

How Much Variation in Paediatric Epilepsy Admission Rates in England Can Be Explained by Variation in Unit-Level Performance in The National Clinical Audit (Epilepsy12)?

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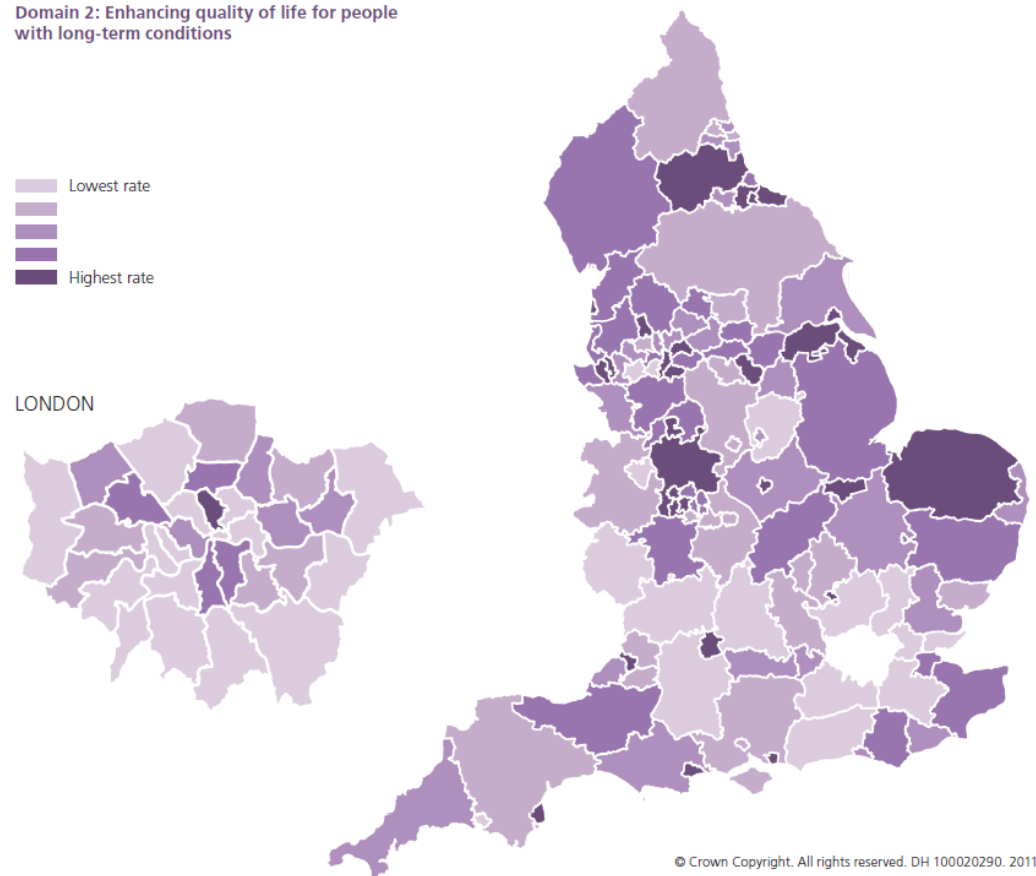
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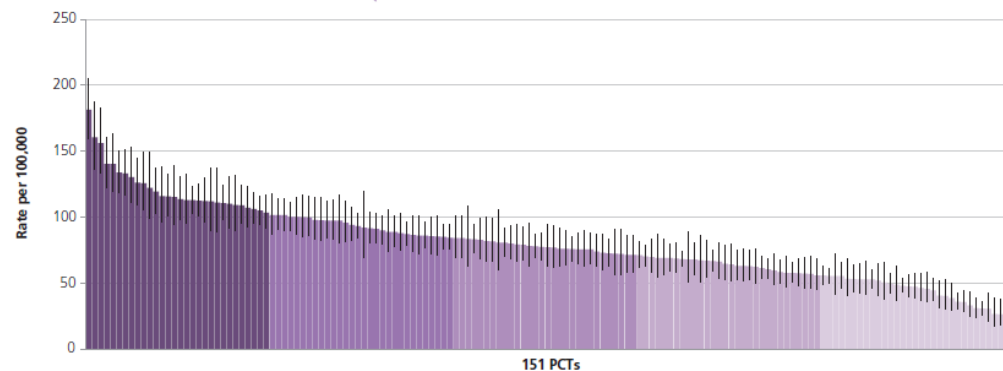
Map 15: Emergency admission rate for children with epilepsy per population aged 0–17 years by PCT

Directly standardised rate 2007/08–2009/10

Domain 2: Enhancing quality of life for people with long-term conditions



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- Most common neurological disorder of childhood. Estimated 48000-60000 patients 0-17 years.
- High rates of over and underdiagnosis
- UK compares poorly to other Western European countries for epilepsy mortality in children
- National audit showed that care failings contributed to at least 24% of epilepsy-related deaths in children.
- Emergency admission rates ranged from 19.1 to 181.2/100,000 (9 fold variation) Excluding 5 lowest and 5 highest, range is 30.8-133.7/100,000 (4.3-fold variation).
- 9-fold regional variation in epilepsy-related mortality among children.

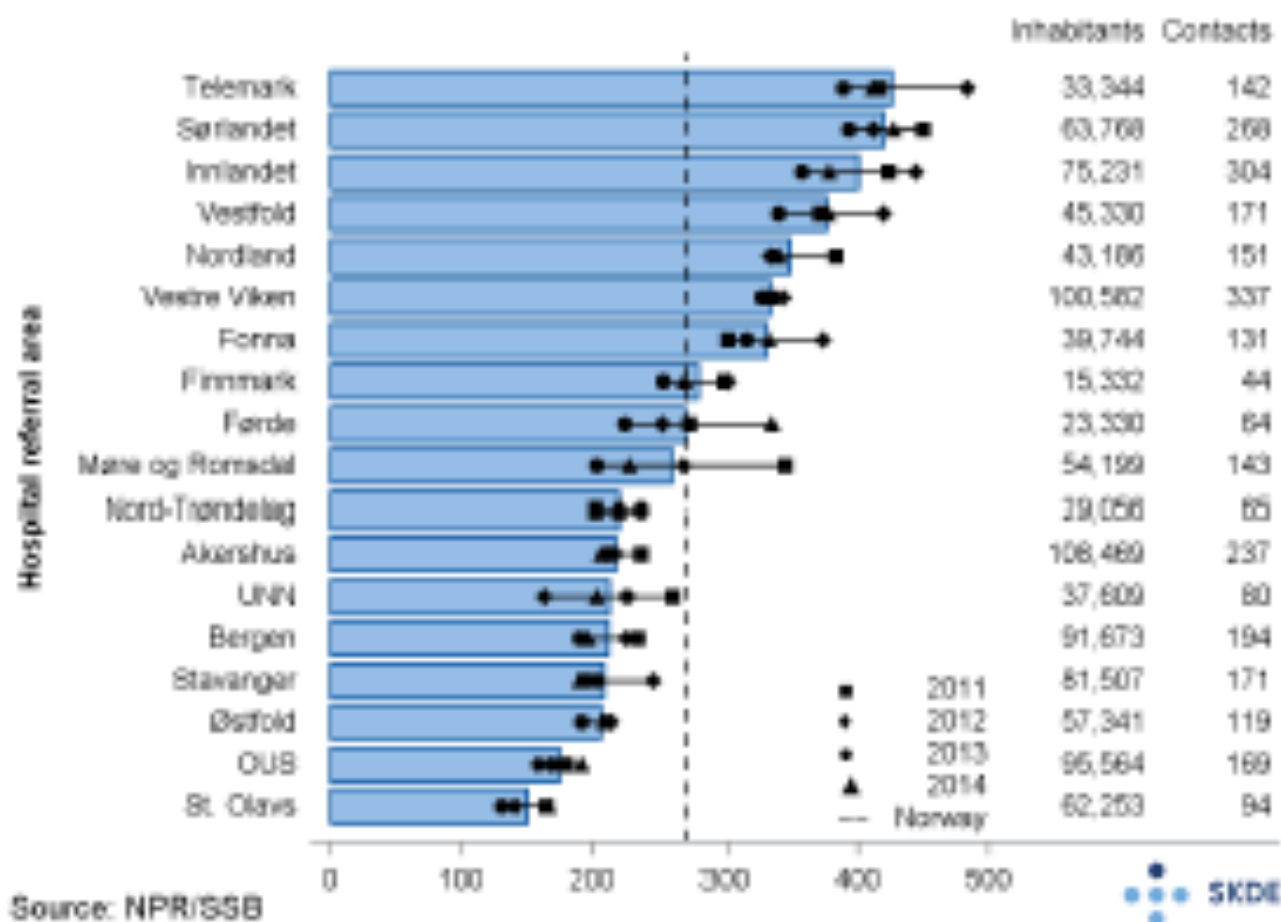
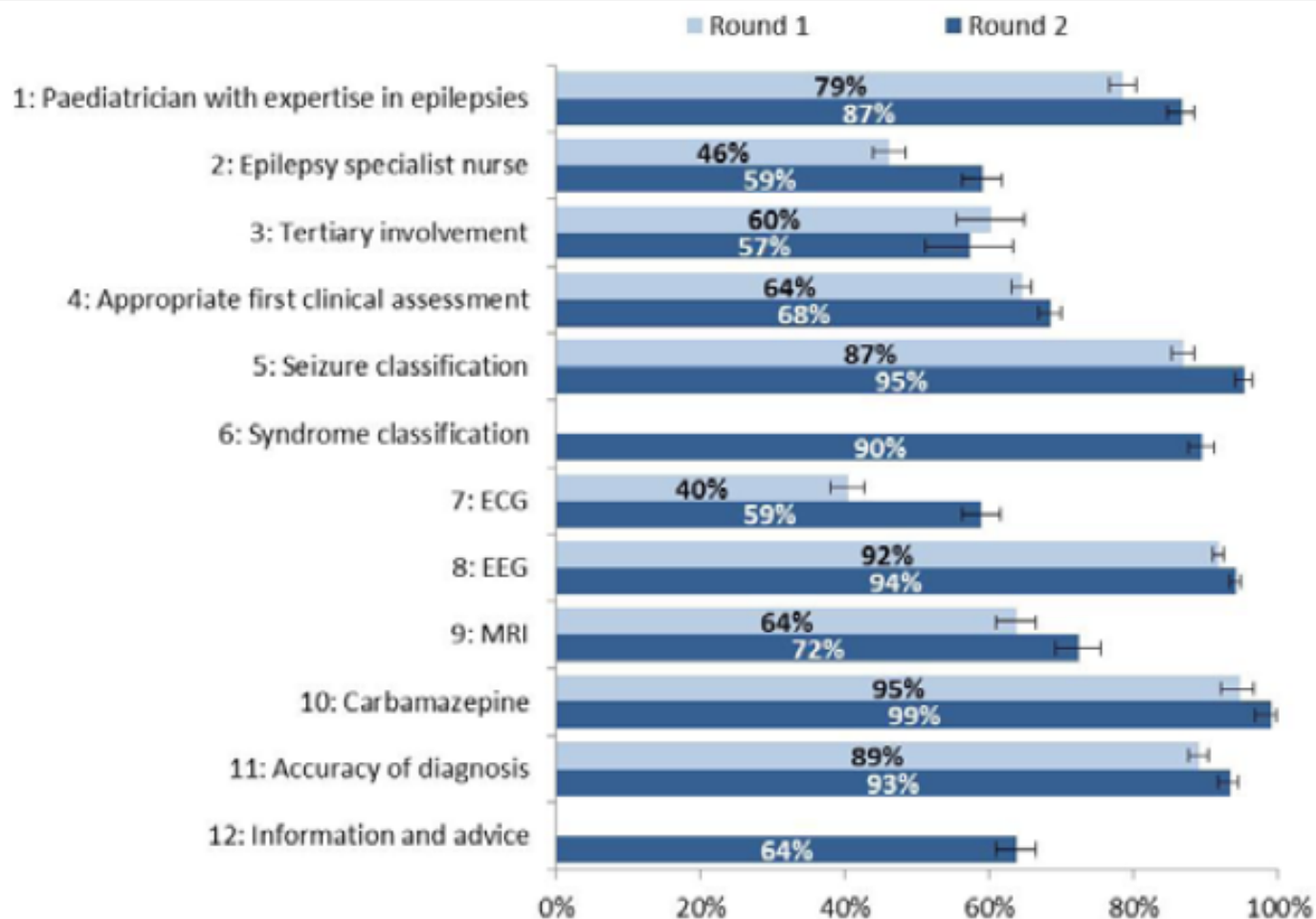


Figure 6.25: Epilepsy, admissions, age-adjusted usage rates per 100,000 children 0-16 year, per hospital referral area, per year and as an average for the period 2011-2014.

Epilepsy 12 National Clinical Audit. Round 1 – 2011/12, Round 2 – 2013/14

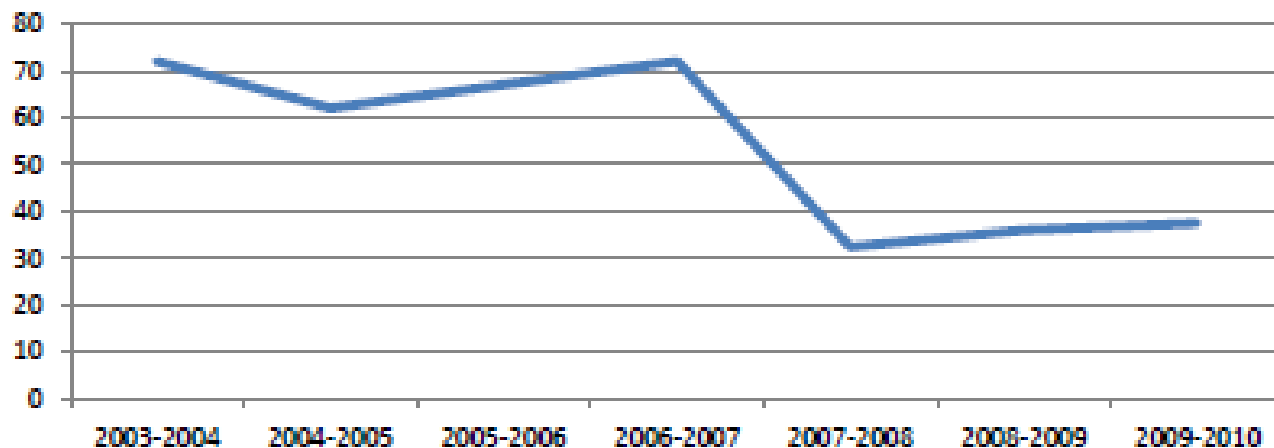


- Expected that improving performance on the national audit will reduce variation and improve overall quality and outcomes of care
- Best practice tariff rewards units that meet key audit standards with approx. £200 tariff per patient per year.

Epilepsy related admissions

Mean admission rates over 3 years before the ENS commenced were 67/100,000 children/year (range 62-72.1). Mean rates over 3 years after ENS commencement were 35.2/100,000 children/year (range 32.3-37.5)

Fig 2. Graph showing annual epilepsy admissions aged under 19 years for Nottinghamshire County per 100,000 population



ENS commenced

Aim

To investigate the unit-level association between performance on national clinical audit and admission rates from Hospital Episode Statistics.

Methods overview

1. Calculate unit-level admission rates for paediatric epilepsy using hospital catchment populations as denominator.
2. Use regression models to investigate cross-sectional associations in 2014 (latest round of national clinical audit)
3. Use difference-in-difference analysis to investigate whether change in performance on national clinical audit was associated with change in admission rates between 2011 and 2014 (Rounds 1 and 2 of the national clinical audit).

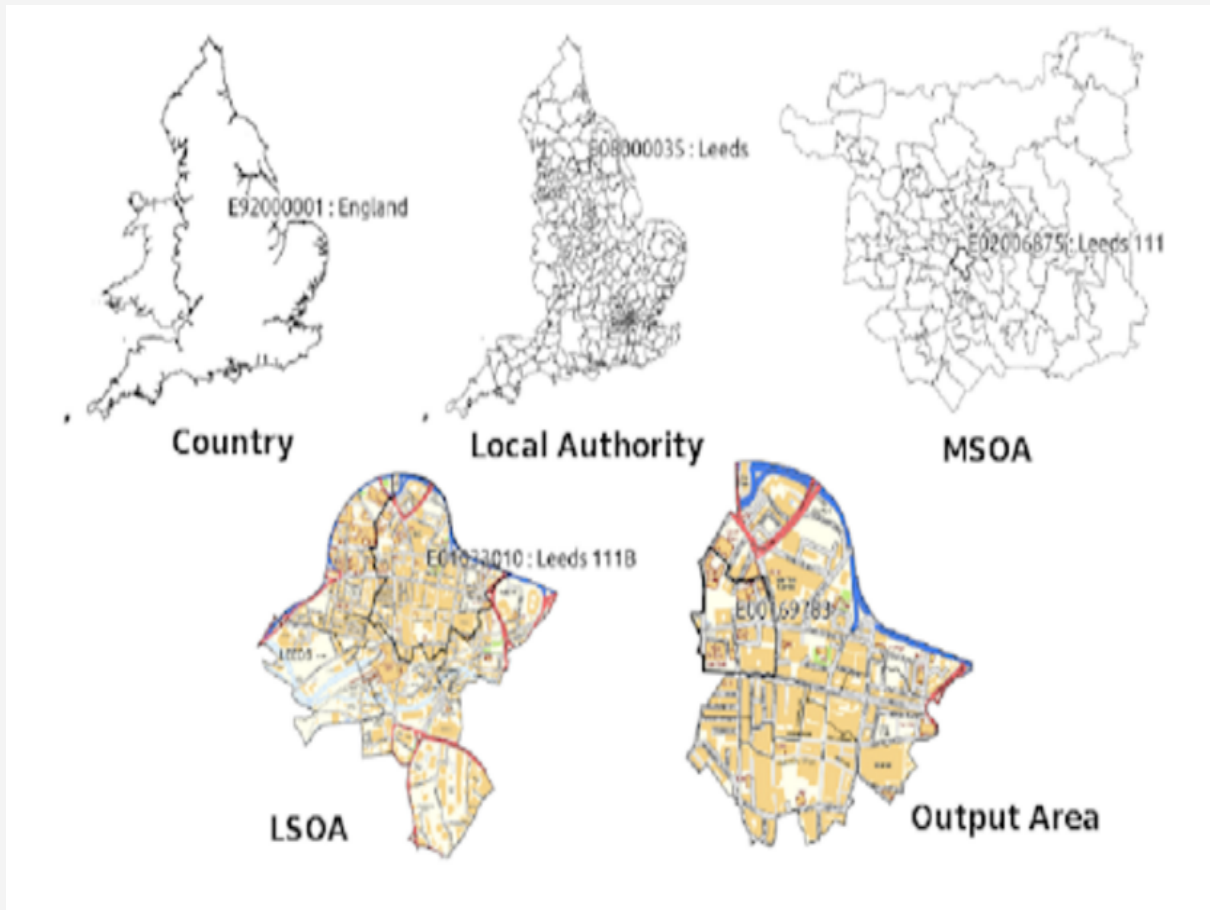
Hospital Episode Statistics (HES)

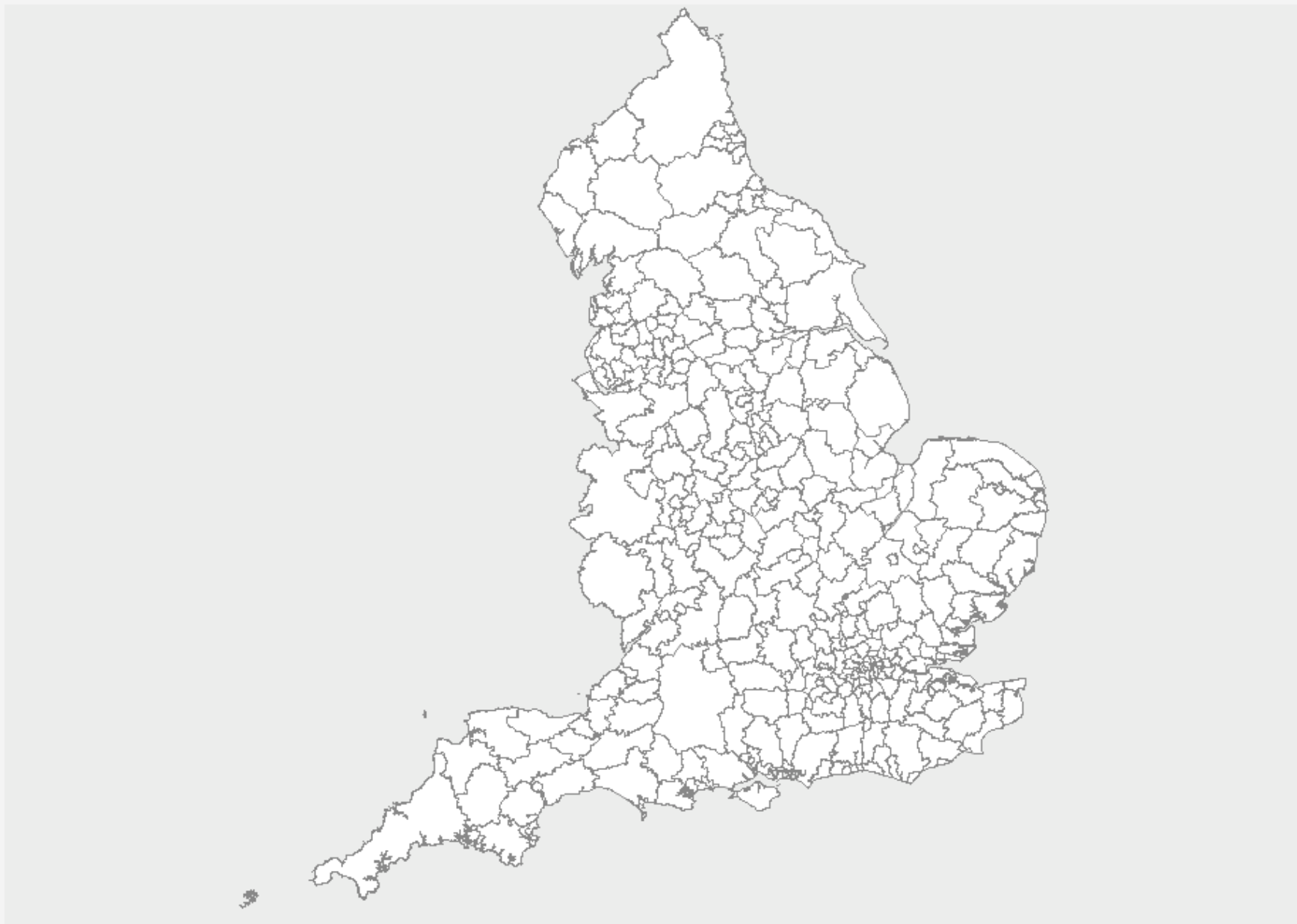
- Patient-level administrative data
 - has information on patient characteristics and geography
- It capture all admissions of patients to hospital
 - emergency (e.g. A&E) and referrals (e.g. from GP)
- HES uses the WHO's ICD-10 diagnosis information
- Good spatial coverage for England

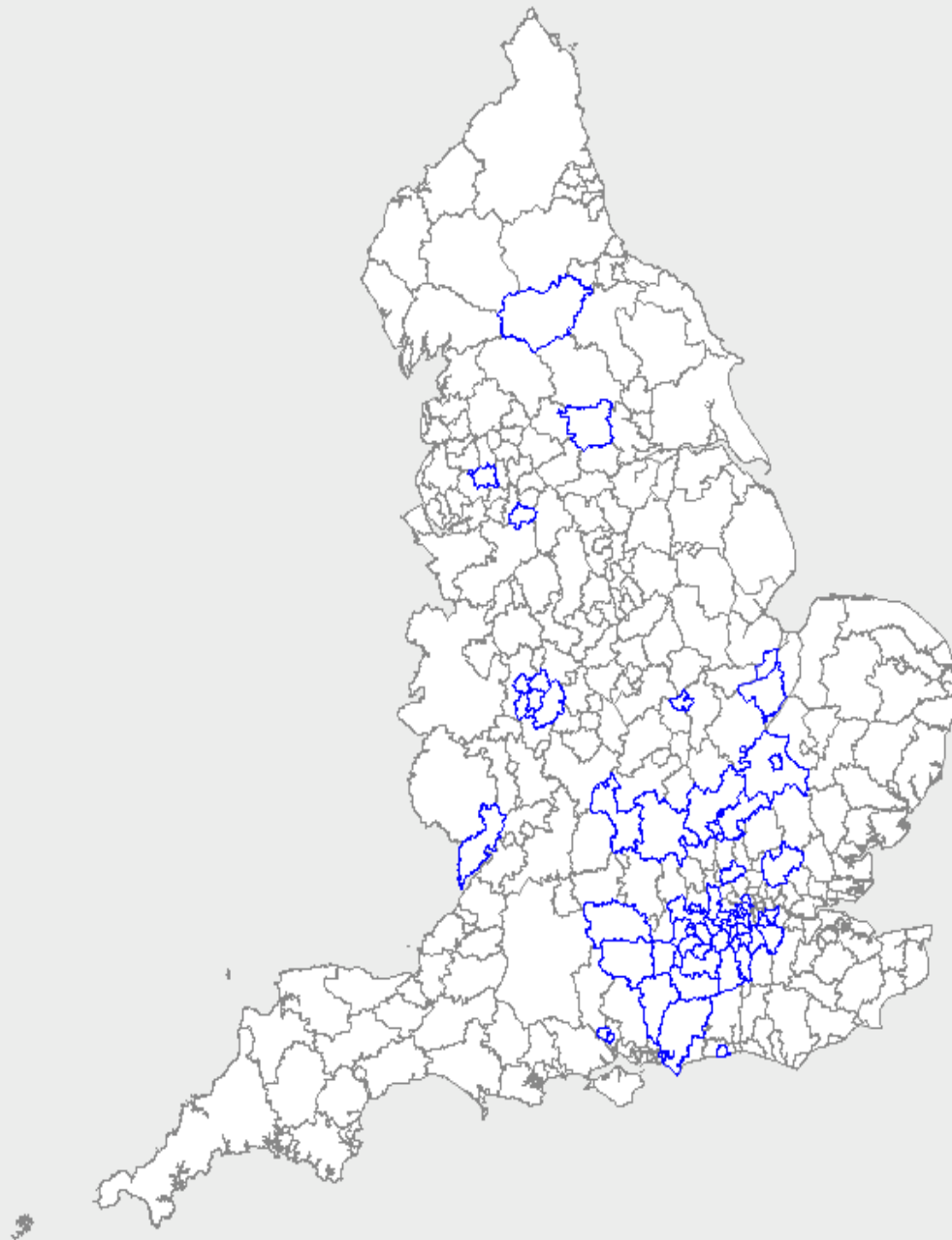
Hospital catchment population - Proportionate flow method

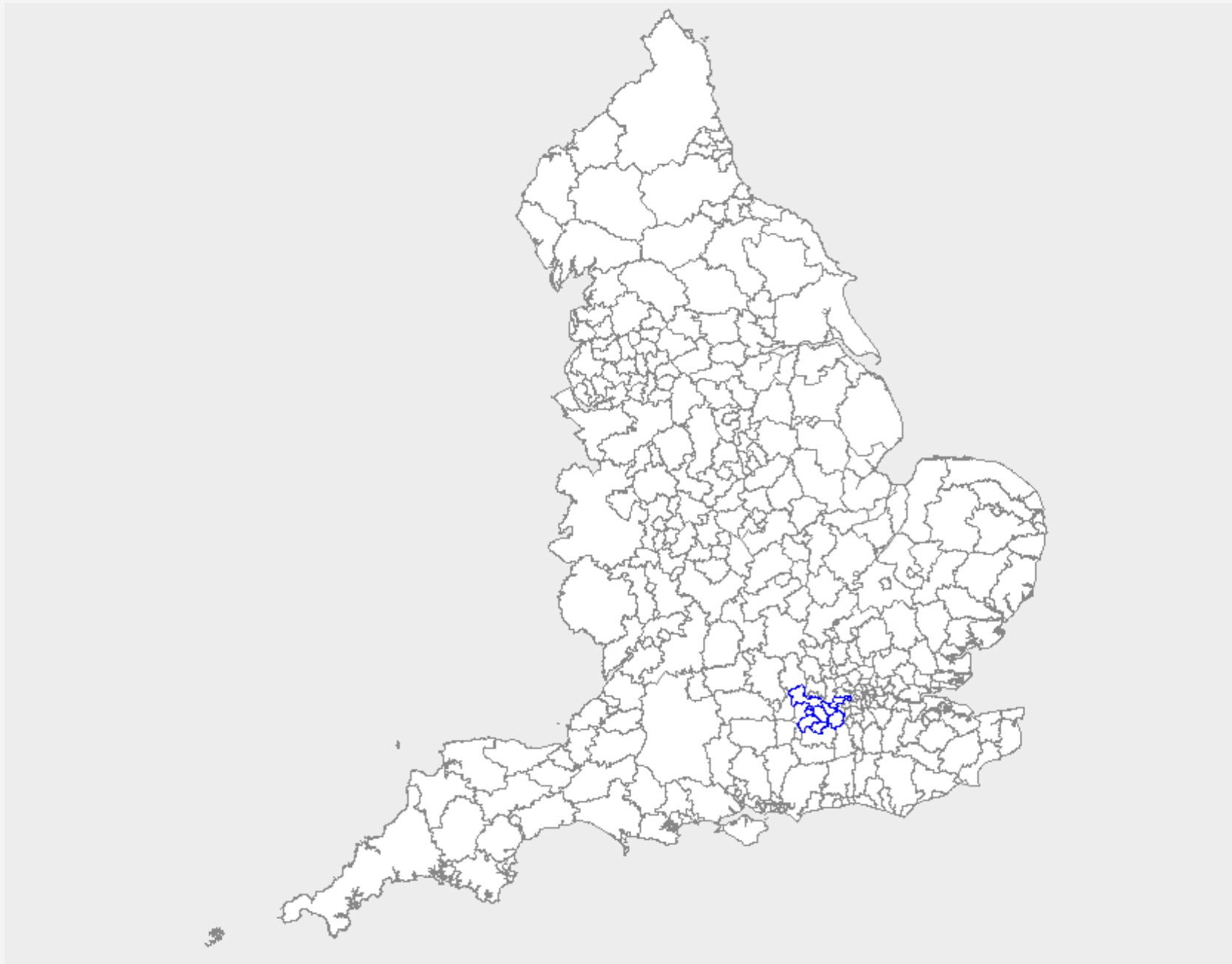
- Utilised Census area statistics, Hospital Episodes Statistics and resident population estimates and uses the proportionate flow method.
- Simply looks at the proportion of admissions for each trust coming from a specific area.
- In the proportionate flow method the proportion of individual admissions is calculated for each trust by sex and age band for each Lower Super Output Areas (LSOA).

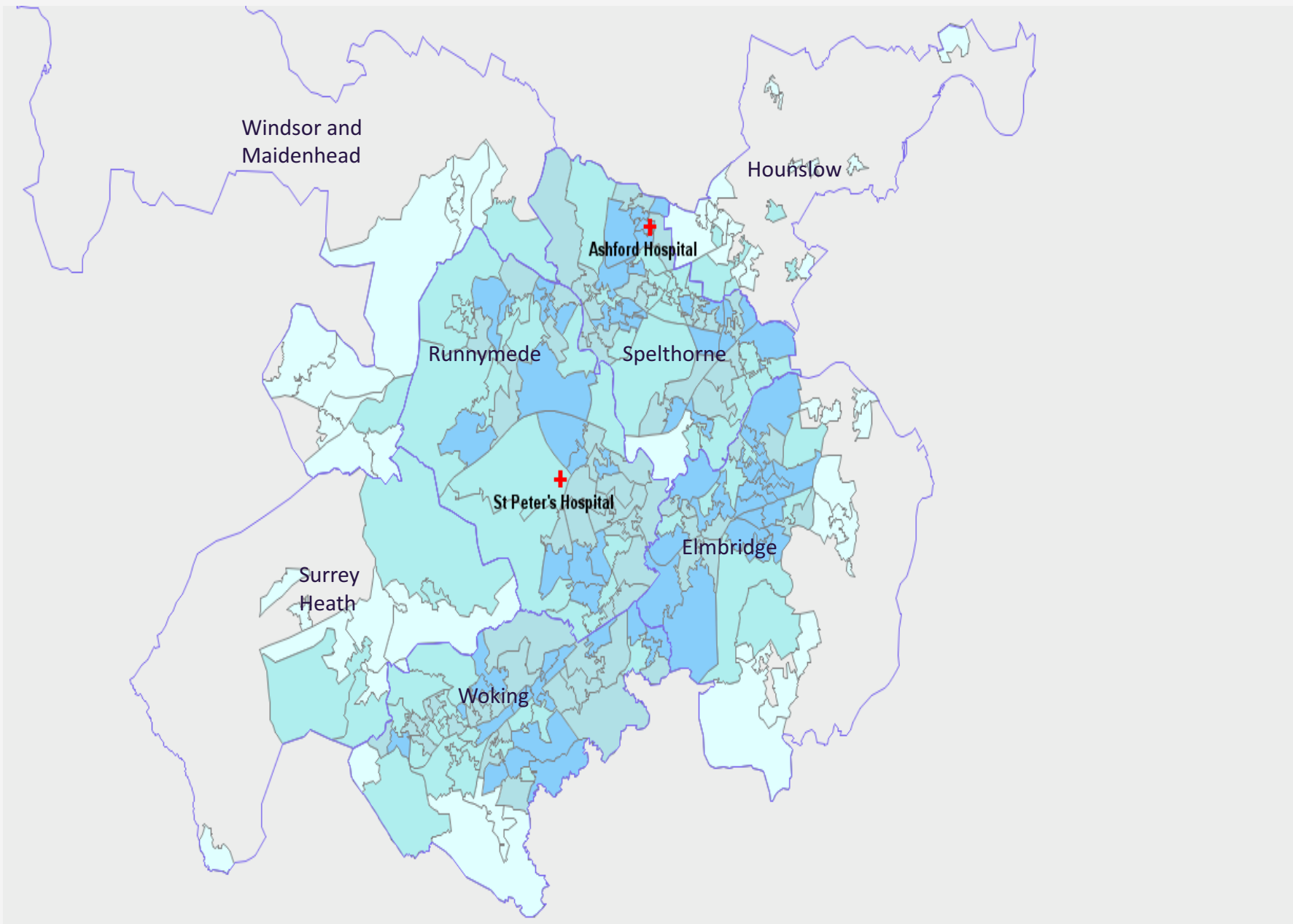
Census Geography hierarchy going from Country to Local authority to MSOA to LSOA to OA

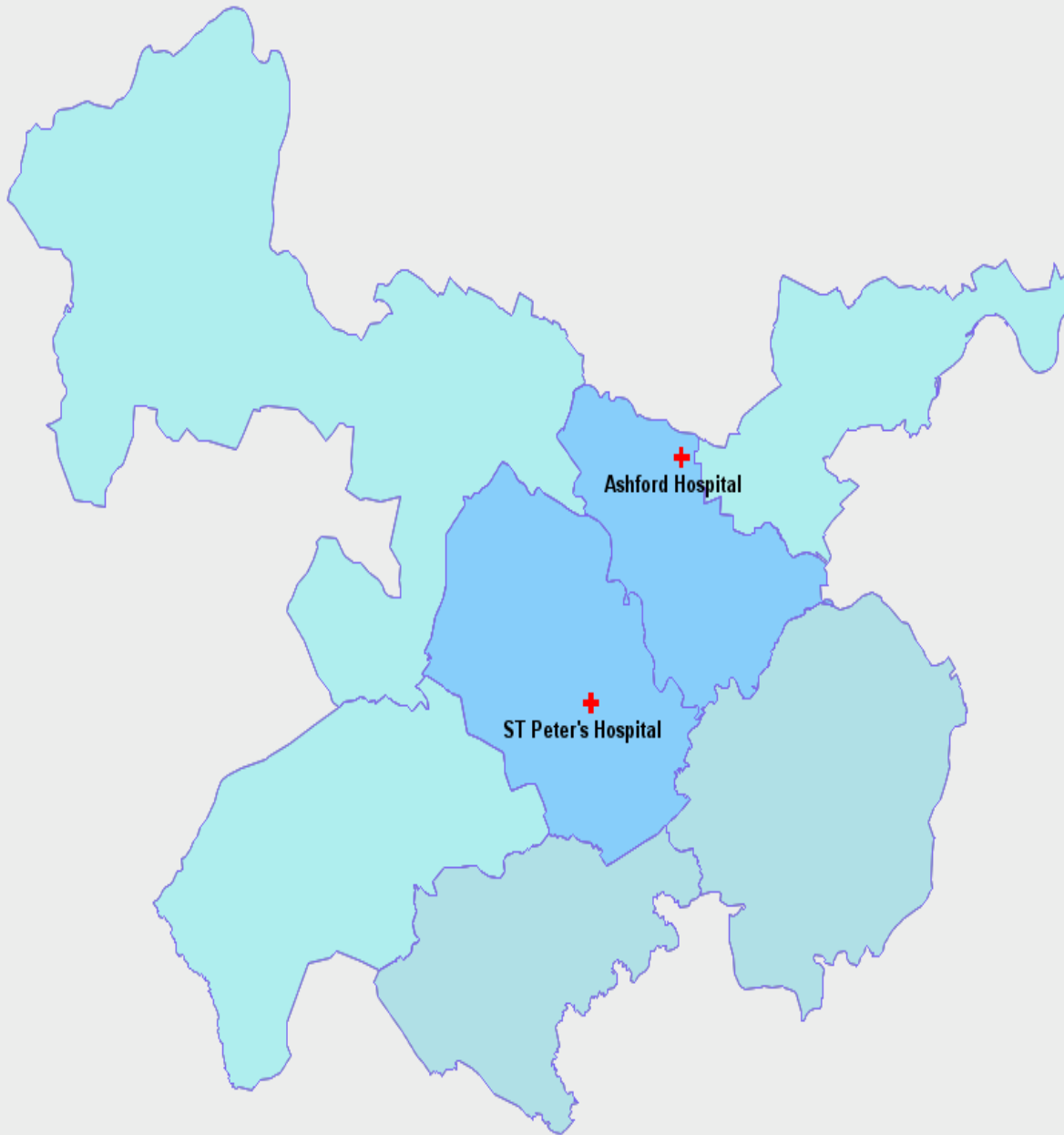






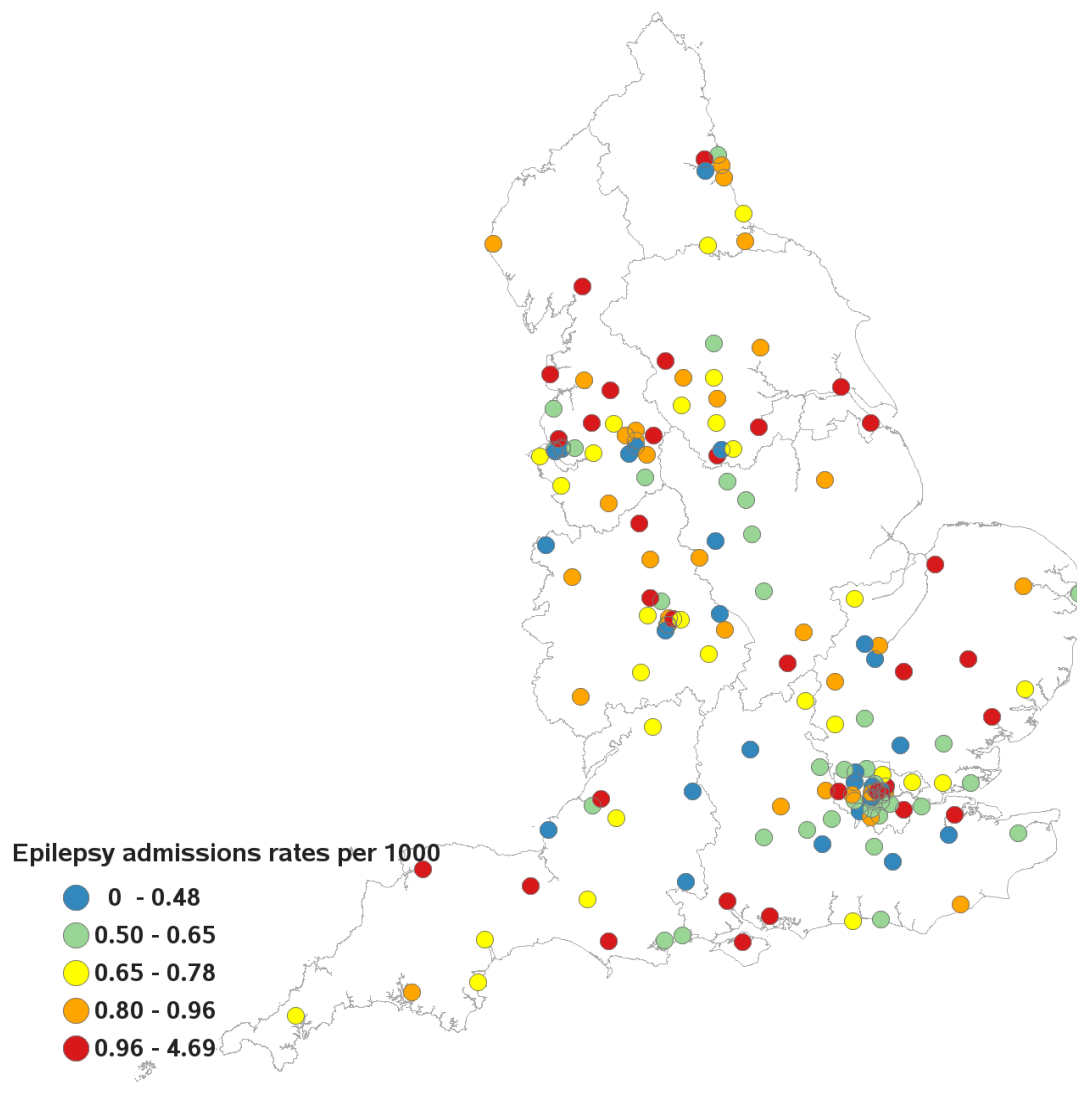




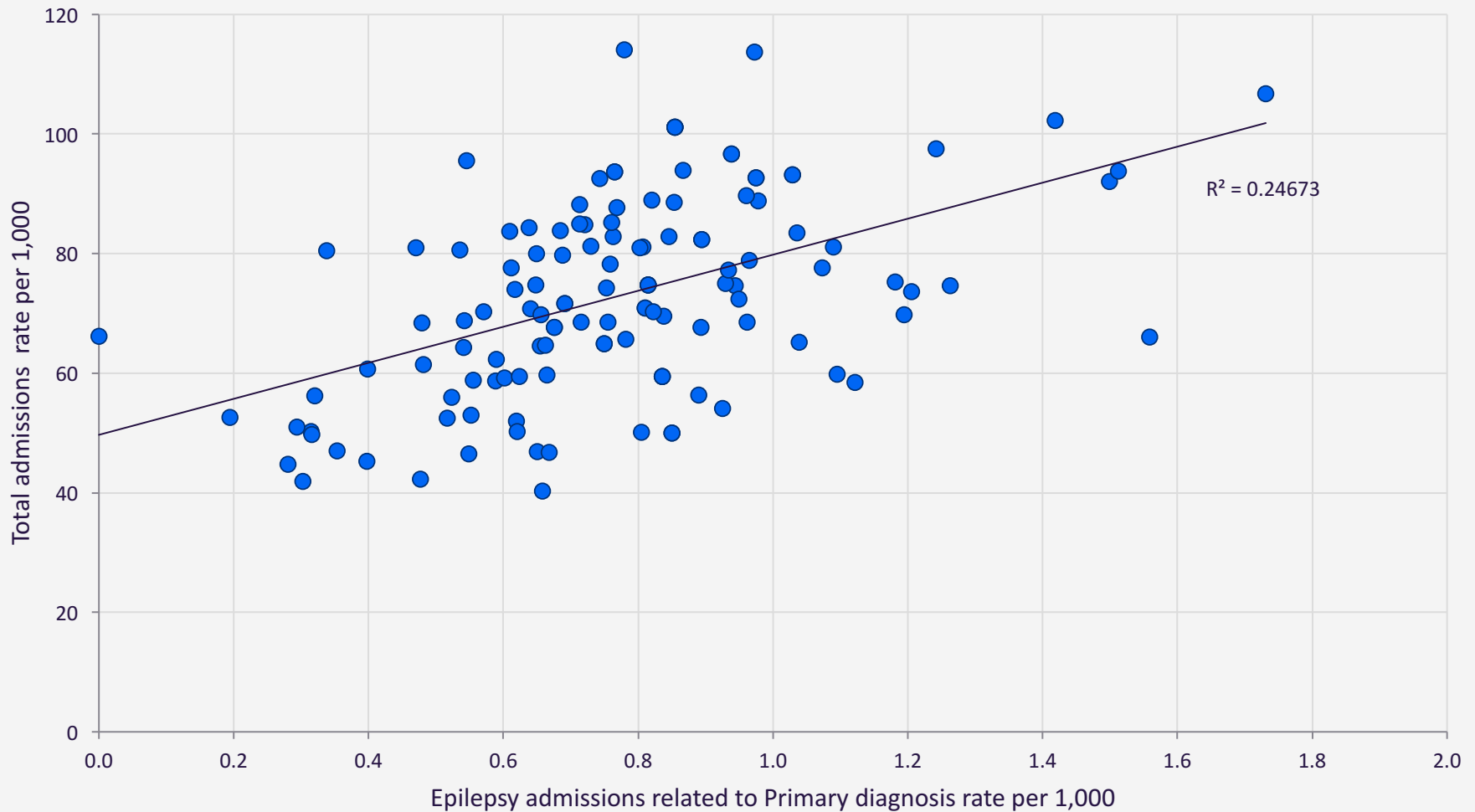


Emergency admission rate for Children aged 0-18 years

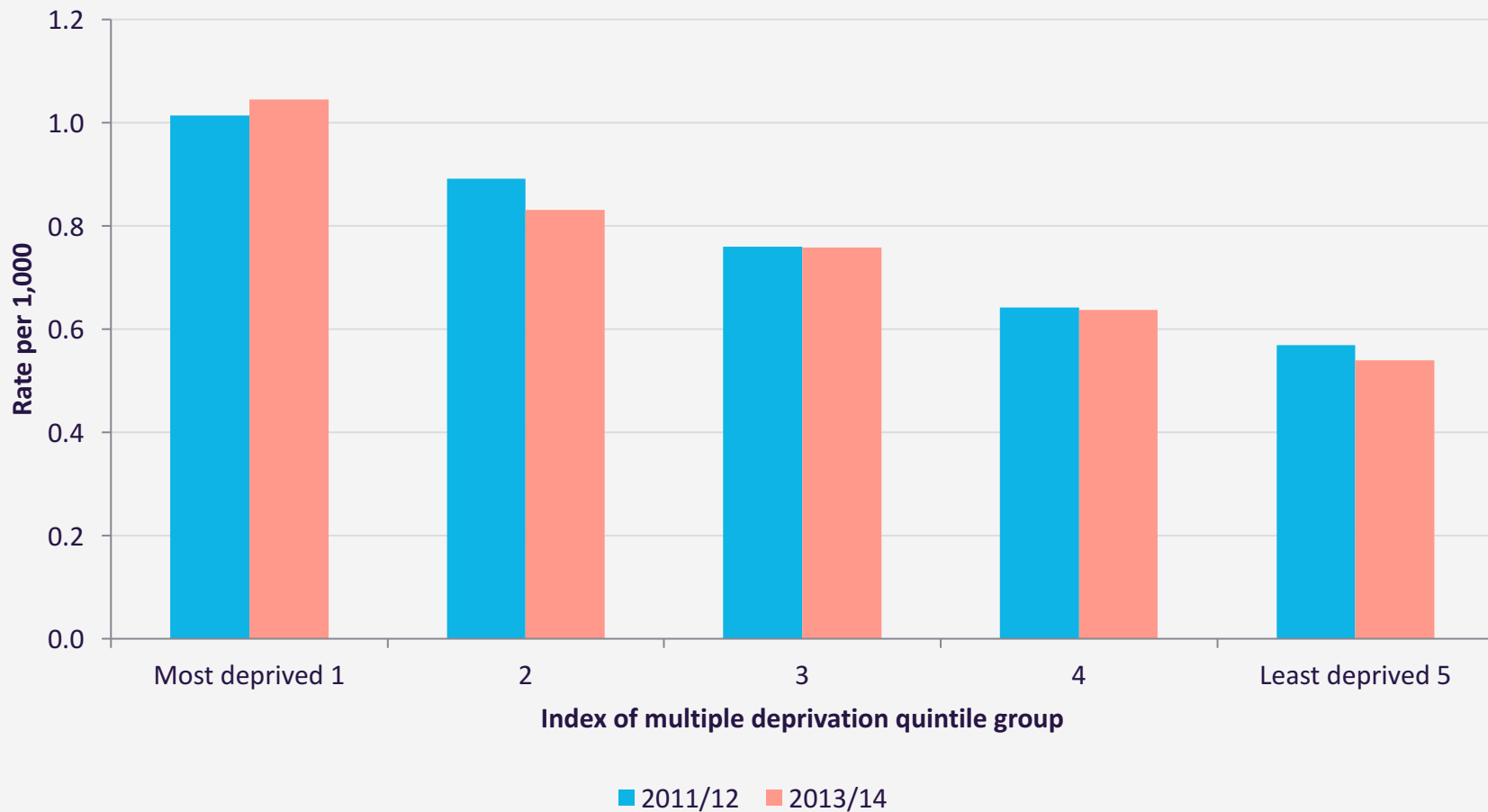
Rate per 1000 in hospital catchment population



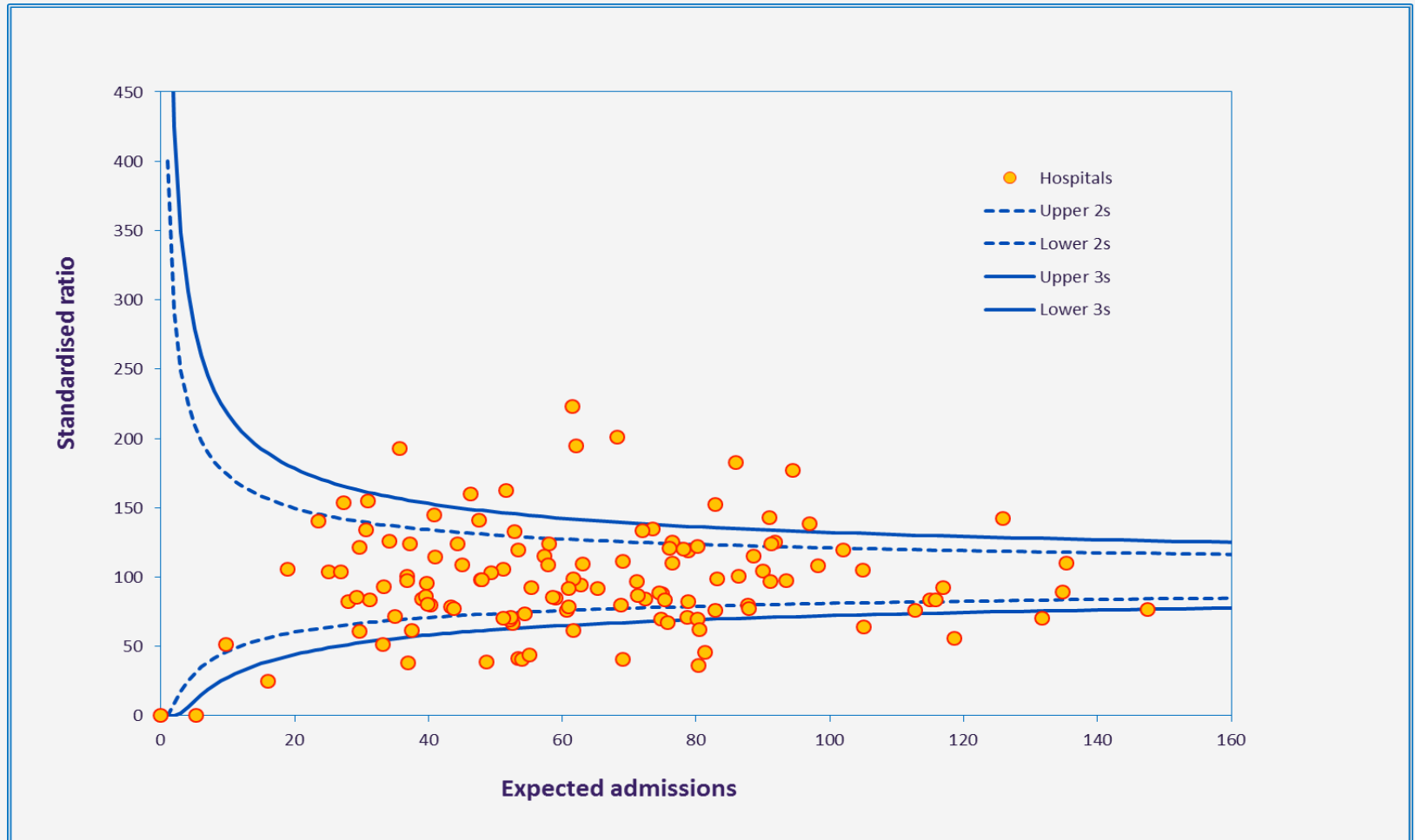
Scatter plot of all causes admission in under 19 years old (excluding tertiary centres) against epilepsy admissions related to Primary diagnosis in 2013/14



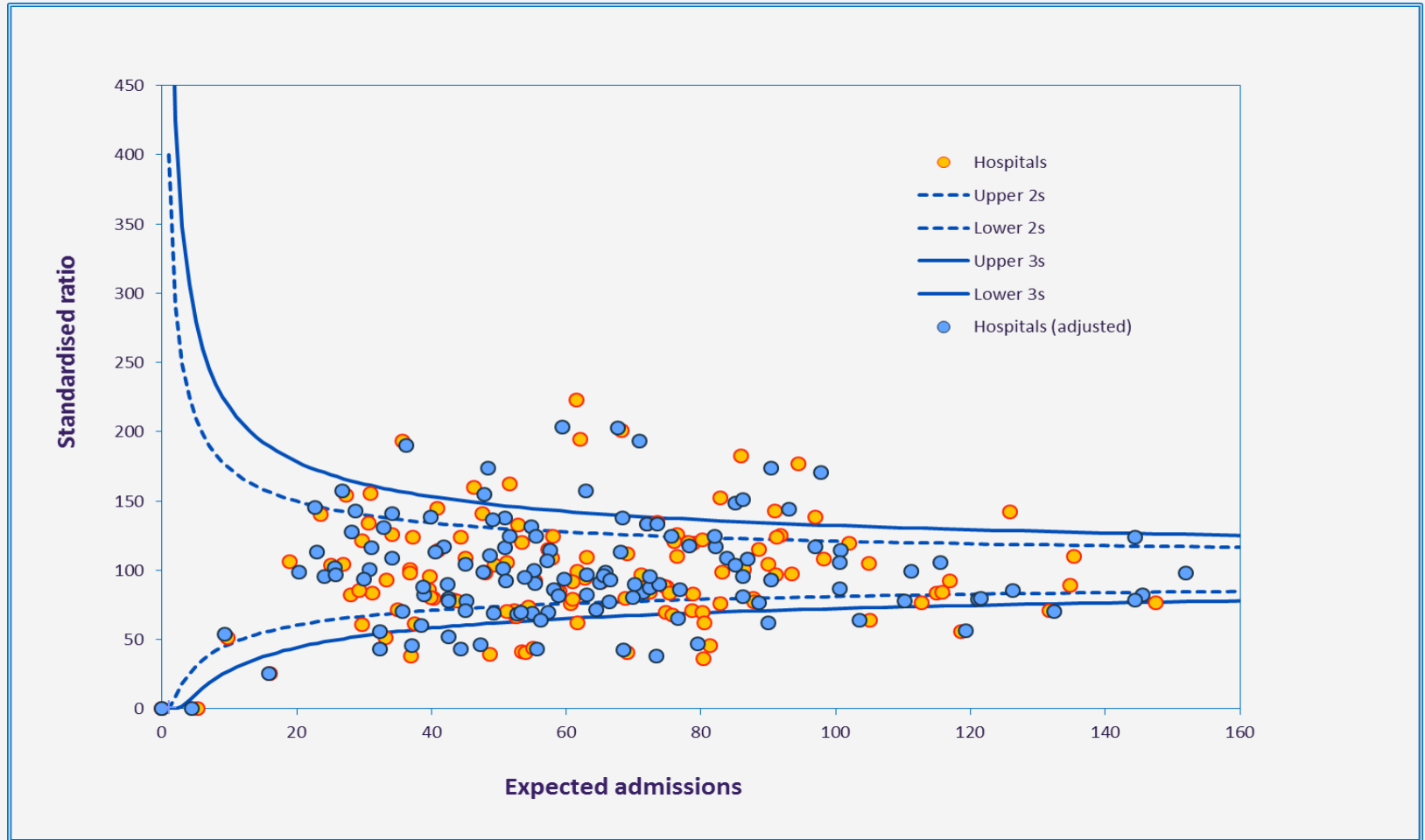
Emergency admissions relating to Primary Epilepsy diagnosis in England between 2011/12 and 2013/14 by IMD quintile



Funnel plot – Epilepsy admissions relating to Primary diagnosis, 2013/14



Funnel plot – Epilepsy admissions relating to Primary diagnosis adjusted for age, sex and deprivation, 2013/14



Cross sectional model

- Poisson regression to examine associations between hospital outcomes and audit indicators.
- The unit of analysis for hospital use is the number of emergency admissions relating to epilepsy to a hospital.
- We included an offset term for the hospital-specific catchment population.

Outcome variable	Independent variables
Emergency epilepsy admissions related to primary diagnosis at hospital level in 2013/14	<ul style="list-style-type: none">• Age• Sex• IMD (Deprivation) <p style="text-align: center;"><u>Audit level indicators</u></p> <ul style="list-style-type: none">• Input by a Paediatrician with expertise in epilepsies.• Input by an Epilepsy specialist nurse.• Input of tertiary care by one year.• Appropriate first clinical assessment.• Appropriate carbamazepine.• Water safety information and advice.• Number of general paediatric consultants.• Number of paediatric consultants with expertise in epilepsies.• Number of epilepsy specialist nurses.• Host paediatric neurology clinics?• Specific clinic for young people with epilepsies?• Handover clinic?

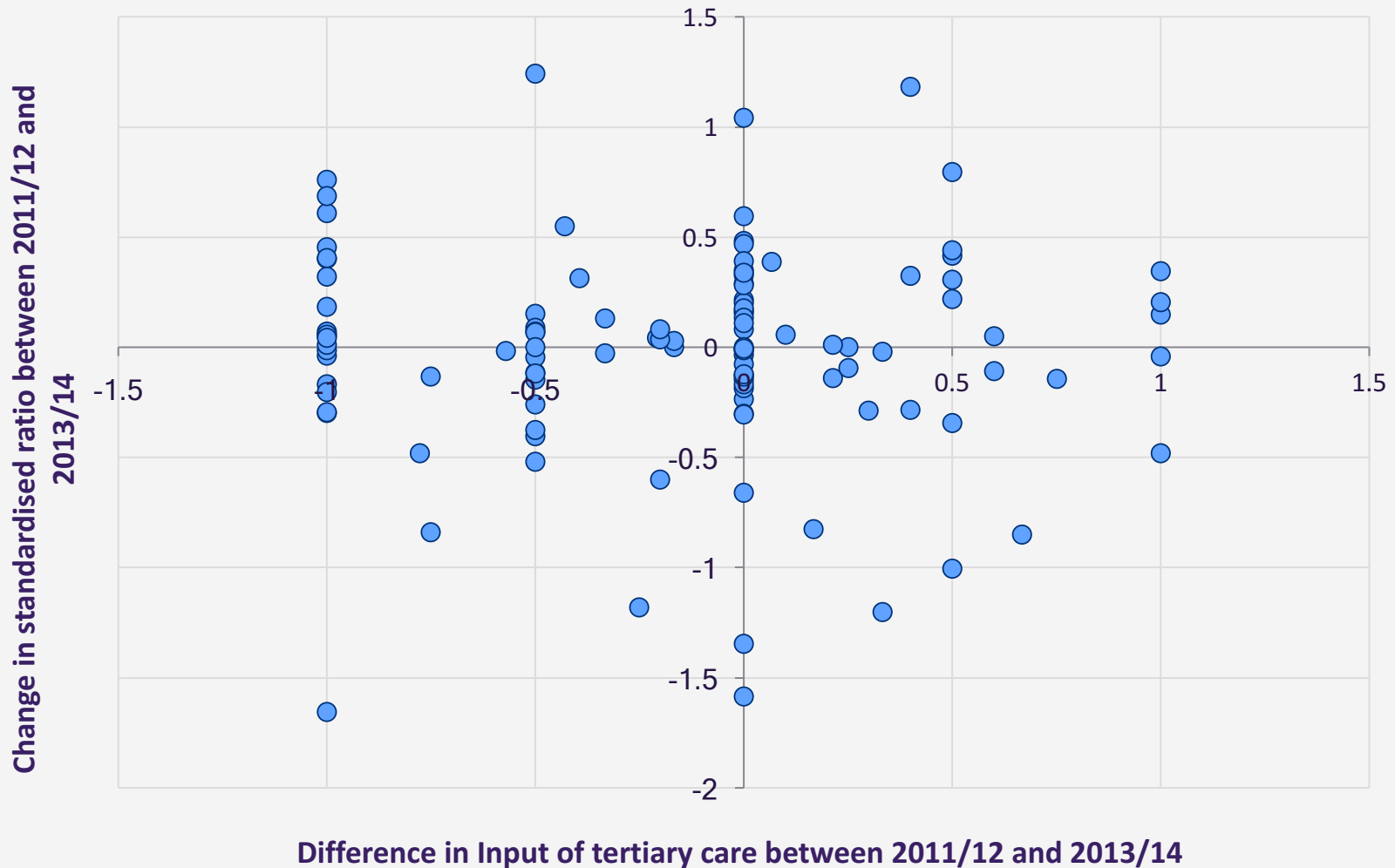
Result of cross sectional model

Variable	Estimate	95% Confidence interval		P value
0-3 years old	-7.8846	-8.0758	-7.6935	<.0001
4-7 years old	0.6588	0.5381	0.7794	<.0001
8-11 years old	0.4769	0.3543	0.5996	<.0001
12-15 years old	0.1215	-0.0074	0.2505	0.0647
16-18 years old	<i>Reference category</i>			
Male	0.0717	-0.0031	0.1464	0.0603
Female	<i>Reference category</i>			
Most deprived 1	0.567	0.4438	0.6901	<.0001
2	0.3809	0.2586	0.5032	<.0001
3	0.2903	0.1666	0.414	<.0001
4	0.1232	-0.0032	0.2496	0.0561
Least deprived 5	<i>Reference category</i>			
1. Input by paediatrician with expertise in epilepsies	0.044	-0.1226	0.2106	0.6045
2. Input by an epilepsy specialist nurse	0.063	-0.027	0.1531	0.1698
3. Input of tertiary care by one year	-0.0407	-0.1351	0.0537	0.3985

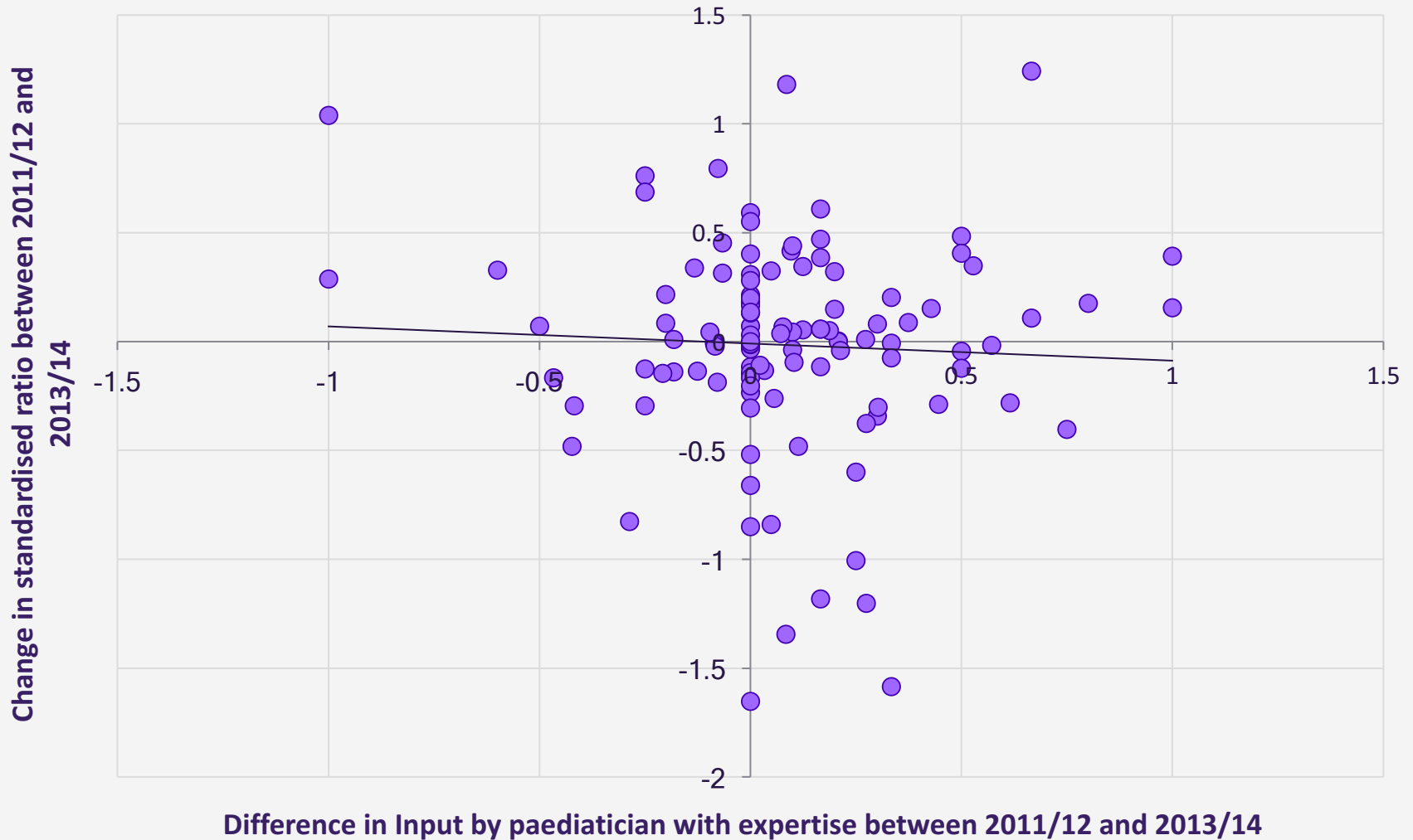
Result of difference-in-difference model

Variable	Estimate	95% Confidence interval		P value
0-3 years old	0.0639	-0.0922	0.2199	0.4222
4-7 years old	-0.0783	-0.2401	0.0835	0.3429
8-11 years old	0.0246	-0.1451	0.1944	0.7760
12-15 years old	0.0115	-0.1591	0.1822	0.8946
16-18 years old	<i>Reference category</i>			
Male	-0.0251	-0.1196	0.0694	0.6028
Female	<i>Reference category</i>			
Most deprived 1	-0.0122	-0.1682	0.1438	0.8782
2	0.05	-0.1074	0.2073	0.5338
3	0.0412	-0.1225	0.205	0.6215
4	0.1121	-0.0573	0.2815	0.1948
Least deprived 5	<i>Reference category</i>			
1. Input by paediatrician with expertise in epilepsies	0.0053	-0.1718	0.1824	0.953
2. Input by an epilepsy specialist nurse	-0.043	-0.1936	0.1076	0.5759
3. Input of tertiary care by one year	0.1254	0.0339	0.2168	0.0072

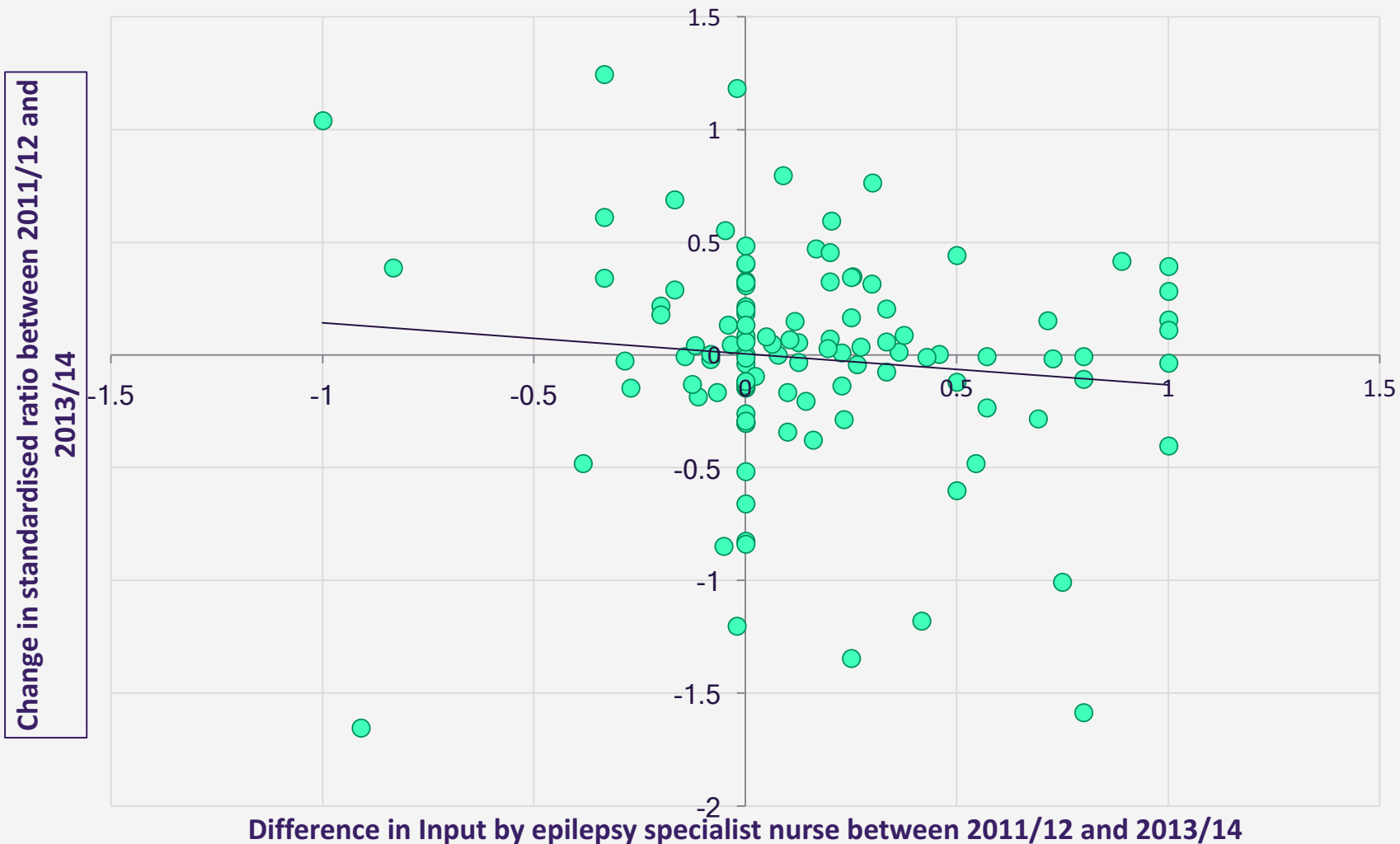
Do difference in proportion of input of tertiary care corresponds to changes in epilepsy admissions?



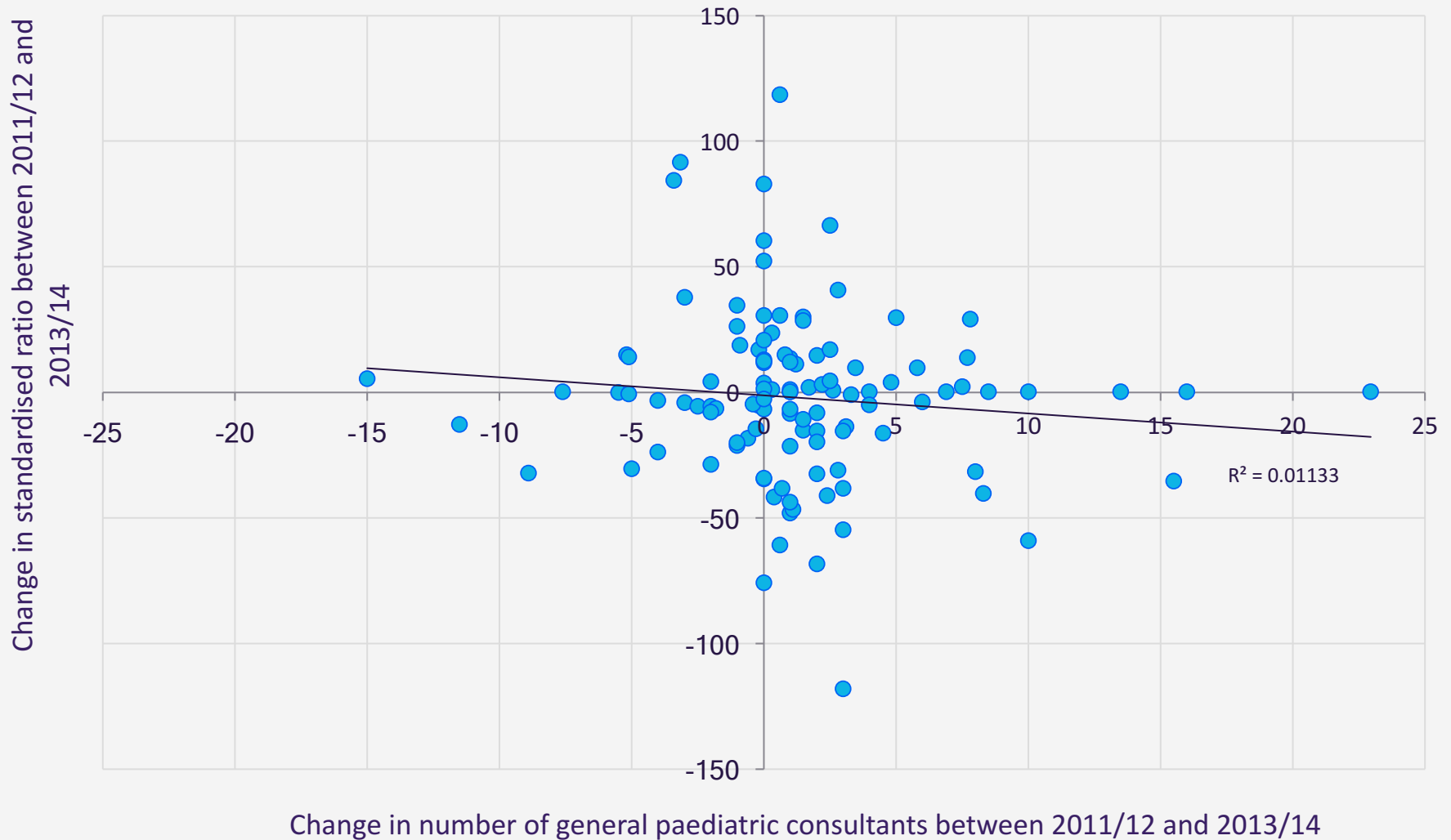
Do difference in proportion of input by paediatrician with expertise in epilepsy corresponds to changes in epilepsy admissions?



Do difference in proportion of input by epilepsy specialist nurse corresponds to changes in epilepsy admissions?



Do difference in number of paediatric consultants corresponds to changes in epilepsy admissions?



Policy implications and next steps

- How robust are these findings? Is there a need for further sensitivity analyses, including different ways of calculating hospital catchment populations?
- Limitations of Epilepsy 12 indicators as quality measures
- Limitations of admission rates as outcome measure.

Further questions/comments/suggestions very welcome!

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