ISDS Public Health – 28th May 2009

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Problem

- Charged with commissioning services to improve overall health AND reduce health inequalities
- Use of targeted risk-modifying interventions
- Need to monitor changes in the non-communicable disease status of the population and understand the impact of interventions

The Question

- Could spatial latent variable modelling of non-communicable disease inform public health commissioning of services?

Joint modelling of the spatial distribution of mortality/morbidity

- Model disease X using disease Y as a proxy for a risk factor
- or treat the risk factor as a spatial latent variable common to both diseases

  – e.g. chronic obstructive pulmonary disease and lung cancer
  – changes over time in joint variation and disease specific variation

COPD and lung cancer

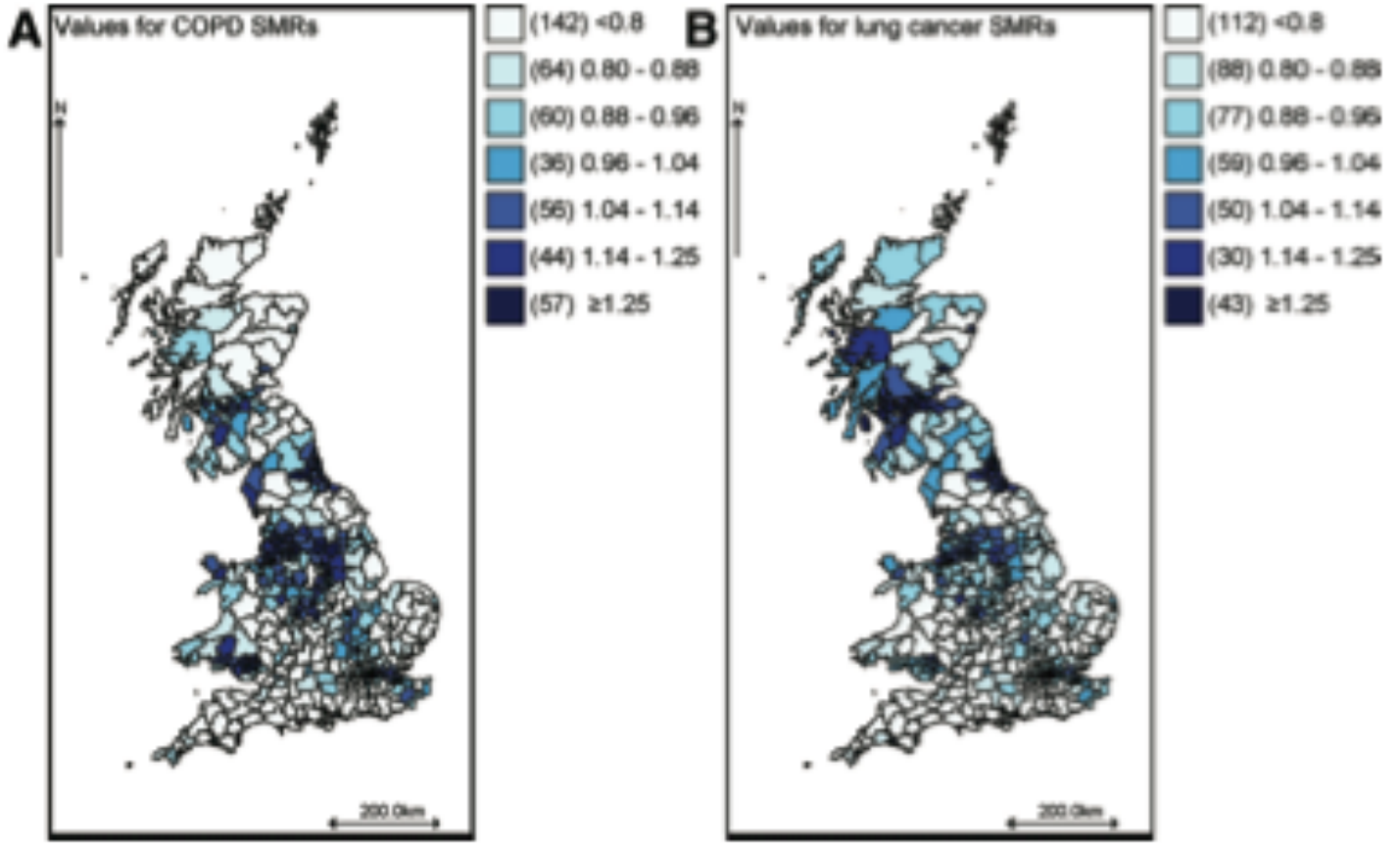
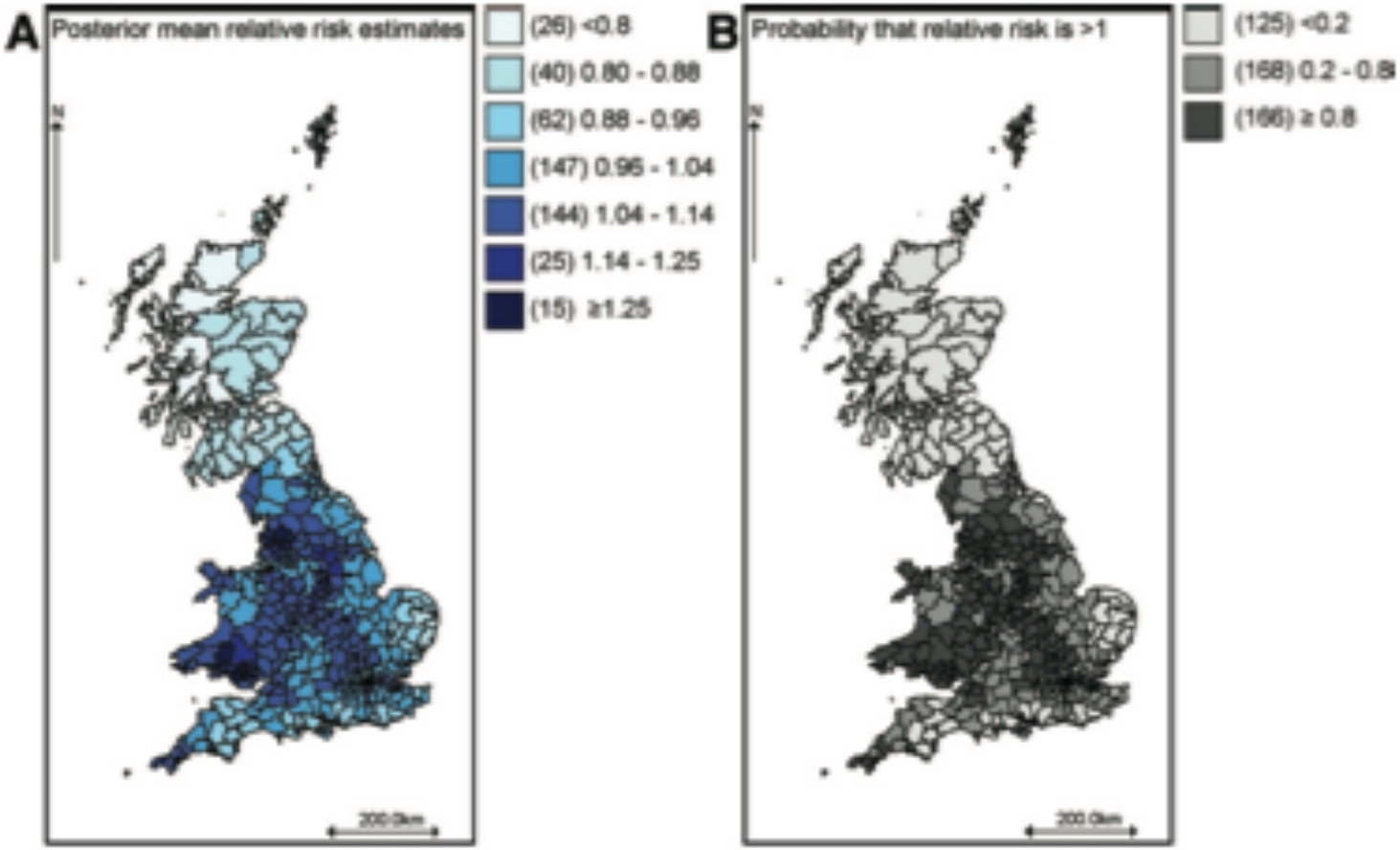


FIGURE 1. Maps of district-level COPD and lung cancer SMRs for Great Britain 1981–1999. (A) SMR for COPD; and (B) SMR for lung cancer.

Best and Hansell; Epidemiology Vol 20:3 May 2009

Use lung cancer SMR as a proxy for smoking

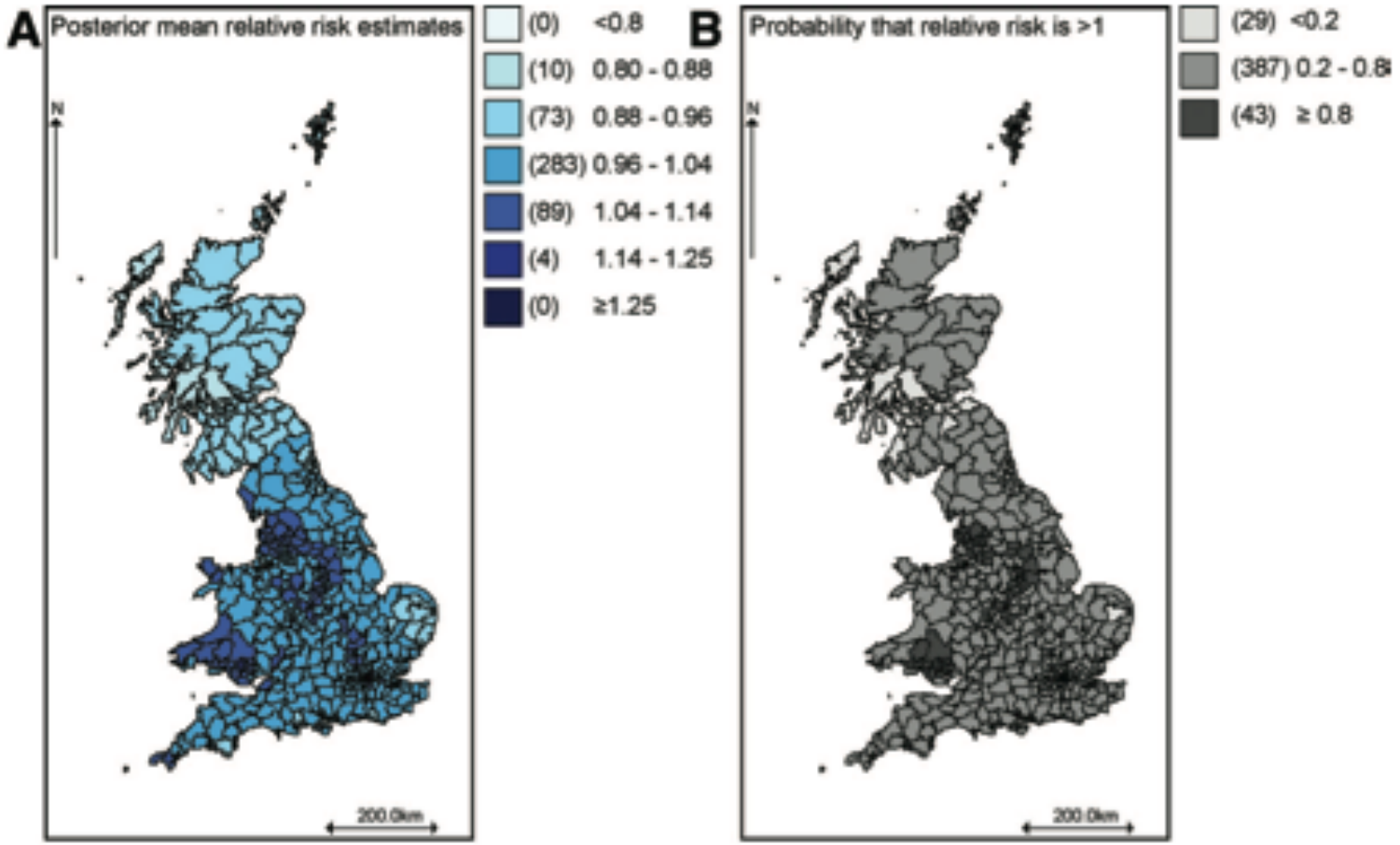


Residual relative risk of COPD not explained by smoking

Probability that residual RR exceeds 1

Best and Hansell

Treat 2 diseases symmetrically- shared latent component and disease specific



Residual relative risk of COPD not explained by the latent smoking proxy

Probability that residual RR exceeds 1

Best and Hansell

Challenges

- Appropriate statistical model
- Data sources
  - Age population profile by geographical unit - yearly
  - Utilisation of acute health service e.g. hospital discharges by area, sex, age
  - Deaths –area age sex cause
  - Cancer statistics type, sex, age, by area
  - Survey data on behavioural choices- time span variable
- Useful for public health practitioner

For practical public health…..

- Model with GUI allowing data streams to be selected and designated as risk factor proxy
- Capacity to run the model with an unnamed common spatial latent variable
- Production of maps with highlighted areas of variance
- Appropriate representation of significant changes over time
- Flag an area having had a specific intervention - to see if spatial pattern changes

Influenza A (H1N1) swl

- Social and health inequalities
- Severe respiratory complications
- Target vaccine to certain groups
- Vaccine uptake data