduction to GIS, spatial analysis and spatial epidemiology
- Spatial epidemiology in practice and the growth of GIS
- Introduction to Geographic concepts
- Specific geographic concepts (problems with interpreting ecological data)
- Spatial analytical techniques 1: Area based processes – Disease Mapping
- Spatial analytical techniques 2: Point based processes – Cluster Analysis
- Data Issues: Access to data, ethics and confidentiality
- Non-infectious disease spatial epidemiology
- Infectious disease spatial epidemiology
- Public health surveillance

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- Outbreak investigation: cluster analysis in practice
- Emerging areas in spatial epidemiology : Zoonotic Diseases

Basic Level Public Health Geographical Data Analysis Using GIS

The introductory course takes you through the basic level skills for mapping Public Health data using a desktop Geographical Information System (GIS).

The basic level training programme comprises a one-day instructional session, the basic level workbook, and accompanying CD-ROM that contains all the data required for the exercises contained in the workbook.The exercises are broken down into four sessions and are based around a scenario that might typically be found within in a Public Health setting. The four sessions are separate but link together forming a cohesive training package designed to introduce the basic elements for creating maps and displaying data spatially. Emphasis is centred on displaying data geographically rather than the analysing data geographically. The spatial analytical aspects of GIS are covered in the intermediate level training. The workbook is designed for people new to the concepts of GIS, and assumes no prior knowledge of mapping in general or the use of ArcGIS in particular.

Topics covered include:
- Introduction to GIS and GIS data types
- Introduction to health data commonly used in mapping
- The value of mapping health data (mapping as powerful tool for communication)
- Importing data from spreadsheets and databases
- Creating area based thematic maps
- Creating alternative maps types (Dot density, Bar Chart, Pie Chart)
- Mapping fundamentals and cartographic principles (use of colour/symbology)
- Using maps in practice (importing into word and powerpoint presentations)

Intermediate Level Public Health Geographical Data Analysis Using GIS

The intermediate training will take you through the intermediate level skills of analysing Public Health data geographically using a ArcGIS desktop mapping and GIS package.

The exercises are based around four sessions. The four sessions are separate but link together forming a cohesive training package covering a range of generic GIS and geo-data analysis skills based around problems or scenarios that might typically be encountered in a Public Health setting. The workbook assumes a basic level of prior GIS experience, although all the steps required to undertake the tasks are described in detail. The workbook is designed to be followed in sequence, with knowledge from the earlier exercises being assumed in later ones.

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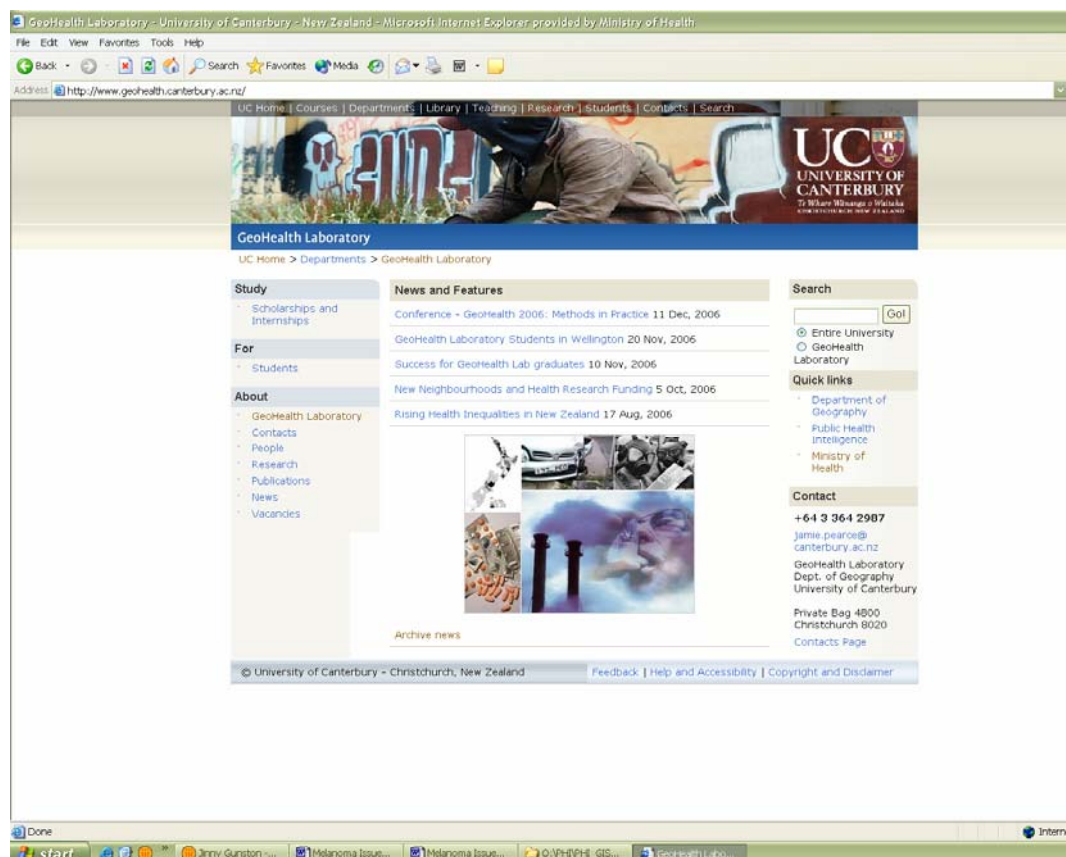*GIS Expertise & High Quality Research for Public Health*

Section 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. This section will briefly outline the ongoing efforts to raise the profile of the GeoHealth Laboratory.

Web Pages

A comprehensive set of web pages have been created by Jamie Pearce and Paul Bealing (DoG, web administrator). The web page has since been updated from its original version. The site:

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

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Section 6. Plans for Year Two

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.

Research

Many of the research projects listed in section 2 will be carried over to year three. Additional research projects include:

- Places of smoking – evaluating changes to smoking legislation in New Zealand (Jamie Pearce, Ross Barnett and Lee Thompson)
- Jamie has been invited to provide a submission to the New Zealand Geographer on research activity in the GeoHealth Lab (for April 2007)
- World health inequalities – project with Peter Day and Danny Dorling
- Obesogenic environments and health – project with Peter Day, Dyfed, Paul and others
- GeoHealth work on youth mortality and driving has just been accepted. Second study underway (with Robin Haynes and others)

Scholarships

It is hoped that a PhD scholarship will be awarded shortly.

Training

Both basic and intermediate GIS courses, and the spatial epidemiology course will continue to be run in the next year. PHI is working towards developing a curriculum of short courses aimed at the practical needs of the health sector.

Promotion and Publication

Conference Presentations for 2006

Many of the PHI/Laboratory and Geography Department staff have presented their own and joint work at a number of leading conferences and workshops, this includes our own flagship event *GeoHealth 2006: Methods in Practice*:

05/06

- International Geographical Union Commission on Health and Environment, Waiheke Island
- International Geographical Union Regional Conference, Brisbane
- GeoSpatial Research and Application Frontiers in Environmental and Public Health Systems, Hong Kong
- Australasian Epidemiological Association, Melbourne
- PHI Analytical Workshop, Evidence for Public Health Practice, Wellington

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- Association of American Geographers, Chicago
- Royal Geographical Society, London

06/07
- Association of American Geographers, San Francisco
- Royal Geographical Society, London
- International Symposium in Medical Geography, Bonn

One Day Symposium: Understanding the Obesogenic Landscape

We will host a one day symposium in Wellington as part of the Laboratory's commitment of providing high quality policy relevant research for the health sector. The target audience will be MoH, health sector and other researchers and agencies involved in evidence gathering or implementing the governments *Health Eating and Health Action* programme. As well as outlining practical research the symposium will also serve to raise the profile of the Laboratory with the key health sector stakeholders that include the MoH and DHBs.

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