



Weekly Influenza and COVID-19 Surveillance graphs

PHE publishes a weekly national influenza and COVID-19 surveillance report which summarises the information from the surveillance systems which are used to monitor influenza, COVID-19 and other seasonal respiratory viruses in England.

Additional figures based on these surveillance systems are included in this slide set.

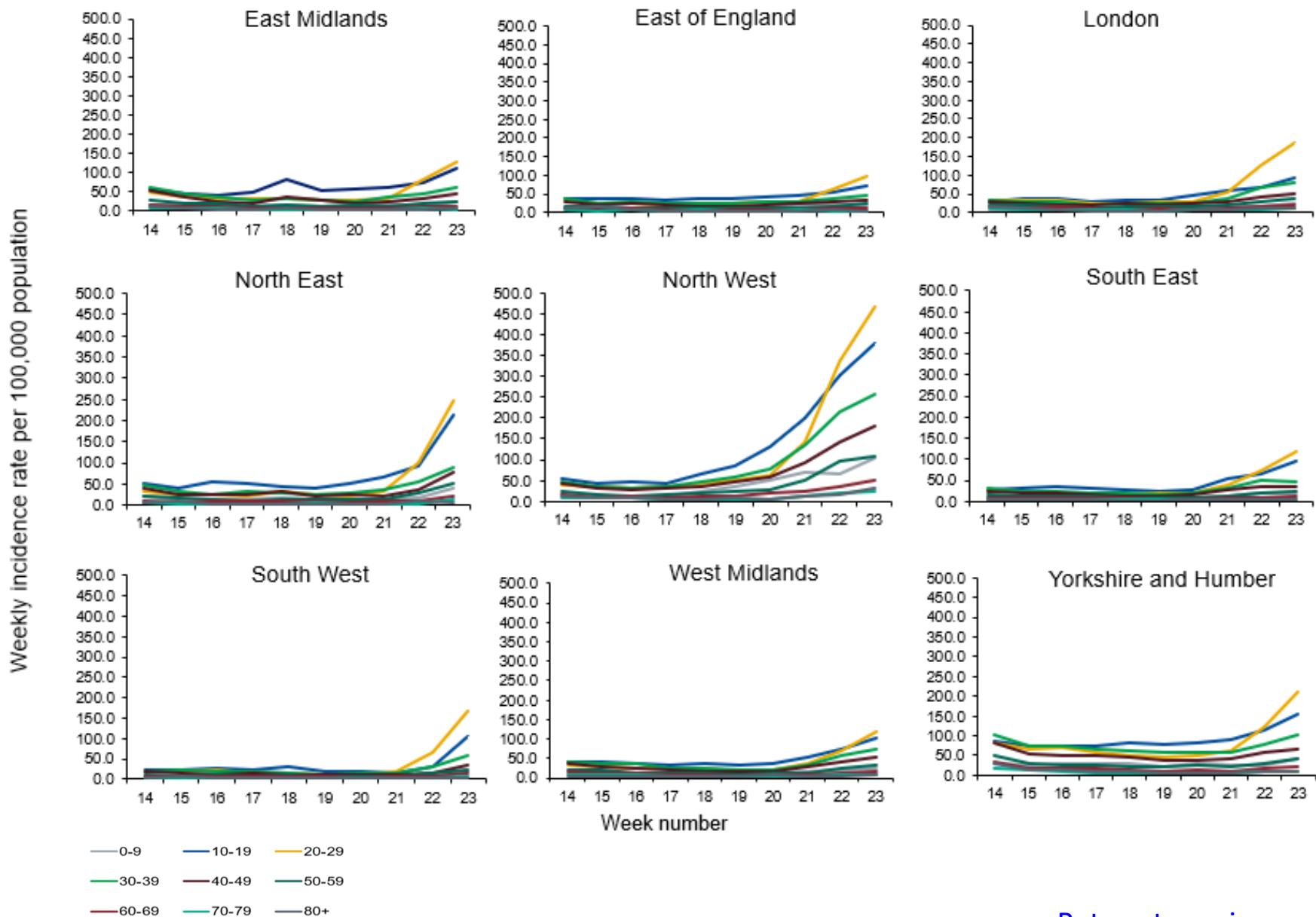
The figures presented in this slide set are based on data from week 23 (between 07 June and 13 June 2021).



Confirmed COVID-19 cases in England

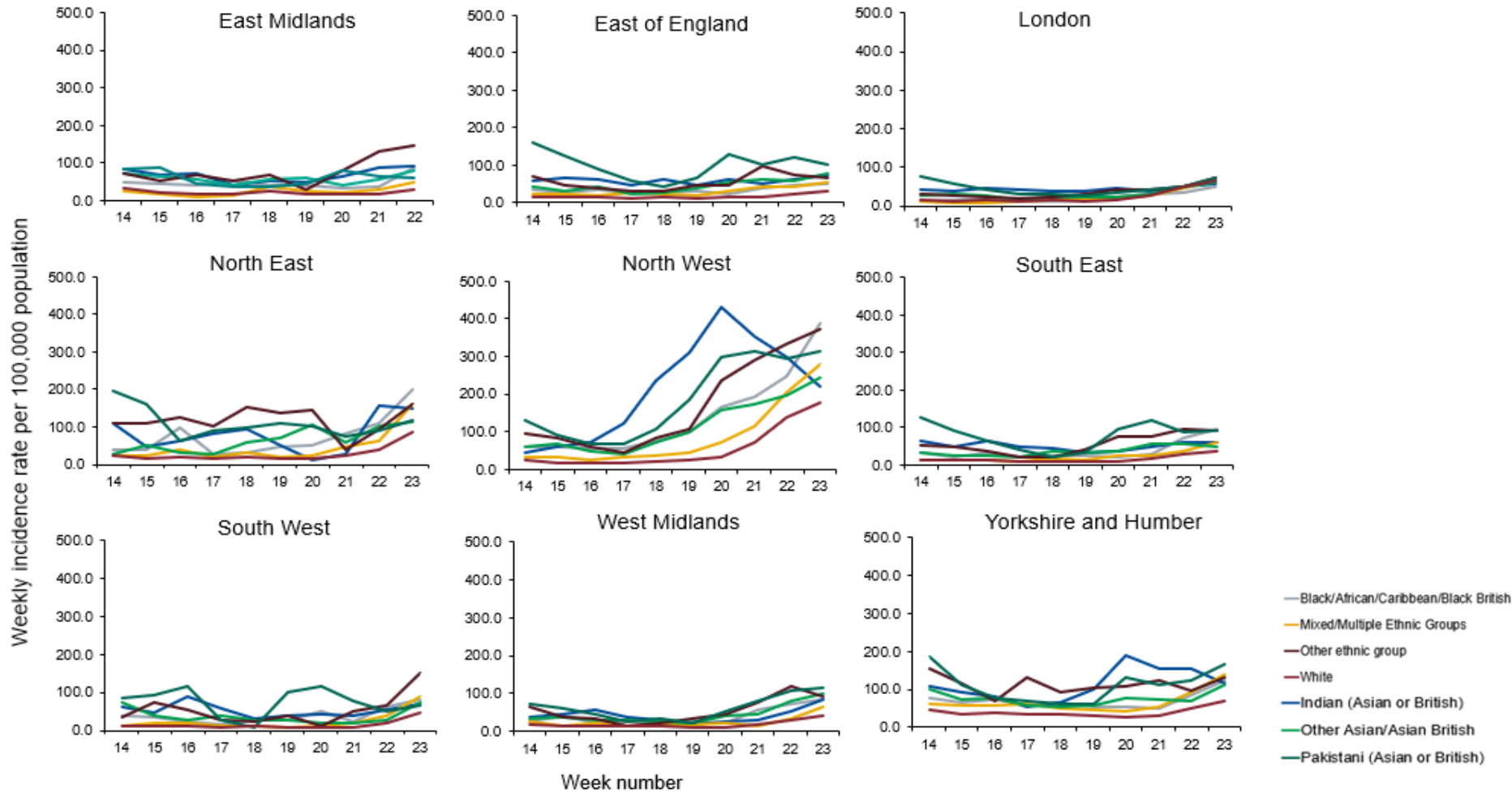


Weekly COVID-19 incidence per 100,000 population by age group and region, weeks 14 to 23





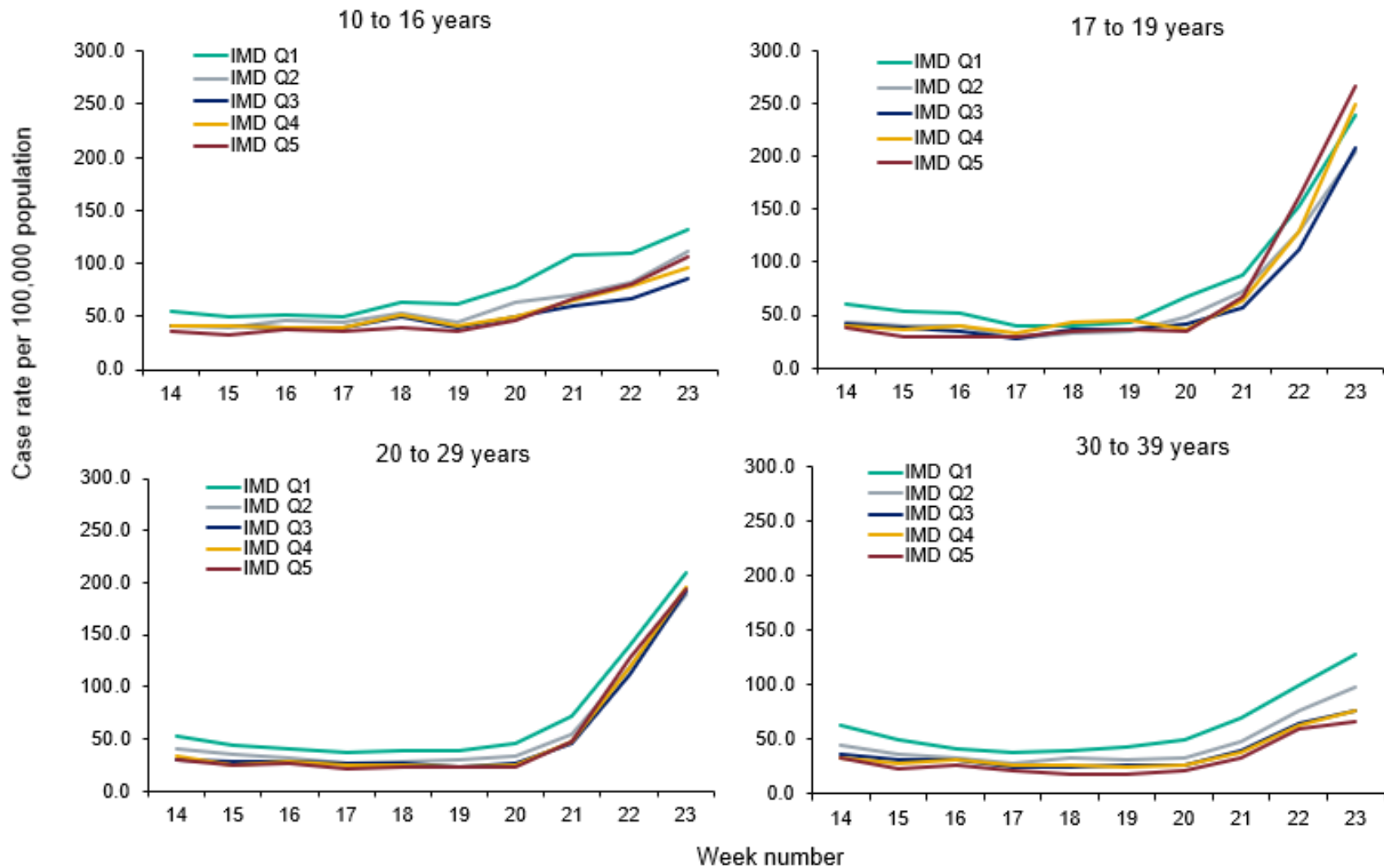
Weekly COVID-19 incidence per 100,000 population by ethnicity and region, weeks 14 to 23



Caveat: From this week the ethnicity analysis is based on a new method for assigning ethnicity, developed by PHE. The previous method used the most recent ethnicity recorded through linkage to Hospital Episode Statistics and was supplemented by ethnicity recorded in pillar 2 cases. However, this method led to unfeasibly high rates in the 'Other' ethnic group when applied to COVID-19 cases, hospitalisation or mortality. As the recording of ethnicity in pillar 2 cases has improved over time, the new method uses the pillar 2 ethnicity and supplements this with the most frequent ethnicity recorded through linkage to Hospital Episode Statistics, unless the most frequent was 'Other' when the second most frequent was chosen.

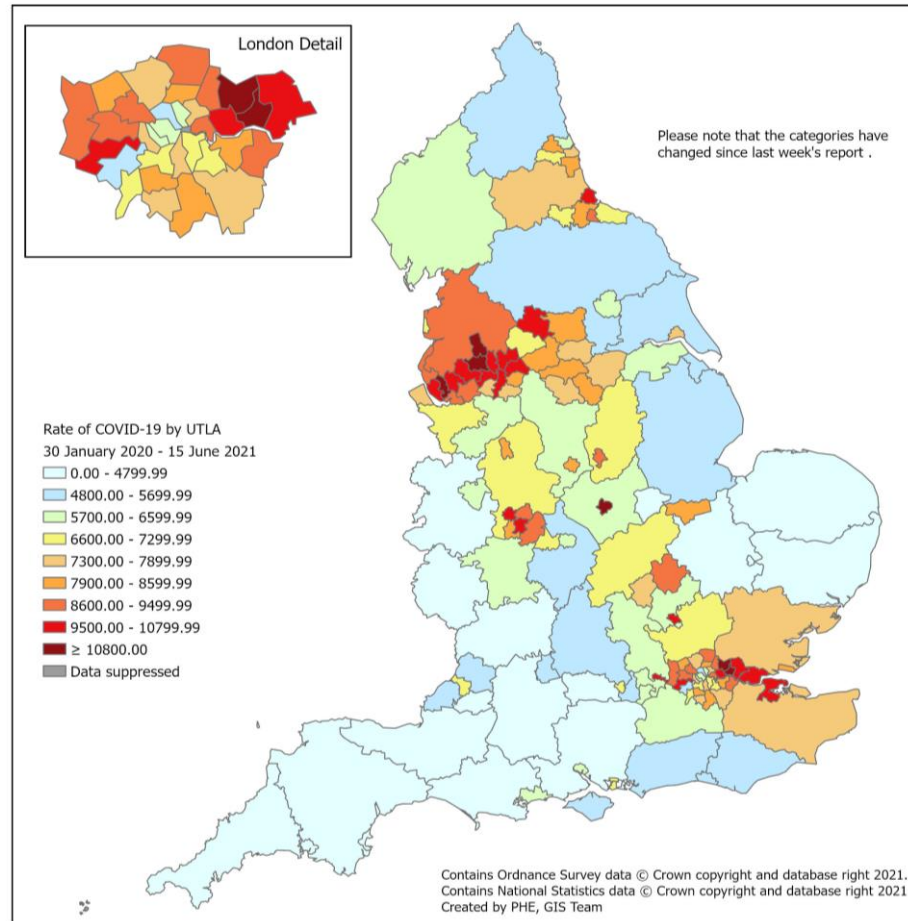


Weekly COVID-19 rate per 100,000 population by IMD quintile (1 being the most deprived and 5 being the least deprived), weeks 14 to 23



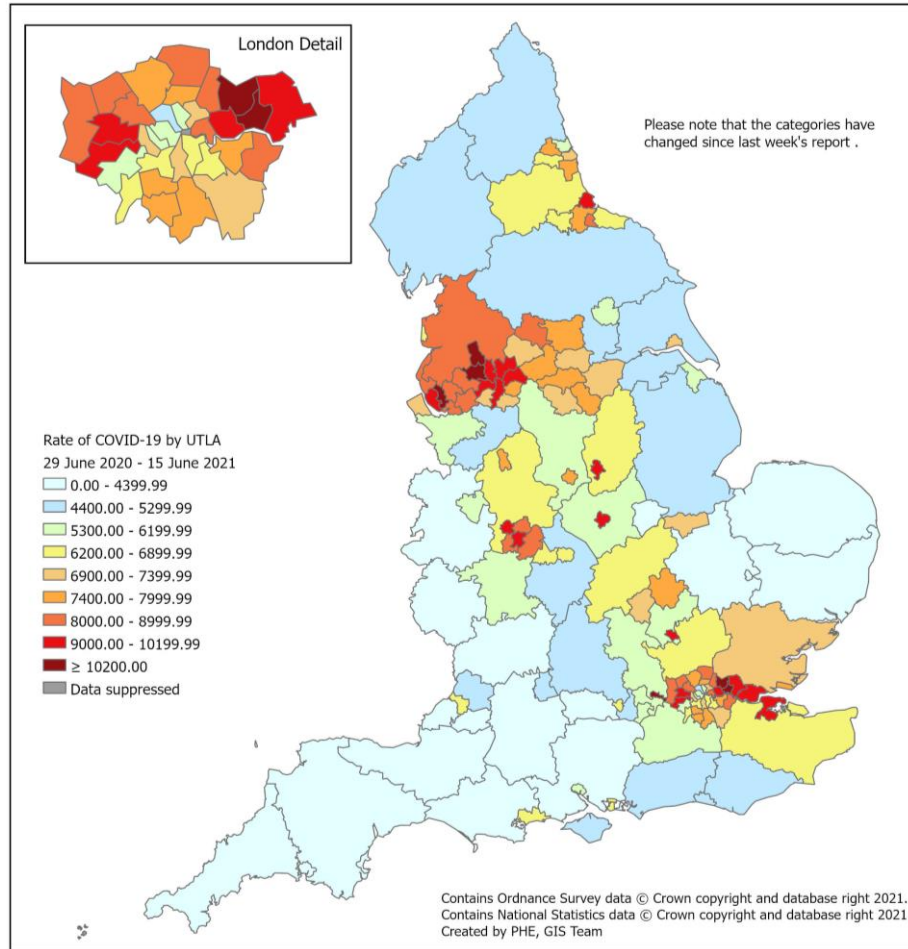


Cumulative rate of COVID-19 cases per 100,000 population tested under Pillar 1 and 2, by upper-tier local authority, England (box shows enlarged map of London area)



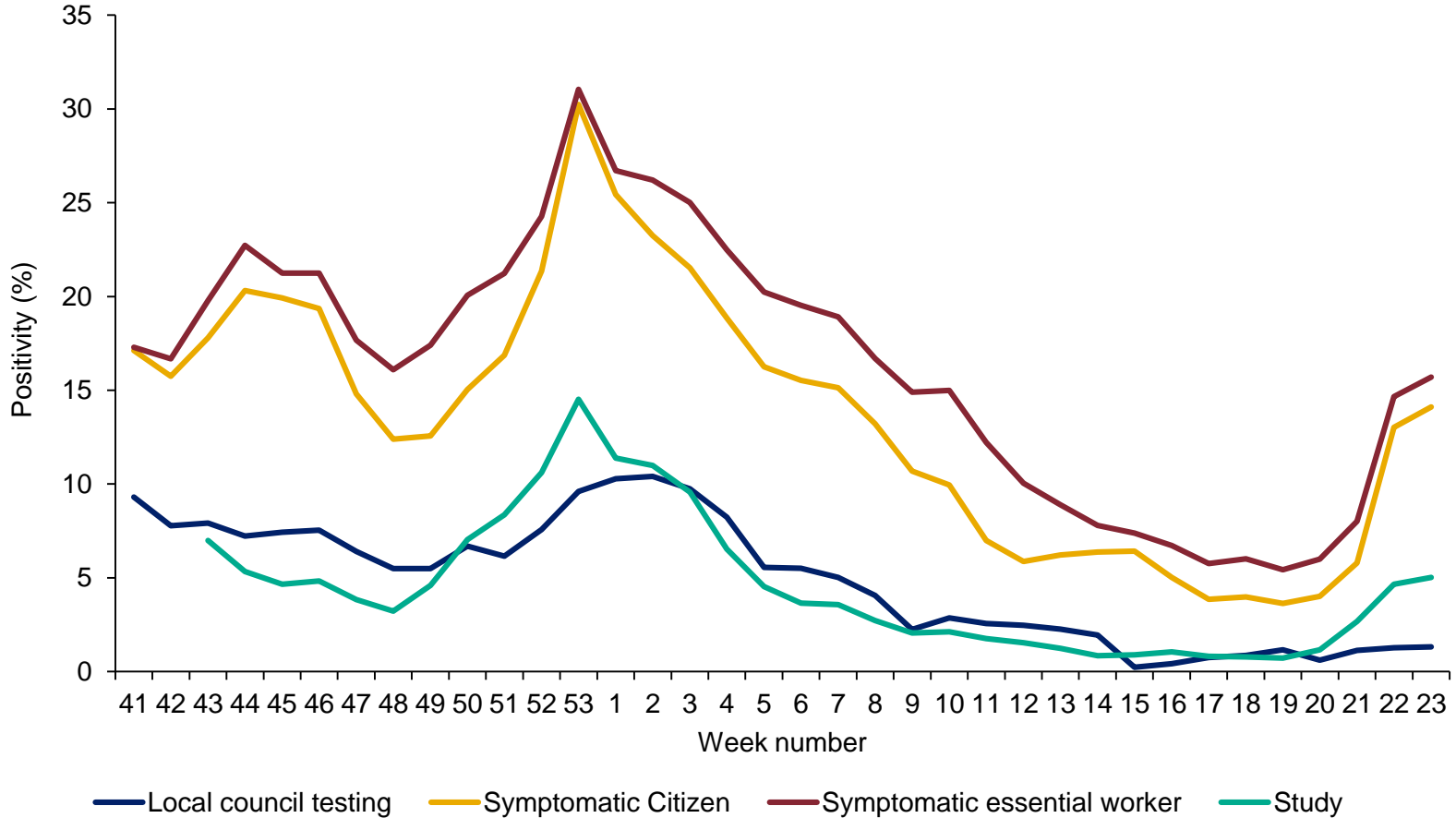


Cumulative rate (from week 27) of COVID-19 cases per 100,000 population tested under Pillar 1 and 2, by upper-tier local authority, England (box shows enlarged map of London area)





Weekly positivity of laboratory confirmed COVID-19 cases by reason for test, weeks 41 to 23

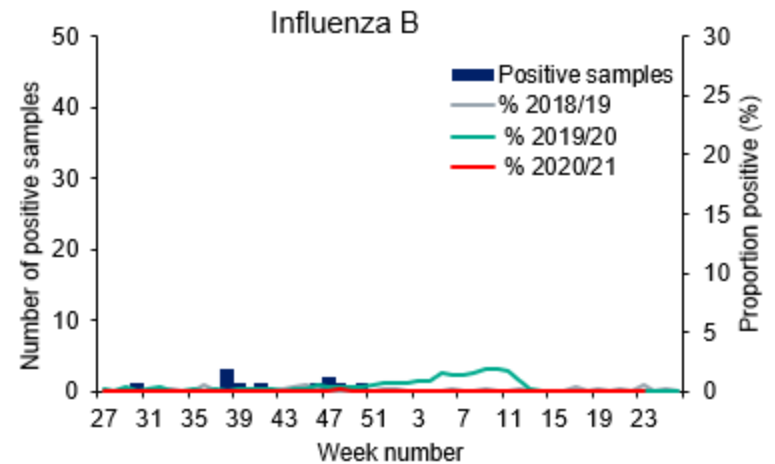
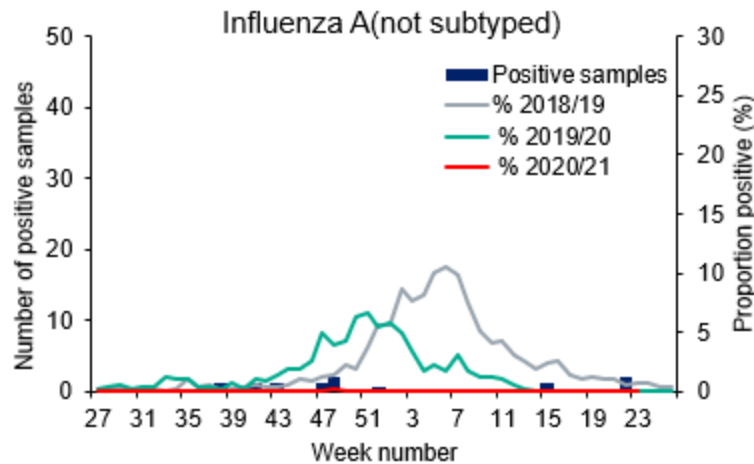
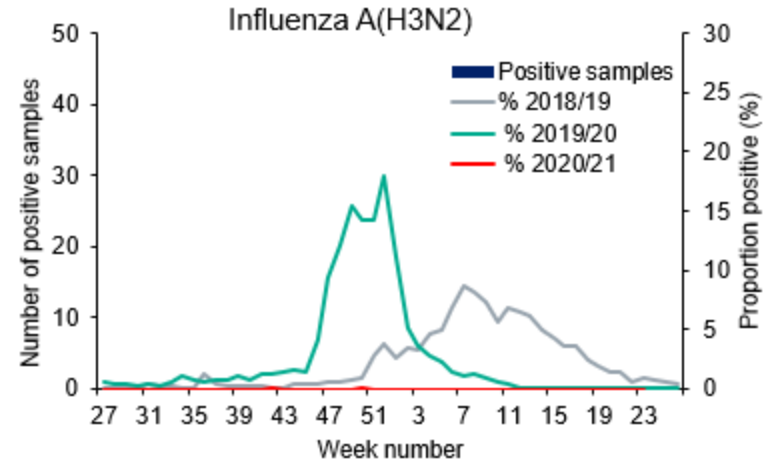
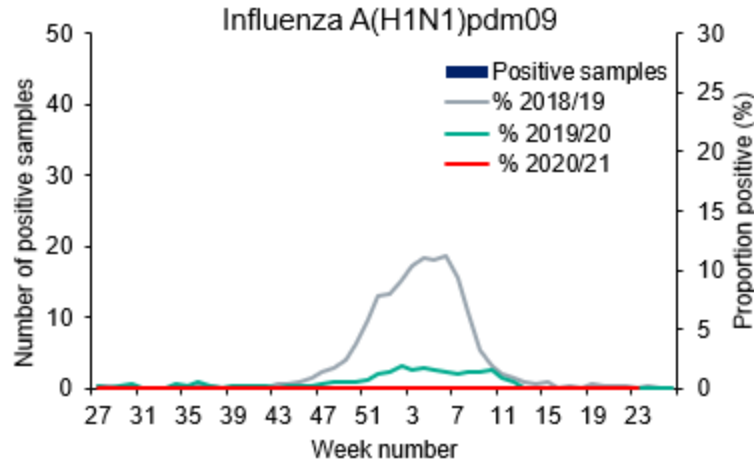


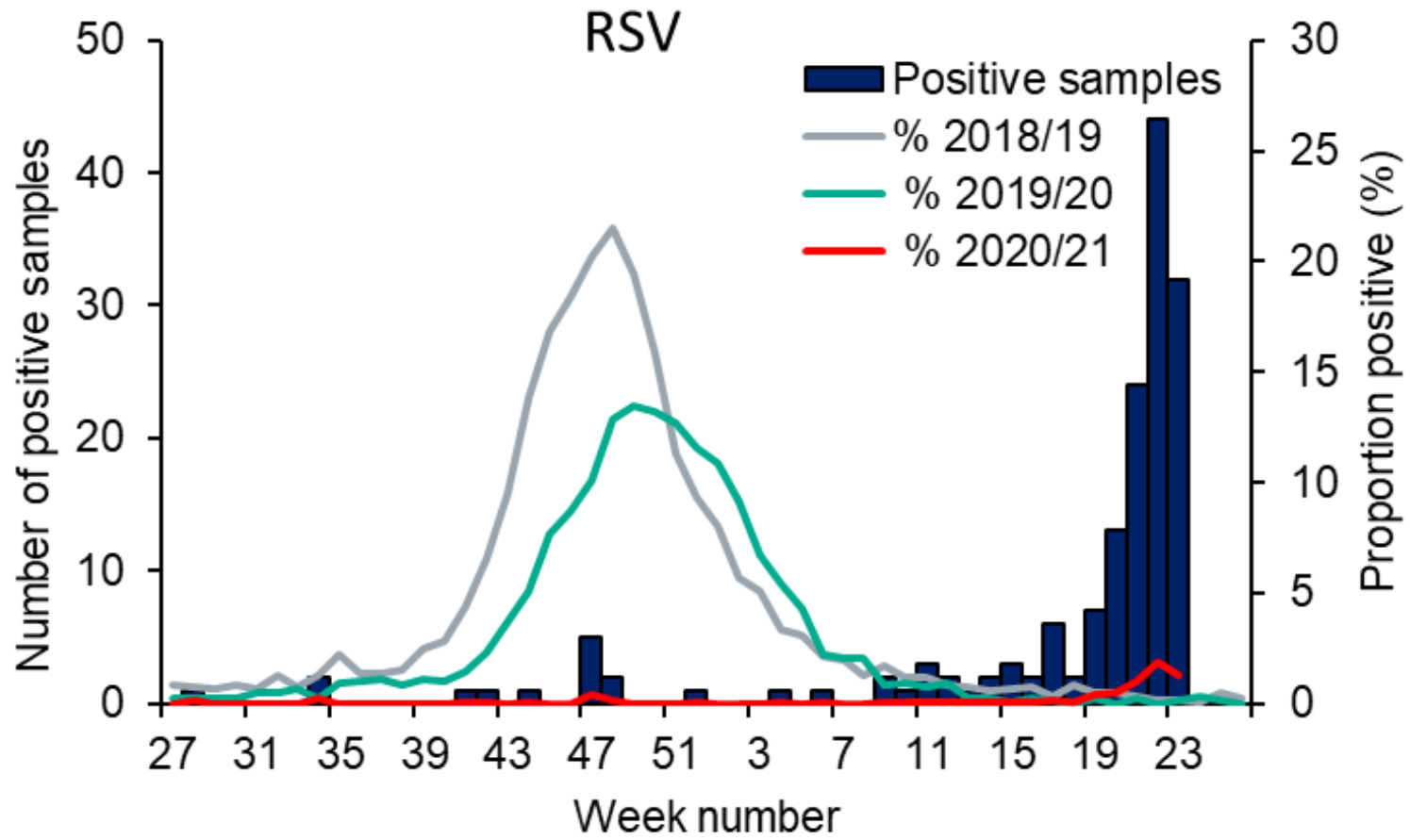


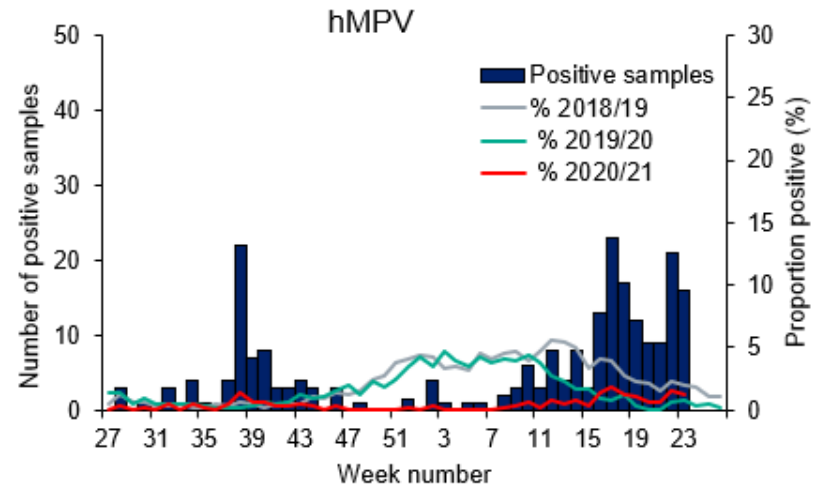
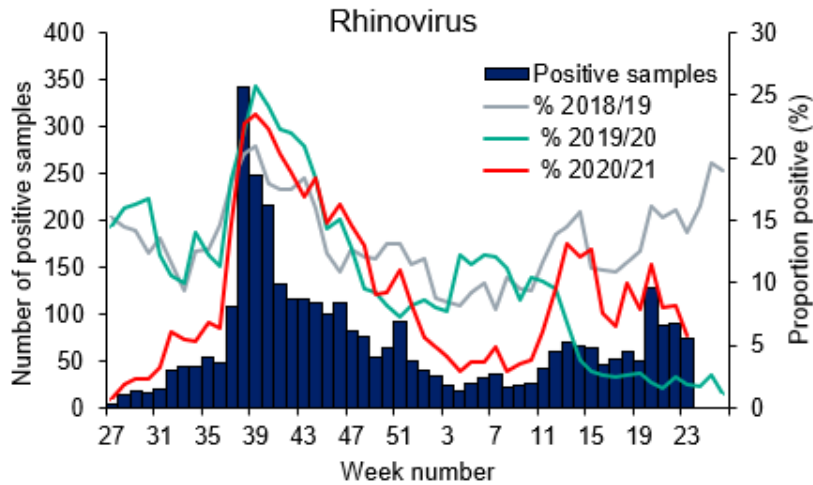
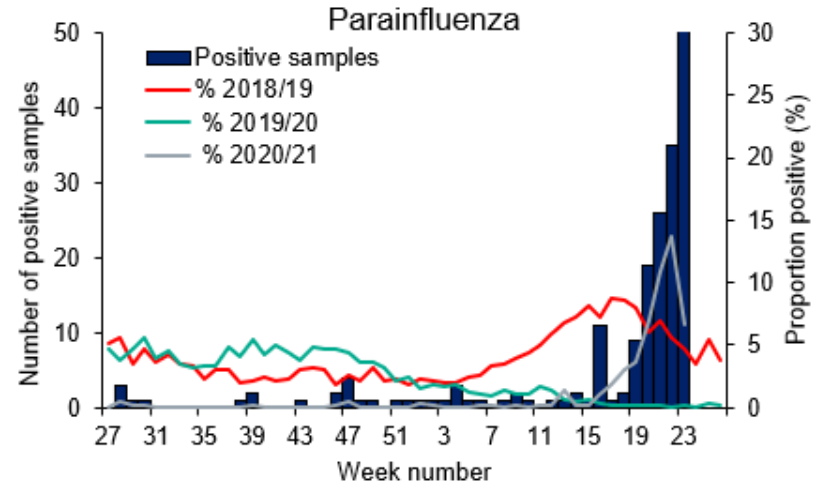
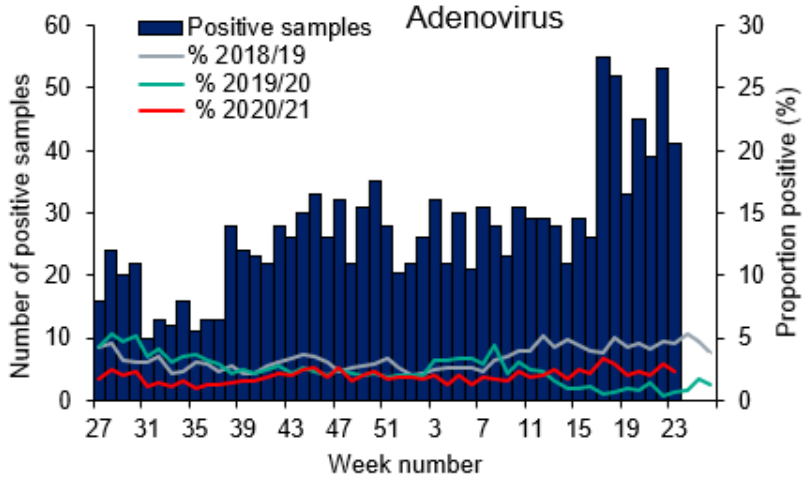
Respiratory Datamart system (England)



Respiratory DataMart – Influenza subtypes









Community surveillance



Data Information

- We report on new acute respiratory infection (ARI) incidents reported to Health Protection Teams (HPTs) and entered on HPZone in the previous reporting week in educational settings by locality
- Individual case notes are reviewed by an epidemiologist and an assessment made about whether the criteria for a confirmed COVID-19 cluster or outbreak are met. See definitions below.
- The incidents captured on HPZone represent a subset of all ongoing clusters and outbreaks in England. A variety of arrangements are in place with local authorities and other stakeholders supporting HPTs, however, data may not routinely be documented on HPZone. As a result, the number of outbreaks reported for some of the regions are underestimates

Caveats

- A national school helpline started operating on 17 September 2020 and a Universities helpline started operating on 7 October schools in England were closed for half-term during weeks 43 or/ and 44.
- From Week 1 2021 the third national lockdown came into effect and schools were closed with the exception of vulnerable children and children of key workers. Early years settings have remained open.

Definitions

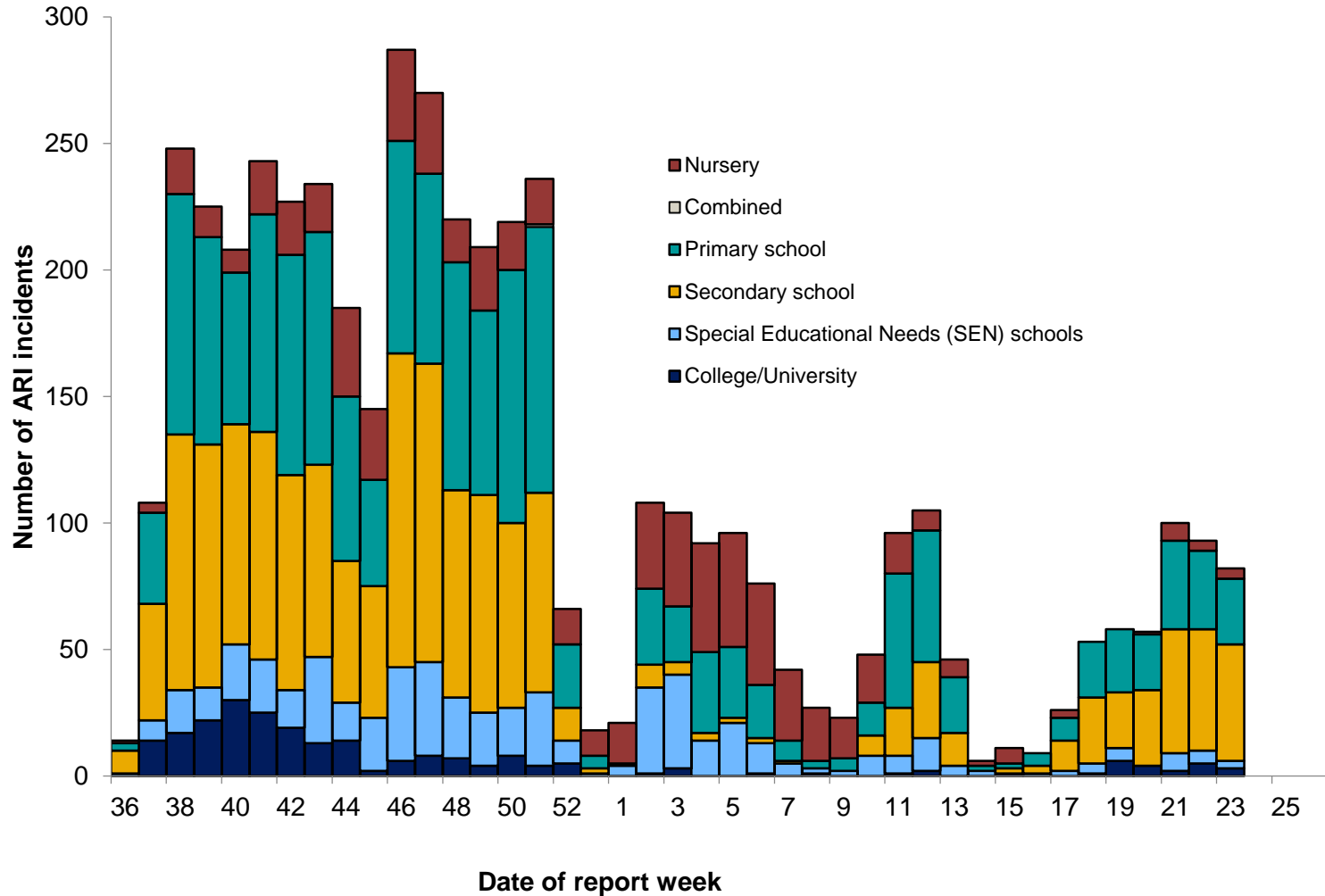
Cluster: two or more test-confirmed cases of COVID-19 among individuals associated with a specific non-residential setting with illness onset dates within a 14-day period (in the absence of detailed information about the type of contact between the cases).

Outbreak: two or more test-confirmed cases of COVID-19 among individuals associated with a specific non-residential setting with illness onset dates within 14 days, and one of:

- Identified direct exposure between at least 2 of the test-confirmed cases in that setting (for example under one metre face to face, or spending more than 15 minutes within 2 metres) during the infectious period of one of the cases.
- When there is no sustained local community transmission - absence of an alternative source of infection outside the setting for the initially identified cases



Number of COVID-19 confirmed clusters or outbreaks by type of educational setting, England





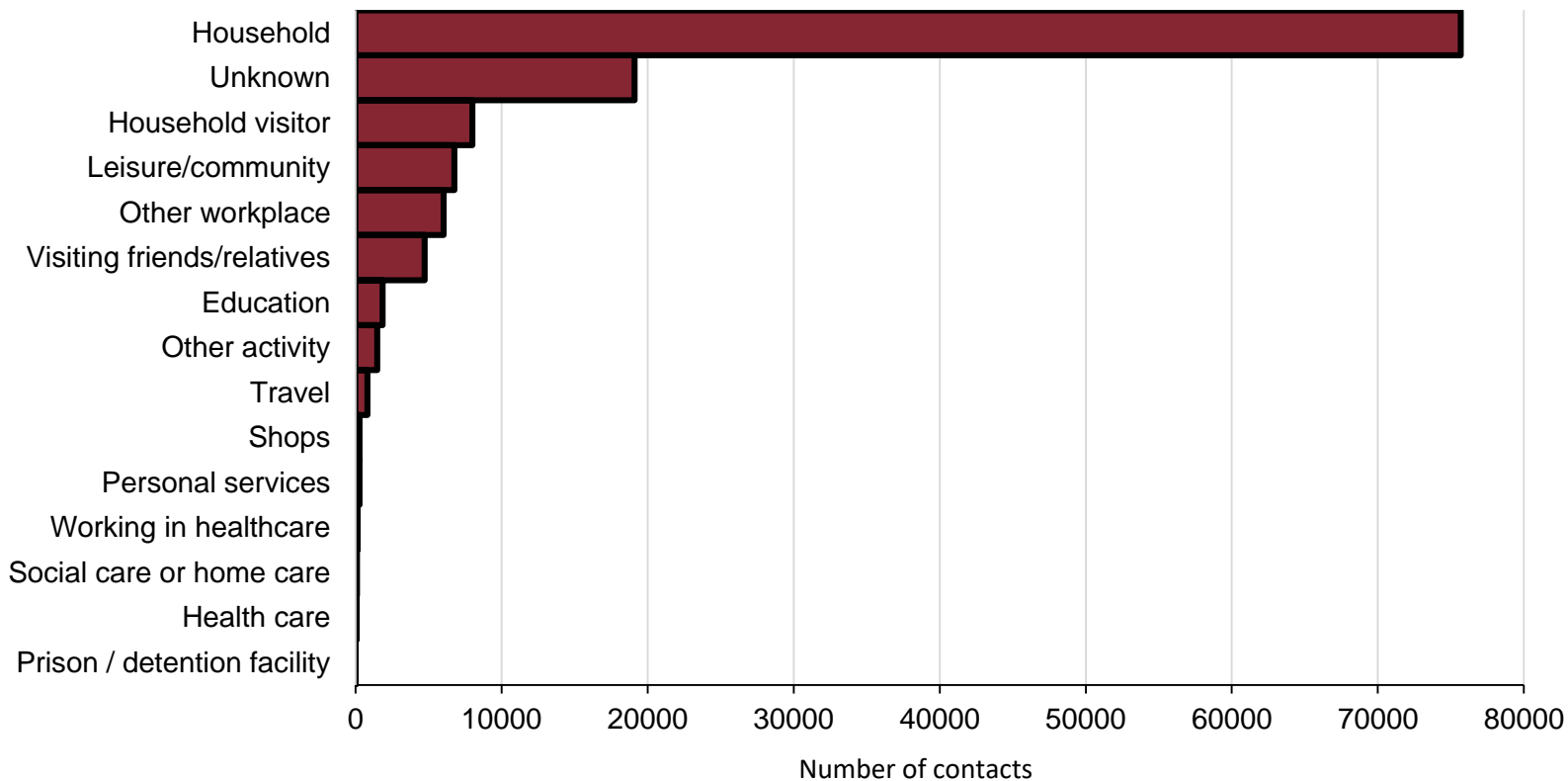
Cumulative number of confirmed COVID-19 clusters or outbreaks by type of educational setting and PHE Centre since week 36, England

PHE Centres	Nursery	Primary School	Secondary School	Combined	Special Educational Needs (SEN) schools	College University	Total
East of England	8 (0)	24 (0)	54 (1)	1 (0)	9 (0)	14 (0)	110 (1)
East Midlands	103 (0)	189 (2)	137 (6)	1 (0)	62 (1)	25 (0)	517 (9)
London	125 (0)	381 (6)	394 (5)	2 (0)	61 (0)	47 (2)	1010 (13)
North East	1 (0)	23 (0)	26 (1)	0 (0)	10 (0)	6 (0)	66 (1)
North West	38 (0)	98 (4)	116 (3)	1 (0)	58 (0)	18 (0)	329 (7)
South East	161 (2)	313 (8)	379 (20)	3 (2)	117 (1)	38 (0)	1011 (33)
South West	38 (0)	105 (0)	106 (3)	1 (0)	58 (0)	28 (1)	336 (4)
West Midlands	108 (1)	302 (4)	235 (3)	2 (0)	82 (1)	27 (0)	756 (9)
Yorkshire and Hur	114 (1)	239 (2)	158 (4)	3 (0)	79 (0)	26 (0)	619 (7)
Total	696 (4)	1674 (26)	1605 (46)	14 (2)	536 (3)	229 (3)	4754 (84)

*Number of outbreaks for Week 23 in brackets



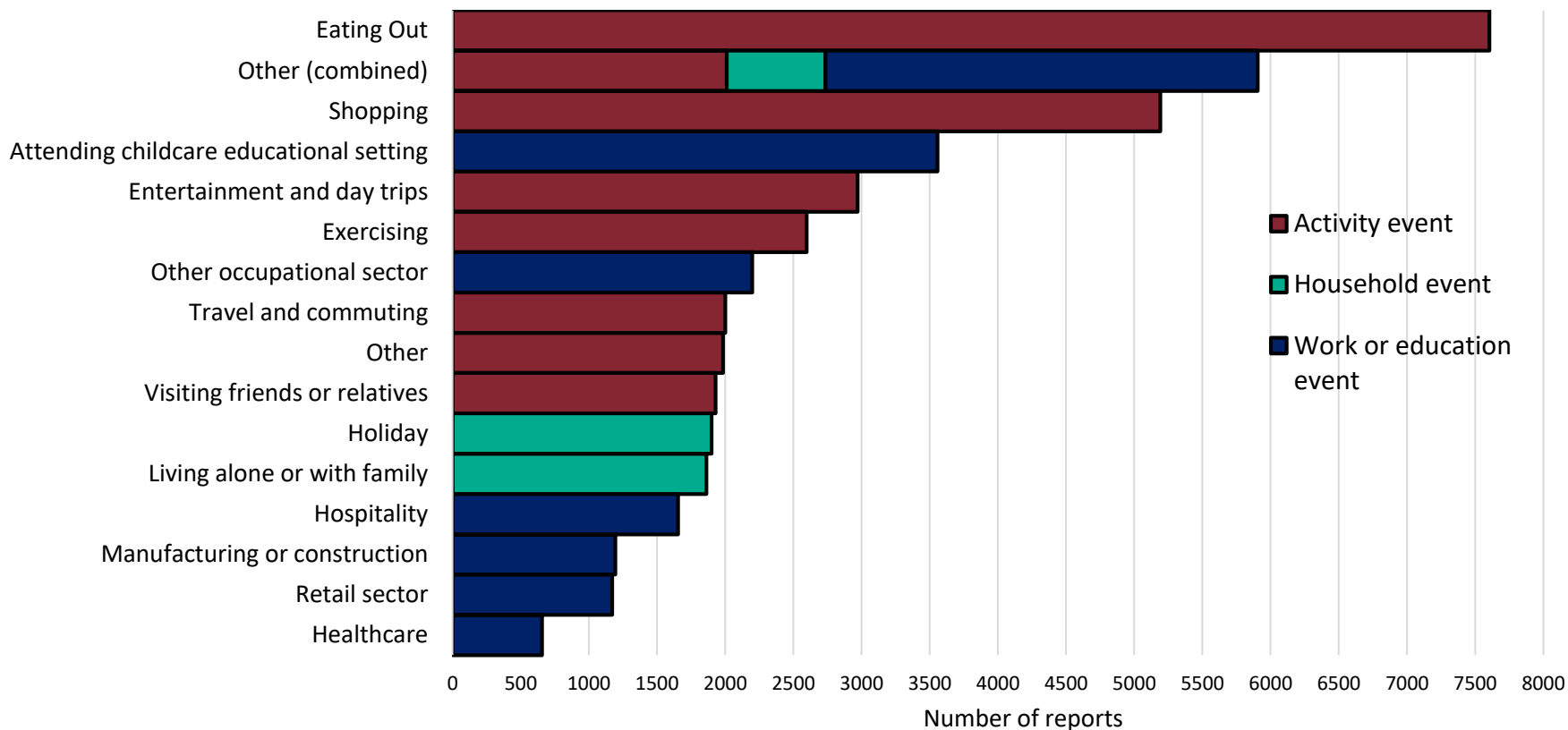
Contacts by exposure/activity setting in week 23, England (Data source: NHS Test and Trace)



Note: categories have been grouped as follows: leisure / community includes eating out, attending events and celebrations, exercising, worship, arts, entertainment or recreation, community activities and attending play groups or organised trips; other workplace includes: retail, manufacturing or construction, hospitality, transport, emergency services or border force, food production and agriculture, prison, financial services, civil service or local government, information and communication, military, critical national infrastructure.
Personal services include hairdressers, barbers, tattooists and nail bars.



Events and activities reported by people testing positive, prior to symptom onset in week 23, England (Data source: NHS Test and Trace)



Note: 'Other' includes a wide range of different activities and settings, each of which has small numbers of individuals, as well as activities which did not fit any specific category and were added as Other by the case. This includes: all within 'activities': Arts, entertainment or recreation; Civil service or government; Close contact services; Community and charity activities; Critical national infrastructure; Emergency services; Financial services; Food production; Hospitality; Immigration border services; Information and communication; Military; Personal care; Prison; Private events and celebrations; Public events and mass gathering; event within a shared household; Sport events; Supported living; Teaching and education; Transport; 'Other (combined)' includes all exposure group types that have small counts such as "went to church", "went to the zoo" within that event type.



Surveillance in 'educational-age' cohorts



- Data source: SGSS Pillar 1 (NHS and PHE testing) and Pillar 2 (community testing) – England
- Educational-age cohorts have been calculated using dates of birth that correspond to a particular year group. School year groups run from 1 September to 31 of August of the following calendar year.
- We include all cases regardless of whether or not they attended an educational setting or whether or not the educational setting was open during the reporting period
- Data for the most recent week are provisional and likely to be an underestimate
- From early December 2020 a mass testing programme has been rolled out in Higher Education Institutions using Lateral Flow Devices ahead of students returning home for the Christmas break. This will impact testing trends and positivity data during this period.
- From January 2021 a mass testing programme using Lateral Flow Devices has been gradually rolled out among teachers and secondary school students ahead of students returning to school on the 8 March. This has impacted testing trends and positivity data reported from the end of February onwards, particularly in the secondary school-aged cohorts.

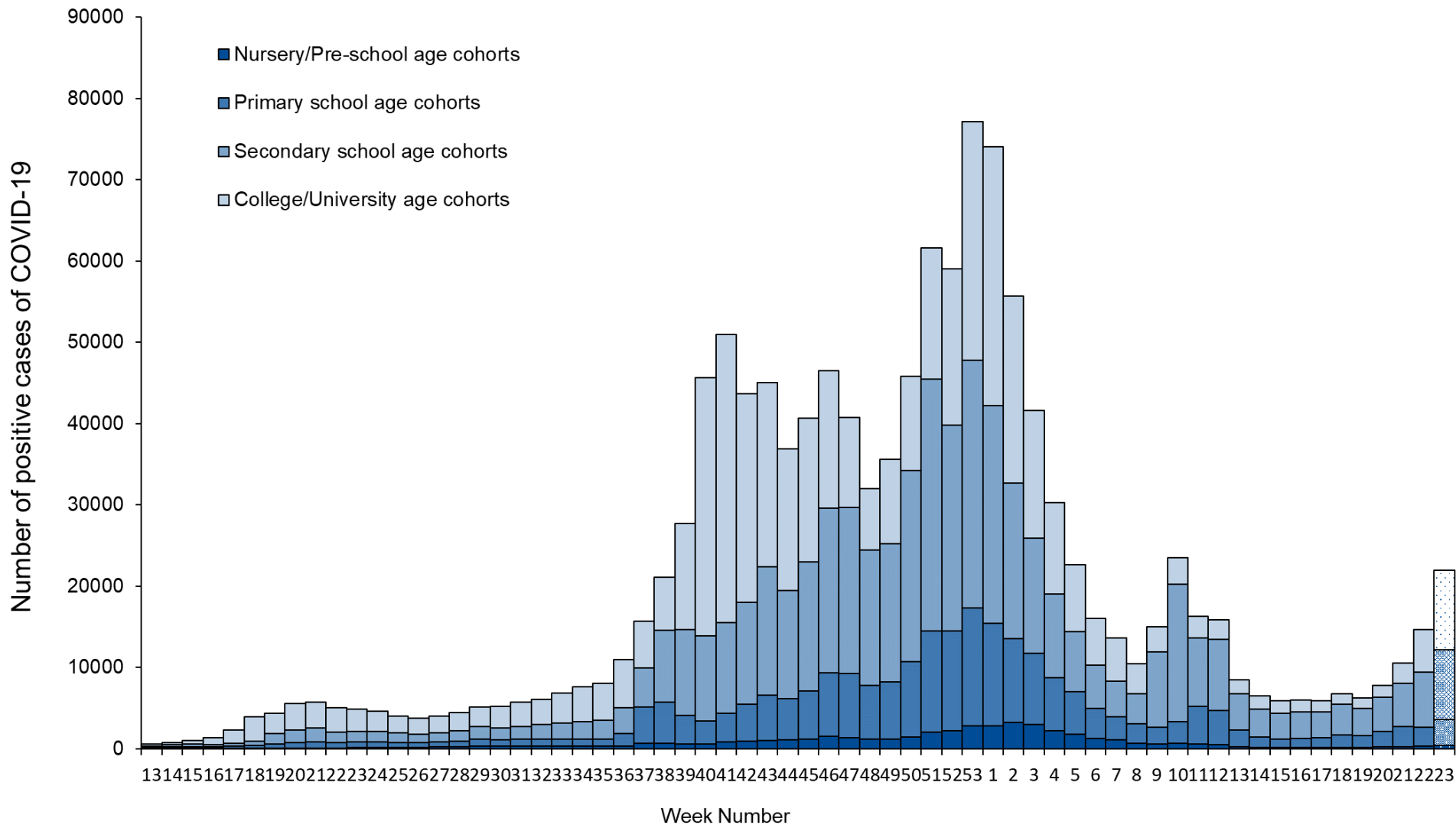


- The table aside represents the birth cohorts for each year group

Birth cohort			Year group
01/09/1998	to	31/08/1999	Uni Year 4
01/09/1999	to	31/08/2000	Uni Year 3
01/09/2000	to	31/08/2001	Uni Year 2
01/09/2001	to	31/08/2002	Uni Year 1
01/09/2002	to	31/08/2003	Year 13
01/09/2003	to	31/08/2004	Year 12
01/09/2004	to	31/08/2005	Year 11
01/09/2005	to	31/08/2006	Year 10
01/09/2006	to	31/08/2007	Year 9
01/09/2007	to	31/08/2008	Year 8
01/09/2008	to	31/08/2009	Year 7
01/09/2009	to	31/08/2010	Year 6
01/09/2010	to	31/08/2011	Year 5
01/09/2011	to	31/08/2012	Year 4
01/09/2012	to	31/08/2013	Year 3
01/09/2013	to	31/08/2014	Year 2
01/09/2014	to	31/08/2015	Year 1
01/09/2015	to	31/08/2016	Reception
01/09/2016	to	31/08/2017	Pre-school
01/09/2017	to	31/08/2018	Nursery

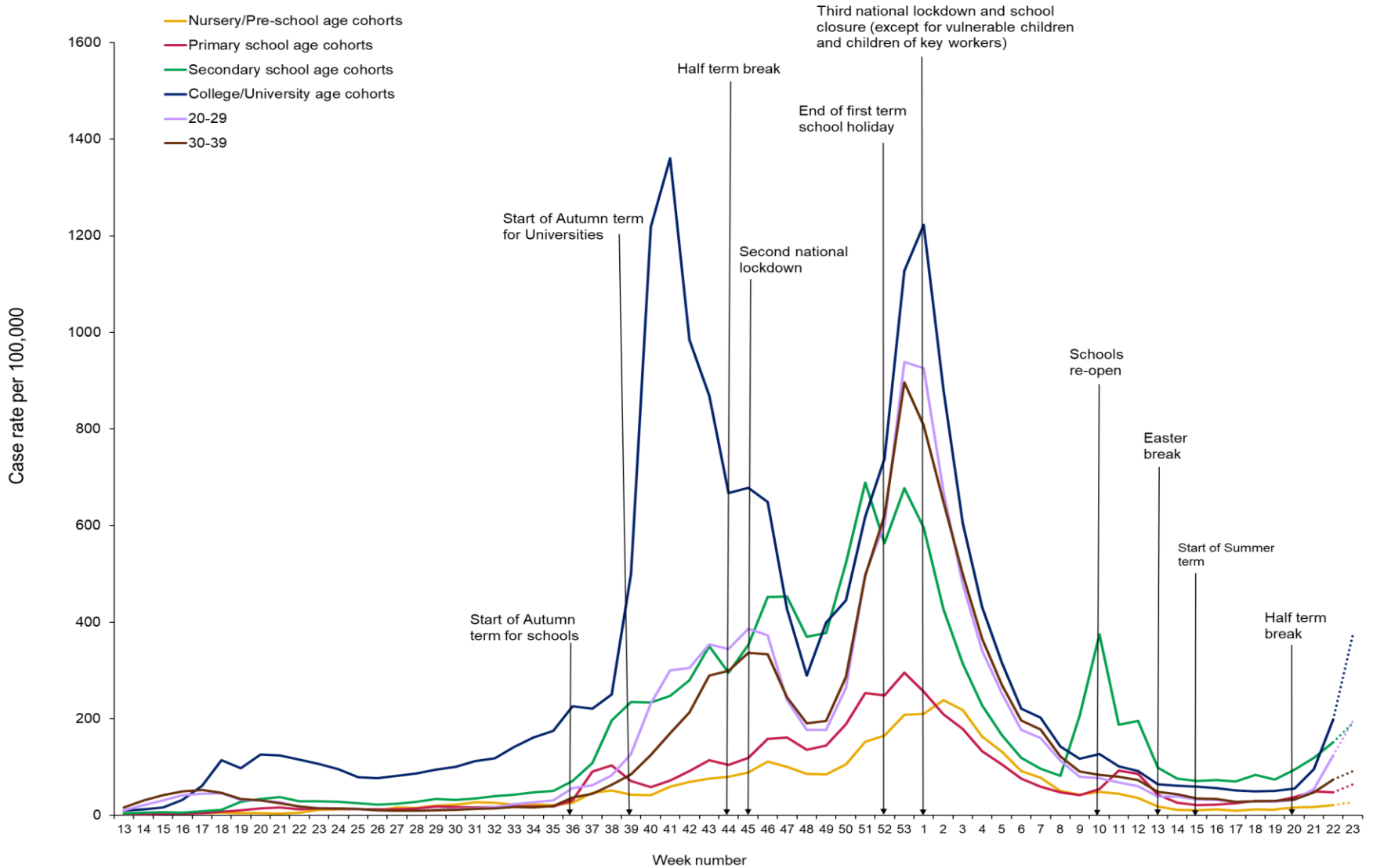


Weekly number of laboratory confirmed COVID-19 cases in nursery/preschool, primary, secondary and college/university age cohorts



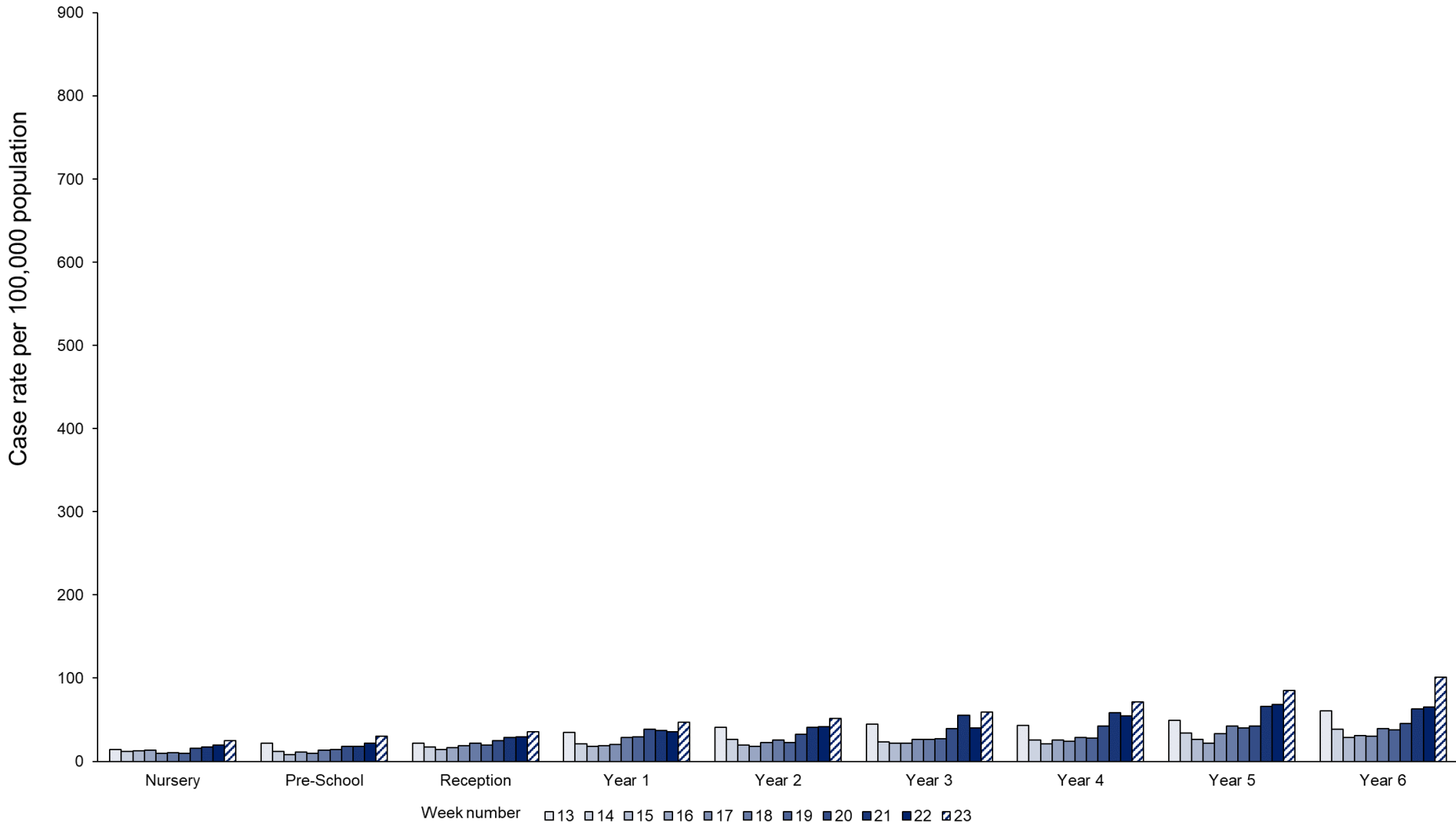


Weekly incidence of laboratory confirmed COVID-19 cases per 100,000 population in nursery/preschool, primary school, secondary school and college/university age cohorts



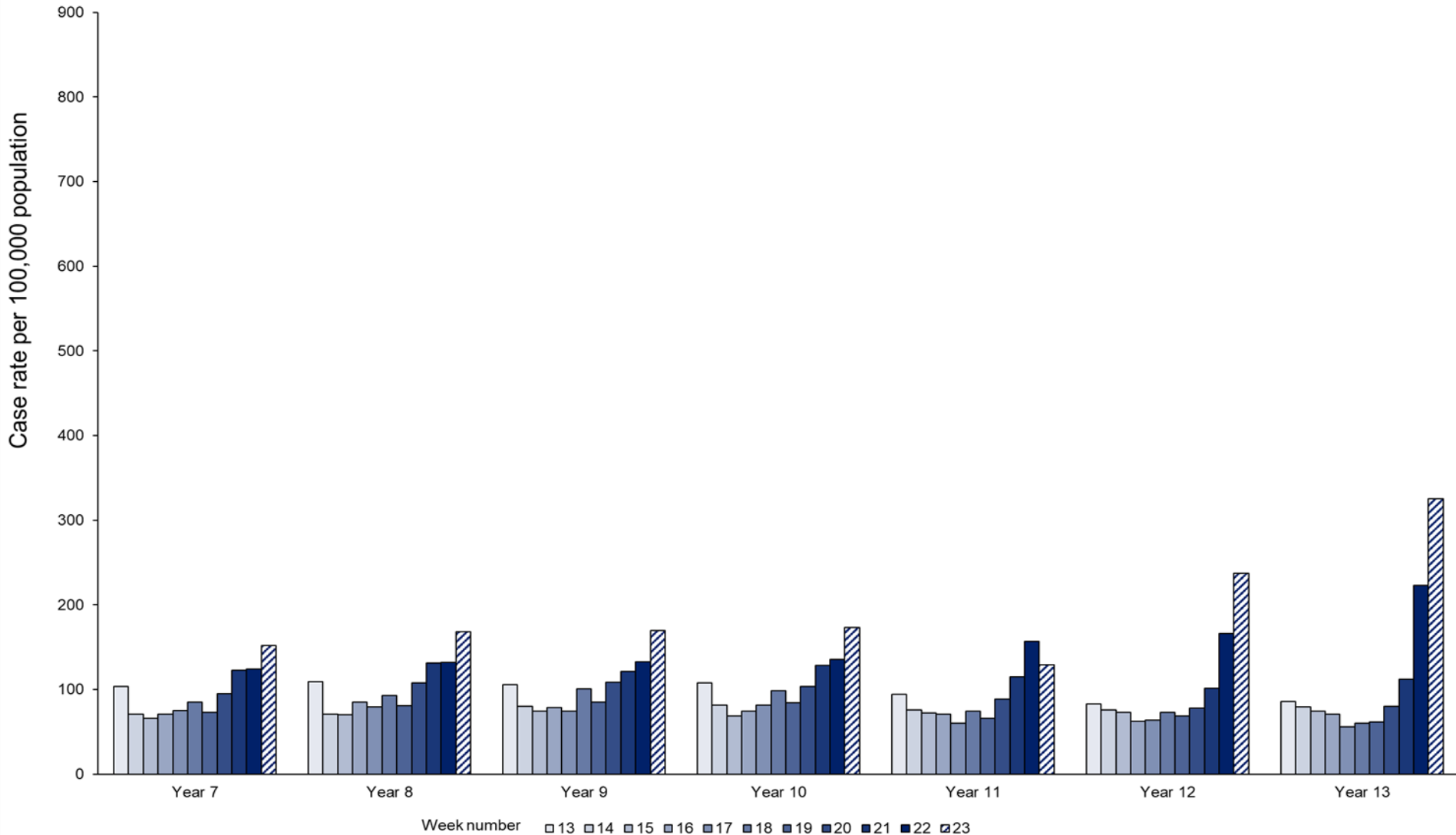


Weekly incidence of laboratory confirmed COVID-19 cases per 100,000 population in educational age cohorts presented by Year group, from nursery to Year 6, weeks 13 to 23



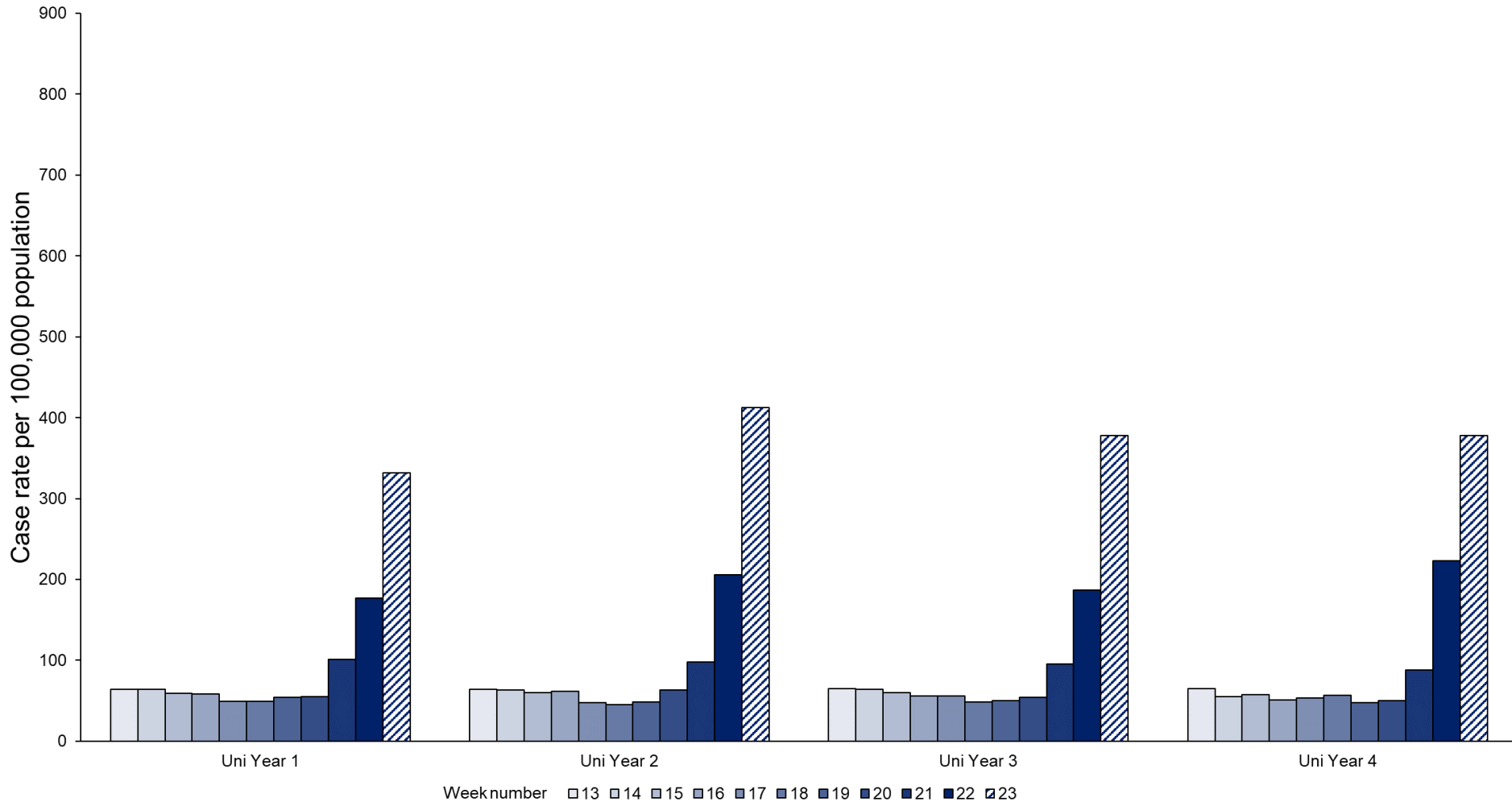


Weekly incidence of laboratory confirmed COVID-19 cases per 100,000 population in educational age groups presented by secondary school year groups (Year 7 to Year 13), weeks 13 to 23





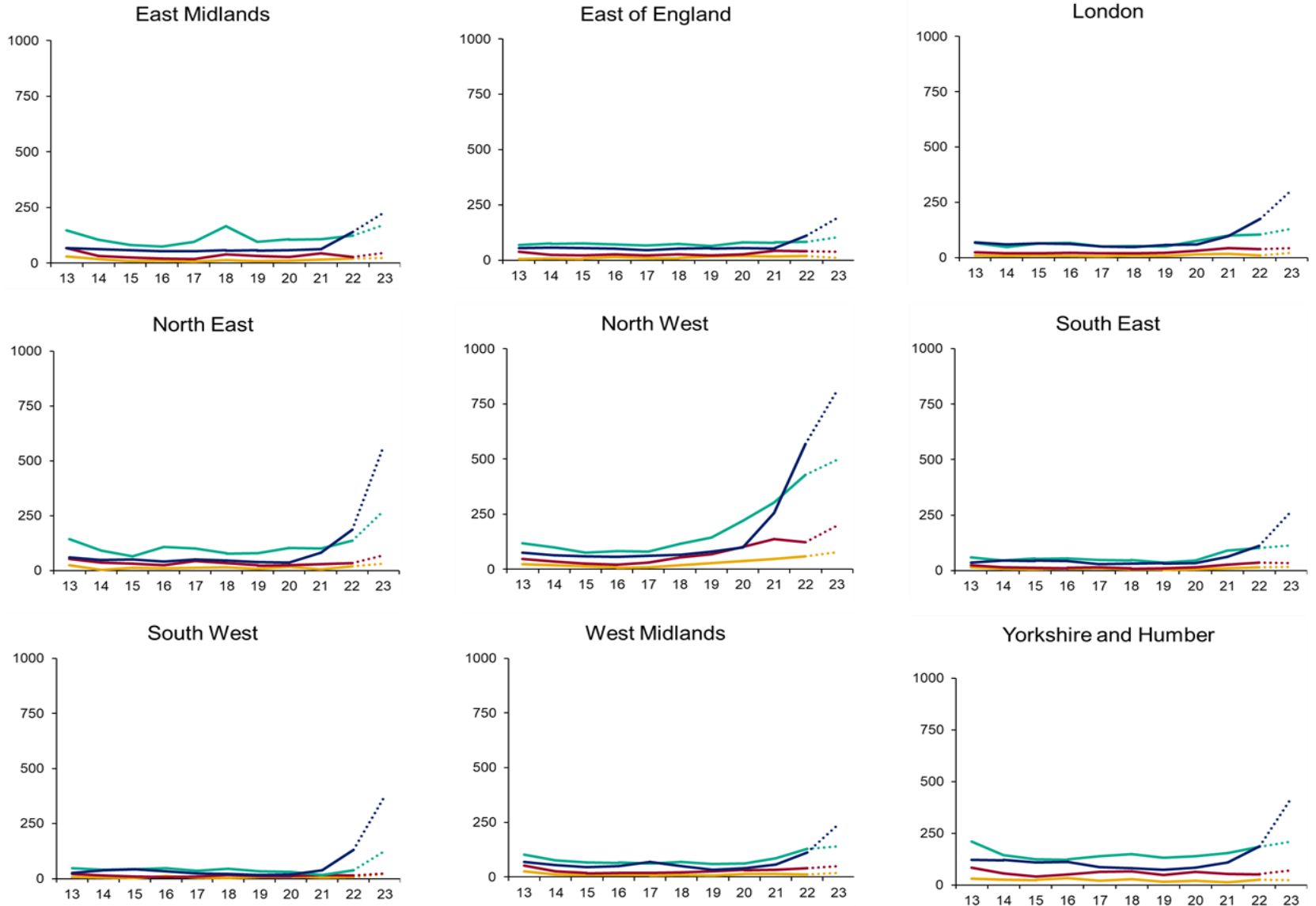
Weekly incidence of laboratory confirmed COVID-19 cases per 100,000 population in educational age cohorts corresponding to university/college year groups, weeks 13 to 23





Weekly incidence of laboratory confirmed COVID-19 cases per 100,000 population by educational age cohorts and PHE region, weeks 13 to 23

Case rate per 100,000 population

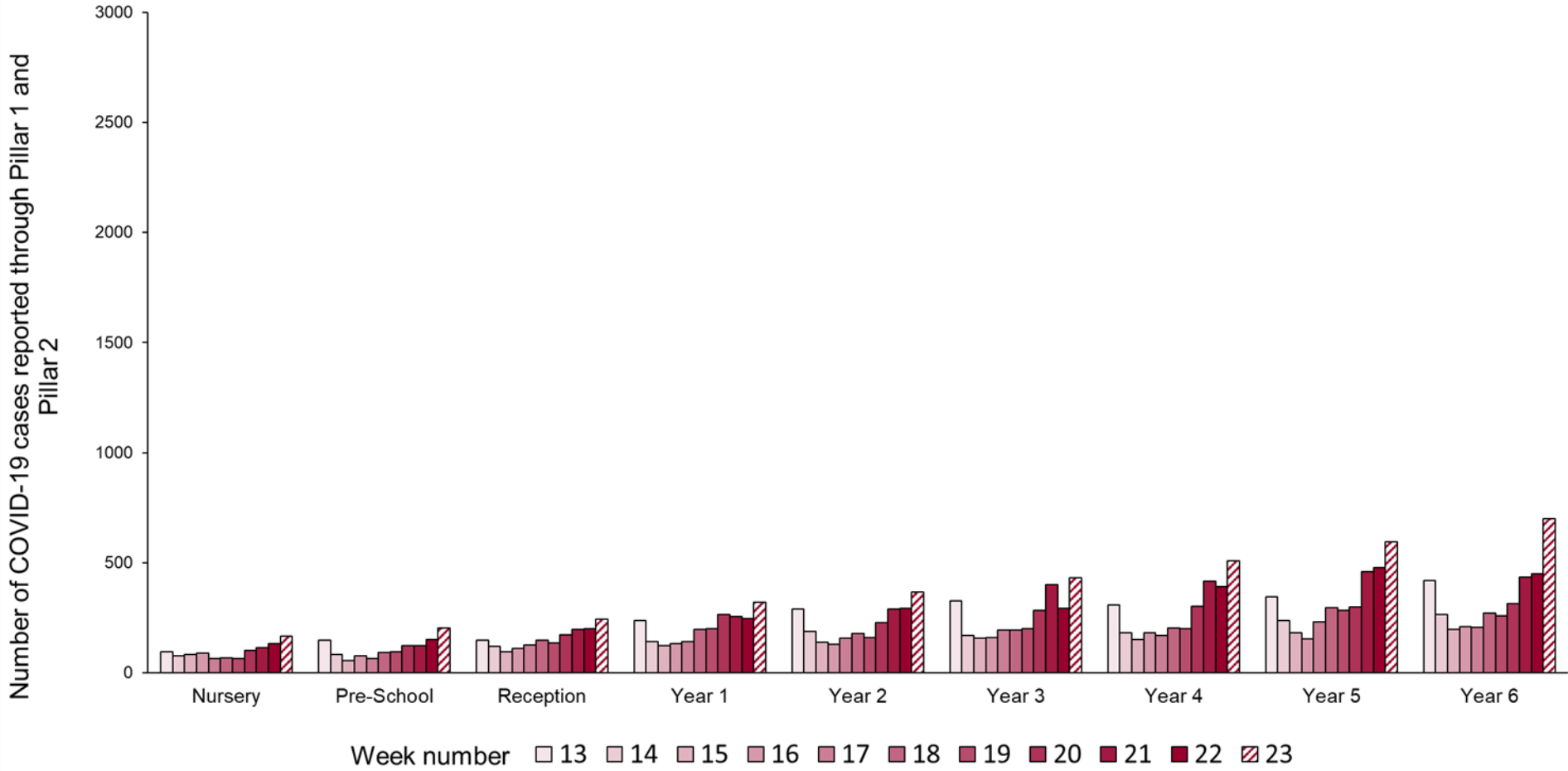


— Nursery/Pre-school age cohorts — Primary school age cohorts — Secondary school age cohorts — College/University age cohorts

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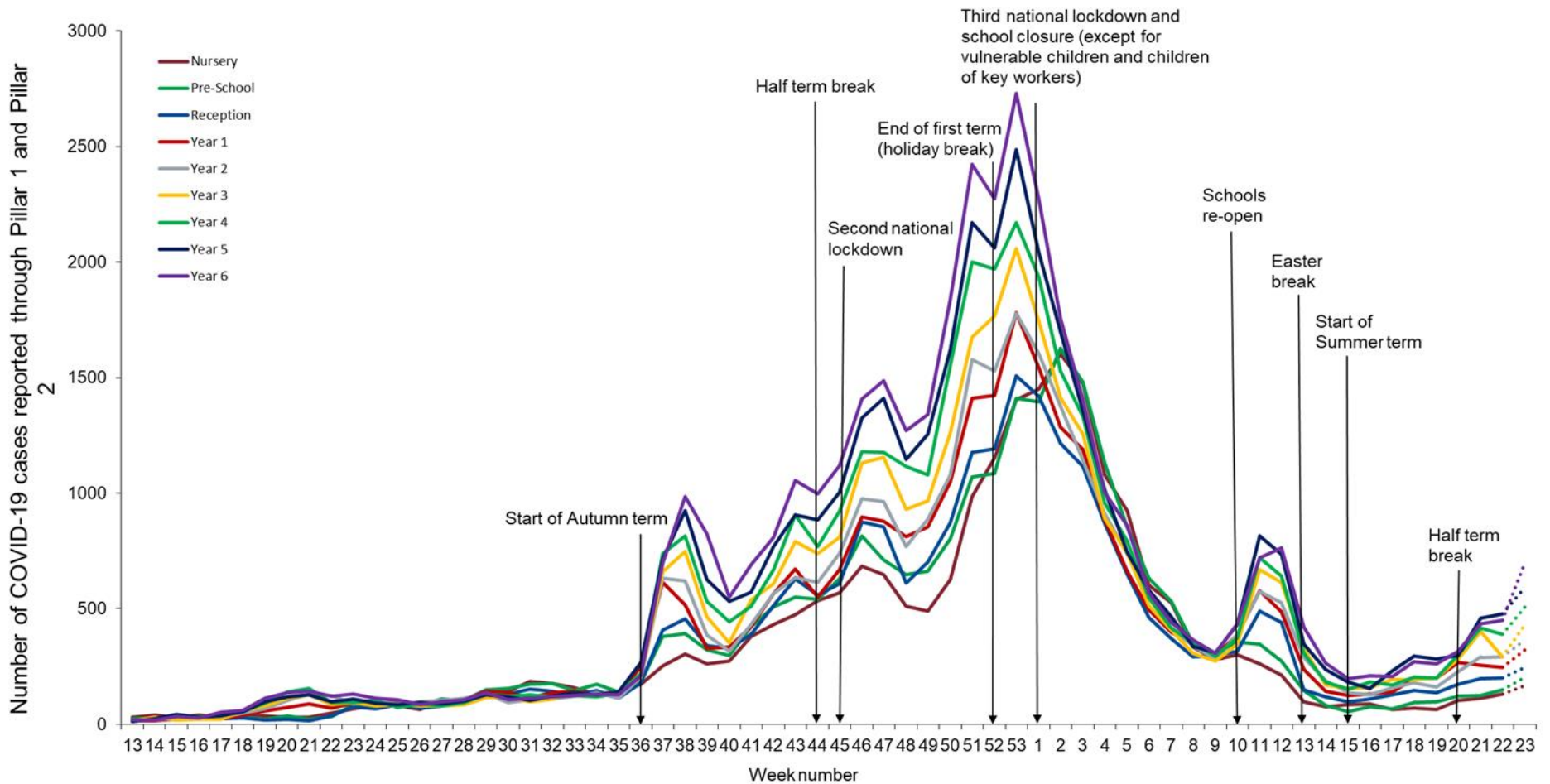


Weekly number of new laboratory confirmed COVID-19 cases in educational age cohorts presented by Year group, from nursery to Year 6, weeks 13 to 23



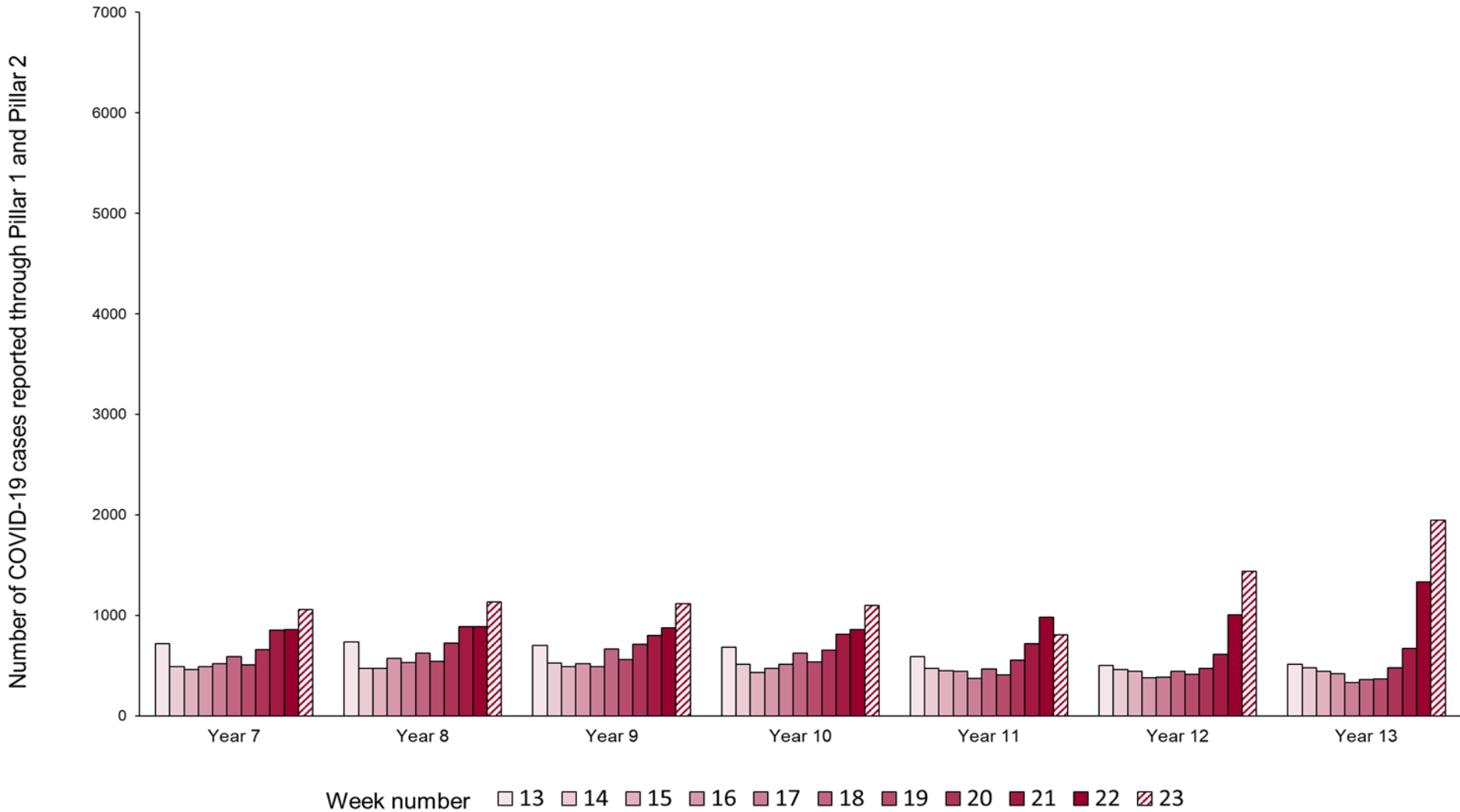


Weekly number of new laboratory confirmed COVID-19 cases in educational age cohorts presented by Year group, from nursery to Year 6





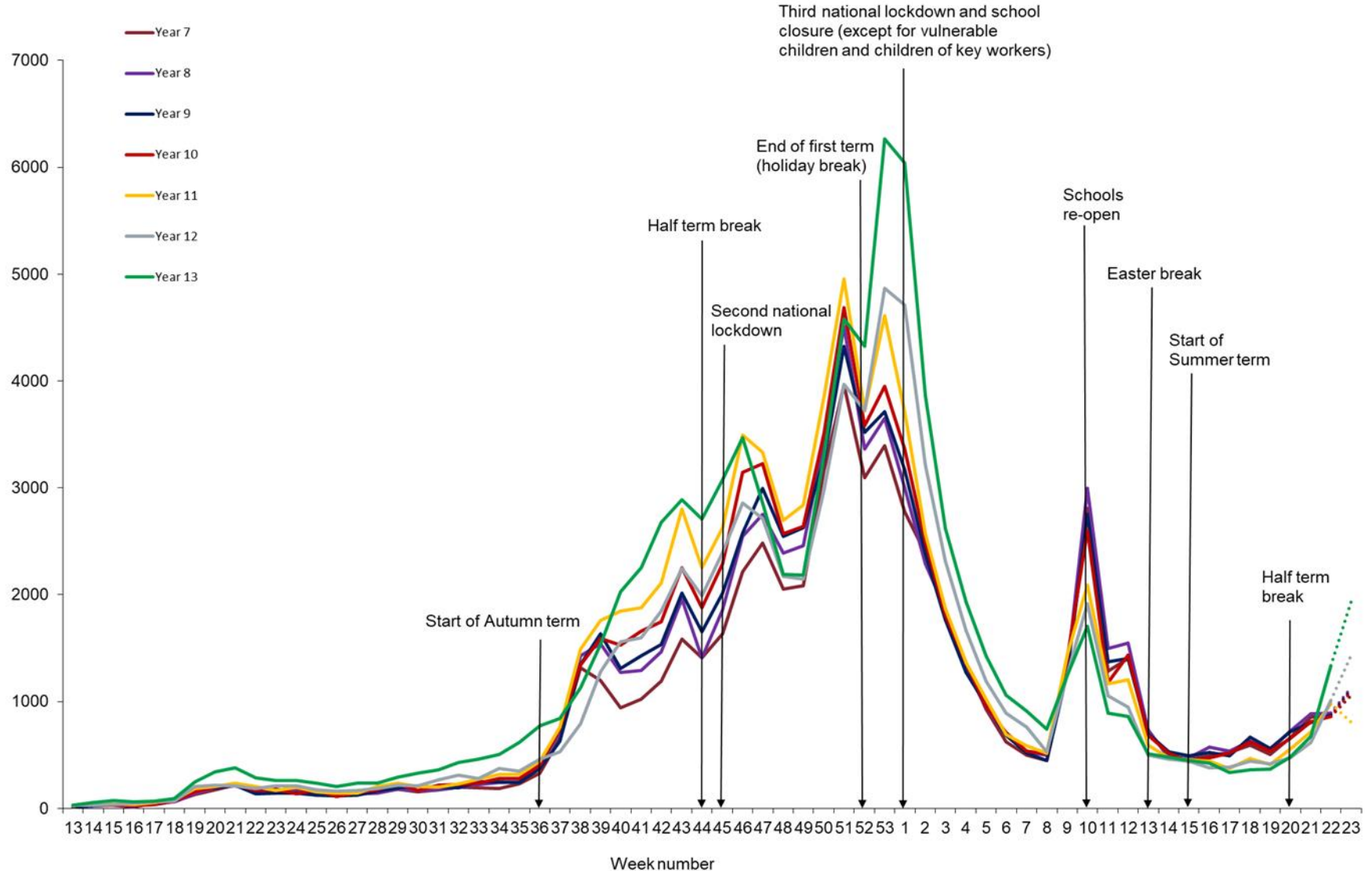
Weekly number of new laboratory confirmed COVID-19 cases in educational age groups presented by secondary school year groups (Year 7 to Year 13), weeks 13 to 23





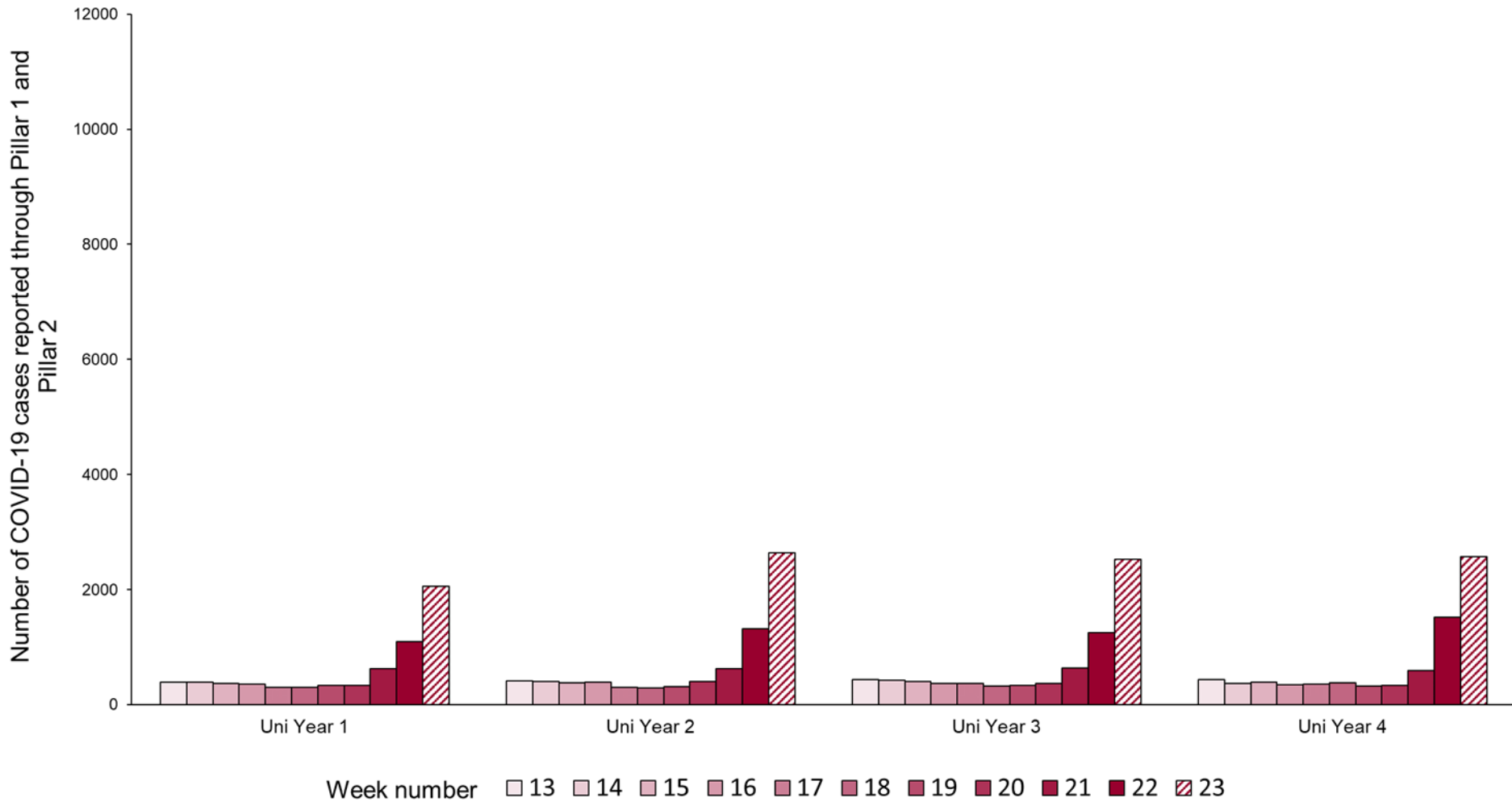
Weekly number of new laboratory confirmed COVID-19 cases in educational age groups presented by secondary school year groups (Year 7 to Year 13)

Number of COVID-19 cases reported through Pillar 1 and Pillar 2



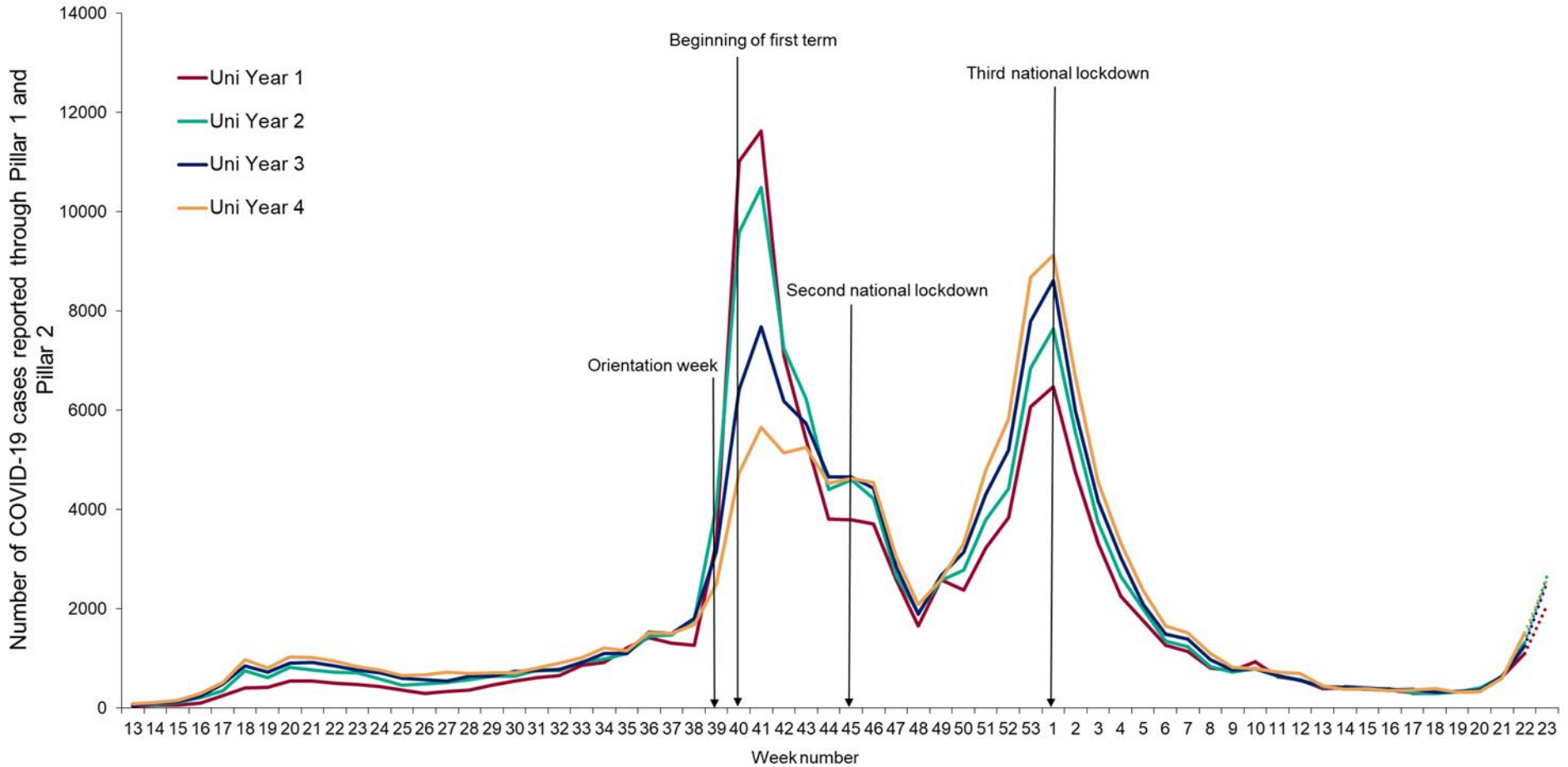


Weekly number of new laboratory confirmed COVID-19 cases in educational age cohorts corresponding to university/college year groups, weeks 13 to 23





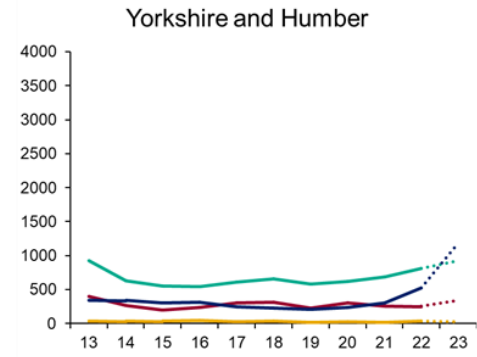
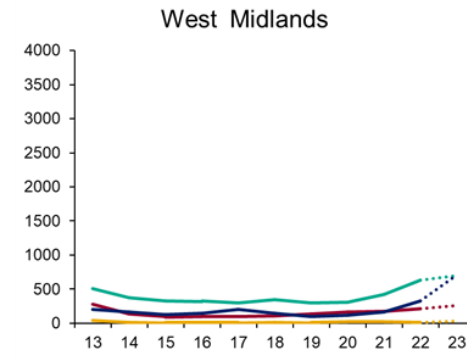
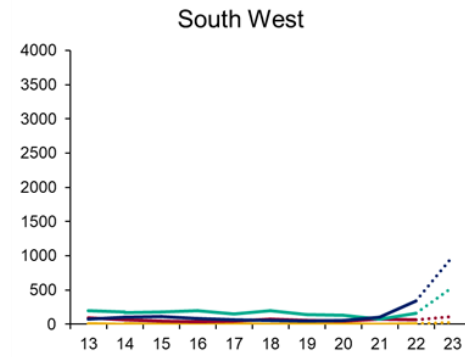
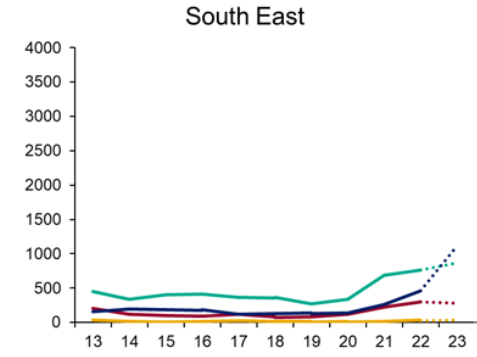
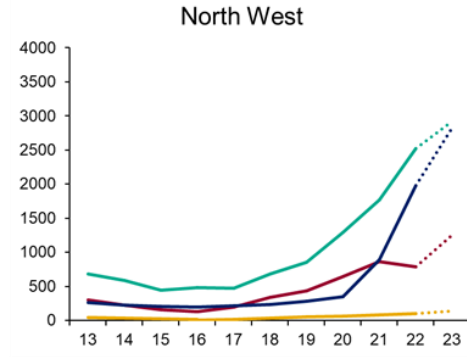
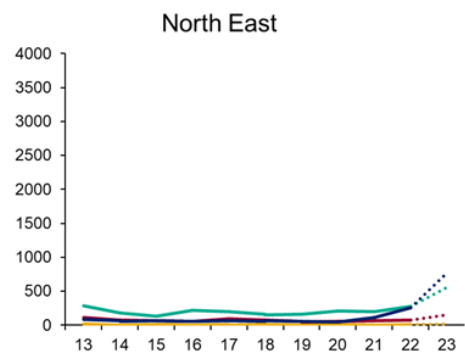
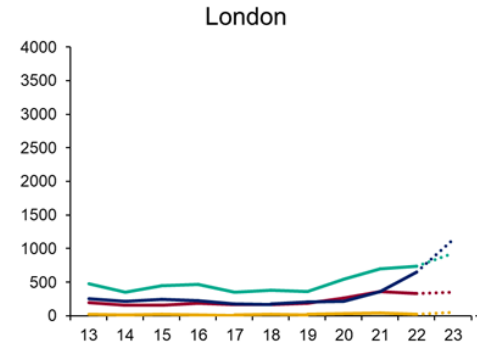
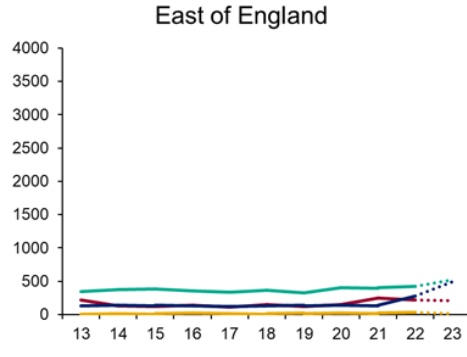
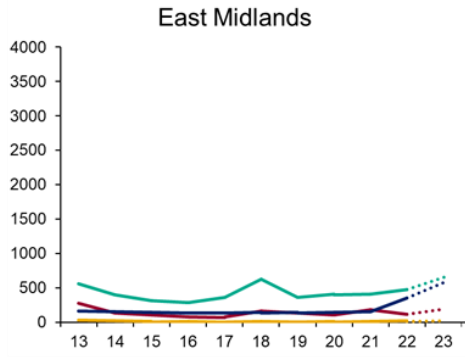
Weekly number of new laboratory confirmed COVID-19 cases in educational age cohorts corresponding to university/college year groups





Weekly number of new laboratory confirmed COVID-19 cases by educational age cohorts and PHE region, weeks 13 to 23

Number of new laboratory confirmed COVID-19 cases

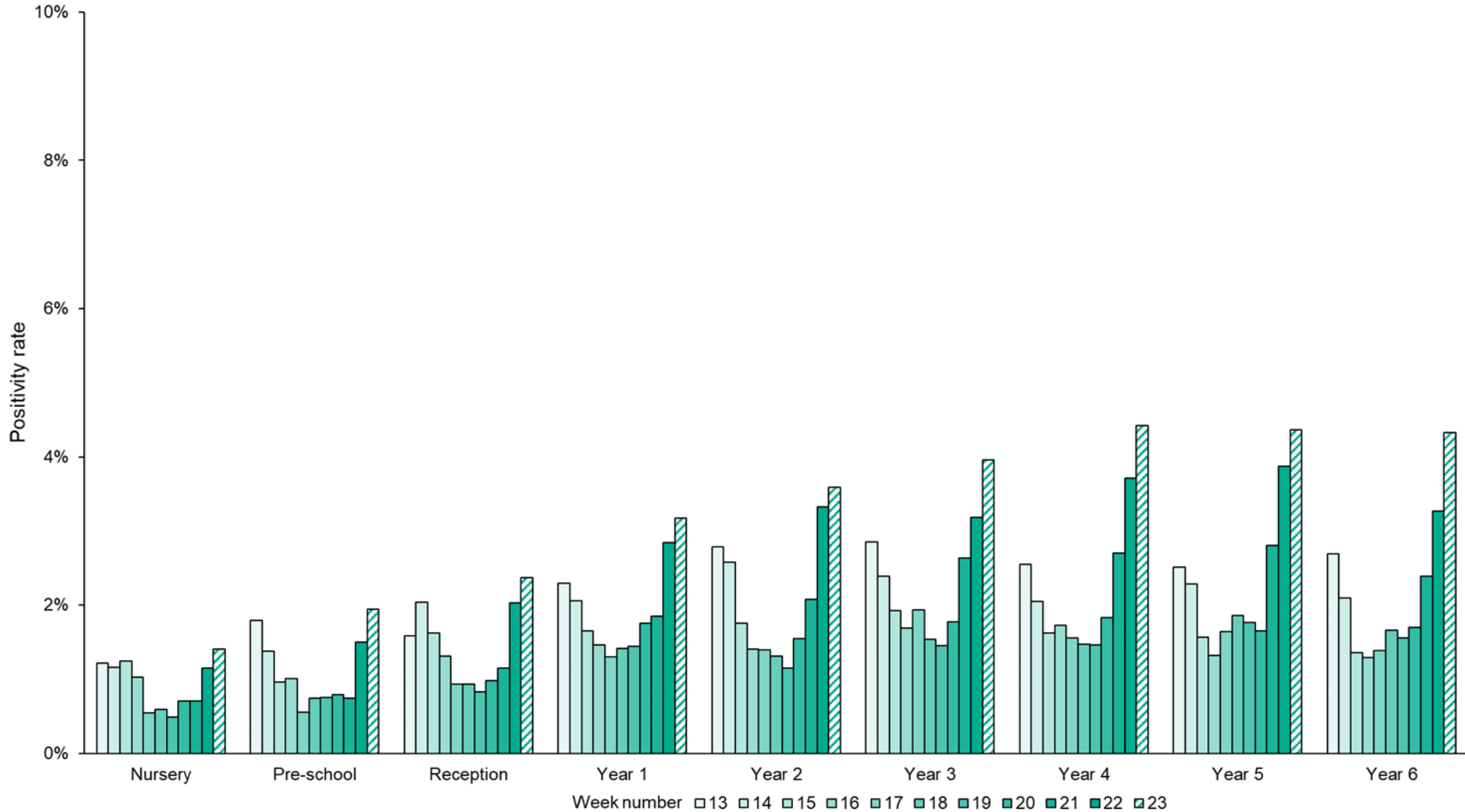


— Nursery/Pre-school age cohorts — Primary school age cohorts — Secondary school age cohorts — College/University age cohorts

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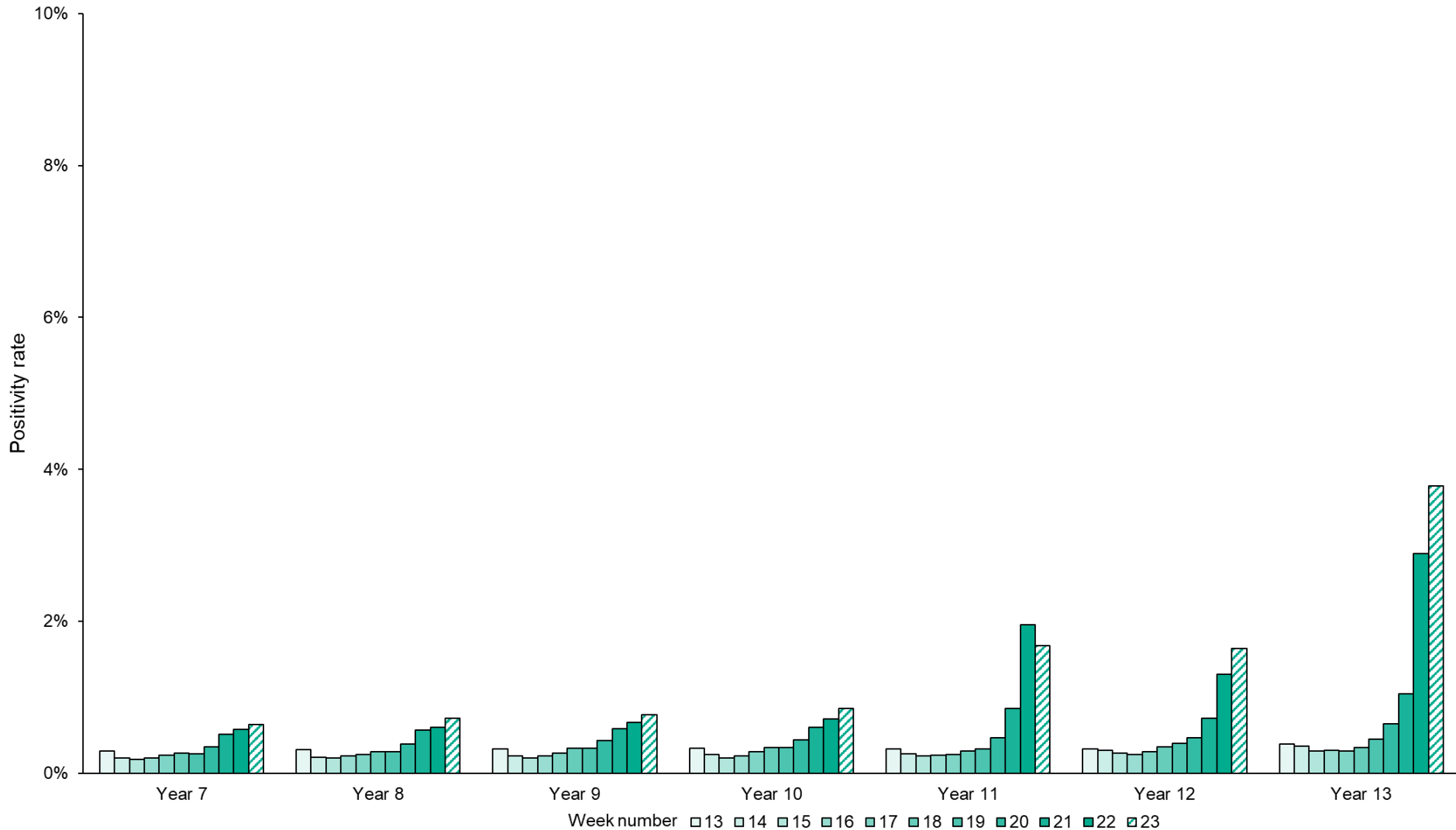


Weekly positivity rates of confirmed COVID-19 cases in educational age cohorts presented by Year group, from nursery to Year 6, weeks 13 to 23



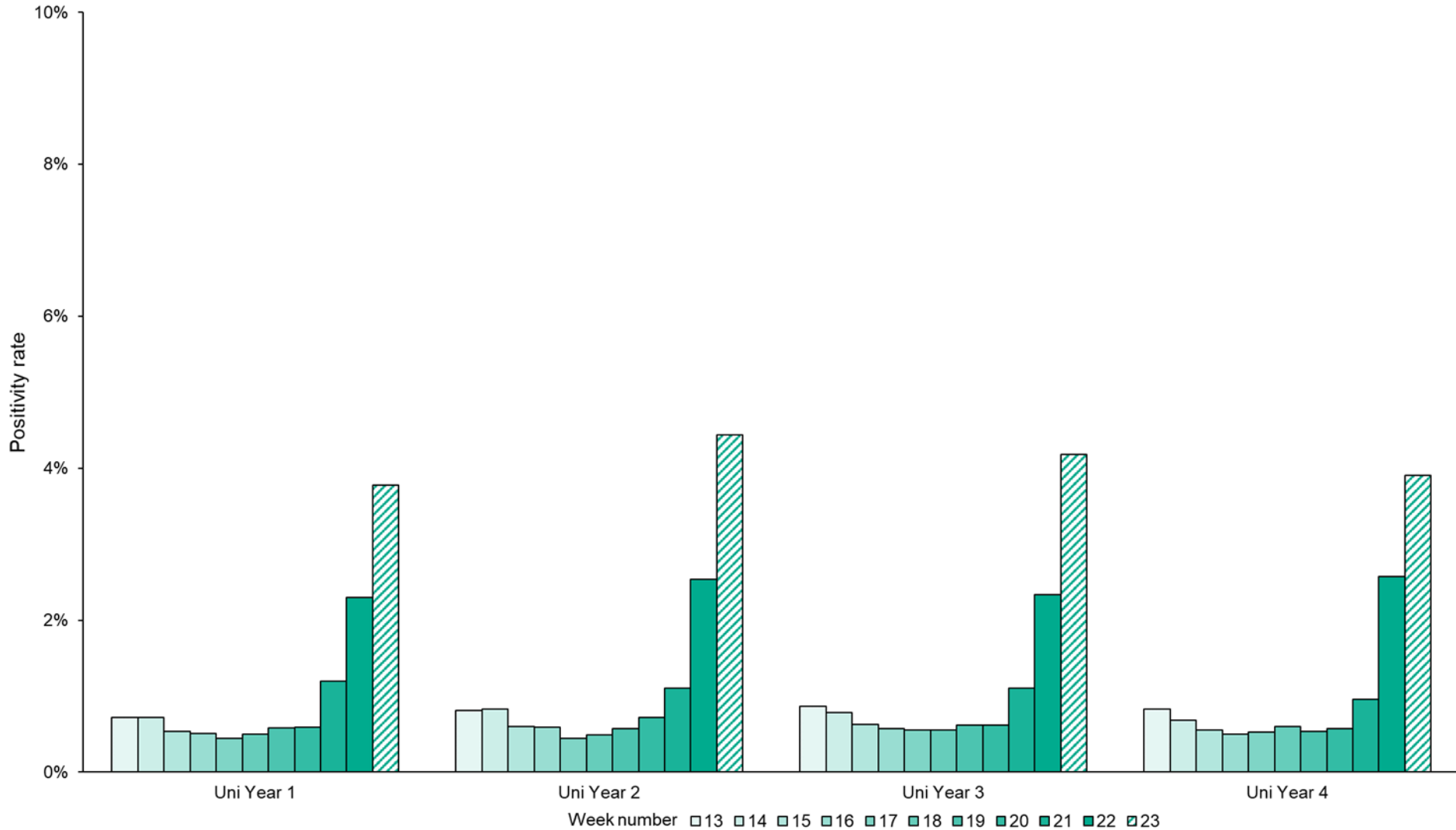


Weekly positivity rates of confirmed COVID-19 cases in educational age cohorts presented by secondary school year group (Year 7 to Year 13), weeks 13 to 23



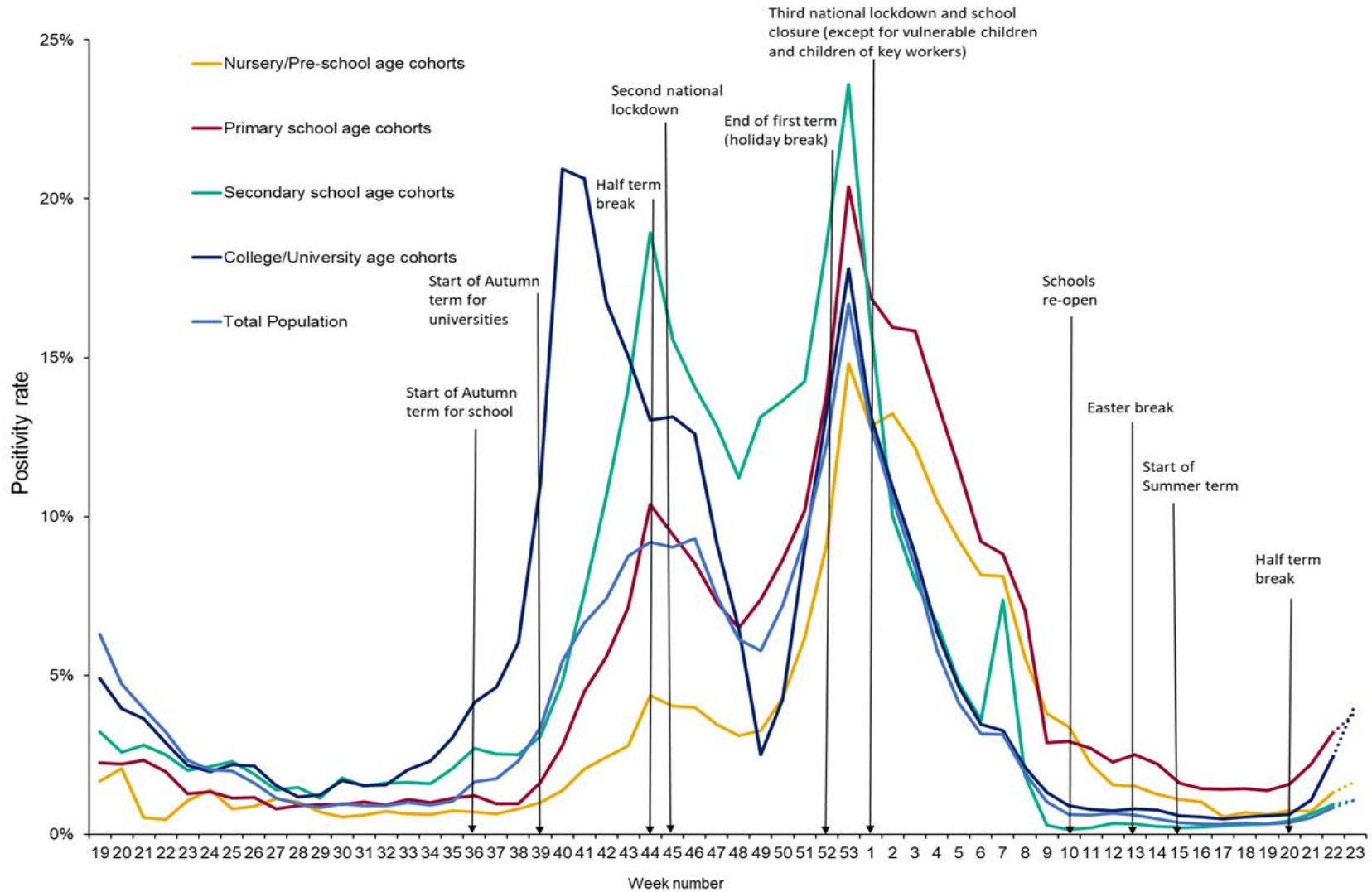


Weekly positivity rates of confirmed COVID-19 cases in educational age cohorts corresponding to university/college year groups, weeks 13 to 23





Weekly positivity rates of confirmed COVID-19 cases, in nursery/preschool, primary school, secondary school and college/University age cohorts

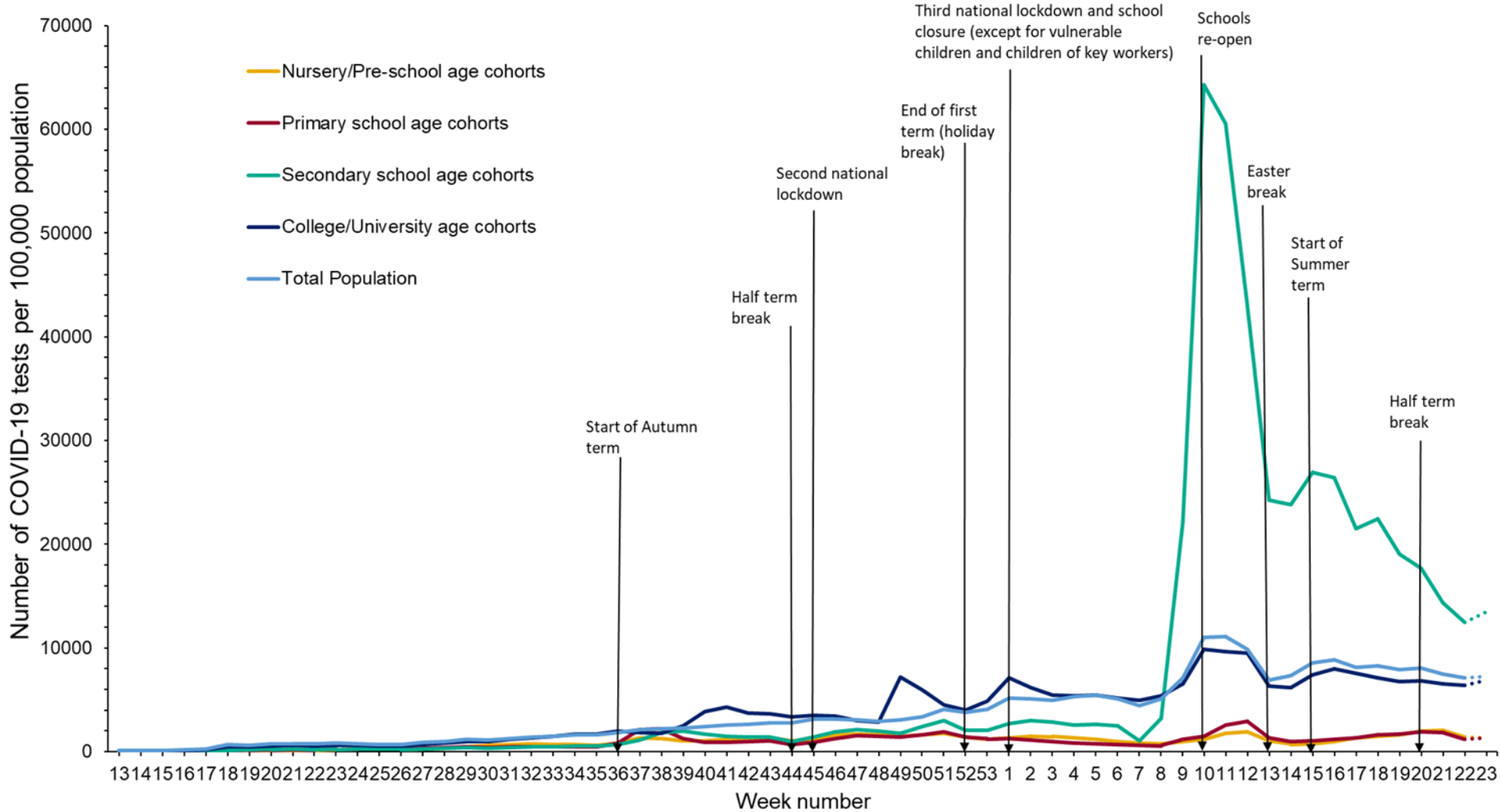


- From January 2021 a programme of rapid asymptomatic testing was rolled out to students in the secondary school aged cohorts attending these settings during lockdown. We note a drop in the number of tests conducted in these cohorts and an increase in positivity during week 7 which coincides with half term break.
- Lateral flow device testing of secondary aged pupils in a supervised environment from week 8

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Weekly rate of new COVID-19 tests performed per 100,000 population in nursery/preschool, primary school, secondary school and college/University age cohorts



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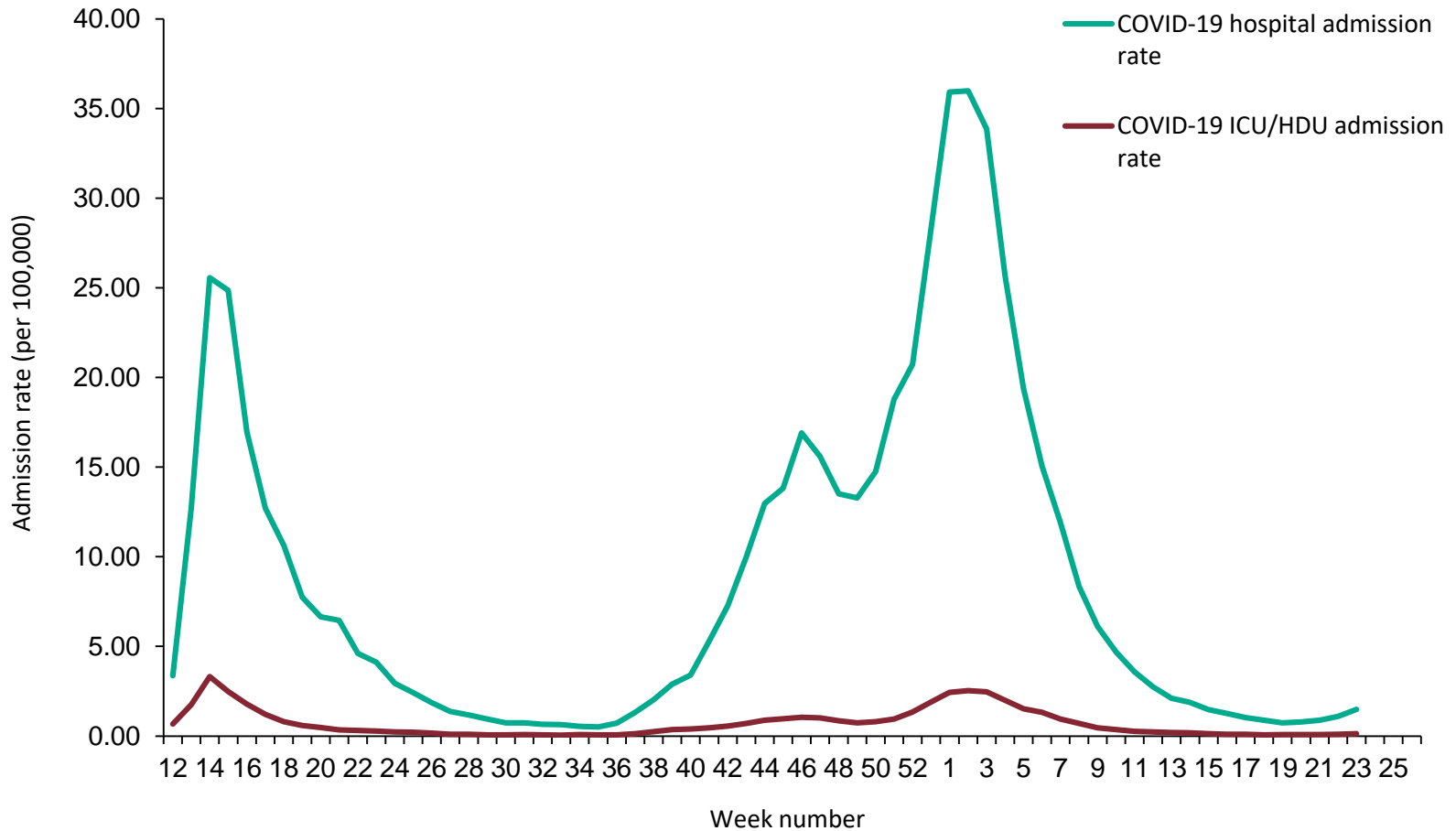
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Secondary Care surveillance

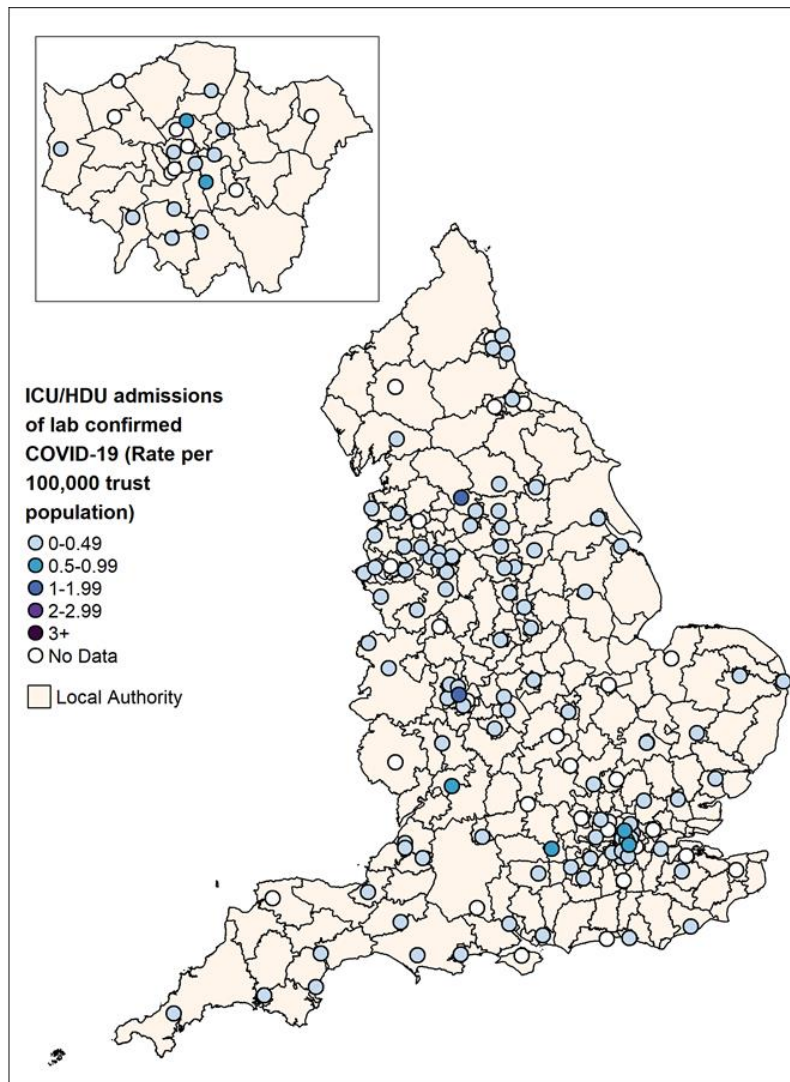
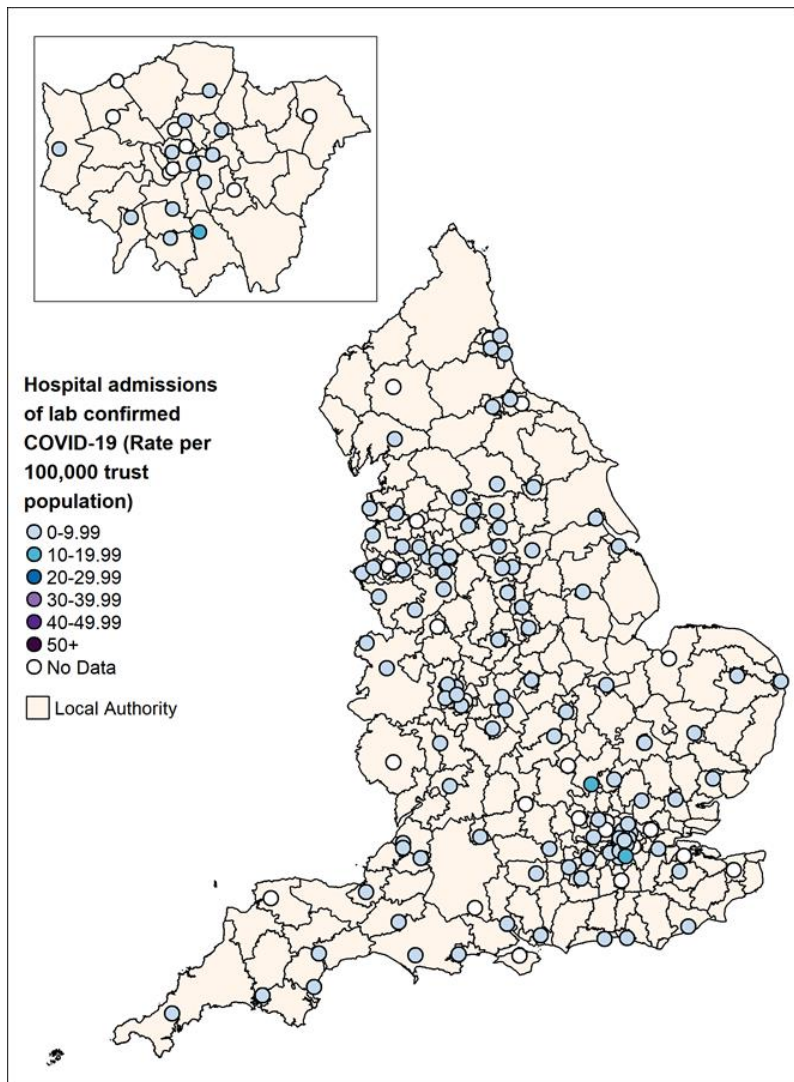


Weekly overall hospital and ICU/HDU admission rates per 100,000 of new COVID-19 positive cases reported through SARI Watch, England since week 12 2020





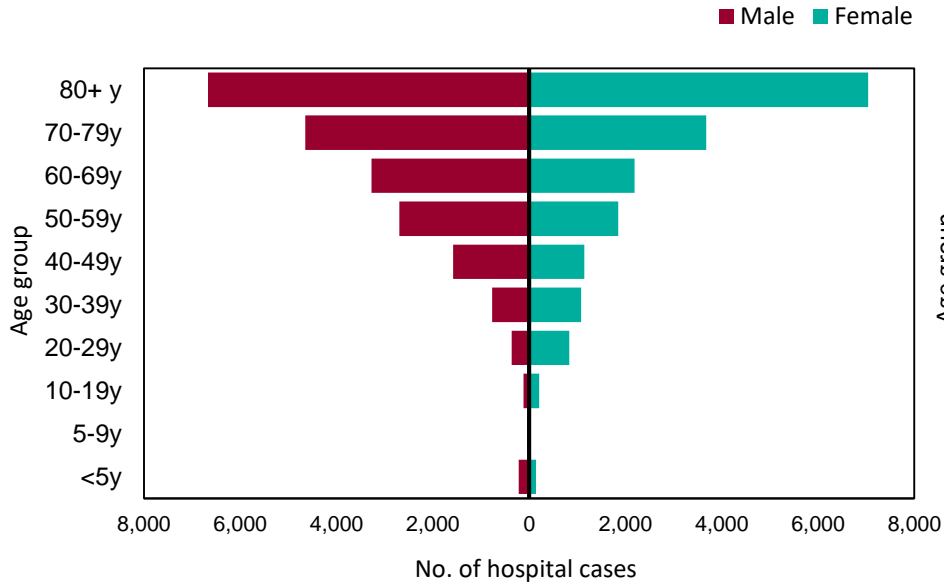
Weekly admission rates for hospital and ICU/HDU laboratory confirmed COVID-19 cases reported through SARI Watch, week 23



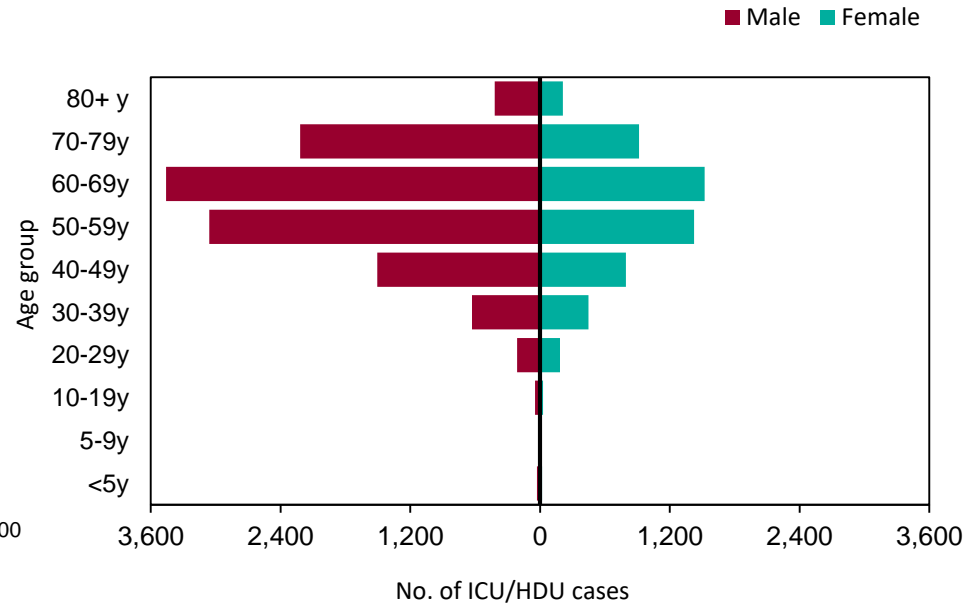
Due to the decreasing incidence of COVID-19, hospitalisation rates are now low and majority fall in the lowest rate bands. Small variation is expected from week to week although close monitoring of trusts continues.

Age/sex pyramid of new (a) hospital (lower level of care) (n=38,565) and (b) ICU/HDU (n=17,136) COVID-19 cases reported through SARI Watch, England

(a)



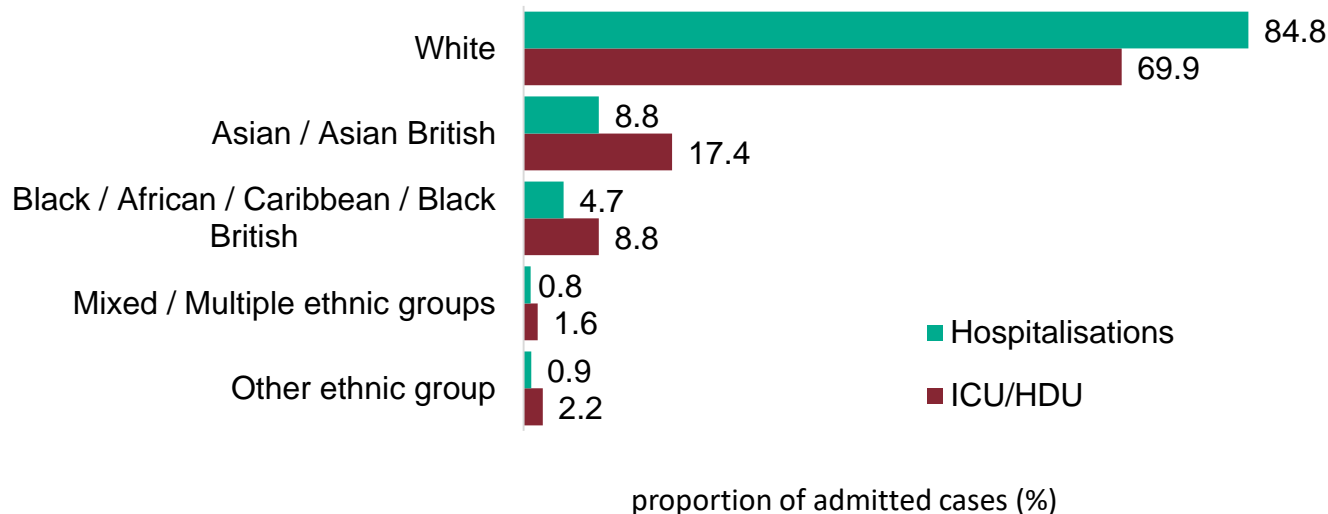
(b)



This figure is based on individual patient level data which are provided to SARI Watch from a subset of NHS Acute Trusts, therefore the data should be interpreted with caution as the distribution of age, sex and ethnic group may not be representative of all hospitalised patients.



Ethnic group of new hospitalisations (lower level of care) (n=36,584) and ICU/HDU (n=15,691) COVID-19 cases reported through SARI Watch, England

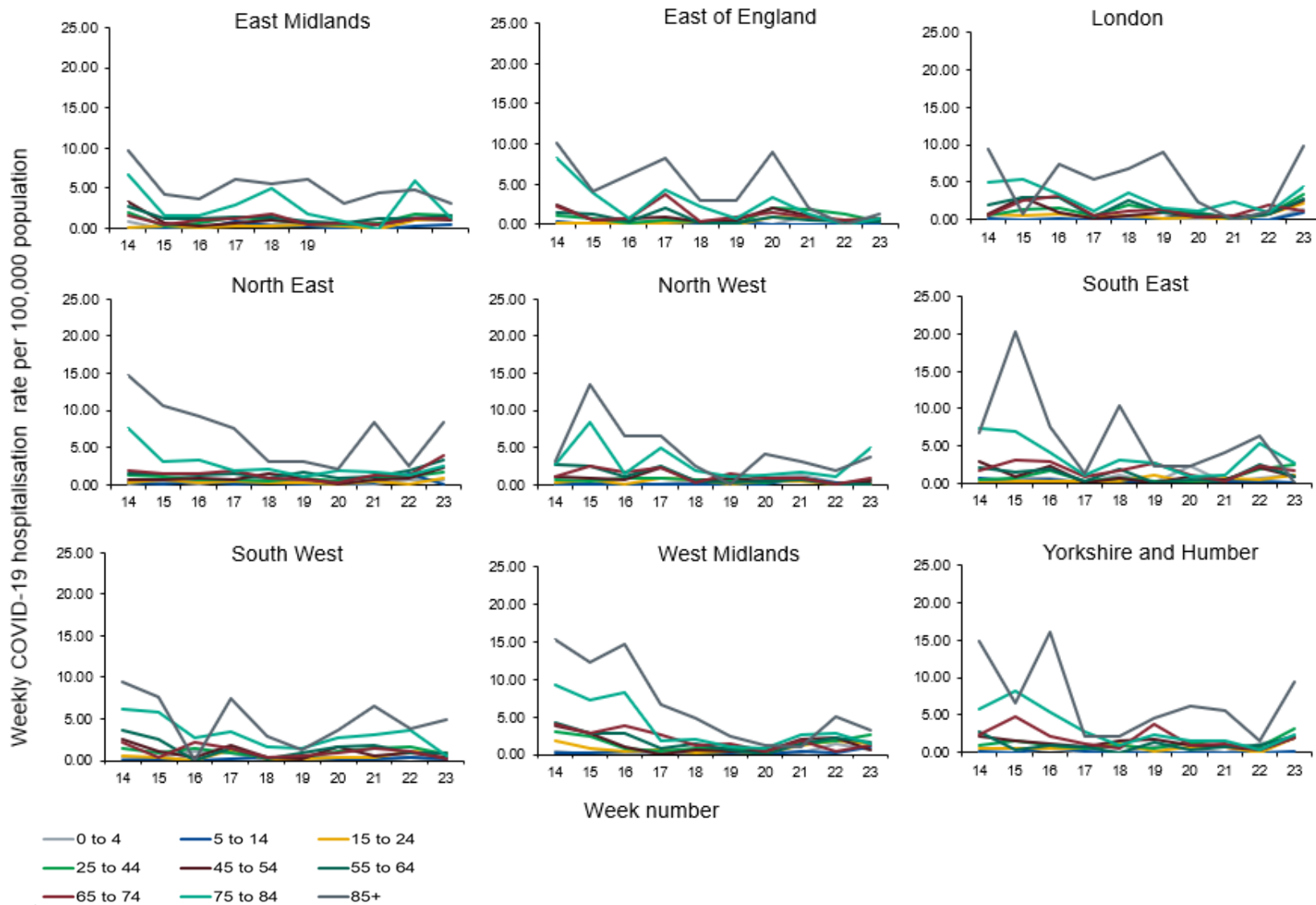


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Caveat: From this week the ethnicity analysis is based on a new method for assigning ethnicity, developed by PHE. The previous method used the most recent ethnicity recorded through linkage to Hospital Episode Statistics. However, this method led to unfeasibly high rates in the 'Other' ethnic group when applied to COVID-19 cases, hospitalisation or mortality. The new method uses the most frequent ethnicity recorded through linkage to Hospital Episode Statistics, unless the most frequent was 'Other' when the second most frequent was chosen.

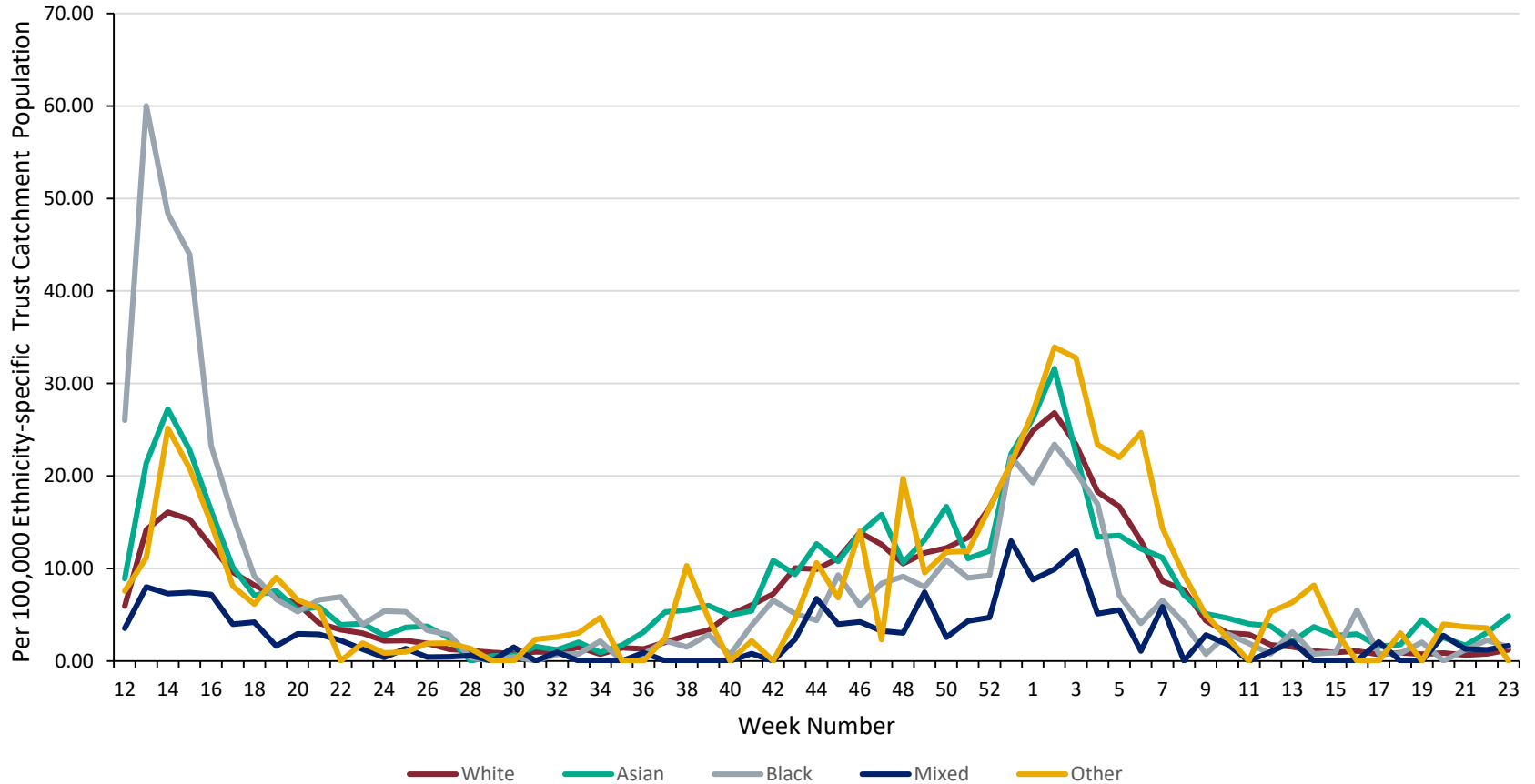


Weekly COVID-19 hospitalisation rate per 100,000 trust catchment population by age group and region, weeks 14 to 23





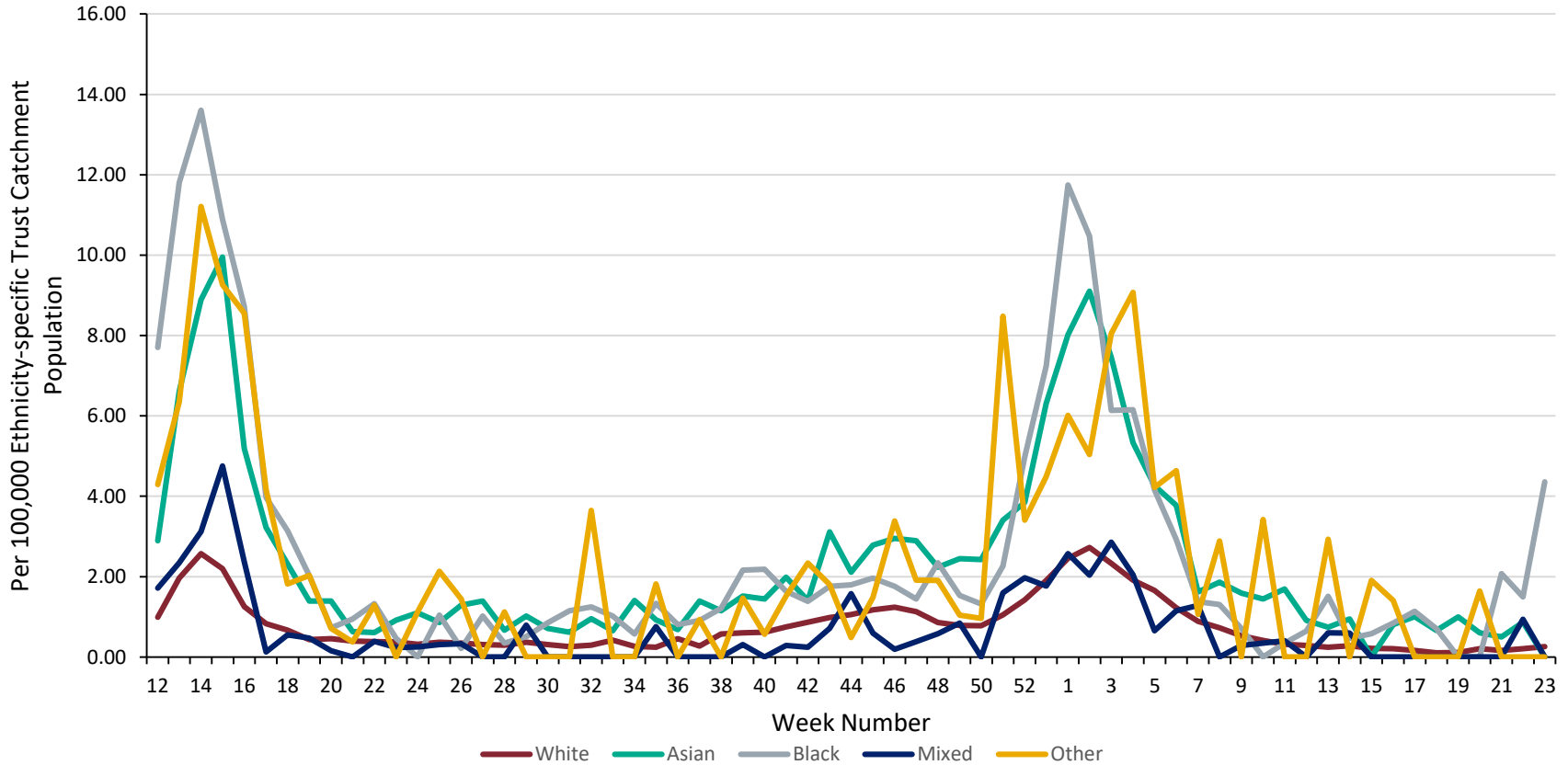
Hospital admission rate (excluding ICU/HDU) by ethnicity per 100,000 trust catchment population



Caveat: From this week the ethnicity analysis is based on a new method for assigning ethnicity, developed by PHE. The previous method used the most recent ethnicity recorded through linkage to Hospital Episode Statistics. However, this method led to unfeasibly high rates in the 'Other' ethnic group when applied to COVID-19 cases, hospitalisation or mortality. The new method uses the most frequent ethnicity recorded through linkage to Hospital Episode Statistics, unless the most frequent was 'Other' when the second most frequent was chosen.



Rate of admission to ICU/HDU by ethnicity, per 100,000 trust catchment population



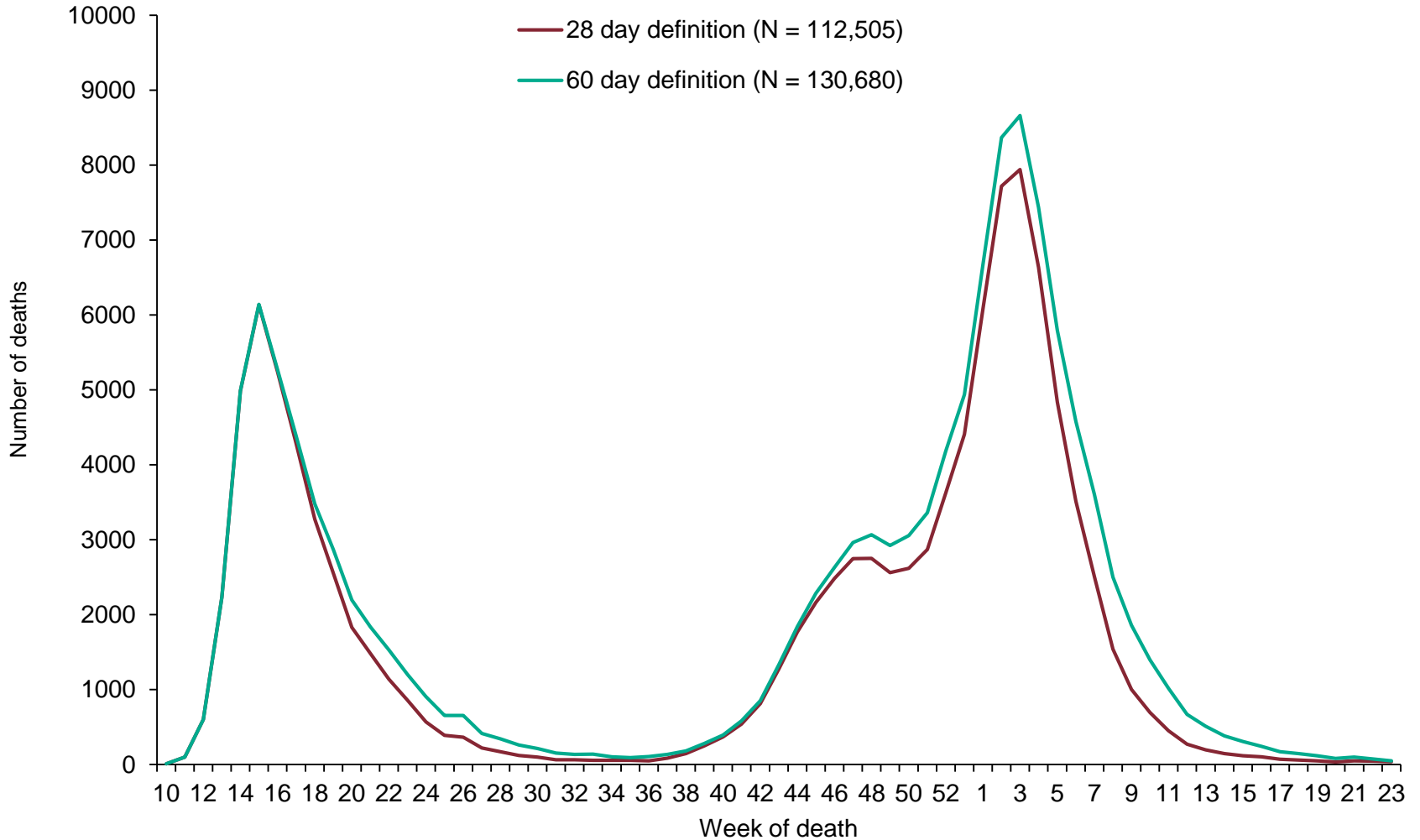
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Mortality surveillance



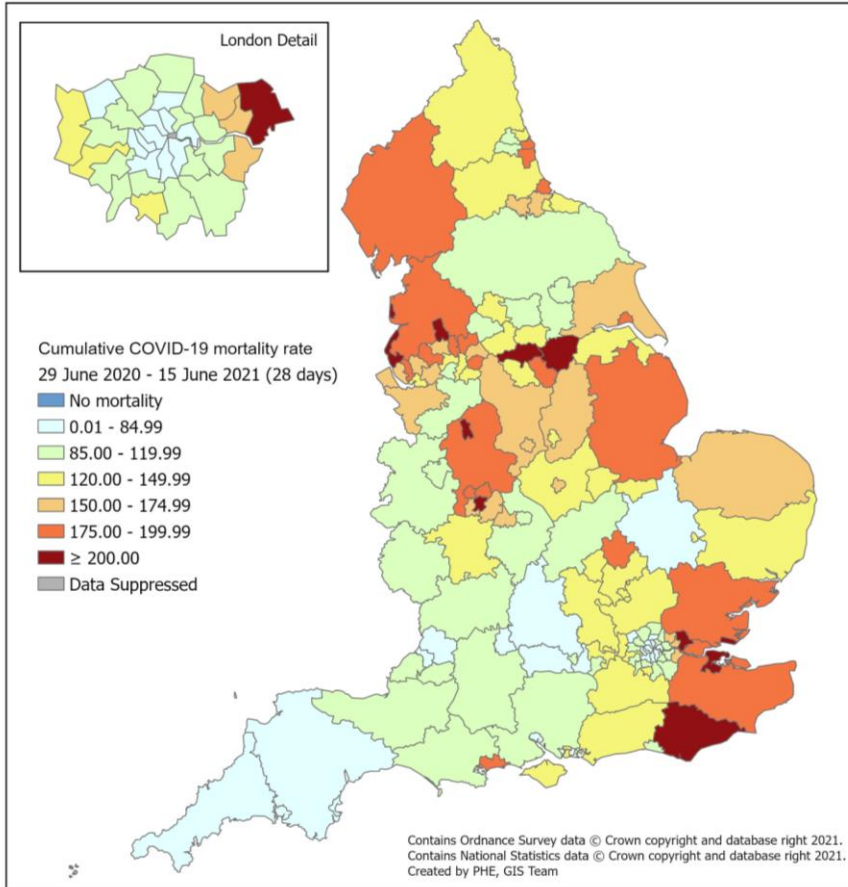
Number of deaths since week 10 2020 by week of death and time since laboratory confirmation of COVID-19, England



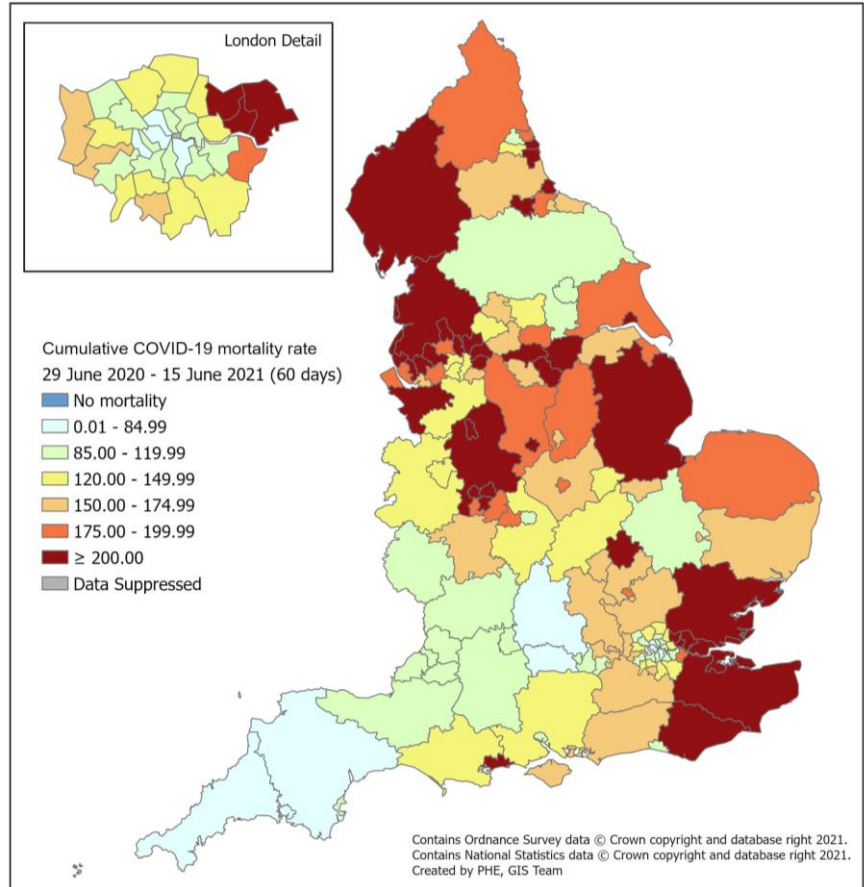


Cumulative mortality rate of COVID-19 cases per 100,000 population tested under Pillar 1 and 2 since week 27 by (a) 28 day definition and (b) 60 day definition

(a)

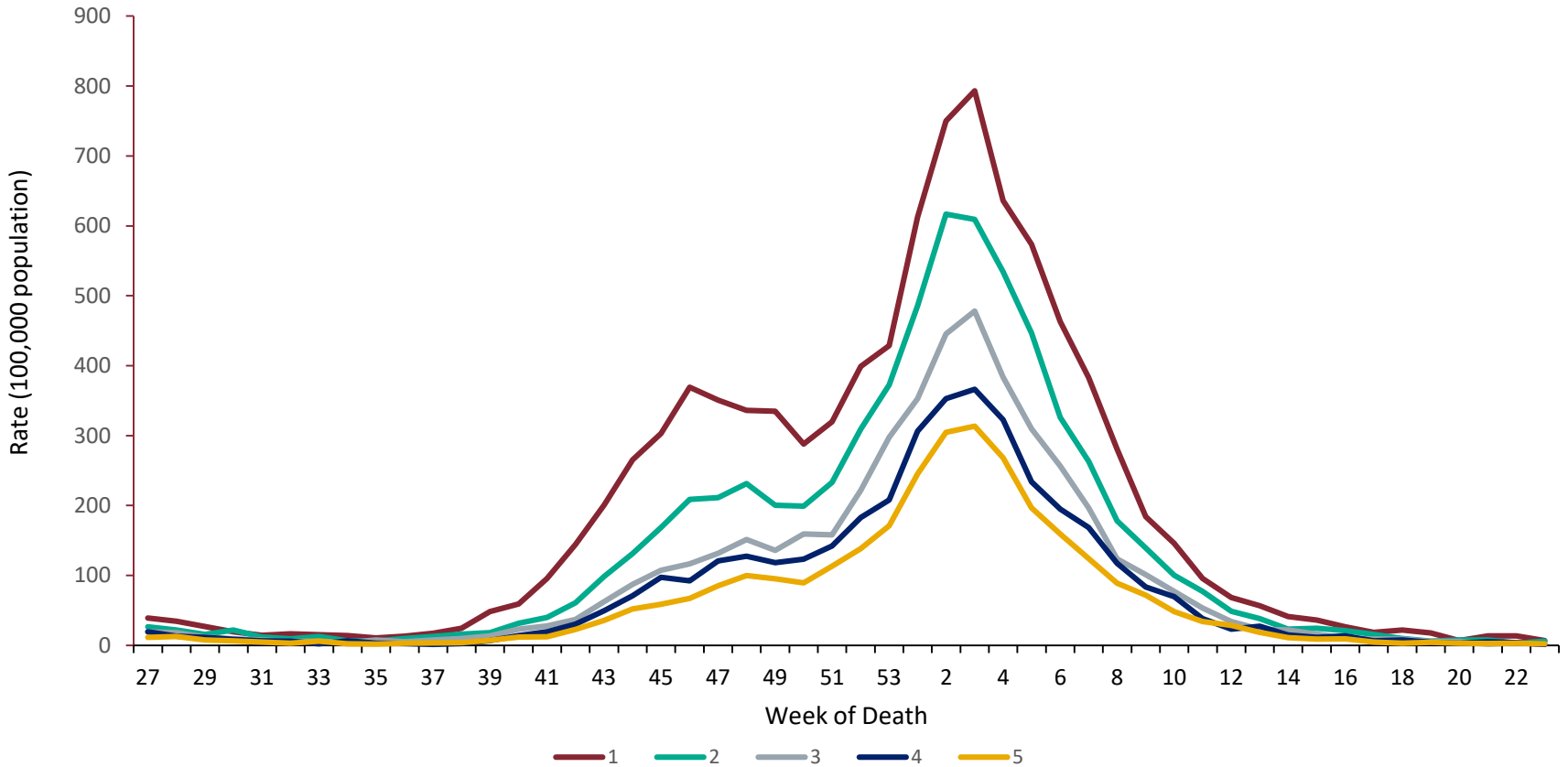


(b)





Age-adjusted mortality rate** (per 100,000 population) in laboratory-confirmed cases of COVID-19 by IMD quintile, from week 27 onwards, by week using the 60 day definition



**Rates are time-adjusted: a weekly population denominator has been used to calculate the mortality rate



Possible reinfections in England

(updated monthly)



Possible reinfections in England

The following figures present population data based on the first time that individuals tested positive for SARS-CoV-2 through PCR and/ or lateral flow device testing in England together with those who have tested positive for SARS-CoV-2 through PCR and/ or lateral flow testing with an interval of at least 90 days between two consecutive positive tests. This excludes positive LFD test results removed from the main SGSS dataset because the LFD test positive result was followed by a negative PCR result within 3 days and LFD test results where we have had feedback that a positive result was entered in error. The interval of 90 days is in line with the definition currently adopted within Siren, by CDC in [their definition](#) of a person to prioritise for investigation of suspected SARS-CoV-2 reinfection and the draft definition being considered by the World Health Organisation for a suspected reinfection.

These figures present population level data that complements studies that can undertake more detailed investigation at an individual level as exemplified by SIREN the large multicentre prospective cohort study that has followed around 45,000 participants employed by NHS hospitals. In line with [other studies](#), this suggested that those with serological evidence of a previous SARS_CoV-2 infection had an 84% lower risk of infection than those without evidence of prior infection over a median 7-month period.

For a possible reinfection to be categorised as confirmed they require sequencing of a specimen at each episode and for the second specimen to be genetically distinct from that sequenced from the first episode. Availability of such dual sequencing is currently very low for several reasons; sequencing was not widely undertaken early in the pandemic; LFD test results do not allow sequencing and some PCR samples have a low viral load where sequencing cannot be undertaken. To meet the definition of a probable reinfection requires sequencing at the second episode that identifies a variant that was not circulating at the time of the first episode.

Further data on reinfections is published in the weekly Influenza and COVID-19 surveillance report.



Possible reinfections in England

Table summarising different categories of COVID-19 infection with relevant numbers generated by ongoing analysis in England to 30th May 2021 (end week 2021-22)

Infection type	Definition	Current totals
Primary infection/ first positive	the first positive PCR/ LFD test result for an individual	3.9 million first positives
Possible reinfection	identified based on two sequential positive test results (PCR or LFD) at least 90 days apart	15,893 possible reinfections
Probable reinfection	where only reinfection sample is available, and this is congruent with contemporaneous phylogeny OR the second event identifies a variant which was not in circulation at the time of first infection	478 classified as probable*
Confirmed reinfection	sequencing of a specimen at each episode of a possible reinfection with the second specimen genetically distinct from that sequenced at first episode	53 confirmed reinfections*
Persistent infection	<i>Nominally repeat test positives at between 14 and <90 day intervals (likely associated with immunosuppression)</i>	Unquantified

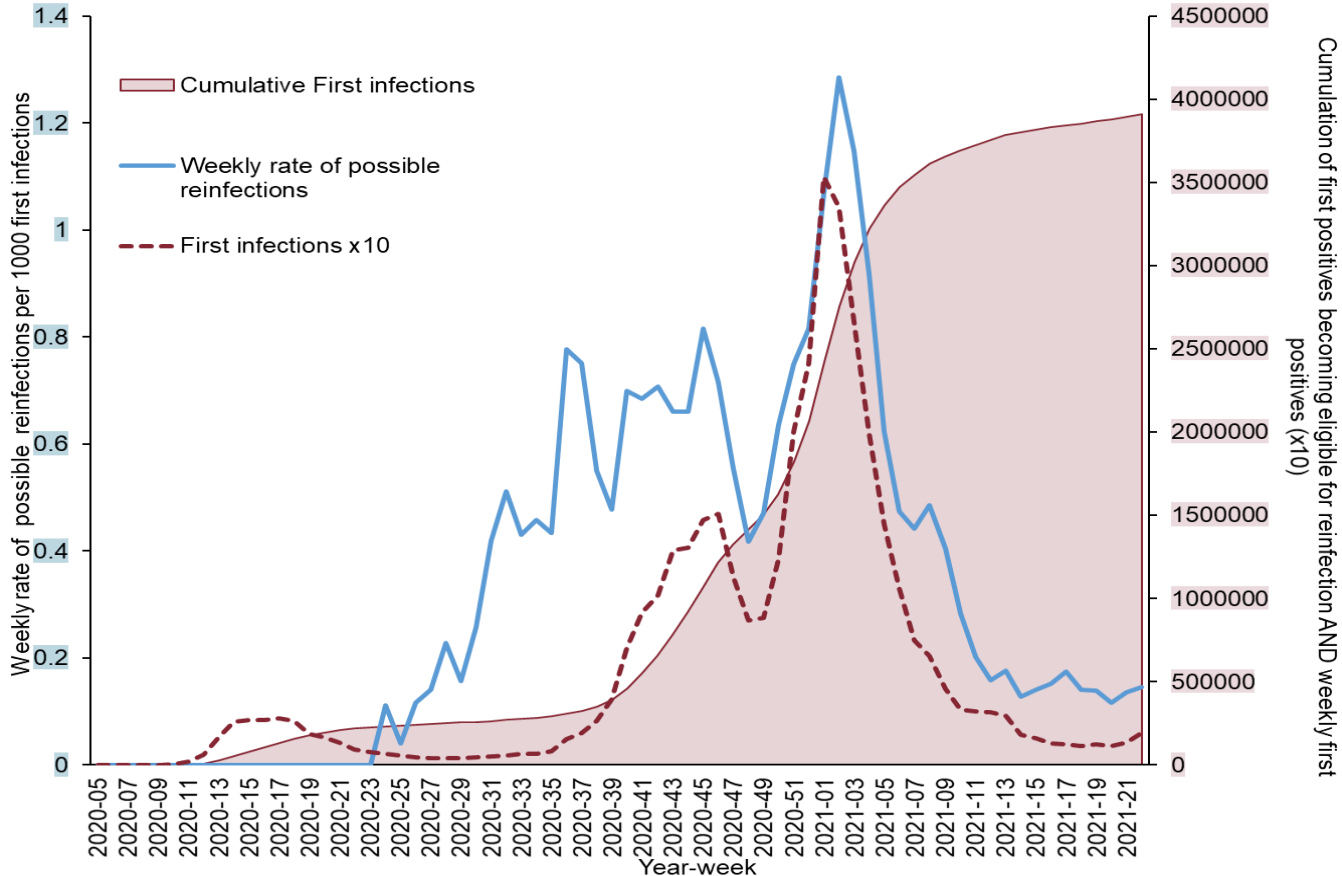
*based on review of 1224 possible reinfections with sequencing data available

The table summarises the definitions of different categories of COVID-19 infection accompanied by totals generated to 30th May 2021 (end week 2021-22) as part of ongoing analysis and based on review of 1224 possible reinfections with sequencing data available. These data are skewed by the limited availability of sequencing data, particularly in the early months of the pandemic. More recently, widespread routine testing of asymptomatic individuals has taken place and this, together with surge testing, will lead to an increased number of asymptomatic reinfections being identified.



Possible reinfections in England

The weekly rate of possible COVID-19 reinfections with cumulation of first infections becoming eligible for reinfection and total first positives* (England only to week 2021-22)



*These data have been derived independently based on P1 and P2 datasets and may therefore differ to previously published data.

It is important to consider reinfections in the context of first infections and there is a 90-day delay before people with a first infection can become eligible for reinfection. The following graph shows: weekly rates of possible reinfections per 1000 first infections based on a cumulative denominator derived from total individuals with a first SARS-CoV-2 positive test result at a point 13 weeks (91 days) before the second positive test result together with the cumulative total of first infections (secondary Y-axis) and total first infections (secondary Y-axis) by week of onset



COVID-19 antibody test results NHS & Commercial Laboratories



Seropositivity among individuals tested for COVID-19 antibodies

Seropositivity is now being reported using the results of COVID-19 antibody tests (IgG or total (IgM and IgG combined) lab-based immune -assay) undertaken in NHS and commercial laboratories (Thrive) contracted by NHS Test and Trace (TT) as part of the national testing strategy. Assays used by laboratories test for antibody responses to SARS-CoV2, where the nucleoprotein (N) assays can only detect post-infection antibodies, while the spike (S) assays are expected to detect both post-infection antibodies and vaccine induced antibodies.

Antibody testing has been offered exclusively to healthcare and social care professionals in England, and other key worker groups across the Devolved Administrations. NHS antibody testing was also made available to some patients following recovery from acute disease.

NHS laboratories introduced antibody testing, which requires a venous blood sample, in May 2020 for all NHS staff and patients, with an extension of the test offer to wider health and social care staff from July 2020. Multiple manufacturers provide the antibody testing platforms in the NHS. The possible variability of antibody assays being used within NHS laboratories means differentiating antibody detection due to a past infection rather than vaccine is currently difficult post the introduction of the vaccine.

The NHS TT home-sampling tests, provided by Thrive, which uses a capillary blood sample analysed in a laboratory became routinely available in mid-September 2020 (week 38). Initially an additional testing offer for social care staff, the NHS TT kit is now the main antibody test offered to social care staff and is also available to those working in healthcare. Thrive currently use a Roche antibody test for the SARS-CoV N protein only identifying those with a past infection.

Overall, the cohort breakdown of NHS testing between May and December of 2020 as reported by NHS E*, 25% were patients, 72% NHS staff and 3% social care staff . The proportions have changed over time in 2020 but are now stable: Of the 366,784 and 65,603 tests conducted through NHS testing in July and December respectively, the proportion of tests performed in patients increased from 26% in July to 56% in December; where the proportion of tests in NHS staff decreased from 72% in July to 43% in December; and the highest proportion of social care staff tested were tested in August (12%) and September (16%).

For TT testing overall at the beginning of 2021, 52.5% reported their industry as social care and 47.5% reported their industry as health. However, the weekly number of TT tests is variable and will be dependent on a range of factors including changes in demand for the service.

The graphs that follow show the number of SARS-CoV-2 antibodies (Ab) tests among individuals and the percentage positive (Ab test positivity) for TT testing by week, region and age. Although NHS laboratories continue to provide antibody testing, data are only presented for TT due to the potential inconsistencies with antibody levels in the data received from NHS laboratories following the vaccine rollout.

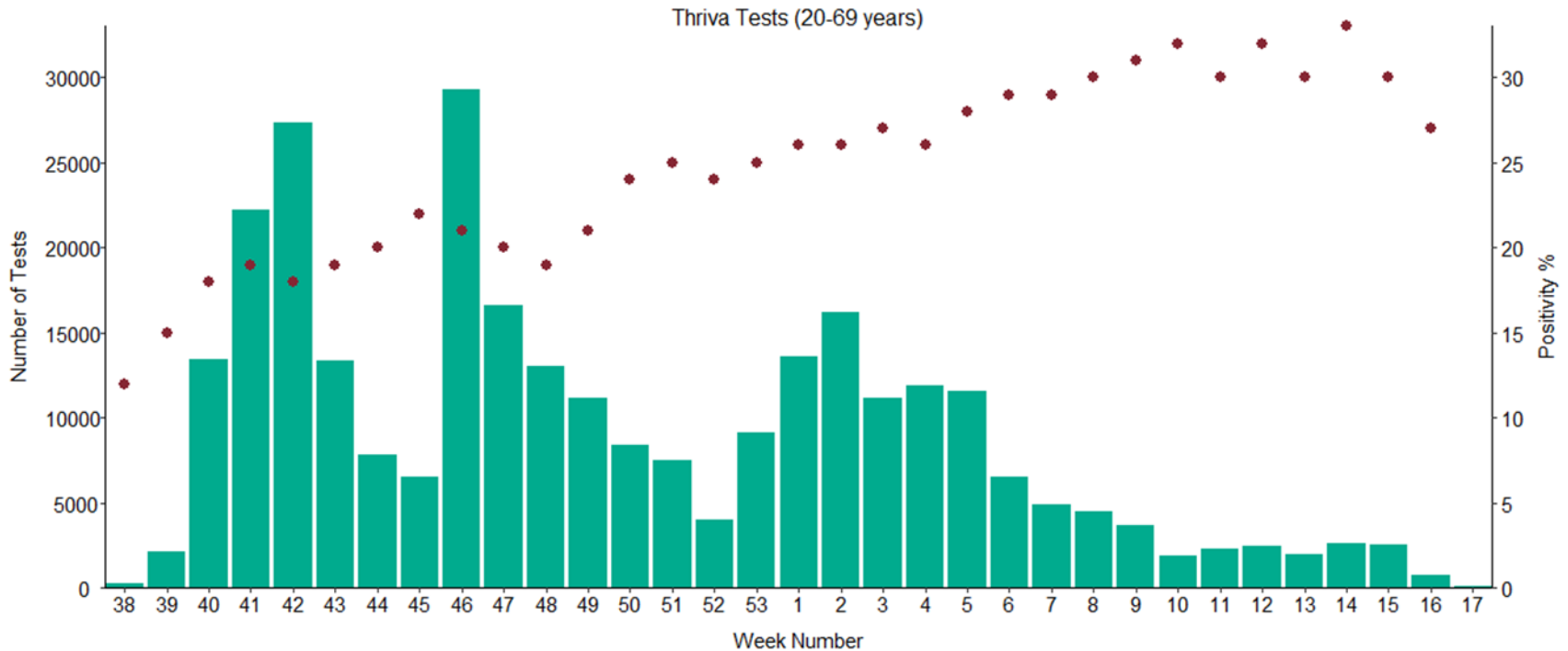
As antibody testing is largely occurring in health and social care staff (and some patients who have recovered from COVID-19), who are likely to have higher COVID-19 exposures than the general population, these antibody test results are not generalisable to the general population.

* The cohort breakdown of testing through NHS laboratories was reported from NHS E, these data may differ from those reported from PHE SGSS.



Seropositivity among individuals tested for COVID-19 antibodies by week

Following the introduction of TT testing in week 38, 291,057 tests have been carried out, with a transient increase between weeks 40-42 of 2020 following the initial introduction of TT testing. The proportion of positive tests for TT tests increases overtime consistent with the blood donor seroprevalence data and reflecting previous SARS-CoV2 infection. By the end of 2020, 25% of tests conducted by TT were positive for SARS-CoV2, with the proportion positive in week 16 of 2021 for TT increasing to 27%. The higher positivity from TT antibody testing, when compared to population weighted seroprevalence surveys, is to be expected given that these tests largely represent health and social care staff who are more likely to be exposed to SARS-CoV-2. Seropositivity is likely to reflect transmission occurring in the previous 2-3 weeks or more.

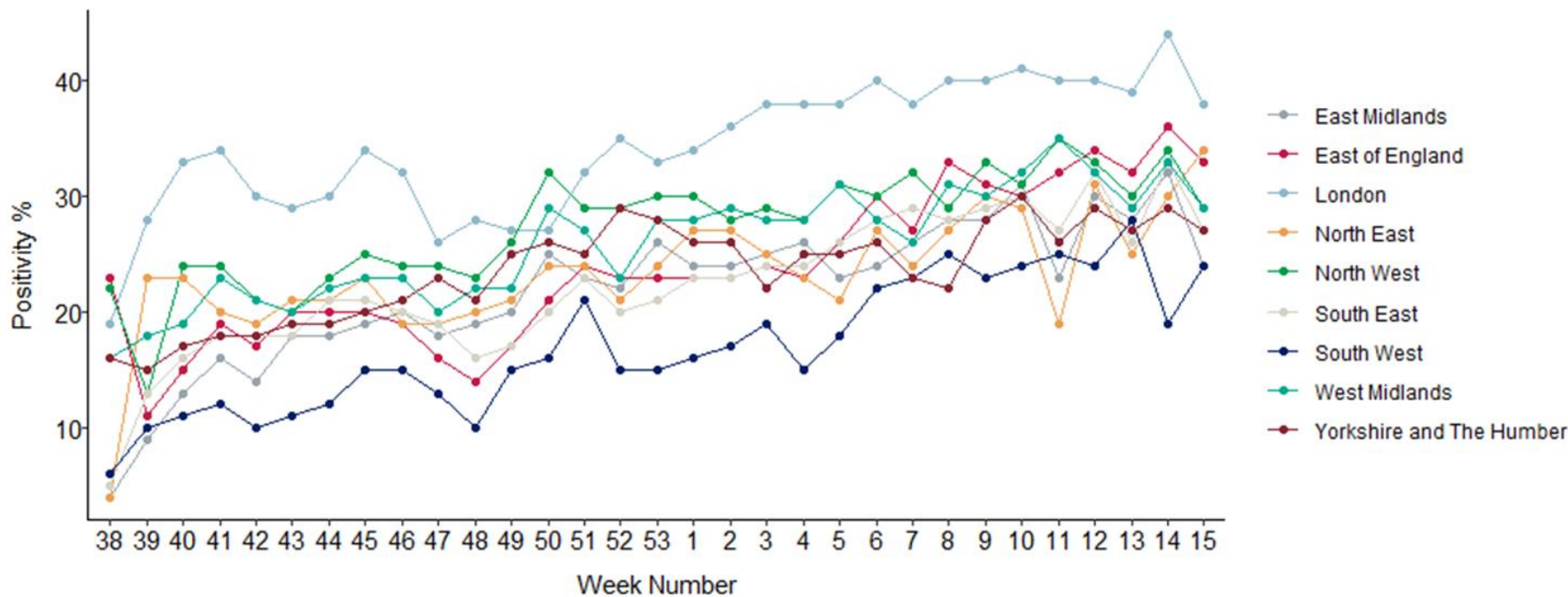


Bars represent number of tests; points represent positivity. Positivity shown where number of tests >100.



Seropositivity among individuals (aged 20-69 years) tested for COVID-19 antibodies by region for test and trace tests (Thrive)

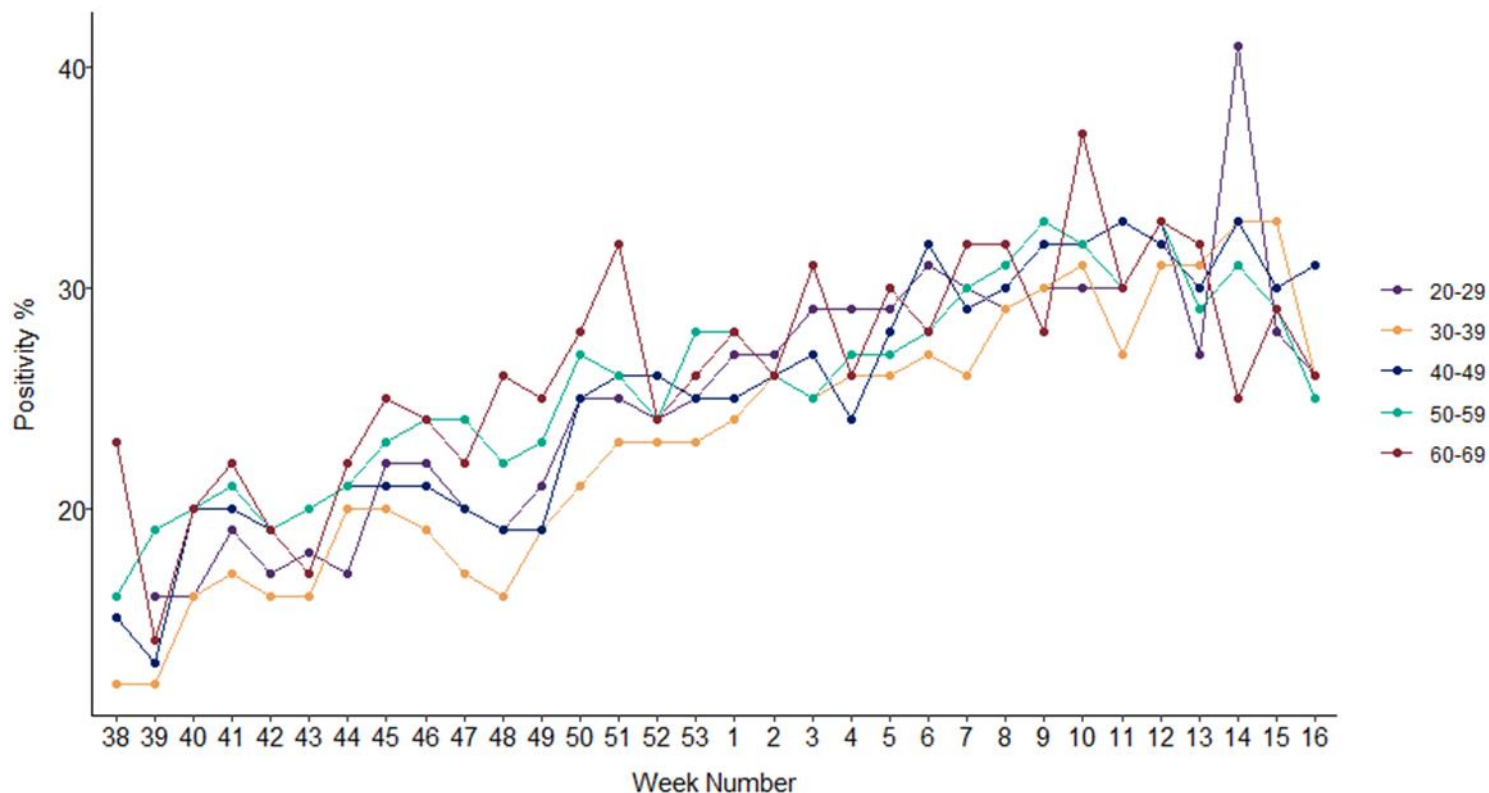
The graphs below demonstrates the distribution of TT tests by region (introduced mid-September 2020 (week 38)) and the percentage of tests positive for COVID-19 antibodies within each region. Overall, seropositivity was highest in London (34%), followed by the North West (26%). Seropositivity was lowest in the South West (14%). This geographical pattern is broadly consistent with previous SARS-CoV-2 infections. The region is based on the individuals postcode of residence entered when ordering a TT test.



Positivity is not shown for Week 16 and Week 17 as for some regions <100 tests were reported.



Seropositivity among individuals (aged 20-69 years) tested for COVID-19 antibodies by age for test and trace tests (Thrive)



The graph above shows the distribution of TT tests by age group (introduced mid-September 2020 (week 38)) and the percentage of tests positive for COVID-19 antibodies within each age group. Seropositivity increased overtime for all age groups reflecting past incidence of confirmed SARS-CoV2 infection, with little difference in positivity by age groups. The proportion seropositive shows little variation by age over time. Seropositivity is not shown for week 17 as <100 tests were reported.

By sex a larger proportion of tests carried out were among females (78%), a reflection of the distribution within health and social care, with no difference in seropositivity by sex (22% and 24% for females and males, respectively).



Co/secondary infections with COVID-19

(updated monthly)



Co/secondary infections with COVID-19 (data updated monthly)

- Caveat - undertesting for other pathogens may result in an underestimate of co/secondary infection cases.
- Co/secondary infections refers to when a patient has an infection with more than one pathogen at the same time (co-infection), or acquires another infection after contracting the first infection (secondary infection).
- Numbers of co/secondary infection remain low across PHE surveillance systems except for patients with severe respiratory failure requiring Extra Corporeal Membrane Oxygenation (ECMO). Analysis of COVID-19 cases with severe respiratory failure requiring ECMO indicates co/secondary infections among these account for just less than a third of all severe respiratory failure cases due to infection.
- Preliminary data analysis from the first pandemic wave indicates that health care associated infections, *Streptococcus pneumoniae*, influenza, *Aspergillus* and *Candidemia* cases and cases with severe respiratory failure requiring ECMO have increased risk of mortality in comparison to patients without co/secondary infection.

Definitions agreed with DAs



Co/secondary infections among Extra Corporeal Membrane Oxygenation (ECMO) patients (patients with most severe clinical respiratory signs)

Based on cumulative data on ECMO activity from week 40 (week beginning 30 Sep 2019) to week 19 (week ending 16 May 2021), which includes data from the first and second waves of the pandemic. COVID-19 cases are from week 5 2020 (week commencing 17 January 2020) due to retrospective reporting.

- 31% (184/602) of patients admitted to ECMO with a laboratory confirmed respiratory infection had a co/secondary infection reported.
- 43% (16/37) of patients with influenza had co/secondary infections
- 30% (153/504) of patients with COVID-19 had co/secondary infections. Of these 153 cases, the most frequent co/secondary infections in COVID-19 cases were Gram-negative bacilli (55) and fungi (31), accounting for 56% (86/153).



Co/secondary infections among patients with Healthcare Associated Infections: Blood stream and respiratory infections (bacterial and fungal) in COVID-19 patients in England in wave 2 by COVID-19 diagnosis (29 June 2020 to 28 February 2021)

- 0.2% of COVID-19 patients had a key bacterial/fungal coinfection (± 1 day of first SARS-CoV-2 positive specimen date), or secondary infection (between 2 days and <28 days after the SARS-CoV-2 positive specimen date)
 - Of all COVID-19 patients, 0.05% had a key respiratory infection; 0.1% had a key bloodstream infection.
- 82% of co/secondary infections of any site* were categorised as secondary infections.
- Although the proportion of COVID-19 cases with co/secondary infection remains small, case numbers have almost doubled since January reporting (COVID-19 cases until 3 January) and the total 6,979 co/secondary infections during this period have presented a significant and sustained burden to hospitals
- Most frequent species identified from co/secondary infection isolates were:
 - **Respiratory:** *Staphylococcus aureus*, *Pseudomonas aeruginosa*, *Klebsiella pneumonia* and *Escherichia coli*.
 - **Blood:** *Escherichia coli*, *Staphylococcus aureus*, *Enterococcus faecium* and *Klebsiella pneumoniae*.
- Co-infections continued to occur more frequently in the elderly, those aged ≥ 60 years accounting for more than three-quarters (78%) of co-infections and 66% of secondary infections.

* Includes Respiratory, Bloodstream, *Clostridioides difficile* infection (CDI), as well as any combination of Respiratory, Bloodstream infection and CDI



Co/secondary infection with respiratory viruses, vaccine preventable bacteria and fungi

Virus / Bacteria/Fungi	First Wave (30 Jan 2020 - 28 Jun 2020)	Second Wave (29 June 2020 - 24 May 2021)	Total Cases
Influenza A	33	3	36
Influenza B	13	7	20
Influenza A & B	1	0	1
Flu (not typed)	1	0	1
Parainfluenza (any subtype)	14	8	22
Seasonal coronavirus	111	53	164
Enterovirus	5	6	11
Adenovirus	14	12	26
Rhinovirus	97	54	151
RSV	23	3	26
Human metapneumovirus	55	1	56
<i>Aspergillus fumigatus</i> ISOLATES (azole resistant)	46 (4)	121 (2)	167 (6)
Probable/Proven cases of COVID associated pulmonary aspergillosis (CAPA)	15	39	54
<i>Candida</i> spp.: Candidemia	63	134	197
<i>Bordetella pertussis</i>	0	0	0
<i>Haemophilus influenzae</i>	3	2	5
<i>Neisseria meningitidis</i>	2	0	2
<i>Streptococcus pneumoniae</i>	40	45	85

Please note fungal data refers to secondary infections only.

The UK moved out of influenza season in early 2020/21 when COVID-19 increase began in March 2020.

Data contains results from two systems (Respiratory DataMart system and SGSS).

Mycology data contains results from Mycology reference laboratory data, Candidaemia is representative of deep infection.

One case of osteomyelitis and one case of ventriculitis were documented in wave two.

Legionella, *Mycoplasma* and gastrointestinal infection data not included.