Geographical variation in the risk of childhood pneumonia and relationships to socio-economic and health deprivation

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On behalf of North East of England Paediatric Respiratory Infection Study Group

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Introduction

- Socio-economic deprivation is a recognised risk factor for childhood pneumonia, while the relevance of health deprivation is unknown.
- The aim of this study was to establish whether there is significant spatial variation in risk of childhood pneumonia and whether this risk was determined by health and socio-economic deprivation.

Methods

- Data on childhood hospital admissions in NE England from May 1997-April 2007 (0-14 years) with a diagnosis of bacterial or lobar pneumonia were extracted from the Hospital Episode Statistics database.
- The spatial unit was a postcode district (n=116).
- Post-code linked data from the health and socio-economic domains of the UK Child Wellbeing Index was obtained.
- Bayesian convolution models were used to model calculate the standardised relative risk of admission to hospital with pneumonia in postcode districts and establish any association with deprivation indicators.

Deprivation indicators

- The deprivation indicators were based on combinations of the following per district:

I.Socio-economic - children living in households in receipt of both in work and out of work means tested benefits.

II.Health - all emergency hospital admissions, all outpatient attendances for children and children receiving disability living allowance as a proportion of all children in each area.

References

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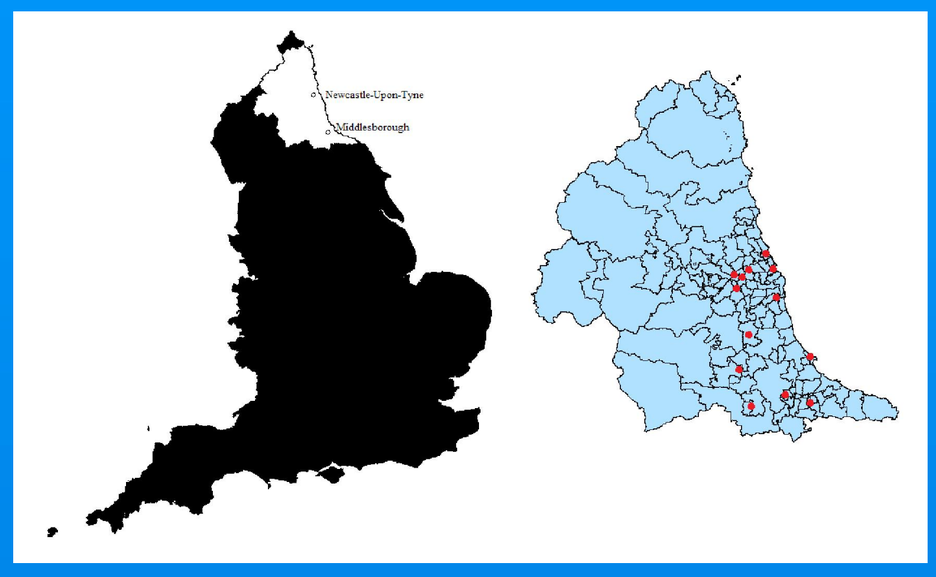

Figure 1: Study area.

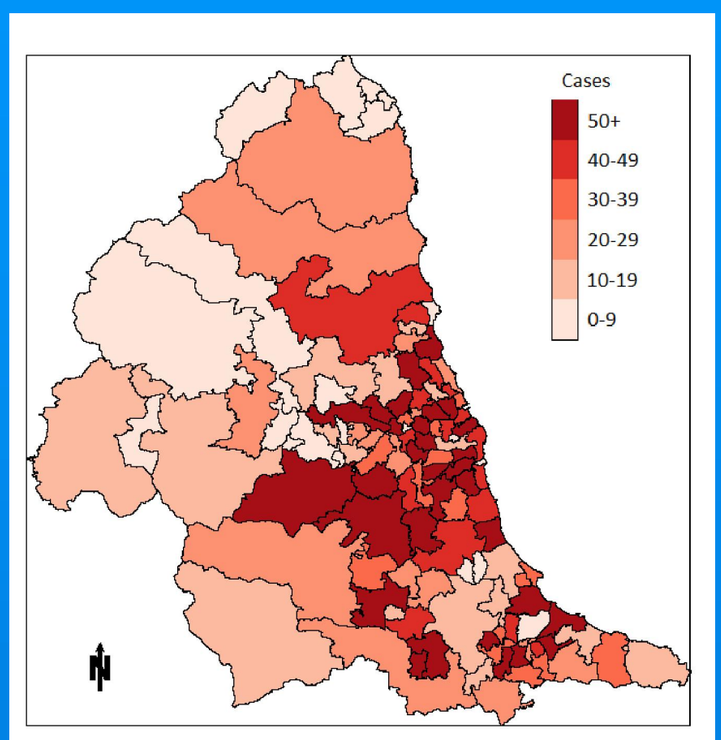

Figure 2: Expected cases of pneumonia

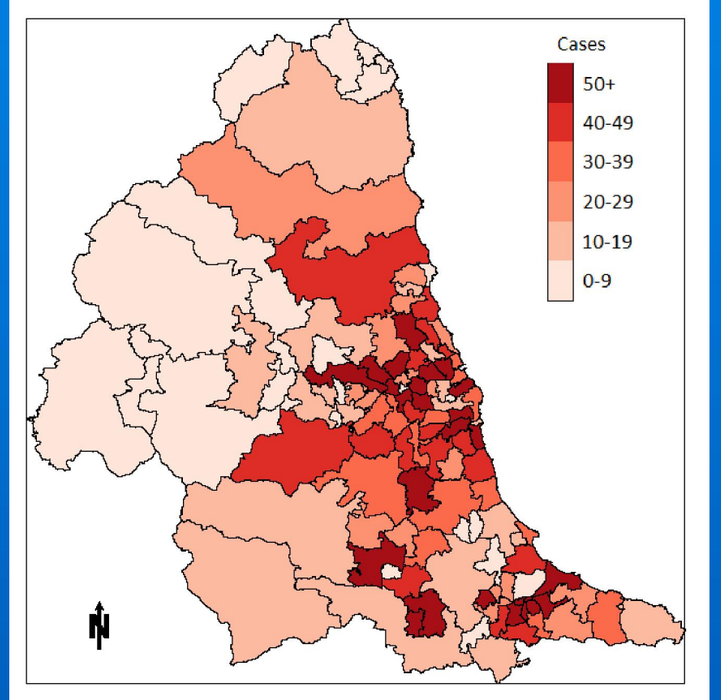

Figure 3: Observed cases of pneumonia

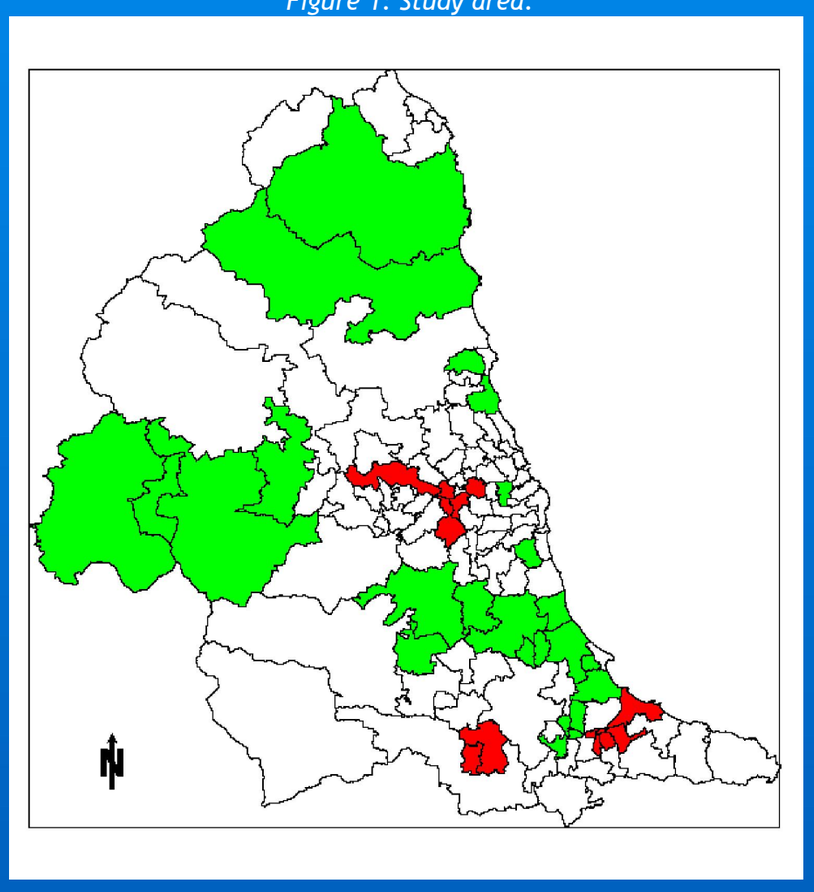

Figure 4: Areas of significant different relative risk of admission to hospital with pneumonia. Green indicates area of significantly lower risk and red an area of higher risk,

Results

- There were 3874 admissions. The mean number of admissions per post-code district was 33 (Range: 0 to 128) and the mean population per district was 3548 children (Range: 47 to 11,406).
- From a total of 116 districts, 35 had a significantly different relative risk (RR) using a 95% Bayesian confidence interval (BCI) than that predicted by population alone (23 lower risk, 12 higher risk).
- The lowest RR was 0.37 and the highest 2.97 giving an eight fold variation in risk between postcode districts.
- The model using only health deprivation provided the best explanation of the data (Deviance Information Criterion for null model 749.68 vs. 744.08 for health deprivation model).

Discussion

- There is substantial variation in the relative risk of pneumonia in different areas of NE England.
- Health deprivation better explains the spatial variation in risk than socio-economic deprivation.
- There remains significant unexplained variation despite accounting for these factors.
- Targeted district level public health interventions such as anti-tobacco smoking drives should be considered to alleviate inequalities between areas.

Acknowledgements

Thanks to D Cliff(Newcastle University) for his assistance with data handling.

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