SUMMER RESEARCH 2024/25
PROJECT ABSTRACT

THE UNIVERSITY OF WAIKATO
Te Whare Wānanga o Waikato

PROJECT # 5

SUPERVISOR/S:	Dr Jesse Whitehead & Marcus Blake
PROJECT TITLE:	Developing a 'live' map of spatial access to health services
FIELD:	Population Studies; Geospatial Information Systems; Computer programming; Health Geography
DIVISION/SCHOOL:	Te Ngira Institute for Population Research
PROJECT LOCATION:	Hamilton (Hybrid)
EXTERNAL PARTNER:	Braemar Charitable Trust

PROJECT ABSTRACT:

Equitable access to health services is an important issue, especially for priority populations, such as Māori, Pacific people, and Rural populations (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10454131/ ; https://www.health.govt.nz/publication/rural-health-strategy ; https://www.rnz.co.nz/news/te-manu-korihi/478616/maori-in-rural-new-zealand-further-from-good-healthcare-researcher).
Generic models of service accessibility tend to under-estimate travel times for rural (and especially remote) populations who live in areas with road networks that are more vulnerable to disruption. This can be caused by extreme weather events, road crashes, or routine maintenance that closes or significantly slows sections of road for long periods of time - often with no alternative routes available. High quality data is needed to make evidence-informed decisions about how to improve services accessibility, leading to more equitable outcomes. This project will directly contribute to an improved understanding of access to health services across the Waikato and wider Manawa Taki community. It will build on the co-supervisor's work to rapidly estimate health service accessibility and focus on incorporating up-to-date information about the condition of roads (speed, disruptions, and closures) into these models. This will give a more accurate and nuanced picture of service accessibility that can be used to support better decisions about where and how health services are delivered.

STUDENT SKILLS:

- Data collection & validation (especially geospatial data).
- Geospatial data processing using Python and open-source geospatial software.
- Theoretical and practical/programmatical understanding of graph theory and its application in road network applications.
- Interactive online cartography skills using Esri ArcGIS Online technologies.
- Poster-making and presentation skills.

PROJECT TASKS:

1. Collect and validate datasets (~2 weeks)
2. Within the Manawa Taki Health Region collect and validate the following datasets:
    - Road speed data for the calculation of time
    - Road closure updates from national (Waka Kotahi) and local (district and regional councils) sources including the following information:
    - Time taken for roads to partially or fully open.
    - Direction of road closure and opening.
    - Health facilities, including both public and private services.
    - Location of services
    - Opening hours
    - Services provided (where data is available)
    - NZ Street Address locations (including residential flags).
3. Data Processing (~2 weeks)
4. Integrate road speed and road closure data into 'spatial accessibility' code that has been developed by the co-supervisors.
5. Re-run this spatial accessibility code, with roading condition information, to highlight how access to services varies when road conditions are considered.

7. Examine equity of access to health services, and the impact of road closures on equity by:
    - Quantifying average time to health service overall and for "high-risk populations" under 'normal' conditions.
    - Quantifying average time to health service overall and for "high-risk populations" when road closures disrupt access.
    - Quantifying the extent of disruption for priority / "high-risk" populations
8. Validation of Results (~2 weeks)
9. Check results for anomalies.
10. Fix any issues with code or input datasets.
11. Preparation of results for dissemination (~3 weeks)
12. Summarise key findings
13. Prepare a poster outlining background information, methods, results, limitations, and implications of this research
14. Prepare a digital StoryMap with interactive maps that supplements the static poster
15. With support of the project supervisors, prepare conference abstracts for the National Rural Health Conference (Christchurch 2025) and FOSS4G Auckland (2025)
16. Research dissemination (~1 weeks)
17. Present poster at the Waikato University Summer Research Scholarship Poster event
18. Present research (either as a poster, lightening talk, or short oral presentation) at the National Rural Health Conference (Christchurch, 2025) and FOSS4G (Free and Open Source Software for Geospatial – an international conference) to be held in Auckland in 2025.
19. NB: This will take place after the Summer Research Scholarship program has been completed, but supervisors will support the successful student to attend and present at this conference.

EXPECTED OUTCOMES:

- Student's Research Poster (as per clause 6 of the Scholarship regulations)
- A demonstration dataset of time-based access to health services for the Waikato and Manawa Taki regions.
- In future these data could be confidentially linked within the Te Whatu Ora or Braemar Charitable Trust systems with health outcome data to better understand the accessibility challenges of patients using public and private health services in our community.
- Equity analysis:
    - Identification of address locations which have the least spatial access to health services
    - Identification of address locations which had the greatest change in access to health services as a result of changing road conditions
    - Identification of sociodemographic differences in spatial accessibility using area-level datasets
- Digital StoryMap:
    - Develop a digital StoryMap which visualises findings in an online, interactive format
- Conference Abstract:
- Prepare a conference abstract for FOSS4G Auckland (2025) and the National Rural Health Conference (2025). These will outline a brief summary of the research including:
    - Background
    - Methods
    - Results
    - Limitations
    - Conclusions