case study

esri Australia

Influencing public health policy with location-based evidence

University of Canberra Health Research Institute

UNIVERSITY OF CANBERRA

By leveraging location intelligence to highlight the relationship between place and health, the University of Canberra introduced a research initiative to influence policy and help reduce Australia's annual health expenditures.

Project overview

With 50% of Australians living with some form of chronic condition and 63% of the population over the age of 18 being obese, the nation spends more than $180 billion on health each year.

The previously unstudied relationship between health and place reveals that disease incidence reflects more than the simple presence or absence of a disease; it reflects genetic, lifestyle and environmental factors, cultural influences, socioeconomic conditions and the availability and quality of health care programs and services.

By highlighting geographic patterns in disease incidence and delivering a clearer understanding of the relationship between health and place, government bodies can access evidence-based information about where to direct health funding and investments to alleviate the impact of avoidable health issues.

To help alleviate the burden of chronic diseases using spatial epidemiological research, the University of Canberra Health Research Institute pioneered a global health platform – the Australian Geospatial Health Lab (AGeoH-L).

Enabling the sharing of systematic, interagency research across jurisdictions – both nationally and internationally – AGeoH-L was built to deliver evidence-based research that could inform and influence health policies.

Today, AGeoH-L supports policy makers in developing and evaluating targeted intervention plans that are specific to populations and their environments.

University of Canberra – Health Research Institute (HRI) in focus:

In 2013, in response to local and regional needs to address the rising burden of chronic disease, the ACT Regional Health Observatory was established between the University of Canberra's Health Research Institute (HRI) and local partners.

Later, as its research priorities evolved to take on a national scope, HRI reshaped the Health Observatory to focus on social, built and physical environmental factors that affect health and contribute to health risks.

In 2017, the Spatial Epidemiology Research Group (SERG) was formally established as a core component of the University of Canberra HRI. SERG's mission is to conduct population-level analysis from a foundation of socio-spatial epidemiology and evaluation research for disease prevention.

Bringing together researchers with a solid track record of productive spatial health research from across the globe, the University of Canberra's HRI sought to perform translational multidisciplinary research – with the aim of collaborating with community, government and industry, to improve overall population health.

Being in close geographical proximity to many Federal departments and national health agencies, HRI focuses on helping senior policy makers implement improvements in primary health care, health promotion and health care service delivery.

> "With the rapid increase in the prevalence of chronic diseases across the world, health is one of the biggest spends for government of all levels. Therefore, research into the relationship between health and place has never been so important."

Neil Coffee, Associate Professor,
Health Research Institute, University of Canberra

The challenge:

To facilitate collaboration between community, industry and government agencies, the HRI needed an infrastructure that would provide a consistent characterisation of the built and social environment, ensure data security and could be shared as a research platform nationally and internationally.

The platform had to provide highly secure portal-to-portal connectivity with collaborators including government and agencies – such as Australian Institute of Health and Welfare (AIHW) and Australian Bureau of Statistics (ABS) – allowing them access to HRI's standardised indicator classification system which expresses measures for Australian and international data.

To deliver an advanced, searchable geospatial infrastructure that would support scientific knowledge development, the core requirements were to automate the uploading of existing spatial data sets and integrate multiple administrative data sets according to the spatial coordinates of measures, to make them searchable.

Leveraging its indicator classification system and automating data extractions of relevant indicators and their spatial scales of measurement would help deliver the rigorous, location-based evidence that would effectively address the burden of chronic disease and positively influence public policy in favour of better health and wellbeing and reduce social health inequities.

> "The Australian Geospatial Health Lab was introduced to address the missing gap in health and place research – looking at the context of built environment, geography and lifestyle, and how this influences a community's health outlooks."

Mark Daniel, Professor of Epidemiology, Health Research Institute, University of Canberra

The solution:

The University of Canberra's HRI partnered with Esri Australia to deploy an enterprise level solution, which was used to build the Australian Geospatial Health Lab (AGeoH-L).

As a collaborative infrastructure, AGeoH-L brings together information from community, government and industry sources to deliver multidisciplinary research on chronic disease and social health inequities.

It also implemented a relational database management system with enabled portal-to-portal connectivity that linked AGeoH-L to its research partners from various levels of Australian government – local, territorial, state and federal – and government agencies including ACT Health, AIHW and ABS.

Partners can connect to the platform using portal-to-portal connectivity that ensures data security, delivering access to the standardised system to provide transparent, replicable research outcomes.

Using an indicator classification system allowed partners and collaborators to connect to AGeoH-L via secure portals to access internal data or add their data through the indicator framework, ensuring data comparability and alignment of measures across different states or countries. These data can then be visualised and analysed according to the framework, and used to communicate findings with government, community and other relevant organisations.

The innovations:

This project is a first-of-its-kind example of how geospatial modelling and automating data integration and management can support the visualisation and analysis of spatial information to create a clearer picture for decision-makers.

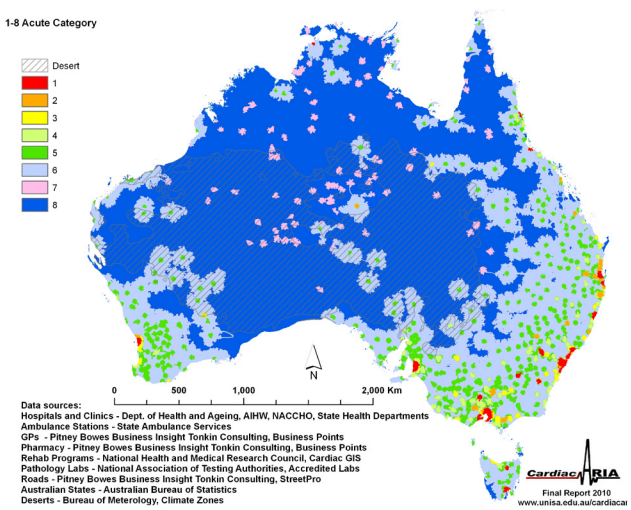
By applying GIS and geospatial modelling through AGeo-H-L, SERG delivers research that:

- **Expresses environmental features at the household, neighbourhood, community and regional levels;**
- **Can affect multiple sectors including urban planning, education, housing, retail and transportation.**
- **Delivers evidence-based analyses of chronic diseases, lifestyle risk factors (obesity, diet, physical inactivity, smoking) and clinical and biochemical markers.**

Establishing an internet-based portal-to-portal capability with the custom-built Esri Enterprise system was key to the University of Canberra's partnerships. These include Kuwait's Dasman Diabetes Institute and a number of other research partners in France, India and Canada, as well as Australian government agencies, such as the ABS and AIHW.

Acute Cardiac ARIA Index

Cardiac ARIA accessibility model showing a geographic measure of access to cardiac services, highlighting the burden of cardiovascular disease in urban, rural and remote Australia through geographic classification.



The outcomes:

The University of Canberra's HRI is committed to pushing the boundaries of spatial health research through the introduction of its innovative GIS infrastructure and advanced spatial data exploitation, only made possible by the current landscape of advanced analytics and geographical insights.

Using geospatial modelling to express environmental factors at multiple levels, AGeoH-L translates research into intelligence that informs policy and helps deliver focused disease prevention strategies.

In Adelaide, characteristics of urban environments that increased cardiometabolic risk were identified through research conducted on a population-based cohort over a 10-year period.

Findings from this work underpinned further research that showed variance in the impact of the obesity prevention and lifestyle (OPAL) initiative – a $45 million federal, state and local government program – by community environments. This highlighted the relevance of prevention at this level.

Another example is Cardiac ARIA, an accessibility model that visualises community proximity to acute, emergency and post-cardiac facilities to determine life-saving access to some form of cardiac service within one-hour.

The research revealed that many parts of remote and rural Australia had much poorer access to services and less service delivery. As a result, additional cardiac nurses and advanced diagnostic blood test services were implemented across various remote and rural communities.

By understanding how preventable outcomes and risk factors are shaped in social and built environments, the rigorous evidence enabled through AGeoH-L is transformed to inform policy and practice for disease prevention through partnerships with citizens, stakeholders and government.

Solution mix:

- Enterprise deployment
- Embedded machine learning into the custom Enterprise build
- Custom coding for embedding the indicator classification system into the Enterprise deployment
- Implementation of a relational database management system
- Enabling portal-to-portal connectivity for linking to research partners

The Australian Geospatial Health Lab fosters collaboration across research academics, local government, state government – anyone who's interested in understanding how health and place interact. GIS is the all-pervasive enabler that links everything together.

Discover the value of Esri Australia's GIS technology solutions and how location helps deliver better policy outcomes.

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