Public Health England

Protecting and improving the nation's health

Serological Surveillance: Summary report 9
PHE Surveillance Cell

17 June 2020

Key messages:

This week's report includes analysis of:

i) 1,975 paediatric and adolescent samples collected from the 'What's the Story' Study (n=130), SEU (n=1077) and paediatric collections (n=768) from early February to late May (weeks 5-22). This supplements the results from testing GOSH samples which have been presented in previous reports.

ii) 3,070 samples collected in individuals aged 65 years and over in General Practice via the Royal College of General Practitioners'sentinel surveillance network from weeks 15-20

iii) an additional 2,014 adult blood donor samples (collected in early June (weeks 23 – 24) from London and the North West regions

• Adjusted prevalence for individuals under 20 years based on testing samples from the SEU and Paediatric collections remained stable at 5.4% (95%CI: 3.6%-7.7%) in April (weeks 14-17) and 5.5% (95% CI: 3.7% -7.8%) in May (weeks 18-22).

• Low prevalence was found amoung the 65+ population. In mid May (weeks 20-21) adjusted prevalence was 3% (1% - 5%) using the EuroImmun assay and 3.2% (2% - 4.8%) using the Abbott assay. There was no clear trend by age group or gender.

• Adjusted prevalence in blood donors in London have remained stable in recent weeks, prevalence was 15.7% (95%CI: 12.6% - 19.1%) in week 21 and 14.9% (95% CI: 12.2% - 17.9%) in week 24.

• A slightly lower adjusted prevalence rates of 8.8% (95% CI: 6.6% - 11.3%) in week 23 was found in blood donors in the North West of England, previously 10.6% (95% CI: 8.2% - 13.4%) in week 19.

Enhanced Sero-surveillance

Details of the serosurveillance sample sources can be found in previous reports.

For the first time we include the results of testing a range of paediatric and adolescent collections. This includes testing of 1975 samples from i) individuals aged under 25 years participating in the NIHR

funded study 'What's the STORY' recruiting healthy individuals across 10 participating sites in England (n=130), ii) from individuals aged under 30 years from the PHE SEU collection comprising residual sera from NHS and Public Health laboratories in England (n=1077) and iii) individuals under 18 years from residual sera provided by 8 participating paediatric centres across England (Alder Hey, London (Barts), Leicester Royal Infirmary, Mid Yorkshire, Rotherham, Sheffield, London (South West Pathology) and London (St Mary's)). 'Paediatric collection' (n=768). These collections supplement the samples provided by Great Ormond Street Hospital (GOSH) that have been previously reported.

In addition, we include the first set of data from the testing of samples in individuals aged 65 years and above provided through the Royal College of General Practioners Research and Surveillance Centre (RCGP RSC).

This week's report also includes additional data from testing adult samples from blood donors in England (NHS Blood and Transplant (NHSBT)) and Wales (Welsh Blood Service, WBS) with regions sampled at different time periods. This week's report presents results from testing a fifth set of blood donor samples from London, and a third set of samples from the North West (comprising 2014 new samples in total).

Results

1. Seroprevalence in individuals aged under 30 years (What's the Story, SEU and Paediatric collections, and GOSH)

The results from testing an additional 1,975 samples using the Abbott Assay from a range of collections (STORY, SEU and Paediatric collections) have been added to the previous analyses in order to provide more up to date estimates and regional patterns of prevalence among the under-30 population for weeks 10 – 22. Seroprevalence estimates were adjusted for the sensitivity and specificity of the Abbott assay, based on sensitivity of 139/152 (91.4%) and specificity of 1144/1146 (99.8%) and uncertainty using a Bayesian approach.

Samples from the SEU collection are geographically distributed across the country but with limited representation from London (**Appendix 1, Table 1**). This compares with samples provided through the Paediatric collection where London centres are over represented (26% from London, **Appendix 1, Table 1**). Given that both these samples sets are derived from residual sera and tested using the Abbott assay, prevalence estimates have been generated by pooling these datasets. These compare with samples tested to date from the STORY study which have exclusively been from the South East (81%) and East of England (19%) regions (samples from additional sites collected more recently and results from these regions available in coming weeks) and GOSH collection which are predominantly from London (76%) and neighbouring areas.

Tables 1-4 summarise the prevalence estimates over time for the GOSH, STORY, SEU and Paediatric collections. The STORY, SEU and Paediatric sample sets show a similar pattern to the previously presented GOSH data – with an increase in adjusted prevalence between March and April, followed by a plateau or slight decline in May. The exception to this pattern is the SEU data for the older

population of 20-29 year olds, which shows an increase in adjusted prevalence from 7% (3.3% - 12.4%) in Weeks 14-17 to 10.1% (4.9% - 17.7%) in Weeks 18-22.

Adjusted prevalence for individuals under 20 years based on testing samples from the SEU and Paediatric collections combined remained stable at 5.4% (95%CI: 3.6%-7.7%) in April (weeks 14-17) and 5.5% (95% CI: 3.7% -7.8%) in May (weeks 18-22). These estimates are all lower than those seen in GOSH samples tested previously (table 1). Figure 1 shows the adjusted seroprevalence by age group over time. Prevalence has increased across all age groups with largest increases observed in young adults aged 20-29 years reaching approximately 10% by week 20. Increases in younger age groups are more modest with adjusted prevalence estimated at 2.6% (0.5% - 7.4%) for 1-4 year olds, 5.6% (2.6% - 10.3%) for 5-10 years and 6.0% (3.7% - 9.3%) for 11-19 year olds in week 20.

***Table 1**: Summary of GOSH Prevalence Estimates by period of sampling (ages 1 – 20), using the Euroimmun assay*

date range	Week of collection	pos	total	% pos (95% CI)	adjusted prevalence (95% CrI)
20 Mar - 28 Mar	12-13	14	190	7.4% (4.1% - 12.1%)	7.9% (3.9% - 13.4%)
1 Apr - 26 Apr	14-17	90	589	15.3% (12.5% - 18.4%)	17.7% (14% - 21.8%)
27 Apr- 5 May	18-19	26	226	11.5% (7.7% - 16.4%)	13% (8.3% - 18.8%)

***Table 2:** Summary of 'What's the Story' Prevalence Estimates by period of sampling (ages 1 – 24), using the Abbott assay*

date range	Week of collection	pos	total	% pos (95% CI)	adjusted prevalence (95% CrI)
18 - 29 Mar	12-13	0	26	0.0% (0.0% - 13.2%)	0.9% (0% - 9.9%)
30 Mar - 21 Apr	14-17	2	64	3.1% (0.4% - 10.8%)	3.4% (0.4% - 10.2%)
5 - 29 May	19-22	1	40	2.5% (0.1% - 13.2%)	2.8% (0% - 11.7%)

***Table 3**: Summary of SEU and Paediatric Prevalence Estimates by period of sampling (ages 1 – 19), using the Abbott assay*

date range	Week of collection	pos	total	% pos (95% CI)	adjusted prevalence (95% CrI)
1 Feb - 1 Mar	05-09	0	105	0.0% (0.0% - 3.5%)	0.2% (0% - 2.7%)
2 Mar - 29 Mar	10-13	2	169	1.2% (0.1% - 4.2%)	1.1% (0% - 3.8%)
30 Mar - 26 Apr	14-17	29	568	5.1% (3.4% - 7.3%)	5.4% (3.6% - 7.7%)
27 Apr - 26 May	18-22	31	593	5.2% (3.6% - 7.3%)	5.5% (3.7% - 7.8%)

***Table 4**: Summary of SEU Prevalence Estimates by period of sampling (ages 20 - 29), using the Abbott assay*

date range	Week of collection	pos	total	% pos (95% CI)	adjusted prevalence (95% CrI)
1 Feb - 1 Mar	05-09	0	86	0.0% (0.0% - 4.2%)	0.3% (0% - 3.2%)
2 - 29 Mar	10-13	0	89	0.0% (0.0% - 4.1%)	0.3% (0% - 3.1%)
30 Mar - 26 Apr	14-17	9	138	6.5% (3.0% - 12.0%)	7% (3.3% - 12.4%)
27 Apr - 26 May	18-22	9	97	9.3% (4.3% - 16.9%)	10.1% (4.9% - 17.7%)

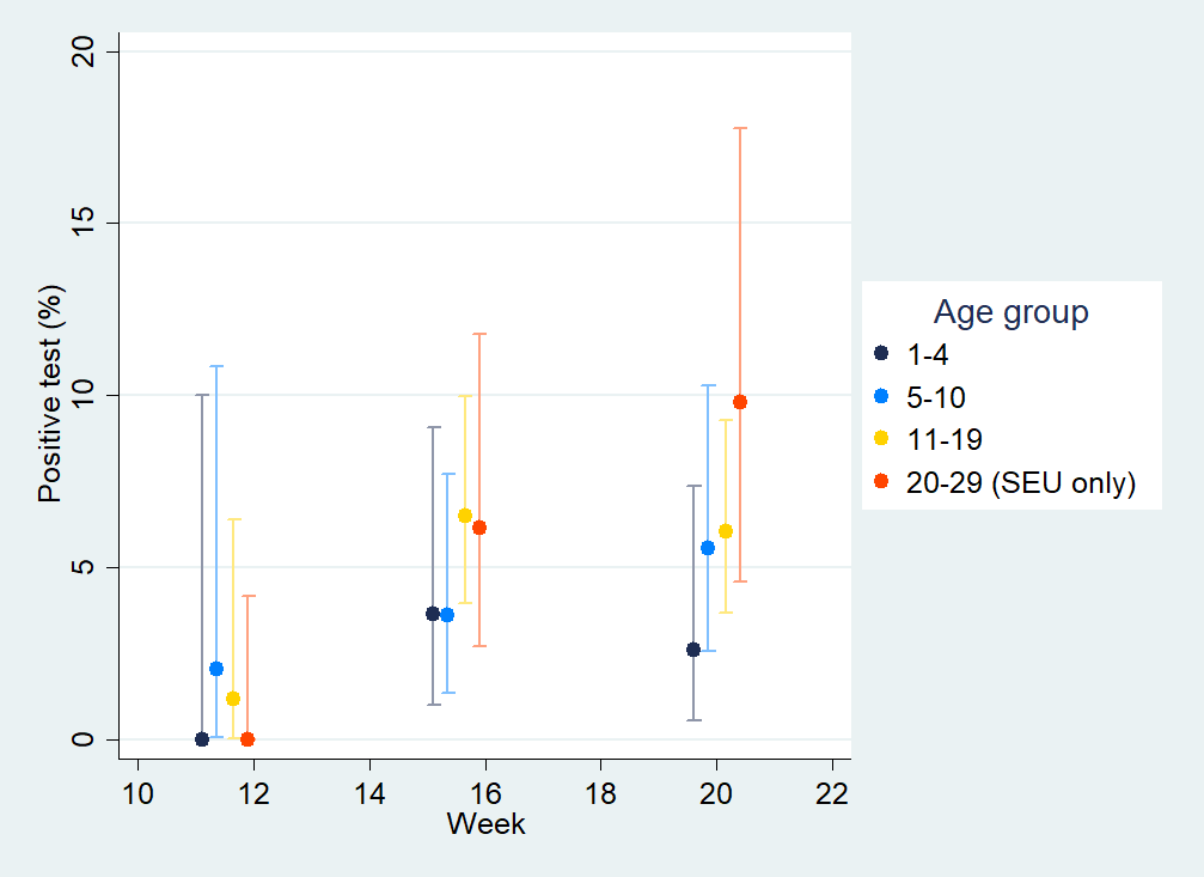


Figure 1: Adjusted SARS-CoV-2 antibody seroprevalence in individuals under 30 years (SEU and Paediatric collections) using the Abbot assay, by age group

2. Seroprevalence in individuals aged 65 years and over (RCGP collection)

Analyses of samples from individuals aged 65 and over – presented for the first time this week are included in this report (**Appendix 2**). A large number of samples have been tested using both EuroImmun and Abbott assays. For the Abbott assay adjusted prevalence was based on assay sensitvity of 139/152 (91.4%) and specificity of 1144/1146 (99.8%) . Prevalence appears low in this population; in mid May (weeks 20-21) prevalence was 3% (1% - 5%) using the EuroImmun assay and 3.2% (2% - 4.8%) using the Abbott assay. No consistent trend over time was found using either assay (Table 5).

Table 5: Overall % positive and adjusted prevalence in the RCGP 65+ data, by weeks of sample collection

Assay	Date range	weeks	pos	total	% pos (95% CI)	adjusted prevlance (95% CrI)
Abbott	16 Mar - 10 Apr	12-15	0	16	0.0% (0.0% - 20.6%)	1.5% (0% - 15.7%)
	13 - 25 Apr	16-17	5	140	3.6% (1.2% - 8.1%)	3.8% (1.2% - 8.1%)
	27 Apr - 9 May	18-19	30	1060	2.8% (1.9% - 4.0%)	2.9% (1.8% - 4.2%)
	11 - 20 May	20-21	24	767	3.1% (2.0% - 4.6%)	3.2% (2% - 4.8%)
EuroImmun	16 Mar - 10 Apr	12-15	5	337	1.5% (0.5% - 3.4%)	0.6% (0% - 2.8%)
	13 - 25 Apr	16-17	32	753	4.2% (2.9% - 5.9%)	4% (2% - 6.2%)
	27 Apr - 9 May	18-19	22	1218	1.8% (1.1% - 2.7%)	0.9% (0% - 2.3%)
	11 - 20 May	20-21	26	762	3.4% (2.2% - 5.0%)	3% (1% - 5%)

With regards to age, little difference in prevalence was found between age groups (**Figure 2**), and similarly little difference was found between genders (data not shown). However prevalence by region follows a similar pattern to other data sets, with a higher prevalence in London than seen in other regions, and an overall decline in prevalence between April and May (**Figure 3 and Appendix 2, Table 2)**.

These findings compare with results from the testing of serum samples collected from more than 500 care home residents and staff in 6 London care homes experiencing large outbreaks in April 2020 (The EASTER6 Study). This included nearly 400 residents and staff who had been tested (nasal swabbing) and followed up in the initial outbreak. Approximately 90% of residents and 90% of staff who tested positive on nasal RT-PCR were seropositive 4-6 weeks later (Abbott Platform) irrespective of whether they were symptomatic or asymptomatic and, overall, 70% in both groups were seropositive for SARS-CoV-2 antibodies.

Figure 2: *Adjusted SARS-CoV-2 antibody seroprevalence among RCGP 65+ samples using the Euroimmun and Abbot assays; by age*

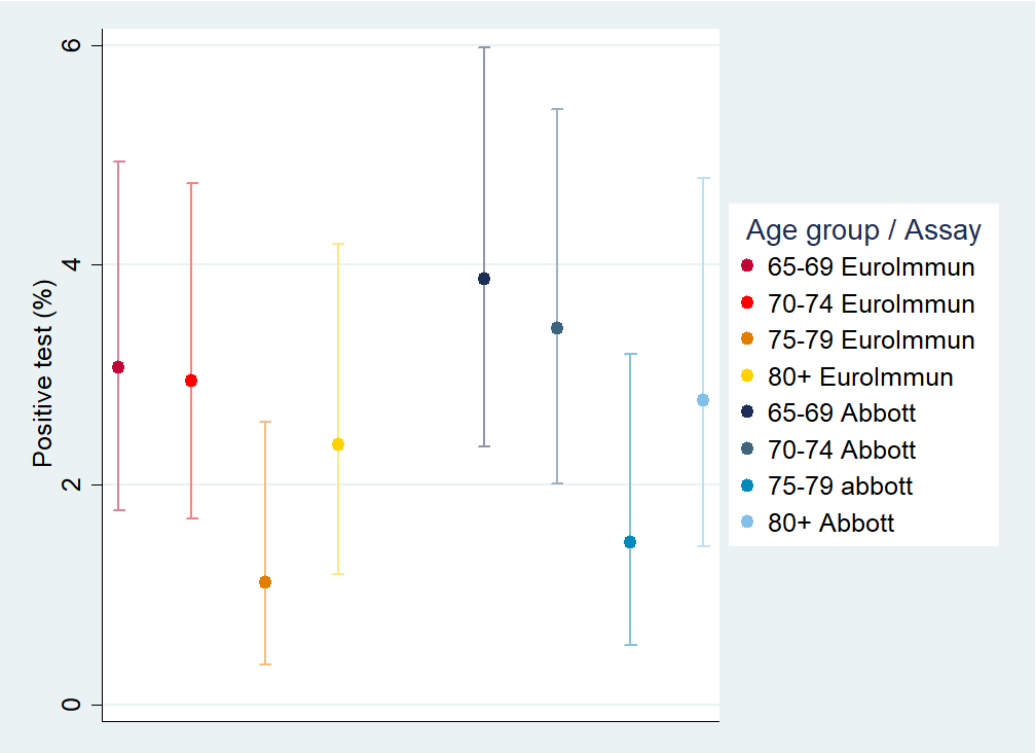
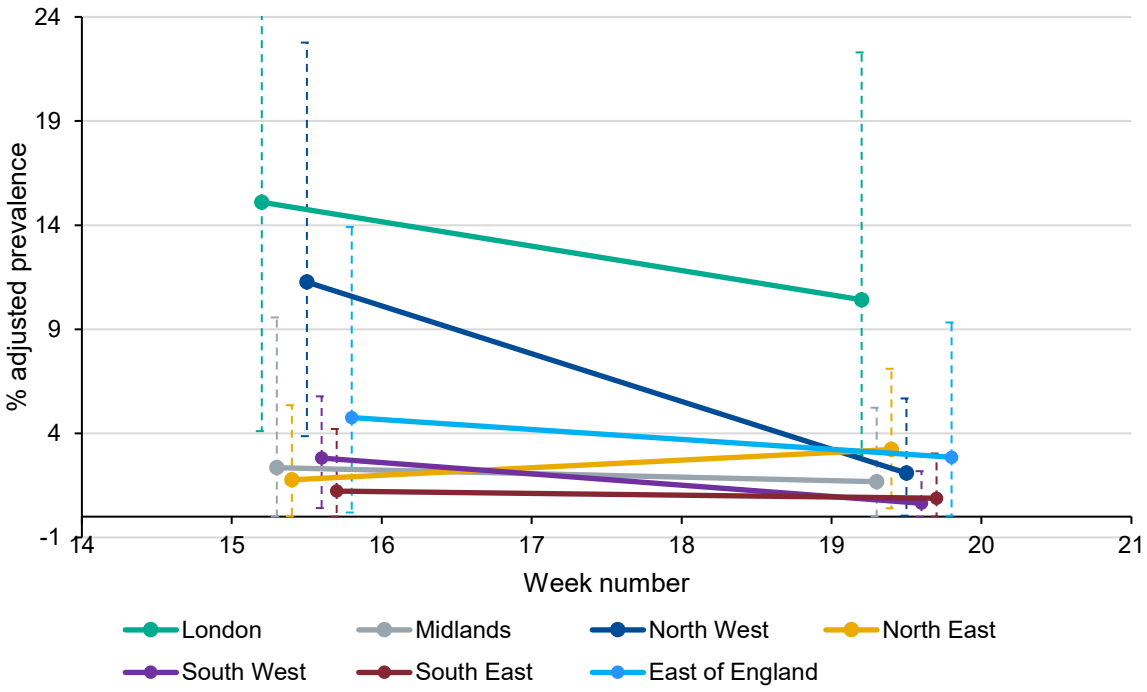


Figure 3: *Adjusted SARS-CoV-2 antibody seroprevalence among RCGP 65+ samples using the Euroimmunand Abbot assays; by region*



Blood donor data (aged 17-69 years)

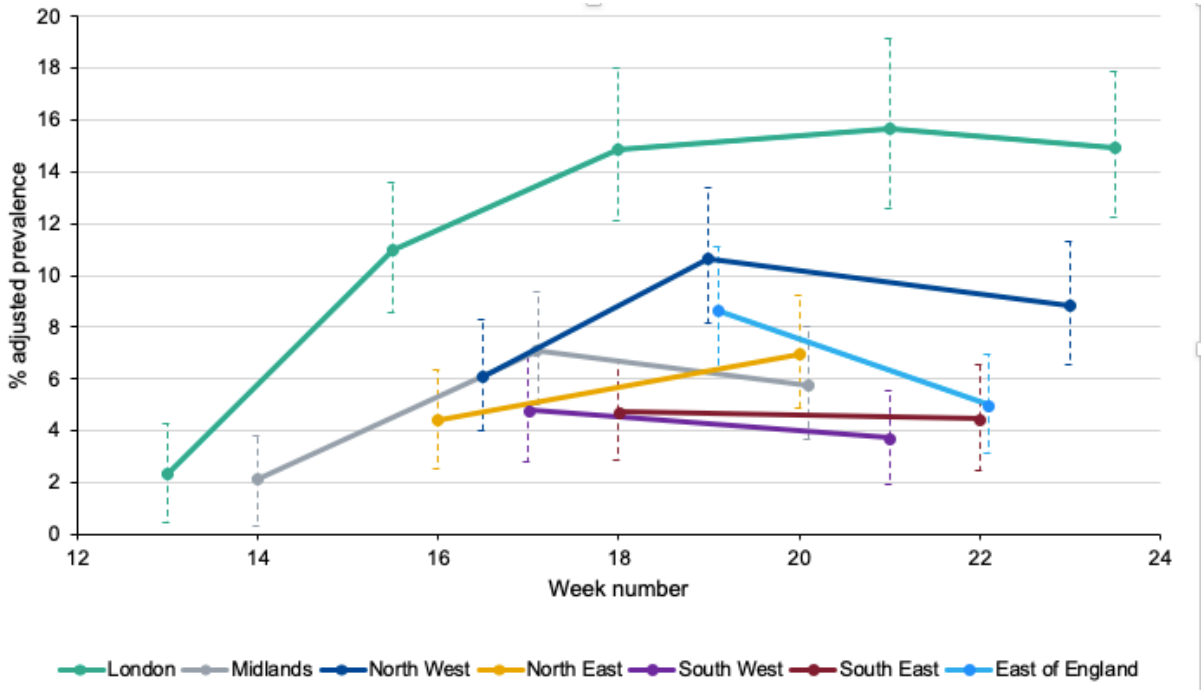
Seroprevalence estimates presented here are based on a total of 19,269 adult samples from NHSBT and Welsh Blood Service (WBS) and includes the results of 1,094 new samples from London and 1,020 new samples from the North West (collected between the 5th and 8th of June (weeks 23/24)).

Seroprevalence estimates amongst blood donors were adjusted for the sensitivity and specificity of the EuroImmun assay, based on sensitivity of 132/160 (82.5%) and specificity of 569/574 (99.1%) and uncertainty using a Bayesian approach.

Regional prevalence estimates over time

The additional results from week 24 (**Figure 4**) show that adjusted prevalence in London has remained stable; prevalence was 15.7% (12.6% - 19.1%) in week 21 and 14.9% (12.2% - 17.9%) in week 24. This is a continuation of a plateau that began in Week 18. The week 23 data for the North West (the third sample set from this region) indicates a slightly lower adjusted prevalence; 10.6% (8.2% - 13.4%) in week 19 and 8.8% (6.6% - 11.3%) in week 23. (**Table 3, Appendix 3**).

Figure 4: *Adjusted SARS-CoV-2 antibody seroprevalence in UK blood donors*



*using Euroimmun assay adjusted for sensitivity (82.5%) and specificity (99.1%)

**error bars show 95% confidence intervals

Comments

In this weeks report, we present seroprevalence estimates for children and adolescents using a range of serum collections. These supplement the results from GOSH which have previously been presented. Whilst testing samples from GOSH provide information on trends specifically in London and neighbouring areas, the specialist patient population and restricted geography limits the generalisability of these findings to the wider paediatric population. Samples collected through What's the STORY provide a representative set of samples from healthy individuals; however sample size is limited and currently data is only available from the South East region. In the coming weeks however testing from samples across other regions will become available. The SEU and Paediatric collections provide valuable additional data from larger numbers of samples geographically distributed across the country. Furthermore the long standing nature of the SEU collection has enabled baseline testing for evaluating specificity of the serological assays. These data suggest that the adjusted prevalence amongst individuals under 20 years has remained relatively stable during April and May at approximately 5% with clear regional patterns.

In addition, for the first time seroprevalence estimates in older adults are presented. These are based on testing samples collected in primary care through the RCGP RSC and provide a unique and large set of samples from adults aged 65 years and older in the community. The findings suggest relatively low prevalence in older adults with no specific age or gender trends.

In this week's report, additional testing of adult blood donor samples from London and the North West are included. The estimates among adult donors aged 17-69 years in recent weeks from a number of regions are showing a slightly lower prevalence, although a particlarly notable lower prevalence in the most recent data from testing donors in the North West. The very slight decline in prevalence estimates in London (similar to what was prevoulsy observed in the Midlands, South West and South East regions) are consistent with prevalence reaching a plateau.

As noted in previous reports, these lower prevalence estimates could in part be driven by changes in the precise locations of sampling in each region over time, especially where wide disparity in prevalence is present within a region, though little such disparity has previously been found in the North West region. In addition, the sensitivity of the assay over time (for instance, 60 or more days post onset) remains unclear. It is possible that with the gradual easing of lockdown measures and individuals encouraged to return to work, we see a slightly different profile of individuals now donating blood.

Analyses of RCGP data from the over-65 population and the What's the Story study, GOSH, SEU and paediatric collections, show similar trends to those seen in the blood donor data with plateaus or declines in prevalence over time. Consistent declines seen in many datasets could be explained by antibody waning and declines in assay sensitivity over time; analyses of longitudinal studies e.g.ESCAPE (study of PHE and NHS employees with serial sampling over 6 months) are therefore important to help interpret the results from these cross sectional seroprevalence surveys.

Appendix 1: Geographical analysis of Paediatric and Adolescent Collections

Table 1: Geographic spread of Paediatric and Adolescent sample collections, frequency and percentage of test results in indiviauls aged 1+ available by region

Region	GOSH	SEU	Paediatric	STORY
EE	249 (25%)	81 (8%)	7 (1%)	25 (19%)
London	575 (76%)	35 (4%)	196 (26%)	0 (0%)
Midlands	14 (1%)	126 (12%)	59 (8%)	0 (0%)
NE	11 (1%)	312 (29%)	238 (31%)	0 (0%)
NW	4 (0%)	381 (35%)	174 (23%)	0 (0%)
SE	74 (7%)	50 (5%)	14 (2%)	105 (81%)
SW	9 (1%)	92 (9%)	0 (0%)	0 (0%)
Wales/Scot/NI/IoM	7 (1%)	0 (0%)	13 (2%)	0 (0%)
Unknown	62 (6%)	0 (0%)	67 (9%)	0 (0%)

EE = East of England, NE = North East, NW = North West, SE = South East, SW = South West, Scot = Scotland, NI = Northern Ireland, IoM = Isle of Man

Appendix 2: RCGP-RSC data, ages 65+

Included in this week's data are some results of testing blood samples collected through GPs, on individuals requiring blood tests via the Royal College of General Practioners Research and Surveillence Centre (RCGP-RSC). Samples have been analysed using the Abbott and EuroImmun assays, however while many samples have been tested using both assays, many earlier samples have only been tested using EuroImmun and many later samples have only been tested using the Abbott assay.

Table 2 shows the prevalence by region for weeks 14-21 (27 April – 20 May). There was considerable regional variation in number of samples taken, with relatively few samples taken from London. However, the trend of higher prevalence in London appears to be consistent with other data sources covering younger age groups.

Table 2: % positive and adjusted prevalence by region, weeks 14-17 and 18-21 (30 Mar – 20 May) using the EuroImmun and Abbott assay

Region	date range	week	pos	total	% pos (95% CI)	adjusted prevalence (95% CrI)
EuroImmun						
EE	30 Mar 24 Apr	14-17	3	62	4.8% (1.0% - 13.5%)	4.8% (0.2% - 13.9%)
EE	27 Apr 20 May	18-21	3	89	3.4% (0.7% - 9.5%)	2.9% (0% - 9.3%)
London	30 Mar 24 Apr	14-17	4	31	12.9% (3.6% - 29.8%)	15.1% (4.1% - 33.2%)
London	27 Apr 20 May	18-21	5	54	9.3% (3.1% - 20.3%)	10.4% (2.9% - 22.3%)
Midlands	30 Mar 24 Apr	14-17	2	69	2.9% (0.4% - 10.1%)	2.4% (0% - 9.6%)
Midlands	27 Apr 20 May	18-21	5	206	2.4% (0.8% - 5.6%)	1.7% (0% - 5.2%)
NE	30 Mar 24 Apr	14-17	5	200	2.5% (0.8% - 5.7%)	1.8% (0% - 5.4%)
NE	27 Apr 20 May	18-21	8	220	3.6% (1.6% - 7.0%)	3.2% (0.4% - 7.1%)
NW	30 Mar 24 Apr	14-17	6	60	10.0% (3.8% - 20.5%)	11.3% (3.9% - 22.8%)
NW	27 Apr 20 May	18-21	6	217	2.8% (1.0% - 5.9%)	2.1% (0% - 5.7%)
SE	30 Mar 24 Apr	14-17	5	244	2.0% (0.7% - 4.7%)	1.2% (0% - 4.2%)
SE	27 Apr 20 May	18-21	7	398	1.8% (0.7% - 3.6%)	0.9% (0% - 3%)
SW	30 Mar 24 Apr	14-17	11	334	3.3% (1.7% - 5.8%)	2.8% (0.4% - 5.8%)
SW	27 Apr 20 May	18-21	11	720	1.5% (0.8% - 2.7%)	0.6% (0% - 2.2%)
Abbott						
EE	27 Apr 20 May	18-21	4	80	5.0% (1.4% - 12.3%)	5.4% (1.6% - 12.4%)
London	27 Apr 20 May	18-21	5	50	10.0% (3.3% - 21.8%)	11.1% (4% - 22.5%)
Midlands	27 Apr 20 May	18-21	5	183	2.7% (0.9% - 6.3%)	2.8% (0.8% - 6.2%)
NE	27 Apr 20 May	18-21	6	200	3.0% (1.1% - 6.4%)	3.1% (1.1% - 6.4%)
NW	27 Apr 20 May	18-21	6	210	2.9% (1.1% - 6.1%)	3% (1% - 6.2%)
SE	27 Apr 20 May	18-21	8	375	2.1% (0.9% - 4.2%)	2.1% (0.8% - 4.2%)
SW	27 Apr 20 May	18-21	16	655	2.4% (1.4% - 3.9%)	2.5% (1.3% - 4%)

Appendix 3: NHSBT data

***Table 3**: Summary of NHSBT Prevalence Estimates by region and period of sampling, using the Euroimmun assay*

Region	date range	Week of collection	pos	total	% pos (95% CI)	adjusted prevalence (95% CrI)
NHS blood & transplant						
London	26-27 Mar	13	22	757	2.9% (1.8% - 4.4%)	2.3% (0.4% - 4.3%)
	9-13 Apr	15-16	107	1085	9.9% (8.2% - 11.8%)	11% (8.6% - 13.6%)
	1-3 May	18	127	974	13.0% (11.0% - 15.3%)	14.9% (12.1% - 18%)
	21 - 22 May	21	109	797	13.7% (11.4% - 16.3%)	15.7% (12.6% - 19.1%)
	5 - 8 Jun	23-24	143	1094	13.1% (11.1% - 15.2%)	14.9% (12.2% - 17.9%)
Midlands	2-3 Apr	14	25	916	2.7% (1.8% - 4.0%)	2.1% (0.3% - 3.8%)
	23-24 Apr	17	70	1043	6.7% (5.3% - 8.4%)	7.1% (5% - 9.3%)
	14-15 May	20	49	870	5.6% (4.2% - 7.4%)	5.8% (3.7% - 8%)
NE	14-16 Apr	16	46	1016	4.5% (3.3% - 6.0%)	4.4% (2.5% - 6.3%)
	13-14 May	20	67	1014	6.6% (5.2% - 8.3%)	7% (4.8% - 9.2%)
NW	15-20 Apr	16-17	55	936	5.9% (4.5% - 7.6%)	6.1% (4% - 8.3%)
	6-8 May	19	92	959	9.6% (7.8% - 11.6%)	10.6% (8.2% - 13.3%)
	4-6 Jun	23	83	1020	8.1% (6.5% - 10.0%)	8.8% (6.6% - 11.3%)
SW	24-26 Apr	17	42	865	4.9% (3.5% - 6.5%)	4.8% (2.8% - 6.9%)
	21 - 22 May	21	42	1050	4.0% (2.9% - 5.4%)	3.7% (1.9% - 5.6%)
SE	30 Apr - 1 May	18	49	1020	4.8% (3.6% - 6.3%)	4.7% (2.9% - 6.7%)
	28-29 May	22	38	832	4.6% (3.3% - 6.2%)	4.4% (2.5% - 6.6%)
EE	7-10 May	19	81	1015	8.0% (6.4% - 9.8%)	8.7% (6.4% - 11.1%)
	28-29 May	22	55	1100	5.0% (3.8% - 6.5%)	5% (3.1% - 6.9%)
Welsh blood service						
Wales		17	34	1006	3.4% (2.4% - 4.7%)	3% (1.1% - 4.7%)