

Spatial patterns of coronary heart disease incidences in North Karelia

What factors are associated with risk clusters?

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UEF // GEOSPATIAL HEALTH

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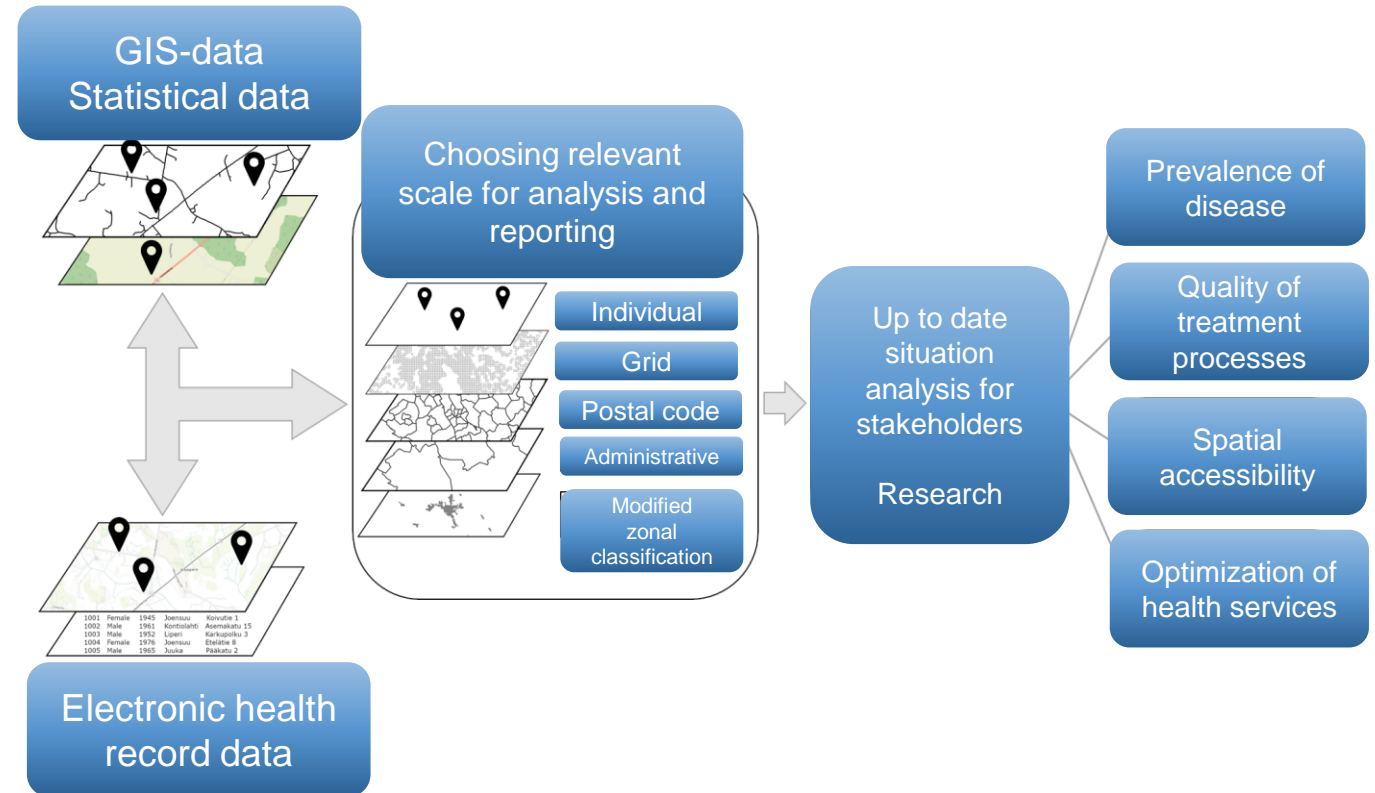
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1. IMPRO-project and our work package

IMPRO – Improved knowledge base and service optimisation to health and social services

- Multidisciplinary research project
- Regional and national level research
- Siun sote area electronic health records
- Work package focus on health geography
 - Type 2 diabetes
 - Atrial fibrillation
 - Coronary heart disease
- Covid-19 pandemic:
 - Effects in chronic disease treatment

<https://www.stnimpro.fi/>



Original figure from: Toivakka, M., Repo, T., Leminen, A., Pyykönen, M., Laatikainen, T. & Tykkyläinen, M. (2018). Potilastieto ja paikkatieto kohtaavat. *Terra* 130: 4, 201–205.

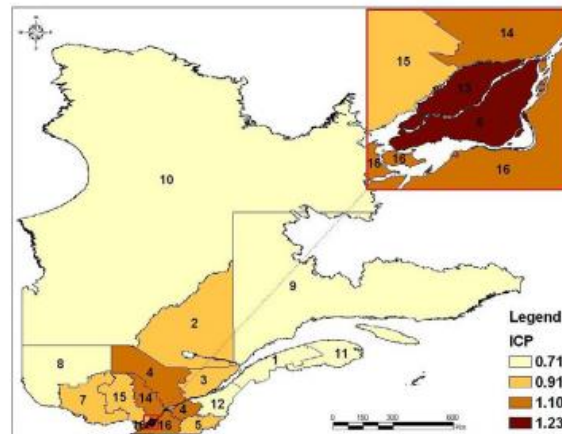
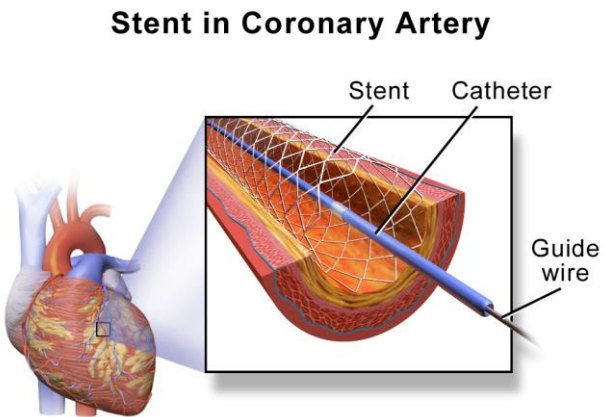
2. Coronary heart disease

- Despite improvement in medicine - Major global disease burden
- Male/female differences
- Primary prevention and new evidence-based invasive and medical treatments such as revascularization procedures have reduced ACS incidences and mortality

Geography of CHD-risk:

Spatial variation in the management and outcomes of acute coronary syndrome (Vanasse et al 2004)

Environmental exposure (smoke, groundwater, neighborhood deprivation)



(a) Standardized ICP ratio Vanasse et al 2004

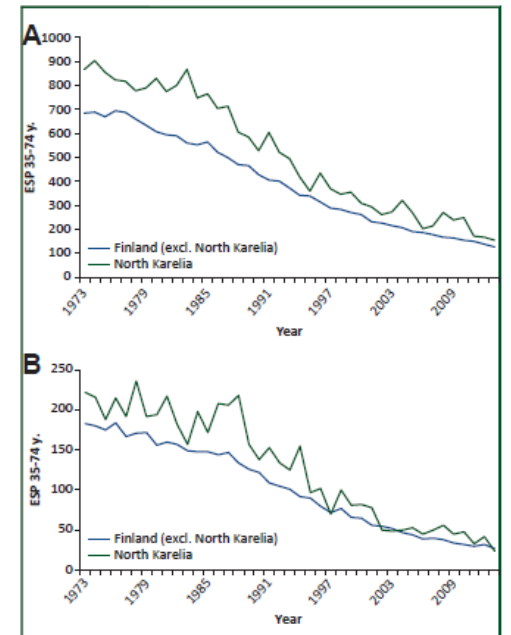


FIGURE 2. Age-standardized trends in coronary heart disease mortality in North Karelia (green line) and in the rest of Finland (blue line) among men (A) and women (B) ages 35 to 74 years. The average annual decline was 4.5% both in North Karelia and in the rest of Finland among men. Among women, the corresponding average annual declines were 5.2% and 5.1%. The ICD-10 codes I20 to I25 and corresponding ICD-9 and ICD-8 codes as the underlying cause of death were taken as coronary deaths in this analysis. ESP, European standard population; ICD, International Classification of Diseases.

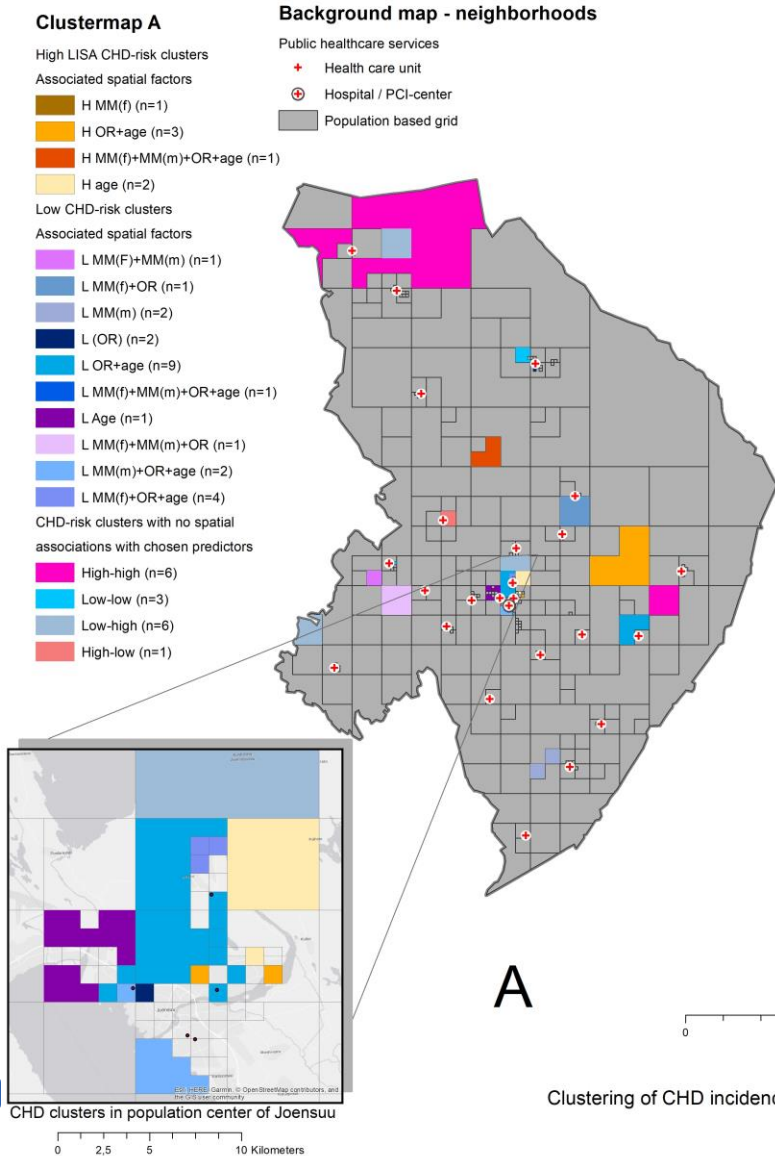
Salomaa et al 2016

3. Aim methods and data of the present study

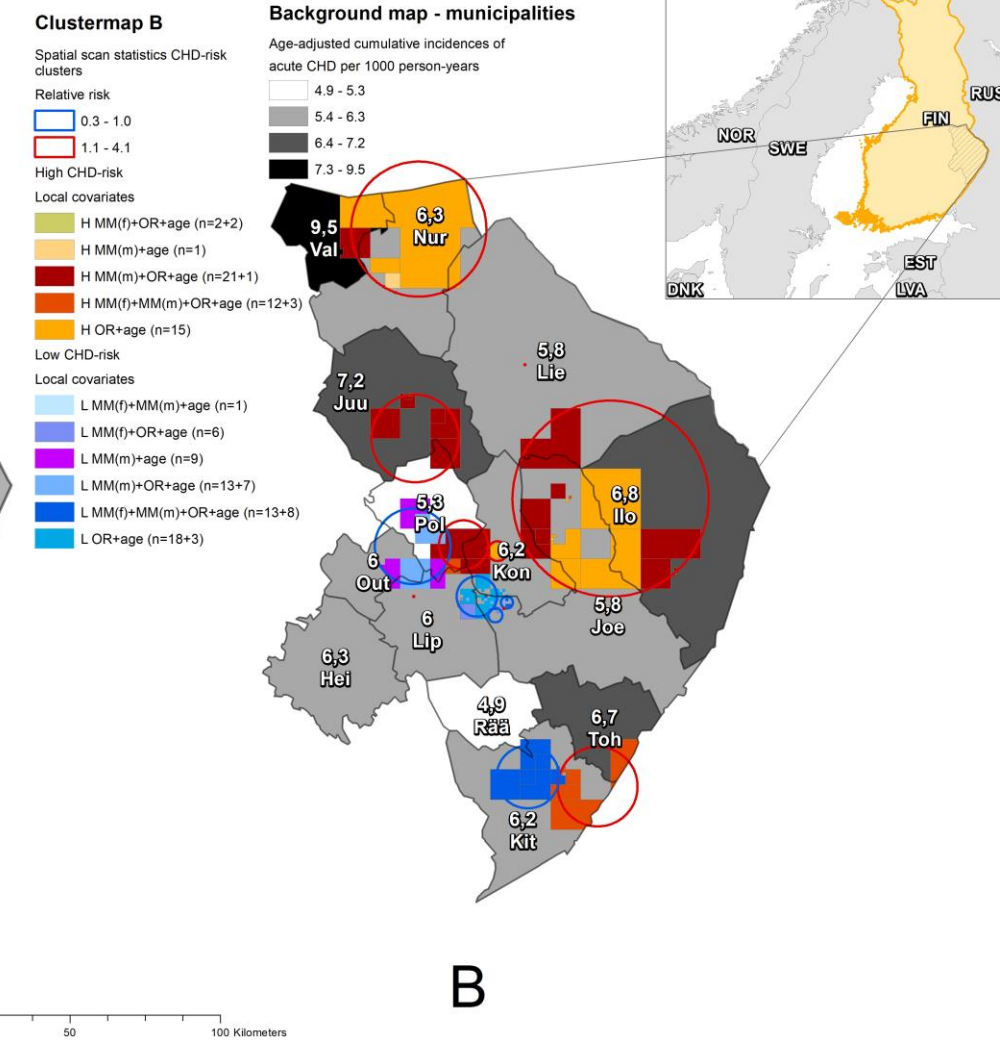
- Small area level spatial clustering of coronary heart disease in North Karelia region
- What factors are associated with the high- and low-risk areas → help the targeting primary prevention resources
- Clustering method comparison: **LISA** and **spatial scan statistics**
- Spatial clustering of CHD and subgroups
 - Male CHD
 - Female CHD
 - ACS
 - PCI/CABG
 - Ratio of PCI/CABG among CHD
- Predictors of neighborhood level incidence rate variation: EHR data and Statistics Finland data
- Sensitive health data – new population based spatial zoning

4. Results 1/2

Neighborhood level LISA CHD clusters and spatially associated factors



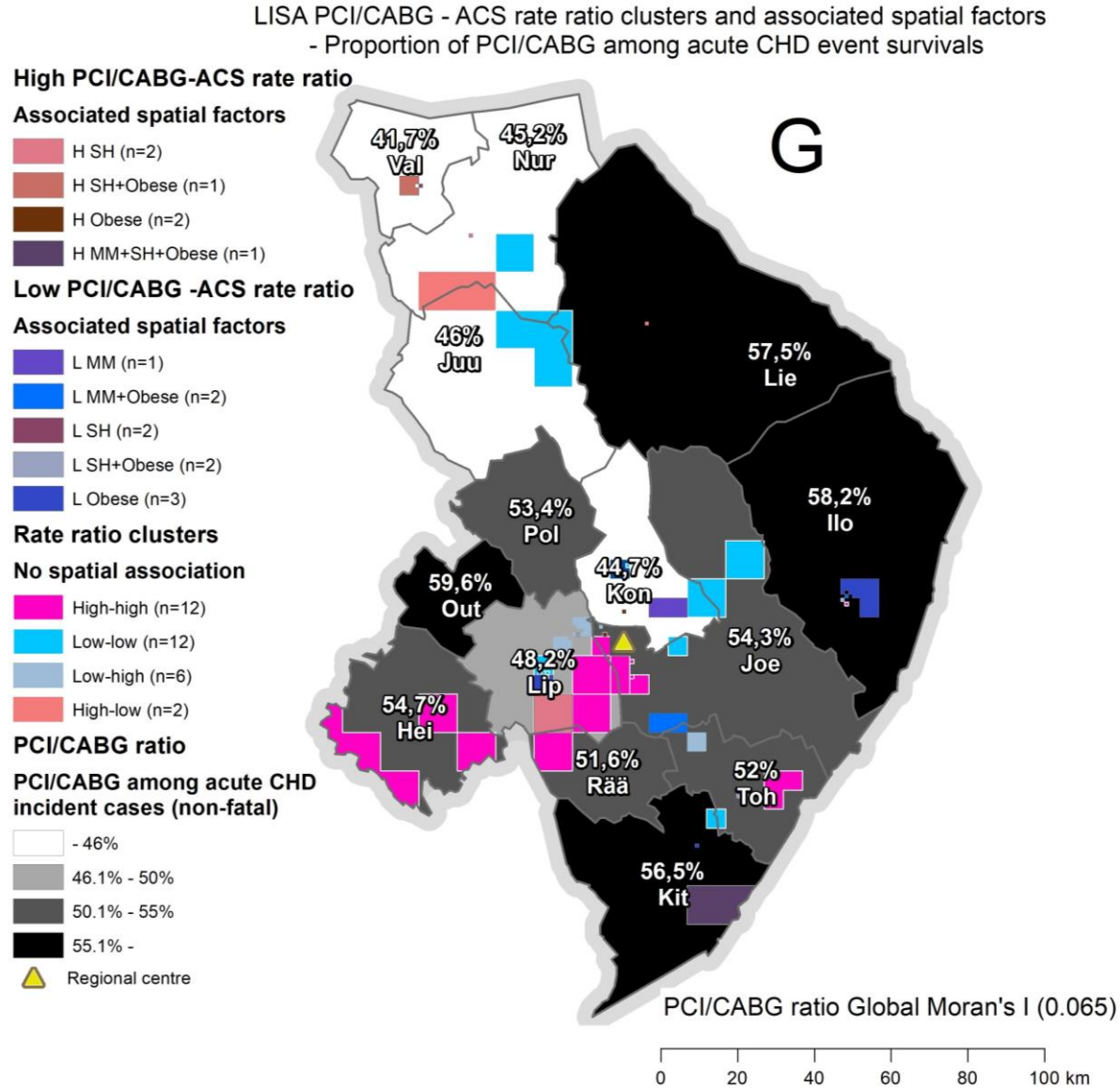
Neighborhood level spatial scan statistics CHD clusters and covariates - Municipality level cumulative CHD incidences per 1000 person-years



Clustering of CHD incidence rate Global Moran's I index (0.09) p=0.01

5. Results 2/2

Ratio of PCI/CABG procedures



6. Conclusion

- Several overlapping (mostly demographic) factors are associated with incidence clusters
- No clear sign of spatial inequalities in CHD-risk based on neighborhood SES or higher ratio of cardiac procedures among those living closer to hospital – but differences between municipalities may indicate differences in treatment practices or suboptimal treatment processes

Thank you

Questions, comments?