The GeoHealth Laboratory

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University of Canterbury - Te Whare Wananga O Waitaha, Christchurch, NZ

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Pegasus Health, Christchurch, October 19th 2015
What is the GeoHealth Laboratory?

• A partnership between Health & Disability Intelligence (HDI), MoH, & the Department of Geography, UC
• Seeks to advance MoH policy & UC’s health sciences research agenda for the mutual benefit of the New Zealand health sector
• Aims to:
  – Build a strategic partnership around health geography, spatial epidemiology, & Geographical Information Systems (GIS)
  – Increase research capacity & research outputs in health & GIS
History

• Established in 2004
• Launched by the Minister of Health, Nov 2004 at the GeoHealth Conference, Wellington
• Formally opened on the 18th February 2005

• 6th May 2005 visited by Prime Minister, Helen Clark

“\textit{I didn't realise geography was so jazzy!}”
Staff and students

- Research staff (postdocs)
- Graduate students
  - Masters and PhD
- UC staff
  - Academics – Geography & other
  - Technical GIS & other support
Directors

• Directors
  – Prof Simon Kingham
  – Dr Malcolm Campbell

• International Advisor
  – Prof Jamie Pearce (Edinburgh Uni)
Current staff

• 3 postdoctoral researchers
  • Dr John McCarthy
  • Dr Paul Beere
  • Dr Melanie Tomintz
Current students

• Students
  – Niamh Donnellan
  – Alison Watkins
  – Daniel Hogg
  – Robert Poynter
  – Kirsty Curry
  – Allan Schori
  – Jesse Wiki
Graduates

• Kurt Janssen (PHI intern) - MoH, MfE, ESRI (California), Interpret (ChCh)
• Katherine Tisch (Masters) – ESR, GeoHealth Lab, Edinburgh Uni
• Erin Holmes (Masters) - MoH (Wellington)
• Kate McPherson (Masters) - CCC (Christchurch)
• Laura Miller (PhD) - (AAG ‘best thesis’ winner 2008), Researcher (Perth, Aus)
• Jeff Wilson (PhD) – Harvard Uni (postdoc), Dean, Huston-Tillotson Uni, US
• Chris Bowie (Masters) – Researcher (GeoHealth Laboratory), Researcher (Opus)
• Sam Valentine (Masters) - Project Manager, Appian Group (Sydney)
• Matt Willoughby (Masters) - Canterbury District Health Board
• Kimberley Reed (Masters GIS) – GIS Analyst at Marlborough Lines Ltd
• Dan Nutsford (Masters GIS) – GIS professional in UK
• Jayden MacRae (Masters) – CEO, Patients First, Wellington
• Nick Brunsdon (Masters) – Economic analyst, CDC, Christchurch
How the work program is planned

• Long term program
  – Ongoing negotiation
  – MoH priorities

• Urgent requests
How the work is done – and engagement opportunities

• Postdocs
  – MoH approved projects

• Students
  – MoH scholarship funded PhD and Masters theses
  – Other PhD and Masters theses
  – GEOG420 Individual research projects (0.25 EFTS)
  – GISC411 (GIS and Health) projects (0.125 EFTS)
  – GEOG/GISC415 Internships (150/100 hrs)
  – Summer scholarships (50/50 co-funded)
GISC411 Research Topics

- Sunshine exposure & mental health
- Do people with long term health conditions (using the NZHS) live nearer or further from GPs and/or hospitals?
- Is there any relationship between physical activity rates (using NZHS) & proximity to walking tracks (from koordinates.com)?
- Is there a Relationship between Alcohol Consumption & Proximity to Alcohol Outlets in New Zealand?
- Does Tobacco Outlet Exposure in New Zealand Influence Smoking Behaviours?
- Are there Spatial and Social Gaps in the Provision of Audiologist Services in New Zealand?
Research themes

New Zealand Sociology Volume 28 Issue 3 2013

Variation in health and social equity in the spaces where we live: A review of previous literature from the GeoHealth Laboratory

Christopher Bowie, Paul Beere, Edward Griffin, Malcolm Campbell & Simon Kingham
Indices of access to factors in the built environment

- Creation of exposure indices e.g.
  - Green (parks) and blue (water) space
  - Key resources and destination
  - Social cohesion and isolation
  - Travel time network
  - Urban/rural
  - Earthquakes
Access to neighbourhood destinations

• Access to ‘unhealthy’
  – Tobacco
  – Alcohol
  – ‘Unhealthy’ food sources
  – Gambling opportunities

• Access to ‘healthy’
  – Green and blue space
    • proximity vs visual
    • Useable vs non-useable
- **Food Environment**
  - Takeaways
  - Deli/Eating houses
  - Dairies
  - Bakeries

- **Physical Environment**
  - Green space
Network Route Analysis

- Closest Facility Network
  - Schools
  - Pop weighted Centroids

- Match the NZHS child to the nearest age/gender appropriate school
Neighbourhood Environment – Route Buffer

- Food environment vs Physical environment
- 200 metre buffer round school & home
- 30 metre & 100 metre buffer round route
Neighbourhood Environment

- Food environment vs Physical environment
- Closest Facility Network Analysis
- 30 metre buffer zone
- 100 metre buffer zone
Air pollution

- Exposure to air pollution
- Environmental justice
- Health impact

Fig. 12. Median UFP concentrations (pt/(cm$^3 \times 10^2$) for Mangere Bridge – a) early morning b) midday c) late afternoon and d) late evening.
Air pollution

• Land use regression (LUR) modelling
Inequalities in access to and utilisation of health services

• Neighbourhood deprivation & hospital admissions
• Neighbourhood deprivation & GP use
• Travel time and GP use
• Road closure and health access
• Healthline
• Quitline

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<th>Pop</th>
<th>%</th>
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Calls to Healthline and subsequent patient action
Patient ‘tracking’ and personal health

- The Sensing City and Health: COPD pilot project
- Track inhaler use among COPD patients
Inhalers (e.g. Ventolin, Duolin) are used to provide relief and symptom control in COPD

Frequency of inhaler use provides an indication of symptoms

Knowledge of inhaler use (when, where, if) will help management of COPD

Trackable ‘Inhaler’ monitors:

- Time and location of use (link to phone)
- The dispensing of medication
- The air temperature at point of use
Real time ‘risk’

• Accurately assigning exposure
• Following ‘patient’
• How does COPD condition alter as (s)he moves through the smart city?
• Know when and where pollution is higher + smart inhaler data + real time
Summary

• GeoHealth Laboratory 11 years old
• Collaboration between MoH and UC
• Applied research
• Academically robust
  – over 80 peer reviewed papers
• Capability building through scholarship program
• Opportunities to engage