



Air Pollution, housing and respiratory tract Infections in Children: National birth Cohort study (PICNIC)

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Medical
Research
Council



The Telegraph

More than 2,000 children die from pneumonia every day, charities warn

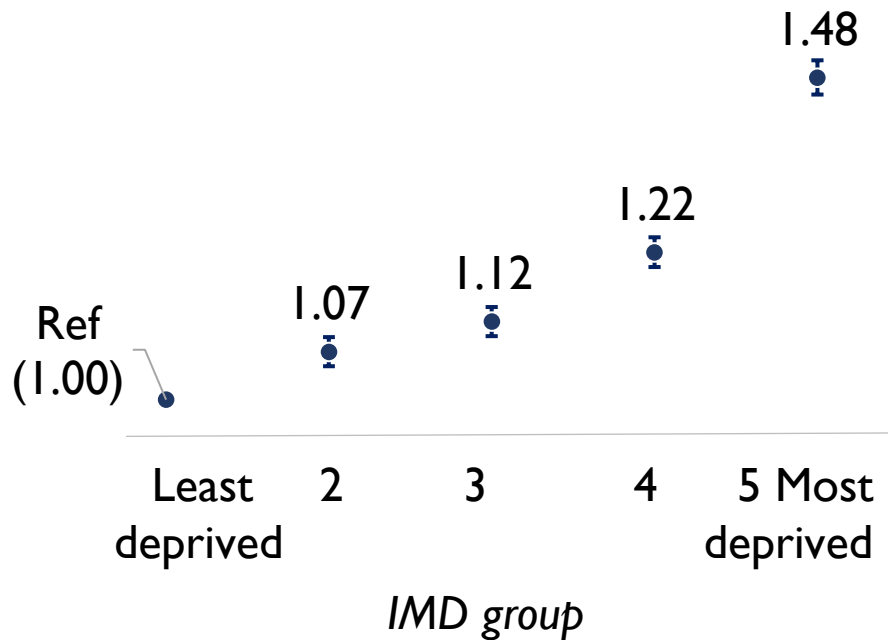


Childhood pneumonia cases up 50% in 10 years, NHS data shows



Poorest areas hardest hit by 'forgotten epidemic' of pneumonia putting a child in hospital every 10 minutes

Fig 3. Rate ratio of bronchiolitis admissions <1 year: England, 2012-2016



Lewis, De Stavola & Hardelid (*J Epidemiol Comm Health*, 2020)

Slide courtesy of
Kate Lewis



Risk factors for admission to hospital with laboratory-confirmed influenza in young children: birth cohort study

Pia Hardelid¹, Maximiliane Verfuenden¹, Jim McMenamin² and Ruth Gilbert¹

Risk factor and scenario[#]

Population-attributable fraction

Age group 1: <6 months

Parity: first child	45.5 (33.5–55.3)
Maternal age: 30–39 years	18.5 (5.5–29.7)
High risk: no	4.5 (1.3–7.7)
Season of birth: April–June	65.8 (49.9–76.6)

Air Pollution, housing and respiratory tract Infections in Children: National birth Cohort study (PICNIC)



Fury as long-awaited UK environment bill is delayed for third time

Green campaigners attack further delay 'to most important piece of legislation for decades'



UK broke law by 'systematically and persistently' breaching air pollution limits, top court rules



Pregnant mum 'living out of bags' in cramped house plagued by mould and mice

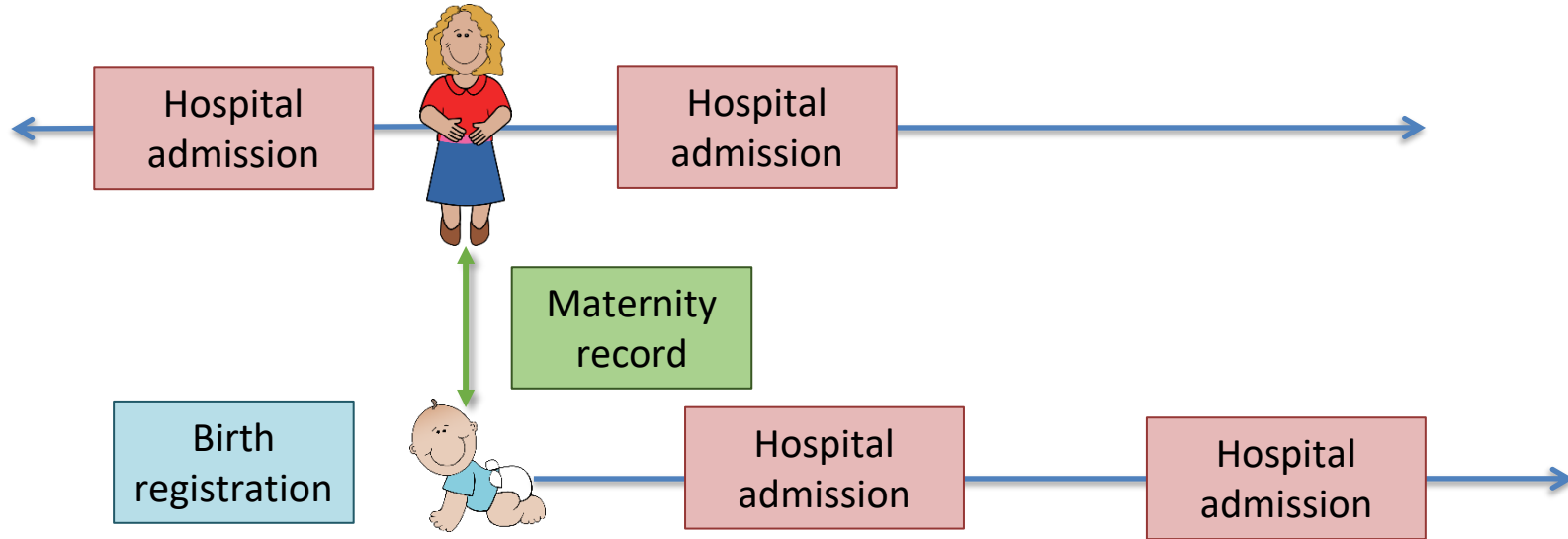
Cramped housing has helped fuel spread of Covid in England - study

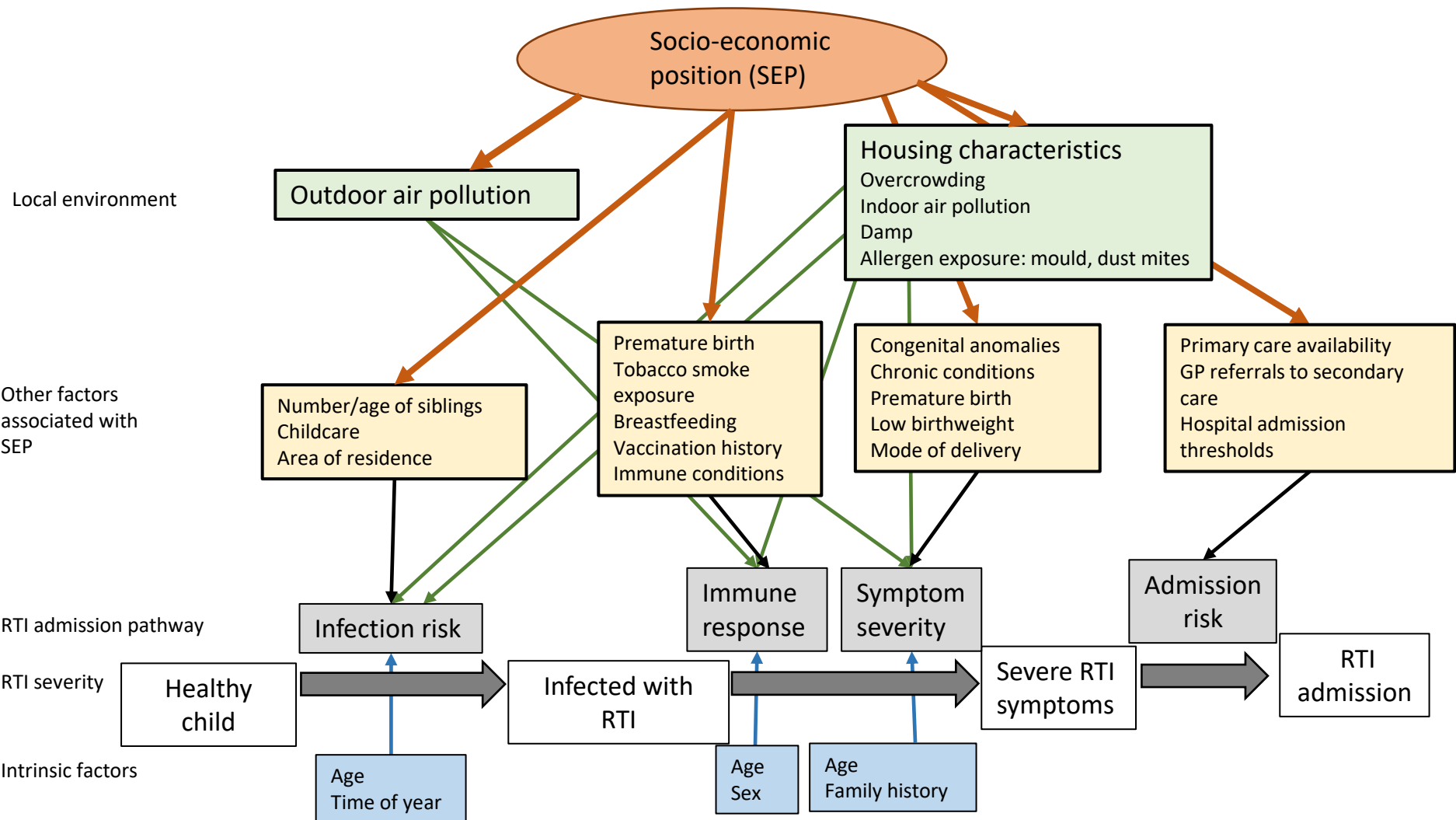


'The worst I've ever seen': The appalling and 'unliveable' council housing conditions some have endured during lockdown

PICNIC Aim:

‘To determine the contribution of exposure to air pollution and adverse housing conditions during pregnancy, infancy and early childhood to hospital admissions for respiratory tract infections (RTIs) in children less than 5 years old in England and Scotland’

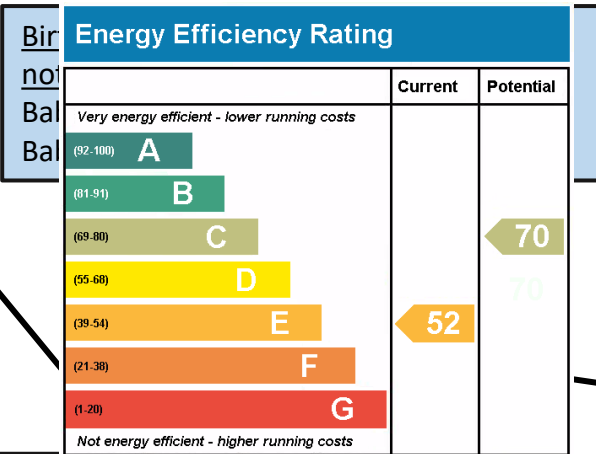




Small area-level data:
Dwelling level data
 EPC data
 HEED data^b
Postcode level data
 DEFRA annual air pollution data 1x1 km grid
Output area level
 Tobacco expenditure data^b

Daily air pollution data
 Greater London – 100x 100m grid
 City of Glasgow – 50x50m grid

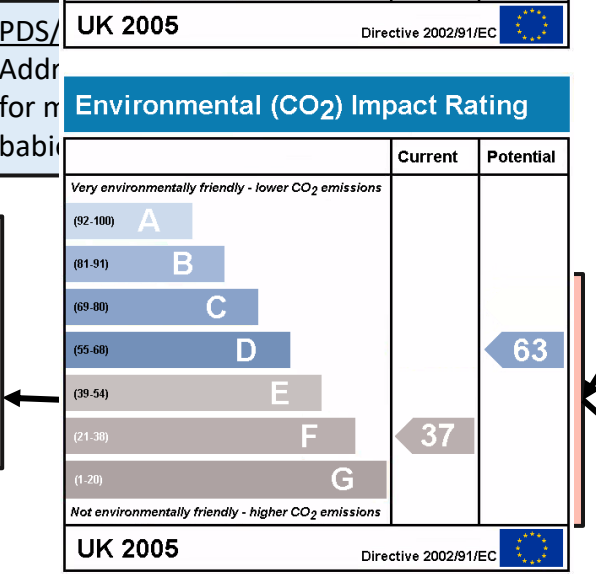
Sub-cohort 1: linked to fine spatio-temporal AP data
 42,000 children born in Glasgow 2009-14
 432,000 children born in Greater London 2010-14



Hospital & mortality records for babies and mothers
 1981-2020 (Scotland)
 2005-2014 (England)

Additional health data available in Scottish cohort
 Vaccination records^a
 Child Health Surveillance Data^a
 Dispensed antibiotics and inhalers^a
 Shielded patient list^a
 Public Health Laboratory Surveillance data^a

2001 Census records^a
 Mother's Census records
 2011 Census records
 Mother's Census records
 Resident partner's Census records^b



Sub-cohort 2: Census linked
 1.5 million children born in England 2010-12
 300,000 children born in Scotland 2000-02 & 2010-12

^aScotland only
^bEngland only

England

1. NHS London Queen's Square Ethics Committee (reference: 18/LO/1514)
2. Confidentiality Advisory group (reference: 18/CAG/0159)
3. Administrative Data Research Network (reference PROJ-194 – note committee is now defunct)
4. ONS Research Accreditation Panel (reference 2019/020)
5. National Statistician's Data Ethics Advisory Committee (reference: 18(07))
6. Independent Group Advising on Release of Data (NHS Digital, reference DARS-NIC-234656)

Scotland

1. Public Benefit and Privacy Committee- Health and Social Care (reference 1819-0049)
2. Public Benefit and Privacy Committee- Statistics (reference 1819-0049)
3. University of Edinburgh School of Geosciences Ethics Committee (reference 2020-401)

BIRTH

CERTIFIED COPY OF AN ENTRY Pursuant to the Births and Deaths Registration Act 1953

BIRTH		<small>Form</small>
<small>Registration district</small>		<small>Administrative area</small>
CHILD		
1. Date and place of birth		
2. Name and surname		
FATHER		
4. Name and surname		
5. Place of birth	6. Occupation	
MOTHER		
7. Name and surname	8. (b) Occupation	
8(a) Place of birth	9. (b) Surname at marriage if different from maiden	
9. (a) Maiden surname		
10. Usual address (if different from place of child's birth)		
11. Name and surname (if not the mother or father)		12. Qualification
INFORMANT		
13. Usual address (if different from that in 10 above)		
14. I certify that the particulars entered above are true to the best of my knowledge and belief		
15. Date of registration	16. Signature of registrar	
17. Name given after registration, and surname		

Certified to be a true copy of an ~~entry~~ register in my custody.

*Suggests Identity Registrar
Registrar
*Scribe not which ever does not apply

CAUTION: THERE ARE OFFENCES RELATING TO FALSIFYING OR ALTERING A CERTIFICATE AND TO OR POSSESSING A FALSE CERTIFICATE. "CROWN COPYRIGHT
System No. 50967648
WARNING: A CERTIFICATE IS NOT EVIDENCE OF IDENTITY.



Household Questionnaire

England

Office for National Statistics



Complete online



www.census.gov.uk

Your personal internet access code is:

OR fill in this paper questionnaire and post it back using the pre-paid envelope supplied.

If your address is incorrect or missing, enter your correct address here:

<small>Postcode</small>	<small> </small>

Declaration

This questionnaire has been completed to the best of my knowledge and belief.

Signature

Date Telephone number

We may contact you if we need to collect missing information.

If you have lost your envelope, please return to: FREEPOST 2011 Census, Processing Centre, UK

Return to:
FREEPOST 2011 Census,
Processing Centre, UK

A message to everyone - act now

Everyone should be included in the census - all people, households and overnight visitors.

It is used to help plan and fund services for your community - services like transport, education and health.

Please complete your census questionnaire on 27 March 2011, or as soon as possible afterwards. You can fill it in online or on paper.

Taking part in the census is very important and it's also compulsory. You could face a fine if you don't participate or if you supply false information.

Your personal information is protected by law. Census information is kept confidential for 100 years.

So help tomorrow take shape and be part of the 2011 Census.

J. N. Matheson

Jil Matheson
National Statistician

Where can you get help?

- www.census.gov.uk
- Census helpline 0300 0201 101
- Text Relay 18001 0300 0201 160

Help is available in large print and Braille

Indices of Deprivation

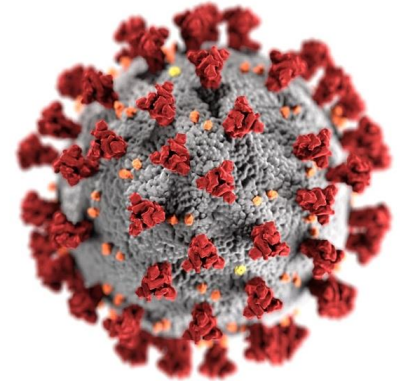
Multiple Deprivation 2020

H1

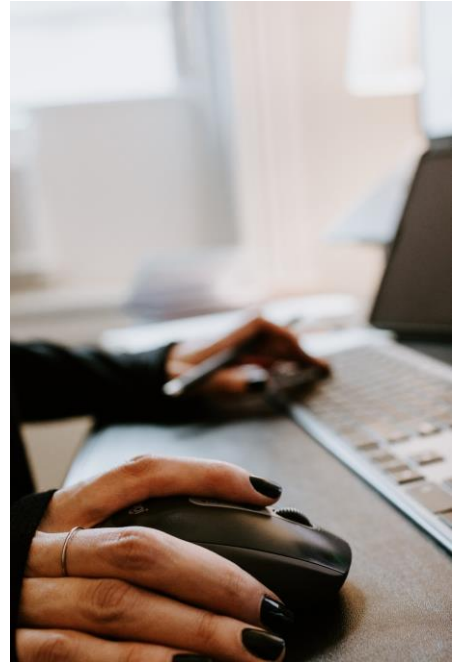
Objectives

- 1) determine the risk of:
 - a) SARS-CoV-2 test
 - b) SARS-CoV-2 infection
 - c) COVID19-related hospital admission
 - d) Multisystem Inflammatory Syndrome in Children
 - e) COVID-related intensive care unit stay

- 2) establish how these risks vary according to clinical, family and socio-demographic risk factors



- All approvals are now in place (including amendments –almost!)
- Air pollution data downloaded and mapped to postcodes
- EPC data mapped to postcodes
- Comparison of air pollution exposures during pregnancy according to different spatio-temporal resolution
- Cleaning and validation of English & Scottish birth cohorts
- Derivation of outcomes for SARS-CoV-2 study



Air pollution exposure assigned at postcode level

Methodology

- i. Match exposure data to UK postcodes using geographical x & y coordinates
- ii. Next → Link exposure data with the postcode of the cohorts home address

Data sources

Air pollution

- Department for Environment, Food and Rural Affairs (DEFRA)
- Cambridge Environmental Research Consultants (CERC)

Postcodes

- Office for National Statistics (ONS) postcode directory

	DEFRA	CERC
Air pollutants	PM10, PM2.5, NO2, NOx, CO, SO2, O3, benzene	PM10, PM2.5, NO2, O3
Spatial resolution	1x1km grid*	100x100m grid*
Temporal resolution	Annual	Daily
Coverage (years)	2001-2018	2010-2014
Coverage (geography)	England & Scotland	Greater London
Geographical identifier in dataset	x & y co-ordinates of each grid cell	x & y co-ordinates of each grid cell
Linking variable (to mother-birth cohorts)	Postcode*	Postcode*
*All based on the Ordnance Survey (OS) National Grid reference system (also known as British National Grid)		

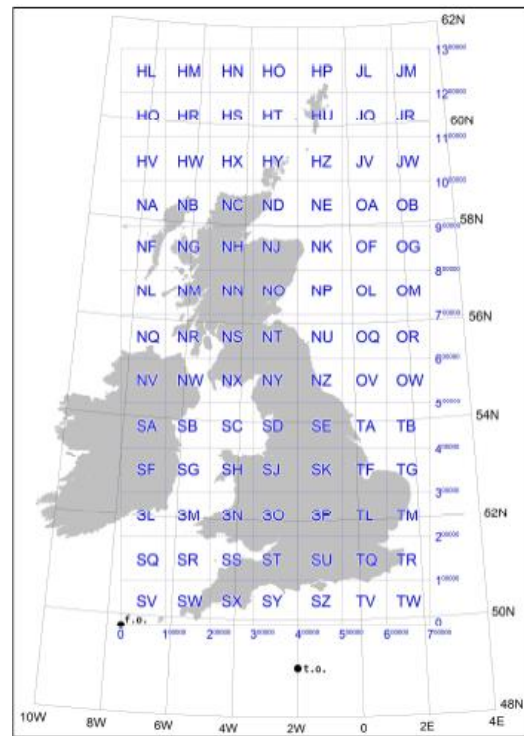
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- A postcode designates an area with several addresses or a single major delivery point
- On average 15 properties per postcodes, but it can be anywhere between 1 and 100
- 1.8 million postcodes in use in UK
- ~380,000 in Greater London

POSTCODE			
Outward code		Inward code	
Area	District	Sector	Unit
WC	1N	1	EH

ONS postcode directory

- All postcodes ever used in UK since introduction of system.
- Start and end dates when postcode in use.
- X and Y geographical co-ordinates of postcodes based on the British National Grid

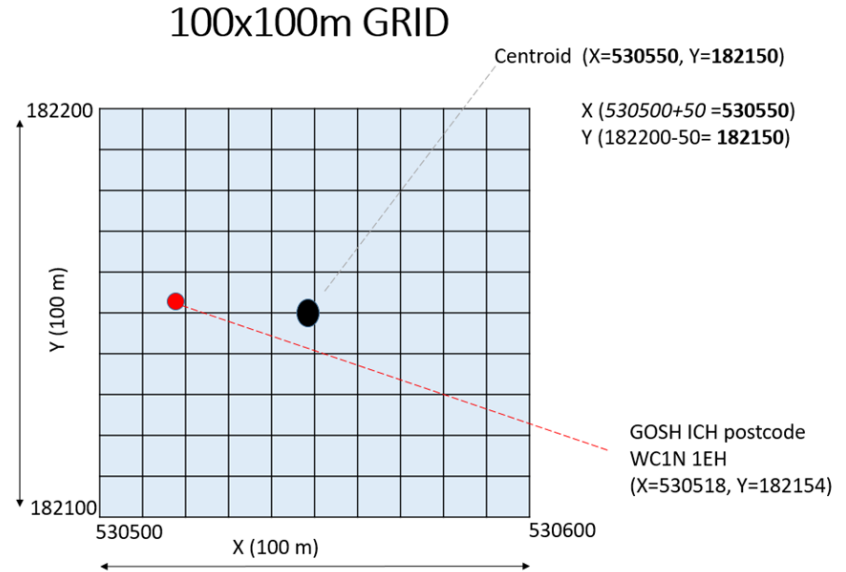


The British National Grid

Copyright Ordnance Survey 2018

Geographical coordinates of each postcode mapped to the nearest centroid of each:

- 1×1 km grid for the DEFRA air pollution data;
- 100x100m grid for the CERC air pollution data.



The 100x100m grid of coordinates (X=530500, 182200), its centroid and the geographical coordinates of the postcode for GOSH ICH, University College London

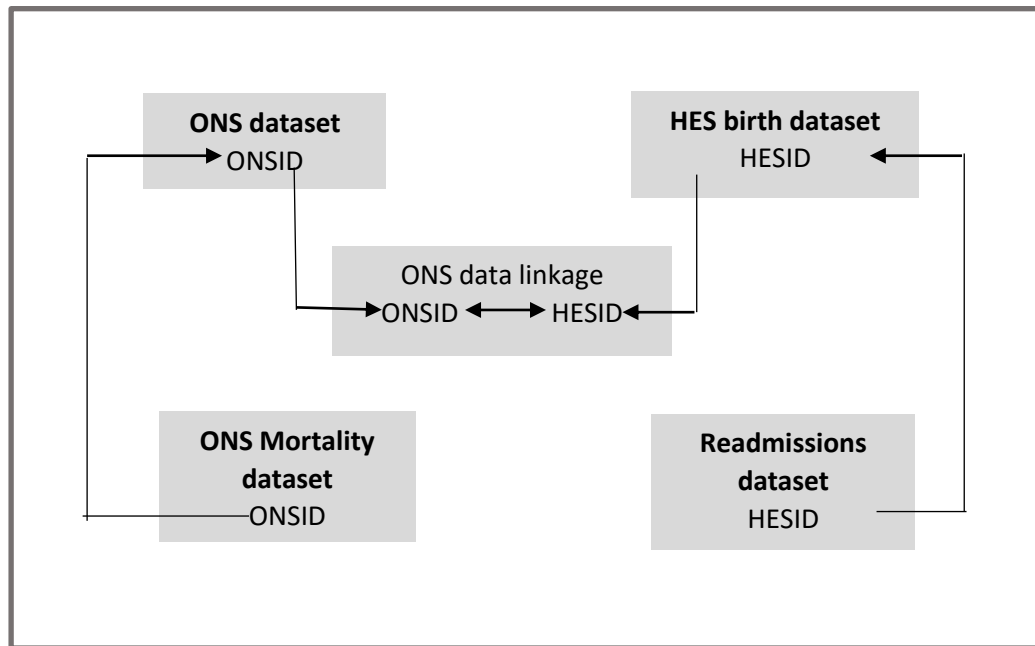
DEFRA data linkage – England and Scotland

- Over 108,000 1x1km grids with at least one postcode
- On average there are 22 postcodes in a grid in England and 11 in Scotland
- Total size of data files with air pollution data and mapped postcodes: ~ 16 GB

CERC data linkage – Greater London

- Over 111,000 100x100m grids with at least one postcode
- On average 2/4 postcodes in a grid
- Total size of data files with air pollution data and mapped postcodes: ~ 11 GB

Diagram showing how the children identifiers were used to link the Office for National Statistics (ONS) dataset with the Hospital Episodes Statistics (HES) dataset



- ONS birth registration data in England for 2005-2014 were linked with the HES Birth dataset
- ~ 5,970,000 (92.8%) live birth singleton were successfully linked with a hospital birth record
- Children with missing link more likely to be born at home, in a private place or in the earlier years of the cohort
- ~2,250,000 children had a record of hospital admission during the same period

Disclaimer

This work was produced using statistical data from ONS. The use of the ONS statistical data in this work does not imply the endorsement of the ONS in relation to the interpretation or analysis of the statistical data.

This work uses research datasets which may not exactly reproduce National Statistics aggregates.

Project partners

UCL GOS ICH: Pia Hardelid, Graziella Favarato, Linda Wijlaars,
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University of Edinburgh: Steve Cunningham, Chris Dibben, Tom Clemens



Tampere University: Jonathon Taylor

City, University of London: Alison Macfarlane

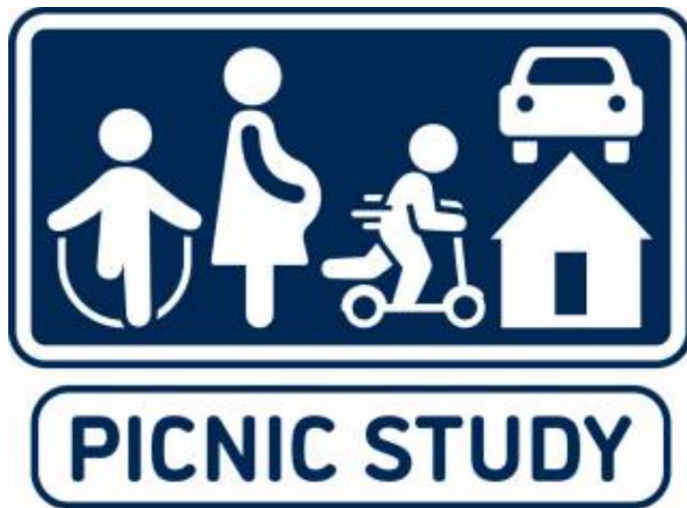
Charity collaborators: Shelter, British Lung Foundation/Clean Air Parents Network



Public Health Scotland: Rachael Wood, Lynda Fenton, Jim McMenamin

Funding: Medical Research Council





<https://www.ucl.ac.uk/child-health/picnic-study>