Isle of Man Government

Reiltys Ellan Vannin



# COVID-19 Weekly Surveillance Report

*19th May 2022*

**Public Health Directorate**

# Introduction

This report is a summary of indicators which are used to understand the dynamics of the spread of COVID-19 on the Isle of Man.

This report will be published each Thursday for data up to and including the previous Sunday e.g. 12th August is for data up to 8th August.

The COVID-19 results are a combination of positive PCR and LFT tests.

The report has been compiled by the Public Health Intelligence Team using data from Manx Care, the Civil Registry and the Lateral Flow Test (LFT) system.

# Wave Surveillance

- This week saw a plateauing in case numbers across all age groups. The effective reproduction number ($R_t$) was 1.19 this week, a further slight increase from last week's value of 0.56. As seen in previous weeks, the increase in $R_t$ from the previous week, despite a plateau in case numbers, is due to a smaller number of weekly cases that are assumed recovered after a 10 day period than in previous weeks. It is worth noting that $R_t$ values, as seen in the daily $R_t$ table (Appendix 1), are sensitive to large fluctuations when daily case numbers are small. Therefore, consideration should be taken of other epidemiological data to gain a true understanding of patterns of spread.

- Case ascertainment and calculation of the reproduction number is, of course, dependent on patterns of testing and reporting so it is likely that there are more cases than are currently notified. This caveat has applied throughout the pandemic when COVID has been transmitting on Island, although the change to LFD self testing and self reporting may have impacted on that to an unknown extent. Further changes to testing guidance published on 1 April are likely having an additional impact. This week we have seen a plateau in seven day average daily reporting from 25 to 27. Some of this is likely to be due to changes in testing and reporting. However, there is also likely to be a true fall/plateau as this would be in line with the fall in cases currently being reported in the UK from the Office of National Statistics Infection Survey.

- In the absence of new variants of concern, we would expect the fall in cases to continue as the current BA.2 omicron wave passes through the susceptible population and we move through Spring into Summer. Our current continuing trend in case numbers supports this.

# Waste Water Surveillance

- This week we have included the latest update from the Waste Water Surveillance pilot project. This project is a partnership between the Isle of Man government and the London School of Hygiene and Tropical Medicine. The project aims to investigate the usefulness of waste water testing to monitor levels of infectious disease on Island, including SARS-CoV-2 (the virus that causes COVID-19), enterovirus (a family of viruses which includes the 'winter vomiting bug' norovirus) and influenza. The latest report from the project is included in full in Appendix 2.

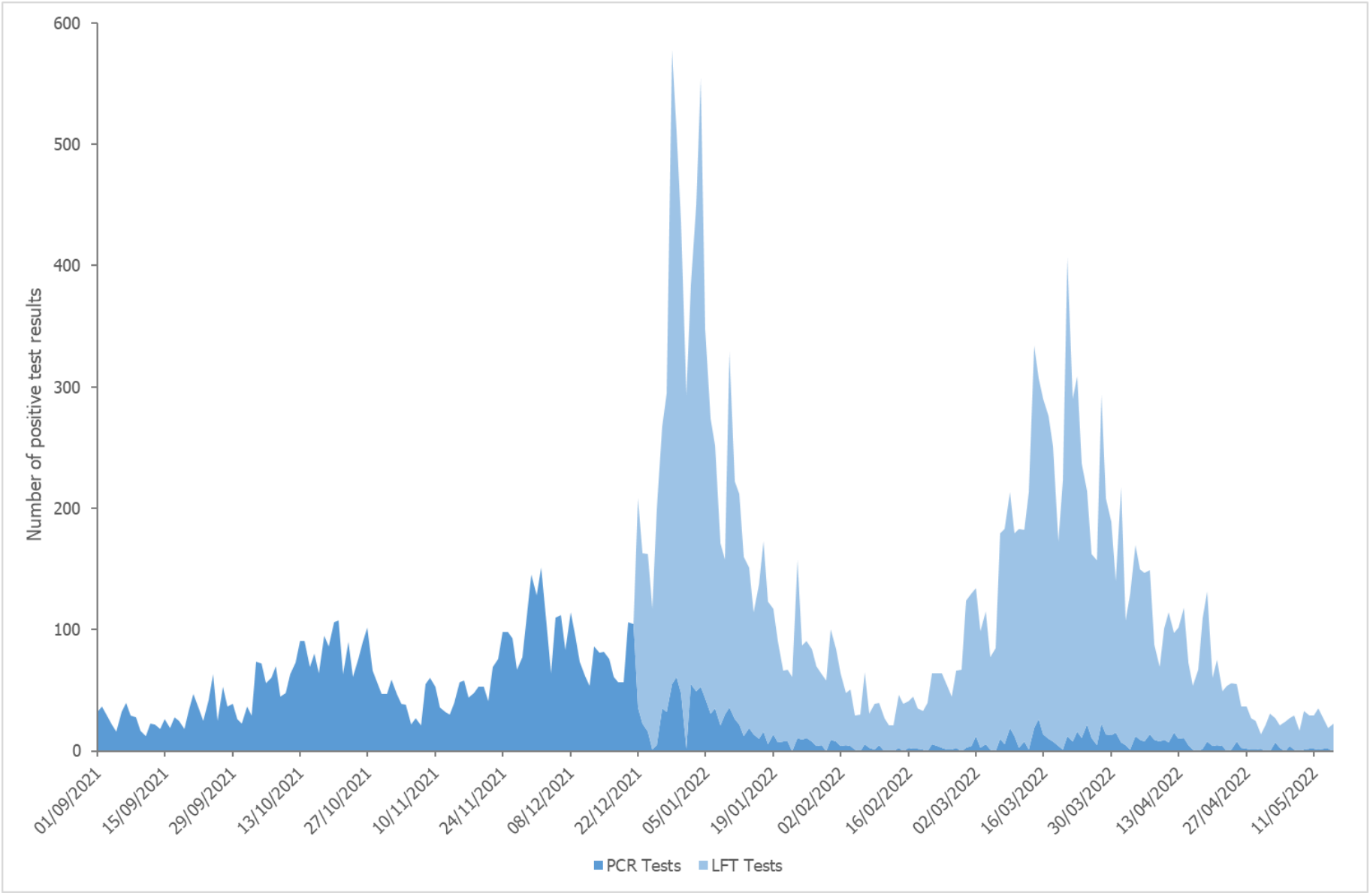
- Testing people for COVID-19 (as we have been doing using the LFD tests) is expensive and intrusive for individuals. At best, only a proportion of the population will be tested. This means that levels of infection seen from testing are always likely to be an underestimate of the true level. Waste water testing for SARS-CoV-2 RNA offers a way of sampling across the population.

- Results from the latest update show an increase in SARS-CoV-2 RNA from week ending 07 May 2022 to week ending 14 May 2022. These results may suggest an underreporting of cases from the LFD testing data.

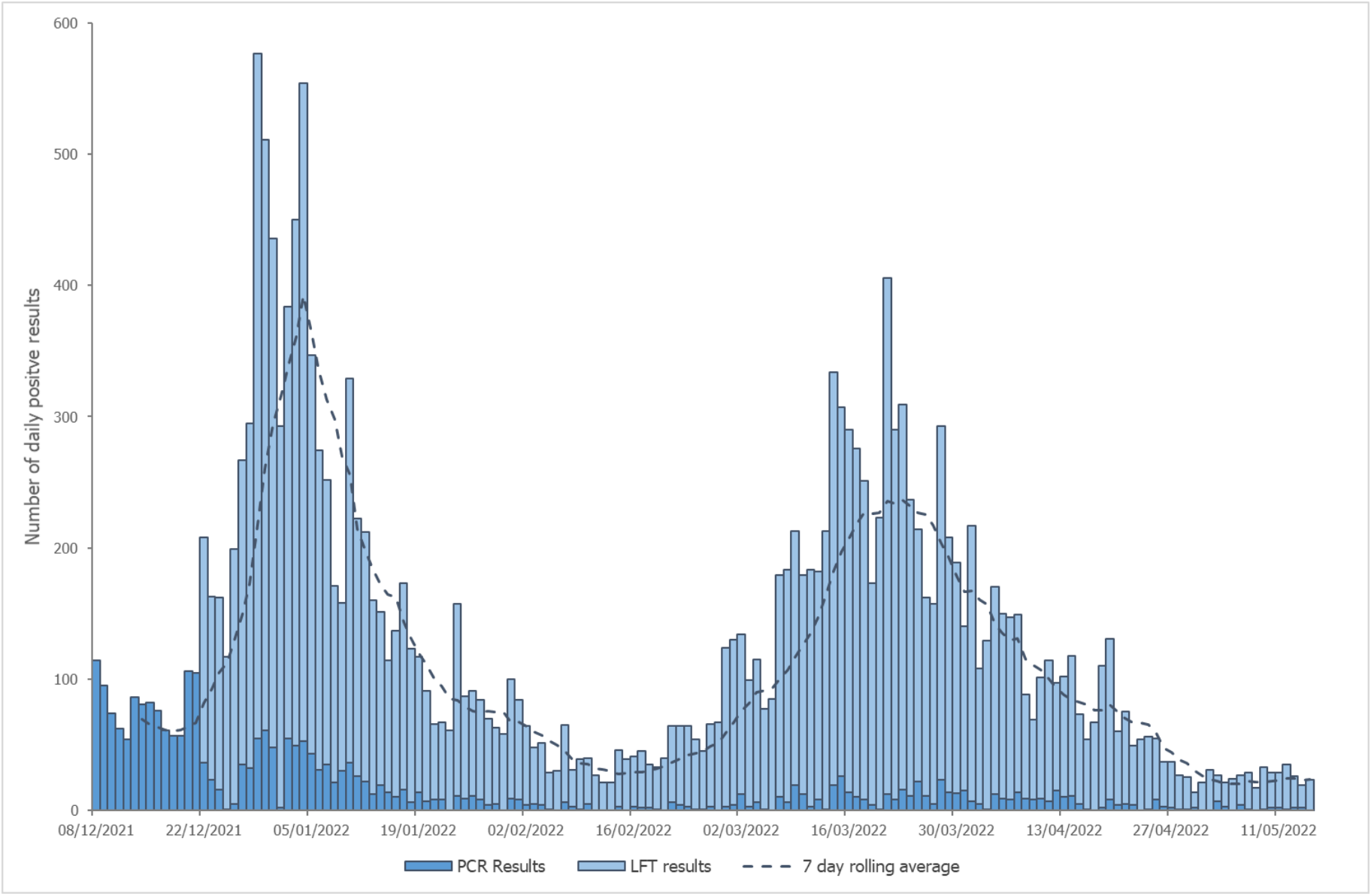
# Key Points

- The current 7-day average for reported positive results is 27.
- The trend of case numbers reported from testing shows a plateau this week.
- The effective reproduction number ($R_t$) was 1.19 this week.
- The snapshot of the Hospital is not available in this week's report.

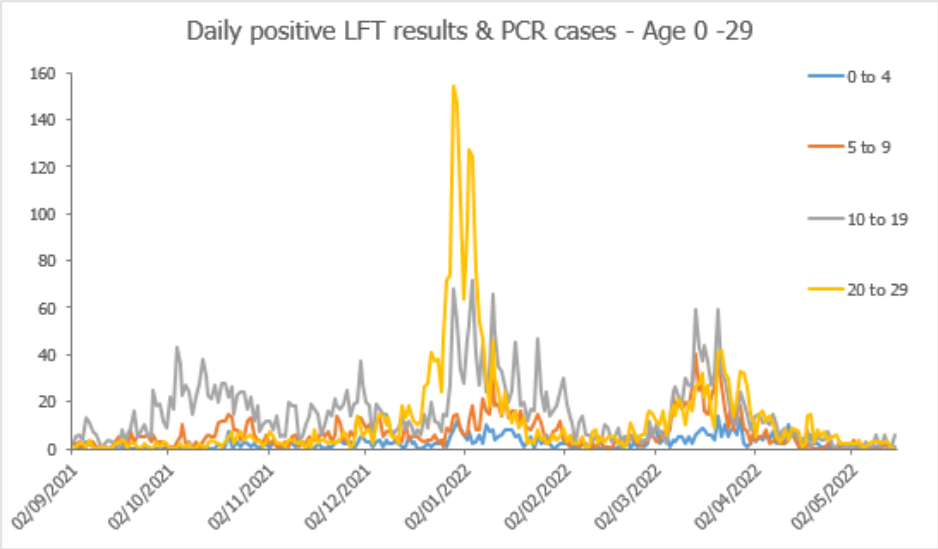
# Positive COVID-19 Tests

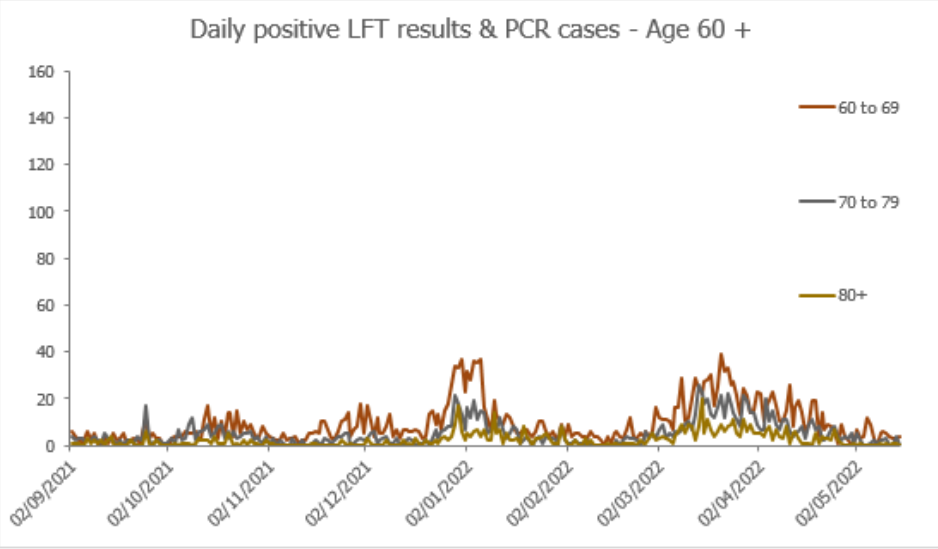


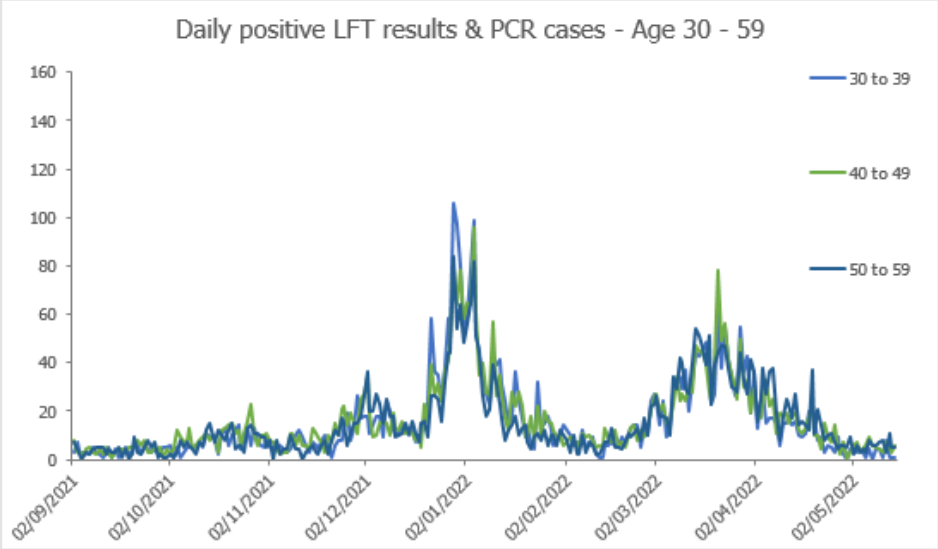
# Daily Positive Results – 4th Wave

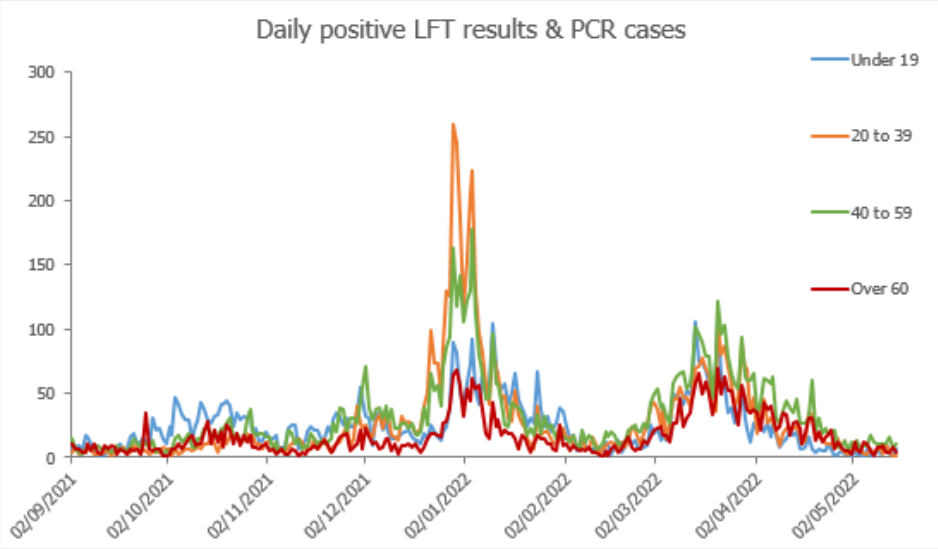


# Age Group Analysis

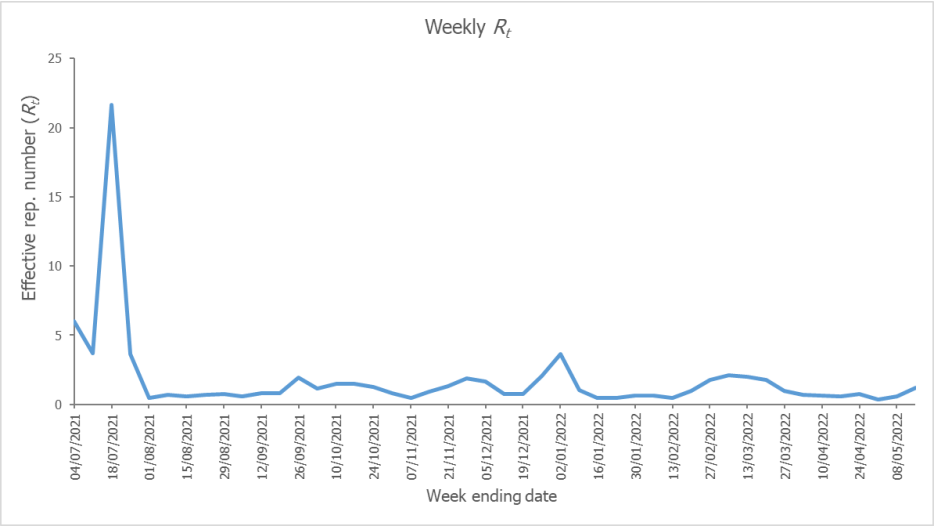


# Effective Reproduction Number ($R_t$)



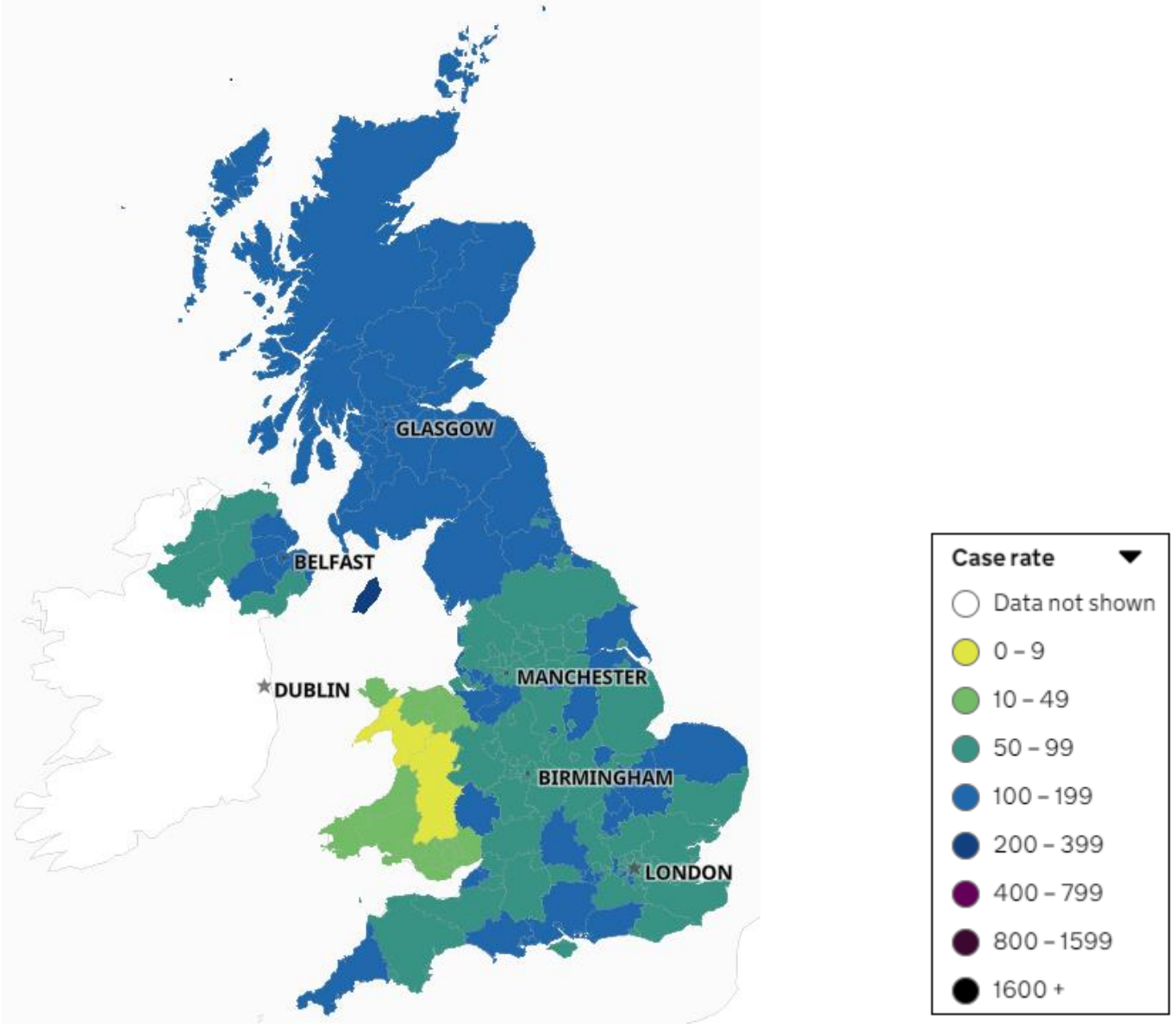

Latest 7 day
$R_t$ = 1.19

- The Effective Reproduction Number ($R_t$) represents the number of secondary infections generated by each case over time 't' (over a week as presented here) and can be dramatically modified by applying effective interventions.
- When $R_t > 1$ there are more new infections than recoveries, thus the number of infected individuals in the population is increasing, while for $R_t < 1$ the number of infected individuals must be decreasing for the opposite reason.
- The calculation of $R_t$ is as follows[1]:

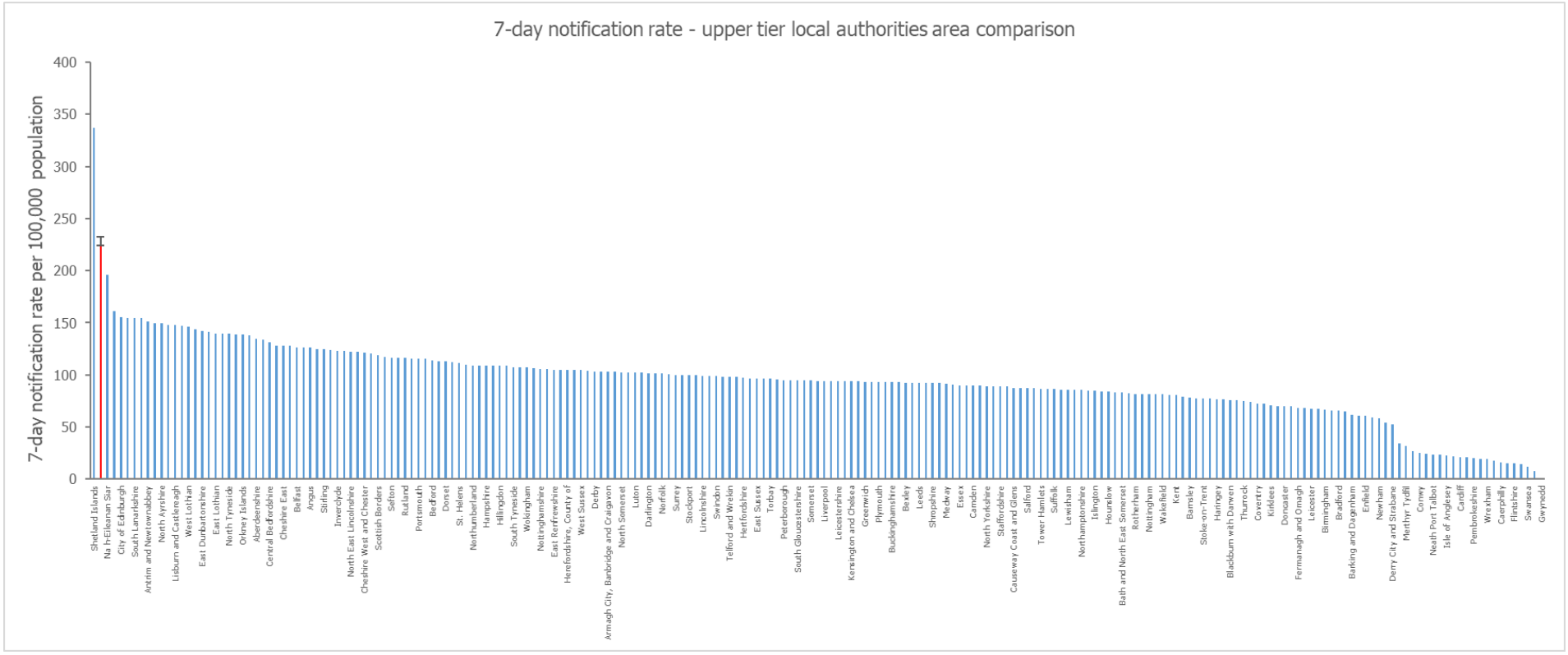
$$R_t\,(t_i) = \frac{\text{New Infections}}{\text{New Recoveries} + \text{New Deaths}}$$

- The UK uses a more complex method of estimating $R_t$ which we are not able to replicate here. The use of this simplified methodology limits the robustness of comparing our $R_t$ value with UK estimates, however it provides a useful comparison between different time periods on Island. New Recoveries is calculated using the presumed 10 day recovery period from positive test result.
- A full table of daily $R_t$ values for the current wave is available in Appendix 1.
- It is worth noting that $R_t$ values, as seen in the daily $R_t$ table (Appendix 1), are sensitive to large fluctuations when daily case numbers are small. Therefore, consideration should be taken of other epidemiological data to gain a true understanding of patterns of spread.

# 7-day Notification Rate Area Comparison

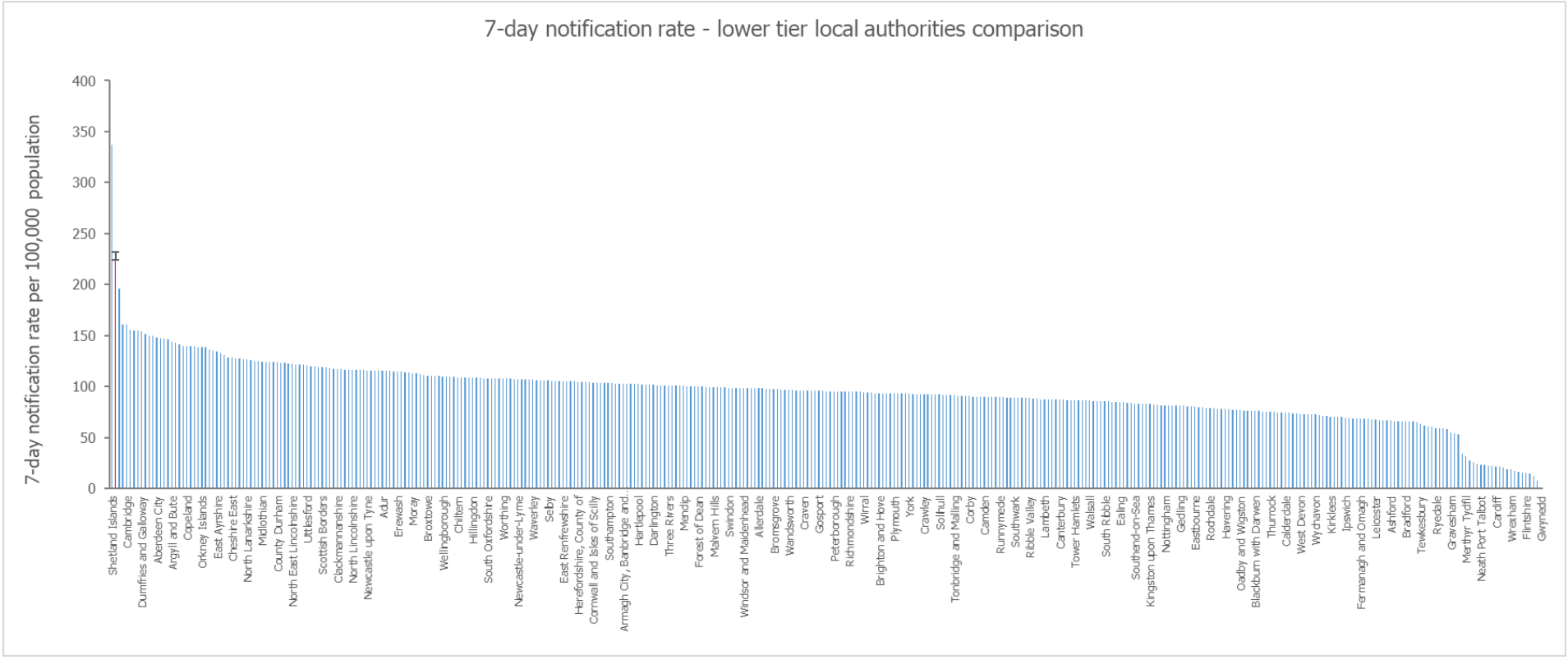


# 7-day Notification Rate – Upper Tier LA Comparison




The Isle of Man (shown in red), has the 2nd highest 7-day notification rate per 100,000 population when included in the upper tier local authorities of the UK. It should be noted that the differences in testing availability on the Isle of Man compared to areas in the UK are likely to impact the 7-day notification rate data.

# 7-day Notification Rate – Lower Tier LA Comparison



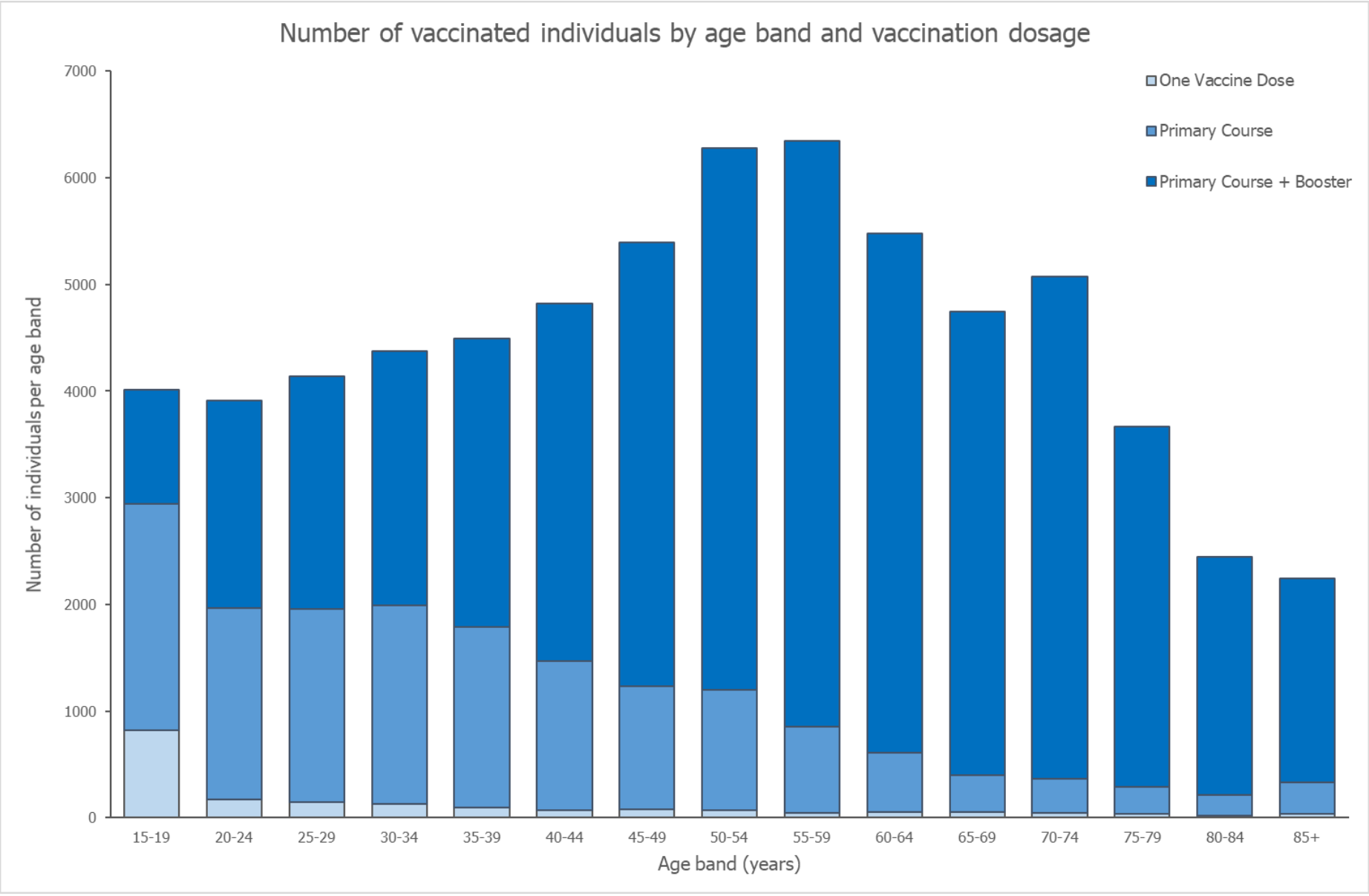

The Isle of Man (shown in red), has the 2nd highest 7-day notification rate per 100,000 population when included in the lower tier local authorities of the UK. It should be noted that the differences in testing availability on the Isle of Man compared to areas in the UK are likely to impact the 7-day notification rate data.

# 14-day Notification Rate Comparison

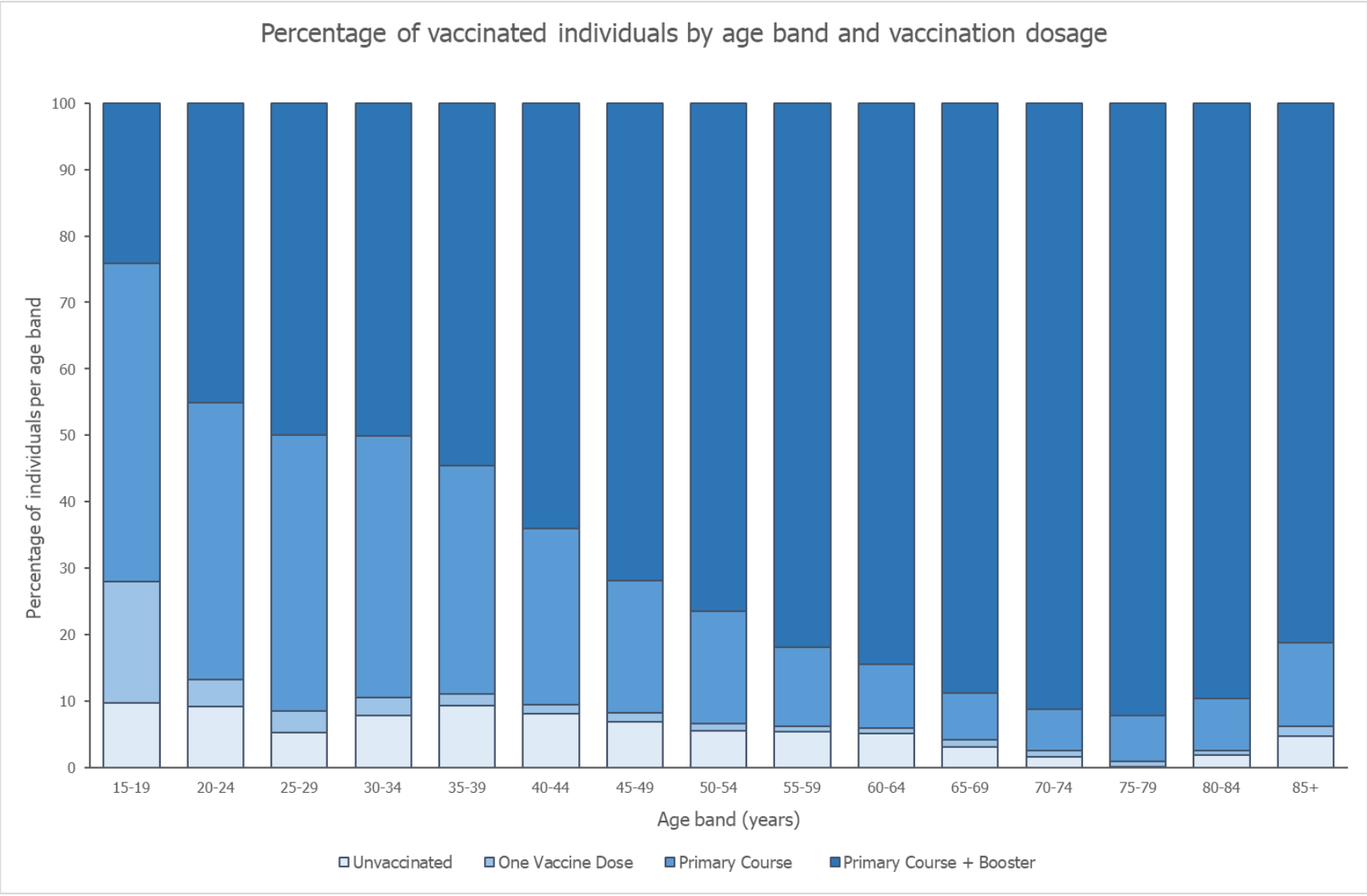
| | | Isle of Man | | | United Kingdom |
|---|---|---|---|---|---|
| Year | Week number | 14 day rate | Lower CI | Upper CI | 14 day rate |
| 2021 | 36 | 617 . 41 | 612 . 23 | 622 . 60 | 727 . 08 |
| | 37 | 565 . 67 | 561 . 04 | 570 . 30 | 663 . 56 |
| | 38 | 660 . 93 | 654 . 07 | 667 . 78 | 643 . 48 |
| | 39 | 766 . 77 | 760 . 65 | 772 . 89 | 691 . 94 |
| | 40 | 874 . 96 | 867 . 84 | 882 . 08 | 778 . 05 |
| | 41 | 1136 . 04 | 1128 . 80 | 1143 . 29 | 805 . 89 |
| | 42 | 1357 . 14 | 1348 . 52 | 1365 . 75 | 852 . 05 |
| | 43 | 1303 . 04 | 1291 . 68 | 1314 . 39 | 936 . 14 |
| | 44 | 878 . 49 | 865 . 69 | 891 . 29 | 776 . 13 |
| | 45 | 666 . 81 | 660 . 02 | 673 . 60 | 697 . 62 |
| | 46 | 785 . 59 | 780 . 35 | 790 . 83 | 798 . 68 |
| | 47 | 1110 . 17 | 1099 . 81 | 1120 . 53 | 860 . 74 |
| | 48 | 1660 . 55 | 1645 . 83 | 1675 . 27 | 909 . 34 |
| | 49 | 1680 . 54 | 1664 . 71 | 1696 . 38 | 988 . 25 |
| | 50 | 1299 . 51 | 1289 . 26 | 1309 . 77 | 1317 . 95 |
| | 51 | 1834 . 60 | 1807 . 69 | 1861 . 52 | - |
| | 52 | 4497 . 13 | 4417 . 01 | 4577 . 25 | 2753 . 48 |
| 2022 | 1 | 5851 . 91 | 5781 . 44 | 5922 . 39 | - |
| | 2 | 4170 . 19 | 4102 . 45 | 4236 . 94 | 2911 . 96 |
| | 3 | 2412 . 03 | 2372 . 78 | 2451 . 28 | 1824 . 83 |
| | 4 | 1561 . 76 | 1542 . 00 | 1581 . 53 | 2008 . 64 |
| | 5 | 1193 . 67 | 1176 . 69 | 1210 . 65 | 1594 . 05 |
| | 6 | 759 . 71 | 747 . 32 | 772 . 11 | 1429 . 55 |
| | 7 | 617 . 41 | 611 . 64 | 623 . 19 | 1179 . 00 |
| | 8 | 830 . 28 | 823 . 86 | 836 . 69 | 791 . 47 |
| | 9 | 1397 . 12 | 1381 . 42 | 1412 . 82 | 939 . 69 |
| | 10 | 2461 . 43 | 2437 . 40 | 2485 . 45 | 1293 . 95 |
| | 11 | 3743 . 30 | 3714 . 64 | 3771 . 95 | 1415 . 20 |
| | 12 | 4267 . 81 | 4230 . 67 | 4304 . 94 | 1357 . 28 |
| | 13 | 3951 . 91 | 3548 . 23 | 3634 . 95 | 1691 . 45 |
| | 14 | 2529 . 64 | 2498 . 87 | 2560 . 41 | 1329 . 78 |
| | 15 | 1760 . 51 | 1741 . 72 | 1779 . 30 | 570 . 02 |
| | 16 | 1364 . 19 | 1349 . 45 | 1378 . 93 | 563 . 56 |
| | 17 | 883 . 20 | 865 . 76 | 900 . 64 | 479 . 31 |
| | 18 | 461 . 00 | 455 . 68 | 466 . 33 | 217 . 36 |
| | 19 | 435 . 13 | 432 . 41 | 437 . 85 | - |

The 14-day rate is calculated by totalling new confirmed cases over the past 14-day period, dividing this number by the total population, and then multiplying by 100,000 to enable area comparisons. It should be noted that differences in testing availability between the Isle of Man and United Kingdom will likely impact the 14-day notification rate data.

# Vaccine Uptake and Coverage

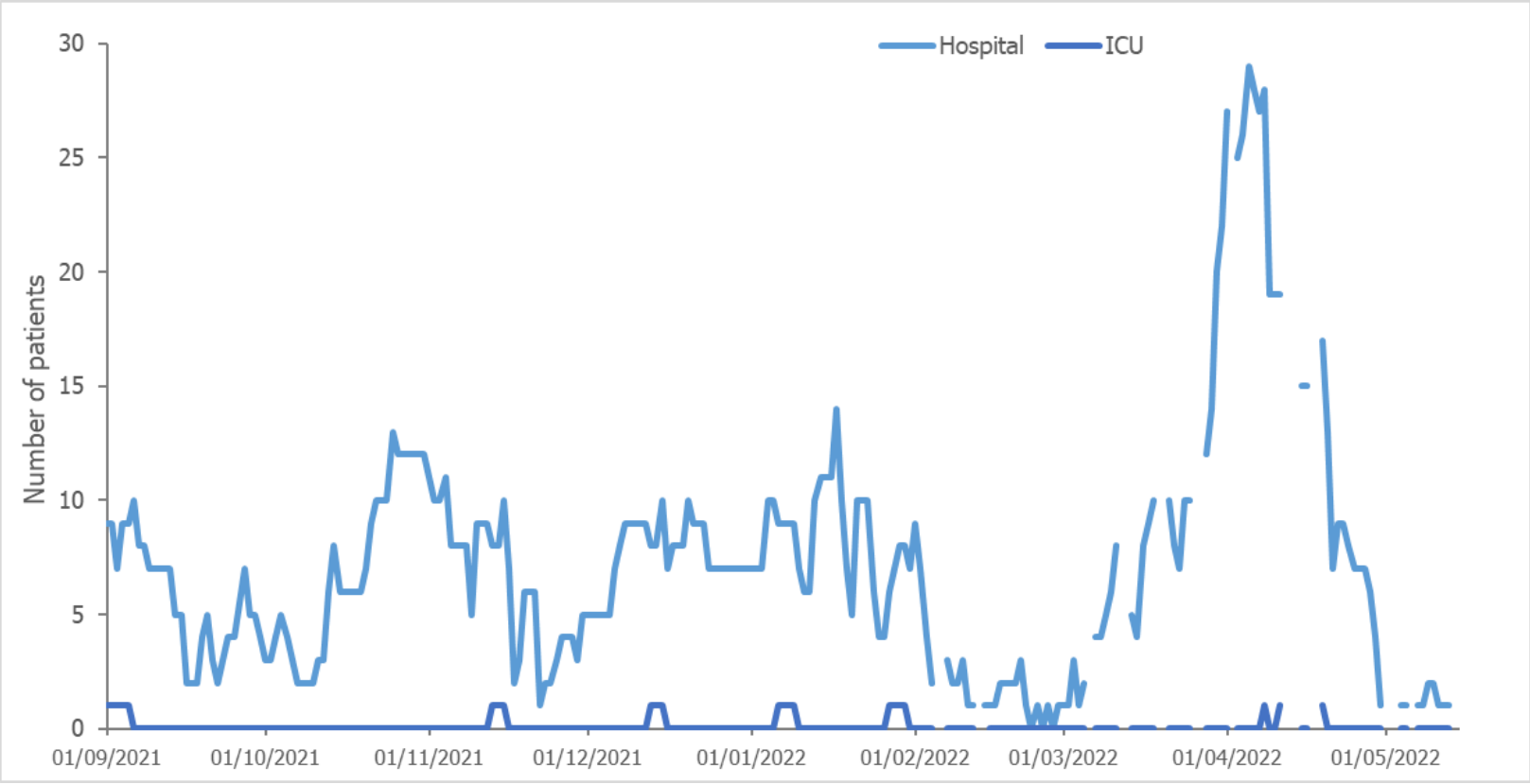


# Vaccine Uptake and Coverage




This data uses the 2021 Census populations as reference for eligible population[3].

# Hospitalised Patients




Patients in hospital with a confirmed COVID-positive status at the time of the daily snapshot, taken at 12pm.

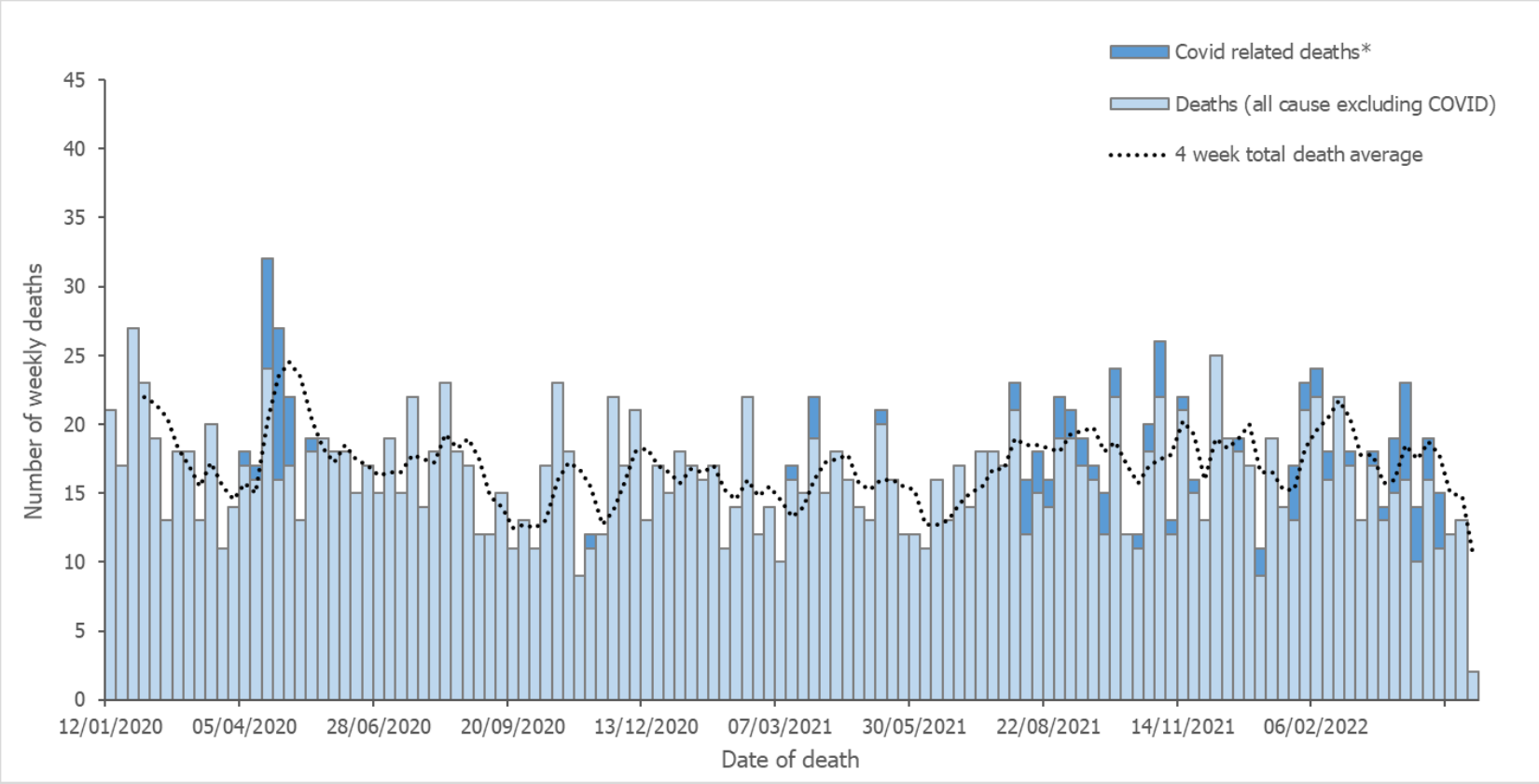
# Hospitalised Patients

Due to small numbers, and the associated caveats and identifiability, data for the Hospital snapshot is not available in this week's report.

# Hospitalised Patients

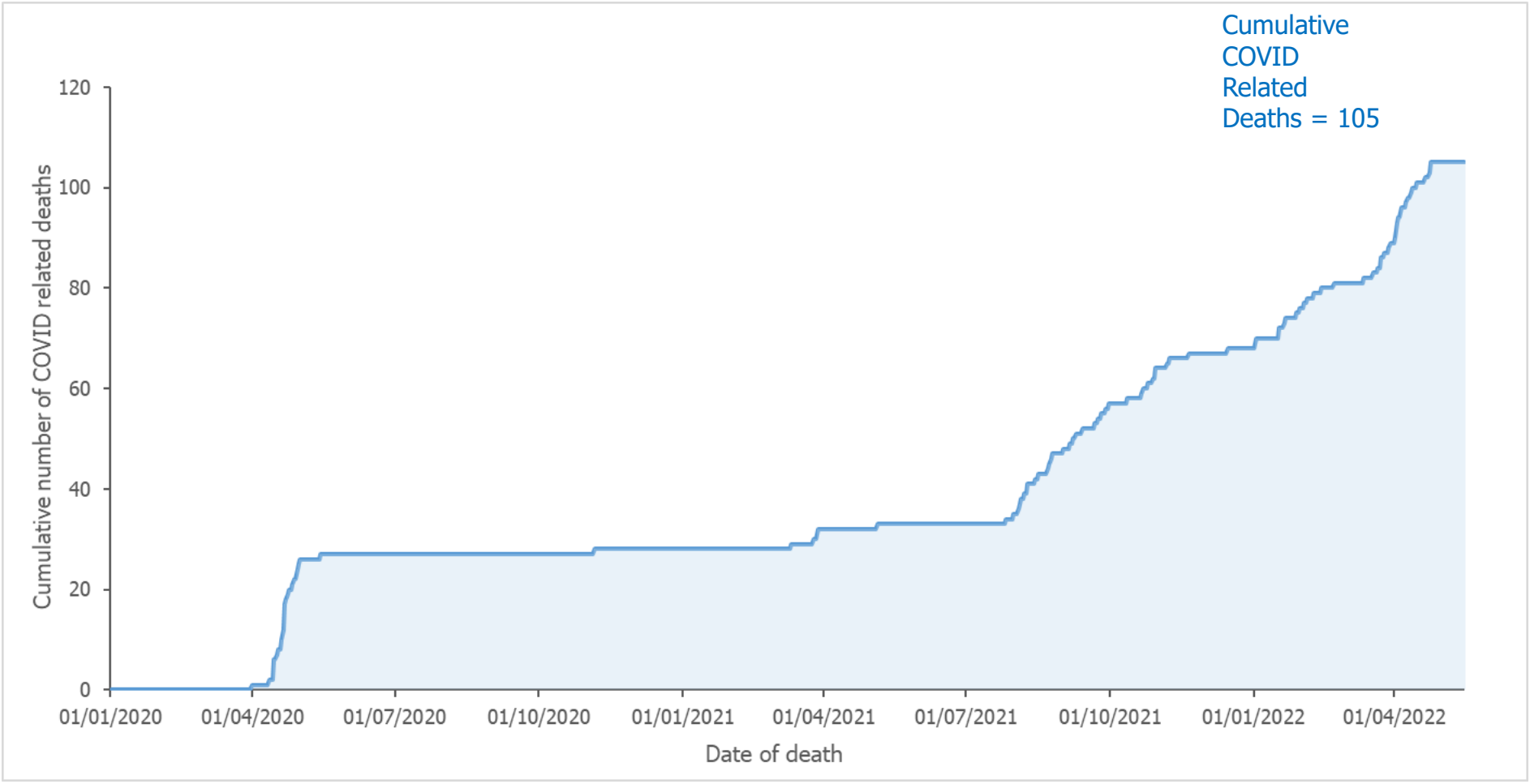
Due to small numbers, and the associated caveats and identifiability, the additional narrative for the Hospital snapshot is not available in this week's report.

# Weekly Deaths – Whole Pandemic

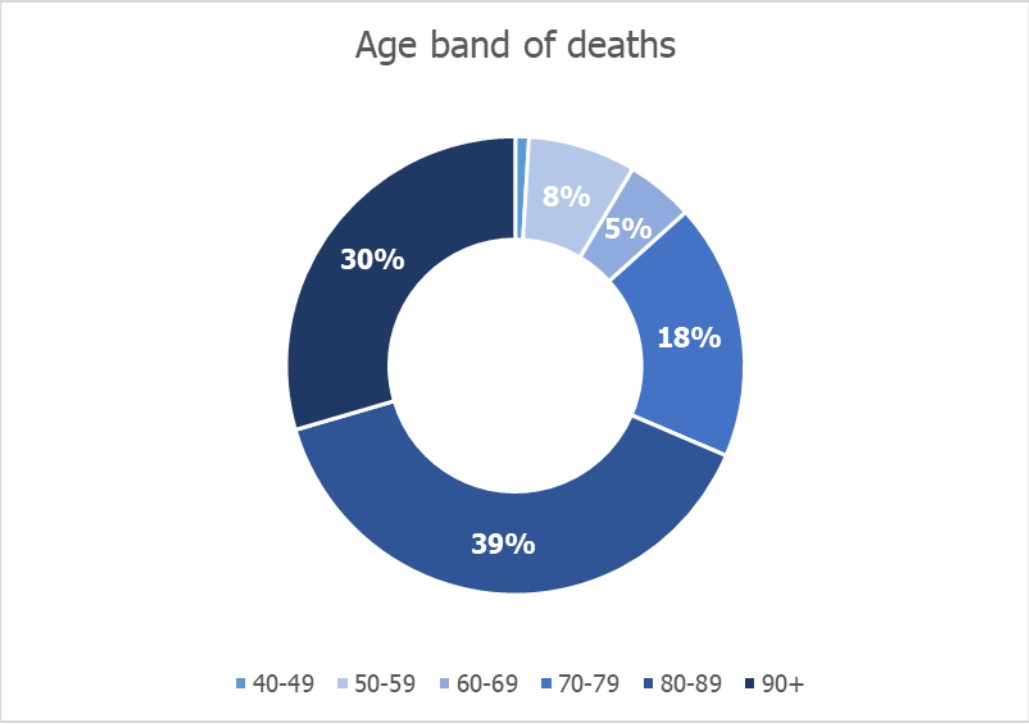



- *COVID related deaths are those where COVID-19 is mentioned **anywhere** within the death certificate.
- **Death registrations are often delayed** and therefore deaths occurring in a given week may not be input into the week of which death occurred until a later date, meaning figures are likely to change retrospectively as data is updated. This also means that the most recent numbers will be incomplete at the time of release, and will update in subsequent reports.
- Cumulative COVID-19 related deaths stands at 105.

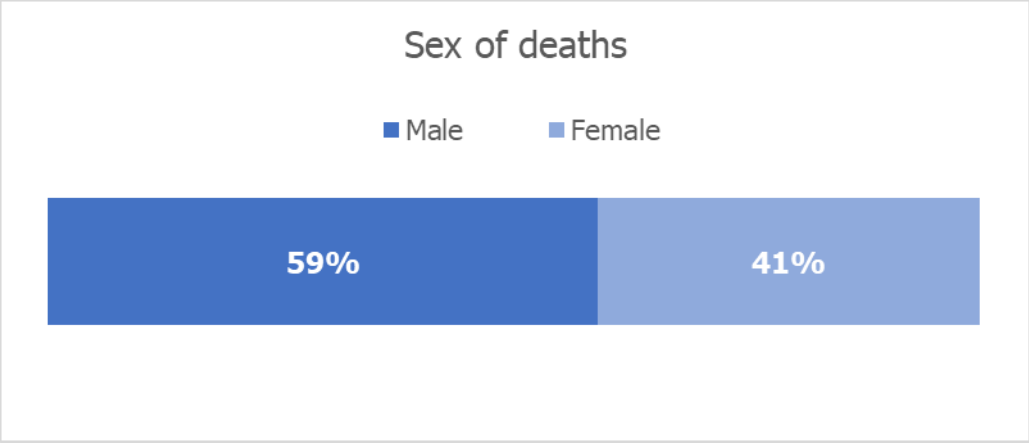
# Cumulative COVID-Related Deaths



# COVID-Related Deaths Overview




| Age band of deaths | No. of deaths | % of total deaths |
|---|---|---|
| 40-49 | 1 | 1.0% |
| 50-59 | 8 | 7.6% |
| 60-69 | 5 | 4.8% |
| 70-79 | 19 | 18.1% |
| 80-89 | 41 | 39.0% |
| 90+ | 31 | 29.5% |




| Place of death | No. of deaths |
|---|---|
| Hospital | 51 |
| Hospice | 4 |
| Nursing/Residential Home | 41 |
| Domestic Property | 9 |

# Arrivals Testing

From the 1st April, arrivals testing requirements are as follows:

As of 1 April 2022 there are no travel related restrictions on the Isle of Man.

You **do not** need to:

- complete a travel declaration form before you travel to the Isle of Man from abroad
- take any COVID-19 tests before you travel or after you arrive
- isolate when you arrive

This applies whether you are vaccinated or not.

Other countries may have rules about what you need to do to leave the country to travel to UK/ Isle of Man. You should check travel advice for the country you are travelling from.

# Definitions

**Vaccination Status**

- One dose = those who have received only one dose
- Primary Course = those who have received a full course (two or three dose). Third dose, those with immunosuppression only.
- Primary Course + Booster = a full course plus a booster

# Appendix 1

| Date | Daily $R_t$ | Date | Daily $R_t$ | Date | Daily $R_t$ | Date | Daily $R_t$ | Date | Daily $R_t$ | Date | Daily $R_t$ | Date | Daily $R_t$ | Date | Daily $R_t$ | Date | Daily $R_t$ | Date | Daily $R_t$ | Date | Daily $R_t$ | Date | Daily $R_t$ | Date | Daily $R_t$ | Date | Daily $R_t$ | Date | Daily $R_t$ | Date | Daily $R_t$ | Date | Daily $R_t$ | Date | Daily $R_t$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 01-Jul | 6.00 | 20-Jul | 11.67 | 08-Aug | 0.67 | 27-Aug | 0.54 | 15-Sep | 1.63 | 04-Oct | 1.76 | 23-Oct | 0.99 | 11-Nov | 0.61 | 30-Nov | 2.74 | 19-Dec | 0.60 | 07-Jan | 0.86 | 26-Jan | 0.67 | 14-Feb | 0.92 | 05-Mar | 1.20 | 24-Mar | 0.71 | 12-Apr | 0.90 | 01-May | 0.28 |
| 02-Jul | 2.67 | 21-Jul | 13.14 | 09-Aug | 0.73 | 28-Aug | 0.79 | 16-Sep | 0.59 | 05-Oct | 1.14 | 24-Oct | 0.67 | 12-Nov | 0.67 | 01-Dec | 3.12 | 20-Dec | 1.43 | 08-Jan | 0.30 | 27-Jan | 0.46 | 15-Feb | 1.34 | 06-Mar | 1.57 | 25-Mar | 0.70 | 13-Apr | 0.79 | 02-May | 0.63 |
| 03-Jul | 6.00 | 22-Jul | 9.55 | 10-Aug | 0.64 | 29-Aug | 0.34 | 17-Sep | 0.70 | 06-Oct | 2.24 | 25-Oct | 1.09 | 13-Nov | 0.77 | 02-Dec | 2.19 | 21-Dec | 1.69 | 09-Jan | 0.31 | 28-Jan | 0.56 | 16-Feb | 1.37 | 07-Mar | 3.96 | 26-Mar | 0.56 | 14-Apr | 0.69 | 03-May | 0.50 |
| 04-Jul | 5.00 | 23-Jul | 1.13 | 11-Aug | 0.76 | 30-Aug | 0.51 | 18-Sep | 0.86 | 07-Oct | 1.13 | 26-Oct | 1.13 | 14-Nov | 1.05 | 03-Dec | 1.38 | 22-Dec | 3.85 | 10-Jan | 0.77 | 29-Jan | 0.53 | 17-Feb | 0.70 | 08-Mar | 2.77 | 27-Mar | 0.57 | 15-Apr | 0.49 | 04-May | 0.38 |
| 05-Jul | 7.00 | 24-Jul | 1.56 | 12-Aug | 0.63 | 31-Aug | 0.78 | 19-Sep | 0.64 | 08-Oct | 1.89 | 27-Oct | 1.59 | 15-Nov | 2.59 | 04-Dec | 0.65 | 23-Dec | 1.88 | 11-Jan | 0.76 | 30-Jan | 0.63 | 18-Feb | 1.16 | 09-Mar | 3.18 | 28-Mar | 1.17 | 16-Apr | 0.37 | 05-May | 0.44 |
| 06-Jul | 0.67 | 25-Jul | 1.35 | 13-Aug | 0.48 | 01-Sep | 0.68 | 20-Sep | 2.00 | 09-Oct | 1.15 | 28-Oct | 0.71 | 16-Nov | 2.15 | 05-Dec | 1.11 | 24-Dec | 2.00 | 12-Jan | 0.55 | 31-Jan | 1.48 | 19-Feb | 0.87 | 10-Mar | 1.44 | 29-Mar | 1.20 | 17-Apr | 0.45 | 06-May | 0.73 |
| 07-Jul | 7.00 | 26-Jul | 0.47 | 14-Aug | 0.40 | 02-Sep | 0.66 | 21-Sep | 3.62 | 10-Oct | 1.85 | 29-Oct | 0.66 | 17-Nov | 2.10 | 06-Dec | 1.20 | 25-Dec | 1.43 | 13-Jan | 0.35 | 01-Feb | 1.22 | 20-Feb | 1.03 | 11-Mar | 1.41 | 30-Mar | 0.83 | 18-Apr | 1.25 | 07-May | 0.78 |
| 08-Jul | 6.00 | 27-Jul | 0.52 | 15-Aug | 0.65 | 03-Sep | 0.77 | 22-Sep | 1.52 | 11-Oct | 2.74 | 30-Oct | 0.44 | 18-Nov | 0.87 | 07-Dec | 1.24 | 26-Dec | 2.62 | 14-Jan | 0.27 | 02-Feb | 1.03 | 21-Feb | 2.37 | 12-Mar | 1.35 | 31-Mar | 0.34 | 19-Apr | 1.90 | 08-May | 0.63 |
| 09-Jul | 7.00 | 28-Jul | 0.86 | 16-Aug | 0.63 | 04-Sep | 0.44 | 23-Sep | 1.09 | 12-Oct | 1.97 | 31-Oct | 0.43 | 19-Nov | 0.88 | 08-Dec | 1.48 | 27-Dec | 4.38 | 15-Jan | 0.33 | 03-Feb | 0.31 | 22-Feb | 3.05 | 13-Mar | 2.15 | 01-Apr | 0.75 | 20-Apr | 0.59 | 09-May | 1.32 |
| 10-Jul | 2.57 | 29-Jul | 0.48 | 17-Aug | 0.81 | 05-Sep | 0.33 | 24-Sep | 2.33 | 13-Oct | 3.03 | 01-Nov | 0.94 | 20-Nov | 1.00 | 09-Dec | 0.86 | 28-Dec | 5.16 | 16-Jan | 0.50 | 04-Feb | 0.57 | 23-Feb | 3.05 | 14-Mar | 2.90 | 02-Apr | 0.35 | 21-Apr | 0.66 | 10-May | 2.07 |
| 11-Jul | 3.50 | 30-Jul | 0.45 | 18-Aug | 0.56 | 06-Sep | 1.07 | 25-Sep | 2.33 | 14-Oct | 1.23 | 02-Nov | 0.53 | 21-Nov | 1.14 | 10-Dec | 0.51 | 29-Dec | 10.12 | 17-Jan | 0.71 | 05-Feb | 0.32 | 24-Feb | 1.17 | 15-Mar | 3.99 | 03-Apr | 0.54 | 22-Apr | 0.51 | 11-May | 1.38 |
| 12-Jul | 2.75 | 31-Jul | 0.31 | 19-Aug | 0.92 | 07-Sep | 1.05 | 26-Sep | 1.32 | 15-Oct | 0.96 | 03-Nov | 0.64 | 22-Nov | 2.16 | 11-Dec | 0.48 | 30-Dec | 4.82 | 18-Jan | 0.73 | 06-Feb | 0.36 | 25-Feb | 1.15 | 16-Mar | 3.41 | 04-Apr | 0.79 | 23-Apr | 0.53 | 12-May | 1.13 |
| 13-Jul | 13.33 | 01-Aug | 0.45 | 20-Aug | 0.80 | 08-Sep | 1.32 | 27-Sep | 1.89 | 16-Oct | 1.43 | 04-Nov | 0.50 | 23-Nov | 2.53 | 12-Dec | 0.36 | 31-Dec | 4.15 | 19-Jan | 0.76 | 07-Feb | 0.91 | 26-Feb | 1.61 | 17-Mar | 1.55 | 05-Apr | 0.93 | 24-Apr | 0.47 | 13-May | 0.96 |
| 14-Jul | 19.60 | 02-Aug | 1.22 | 21-Aug | 0.64 | 09-Sep | 1.17 | 28-Sep | 1.42 | 17-Oct | 1.07 | 05-Nov | 0.24 | 24-Nov | 2.45 | 13-Dec | 0.82 | 01-Jan | 1.41 | 20-Jan | 0.28 | 08-Feb | 0.48 | 27-Feb | 1.49 | 18-Mar | 1.37 | 06-Apr | 0.92 | 25-Apr | 0.75 | 14-May | 0.90 |
| 15-Jul | 17.86 | 03-Aug | 0.80 | 22-Aug | 0.66 | 10-Sep | 0.47 | 29-Sep | 2.17 | 18-Oct | 1.36 | 06-Nov | 0.26 | 25-Nov | 1.74 | 14-Dec | 1.27 | 02-Jan | 2.38 | 21-Jan | 0.30 | 09-Feb | 0.66 | 28-Feb | 3.44 | 19-Mar | 0.81 | 07-Apr | 0.51 | 26-Apr | 0.69 | 15-May | 0.96 |
| 16-Jul | 150.50 | 04-Aug | 0.51 | 23-Aug | 0.93 | 11-Sep | 0.38 | 30-Sep | 0.74 | 19-Oct | 1.91 | 07-Nov | 0.31 | 26-Nov | 1.60 | 15-Dec | 0.74 | 03-Jan | 2.80 | 22-Jan | 0.32 | 10-Feb | 0.41 | 01-Mar | 3.82 | 20-Mar | 1.25 | 08-Apr | 0.43 | 27-Apr | 0.55 | | |
| 17-Jul | 25.57 | 05-Aug | 0.68 | 24-Aug | 1.08 | 12-Sep | 0.62 | 01-Oct | 0.49 | 20-Oct | 2.21 | 08-Nov | 0.95 | 27-Nov | 1.52 | 16-Dec | 0.68 | 04-Jan | 4.74 | 23-Jan | 0.38 | 11-Feb | 0.32 | 02-Mar | 3.27 | 21-Mar | 2.22 | 09Apr | 0.37 | 28-Apr | 0.25 | | |
| 18-Jul | 17.67 | 06-Aug | 0.99 | 25-Aug | 0.78 | 13-Sep | 0.71 | 02-Oct | 1.06 | 21-Oct | 1.73 | 09-Nov | 1.28 | 28-Nov | 1.60 | 17-Dec | 0.73 | 05-Jan | 1.74 | 24-Jan | 1.05 | 12-Feb | 0.33 | 03-Mar | 1.55 | 22-Mar | 1.60 | 10-Apr | 0.73 | 29-Apr | 0.19 | | |
| 19-Jul | 18.57 | 07-Aug | 0.38 | 26-Aug | 0.80 | 14-Sep | 0.82 | 03-Oct | 1.20 | 22-Oct | 0.86 | 10-Nov | 1.13 | 29-Nov | 2.09 | 18-Dec | 0.50 | 06-Jan | 1.03 | 25-Jan | 0.77 | 13-Feb | 0.44 | 04-Mar | 1.80 | 23-Mar | 1.44 | 11-Apr | 0.52 | 30-Apr | 0.23 | | |

# Appendix 2 - Environmental surveillance

Environmental surveillance – or wastewater-based epidemiology (WBE) – has been a widely used tool as part of a range of surveillance systems during the COVID-19 pandemic.

Studies of some of the first COVID-19 cases found the presence of SARS-CoV-2 RNA in the faeces of patients, and studies have found SARS-CoV-2 in the faeces of both symptomatic and asymptomatic individuals.

WBE has the potential to detect changes in the circulation of a pathogen in a population before syndromic-based surveillance systems identify cases.

The use of WBE in surveillance of viral pathogens is an emerging science, and in this pilot study between the Government of The Isle of Man and the London School of Hygiene and Tropical Medicine (LSHTM), we are exploring how WBE could be used to monitor levels of viruses which can have significant public health impact, in a proof-of-principle study.

# Appendix 2 - WBE for viral pathogens pilot study

Wastewater samples are collected four days per week at a collection site on Isle of Man and transported to LSHTM for testing.

Samples are concentrated by filtration and then assayed using reverse-transcription polymerase chain reaction (RT-PCR)-based methods for the presence of viral genomic material (RNA) of a panel of pathogens (SARS-CoV-2, enteroviruses, influenza virus and norovirus).

The amount of viral RNA for each pathogen in the sample tested is estimated by comparison with a quantitative standard, and from this virus genome copies per litre of wastewater is estimated mathematically.

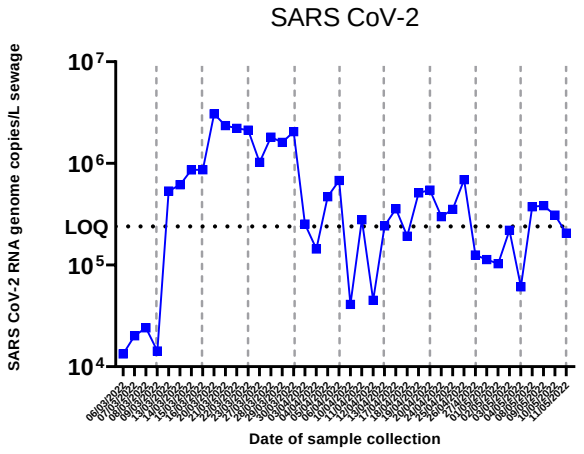
# Appendix 2 - Data update

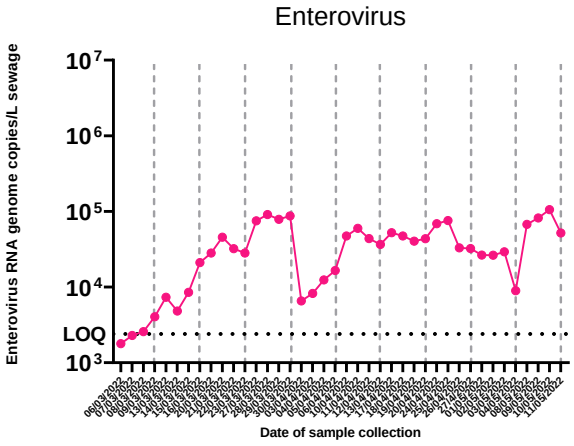
Data presented for samples collected over nine weeks, between 06/03/2022 – 11/05/2022.

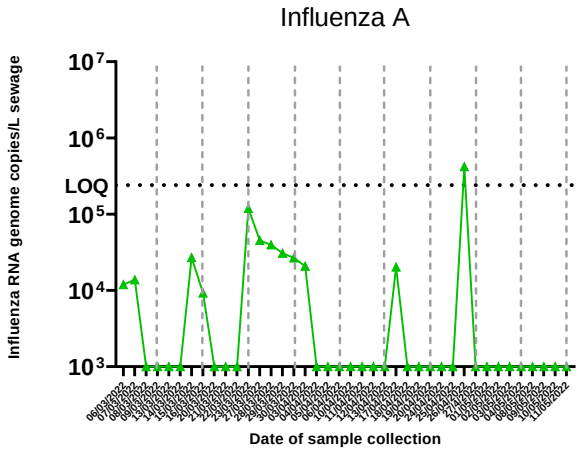
SARS-CoV-2 RNA remains detectable in Week 10 (w/c 08/05/2022) at levels above the limit of quantitation (LOQ) of the assay.

Enterovirus RNA remains detectable above the LOQ, at a consistent level in Week 10 (w/c 08/05/2022).

Influenza virus RNA remains below the LOQ in Week 10 (w/c 08/05/2022).



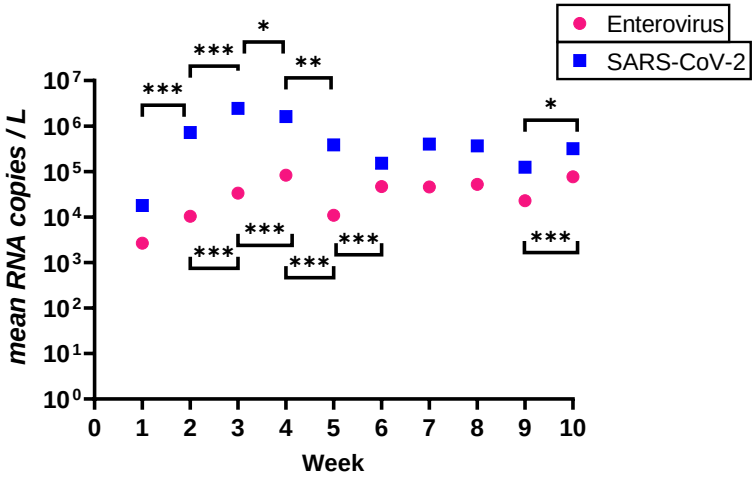



# Appendix 2 - Data update

Monitoring RNA levels in wastewater is inherently stochastic and dependent on multiple factors. To gauge the trend in the changes observed, the weekly mean levels have been compared.

There has been a statistically significant increase ($p<0.05$) in SARS-CoV-2 RNA in Week 10 compared to Week 9.

There has been a statistically significant increase ($p<0.005$) in enterovirus RNA in Week 10 compared to Week 9.



# Appendix 2 - WBE for viral pathogens pilot study

The data and analysis presented here is preliminary, and based on techniques that are in-development. This data has not been peer-reviewed. As such the final data and its interpretation may change following further analyses.

Through this pilot study, we aim to understand more about how WBE is used in monitoring viral pathogens, validating the methods used, and understand for which pathogens the technology is most valid.

Alongside continuing to monitor levels of viral RNA in wastewater samples and provide technical validation of these methods in an applied context, this study will determine the usefulness of sequencing-based methods to characterise virus types detected in the samples, and working with specialists in modelling, how this data can be used to infer relationships between cases and genome detection in wastewater.

# Appendix 2 – References


[1] M. Morvan, A. Lojacomo, C. Souque, M. Wade, T. Hoffmann, K. Pouwels, A. Singer, J. Bunce, A. Engeli, J. Grimsley, K. O'Reilly, L. Danon, Estimating SARS-CoV-2 prevalence from large-scale wastewater surveillance: insights from combined analysis of 44 sites in England. International Journal of Infectious Diseases, Volume 116, Supplement, 2022. doi.org/10.1016/j.ijid.2021.12.057.

[2] Fitzgerald SF, Rossi G, Low AS, et al. Site Specific Relationships between COVID-19 Cases and SARS-CoV-2 Viral Load in Wastewater Treatment Plant Influent. Environ Sci Technol. 2021;55(22):15276-15286. doi:10.1021/acs.est.1c05029

# References


[1] Contreras, S., Villavicencio, H. A., Medina-Ortiz, D., Saavedra, C. P., & Olivera-Nappa, Á. (2020). Real-Time Estimation of $R_t$ for Supporting Public-Health Policies Against COVID-19. *Frontiers in public health*, *8*, 556689. https://doi.org/10.3389/fpubh.2020.556689

[2] Jansen, L., Tegomoh, B., Lange, K., Showalter, K., Figliomeni, J., Abdalhamid, B., Iwen, P. C., Fauver, J., Buss, B., & Donahue, M. (2021). Investigation of a SARS-CoV-2 B.1.1.529 (Omicron) Variant Cluster - Nebraska, November-December 2021. MMWR. Morbidity and mortality weekly report, 70(5152), 1782–1784. https://doi.org/10.15585/mmwr.mm705152e3

[3] https://www.gov.im/media/1375604/2021-01-27-census-report-part-i-final-2.pdf

# Data Disclaimer

While we have used reasonable efforts to ensure the accuracy of the data used within this report, data may be subject to change and historical amendment as new systems become established.

The quality of data provided to Public Health by other organisations is the responsibility of the originating organisation.