

Towards a more dynamic health geography. Tracking and tracing daily movement and exposure

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The story so far... in maps and numbers

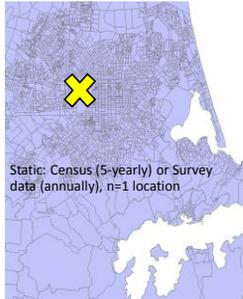


- From 'static' to 'dynamic' exposure – moving beyond the 'home'
- Linking this for each person/patient in time and space to see if patterns or relationships emerge and the extent of differences
 - By **person** or for the **population**
- Collecting location data from two sample groups
 - COPD patients (CRCSI/FPX) [limited-movers?] and with
 - Geography students (UC) to help teaching dynamic / static differences [maximum-movers?].
- Ongoing study in NZ and SWEDEN



My risk 'profile' over a year





Static: Census (5-yearly) or Survey data (annually), n=1 location



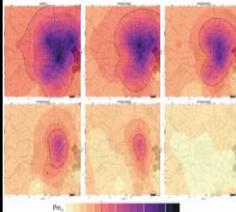
Dynamic: real-time place + exposures
n=525,600 per year @ 1min intervals



Real time 'risk': spatio-temporal dynamics

- Accurately assigning exposure
- How do environmental conditions alter as one moves around the city?
- 'Person X' knows **when and where** pollution is higher + **almost real time**

Dynamic (n=20-30 stations)

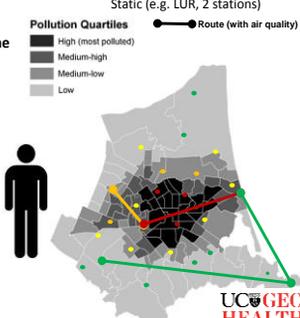


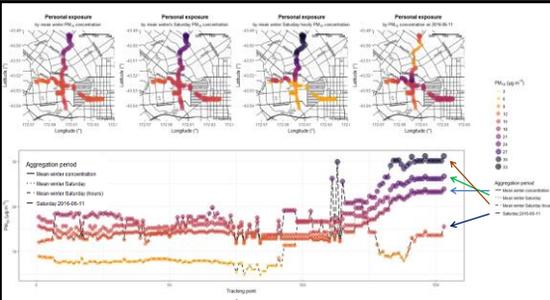
Static (e.g. LUR, 2 stations)

Pollution Quartiles

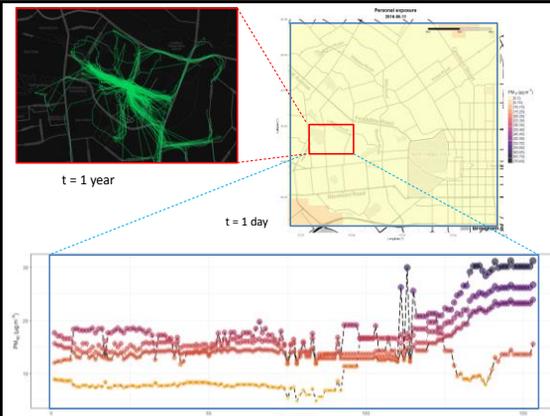
- High (most polluted)
- Medium-high
- Medium-low
- Low

Route (with air quality)



- How interpolation, averaging / method affect the result
- Winter (average), winter (daily), winter (hourly), winter (by minute)

t = 1 year

t = 1 day





Scaling up – student tracks

- Are there home versus daily exposure differences for individuals and groups? How large might this effect be?
- Results are mixed (and student generated...)
- Some preliminary descriptive results (table)
- Small differences in NO2 exposure (1 home, 1 carried) of 0.7ppb
- Reasonable differences in static or dynamic exposure to greenspace and roads (-11.5%, -7.5%)

Exposure Variable	NO2 (Static)	NO2 (Dynamic)	Greenspace (Static)	Greenspace (Dynamic)	Roads (Static)	Roads (Dynamic)
	9.9ppb	10.6ppb	34% E	22.5% E	18% E	10.5% E
			66% NE	77.5% NE	82% NE	89.5% NE

E = Exposed, NE = Not Exposed



Conclusions

- Tricky, high effort, never do this.... (particularly challenging for vulnerable patients who have never using a smartphone / internet)
- Reasonably expensive and resource intensive (but changing over time) – still a significant barrier
- However, early indication is that potentially significant differences in exposures which could impact on individual and population health
- Potential to expand approach to other disease or well-being areas of research? [comments appreciated]



Next Steps / Future Work

- On-going data collection in SWE (close to 30 patients)
- Second round of tracking in CHCH, NZ (aim to recruit 30)
 - Both patients (n=30) and Citizens (n=30)
- Personal (real time) air exposure collection (TZOAs)



Partners / Funders



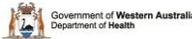
future position
18° 46' 17" South
177° 00' 11" East
213 1741 90 200



Canterbury District Health Board
Te Pōari Hauora o Waitaha



Land Information New Zealand
tāhū te whenua



Government of Western Australia
Department of Health



CRC·SI
Spatially Enabling
Australia and New Zealand



Australian Government
Department of Industry



Business Cooperative Research Centres Program

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Questions?



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- We also have post-doctoral / phd / masters opportunities if you (or anyone you know) may be interested in joining us in NZ

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