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CRediT authorship contribution statement

Acknowledgement

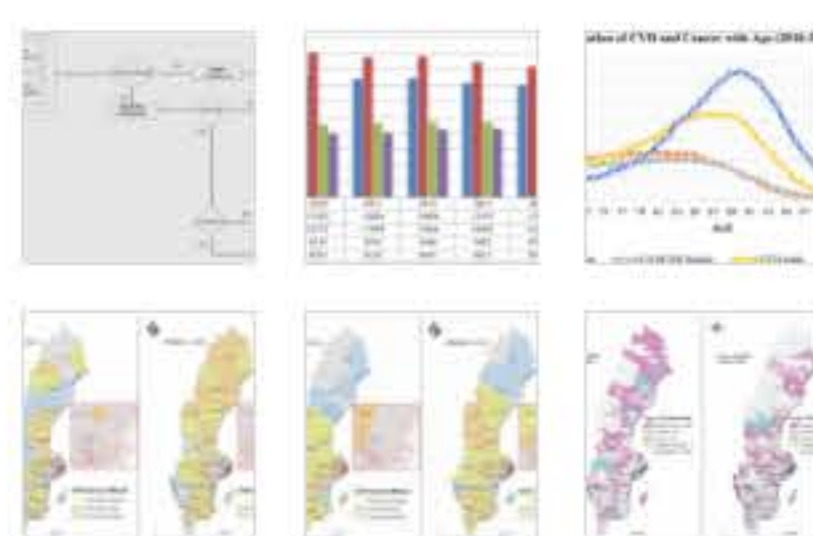
Appendix A. Supplementary data

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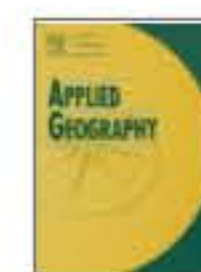
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# Analysis of spatial co-occurrence between cancer and cardiovascular disease mortality and its spatial variation among the Swedish elderly (2010–2015)

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## Highlights

- Most elderly cancer survivors tend to die of cardiovascular (CVD) related diseases.
- It is critical to identify areas where these two main causes of death spatially overlap.
- The Correlation between CVD and cancer crude mortality rates among the Swedish elderly is averagely positive.
- Cancer spatial clusters are enclaved within the bigger CVD spatial clusters.

## Abstract

CVD and cancer are the two leading causes of death worldwide. Improvement in cancer early detection and treatment has resulted in an increased number of cancer survivors. However, many of the survivors tend to develop CVD often leading to their demise. Conversely, people with pre-existing CVD conditions, especially the elderly, have increased chances of developing cancer and dying from the same. The World Health Organization, consequently, recommends joint management of both diseases. However, in Sweden, as with many other countries, few studies have explored the nature of the associations between the two disease mortalities and their spatial variation at a population level.

This study uses correlation, global Moran's index and global bivariate Moran's index to investigate national trends of cancer and CVD crude mortality rates in the Swedish elderly. Spatial scan statistics, spatial overlay and local entropy maps were used to analyse for spatial co-occurrence, local joint spatial clustering and

Our results showed that throughout the years of study, the correlation between cancer and CVD crude mortality rates was averagely positive. Spatial correlation analysis (univariate and bivariate) showed that the contribution of the neighbourhood mortality rates to the observed mortality rates was weak, though significant. From cluster analysis, the cancer and CVD crude mortality rates showed differences in clustering spatial scales with CVD clustering at a smaller scale. Finally, local entropy maps showed that cancer and CVD crude mortality rates were not always related across Sweden, but whenever they were, the relationship was mainly positive and linear.

This study contributes to cancer and CVD public health efforts in Sweden by identifying areas where the two causes of death spatially co-occur, and where the two exhibit no spatial overlap. This provides a valuable starting ground for more focused studies to identify local drivers and/or informs coordinated targeted intervention in both causes of death.

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## Keywords

Cancer; CVD; Spatial variation; Local entropy map (LEM); Spatial scan statistics; Swedish elderly

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