Public Health Scotland COVID-19 Statistical Report

As at 18 May 2020

Introduction

On 1 March 2020, the first person in Scotland was tested positive for COVID-19. On the 17 March NHS Scotland was placed in an emergency footing by the Cabinet Secretary. Schools have been closed since 20 March and the country has been in lockdown since 23 March.

Since the start of the outbreak Public Health Scotland (PHS) has been working closely with Scottish Government and health and care colleagues in supporting the surveillance and monitoring of COVID-19 amongst the population.

The primary focus of this report is a look at some of the demographic characteristics (age, sex, deprivation) of people affected by the virus. It also looks at some of the wider impact of the virus on the healthcare system, comparing recent trends in activity with historic norms.

There is a large amount of data being regularly published regarding COVID-19 (for example, Coronavirus in Scotland – Scottish Government and Deaths involving coronavirus in Scotland – National Records of Scotland). This report complements the range of existing data currently available.

The coronavirus pandemic is a rapidly evolving situation. This report provides an analysis of the data up to the 18 May 2020. Future reports will provide further data and analysis to contribute to the evidence base around the outbreak.

This release contains an initial analysis of COVID-19 outcomes across different ethnic group.

Contents

Main Points

- As at 18 May 2020, there have been 14,594 confirmed COVID-19 cases, equating to 267.1 confirmed cases per 100,000 population.

- 8,950 (61%) of confirmed cases, as at 18 May 2020, were female; 5.636 (39%) were male.

- The number of confirmed cases increases with age. For those aged 75+ the rate is 1,035.8 per 100,000 compared with 311.3 per 100,000 for those aged 45-64, a 3.3-fold difference.

- Between the 1 March 2020 and 14 May 2020, there had been **5,626** admissions to hospital with a confirmed laboratory test of COVID-19.

- As at 17 May 2020, the total number of confirmed COVID-19 patients admitted to an Intensive Care Unit was 502, compared to 495 as at 10 May 2020.

- After initially increasing to around 2,300 per day, the number of COVID-19 related contacts with NHS 24 has decreased to around 1,000.

- At the peak of 6 April, Scottish Ambulance Service attended 653 suspected COVID-19 incidents.

- On average 170 people have attended the COVID-19 assessment centres each day, over the last two weeks. *(NHS Grampian data is included from 1 May 2020)*

- People from the most deprived areas are twice as likely to contact NHS 24, the COVID-19 hubs and assessment centres as those from the least deprived areas.

- An initial analysis of the ethnicity of COVID-19 patients in hospital and seriously ill has been carried out. While the proportion of ethnic minority patients among those seriously ill with COVID-19 appears no higher than the proportion in the Scottish population generally, numbers are currently very low and the analysis will be improved and updated as more data becomes available.

Results and Commentary

The analysis within this report is based on the period to 18 May 2020.

COVID-19 Confirmed Cases

The first part of this report contains information on cases of COVID-19 that have been confirmed by laboratory testing.

The total number of people within Scotland who have, or have had COVID-19, since the coronavirus outbreak began is unknown. The number of confirmed cases is likely to be an underestimate of the total number who have, or have had, COVID-19. This is because there are affected persons in the population infected with the virus, many of whom display mild symptoms and who do not require specialist hospitalised treatment. These people are not likely to have had a laboratory test for COVID-19.

For the reporting period of this report, those tested are mainly patients who are, or have been, in hospital. It also includes other groups of people such as key workers and some testing carried out in care homes. The number of confirmed cases includes people from all those groups who have been tested.

As the number of people being tested for COVID-19 increases, the pattern observed in the data within this report may change.

As at 18 May 2020;

- There have been **14,594** people in Scotland who have tested positive for COVID -19 since the start of the outbreak.

- This equates to **267.1** people per 100,000 population having tested positive for COVID-19.

The numbers of newly confirmed COVID-19 cases, on both a daily and cumulative basis, are shown in Figure 1 and Figure 2 respectively. This data is monitored and published daily on the Scottish Government Coronavirus website (https://www.gov.scot/coronavirus-covid-19/). The drop in the number of confirmed cases at weekends likely reflects that laboratories are doing fewer tests at the weekend.
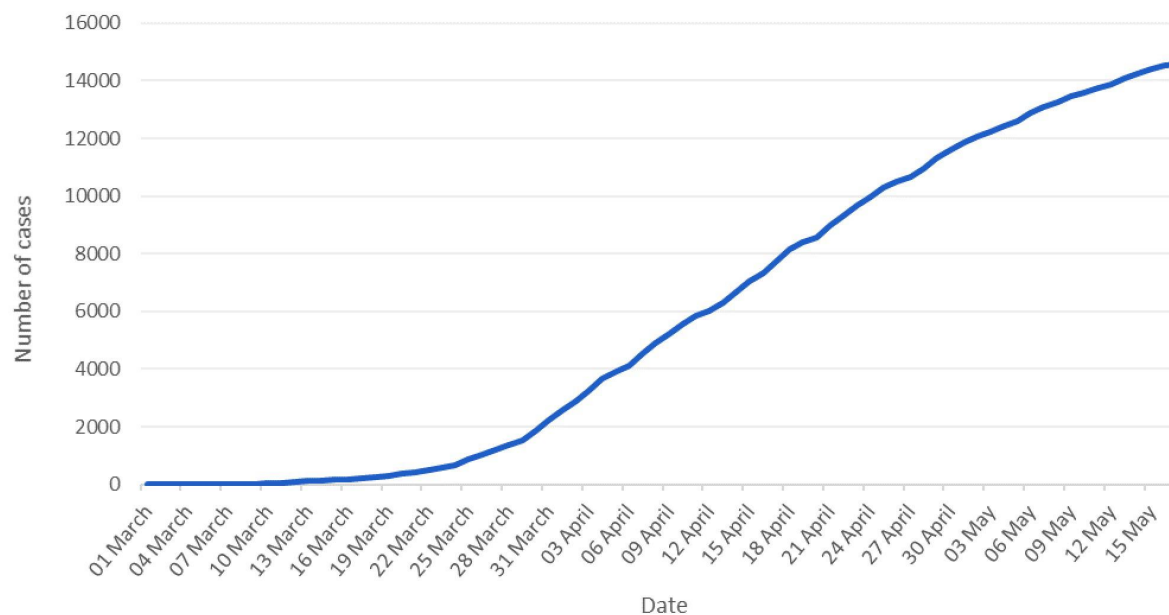
Note that the number of confirmed cases shown for each day may differ slightly from data published on the Scottish Government website. This is because the data below is based on date reported to ECOSS and has some cases added retrospectively and assigned to days based on the most up to date records. **This has no impact on the overall number of confirmed cases**.

Figure 1: Daily number of confirmed cases
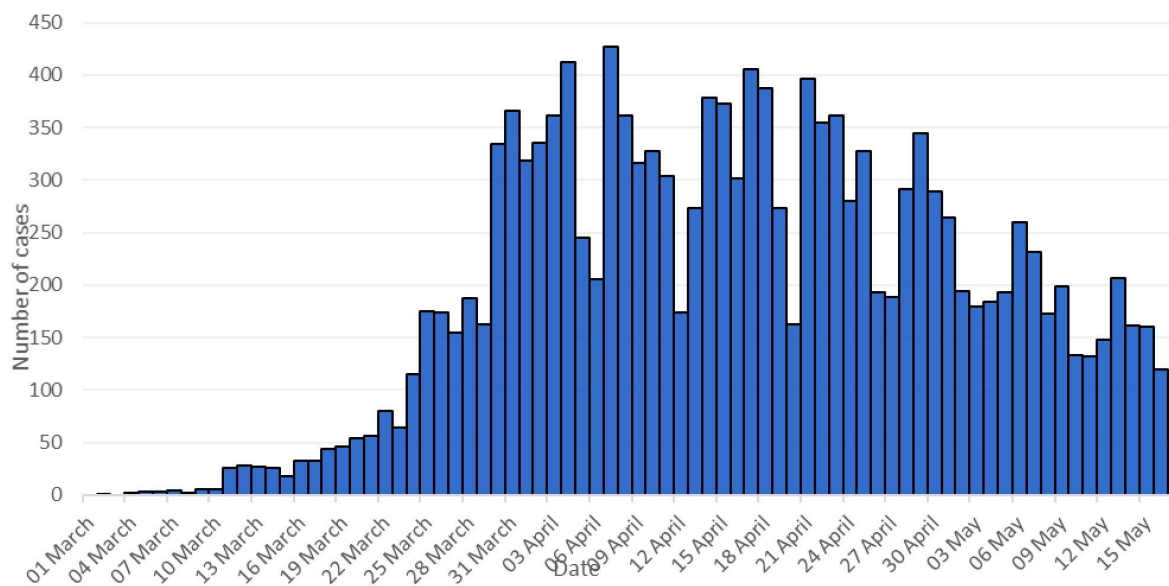
Note: Date refers to the date the sample was received into the HPS Surveillance System.

Figure 2: Cumulative number of confirmed cases

Note: Date refers to the date the sample was received into the HPS Surveillance System.

Age and sex profile of confirmed cases

- Table 1 shows the number of confirmed cases by age and sex as at 18 May 2020.
  61 % of confirmed cases are female; 39% of confirmed case are male.

- One in four confirmed cases (24%) were in the 15-44 age group; 1 in 3 (32%) in the 45-64
  age group and four in ten (43%) aged 65 years and over.

- 40 children aged under 5 years had tested positive for COVID-19.

Table 1: Total number of confirmed cases by age group and sex as at 18 May 2020

Age group (years)	Male	Female	Unknown	Total	Rate per 100,000 population
0 - 4	17	23	0	40	14.7
5 - 14	31	33	0	64	10.8
15 - 44	1,035	2,493	4	3,532	172.0
45 - 64	1,785	2,882	3	4,670	311.3
65 - 74	816	640	1	1,457	251.9
75 - 84	1,123	1,216	0	2,339	690.5
85+	823	1,663	0	2,486	1,956.1
Unknown	6	0	0	6	14.7
All Age groups	5,636	8,950	8	14,594	**267.1**

Among those aged 15-44 years, more than twice as many females than males have been confirmed as having COVID-19. There are likely to be a number of reasons behind this difference, including the testing of NHS and care home staff who are predominately female.

Confirmation of COVID-19 was more common in older than younger age groups. Figure 3 shows the increasing risk with age. As at 18 May 2020, 1035.8 per 100,000 people aged over 75 years were confirmed as having COVID-19. This contrasts with a rate of 311.3 per 100,000 for those aged 45-64 years, a 3.3 -fold difference.

Figure 3: Confirmed case rate per 100,000 population by age group and sex as at 18 May 2020
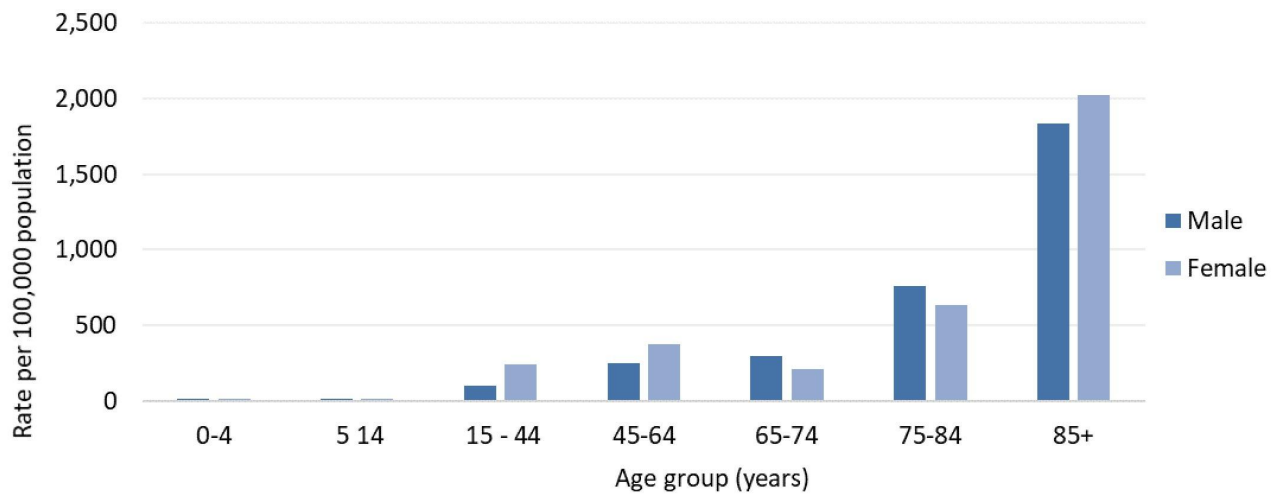
Deprivation profile of confirmed cases

Figure 4 shows the number of confirmed COVID-19 cases by deprivation category from the most deprived 20% of the population to the least deprived 20% of the population.

While there is no evidence of an overall trend over deprivation groups, the highest proportion of confirmed cases (23%) was accounted for by the most deprived 20% of the population. There are a number of factors that could affect the trend in confirmed cases by deprivation, including the geographical spread of the infection and the underlying health of the population. Further, the deprivation profile of those people tested who are not patients (e.g. key health and care workers), may differ from those that are patients and this will be reflected in the data.

Figure 4: Number of confirmed cases across deprivation categories
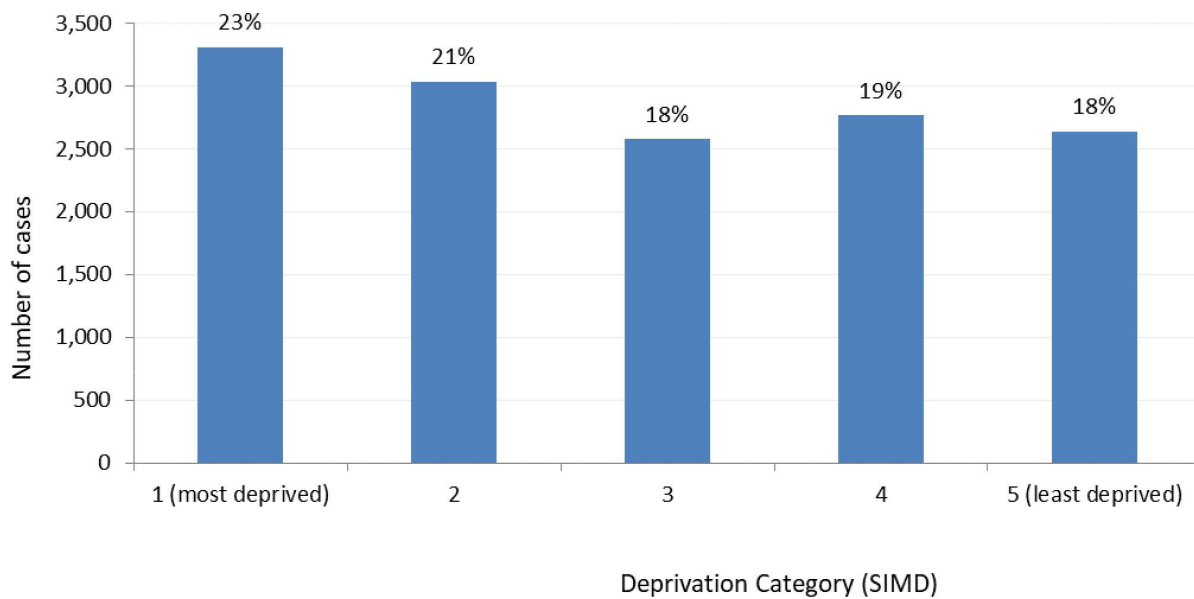
COVID-19 Admissions into Hospital

This section looks at the profile of admissions into hospital for patients who have been diagnosed with COVID-19. A patient may have been diagnosed as having COVID-19 prior to admission to hospital, on the day of admission or during their stay in hospital.

For the purpose of this analysis, COVID-19 related admissions have been identified as the following

Any admission for which the patient was tested positive during their stay in hospital OR within 14 days prior to the date of admission

If a patient has tested positive after their date of discharge from hospital, they have not been included in the analysis.

Between the 1 March 2020 and 14 May 2020, there had been **5,626** admissions to hospital based on the above definition.

Daily profile of admissions into hospital

Figure 5 shows the daily profile of admissions into acute hospitals.

Figure 5: Daily profile of Hospital Admission for those with a positive COVID-19 result
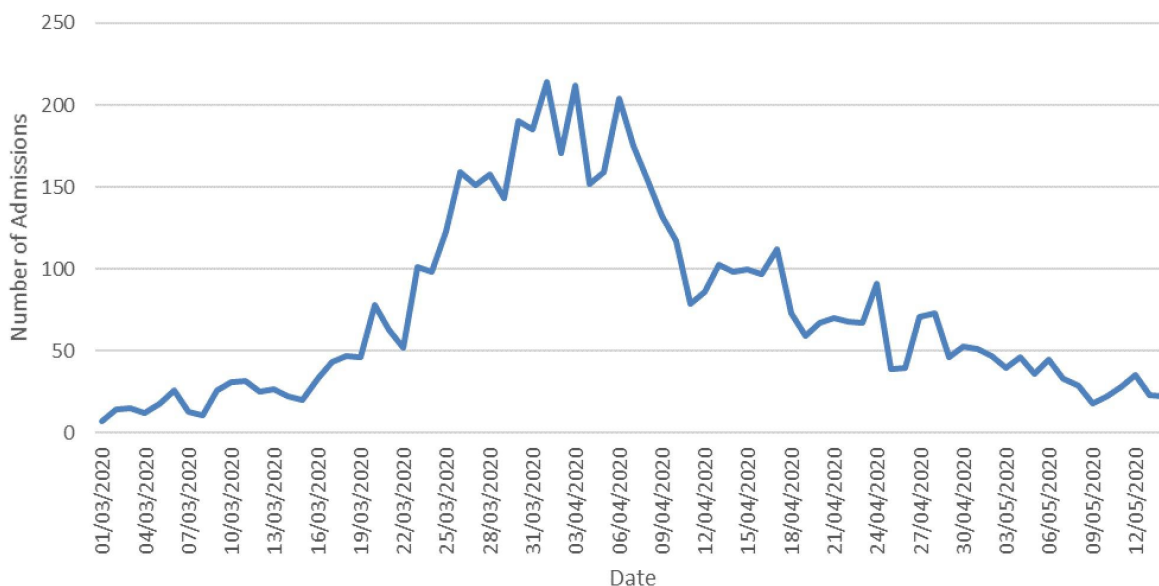
The number of daily admissions increased sharply from 22 March 2020 to more than 200 admissions per day during the 1st week of April. Since then the number of admissions per day into hospital has reduced and, for the last 13 days of this reporting period, was below 50 – around one quarter of the level of admissions in early April.

The number of days a patient stays in hospital will vary depending on how unwell the patient is. For those patients who have been discharged from hospital (4,746), 57% of patients were in hospital for 7 days or less, 21% were hospitalised for between 1-2 weeks, 11% for between 2-3 weeks and a further 11% for more than 3 weeks. The overall average length of stay for patients who have been discharged from hospital is around 10 days (9.7).

Note that there may be a time lag with some data for the most recent days and some of the above figures may change as more data is submitted.

Age and Sex profile of hospital admission

Table 2 shows the age and sex profile of admissions into hospital

- More than 3 out of 5 admissions (63%) were patients aged 65 and over (3,541 admissions)
- 54% of hospital admissions were male and 46% were female. This is a different profile of the overall confirmed cases (39% Male; 61% Female) reflecting the workforce contingent within this latter cohort who are predominately female.

Table 2: Age and Sex profile of Hospital Admissions for those with a positive COVID-19 result

Age group (years)	Male	Female	Total	Rate per 100,000 population
0 - 4	9	11	20	7.2
5 - 14	8	7	15	2.5
15 - 44	205	227	432	21.1
45 - 64	901	717	1,618	107.7
65 - 74	647	417	1,064	186.2
75 - 84	757	645	1,402	423.1
85+	495	580	1,075	871.3
All Age groups	3,022	2,604	5,626	103.5

Figure 6 shows the rate of hospital admissions by age and sex. There is a strong age gradient in the admission profile with a higher rate of admission associated with older people. Males have a higher rate of admission than females and this difference is more marked in the older age groups.

Figure 6: Age and Sex Rate per 100,000 population of Hospital Admissions for those with a positive COVID-19 result
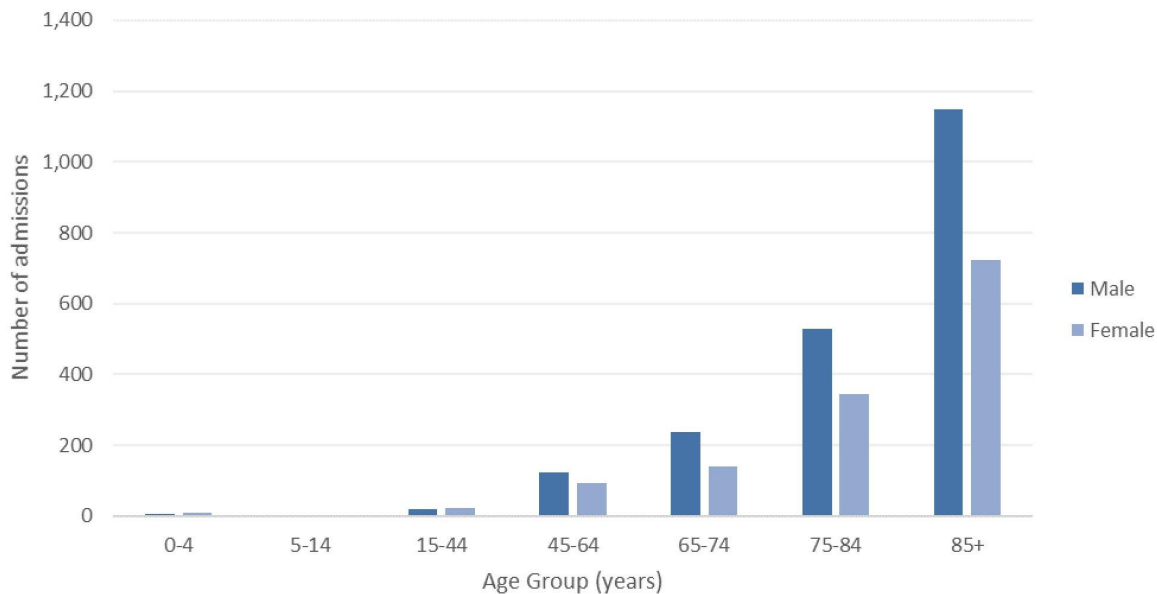
Deprivation profile of hospital admission

Figure 7 shows the number of hospital admissions by deprivation category from the most deprived 20% of the population to the least deprived 20% of the population.

Figure 7: Deprivation profile of Hospital Admissions for those with a positive COVID-19 result
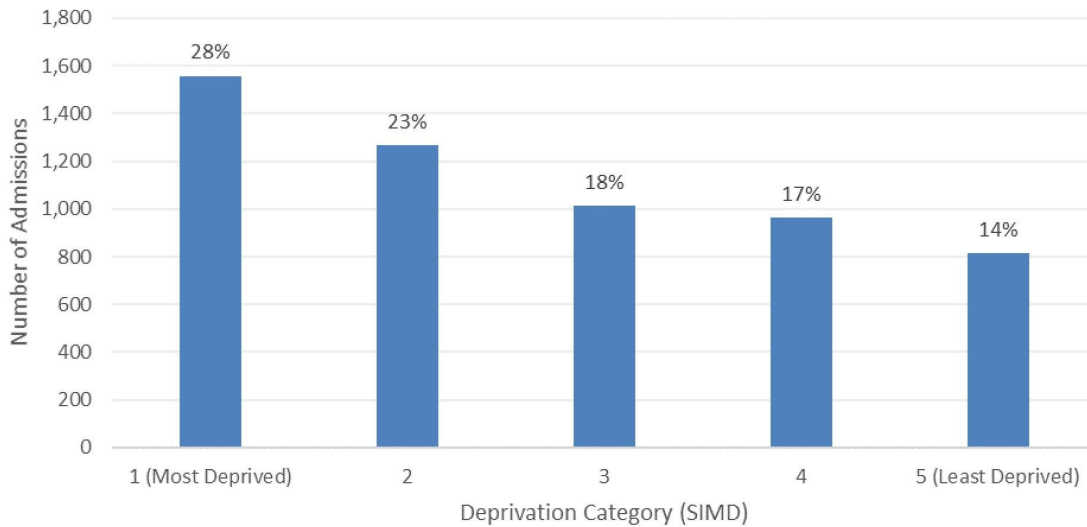
There is some evidence of a trend over deprivation groups with half of hospital admissions (50%) coming from the two most deprived areas. This contrasts with the trend for all confirmed cases, where there was no evidence of an overall trend. This will be partly explained by the workforce element in the total number of confirmed cases, whose deprivation profile may differ from that to hospital admissions. This pattern reflects a similar deprivation trend of overall emergency admissions prior to the COVID-19 outbreak.

Patients in Intensive Care

COVID-19 varies in severity from very mild symptoms through to those requiring hospital admission and the most ill who require intensive care treatment and supported ventilation. This section looks at the age and sex profile of those patients who have been admitted into Intensive Care Units (ICU).

Note that this analysis does not include patients in High Dependency Unit (HDU) wards. As this data becomes available, this will be further analysed and published. Also, this analysis only contains adult ICU information.

A total of 502 COVID-19 patients had been admitted into ICU with some staying for more than two weeks. This compare with 495 as at 10 May 2020

Table 3 shows the age and sex profile of patients who are, or have been, in ICU (up to 17 May 2020) with a confirmed laboratory test for COVID-19.

Most ICU patients to date have been in the 45 – 64 years age group (278; 55 %).

Table 3: Number of Confirmed COVID-19 patients who have been admitted to ICU, by age group and sex

| Age group (years)	Male	Female	Total
15 - 44	33	16	49
45 - 64	188	90	278
65 - 74	112	30	142
75 - 84	27	5	32
85+	1	0	1
All Age groups	361	141	502

01 Mar 2020 to 17 May 2020.
Anyone aged <15 has been excluded from this analysis.

The 65-74 age group had the highest rate of admission into ICU and more males than females had been admitted to ICU for treatment, accounting for 79% of patients. The age distribution for COVID-19 ICU population is not dissimilar to the age distribution seen in other countries. Critically ill older patients may also receive less invasive life support treatments and these will often be delivered outwith ICUs.

A report by the Scottish Intensive Care Audit Group (SICSAG) has been published on the Public Health Scotland website. This report will provide a more detailed analysis of patients being treated in intensive care units.

In the first report published (6th May), counts shown included any patient who had contact with ICU since 1st March 2020 and had a positive COVID-19 test at any time. This definition has now been adjusted to reflect forthcoming reports from SICSAG to only include patients with a positive COVID-19 specimen date on or before discharge from an intensive care unit. Therefore, current data are only comparable to figures previously reported by PHS last week (13th May) and not the previous week.

Figure 8: Patients in ICU: rate per 100,000 population by age group and sex as at 17 May 2020
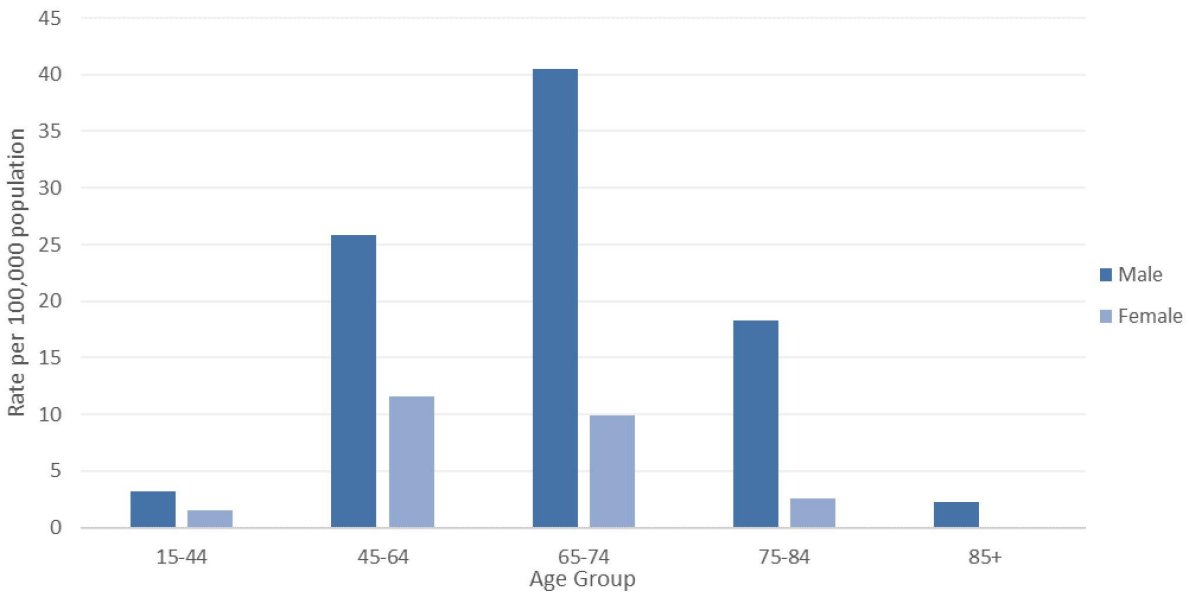
01 Mar 2020 to 17 May 2020.
Anyone aged <15 has been excluded from this analysis.

COVID-19 Activity in the Community

Before the COVID-19 outbreak, when GP Practices and Dentists are open during the day, NHS 24's 111 service generally only advises self-care or for people to contact their GP, unless it is immediately life threatening, in which case they contact a 999 Ambulance. When GP Practices and Dentists are closed, NHS 24 can also direct people to Emergency Departments, Minor Injuries Units and Primary Care Out of Hours services for further clinical input, which could involve a Nurse or GP telephoning or visiting the person at home, or arranging attendance at a Primary Care Emergency Centre.

In response to COVID-19, NHS 24 adapted their service provision. People who are concerned about COVID-19, or who experience symptoms, are advised to seek advice from NHS Inform website, the COVID-19 advice helpline or to contact NHS 24's 111 service if their symptoms worsen and they need clinical advice, following which they may be;

- provided with self care advice or be asked to contact their own GP
- refered to a COVID-19 community hub for further clinical telephone triage, they may then be asked to attend assessment centre or receive a home visit by a Nurse or Doctor
- referred to acute services via the Scottish Ambulance Service or advised to attend hospital, depending on their symptoms.

COVID-19 Contacts with NHS 24 111 and COVID-19 Advice Helpline

Figure 9 shows the trends in contacts with the 111 service where COVID-19 has been recorded as the reason for a person contacting the service, and also the number of calls to the dedicated COVID-19 advice helpline (this COVID-19 advice helpline information is published daily by the Scottish Government).

There are three distinct peaks in calls to the helpline: one when it first opened (at a similar time as the announcement that schools were to close), one the following week when lockdown was announced and finally a smaller peak at the end of March. Since then calls have been steadily falling, with lower demand at the weekend relating to COVID-19 and higher demand at the weekend for other concerns.

COVID-19 contacts with the 111 service saw a sharp increase prior to the opening of the COVID-19 helpline.   From the 23 March 2020, the 111 service now directs people with COVID-19 symptoms to the COVID-19 community hubs for further triage. Contacts to NHS 24 (Monday to Friday 8am – 6pm) which are non COVID-19 related are now referred directly to the patient's GP. From the 28 March to the 9 April there were over 2,000 COVID-19 daily contacts with the 111 service, which have since reduced to around 1,000 per day.

Figure 9: Number of NHS 24 111 COVID-19 Contacts and COVID-19 Advice Helpline calls
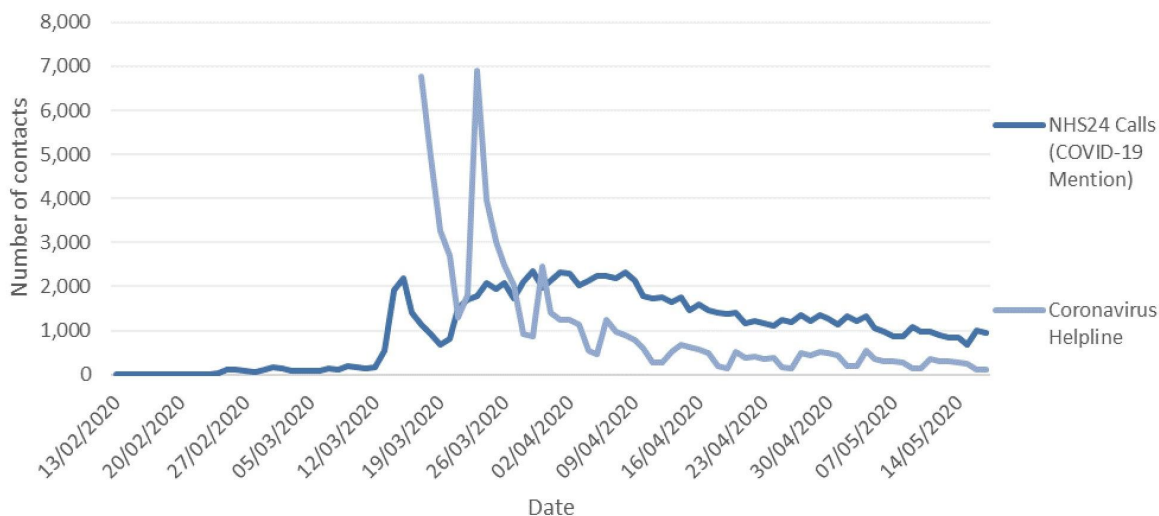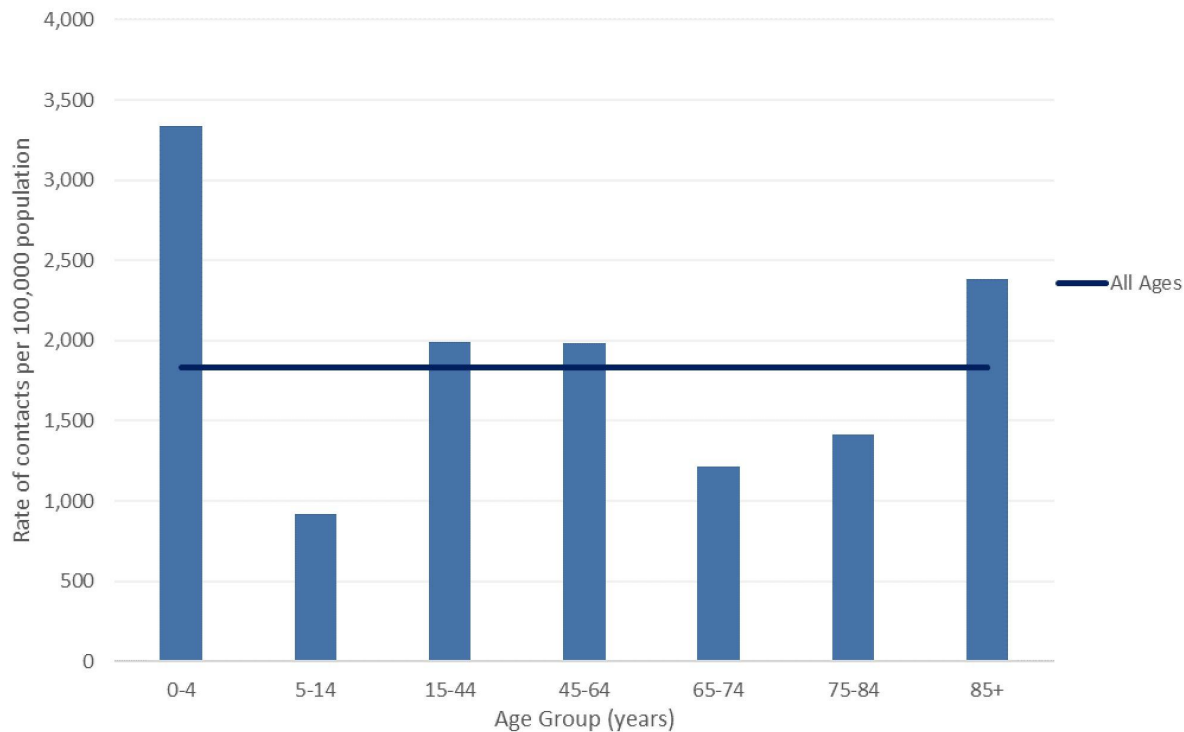
Figure 10 shows the rate per 100,000 population of NHS 24 calls related to COVID-19. The under 5 years age group had a rate of contact noticeably higher than the other age groups.

Figure 10: Rates of NHS 24 111 COVID-19 contacts, by age group

NHS 24 111 COVID-19 contacts by deprivation category

The level of COVID-19 calls to NHS 24 111 service by deprivation category is shown in Figure 11. There is a strong association between contacting NHS 24 and deprivation. More than one in four (28%) people who contacted this service were living in the most deprived areas in Scotland. Figure 11 shows that contacts with the 111 service were twice as likely to have been made by those living in the most deprived areas.

Figure 11: Number of NHS 24 111 COVID-19 contacts, by deprivation category
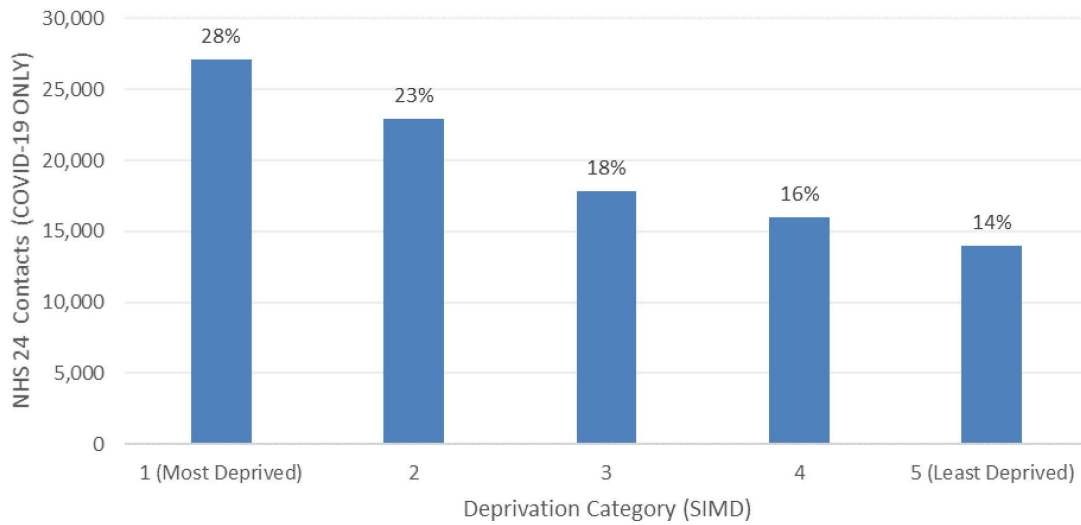
COVID-19 Community Hub and Assessment Centres

People may have multiple consultations with a COVID-19 Community Hub and Assessment Centre depending on their pathway of care. For example, upon referral by NHS 24 (or other services) they will be clinically triaged over the telephone by the community hub and they may then go on to have a consultation in person at an assessment centre; this would result in one person having two consultations.

Between the 23 March and 17 May 58,377   people had a total of 69,736 consultations with COVID-19 Community Hubs and Assessment Centres. *(NHS Grampian data included from 01 May 2020 onwards)*

- Overall COVID-19 related activity was highest on the 7 April with 1,840 consultations
- 85% of all consultations were advice calls.
- 59% of all consultations were with females.
- 28% of all consultations were with people living in the most deprived areas in Scotland.

COVID-19 Community Hub and Assessment Centre, Consultations by Type

Figure 12 shows COVID-19 activity by day of the week broken down by consultation type. A person may contact the Community Hub for advice and then may be asked to come to the Assessment Centre or have a home visit. The number of consultations peaked on 7 April with around 1,800 across all types of consultations. Since then there have been around 900 - 1,200 consultations per day.

Figure 12: Daily COVID-19 COVID Hubs and Assessment Centre Consultations
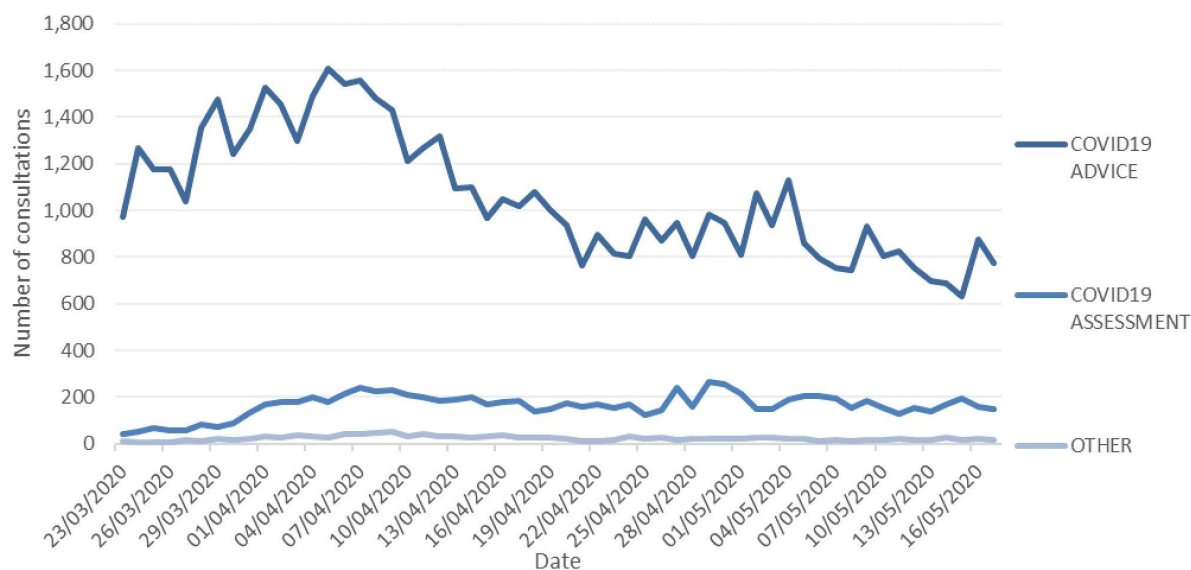
Please note NHS Grampian data included from 01 May 2020

COVID-19 Community Hubs and Assessment Centres, Individuals by Age Group

Figure 13 shows the number of people per 100,000 population accessing COVID-19 Community Hubs and Assessment Centres. The age groups with the highest rate of contact were the under 5's years and those aged 85 years and over. This pattern mirrors pre COVID-19 contacts with urgent care services, with the highest rates of access in the youngest and oldest age groups.

Figure 13: Number of individuals contacting COVID-19 Hubs and Assessment Centres per 100,000 population, by age group
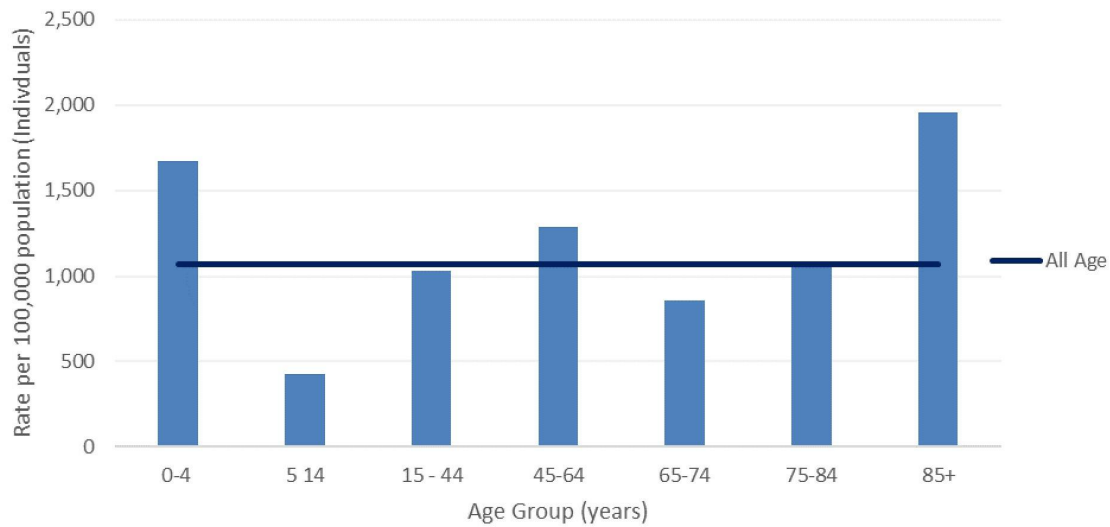

Please note NHS Grampian data included from 01 May 2020

COVID-19 Community Hub and Assessment Centre, by Deprivation category

Figure 14 shows that contact with the Community Hubs and Assessment Centres were more than twice as likely to have been made by people living in the most deprived areas.

Figure 14: COVID-19 Community Hubs and Assessment centres, by deprivation category

Please note NHS Grampian data included from 01 May 2020

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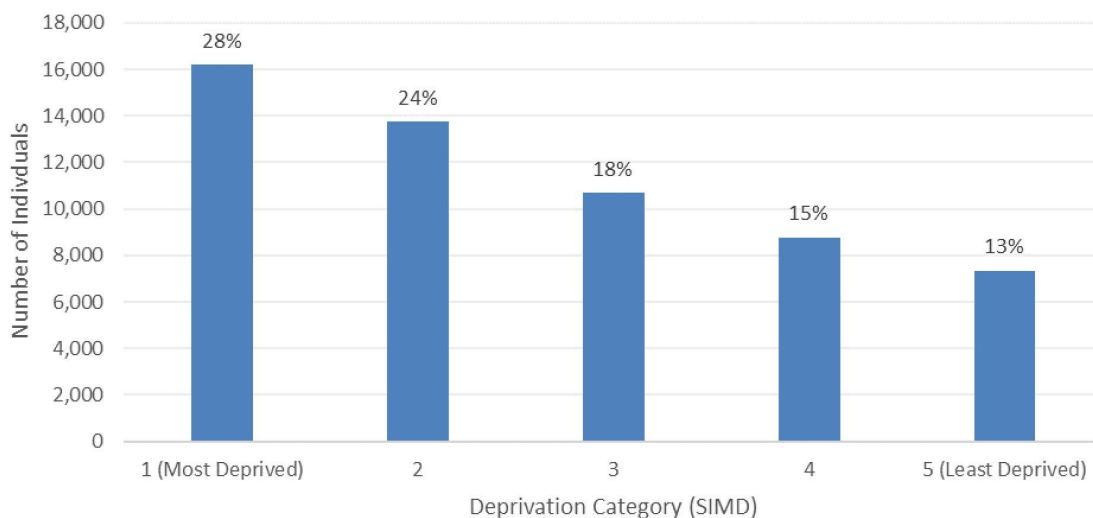
COVID-19 Contacts with Scottish Ambulance Service

When someone telephones 999 and requests an ambulance, the Scottish Ambulance Service (SAS) record this as an incident. In some cases, multiple phone calls can be received for one incident.

The total number of incidents includes

- redirecting and referring suitable people to alternative pathways, following telephone triage and advanced triage through a SAS practitioner.

- attended incidents, where a SAS resource (e.g. ambulance, paramedic in a car, specialist paramedic) has arrived at the scene of the incident. Some incidents may be attended by more than one resource.

Following assessment and treatment by SAS crews some patients do not require to be taken to hospital. These patients can be safely left at home with follow up provided by other services including their own GP or GP OOH Services. It is in the patient's best interest to get the care they require as close to their own home as is feasible.

Scottish Government provide daily provisional updates on the total number of incidents ambulances attend, how many were COVID-19 related and how many people were taken to hospital with suspected COVID-19.

Figure 15 below provides trends of this information, sourced from SAS, from 22 January 2020 to 17 May. It can be seen that pre COVID-19 generally SAS attended around 1,800 incidents each day. However, from the middle of March this has reduced to between 1,400 and 1,600, this reflects the pattern seen with other urgent and emergency care services.

Figure 15: Number of all Attended SAS incidents
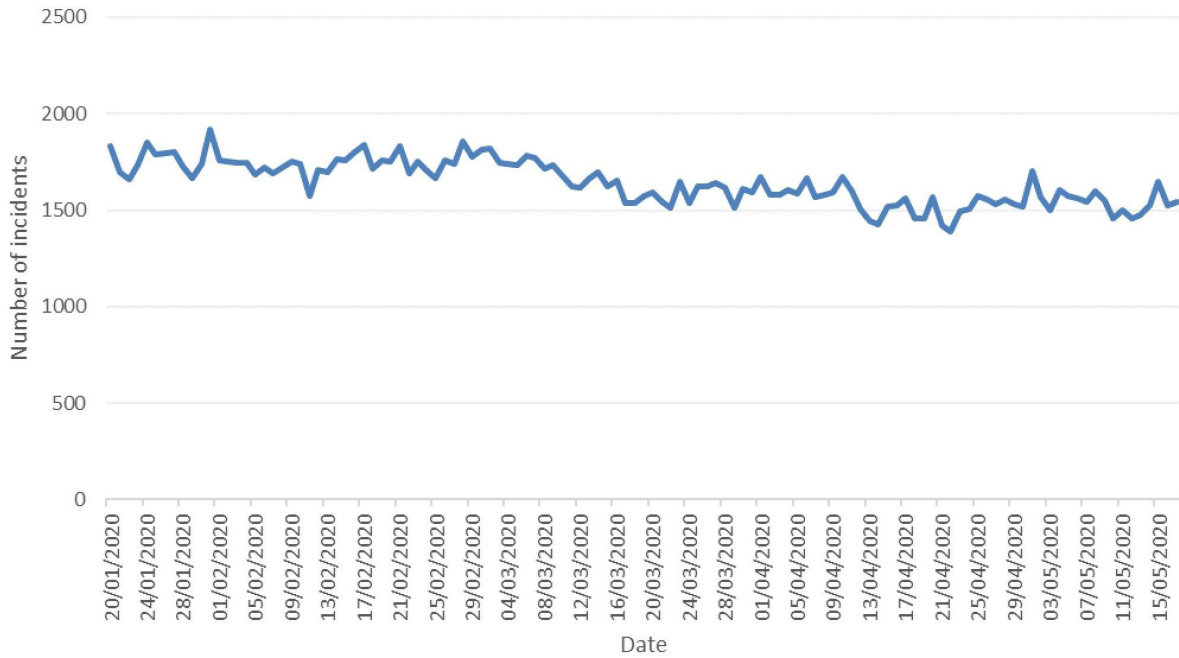
Figure 16 shows the number of incidents which are suspected COVID-19. 6 April saw the peak incidents for SAS with 56% of the incidents attended resulting in people being conveyed to hospital.

Figure 16: Number of SAS suspected COVID-19 incidents by type
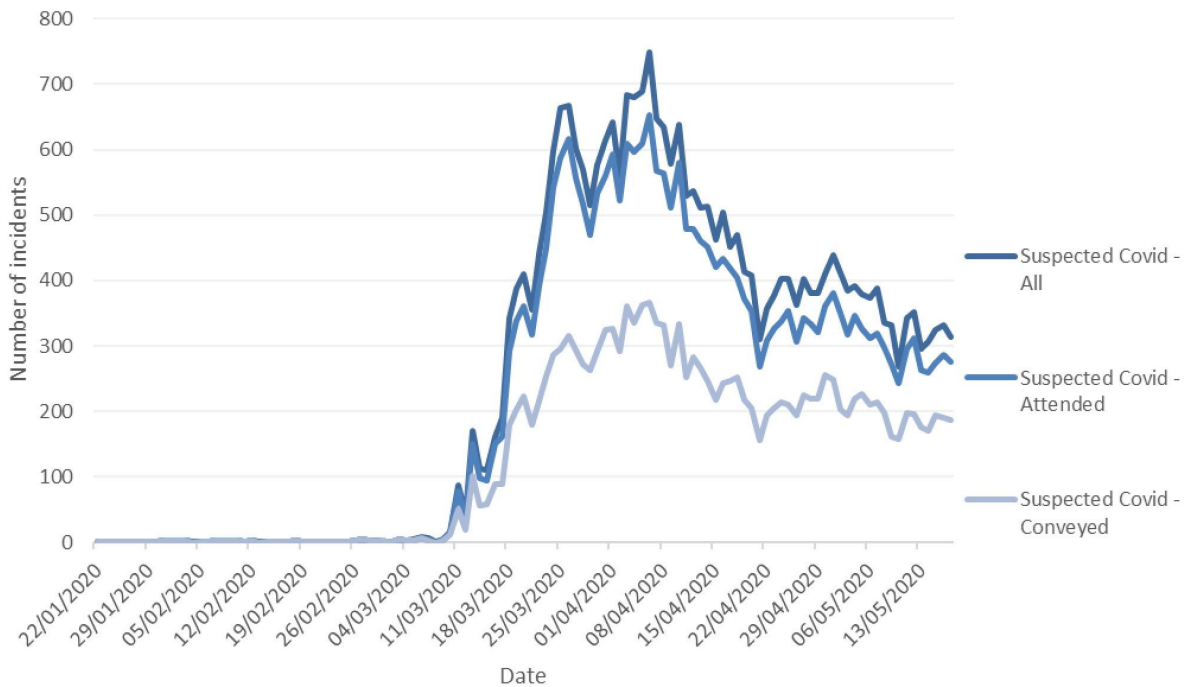
The following information is sourced from the Unscheduled Care Datamart which allows for additional information to be provided as it can be analysed at patient level.

COVID-19 related incidents attended by an Ambulance, by age

Figure 17 shows the rate per 100,000 population of suspected COVID-19 related incidents attended by an ambulance, by age. It can be seen that the 15-44 age group and the over 75's are more likely to have contact with the ambulance service.

Figure 17: Rates of COVID-19 related incidents attended by an ambulance. by age group
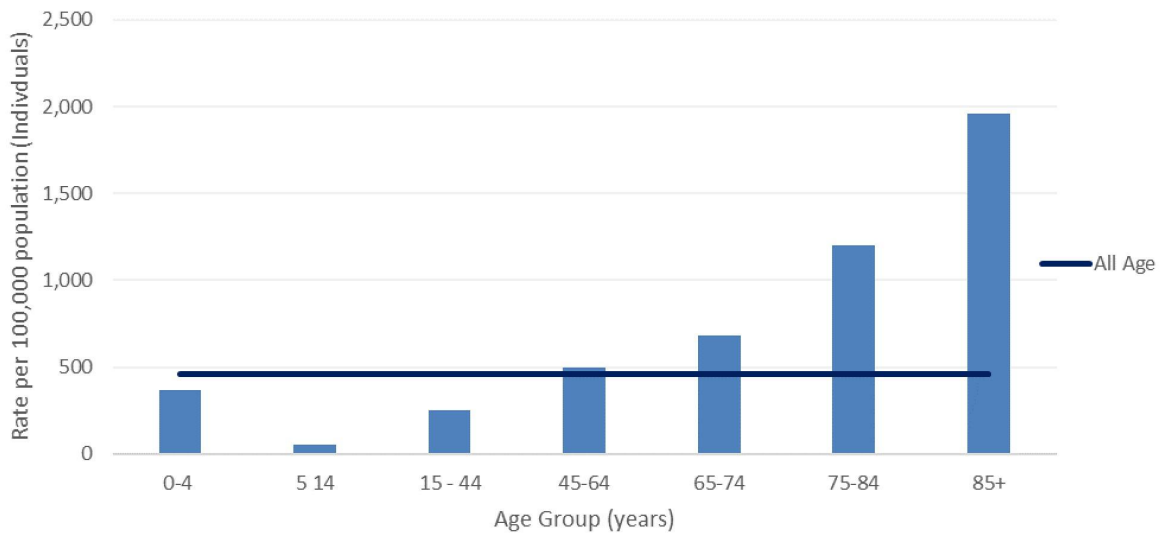
COVID-19 related incidents attended by an Ambulance, by deprivation category

The level of suspected COVID-19 related incidents attended by an Ambulance is shown by deprivation category in Figure 18. Those living in the most deprived areas are three times as likely to have an incident attended by an ambulance as those in the least deprived area.

Figure 18: Number of COVID-19 related incidents attended, by deprivation category
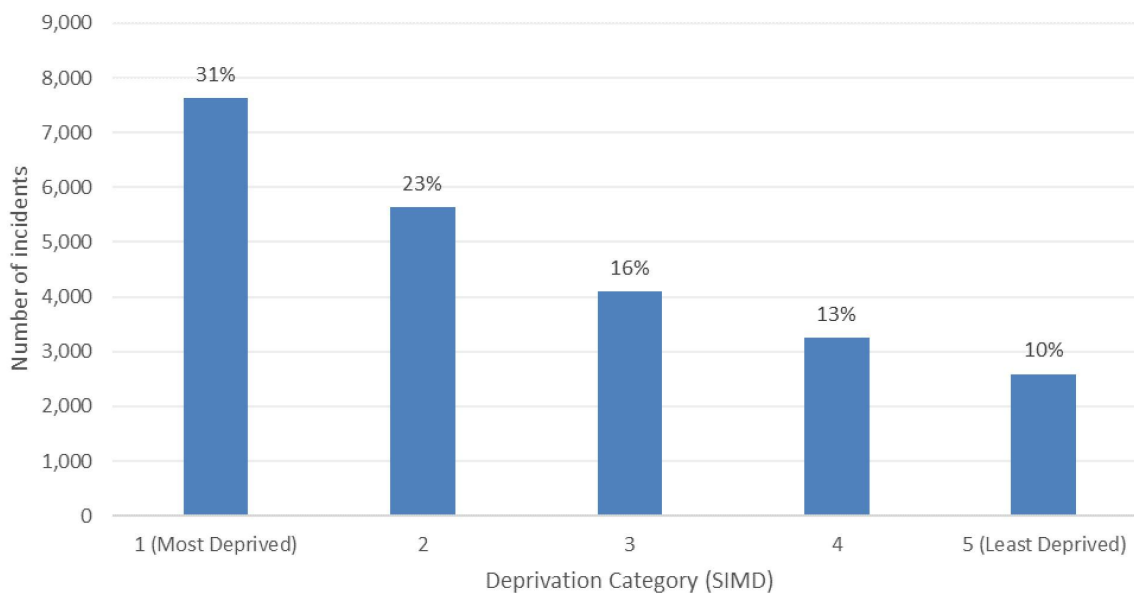
Wider Impact of COVID-19 on A&E and Hospitals Admissions

The response to the COVID-19 pandemic is likely to have a wider impact on health and care as a result of the lockdown, economic pressures and changes to health services. This section focuses on data that are currently available to help understand this impact, including attendances at A&E, NHS 24, GP Out of Hours and admissions into hospital. This information includes both COVID-19 related and non-COVID-19 related activity. More detailed information is available at NHS Board and Health and Social Care Partnership (HSCP) level.

Accident & Emergency attendances

Across Scotland, A&E services would normally see around 25,000 attendances per week. However, following the introduction of lockdown measures on the 18 March, weekly attendances saw a rapid decrease of 56% to around 11,000 (Figure 19). The number of attendances is slowly starting to increase, with attendances for the week ending 10 May at just over 16,500.

This overall reduction has a number of possible causes, such as fewer traffic and workplace related injuries or reluctance to use A&E services during the lockdown period.

Figure 19: Weekly A&E attendances across NHS Scotland
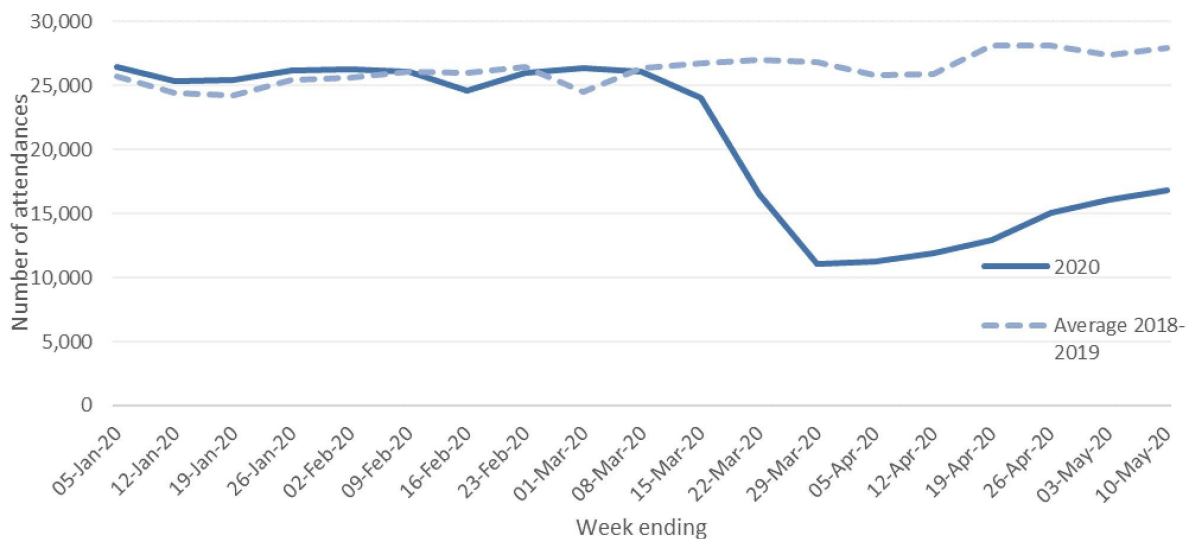
All Admissions to Hospital

Data on hospital admissions normally comes from the SMR01 dataset, which is the official source for published data on hospital admissions. However, there is a time lag in these data being submitted and therefore cannot be used to monitor the impact of COVID-19 at this time. The data below use the RAPID dataset (Rapid And Preliminary Inpatient Data), a more limited but up to date management information flow which provides broadly comparable figures on numbers of admissions. Figure 20 shows the trend in the number of admissions to hospital at a Scotland level, based on the RAPID data. For comparison, the figure also shows average numbers of admissions over the two previous years. The substantial (42%) reduction in admissions since early March is evident.

Planned admissions to hospital started to decrease on the 16 March as hospitals began to create capacity to cope with anticipated pressure from COVID-19. There has been about a 30% reduction in the level of emergency admissions and a 60% reduction in the level of planned admissions. More detailed information is available.

Figure 20: All hospital admissions across Scotland, compared with the average over the previous two years (Source: RAPID dataset)

Completed Contacts with NHS 24 111 service

Figure 21 shows that completed contacts with NHS 24 have increased in the latter part of March. It also highlights the increase in activity over the Easter holiday period compared with the average activity in 2018 - 2019.

The data used in this chart are taken from the Unscheduled Care Datamart. As mentioned in the report above NHS 24 made changes to their service delivery to respond to COVID-19. The data from March 2020 does not reflect the full extent of the demand and activity being undertaken by NHS 24 at this time. Over the coming weeks PHS and NHS 24 are working to further enhance the data and intelligence that can be shown in this publication.

Figure 21: Number of completed contacts to NHS 24 111 Service, compared with 2018-19 average
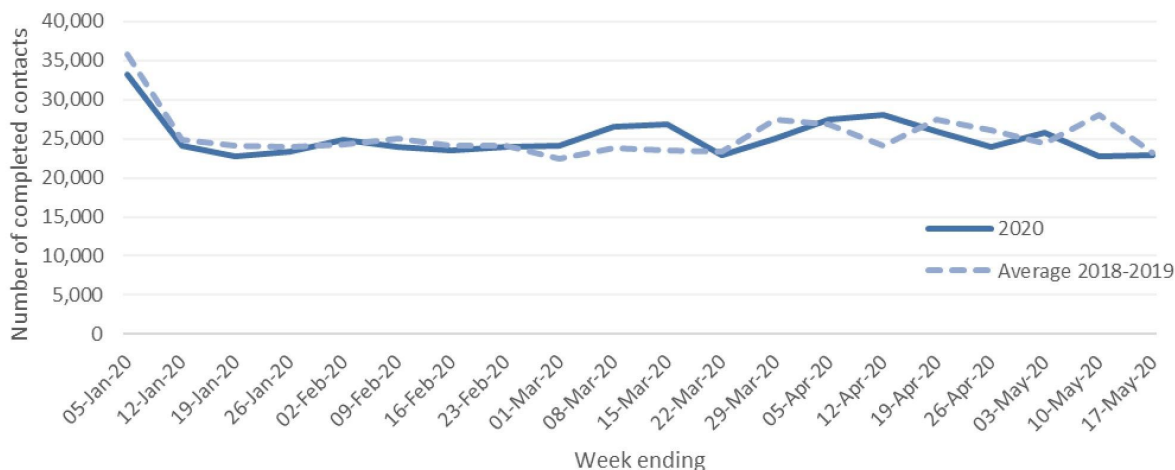
Primary Care Out of Hours service

Figure 22 shows the OOH activity mirrored the previous two-year average until Monday 23 March when the COVID-19 community hubs and assessment centres opened.   People in the out of hours period with COVID-19 symptoms would not attend an out of hours service but be directed towards a COVID-19 community hub and assessment centre. This helps to explain the reduction we can see compared with the previous two year average.

Figure 22: Number of consultations with Primary Care OOH services compared with previous years
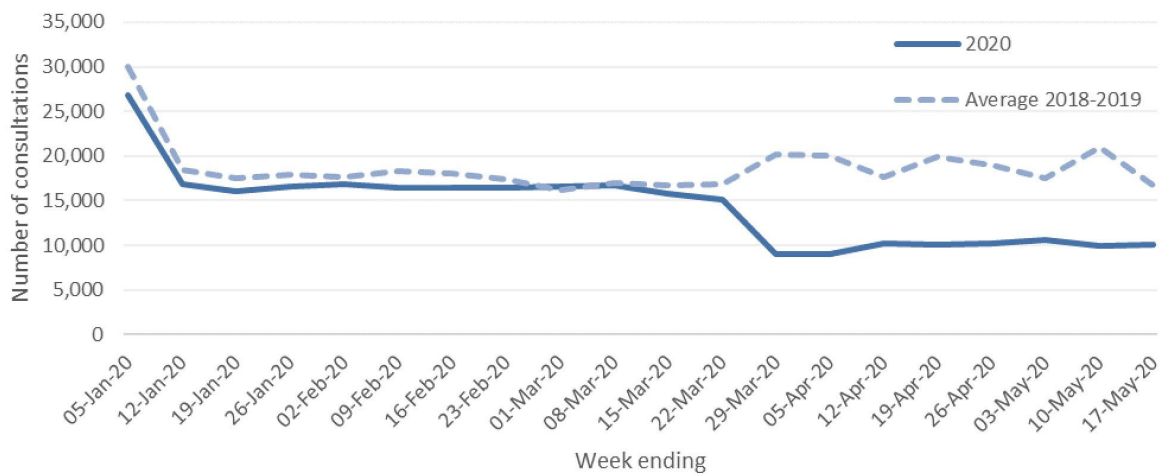
Scottish Ambulance Service

Figure 23 shows the number of incidents attended by the Scottish Ambulance Service this year with the previous two-year average up to 10 May 2020. When lockdown started the number of incidents attended reduced by over a third. This is reflective of demand and activity in other urgent and emergency cares services.

Figure 23: Number of incidents attended by Scottish Ambulance Service this year, compared with average of previous two years
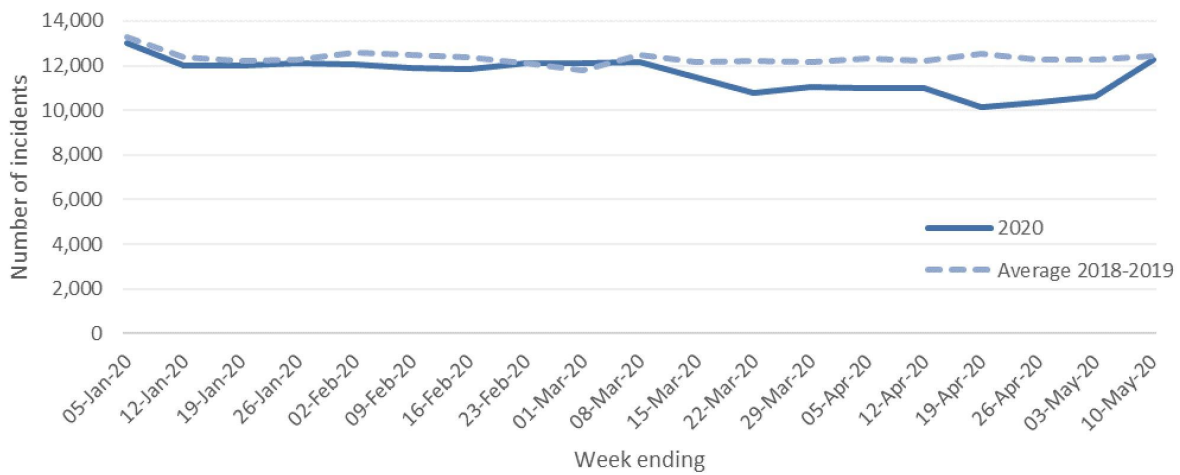
Ethnicity – COVID-19 outcomes

Public Health Scotland has undertaken analysis to investigate whether COVID-19 outcomes vary by ethnic group, as part of a wider programme of work within the organisation researching risk factors for COVID-19. These outcomes focus on those with a confirmed positive test result, as at 5 May, who have been admitted to hospital, and also looks at those with more severe outcomes such as admission to an ICU unit or who died within 28 days of test confirmation.

Results of the last Census in 2011 show that non-White ethnic minority groups accounted for only 4% of the population in Scotland, lower than the 14% reported for England and Wales. Given this, and the uneven distribution of ethnic minority populations across Scotland which are concentrated in urban areas rather than rural areas, it was necessary to include a valid comparison, or 'control' group, to allow for statistical comparison of COVID-19 related outcomes across ethnic groups. Therefore, each person with COVID-19 was matched anonymously to a random sample of 10 persons without a positive test who had the same age and sex and were are registered at the same GP practice.

Due to the small numbers in many ethnic groups it was necessary to aggregate groups to allow valid statistical comparison. Further information is given in the Appendix. While it is recognised it is not ideal to group individual ethnicities, further disaggregation may be possible as numbers of patients increase over time.

Ethnicity was derived from SMR01 hospital discharge records which are clinically coded to a standard appropriate for epidemiological analysis on discharge prior to submission to Public Health Scotland. There is currently a lag of around 3 months for coded data to be available for analysis nationally which means that for the majority of these recently hospitalised patients a record of concurrent ethnicity was not available.

To address this, hospital admission records for these patients and controls were searched across the several years for evidence of a previously recorded ethnicity. Not all these patients and controls had a previous admission during this period however. In addition, while ethnicity recording on routine hospital records has been improving over recent years, it is not available for all hospital patients with most recent figures showing around 80% of records with known ethnicity (link to web page).

The ethnicity profiles of the COVID-19 hospital patients and comparison group are shown in Table 4. Just over 50% of cases, and a higher proportion of controls, were excluded due to lack of a hospital recorded ethnicity. We aim to decrease the level of missing data in future by incorporating new admission records and other available data sources.

Table 4: Association of COVID-19 Hospitalisation with Ethnic group based on hospital records

	COVID-19 (2,443)		Controls (12,286)		Odds ratio (95% CI)	
White	2,397	(98%)	12,094	(98%)	1	
Black/C/A	4	(0%)	26	(0%)	0.59	(0.12, 2.80)
Chinese	3	(0%)	19	(0%)	0.78	(0.22, 2.80)
South Asian	28	(1%)	113	(1%)	1.00	(0.59, 1.72)
Other	11	(0%)	34	(0%)	1.60	(0.70, 3.68)
Unknown*	2,281		34,729			

* Excluded from the analysis. Black/C/A = Black/Caribbean/African

Among those with recorded ethnicity, non-White groups accounted for only around 2% of both the COVID-19 group and comparison group.

Statistical analysis was based on using logistic regression models that took account of the matched cases and controls design to look for evidence of different risk of Covid-19 outcomes across ethnic groups. Further information on this is given in the Appendix. The resulting odds ratios for hospitalisation are shown in Table 4. The odds ratio compares the rate of the COVID-19 outcome across different ethnic groups in comparison with the rate in the White group. A value higher than 1 indicates a higher rate, and a value lower than 1 a lower rate, relative to the White group. An odds ratio of 2 for example would equate to approximately a group being twice as likely to have had a COVID-19 outcome compared to the White group.

Odds ratios were estimated to be 1 or lower for all the ethnic minority groups except the Other group. Confidence intervals show the range of statistical uncertainty in the estimates. These confidence intervals were wide due to the small numbers in the ethnic minority groups meaning that drawing firm conclusions from these sparse data is difficult.

Table 5 shows results of a similar analysis but restricted to COVID-19 patients with the most severe outcomes, i.e. admission to an ICU or died within 28 days.

Table 5: Association of COVID-19 Severe disease with Ethnic group based on hospital records (Admission to ICU or Died)

	COVID-19 (1,144)		Controls (5,758)		Odds ratio (95% CI)	
White	1130	(99%)	5679	(99%)	1	
Black/C/A	0	(0%)	14	(0%)	0.00	-
Chinese	1	(0%)	7	(0%)	0.47	(0.05, 4.05)
South Asian	9	(1%)	39	(1%)	0.84	(0.32, 2.19)
Other	4	(0%)	19	(0%)	1.72	(0.39, 7.58)
Unknown*						

*Excluded from the analysis. Black/C/A = Black/Caribbean/African

This highlights very small numbers of non-White COVID-19 patients who experienced more severe Covid-19 disease. There were no patients with a Black/Caribbean/African ethnicity with severe disease and only 14 non-White patients overall. This compares to 79 non-Whites in the control group. Non-White groups accounted for only around 1% of both the COVID-19 group and comparison group. The odds ratio followed a similar pattern to hospitalisation.

To investigate whether these results could potentially be explained by other factors which influence COVID-19 outcomes, the odds ratios were also adjusted for the deprivation category of the patient (quintiles), and whether patients were care home residents (yes/no). The resulting adjusted odds ratios changed very little however, suggesting these factors did not explain differences among ethnic groups (see Appendix for results).

The exclusion of patients of unknown ethnicity means that the validity of these results depends on the assumption that there are no differences between Covid-19 patients and controls in how accurately ethnicity is recorded on hospital records.

To check this assumption, the analyses were repeated using a proxy measure of ethnicity derived from patient names using software that was developed using algorithms built from a world-wide database that covered names and ethnic groups in a wide range of countries (Onolytics). This gave a predicted ethnicity for all COVID-19 patients and controls meaning all who tested positive could be included. Further information and results using this approach are shown in the Appendix.

Names-based predictions performed better for some ethnic groups compared to others; the Black, Caribbean and African ethnicities in particular were poorly predicted and therefore excluded. However, applying this to the remaining ethnic groups allowed almost all patients and controls to be included and an alternative approach to compare to the results of the analysis based on hospital recorded ethnicity.

The names-based approach estimated a lower likelihood of hospitalisation or severe outcome for the both Chinese and South Asian ethnic groups compared to the White group. Larger numbers and narrow confidence intervals for the South Asian group suggested these could not be explained by natural statistical variation. For the other groups, the very small numbers reported mean that estimates of outcome comparisons with the White group are unstable. These analyses will be updated and monitored as further cases of COVID-19 are confirmed.

These results are based on the numbers of people testing positive through NHS laboratories but results for those tested through regional testing centres were not available. As these data become available these can also be included for analysis. It should also be noted that the deaths reported here are for those who died in within 28 days following a positive test result and often in hospital. We hope to also include COVID-19 deaths based on death certificate coding to these analyses in due course. In addition, National Records of Scotland recently published a note on deaths involving COVID-19 by ethnicity, which describes the information collected by the death registration process in Scotland and some of its limitations (link to note).

Conclusions

Complete and contemporary data on the self-reported ethnicity of seriously ill patients in hospital has always been challenging despite significant progress in recent years.

Results of a comparative statistical analysis of available data highlight the very low numbers of COVID-19 patients in Scotland with evidence of belonging to an ethnic minority group.

Based on the available data to date, the proportion of ethnic minority patients among those seriously ill with COVID-19 appeared no higher than the relatively low proportion in the Scottish population generally.

Using a names-based approach to predicting ethnicity to improve comparisons across some ethnic groups again did not find a higher occurrence of serious COVID-19 illness among these minority ethnic groups compared to the White group.

Further work is required to improve this analysis. Public Health Scotland will continue to refine this work as additional data becomes available, breaking down, where possible, some of groupings necessary in this work to date. In parallel, work will be undertaken to explore and understand emerging patterns including comparisons between the situation in Scotland and the other parts of the UK.

Contact

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Further Information

COVID surveillance in Scotland

Scottish Government

National Records of Scotland

UK and international COVID reports

Public health England

European Centre for Disease Prevention and Control

WHO

International Severe Acute Respiratory Emerging Infection Consortium.

The next release of this publication will be 27 May 2020.

Open data

Data from this publication is available to download from the Scottish Health and Social Care Open Data Portal.

Rate this publication

Let us know what you think about this publication via. the link at the bottom of this publication page on the PHS website.

Appendices

Appendix 1 – Background information

In late December 2019, the People's Republic of China reported an outbreak of pneumonia due to unknown cause in Wuhan City, Hubei Province.

In early January 2020, the cause of the outbreak was identified as a new coronavirus. While early cases were likely infected by an animal source in a 'wet market' in Wuhan, ongoing human-to-human transmission is now occurring.

There are a number of coronaviruses that are transmitted from human-to-human which are not of public health concern. However, COVID-19 can cause respiratory illness of varying severity. Currently, there is no vaccine and no specific treatment for infection with the virus.

On the 30 January 2020 the World Health Organization declared that the outbreak constitutes a Public Health Emergency of International Concern.

Extensive measures have been implemented across many countries to slow the spread of COVID-19. In the UK the current recommendations are for everyone to stay at home as much as possible and severely restrict their interactions with others outside the household.

Further information for the public on COVID-19 can be found on NHS Inform.

Appendix 2 – PHS and Official Statistics

About Public Health Scotland (PHS)

PHS is a knowledge-based and intelligence driven organisation with a critical reliance on data and information to enable it to be an independent voice for the public's health, leading collaboratively and effectively across the Scottish public health system, accountable at local and national levels, and providing leadership and focus for achieving better health and wellbeing outcomes for the population. Our statistics comply with the Code of Practice for Statistics in terms of trustworthiness, high quality and public value. This also means that we keep data secure at all stages, through collection, processing, analysis and output production, and adhere to the 'five safes'.

Appendix 3 – Further Information about the Ethnicity Analysis

Ethnicity Group Classification

Ethnicity recorded in hospital records such as SMR01 is based on census codes. For analysis these were grouped as in Table A1 below. However, where numbers were too few for a particular outcome groups were further aggregated within the Other Ethnic group category.

Table A1 Ethnic group classifications used in analyses

Grouped Ethnicity	Detailed breakdown of recorded ethnicities included
White	White Scottish, British, Irish, Polish, Gypsy/Traveller; Other White
Black/Caribbean/African	Caribbean, Caribbean Scottish or Caribbean British; Black, Black Scottish or Black British; Other Caribbean or Black; African, African Scottish or African British; Other African.
Chinese	Chinese, Chinese Scottish or Chinese British
South Asian	Pakistani, Pakistani Scottish or Pakistani British; Indian, Indian Scottish or Indian British; Bangladeshi, Bangladeshi Scottish or Bangladeshi British.
Other	Any mixed or multiple ethnic groups; Arab, Arab Scottish or Arab British; Other Asian, Asian Scottish or Asian British; Other ethnic group.

Methodology

All persons to date who tested positive for Sars-CoV-2 RNA as at 5 May 2020 were identified using the ECOSS virology laboratory systems. This system records the Community Health Index (CHI) patient identifier but not ethnicity.

A matched set of 10 controls per COVID-19 case were randomly selected from the CHI database for all people in Scotland, matching on age, sex and GP practice of registration. This gave a comparison population of people without a positive test for COVID-19 for each outcome.

Odds ratios were based on conditional logistic regression models including both ethnic group on its own and as a multivariate model adjusted for care home status and deprivation quintile in addition. Care home status (yes/no) was based on the most recent residence recorded on the CHI database. Deprivation quintile was based on the postcode of residence of the case or control.

To maximise ethnicity completeness from hospital records, Inpatient (SMR01) and outpatient (SMR00) discharge records were used. These have increased in their completion of mandatory ethnic group in recent years. For all cases and controls the most frequent ethnic group assignation, excluding those marked as Unknown or Refused, was selected from these two datasets within a 5-year lookback period.

For the name-based ethnicity analysis the Onolytics Ethnicity Classification Software (https://onolytics.com) package was used to assign predicted ethnicity to all cases and controls. This package was formerly known as ONOMAP and was developed by Mateos at UCL which used people's first and family names to estimate underlying ethnic group. It has been developed using algorithms built from the Worldnames database that covered both names and ethnic group in a large number of countries.

Onolytics assigns both predicted geographical region of origin and ethnicity. Onolytics has previously been reported to have variables sensitivity for assigning non-white ethnic groups 17-89%. (Lakha 2011) The "Onolytic Types" were allocated to ethnic groups. Names classified "Muslim" in the Onolytics classification were assigned to the South Asian group, as Scotland most people with Muslim names are South Asian. The Onolytics classification assigns a high proportion of names in Scotland to the category "Celtic" which does not distinguish Irish from Scottish names so that White Irish cannot be differentiated from White British.

This work followed standard operating procedures for handling and processing confidential data held in national datasets. A team separate to the analysts working on this project assigned ethnicity to cases and controls based on names using the software then names were removed and an anonymised dataset containing ethnic group only was passed to the analysts.

The rate ratios shown are based on conditional logistic regression. With the incidence density sampling used in this study, the odds ratios in a conditional logistic regression are equal to rate ratios. The unconditional odds ratios calculated from the numbers of cases and controls in the tables are not the same as the conditional odds ratios.

Further Result Tables

Table A2 Association of COVID-19 Test Positive with Ethnic group based on hospital records

	Cases (4230)		Controls (23833)		Odds ratio (95% CI)	
White	4123	(97%)	23362	(98%)		
Black	15	(0%)	56	(0%)	1.86	(0.82, 4.19)
Chinese	6	(0%)	45	(0%)	0.74	(0.26, 2.05)
South Asian	55	(1%)	238	(1%)	1.34	(0.91, 1.97)
Other	31	(1%)	132	(1%)	1.43	(0.85, 2.41)
Unknown	7202		90061			

Table A3 Multivariate Odds Ratios and 95% Confidence Intervals* with Ethnic Group based on hospital records

	Test Positive		Hospitalised		Admitted to ICU/Died	
White	1		1		1	
Black	1.88	(0.82, 4.28)	0.56	(0.12, 2.74)	0	(0.00, Inf)
Chinese	0.76	(0.26, 2.16)	0.79	(0.21, 2.93)	0.59	(0.06, 5.48)
South Asian	1.39	(0.94, 2.06)	1.09	(0.63, 1.89)	1.08	(0.40, 2.93)
Other	1.47	(0.86, 2.50)	1.63	(0.69, 3.88)	1.94	(0.35, 10.8)

*Adjusted for whether a care home resident and deprivation quintile

Onolytics Result Tables

Table A4 shows that the Onolytics name classification assigns to the same as self-reported category 27380 (100%) of those who self-report their ethnicity as White, 263 (90%) of those who self-report as South Asian,31 (61%) of those who self-report as Chinese, but only 16 (23%) of those who self-report as Black. In subsequent analyses, the Onolytics classification has been collapsed to four groups: White, South Asian, Chinese, Other. Analyses that distinguish the Black group can be done only for the subset of individuals who have SMR records.

Table A4 Agreement between Hospital recorded ethnicity and ethnicity predicted by Onolytics

	White		Black		Chinese		Other		South Asian		Unknown	
Onolytics												
White	27380	(100%)	32	(45%)	10	(20%)	80	(49%)	18	(6%)	90425	(93%)
Black	7	(0%)	16	(23%)	0	(0%)	4	(2%)	1	(0%)	550	(1%)
Chinese	4	(0%)	0	(0%)	31	(61%)	1	(1%)	0	(0%)	934	(1%)
Other	21	(0%)	3	(4%)	9	(18%)	9	(6%)	2	(1%)	686	(1%)
South Asian	43	(0%)	18	(25%)	1	(2%)	58	(36%)	263	(90%)	3728	(4%)
N/A	30	(0%)	2	(3%)	0	(0%)	11	(7%)	9	(3%)	940	(1%)

Table A5 Association of COVID-19 Hospitalisation with Ethnic group based on Onolytics

	Cases (4724)		Controls (47015)		Odds ratio (95% CI)		Multivariate* Odds ratio (95% CI)	
White	4578	(97%)	44821	(96%)				
Chinese	11	(0%)	270	(1%)	0.39	(0.21, 0.71)	0.43	(0.24, 0.80)
South Asian	96	(2%)	1314	(3%)	0.69	(0.55, 0.86)	0.77	(0.62, 0.96)
Other	23	(0%)	385	(1%)	0.57	(0.37, 0.87)	0.58	(0.38, 0.90)

*Adjusted for whether a care home resident and deprivation quintile

Table A6 Association of COVID-19 Severe disease (Admission to ICU or Died) with Ethnic group based on Onolytics

	Cases (2114)		Controls (21009)		Odds ratio (95% CI)		Multivariate* Odds ratio (95% CI)	
White	2069	(98%)	20098	(96%)	1		1	
Chinese	5	(0%)	120	(1%)	0.4	(0.16, 0.99)	0.52	(0.21, 1.30)
South Asian	31	(1%)	560	(3%)	0.52	(0.36, 0.75)	0.63	(0.43, 0.92)
Other	4	(0%)	150	(1%)	0.25	(0.09, 0.69)	0.29	(0.11, 0.81)

*Adjusted for whether a care home resident and deprivation quintile