Examining the geographical variation of discrete and aggregate drowning events using Ambulance Victoria attended cases

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Background
Drowning has a major impact on public health, and as such is investigated using various analytical and/or environment specific approaches. Spatial analysis approaches offer an opportunity to investigate drowning with emphasis on ‘place’.

As drowning can be geographically represented as individual points or as event counts or summaries, there is a need to demonstrate how different spatial data types can be used to visualise how drowning relative risk vary geographically.

Methods
The study used 10 years of individually georeferenced Ambulance Victoria (AV) attended cases (January 1st 2007 to 31st December 2016), in the Australian state of Victoria. Being recorded as individual drowning events, they were first used to construct whole area continuous relative risk maps. By assigning the individual events to areal units and counting the events, relative risk maps were also devised for discrete areal unit maps.

Additionally, as event cases were attributed a fatal and/or non-fatal descriptor, analysis was extended to examine geographical differences of the relative risk of each drowning type for both continuous and discrete areal unit maps. The geographical units used were Statistical Areas Level 4 (SA4) as defined by the Australian Bureau of Statistics (ABS, 2016). Various geographical representations of drowning events are visualised below.

Findings
Using the same underlying data source to construct both continuous and discrete form maps allows comparison of the mapped outputs. Although some inherent methodological differences are associated with each data type, they enable comparison of not only the relative risk of drowning but a comparison of fatal and non-fatal drowning events and how they vary geographically.

In this example, many regional areas have higher relative risk ratios compared to Melbourne metropolitan areas. Although regional areas more susceptible to extreme SMR values because of low population counts, these relative risk visualisation approaches allow researchers to ask important exploratory questions of these map representations.

Conclusion
Visualising the relative risk of drowning is an insightful preliminary step in articulating the geographical distribution of drowning events. This enables drowning prevention experts to focus attention on understanding significant geographical variation of rates and possible etiological factors. However, caution must be exercised in utilising the most appropriate method with benefits and limitations of the different outputs.

Reference