**RISK BENEFIT ANALYSIS**

**Introduction**

The AusUrb-HI pilot project demonstrates how the joint effort between federally funded National Collaborative Research Infrastructure Strategy (NCRIS) facilities such as the Population Health Research Network (PHRN), the Australian Urban Research Infrastructure Network (AURIN) and the Australian Research Data Commons (ARDC), as well as data linkage units and data custodians can securely facilitate access to SA1 level linked health data. Researchers will be able to generate health indicators at a finer spatial granularity, bringing insights that are beneficial to research communities and decision makers.

From this perspective, this project is a pilot project to enable future researchers to follow and approved procedure (which will be documented and shared at the end of this project), in order to apply for and obtain SA1 Level data in their own research projects.

**Potential risks**

This study will be carried out according to the ‘5 Safes framework’. As we will be applying all ‘5 Safes’ in combination, the overall risk of disclosure of any identifying information is very low:

1. Safe people: We have a highly experienced team of researchers covering various disciplines, and who are familiar with issues of confidentiality, privacy, and the conditions of linked administrative data usage through numerous similar studies that have addressed these issues. Investigators either have experience in working with linked data (A/Prof Melanie Davern) and person-level linked health data (Prof David Preen, Dr Derrick Lopez), or have undertaken the Introductory Analysis of Linked Health Data course at the University of Western Australia’s School of Population and Global Health (conducted by Prof Preen) in order to gain relevant experience in working with linked health data (Dr Hao Chen, Flavia Barar).
2. Safe projects: This project has been peer-reviewed and funded through the Department of Education’s NCRIS program and its benefits are discussed below. Findings will not be used for compliance or regulatory purposes.
3. Safe settings: Data will be stored on the secure remote-access Secure Unified Research Environment (SURE facility) maintained by the Sax institute. Access to the datasets will be restricted to research team members who are named in the approved ethics application and have signed a confidentiality document. Users also need to install a personal digital certificate on each computer from which they access SURE.
4. Safe data: Direct identifiers including names, addresses, full date of birth are not provided and researchers will have no direct contact with participants.
5. Safe outputs: All output health data indicators will be aggregated and smoothed in order to reduce the risk of disclosure to a minimum. A risk assessment procedure will be conducted through the project advisory committee (which comprises …\_), which is independent from the project steering committee. All publications and presentations arising from this project will not contain any identifying information, and no individual, medical practice or hospital will be identified or identifiable in such material. The material will be sent to the data custodians for review and comment prior to submission for publication.

Specifically, since we are planning to use SA1 level linked health data in this project, the reporting of the health indicator data will consider two key issues in order to minimize identification risk: (i) data privacy and (ii) statistical stability. Data privacy relates to the responsibility to protect the identity of individuals in the data, and ensure that this is not compromised by the release of that data for reporting purposes. Statistical stability relates to the inherent random fluctuation of statistics based on small numbers of cases; the smaller the numbers, the more they fluctuate, potentially leading to incorrect interpretation. These issues are particularly relevant when considering geographical data. To address both these issues for geographical data, we will use a specific statistical method known as “spatial smoothing”. While standard methods typically only adjust for age and sex in each area, spatial smoothing recognises the geographical structure of the data and includes data from the neighbouring geographical areas when calculating the spatial estimates. This additional data provides greater stability to the estimates. In addition, because the spatial estimates are modelled, rather than observed, spatial smoothing reduces any risk of identifiability for specific individuals. Smoothed estimates are designed to reflect the real differences in the underlying rate or risk between areas. For this study, the spatial smoothing will be adjusted for age, sex and comorbidities (determined from the principal and secondary hospital discharge diagnosis fields).

**Benefits**

The AusUrb-HI pilot project outcomes will produce new, high value data assets (indicators) that will improve our understanding of heat vulnerability and liveability in urban and regional areas.

Climate change poses a significant threat to population health in urbanised areas, particularly through the urban heat island effect. Rapid urban growth and densification, as well as an increasing demand for new housing in Australian towns and cities are likely to exacerbate the effects of extreme heat and increase heat-related illnesses while adding pressure on health infrastructure systems. These elements underpin the need for climate sensitive urban planning and design decisions at local level to counter the effects of extreme heat on population health.

The need to urgently address urban heat to avoid preventable deaths has been highlighted through several cities, including Melbourne, who have appointed Chief Health Officers to manage the risk of extreme heat to population living in cities. “In Melbourne, deaths begin to rise when the mean daily temperature reaches 28℃, with hospital admissions for heart attack increasing by 10.8 per cent when the mean daily temperature reaches 30℃. When the average temperature is higher than 27℃ for three consecutive days, hospital admissions increase by 37.7 per cent. This suggests that even a small reduction in temperature during a heatwave will reduce the numbers of deaths” ([The Conversation, 2022](https://theconversation.com/melbourne-now-has-chief-heat-officers-heres-why-we-need-them-and-what-they-can-do-192248)).

However, existing indicators for heat vulnerability do not include an adequate level of spatial granularity or detailed understanding of human health to generate adequate solutions.

More detailed research is needed to understand the complex set of underlying health conditions (and relationship between emergency department presentations, hospitalisations, and deaths for a range of conditions, including cardiovascular disease (CVD), renal disease, diabetes) exacerbated by heat, as well as the close relationship between human health and the characteristics of the built environment – the context in which they occur, in order to generate a comprehensive understanding of heat vulnerability and its impact on human health and health system demand.

The new indicator data assets developed through the AusUrb-HI project using linked health data at SA1 level will allow us to identify incidence patterns and other key risk factors across urban and regional populations. We will integrate health, socio-economic, environmental, climate and built environment datasets to provide a holistic spatially-explicit understanding of urban population health. These indicators will allow health, urban and social infrastructure planners and policy makers to better understand the drivers behind heat-related illness and develop urgently needed targeted policies and evidence-based actions on a local and urban (macro) level. This project will provide a precision medicine approach to identify local areas of vulnerability to heat events which could be used to mitigation interventions (e.g. local government increasing vegetation, improving housing conditions, introduction of cool places or erecting shade cloths in areas with high heat vulnerability). Furthermore, the project aligns with the federal government’s goal to take action towards climate resilience and reduce green-house emissions by 43% by 2030.

The outcomes of this project will also contribute assets to the research community that will help other researchers investigate similar phenomena in the built environment at every stage, from data integration and analysis methodologies.