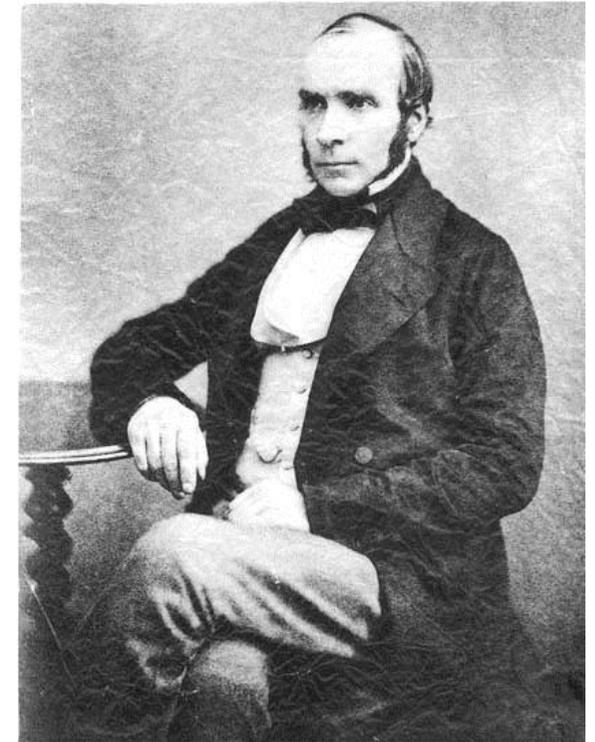
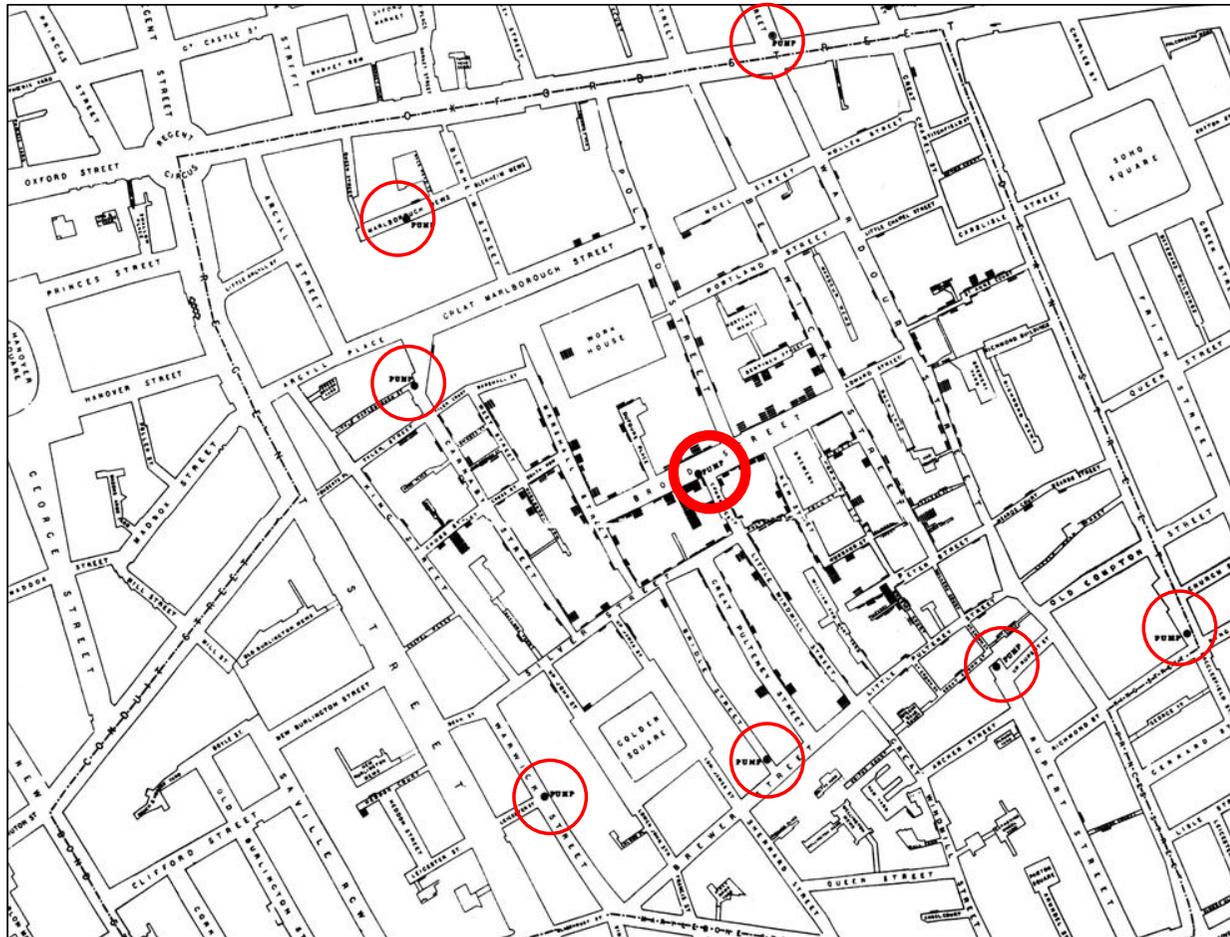


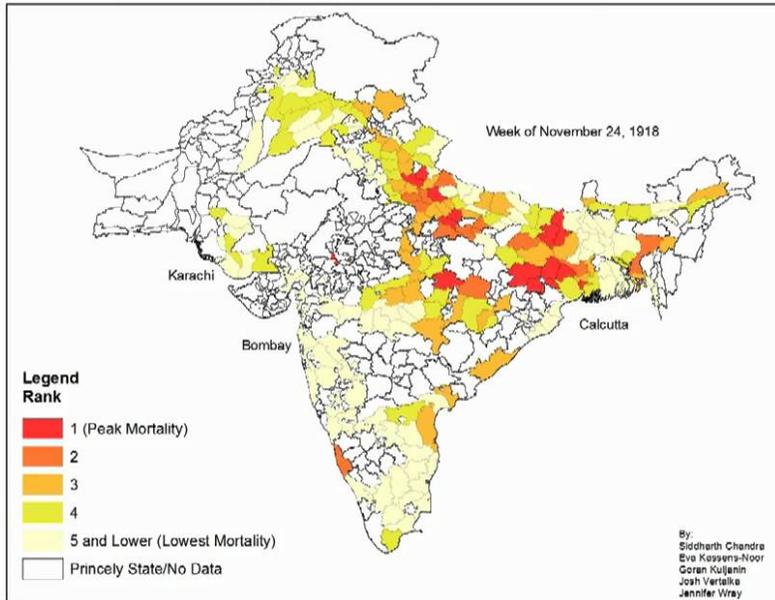
Data Visualisation and Analysis

GIS and BI Dashboards

John Snow, 1854 Cholera epidemic in London focused in the area around Lambeth. The prevailing belief at that time was that cholera was caused by miasma or bad air. Dr John Snow believed that it was caused by something ingested.



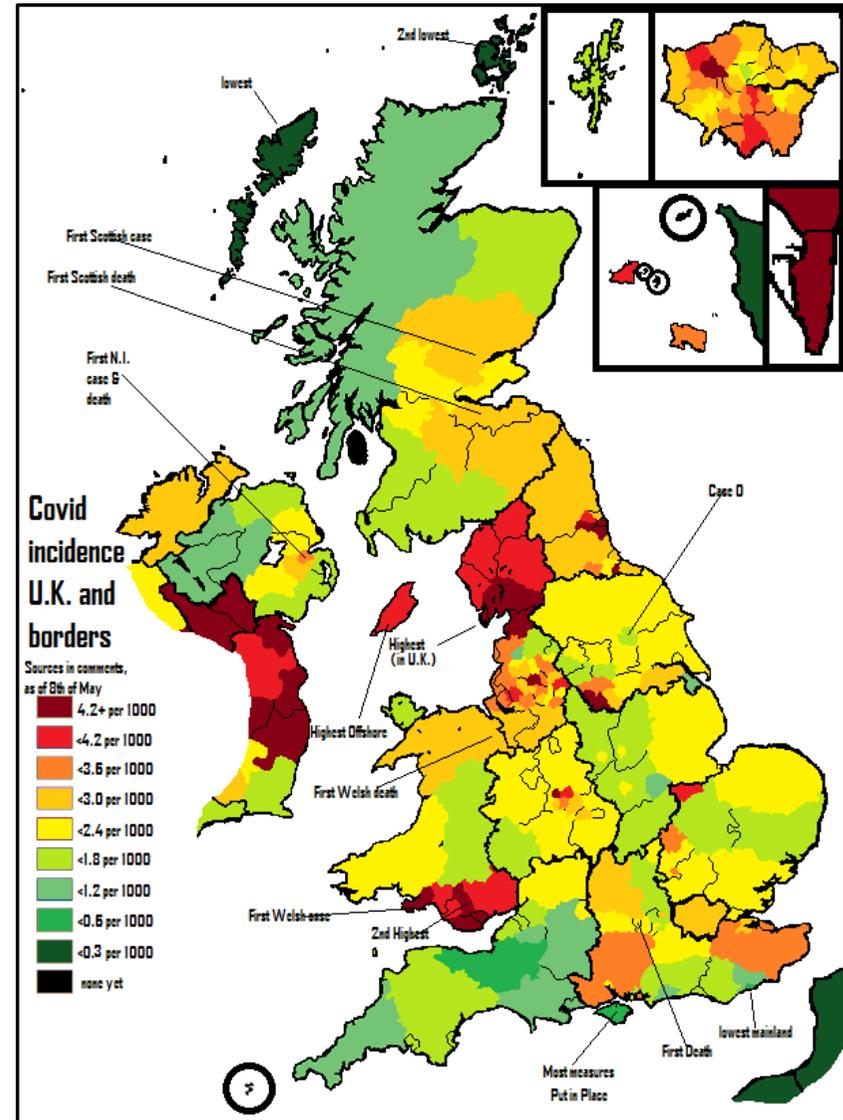
Weekly Influenza Activity in British India During the Pandemic of 1918-19*



*Each week was ranked on the basis of mortality from "flu" over the period January 1916 to December 1920.

This research was made possible by grant number 1R21DA028917-01A1 from the National Institute on Drug Abuse (NIDA) of the National Institutes of Health.

Outbreaks -
Interactive



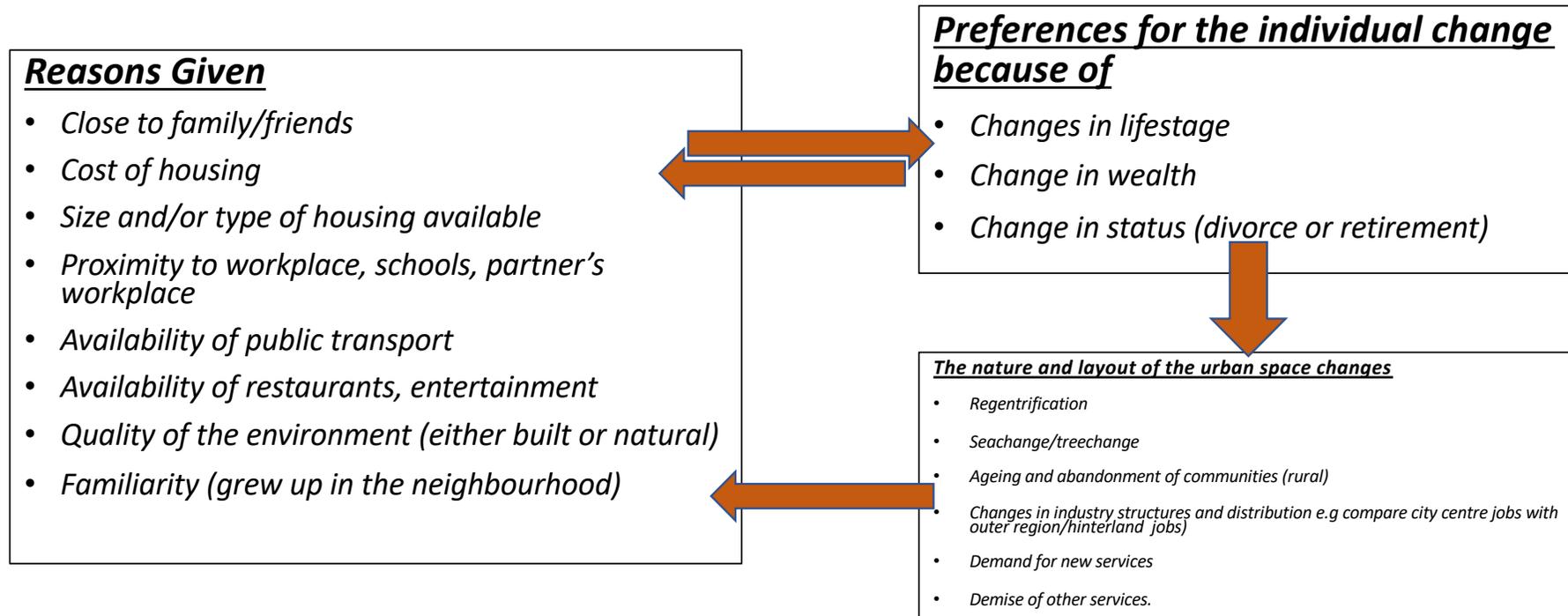
Why do people choose to live where they live? The self filtering process.

Study by Centreforcities

<https://www.centreforcities.org/>

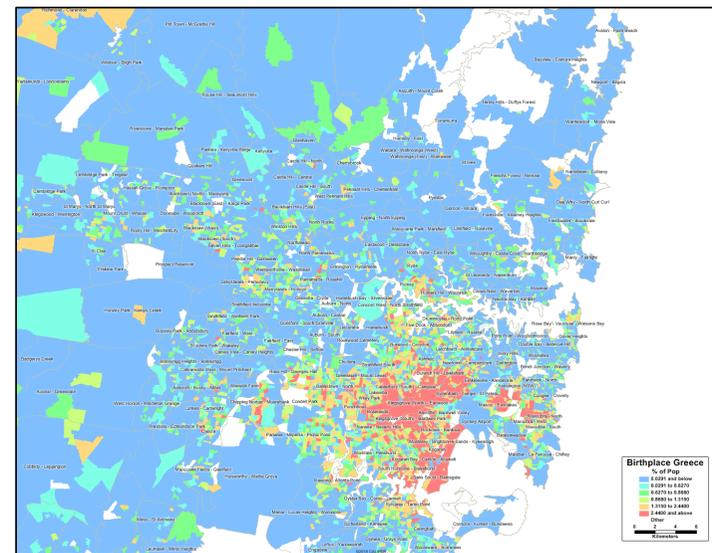
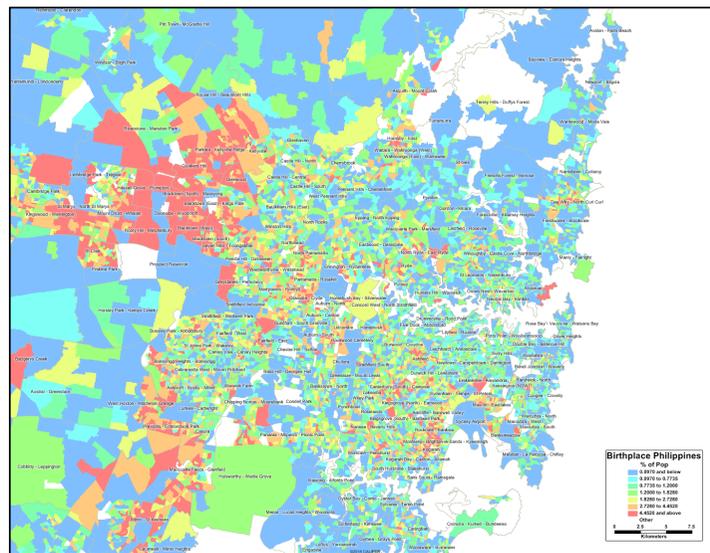
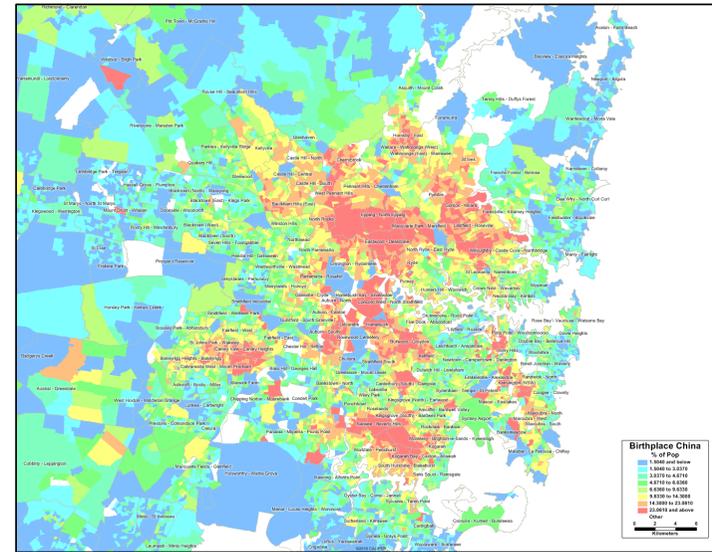
	Age x % of Respondents			
	18-24	25-34	35-54	55+
Grew up in the neighbourhood	28	18	21	13
Close to Workplace	16	24	19	14
Studying in Neighbourhood	17	3	1	0
Close to partners Workspace	1	7	6	5
Close to cultural activities/entertainment	6	9	4	3
Close to family/friends	26	32	12	27
Cost of Housing	20	30	30	28
Public transport	8	15	13	16
Close to Good Schools	2	8	13	8
Close to local shops	7	7	10	12
Safety and Security	11	9	17	17
Quality of environment	7	8	11	15
Close to countryside/Greenspace	7	11	20	30
Size of available housing	12	14	21	29

Why do individuals choose to live where they do..if in fact it is a choice? Push/Pull factors.

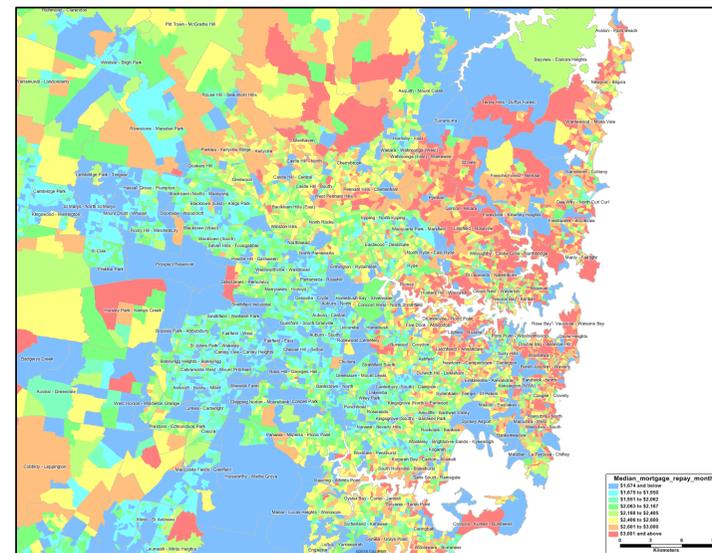
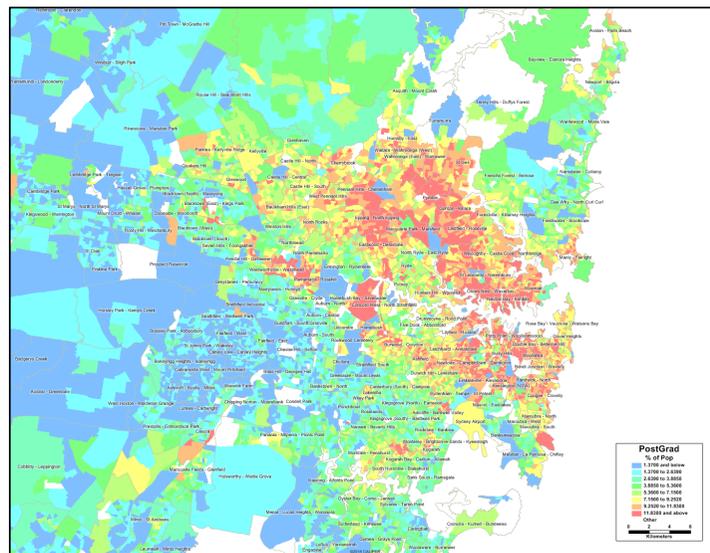
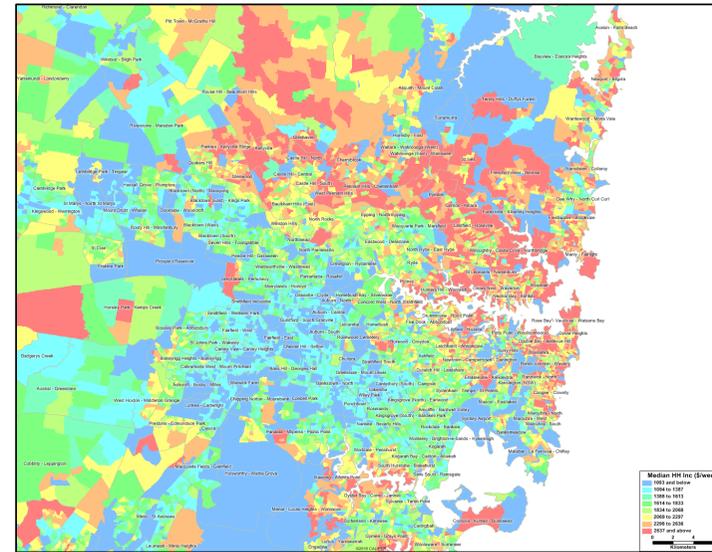


The first law of geography – ‘Everything is related to everything else but near things are more related than those far apart’ – Waldo Tobler, 1970
– or to the statistician – “spatial autocorrelation”

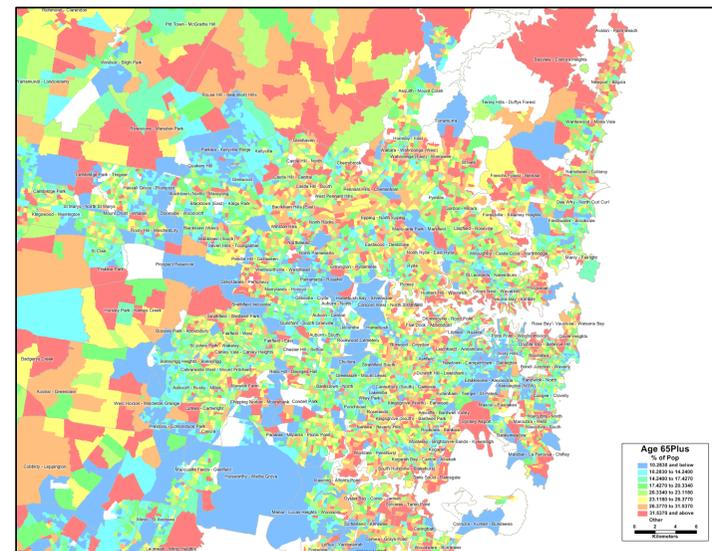
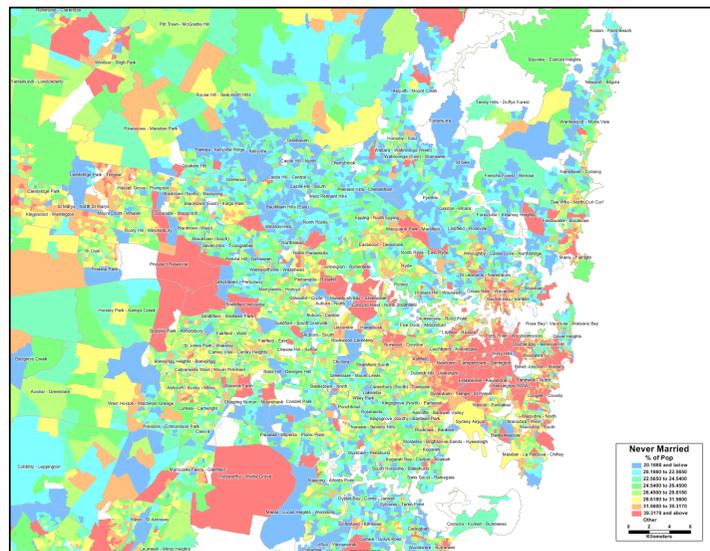
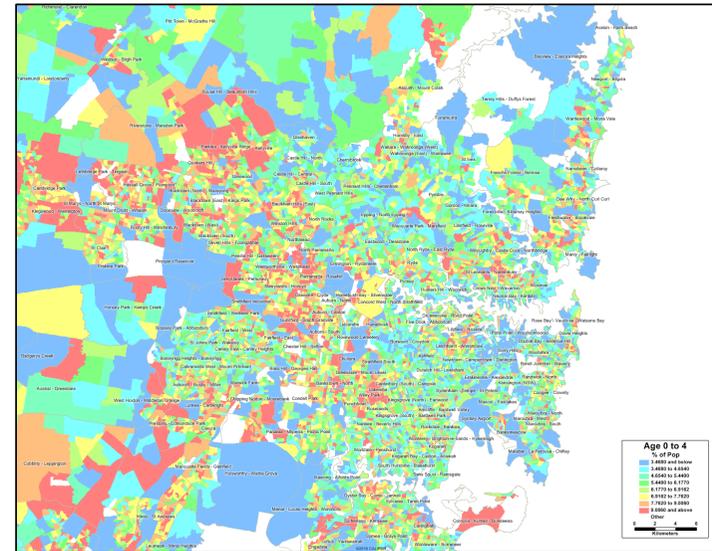
Impact of Urban Push-Pull Factors based on Friends and Family



Impact of Urban Push-Pull Factors based on Income and Education



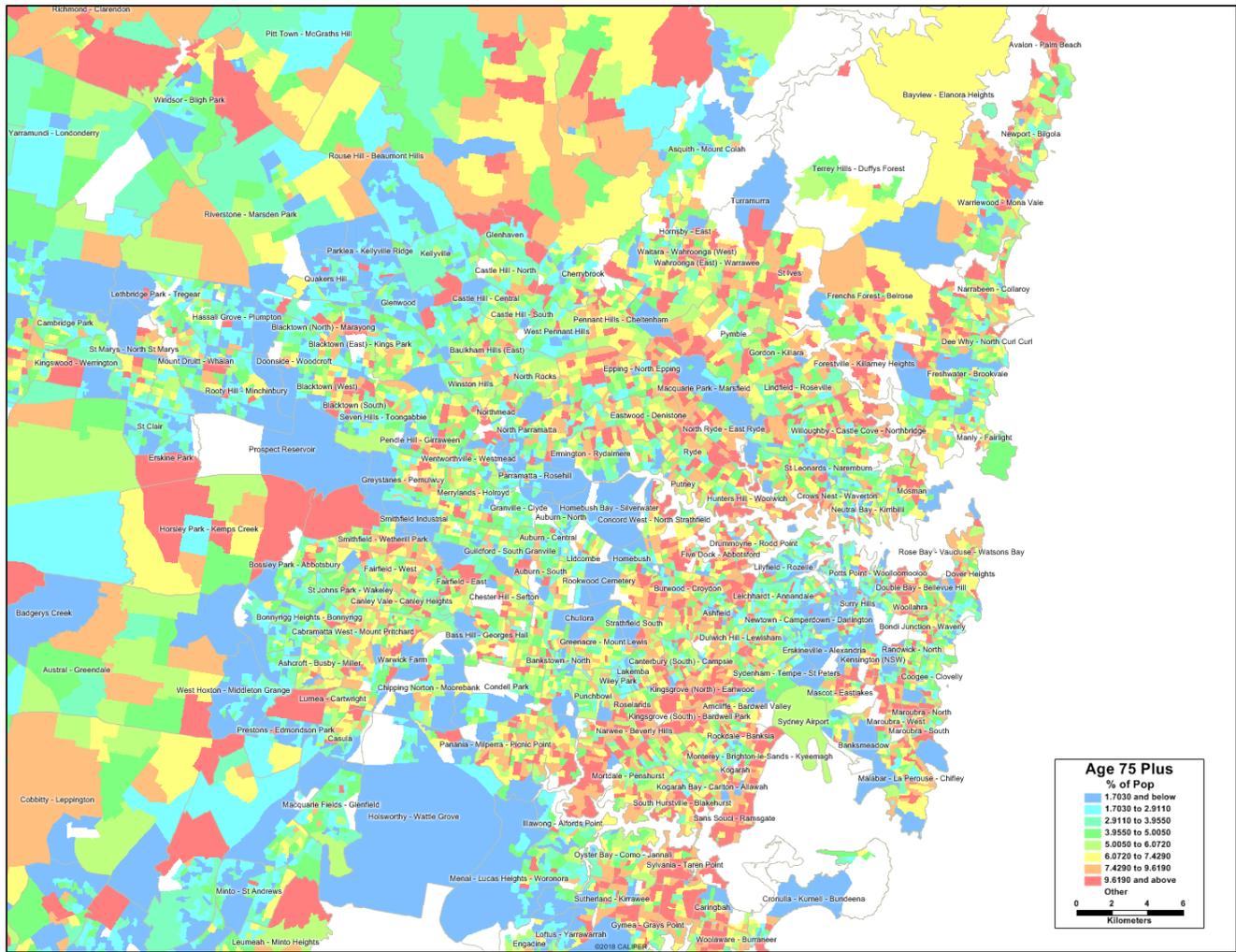
Impact of Urban Push-Pull Factors based on LifeStage



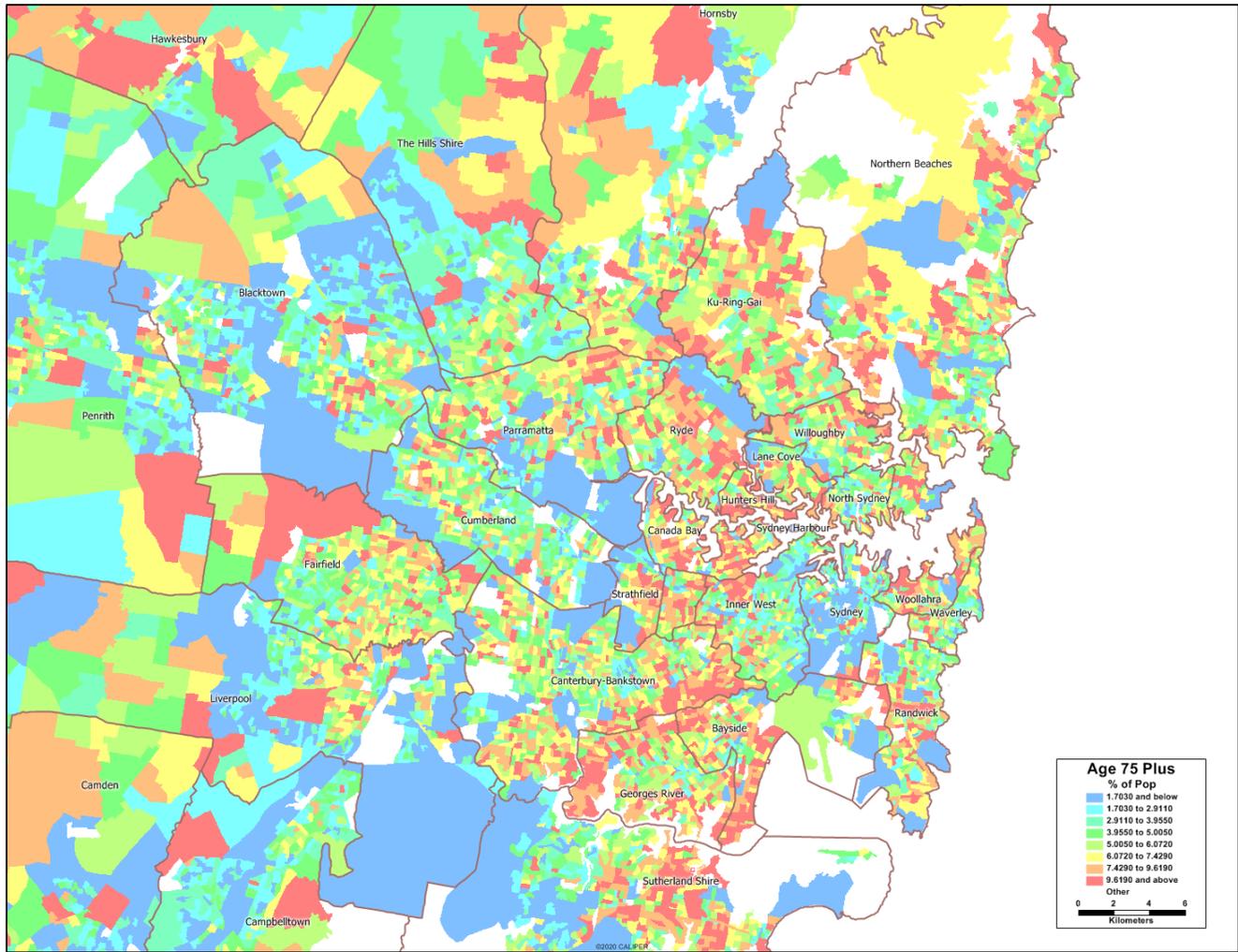
Older Australians

Key Notes

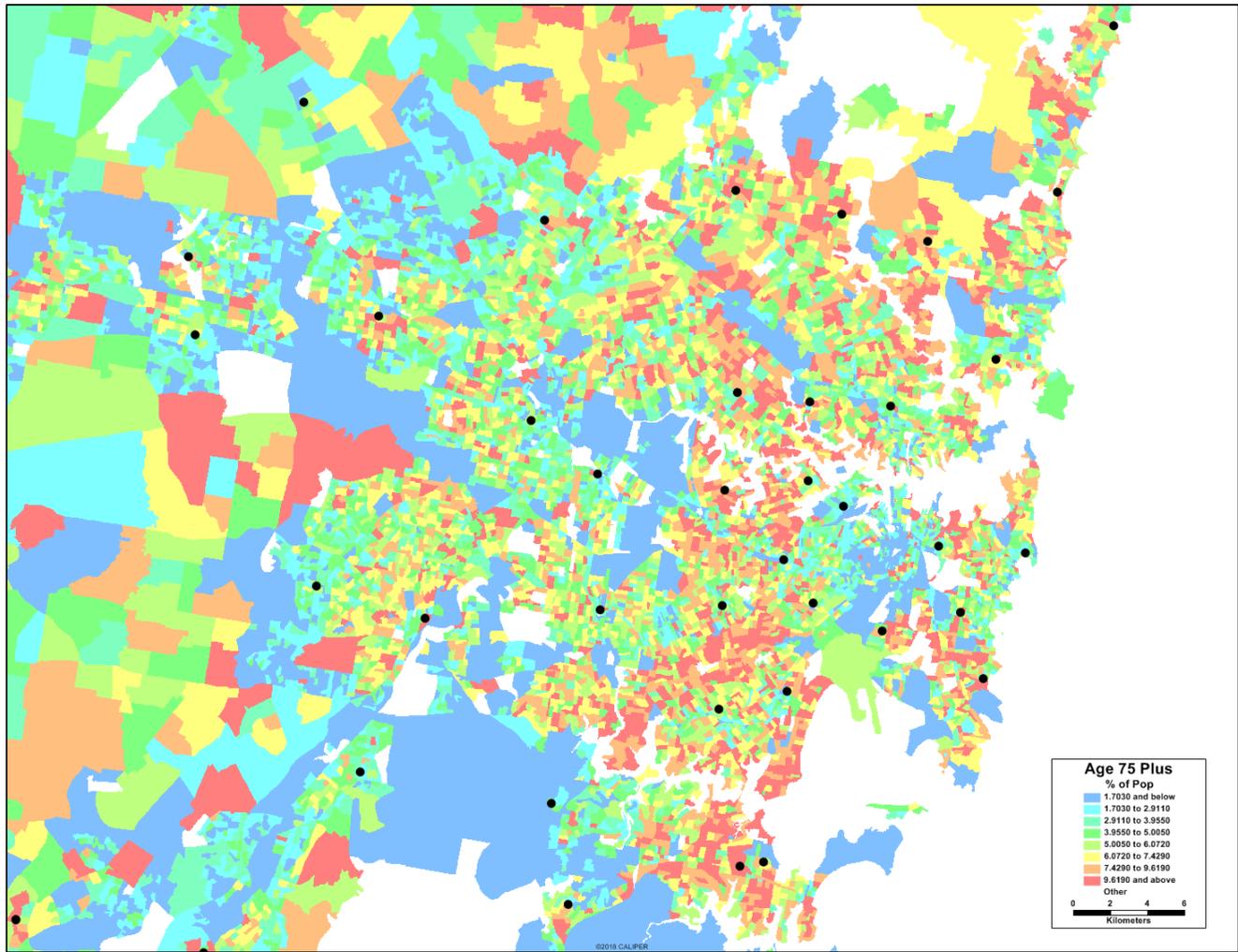
- *Seek independence and security*
- *Prefer to age in place, even if their home is too big for their needs*
- *Options may include integrated housing and care such as residential aged care, retirement villages which have shown dramatic growth in recent years.*
- *Some older Australians (~15%) are renting – generally a highly vulnerable and economically disadvantaged*
- *Lack of affordable downsizing options for older Australians – economic situation aggravated by bureaucracy and redtape.*
- *Residential aged care slowly transforming to end of life care services. Average tenure is 3 years.*
- *Many older people reluctant to plan or get advice about transitions and decisions are initiated by crisis or vulnerability.*
- *Home care aligns with governments fiscal policy. Home care is fare cheaper than residential aged care.*
- *Wealth is in the family home and remains an untapped source of retirement income. Many still engage in precautionary savings which lowers the standard of living in old age.*
- *Most older Australians on low incomes could improve their standard of living by drawing on their home equity, but there is a reluctance to tap into home wealth and strong aversion to debt.*



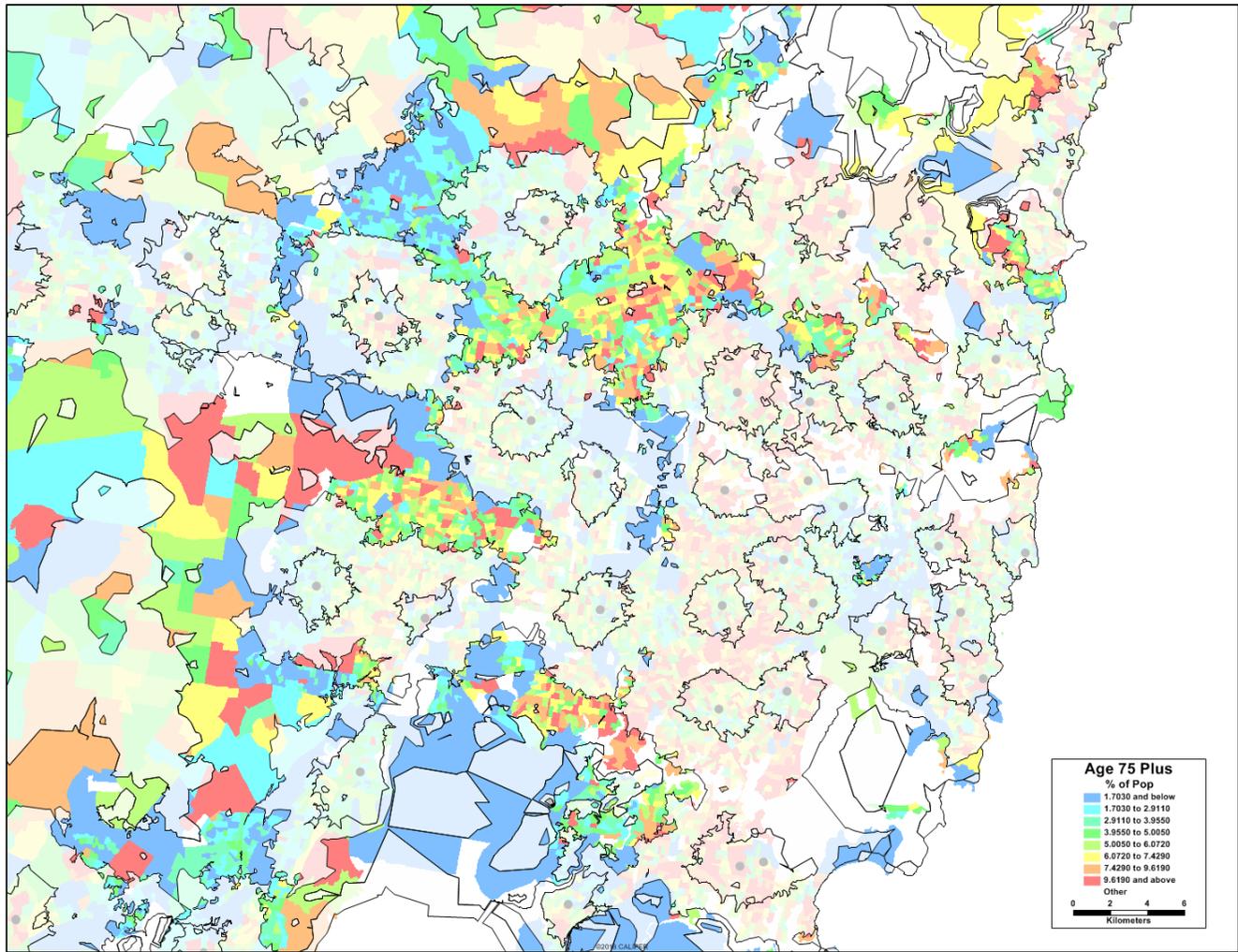
Distribution of Pop Age 75 Plus x SA1 – Sydney Region



Distribution of Pop Age 75 Plus x SA1 x LGA – Sydney Region

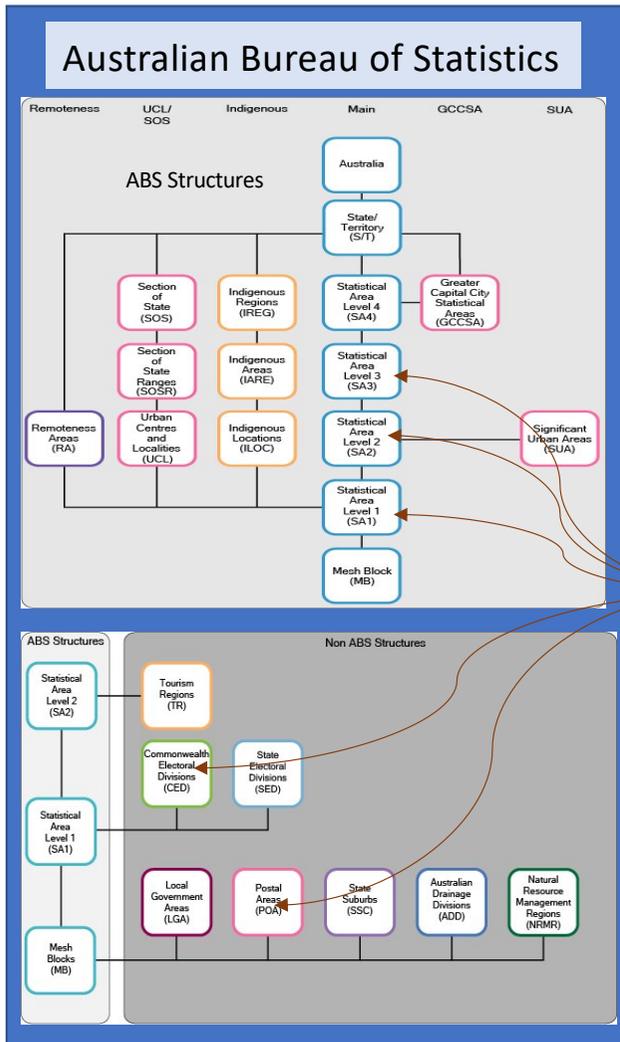


Distribution of Pop Age 75 Plus x SA1 x Ambulance Stations – Sydney Region



Distribution of Pop Age 75 Plus x SA1 x Ambulance Stations x Drive Time Greater than 10 minutes – Sydney Region

A very limited list of unlimited existing data sources – Spatial Files



State Govt – Dept of Health
 (LHD)-Digital Files – varies according to state

Aus Govt – Dept of Health
 Primary Health network (PHN)
 (PHN)-Digital Files
 (PHN)-Concordances
 Districts of Workforce Shortage for GPs
 Areas of Socio-economic Disadvantage

Dept of Industry, Science, Energy Resources - Geoscape

- Geocoded national address file
- Administrative boundaries –
- Local government areas
- Suburbs
- Wards
- Town Points

Australia Post

- Postcode boundaries
- Suburb x postcode

Bureau of Meteorology

- Weather stations

A very limited list of unlimited existing 'external' data sources with a spatial record – Attribute files

Australian Bureau of Statistics

Census 2016

- Community tables 59 tables x 7500 variables.
- Customised tables service
- Time series at the SA2 level

Building

- Approvals
- Building activity
- Demolition approvals

Business Counts

- X Industry x no of employees
- X industry x turnover (cohorts)

Demographic trends

- Deaths x cause
- Birthrates
- Marriages and divorces

Motor Vehicle Census

- Vehicle x make and model

AIHW

Population projections and forecasts x SA2

Dept of Social Security

Payments x Type (age pensions, jobseeker etc.)

Agricultural census

- *Production x classification*
- *Land use*
- *Use of fertilizers*
- *Use of pesticides etc.*
- *vegetation*

Police Dept

- Criminal activity and outcomes

Bureau of Meteorology

- Rainfall
- Temperature x time of day

A very limited list of endless research or tables that provide data that could be modelled to the small area

Australian Bureau of Statistics

Microdata

National Health Survey
Aboriginal and Torres Strait Islander Social Survey
Disability, Ageing and Carers
Participation in Cultural Events
Family Characteristics
Mental Health and Well Being
Mortality
Nutritional and Physical Activity
Sports and Physical Recreation
Work-related injuries
Work-related Training and Adult Learning

AIHW

Alcohol
Domestic and Sexual Violence
Illicit Use of Drugs
Physical Activity
Smoking etc.

Hospital statistics

- *No of beds*
- *No of staff*
- *Facilities*
- *Patient nos x demographics*
- *Patients x care required*
- *Patient x medication x treatment*
- *Injuries x type x time*

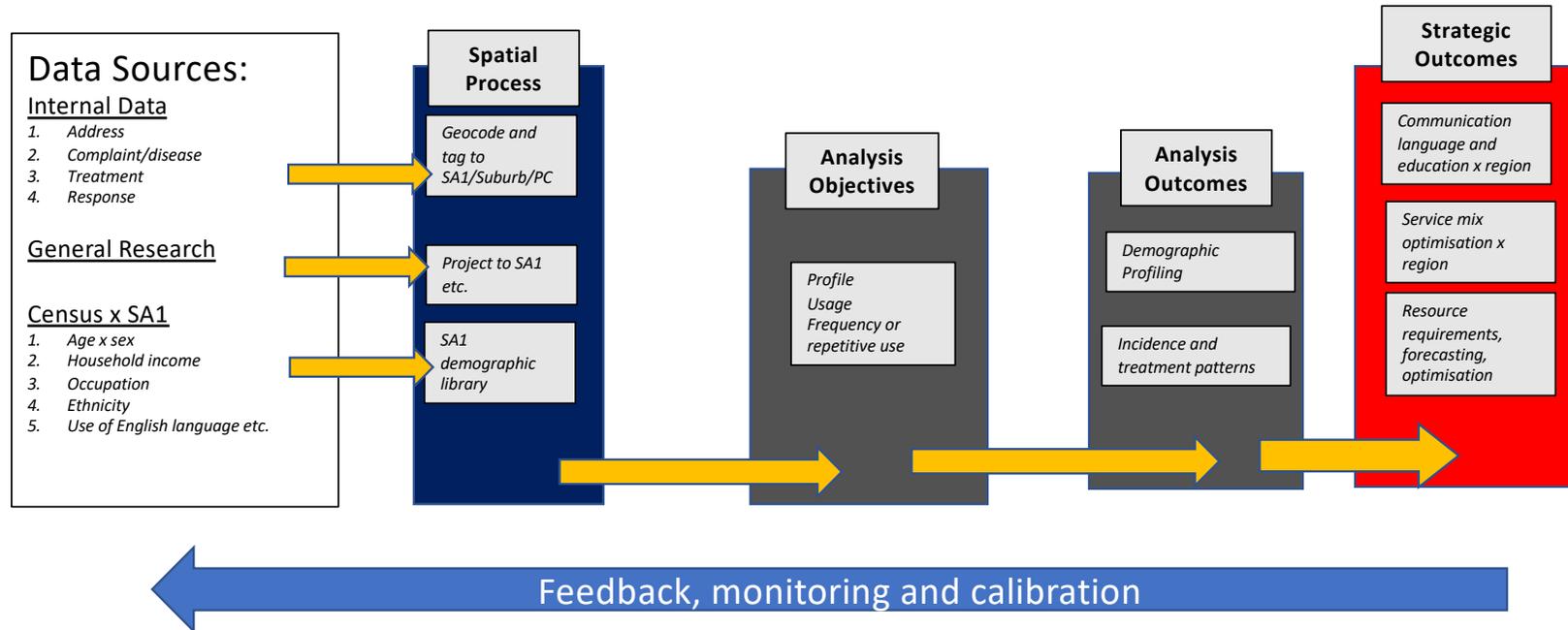
Internal Surveys/Research

- *Objective*
- *What was collected?*
- *Meta-analysis – what else can we use the data for?*

Working with Addresses

- Geographic National Address File allows us to assign a lat/lon coordinate to an address and map it.
- That address can then be tagged to any other geographic feature, such as SA1, LGA, PHA etc. etc.
- Alternatively, if privacy/confidentiality is an issue, then the address can be tagged to an SA1 and the SA1 used for analysis.
- Or analysis can be done by accessing a lower resolution geography such as suburb or postcode.

Data Fusion and Tagging



Predicting Probability that your neighbour will have a heart attack

Step 1

Step 2

Step 3

Step 4

Data Source

1.1 National Health Survey
1.2 Australian Institute of Health and Welfare

2.1 ABS Business Counts x Small Area
2.2 Australian Census

3.1 ABS Census Boundaries
3.2 State and Federal Electoral Boundaries

4.1 Outcomes

What's Missing

Objective

Model Probable Incidence

1.3 Use the NHS and AIHW (other?) surveys to build a probability model for heart attacks. Explore the key indicator demographic variables such age, sex, socio-economic profile, ethnicity etc.

2.3 Use the incidence model from 1.3 and project **probable incidence at the place of residence** small area level using the Australian Census Data

2.4 Use the incidence model and the census data to identify probable age distributions x industry and project **probable incidence by place of work.**

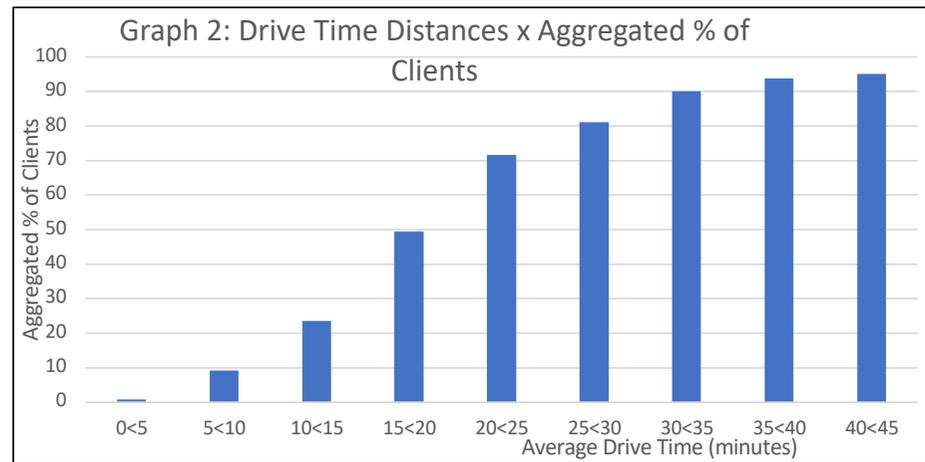
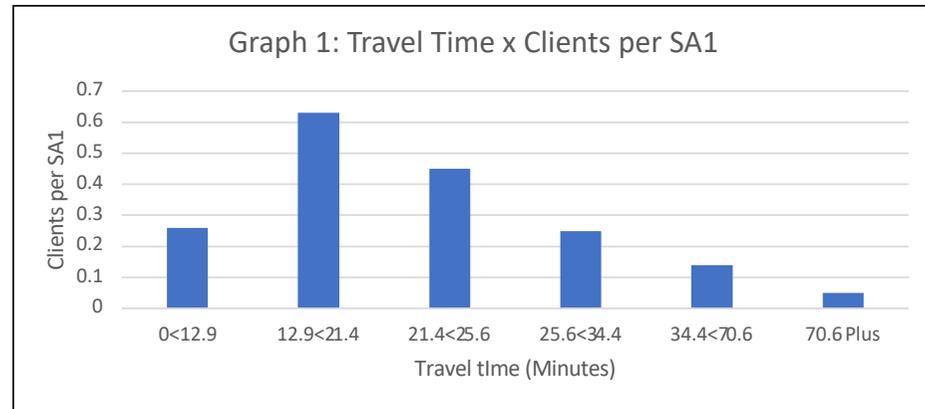
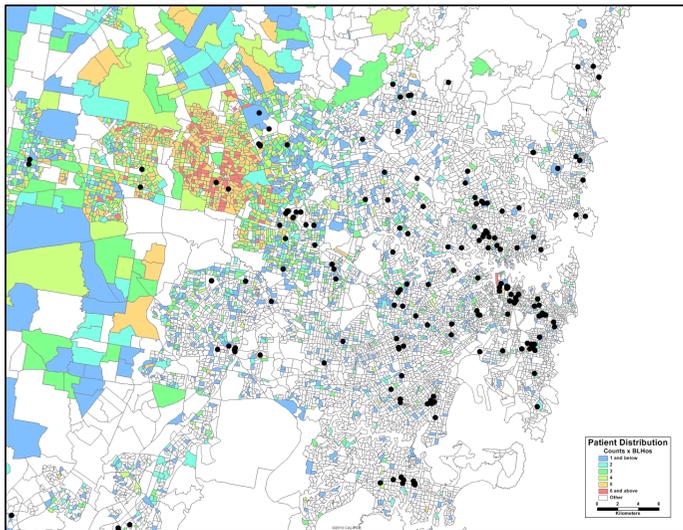
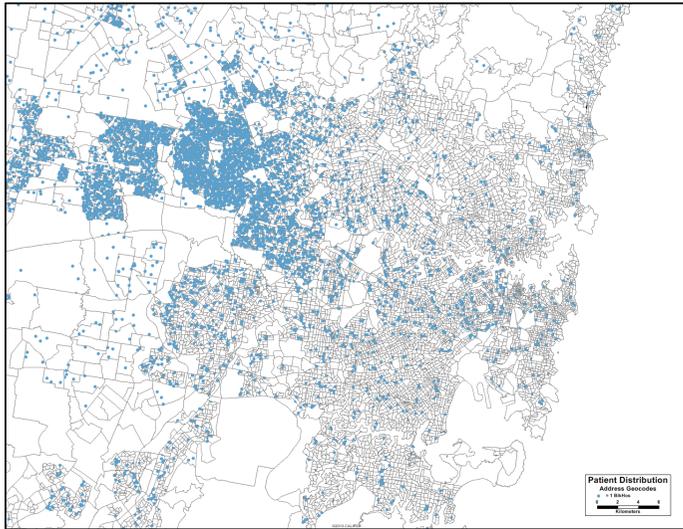
3.3 **tag modelled data to census geography** to build a likelihood of heart attack index for every SA1, SA2, Suburb, Local Government Area (as required)

3.4 **tag modelled data to electoral boundaries**

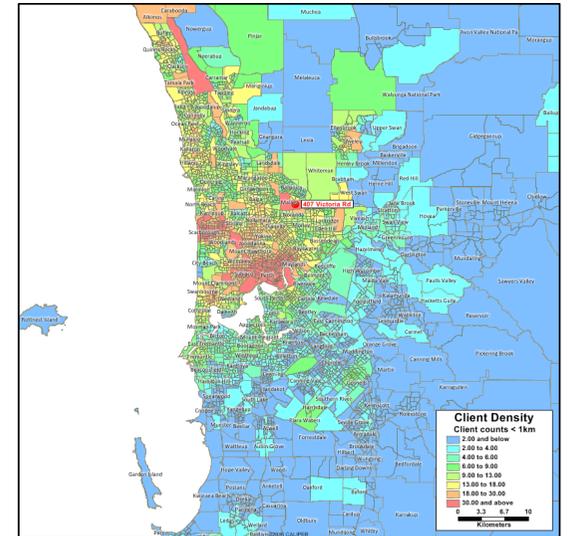
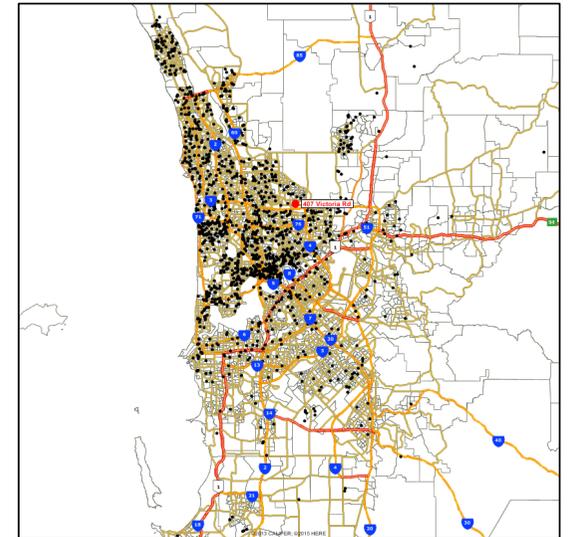
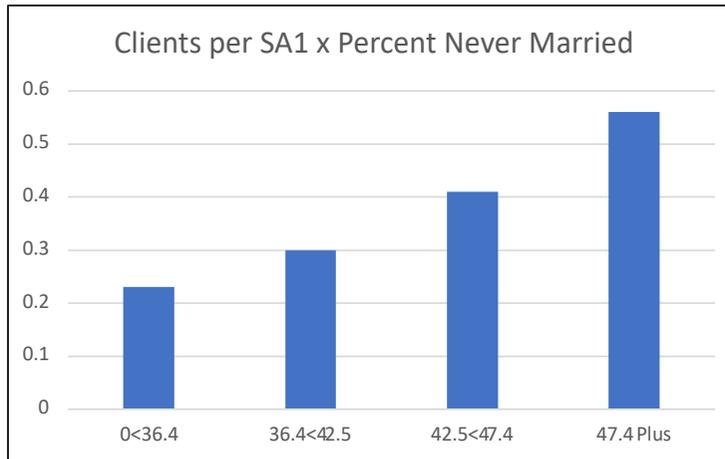
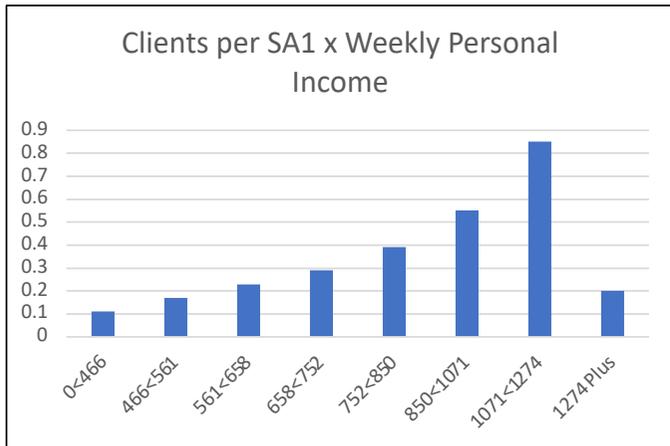
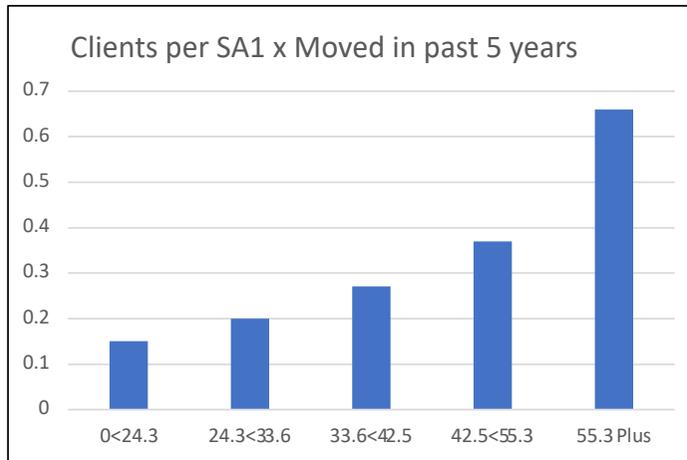
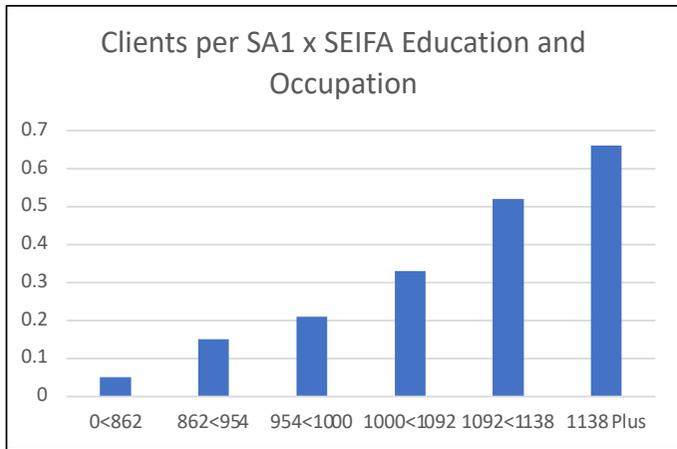
4.2 Interactive mapping system that will allow users to quantify the likelihood of having to confront a heart attack within their suburb or place of work
4.3 Restructure data sources from 1.1 and 1.2 to give users an interactive tool for exploring relationships between heart attack and demography
4.4 Communication and PR Opportunities (to be determined)

How many defibrillators are there by region/address?

SA1 Used for Analysing Trade Area and Area of Influence – the importance of distance



Knowledge from 'fused' data



How I Use Dashboards

3 general applications

1. Updating and reviewing from regularly collected data – this could be an organisation's patient information which details ailment, treatment, results, some personal demographics, services and facilities used, length of treatment, result of treatment. Every patient is treated and the data appended live, daily, weekly etc. e.g National Health Survey
2. Ad hoc research, involving single data collection such as a survey or piece of research. Usually a single data source or limited collection period.
3. As a “knowledgebase”. Multiple data sets from multiple sources, the data is not necessarily linked but will provide insights into a theme or subject. E.g Offensive Language Project

Demos

- National Health Survey Time Series
- Prevalence-Fusion of Demographics, Forecasts and Spatial Distribution
- Offensive Language – Multiple data sets – often unlinked