

The Influence of the Modifiable Areal Unit Problem on Spatial Clusters of Suicide in Scotland

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ABSTRACT

Suicide rates among young adults (15-44 years) in Scotland increased dramatically between 1980 and 2000 and there is growing political and academic concern about the possible causes. One interesting line of enquiry is to explore whether suicide clusters geographically and, hence, whether there is any evidence that suicide behaviour may be 'contagious'. There have been relatively few studies examining the clustering of suicide worldwide. Nevertheless, the distinction between point clusters (those proximal in space and time) and mass clusters (those proximal in time and often related to media reporting of suicide) has been made. Of those studies that have examined point clusters, few have adopted a spatial analytical approach. In Scotland, there is some anecdotal evidence to suggest that a cluster of suicide may exist but this paper explores whether there is any statistically significant evidence of spatial clustering in young adult suicide over the last couple of decades.

Our results suggest that, controlling for the age and sex distribution of the population, there is a large, statistically significant and surprisingly persistent spatial cluster of suicide in East Glasgow in 1980-2, 1990-2 and 1999-2001. This analysis used data on 3722 suicides distributed across 10,058 specially constructed small geographical areas which are consistent through time (called 'Consistent Areas Through Time', or CATTs). However, it is possible that the scale and arrangement of these geographical areas may have influenced the results. This problem is commonly referred to as the 'Modifiable Areal Unit Problem' which suggests that ecological analyses may be undermined by the often arbitrary way that geographical units of analysis are defined. Had we used fewer zones or a different configuration of the same number of zones, it is possible that the results may have varied and the reliability of this cluster would then be in doubt.

We explore this question by undertaking a series of cluster analyses for different configurations of the CATTs. Using specially developed zone design software we aggregated the CATTs into new configurations comprising, 5 000, 1 000, and 500 zones. For each generation of these data sets, we test for evidence of spatial clustering of suicide. Our results show

that the cluster of suicide in East Glasgow was statistically significant in every configuration we used, confirming that the significant clusters of suicide found at the small area (CATT) level were not an artefact of the level of analysis, or the configuration of the data zones used. This raises the question of whether contagious processes influenced this cluster.

We therefore extended our cluster analysis to control for socio-economic deprivation. We show that once deprivation is controlled for, the cluster becomes insignificant in every spatial configuration, suggesting that, rather than relating to contagious processes, the cluster reflects an area of severe deprivation which is strongly related to suicide behaviour in Scotland among young adults. These results have significant policy implications, both in relation to the targeting of suicide prevention campaigns and the importance of dealing with the poor material circumstances which some people live in if suicide is to be reduced in Scotland.

Keywords and phrases: Scotland, Suicide, Modifiable Areal Unit Problem, cluster, contagion, Consistent Areas Through Time, CATT.