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Using routine coverage data to identify immunisation inequalities in England

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Why measure vaccine coverage?

- Nationally:
  - ❑ evaluation of vaccine programme delivery
  - ❑ assessment of the overall level of population protection
  - ❑ Estimation of vaccines' effectiveness and impact
  - ❑ policy decision-making
- Locally:
  - ❑ performance management
  - ❑ risk assessment
  - ❑ identifying under-immunised groups or areas
  - ❑ responding to community outbreaks of vaccine-preventable diseases
- Timely and high quality vaccine coverage data enables better delivery of vaccine programmes

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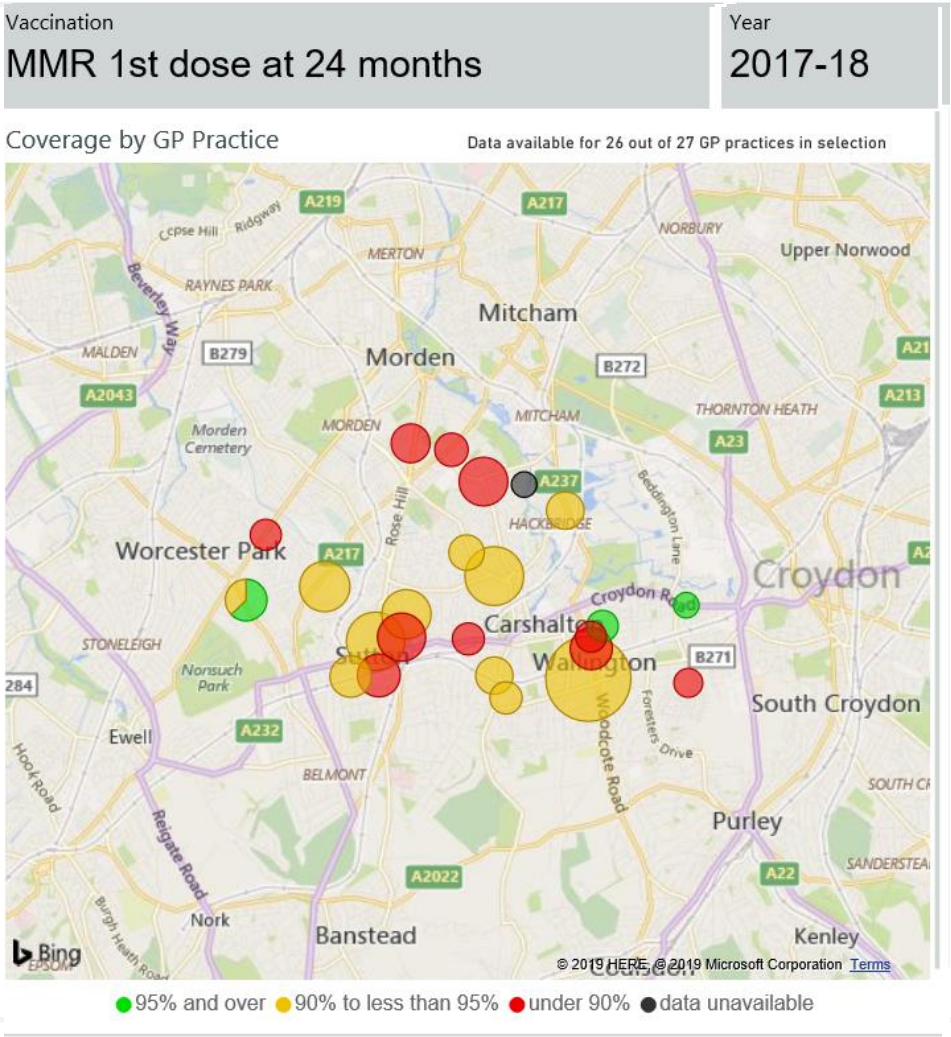
Geographical inequalities



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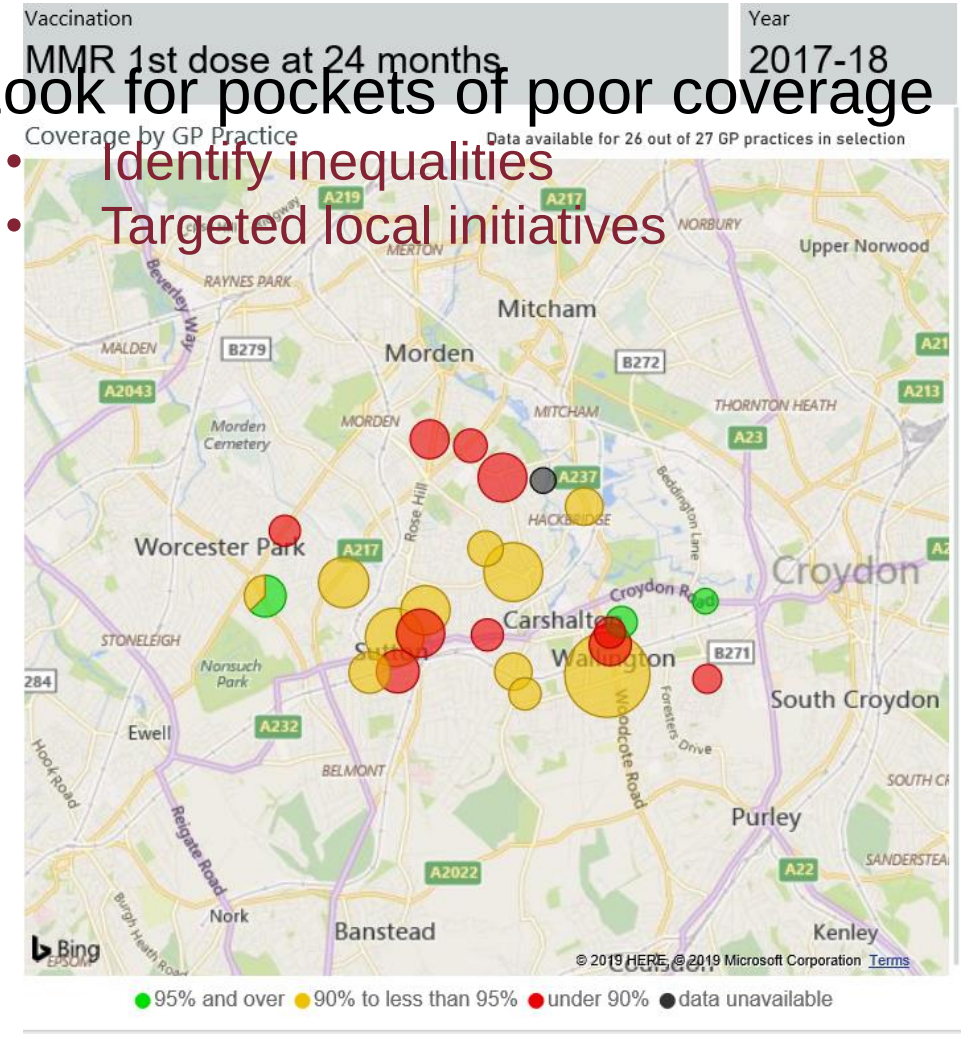
Why do we need to know?

Look for pockets of poor coverage

- Identify inequalities
- Targeted local initiatives



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Monitoring along the life course

Vaccines given

COVER

ImmForm

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ImmForm vs. COVER

COVER : CHIS collection

- Includes unregistered children
- Aggregated at LA level (soon at GP level)
- Good for assessing total coverage of completed courses for target age groups in **routine childhood programme**
- Can maintain full immunisation details up to 19 years, even if child moves
- Authoritative data source

ImmForm : GP collections

- GP registered population only
- Aggregated up from practice-level
- Have accurate records of vaccines recently given in general practice
- Timely data collection (up to weekly)
- Can provide a “snapshot” of coverage trends before COVER submissions are received
- Data “updated” if extracted again
- Can extract additional variables

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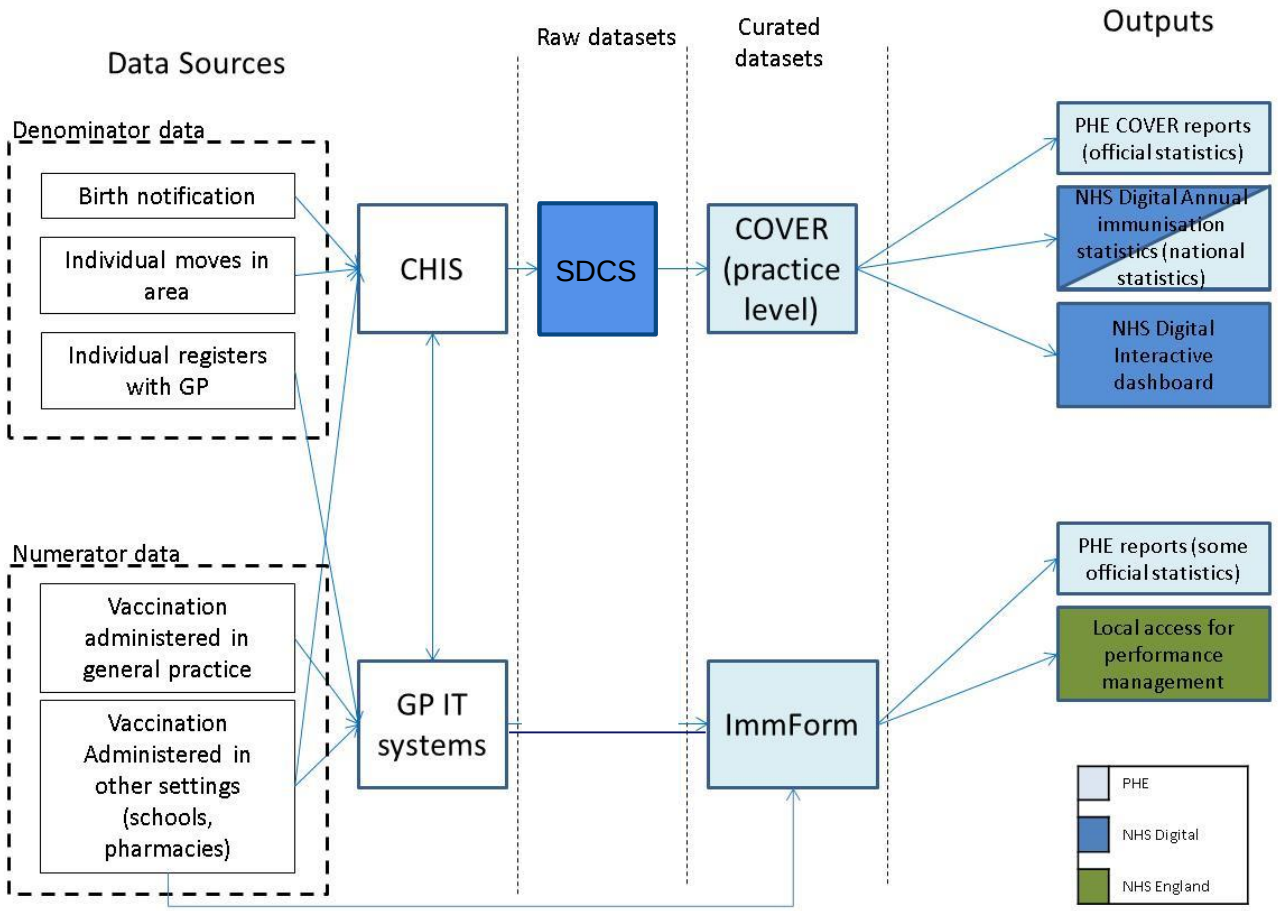
Vaccine coverage data flows



Abbreviations: CHIS: Child Health Information System; GP: General practice; COVER: Coverage of vaccination evaluated rapidly; PHE: Public Health England

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Understanding vaccine coverage inequalities- methods

Literature-based	Quantitative	Qualitative

• Systematic reviews
• Policy/evidence reviews
• Published & grey literature, key informants
	• Descriptive epidemiology
	  • Data triangulation
	• Regression modelling
	  • Individual level, aggregated and ecological-level variable within single models
		• Stakeholder interviews
		  • Questionnaires, semi-structured interviews, focus groups
		  • patients & professionals
		• Systems observation
		  • Time in motion studies

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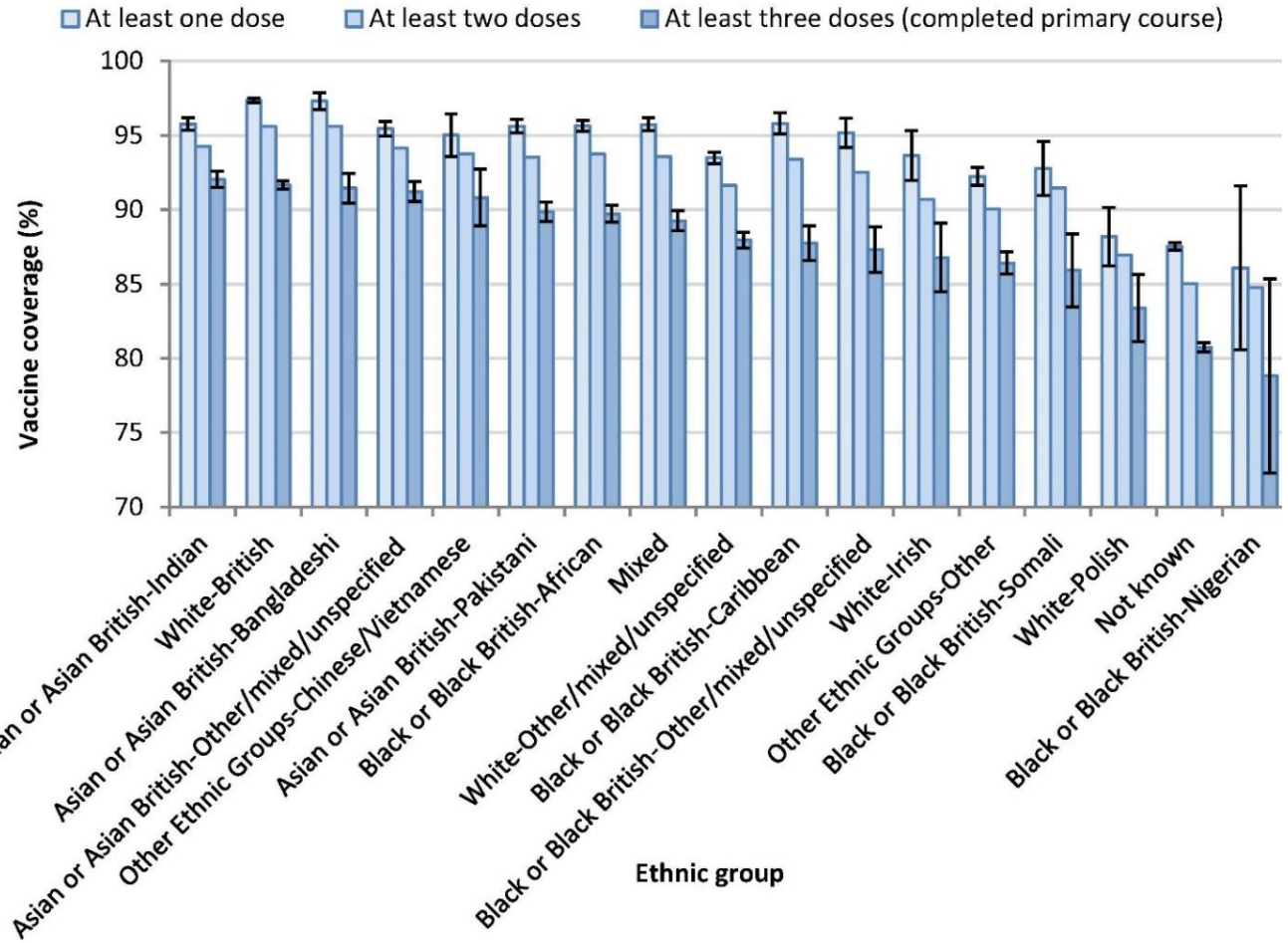
What do we do with the data?

DTP Vaccination coverage of children at five years for children born April 2001 to March 2006, London




Contents lists available at ScienceDirect
Vaccine
journal homepage: www.elsevier.com/locate/vaccine

Inequalities in childhood vaccination timing and completion in London

Karen S. Tiley [a,*], Joanne M. White [a], Nick Andrews [b], Mary Ramsay [a], Michael Edelstein [a]

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What do we do with the data?

Coverage differences of maternal pertussis vaccination, April 2014–March 2015

	No. patients	No. vaccinated	% Crude coverage	−/+95% CI		% Adjusted coverage difference[a]	−/+95% CI		*P*-value
All patients	191 533	109 927	57·4	57·2	57·6	n/a			
NHS England local team									
London	54 724	27 080	49·5	49·1	49·9	(ref)			
Central Midlands	8560	5454	63·7	62·7	64·7	6·2	5·0	7·3	<0·001
Cheshire and Merseyside	8970	5705	63·6	62·6	64·6	10·5	9·4	11·6	<0·001
Cumbria and North East	6846	4528	66·1	65	67·3	11·7	10·5	12·9	<0·001
East	5429	3267	60·2	58·9	61·5	4·7	3·3	6·1	<0·001
Lancashire and Great Manchester	20 052	11 246	56·1	55·4	56·8	5·2	4·3	6·0	<0·001
North Midlands	9511	6123	64·4	63·4	65·3	9·6	8·5	10·6	<0·001
South Central	15 235	9200	60·4	59·6	61·2	3·0	2·0	3·9	<0·001
South East	14 725	8799	59·8	59	60·5	2·8	1·9	3·8	<0·001
South West	10 308	6322	61·3	60·4	62·3	6·2	5·2	7·3	<0·001
Wessex	9083	5891	64·9	63·9	65·8	7·0	5·9	8·2	<0·001
West Midlands	20 320	11 404	56·1	55·4	56·8	5·4	4·5	6·2	<0·001
Yorkshire and Humber	7770	4908	63·2	62·1	64·2	9·9	8·7	11·1	<0·001
IMD quintile									
1 (0·85–10·65)	38 313	25 180	65·7	65·2	66·2	(ref)			
2 (10·7–18·6)	38 530	25 263	66·7	66·2	67·2	−4·2	−4·0	−5·4	<0·001
3 (18·7–28·3)	38 278	22 179	57·9	57·5	58·4	−6·4	−5·7	−7·1	<0·001
4 (28·4–40·82)	38 351	20 415	53·2	52·8	53·7	−9·9	−9·1	−10·6	<0·001
5 (40·83–46·4)	38 261	18 890	49·4	48·9	49·9	−14·0	−13·2	−14·8	<0·001
Ethnic group									
White-British	110 235	69 016	62·6	62·3	62·9	(ref)			
White-Irish	1210	670	55·4	52·6	58·2	−4·4	−7·2	−1·6	0·002
White-other	28 148	13 882	49·3	48·7	49·9	−9·6	−10·3	−8·9	<0·001
Mixed: white and black Caribbean	1163	533	45·8	43·0	48·7	−11·5	−14·4	−8·7	<0·001
Mixed: white and black African	1150	512	44·5	41·6	47·4	−12·8	−15·7	−9·9	<0·001
Mixed: white and Asian	851	452	53·1	49·8	56·5	−6·1	−9·4	−2·7	<0·001
Mixed: other	1482	734	49·5	47·0	52·1	−8·7	−11·3	−6·2	<0·001
Indian	8047	4855	60·3	59·3	61·4	1·7	0·6	2·8	0·003
Pakistani	8900	4363	49·0	48·0	50·1	−7·7	−8·9	−6·6	<0·001
Bangladeshi	5181	2951	57·0	55·6	58·3	3·3	1·8	4·7	<0·001
Asian other	5546	3090	55·7	54·4	57·0	−2·6	−4·0	−1·3	<0·001
Black Caribbean	2035	798	39·2	37·1	41·3	−15·4	−17·6	−13·2	<0·001
Black African	8296	3767	45·4	44·3	46·5	−9·4	−10·5	−8·2	<0·001
Black other	2310	876	37·9	35·9	39·9	−16·3	−18·3	−14·2	<0·001
Chinese	2107	1311	62·2	60·1	64·2	3·0	1·0	5·1	0·004
'Other' ethnic group	4872	2117	43·5	42·1	44·8	−13·7	−15·2	−12·1	<0·001

Epidemiol. Infect. (2018), **146**, 197–206.
doi:10.1017/S0950268817002497

Predictors of coverage of the national maternal pertussis and infant rotavirus vaccination programmes in England

L. BYRNE*, C. WARD, J. M. WHITE, G. AMIRTHALINGAM AND M. EDELSTEIN

Immunisation, Hepatitis and Blood Safety Department, National Infections Service, Public Health England, London, UK

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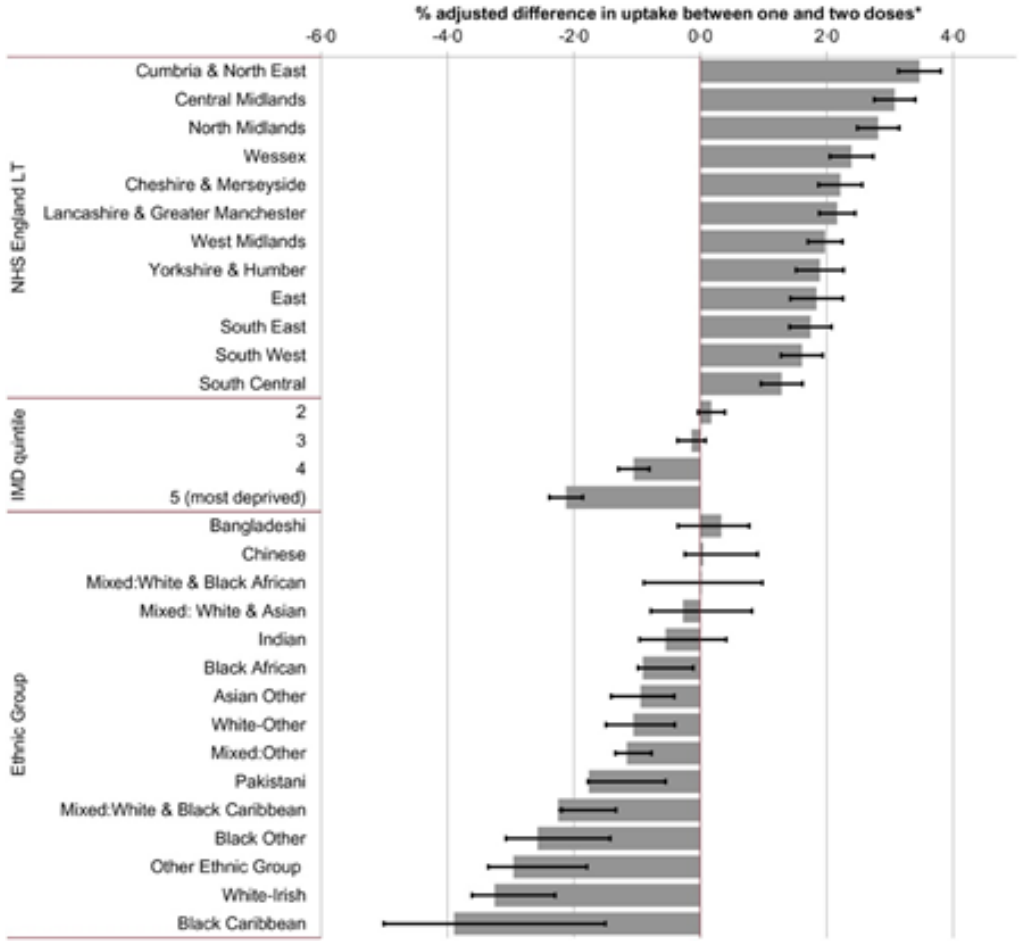
What do we do with the data?

Coverage differences of rotavirus vaccination, April 2014–March 2015



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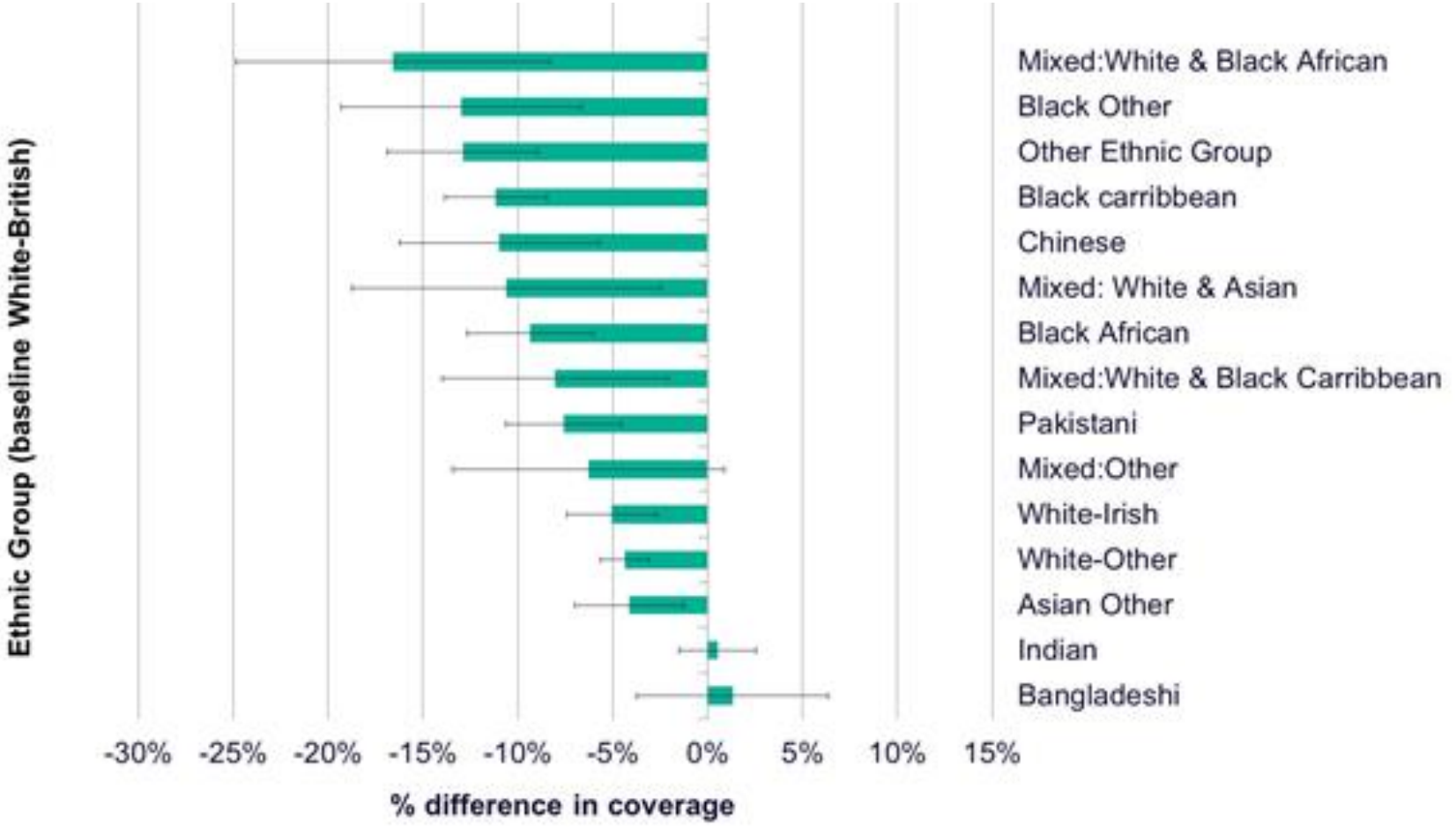
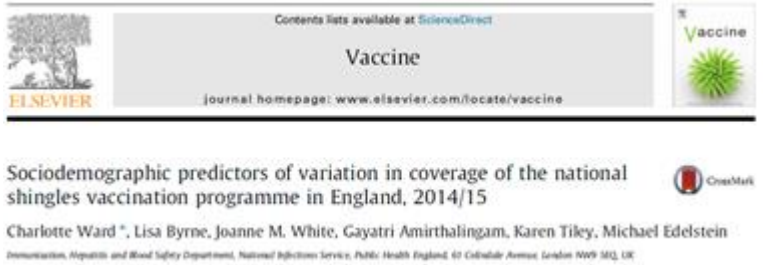
What do we do with the data?

Coverage differences of shingles vaccination, September 2014–August 2015

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Sociodemographic predictors of variation in coverage of the national shingles vaccination programme in England, 2014/15

Charlotte Ward *, Lisa Byrne, Joanne M. White, Gayatri Amirthalingam, Karen Tilley, Michael Edelstein

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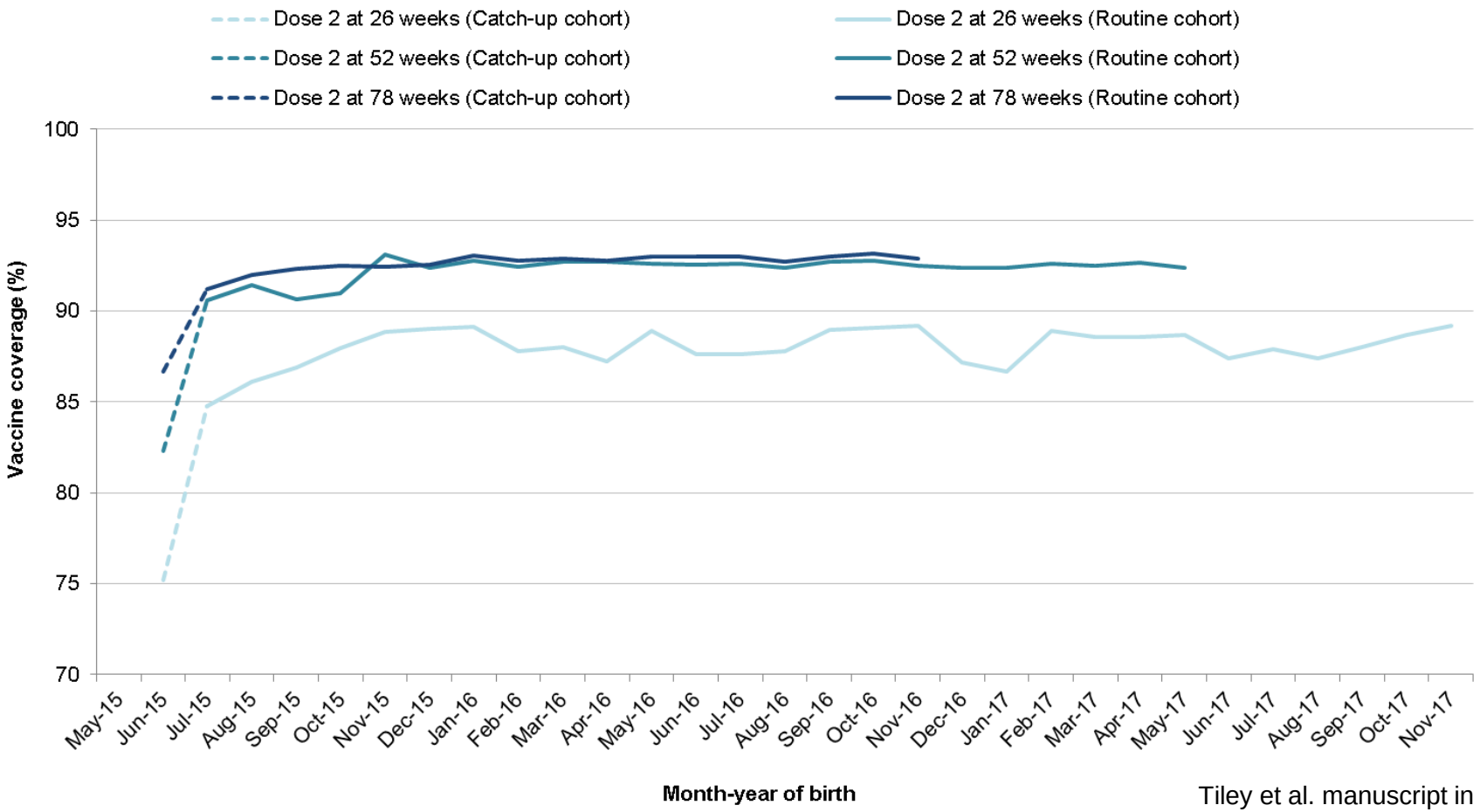
What do we do with the data?

Coverage of MenB dose 2 at six, 12 and 18 months by month of birth for children born May-15 to Nov-17, England



Tiley et al. manuscript in preparation

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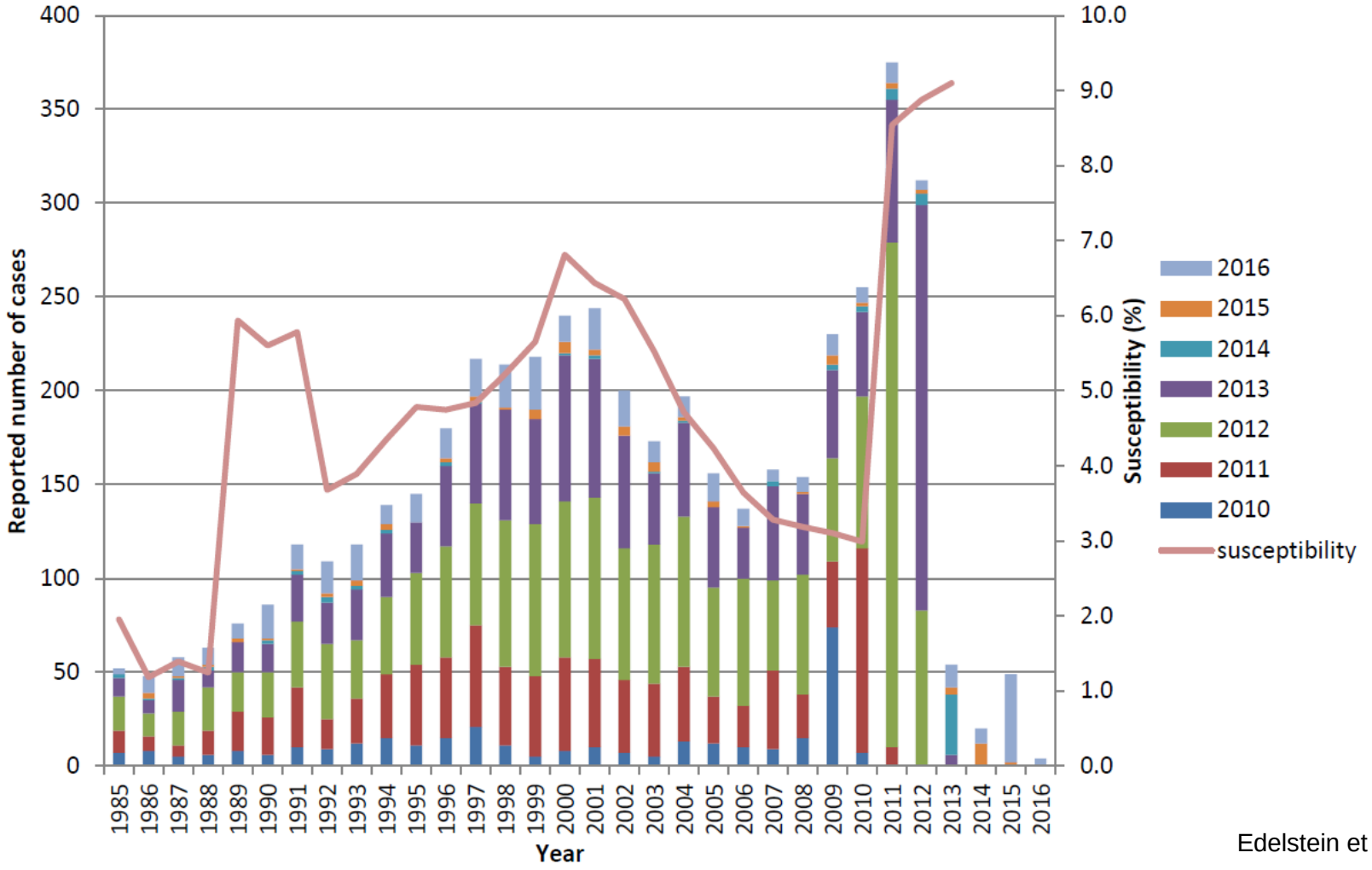
What do we do with the data?

Measles susceptibility and incidence by birth cohort, England 1985- 2016



Edelstein et al. Bulletin of the WHO (Accepted)

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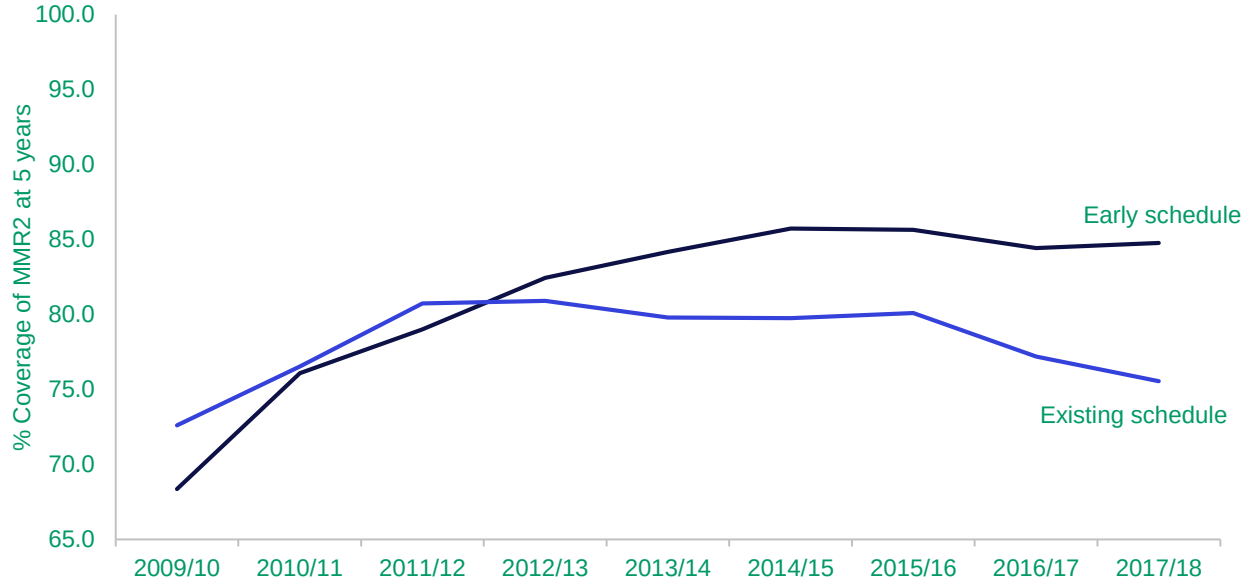
What do we do with the data?



- From 2012 onwards, MMR2 coverage among early implementing LAs was 3.3 percentage points higher (95% CI 1.4, 5.3, p=0.01) than LAs on the existing schedule after adjusting for year and DTaP/IPV/Hib coverage

Lacy et al. manuscript in preparation

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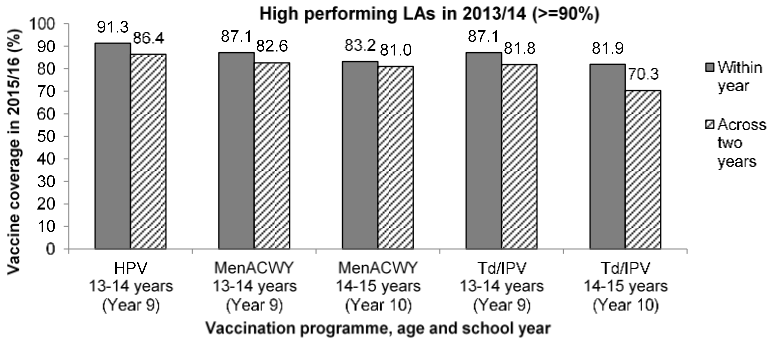
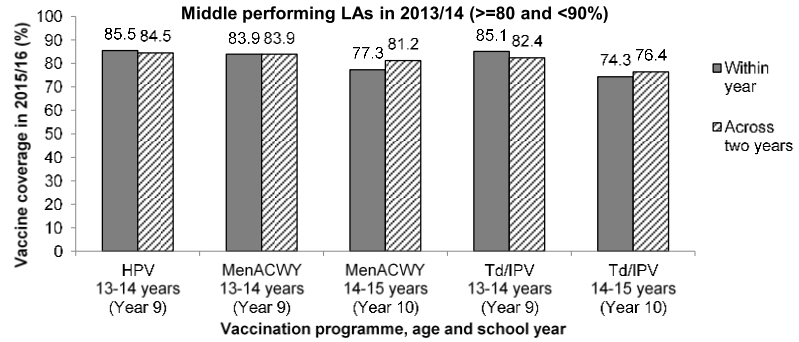
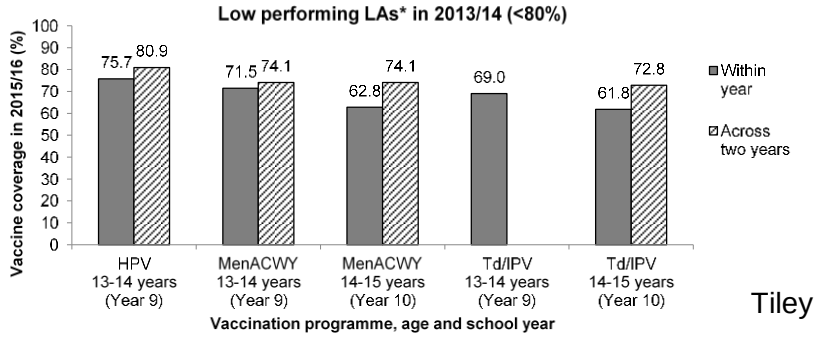
What do we do with the data?







Tiley et al. manuscript submitted for publication

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What do we do with the data?

HPV vaccine coverage and unadjusted/adjusted impact on coverage determined through linear regression, weighted by school size, of school-level predictors, 13-14 year olds, England, 2016/17

	Number of schools	Number of children	Crude vaccine coverage* (%)	Adjusted difference in coverage from baseline (95% confidence interval)
Denomination of school (p<0.001)				
No religious character	1,140	73,834	82.4	Baseline
Church of England/Other Christian faith excluding Roman Catholic	164	9,201	79.8	-0.7 (-2.9, 1.5)
Roman Catholic	90	6,736	84.3	1.9 (-0.6, 4.3)
Islam/Muslim	7	178	56.7	**-24 (-38.2, -9.8)**
Jewish	5	356	59.6	**-20.5 (-30.7, -10.4)**
Other (Hindu, Sikh, Other)	1	48	93.8	10.4 (-16.9, 37.7)
Type of school (p<0.001)				
State-funded secondary	952	83,741	83.1	Baseline
Independent school	235	5,693	72.8	**-10.3 (-13.0, -7.5)**
Special school	179	819	56.7	**-26.1 (-32.7, -19.4)**
Pupil referral unit	41	100	42.0	**-41.1 (-60.0, -22.2)**
Proportion BME in school LSOA **(p<0.001)				
<5%	243	20,210	85.5	
>=5 and <12%	302	25,210	83.7	**-1.6 (-3.8, 0.6)**
>=12 and <34%	233	19,614	81.8	**-4.2 (-6.8, -1.6)**
>=34%	109	8,742	78.0	**-7.1 (-10.8, -3.3)**
School Size (number of pupils) (p<0.001)**				
>400 to 1000	409	26601	82.7	Baseline
Up to 400	50	1397	74.9	**-10.4 (-14.1, -6.8)**
>1000	428	45778	83.4	1.4 (-0.3, 3.1)

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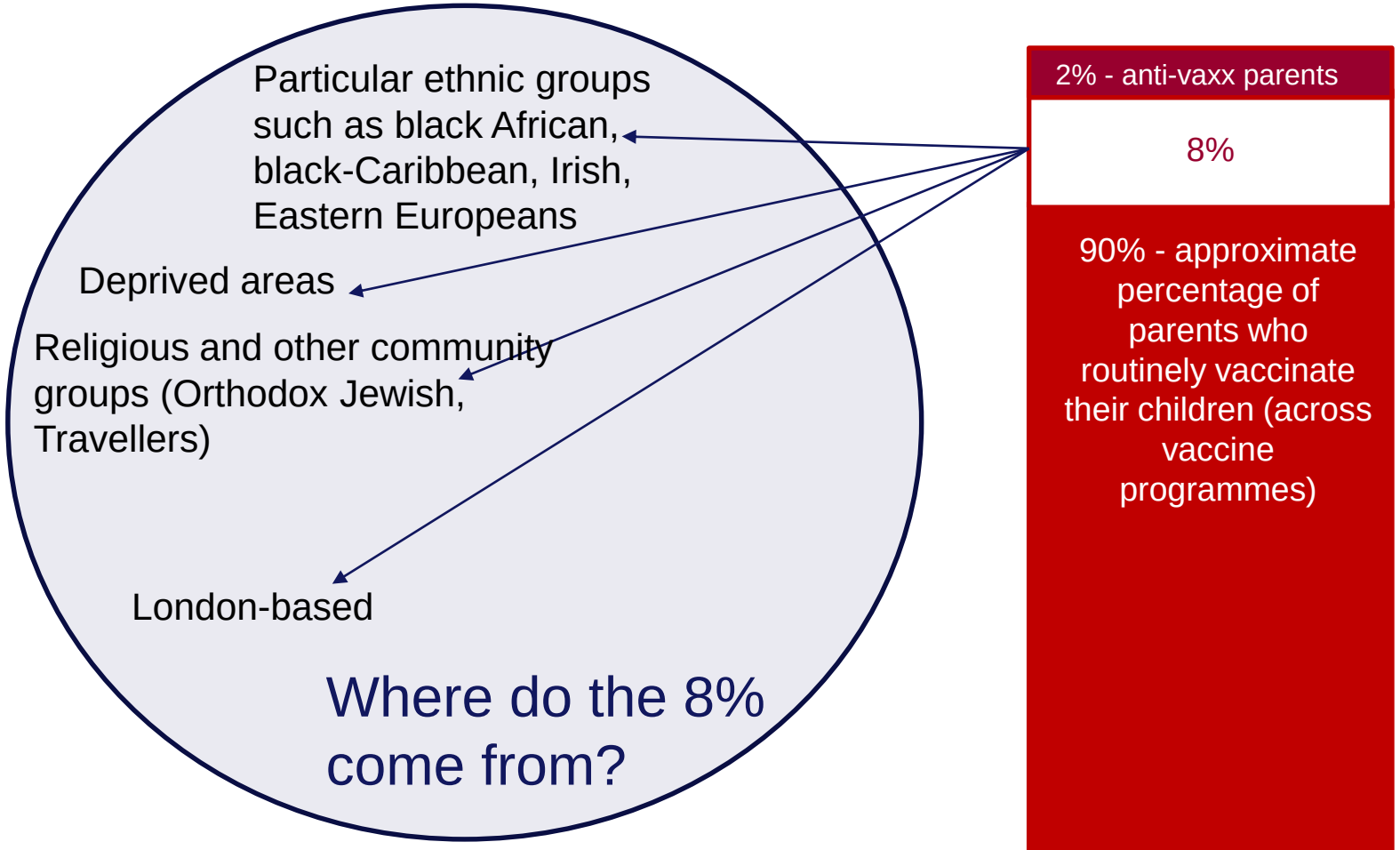
What have we learnt?



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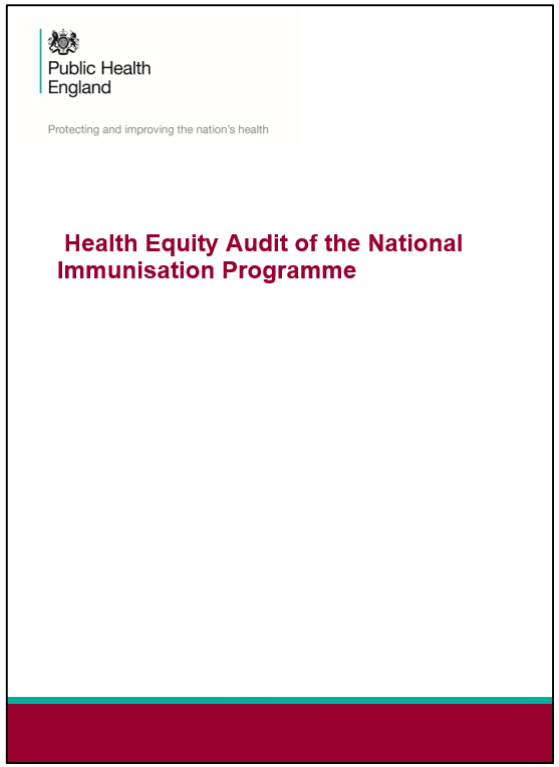
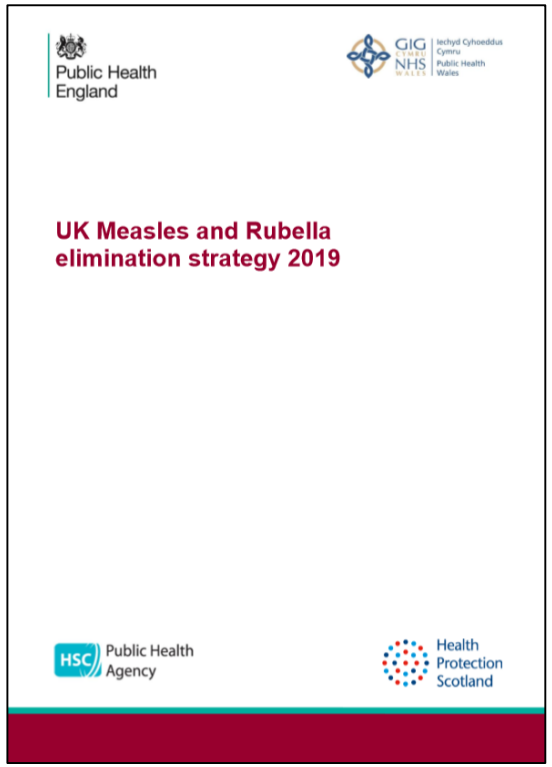
Vaccination: Evidence to action





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Vaccination: Evidence to action

- National Immunisation Inequalities group
  - Vaccine inequalities local action framework

- National Vaccine Coverage Liaison group
  - Collaboration between PHE and National Digital Health Agency for improving immunisation data

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Thank you

National vaccine coverage team (PHE)

Simon Burton, Joanne Lacy, Elise Tessier, Karen Tiley, Joanne White

ImmForm team

Odette Eugenio, Tania Kelly

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Andrew Thorne-Marsh, Alison Golightly