The Locally-Specific Impacts of Alcohol Outlet Density in the North Island, New Zealand

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Acknowledgements

- Co-authors: William Cochrane (University of Waikato), Craig Gordon (HPA), Michael Livingston (University of NSW)

- Commissioned and funded by: HPA (originally ALAC)

- Research Advisory Group: Mariska Wouters, Murray Clearwater, Eva McLaren and Giselle Baretta

- Luke Smith, Lhani Voyle, Omoniyi Alimi, Luke Holland, Emma Coker, William Mangos, Andrew Gentle, Luana Dow, Bob Stewardson, Ashleigh Cox and Emily Geck for their help with geo-coding and verification of the spatial data, and Francisca Simone for timely Geographic Information Systems (GIS) assistance in analysing and mapping the data

Background

- The Sale and Supply of Alcohol Act 2012 gives local bodies the opportunity to develop Local Alcohol Plans

- More information on the locally-specific impacts of liquor outlets is needed

- This research goes some way towards addressing that need

- It follows earlier work conducted by Cameron et al. in Manukau City

The existing evidence base

- Inconsistent associations between outlet density and alcohol-related effect

    - 'Availability theory', on which most research is based, is contested because of the inconsistent evidence

    - Proximity and amenity effects may be a better characterisation

- Generally, outlet density is positively associated with alcohol-related harms (violent and other crime, motor vehicle accidents, hospitalisations, etc.), BUT

    - Varies with type of outcome, outlet type and context

- Growing body of NZ research

    - Similar to general findings

    - Social deprivation is important

The North Island outlet density project

- Commissioned by HPA (originally ALAC) in March 2012

- Aims to extend the previous research on relationships between outlet density and police events and motor vehicle accidents conducted in Manukau City

  - Spatially: The whole of the North Island is included

  - Temporally: Annual average effects over the period 2006-2011 are considered

- Makes use of a relatively new spatial estimation technique, geographically weighted regression (GWR)

  - Allows the relationship between outlet density (by type) and dependent variables to vary spatially

  - Allows locally-specific relationships to be estimated

Data

- Licensing data 2006-2011 for the whole of the North Island (from Ministry of Justice)

  - Geo-coded to CAU

  - Classified by type:

    1. Licensed clubs

    2. Bars and nightclubs

    3. Other on-licence

    4. Supermarkets and grocery stores

    5. Other off-licence

- Converted to outlet density (number of outlets per 10,000 usually resident population) for each CAU

Data

- Police incidents (from NZ Police CARD database), separated into seven categories:

  - Anti-social behaviour

  - Dishonesty

  - Drug and alcohol

  - Property abuse

  - Property damage

  - Sexual

  - Violence

- Motor vehicle crashes (from the NZTA CAS database)

- Converted to density (number of events per 10,000 usually resident population) for each CAU

Data

- Two control variables:

  - Population density (persons per sq kilometre) per CAU

  - New Zealand Deprivation Index for each CAU

- Some adjustments were made to the CAU map, to ensure adequate population size for calculating densities

  - 132 CAUs amalgamated (small population size)

  - 12 excluded (marinas, ports, harbours, etc.)

  - Final spatial model includes 1172 CAUs (including amalgamations)

Methods

- Geographically weighted regression

    - Uses a distance-weighted sub-sample of observations to produce an estimate for each target CAU

    - The sub-sample we employed was the 30 nearest neighbours

    - Each neighbour weighted by distance to target CAU

    - Balancing observed 'local' differences, estimate precision and weak data

- Two outputs

    1. A global model (based on OLS) which summarises the 'average effect', but doesn't take account of any locally-specific effects

    2. A locally-specific model (GWR) where the coefficient estimates vary spatially, suitable for mapping

- All coefficients can be interpreted as marginal effects, i.e. the additional number of events associated with one additional outlet of the given type

Results – Global Model

	1. Antisocial behaviour	2. Dishonesty offences	3. Drug and alcohol offences	4. Property abuses
Club density	3.197***	2.183**	0.026	0.672***
Bar and nightclub density	14.73***	13.43***	1.335***	2.395***
Other on-licence density	3.357***	4.324***	0.0004	0.779***
Supermarket and grocery store density	5.710***	9.816***	-0.170*	2.536***
Other off-licence density	-7.817***	6.994***	-0.040	-1.610***
NZ Deprivation Index	1.030***	0.642***	0.035***	0.250***
Population density	2.175***	4.655***	0.109***	0.076
Global Adjusted R^2	0.7927	0.6331	0.7133	0.6926
GWR Adjusted R^2	0.9455	0.8953	0.8806	0.9343

* Significant at 10% ** Significant at 5% ***Significant at 1%

Results – Global Model

	5. Property damage	6. Sexual offences	7. Violent offences	8. Motor vehicle accidents
Club density	1.267***	-0.031	0.853***	0.129
Bar and nightclub density	2.871***	0.321***	5.311***	0.511***
Other on-licence density	0.666***	0.004	0.557***	0.266***
Supermarket and grocery store density	3.698***	0.270***	2.901***	-1.124***
Other off-licence density	-0.816***	0.008	-0.758*	0.460***
NZ Deprivation Index	0.268***	0.015***	0.539***	-0.023**
Population density	0.308*	0.097***	0.482**	-0.781***
Global Adjusted R^2	0.6496	0.5199	0.7335	0.3412
GWR Adjusted R^2	0.8923	0.7893	0.9270	0.5040

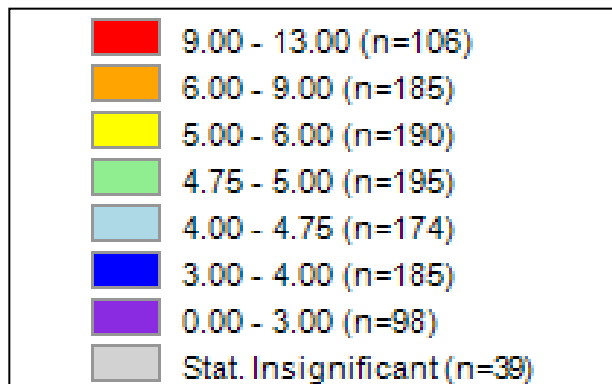* Significant at 10%   ** Significant at 5%   ***Significant at 1%
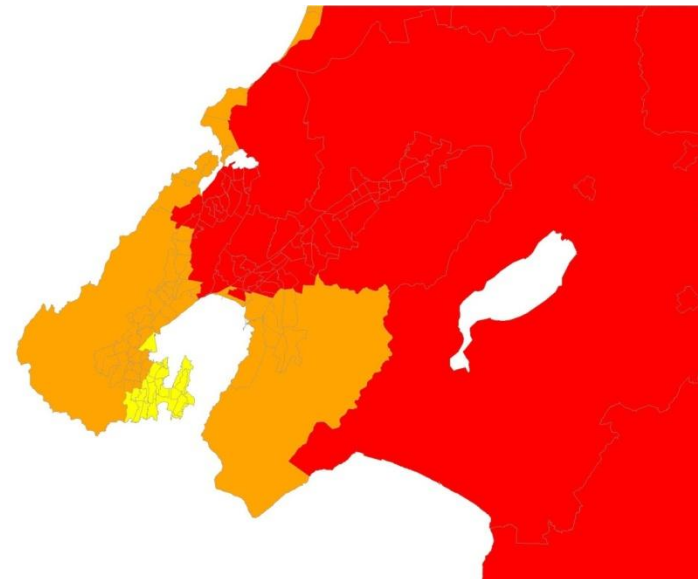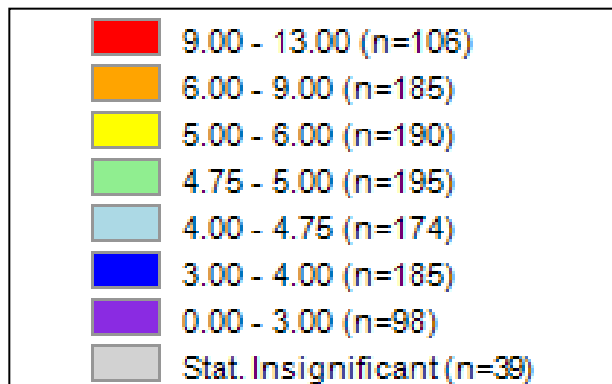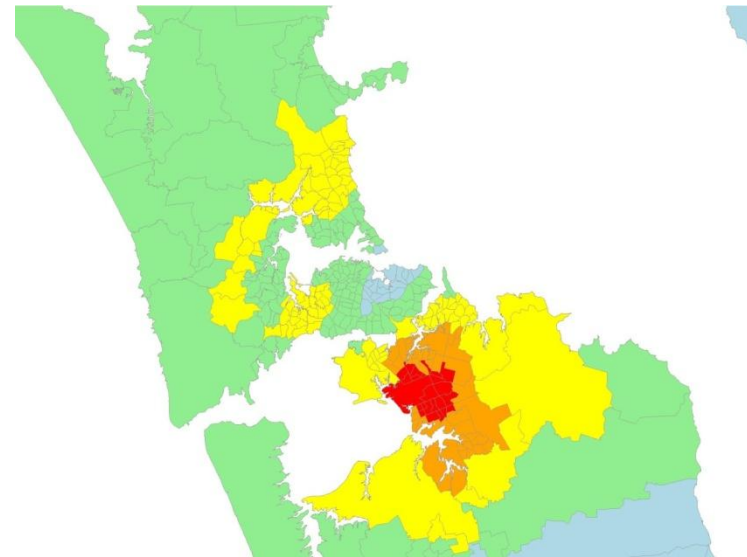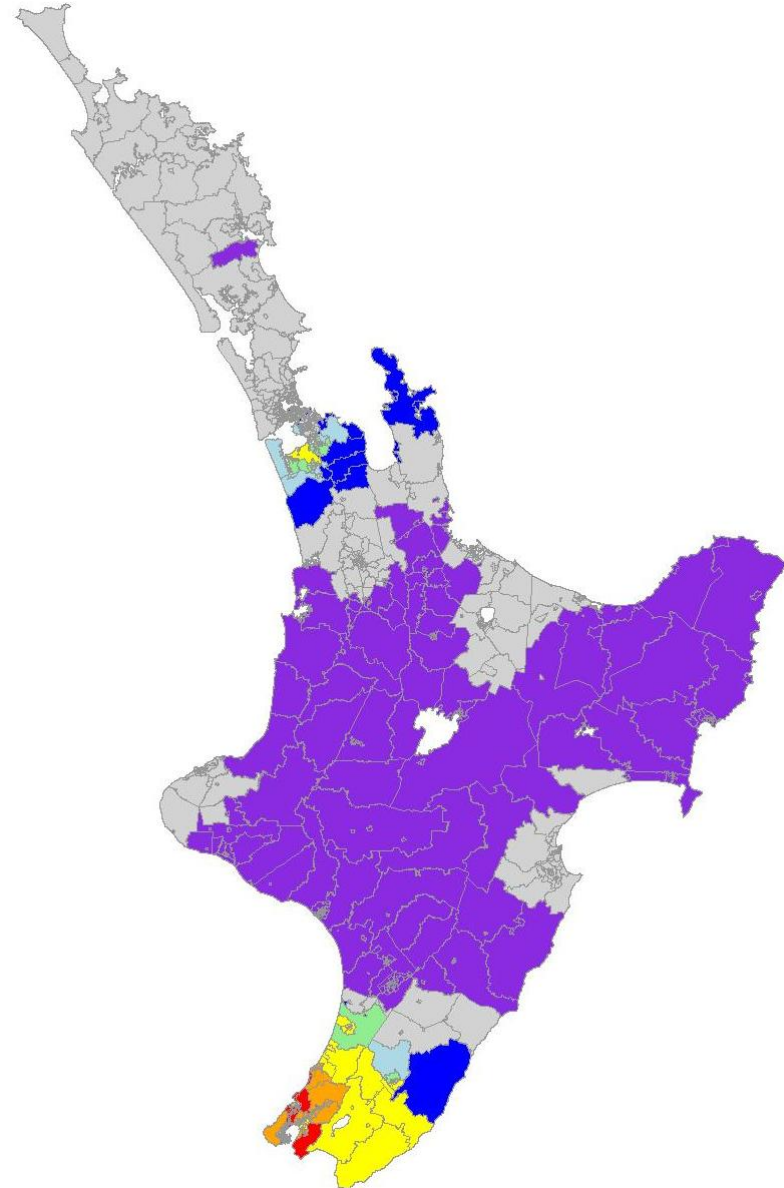
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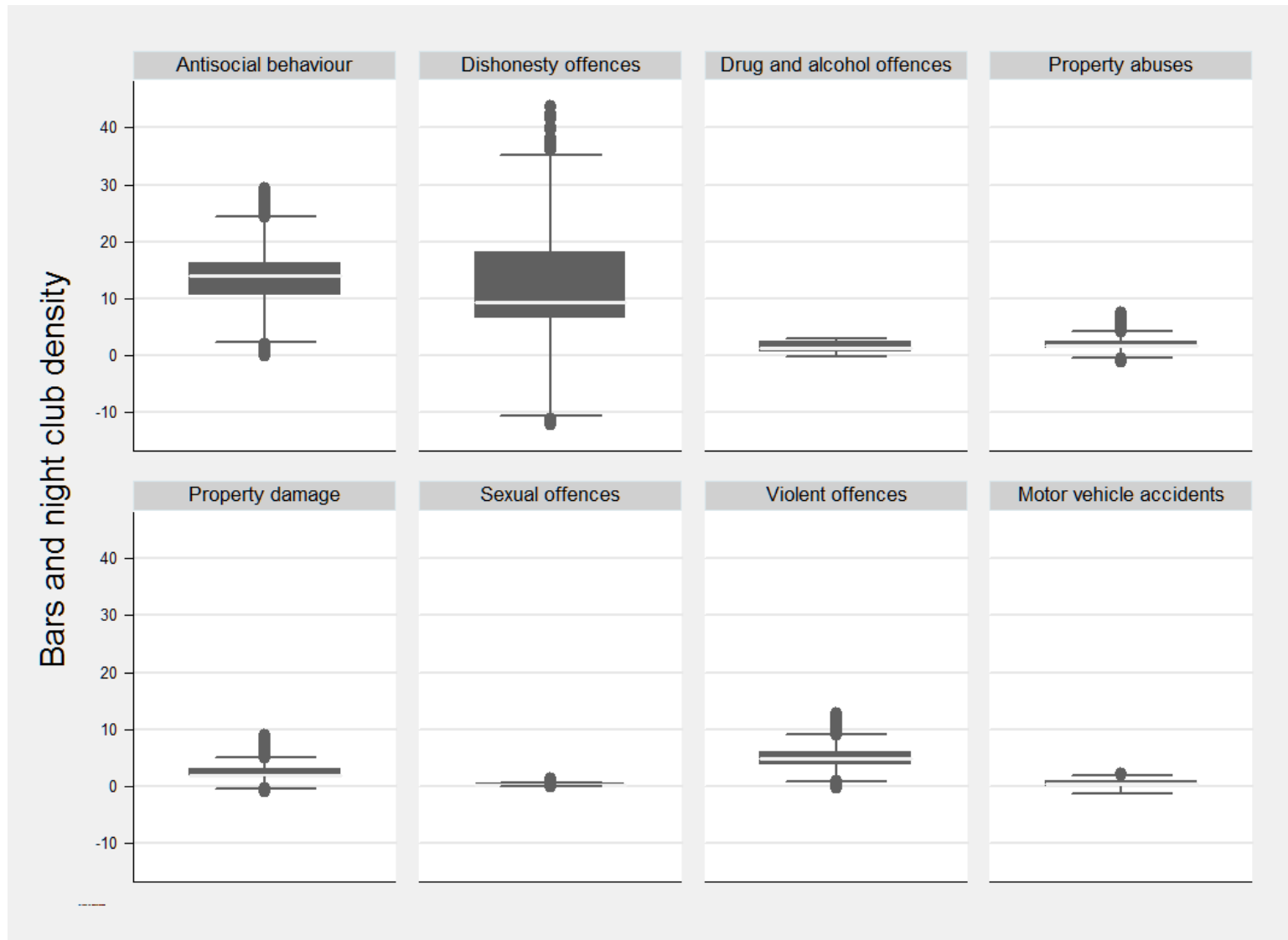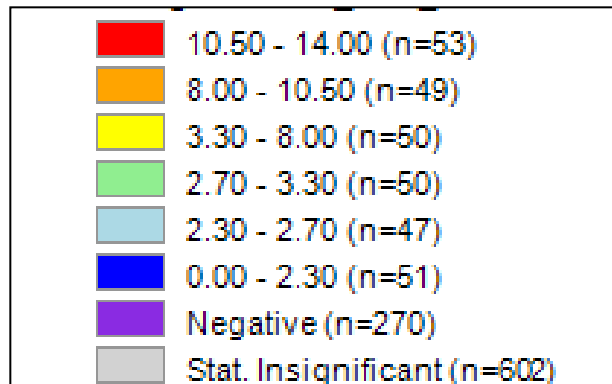
Results – GWR

Bar and night club density vs. violent offences
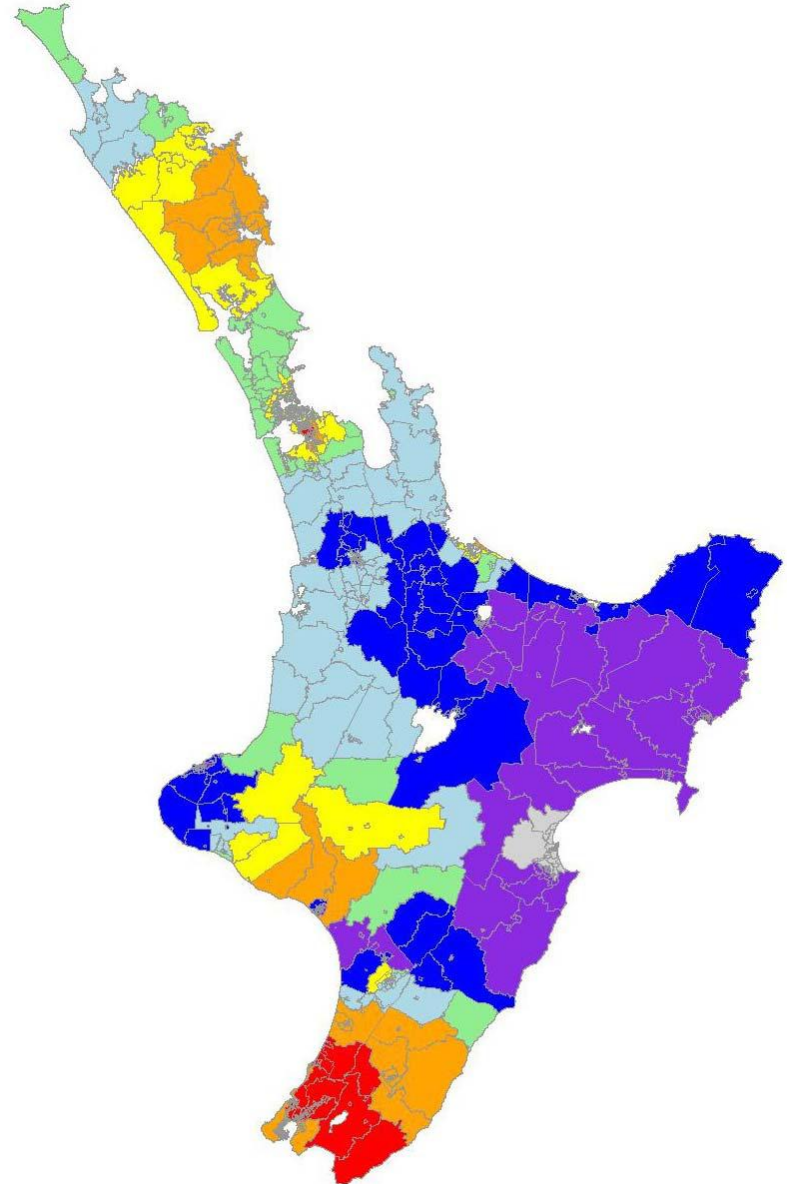
🟥	9.00 - 13.00 (n=106)
🟧	6.00 - 9.00 (n=185)
🟨	5.00 - 6.00 (n=190)
🟩	4.75 - 5.00 (n=195)
🔵	4.00 - 4.75 (n=174)
🟦	3.00 - 4.00 (n=185)
🟪	0.00 - 3.00 (n=98)
⬜	Stat. Insignificant (n=39)

Results – GWR

Bar and night club density vs. violent offences

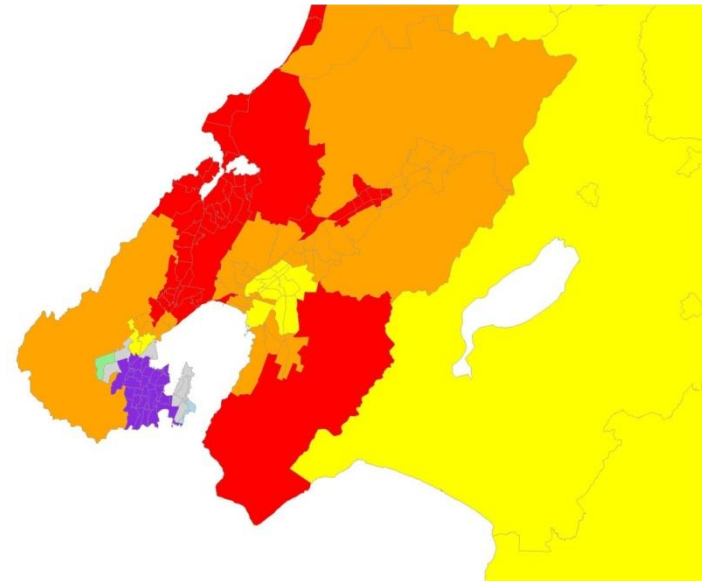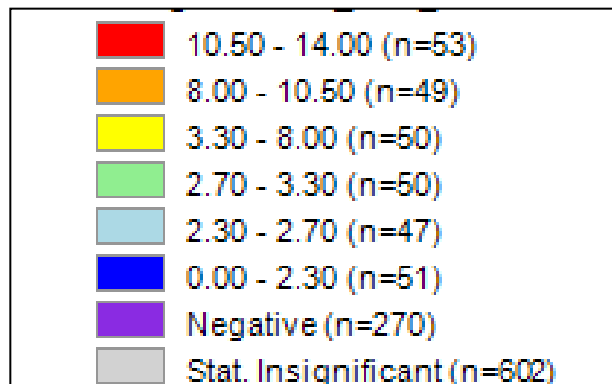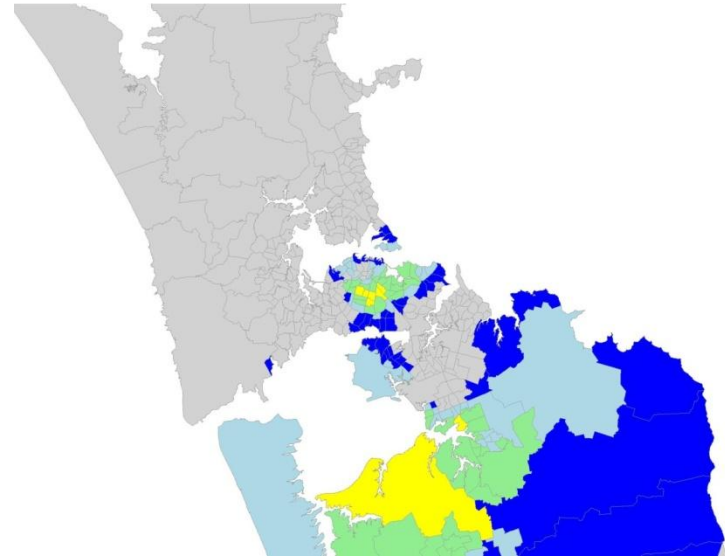|	
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⬜	Stat. Insignificant (n=39)

Results – GWR

Other off-licence density
vs. violent offences

Legend:
- 10.50 - 14.00 (n=53) — red
- 8.00 - 10.50 (n=49) — orange
- 3.30 - 8.00 (n=50) — yellow
- 2.70 - 3.30 (n=50) — green
- 2.30 - 2.70 (n=47) — light blue
- 0.00 - 2.30 (n=51) — blue
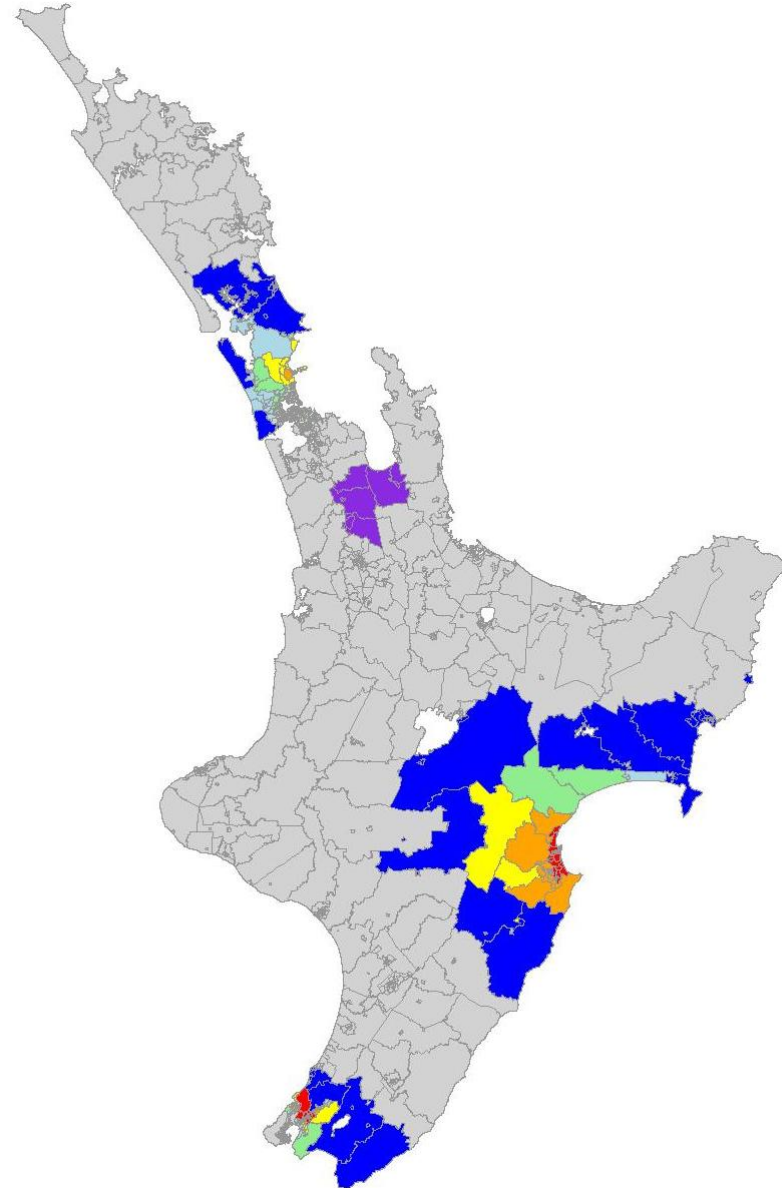- Negative (n=270) — purple
- Stat. Insignificant (n=602) — grey
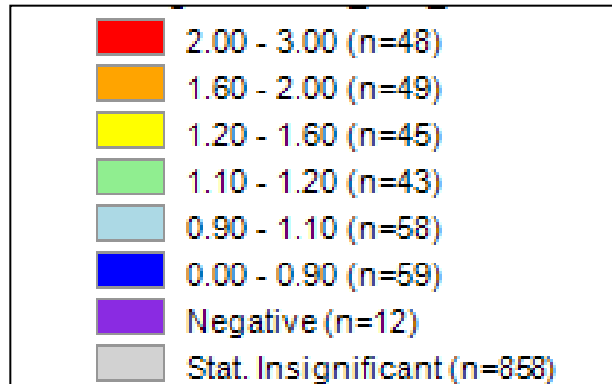
Results – GWR

Other off-licence density
vs. violent offences

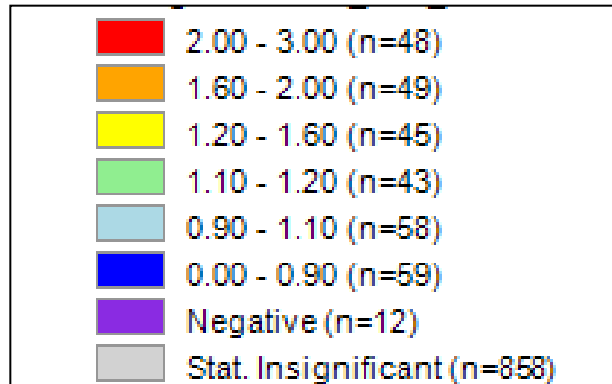|	
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🟦	0.00 - 2.30 (n=51)
🟪	Negative (n=270)
⬜	Stat. Insignificant (n=602)

Results – GWR

Licensed club density
vs. motor vehicle
accidents

🟥	2.00 - 3.00 (n=48)
🟧	1.60 - 2.00 (n=49)
🟨	1.20 - 1.60 (n=45)
🟩	1.10 - 1.20 (n=43)
🟦	0.90 - 1.10 (n=58)
🟦	0.00 - 0.90 (n=59)
🟪	Negative (n=12)
⬜	Stat. Insignificant (n=858)

Results – GWR

Licensed club density vs. motor vehicle accidents

🟥	2.00 - 3.00 (n=48)
🟧	1.60 - 2.00 (n=49)
🟨	1.20 - 1.60 (n=45)
🟩	1.10 - 1.20 (n=43)
🟦	0.90 - 1.10 (n=58)
🟦	0.00 - 0.90 (n=59)
🟪	Negative (n=12)
⬜	Stat. Insignificant (n=858)
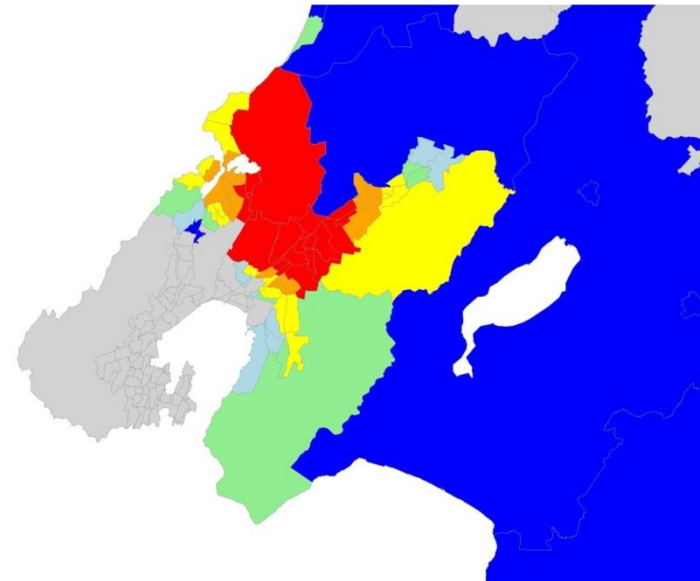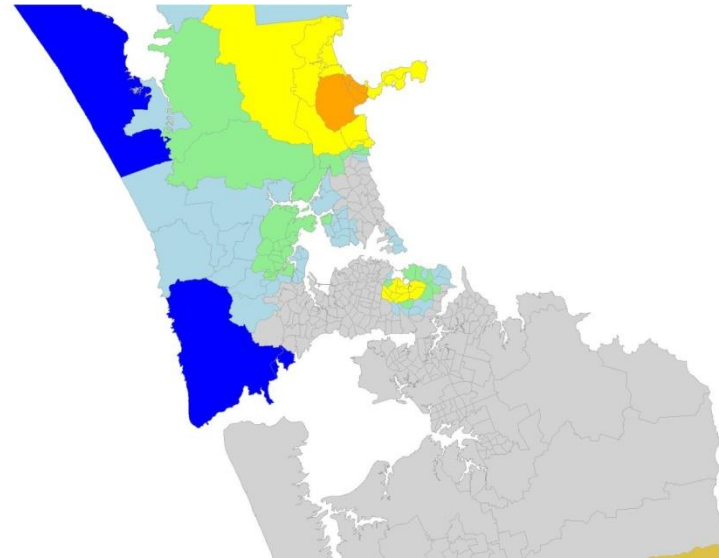
Conclusions

- Different outlet types appear to have different effects

  - May be related to amenity effects

  - Diffusion bias

- Global models may mask substantial 'local' differences

- Some areas show no statistically significant associations

- The degree of observed spatial variation provides support for local alcohol policies

Further thoughts

• Does not show cause

• Quiet on interpretation i.e. What is behind the results? Why? Local knowledge is important

• Uses average effects – doesn't consider changes over time

• GWR model is quite sensitive to weighting decision, inclusion/exclusion of variables, and the presence of outliers

• What about the South Island?

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