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COVIDWATCHEU-NPA

The COVID-19 pandemic in North Western Europe: Lessons learned from the public health responses and pandemic outcomes in the Northern Periphery and Arctic (NPA) programme countries and regions



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1 Introduction

1.1 Region description

The Northern Periphery and Arctic 2014-2020 Programme forms a cooperation between 9 programme partner countries; the Member States of Finland, Ireland, Sweden and the United Kingdom (Scotland and Northern Ireland) in cooperation with the Faroe Islands, Iceland, Greenland and Norway. The programme area encompasses the Euro-Arctic zone, parts of the Atlantic zone and parts of the Barents region, neighbouring on Canada in the West and Russia in the East.

Despite geographical differences, the large programme area shares a number of common features, such as low population density, low accessibility, low economic diversity, abundant natural resources, and high impact of climate change. This unique combination of features results in joint challenges and joint opportunities that can best be overcome and realised by transnational cooperation.

The Northern Periphery and Arctic 2014-2020 Programme is part of the European Territorial Cooperation Objective, also known as Interreg, in the framework of the cohesion policy, supported by the European Regional Development Fund. The programme operates in a multi-layered policy landscape, making it well positioned to contribute to and align with the Europe 2020 Strategy, national and regional policies and development strategies, macro regional and sea basin strategies, and other programmes covering parts of the geographical area.

1.2 Data sources

The information provided in this report is based on the following key open data sources:

- <u>https://ec.europa.eu/eurostat/en/data/database</u>
- <u>https://www.google.com/covid19/</u>
- <u>https://www.statista.com/statistics/1043366/novel-coronavirus-2019ncov-cases-worldwide-by-country/</u>
- <u>https://data.humdata.org/dataset/novel-coronavirus-2019-ncov-cases</u>
- <u>https://api.coronavirus.data.gov.uk</u>
- <u>https://data.gov.ie/blog/coronavirus-covid-19</u>
- <u>https://www.nidirect.gov.uk/campaigns/coronavirus-covid-19</u>
- <u>https://www.gov.scot/publications/coronavirus-covid-19-trends-in-daily-data/</u>
- <u>https://thl.fi/en/web/infectious-diseases-and-vaccinations/what-s-new/coronavirus-covid-19-latest-updates/situation-update-on-coronavirus</u>

- <u>https://www.folkhalsomyndigheten.se/the-public-health-agency-of-sweden/communicable-disease-control/covid-19/</u>
- https://www.regjeringen.no/en/topics/koronavirus-covid-19/id2692388/
- <u>https://corona.fo/statistics</u>
- <u>https://www.covid.is/data</u>
- <u>https://visitgreenland.com/articles/corona-virus-status/</u>
- https://opendata.ecdc.europa.eu/covid19/testing/csv/

In addition, verified information from news' articles, consultancy documents and other national and regional reports were also used to draw on the most current and detailed information available on the NPA regions and countries at the time of writing this report. The data on the number of cases and deaths associated with COVID-19 refers to those known and reported at the end of the first week of January 2021.

1.3 Population profiles of NPA Region

COVID-19 is an infectious disease dependent on our close contact with one another. As was observed with the original SARS coronavirus in 2003/04, urban areas are prone to more rapid viral spread [1, 2]. Accordingly, it is reasonable to hypothesize that the low population density of many NPA regions may confer some benefit in halting spread of this pathogen.

Table 1 outlines some relevant features of the countries examined herein, ranked by population density. As age has such relevance to relative risk of serious illness due to COVID-19 [3], population proportion over the age of 60yrs is highlighted. Obesity, which increases risk of severe complications and death from COVID-19 by 40-50% [4, 5], is also included.

Table 1: Country profiles

| COUNTRY (by Population density) | Area (km2) | Population (persons) | Population density (persons/km2) | Proportion Female (%) | Median Age (yrs) | Population > 60 yrs (%) [GRADED] | Population < 25yrs (%) | Obesity (%) | Life Expectancy (yrs) |
|---------------------------------------|------------|-------------------------|--|--------------------------|---------------------|--|------------------------|----------------|--------------------------|
| | | (projected 2020) | (projected 2020) | (projected 2020) | (projected 2020) | (projected 2020) | (projected 2020) | (2019) | (2018) |
| Greenland | 2,166,086 | 57,616 | 0.1 | 46.0% | 34.3 | 10.4% | 35.3% | 28.0% | 73.4 |
| Iceland | 100,450 | 367,158 | 3.6 | 48.6% | 37.1 | 14.5% | 34.3% | 18.3% | 82.9 |
| Norway | 309,158 | 5,385,544 | 17.2 | 49.6% | 39.5 | 17.7% | 30.6% | 12.8% | 82.8 |
| Finland | 304,316 | 5,538,335 | 18.1 | 50.6% | 42.8 | 22.5% | 27.8% | 17.9% | 81.8 |
| Sweden | 407,300 | 10,371,764 | 25.1 | 49.7% | 41.1 | 20.0% | 30.5% | 13.7% | 82.6 |
| Faroe Islands | 1,393 | 48,678 | 35.0 | 45.6% | 37.2 | 17.4% | 33.6% | 13.0% | 80.8 |
| Scotland | 77,903 | 5,454,240 | 70.0 | 51.3% | 42.0 | 19.0% | 27.5% | 28.0% | 79.3 |
| Ireland | 68,655 | 4,871,772 | 71.4 | 50.5% | 37.8 | 14.6% | 32.3% | 18.2% | 82.3 |
| Northern Ireland | 13,798 | 1,885,190 | 136.6 | 50.8% | 38.9 | 16.6% | 31.9% | 27.0% | 80.9 |

1.4 Testing strategies

Assessment of burden of COVID-19 in each country will depend on how effectively countries can detect COVID-19 infection and spread. The standard method for diagnosis of SARS-CoV-2 infection remains a nucleic acid real-time polymerase chain reaction (PCR) test performed on a nasal and throat swab sample [6].

Table 2 describes the process involved when citizens from each country require testing for SARS-CoV-2. All countries have recognised the necessity to provide testing free-of-charge to citizens, although there are some differences in how a citizen in each country can obtain a test.

While many countries applied relatively strict criteria surrounding foreign travel early in the pandemic, only testing people with a history of travel to Northern Italy for example [7], approaches quickly changed to a more inward-looking approach as it became clear this virus was spreading across all regions.

However, regional considerations are again coming back into the fold given emergence of newer more infectious strains with origins in Brazil, South Africa and England [8].

Table 2: Testing Strategies and Systems

| COUNTRY (alphabetical order) | Who organises the test? | Testing criteria | Cost |
|---------------------------------|---|---|---|
| Faroe Islands | Self referral online or GP referral | Symptomatic | Free to patients, Charge of DK 312 to travellers upon arrival |
| Finland | GP referral/Referral through remote online GP (Omaolo service) | Symptomatic as per assessment in Omaolo service or GP | Free to patient |
| Greenland | Self-referral online | Anyone over > 2 years old. Can be symptomatic or symptoms-free. | Free to patient |
| Iceland | Self referral online | Symptomatic and asymptomatic people. Travellers from abroad. | Free to patient |
| Ireland | GP referral | Initially quite tight criteria (foreign travel etc). Since April 2020 "any cough, fever > 38, loss taste/smell, shortness of breath". | Free to patient |
| Northern Ireland | Self-referral online for at home testing kit or in-person testing site | Symptomatic (high temp, new continuous cough, loss of or change in sense of smell or taste) Asked by local authorities Taking part in government pilot project Test to confirm positive result | Free to patient |
| Norway | Self referral online, if unable to use the online service, can call GP for referral or use coronavirus hotline | Symptomatic Been abroad in red countries Close contact Requested by city of Oslo (connection with ongoing outbreak) | Free to patient |
| Scotland | Self-referral online for at home testing kit or in-person testing site | Symptomatic (high temp, new continuous cough, loss of or change in sense of smell or taste) Asked by local authorities Taking part in government pilot project Test to confirm positive result | Free to patient |
| Sweden | Region specific. Some regions require referral from health centre, others provide online self-referral services | Symptomatic adults or children >6 years old | Free to patient |

1.5 COVID-19 Death definitions

Assessment of COVID-19 mortality in each country will depend on how each country records deaths from COVID-19. While this may appear obvious, there are a number of ways that countries have decided to define a death from COVID-19. The World Health Organisation have advocated a broad approach where deaths from probable COVID-19 are included in official statistics [13].

Table 3 outlines how the various countries define a death from COVID-19 infection. This is important as differing methods of counting will lead to differing assessments of healthcare system impact of the pandemic.

Table 3: COVID-19 Deaths Definition

| COUNTRY (alphabetical order) | Death Definition | Date Applied |
|---------------------------------|--|--------------|
| Faroes | Confirmed COVID-19 case followed by clinically compatible illness. | Aug-20 |
| Finland | Confirmed COVID-19 case followed by clinically compatible illness. | Aug-20 |
| Greenland | Confirmed COVID-19 case followed by clinically compatible illness. | Aug-20 |
| Iceland | Confirmed COVID-19 case followed by clinically compatible illness. | Aug-20 |
| Ireland | Death data includes death in confirmed/probable/possible cases of COVID-19. | Apr-20 |
| Northern Ireland | Death with positive COVID-19 PCR test within previous 28 days. | Mar-20 |
| Norway | Confirmed COVID-19 case followed by clinically compatible illness. | Aug-20 |
| Scotland | Confirmed COVID-19 death if death occurs within 28 days of first positive COVID-19 death | Jul-20 |
| Sweden | Confirmed COVID-19 case followed by clinically compatible illness. | Aug-20 |

Ireland is something of an outlier amongst the countries examined as since April 2020 official figures have featured "probable" deaths from COVID-19 in accordance with WHO guidelines. These deaths can be registered without a history of a COVID-19 positive swab PCR result. Nursing home outbreaks where patients and their families have decided hospitalisation and/or swabbing is not warranted make up the majority of these probable deaths.

On the other hand, Northern Ireland and Scotland (and indeed England and Wales) have employed a stricter definition of a COVID-19 death only being recorded if a positive swab result was obtained in the preceding 28 days. This has led to a significant underreporting of mortality from COVID-19 in the UK, particularly early in the pandemic, when testing systems were being established [9] (see Section "Excess Deaths").

2 COVID-19 Testing, Cases, Deaths Data

2.1 Introduction

Direct comparison of nationally reported figures of COVID-19 cases and deaths is not appropriate when we are trying to compare countries' responses to this pandemic. This is largely due to the differences between countries in testing availability, testing criteria and differences in mortality case definitions and reporting as outlined in Section 1. In addition, some if not all of these criteria have evolved in each country as the pandemic unfolded which introduces further complexity. If these aspects of each country's response were all uniform, we might expect less variance in how much damage COVID-19 is doing in different countries.

Furthermore, certain factors, such as age, obesity, co-morbidity and ethnicity confer additional risks for those infected with SARS-CoV-2, and these will be more or less relevant in different countries due to their population characteristics at baseline.

However, it is also true that by evaluating a countries performance over time (i.e. compare its response at one point in time to another), we can learn important lessons by examining how countries efforts to keep outbreaks in check worked during various stages of the pandemic thus far. All information presented in the following graphs accounts for population such that cases and deaths are displayed as "per 100,000 inhabitants".

Table 6 below outlines the main data points of interest for the following section.

| COUNTRY (ordered by Deaths per capita) | Number of Tests | Number of Tests per 1,000 persons | Positivity Rate (number of cases / number of tests) | Number of COVID-19 Cases | Number of COVID-19 Deaths | Cases per capita (cases per 100,000 citizens) | Deaths per capita (deaths per 100,000 citizens) | Case Fatality Proportion (deaths per 100 positive cases) |
|--|--------------------|--|--|--------------------------------|---------------------------------|---|---|---|
| [population] | | | | (as | of 9th Jan 202 | 20) | | |
| Greenland [57k] | - | - | - | 29 | 0 | 50.9 | 0.0 | 0.0% |
| Faroe Islands [49k] | 204,203 | 4,195 | 0.3% | 646 | 1 | 1327.1 | 2.1 | 0.2% |
| Iceland [339k] | 440,948 | 1,301 | 1.3% | 5,880 | 29 | 1734.4 | 8.6 | 0.5% |
| Norway [5.5m] | 3,263,386 | 592 | 1.7% | 54,919 | 472 | 995.6 | 8.6 | 0.9% |
| Finland [5.5m] | 2,578,333 | 467 | 1.5% | 38,392 | 586 | 695.8 | 10.6 | 1.5% |
| Ireland [4.9m] | 2,645,699 | 539 | 5.3% | 140,727 | 2,336 | 2869.6 | 47.6 | 1.7% |
| Northern Ireland [1.8m] | 1,287,782 | 707 | 6.8% | 87,588 | 1,460 | 4807.2 | 80.1 | 1.7% |
| Sweden [10.2m] | 5,107,586 | 499 | 9.6% | 489,471 | 9,433 | 4784.7 | 92.2 | 1.9% |
| Scotland [5.4m] | 3,582,810 | 657 | 4.2% | 150,649 | 5,108 | 2762.2 | 93.7 | 3.4% |

Table 6: Key Data

2.2 All Countries





New Weekly Cases /100,000

1000

750

Figure 1- COVID-19 cases over time



Figure 2- COVID deaths-19 over time



In comparison to the second and subsequent waves of COVID-19, it is clear when we consider the large spike of deaths seen in April to June 2020 that testing systems were inadequate and huge numbers of citizens developed COVID-19 infections that were not picked up on laboratory testing.

2.4 Finland – Sweden – Norway







2.5 Faroe Islands – Iceland – Greenland

The first point to note is the Y-axis scale is approximately 1/8th of the scale seen for the British Isles.



3 Excess Deaths

3.1 Excess Deaths during COVID-19 pandemic

Due to differences in testing and deaths registration outlined above, calculation of "Excess mortality" during this pandemic will aid understanding of the overall effects of COVID-19. Excess mortality describes the difference between observed numbers of deaths in a specific time period and numbers of deaths that would be expected considering trends seen across same time period in previous years. The baseline period for Table XYZ was the average monthly deaths in the period 2015-2019.

Eurostat data on excess deaths is available for most countries examined in this report, with the notable exception of Ireland. A slow death registrations process, reliant on paper-based certification, means official deaths reporting in Ireland lags behind other countries. A third-party funeral registration website has been used to reasonably accurately describe trends in excess deaths during the pandemic, and they are temporally correlated with the pattern of deaths observed in Figure Z, finding that there were 13% more deaths than expected in the period from March to June 2020.

Greenland and the Faroe Islands, due to very few deaths, are excluded from this analysis.

Table 7: Excess deaths

| COUNTRY (sorted by excess | | | | | | | | | | | | |
|-------------------------------|--------------|-------------|-------------|------------|------------|------------|--------------|--------|--------|--------|--------|--------|
| mortality) | Jan-20 | Feb-20 | Mar-20 | Apr-20 | May-20 | Jun-20 | Jul-20 | Aug-20 | Sep-20 | Oct-20 | Nov-20 | Dec-20 |
| Faroe Islands | - | - | - | - | - | - | - | - | - | - | - | - |
| Greenland | - | - | - | - | - | - | - | - | - | - | - | - |
| Norway ¹ | -3.5% | -2.2% | -0.6% | 2.9% | -3.0% | -1.7% | -2.1% | 1.6% | 4.5% | 0.9% | - | - |
| Iceland ¹ | 13.8% | 3.6% | -2.0% | 4.2% | 7.5% | -21.1% | -5.4% | -6.7% | 0.4% | 26.5% | - | - |
| Finland ¹ | -9.8% | -0.4% | 0.5% | 8.1% | 5.6% | 5.7% | 1.7% | 3.4% | 6.9% | 1.5% | - | - |
| Ireland ² | - | - | 13.0% | 13.0% | 13.0% | 13.0% | - | - | - | - | - | - |
| Sweden ¹ | -3.4% | -4.9% | 1.6% | 38.4% | 24.0% | 10.6% | -1.1% | -1.2% | -2.1% | -3.6% | | |
| Northern Ireland ³ | -4.8% | -4.8% | 0.9% | 47.7% | 20.7% | 4.4% | 2.7% | 6.8% | 12.1% | 18.9% | 24.5% | 10.8% |
| Scotland ⁴ | -4.2% | -6.5% | 10.8% | 70.2% | 23.4% | 1.3% | -0.1% | 1.8% | 2.5% | 10.0% | 17.7% | 5.4% |
| | 1- https://e | c europa eu | /eurostat/d | atabrowser | /view/demo | mexrt/defa | ult/table?la | ang=en | | | | |

1- https://ec.europa.eu/eurostat/databrowser/view/demo_mexrt/default/table?lang=en

2- https://www.hiqa.ie/hiqa-news-updates/covid-19-causes-13-increase-deaths-ireland-between-march-and-june-2020-hiqa 3- https://www.nisra.gov.uk/publications/monthly-deaths

4- https://www.nrscotland.gov.uk/covid19stats + https://data.gov.scot/coronavirus-covid-19/detail.html

Unsurprisingly, Table 7 demonstrates countries that had high COVID-19 activity and deaths also had the highest excess mortality. Estimating how much COVID-19 was

responsible for these excess deaths is possible by examining the proportion of the deaths in each month were directly due to COVID-19. For Scotland [] and Northern Ireland [], 80% and 76% of the additional deaths in April were due to COVID-19 i.e. there were an extra 20% and 24% deaths not attributed to COVID-19 in April, respectively.

Furthermore, analysis of the UK's reporting of COVID-19 deaths reveals a 24% discrepancy for Scotland and 11% difference for Northern Ireland between COVID-19 deaths reported as per criteria (positive test within 28 days of death) and deaths where COVID-19 is written on the death certificate.

This may be due to undercounting of direct COVID-19 related illness or collateral damage as healthcare systems struggle to cope with increased demand. Ongoing analysis of excess mortality, through efforts such as the EuroMOMO project [10], which includes data from Ireland, will continue to provide valuable insights and estimations of morbidity and mortality due to direct and indirect effects of SARS-CoV-2.

4 COVID-19 Responses

4.1 Introduction: Northern Europe and the arrival of SARS-CoV-2

The 9 countries/regions involved in this project have experienced very different outcomes due to the pandemic to date. Although this is the third potentially lethal coronavirus discovered since the turn of century, this is the first pandemic to reach the shores of Europe.

Accordingly, there was no standard approach, although observation of countries more familiar with SARS-CoV-1, such as South Korea and Taiwan led to an assertion that we should "Trace, Test and Treat".

This section outlines how various territories of interest to this project applied, or did not apply, these elements in their response, in addition to border controls and other travel restrictions.

4.2 National Responses

Table 8 outlines common measures and rules that countries have advised, and sometimes mandated, citizens abide by over the past 10 months.

The measures are far reaching and unprecedented, with severe curtailment of educational and recreational activities, in addition to restrictions on movement. These measures are supported in all regions by plentiful public health advice on hand hygiene, physical distancing and reducing social contacts.

Mask wearing is also now advised to reduce viral transmission, in a move that runs counter to Western cultural norms. Different countries recommended this measure earlier than others, and some have been less energetic in their messaging around mask-wearing than others, presumably because empirical evidence was somewhat lacking early in the pandemic.

It is well recognised that COVID-19 is an economic as well as a healthcare crisis, and states have recognised that state subsidies are vital if swathes of people being asked to stay at home will be able to afford to do so.

| Table 8: National responses | /strategy to | COVID-19 | pandemic |
|-----------------------------|--------------|----------|----------|
|-----------------------------|--------------|----------|----------|

| Country Health Response | Faroe Islands | Finland | Greenland | Iceland | Ireland | Northern Ireland | Norway | Scotland | Sweden |
|---|--|---|-----------|--|---|--|--|--|--|
| Work from home | Mar 12th 2020- May 4th 2020 | Mar 12th 2020 | N/A | Mar 13th 2020- May 4th 2020 Jul 30th 2020-Sep 7th 2020 Oct 5th 2020- | Mar 27th 2020- | Mar 28th 2020- Oct 16th 2020 | Mar 12th 2020 | Mar 16th 2020 | Mar 16th 2020 |
| Cocooning for the elderly / vulnerable | Mar 12th 2020- May 4th 2020 Aug 5th 2020-Aug 19th 2020 Dec 19th 2020 | Mar 16th 2020-Jun 17th 2020 | N/A | | Mar 27th 2020-Jun 8th 2020 | Mar 19th 2020-Jul 31st 2020 | Mar 12th 2020 | Mar 16th 2020-Jul 17th 2020 | Mar 10th 2020-Oct 1st 2020 Nov 21st 2020 |
| Stay at home measures | Mar 12th 2020-Apr 20th 2020 Aug 5th 2020 | Mar 12th 2020-Jun 23rd 2020 | N/A | Mar 13th 2020- May 4th 2020 | Mar 27th 2020-Jun 8th 2020 15th Jul 2020- Sep 17th 2020 Oct 1st 2020 Dec 27th 2020 | Mar 23rd 2020- May 18th 2020 Sep 22nd 2020- | Mar 12th 2020-Apr 27th 2020 | Mar 16th 2020 | Mar 11th 2020 |
| Education | Mar 12th 2020-Apr 20th 2020, May 4th 2020, May 11th 2020 Sep 23rd 2020 (one school with an outbreak) | Mar 18th 2020- May 14th 2020 | N/A | Mar 13th 2020- May 4th 2020 | Mar 27th 2020 Sep 1st 2020 (outbreak) Dec 16th 2020 (outbreak) Christmas break 2020-Feb 2021 | Mar 23rd 2020- Aug 24th 2020 Oct 14th 2020-Oct 19th 2020 Jan 8th 2020- | Mar 12th 2020- May 11th 2020 | Mar 19th 2020- Aug 11th 2020 | Mar 17th 2020-Jun 15th 2020 Dec 7th 2020-Jan 6th 2021 |
| Closure of restaurants / bars | Mar 12th 2020 (10pm) | Apr 4th 2020-Jun 22nd 2020 Sep 30th 2020- | N/A | Mar 24th 2020- May 25th 2020 Sep 18th 2020 (Reykjavik) | Mar 27th 2020- Jun 29th 2020 Aug 4th 2020 (11pm)-Sep 8th 2020 Sep 17th 2020 (no indoor dining) Oct 14th 2020 (takeaway only)- Dec 4th 2020-Apr 2021 | Mar 28th 2020-Jul 4th 2020 Sep 30th 2020- | Mar 24th 2020- Jun 1st 2020 | Mar 20th 2020-Jul 15th 2020 | N/A |
| Curfew | N/A | Sep 29th 2020- | N/A | | N/A | N/A | N/A - being considered now due to increase in cases | N/A | N/A |
| Limit to social gathering | Mar 12th 2020- May 4th 2020 Aug 5th 2020- | Mər 12th 2020 | N/A | Mar 13th 2020- May 4th 2020 Jul 30th 2020-Sep 7th 2020 Oct 5th 2020 | Mar 27th 2020-Jun 8th 2020 Jul 15th 2020 Sep 17th 2020 Oct 1st 2020 Oct 1st 2020 Oct 19th 2020-Dec 22nd 2020 Dec 26th 2020 | Mar 23rd 2020- May 18th 2020 Aug 20th 2020- | Mar 24th 2020- May 7th 2020 | Mar 15th 2020- Jun 19th 2020 Sep 14th 2020- | Mar 11th 2020- Jun 15th 2020 Nov 1st 2020- |
| Unemployment financial support | Mar 19th 2020 | Mar 20th 2020 May 8th 2020 Sep 3rd 2020 | N/A | | Mar 26th 2020 Aug 21st 2020 Aug 28th 2020 Sep 7th 2020 | Jul 6th 2020 | Mar 13th 2020 Mar 28th 2020 May 29th 2020 | Mar 11th 2020 Mar 17th 2020 Mar 18th 2020 Mar 29th 2020 | Mar 16th 2020 Apr 30th 2020 Aug 27th 2020 |
| Loosening restrictions | Apr 20th 2020 | May 14th 2020 | N/A | May 4th 2020 Sep 7th 2020 | May 18th 2020 Dec 22nd 2020 | May 18th 2020 Dec 22nd 2020 | Apr 20th 2020 | May 29th 2020 | May 29th 2020 |

Citizens of Finland and Norway have been rewarded for their country's control of the virus by having restrictions loosened in the 2nd quarter of 2020, and although many measures still remain in place, Education provision and freedom of movement remain largely unhindered at the present time. Other countries, including Sweden, Northern Ireland, Ireland and Scotland, have seen measures like school closures and freedom of movement restrictions be relaxed during the summer, only to tighten again in autumn-

winter when virus activity increased rapidly. Smaller countries, like the Faroe Islands and Iceland, can employ more agile response, with measures being brought in and out as needed as dictated by waves of virus activity. Just one country, Finland, has implemented a nightly curfew, although it seems this is being considered by other countries at the present time, as trends relating to more infectious variants of SARS-CoV-2 are examined.

4.3 Travel Restrictions

To prevent spread of SARS-CoV-2 is to prevent spread of humans (or animal hosts as seen in Denmark [minkref]). To date restricting human movement has involved reducing international and domestic travel. Airlines and airports have borne the brunt of the consequences of reduced international travel, while hospitality, recreational, dining, leisure, social and sports facilities have all suffered greatly domestically.

Efforts to limit the demoralising importation of new cases of SARS-CoV-2 has recently been given renewed focus given the emergence of newer and more infectious strains of SARS-CoV-2 [8]. If travel continues freely from areas which have experienced widespread transmission (and consequently, natural mutation) of the virus, then variants will continue to emerge. This is of concern as new mutations could potentially affect disease severity and render national responses and vaccines less useful.

Table 9: Travel Restrictions

| Travel Restriction | Finland | Ireland | Northern Ireland | Norway | Scotland | Sweden | Greenland | Faroe Islands | Iceland |
|---|---------------------------------------|---|---|---|---|--|---|--------------------------------|--------------------------------------|
| Travel Ban | Mar 12th 2020-May 14th 2020 | Feb 2020 (non- essential) | Oct 14th 2020- | Mar 13th 2020-Jul 10th 2020 | Mar 11th 2020 (Non- Essential travel discouraged) | Mar 19th 2020- | Mar 16th 2020 non- essential travel not encouraged | | |
| | Jun 15th 2020-Sep 11th 2020 | Green list issued Jul 9th 2020 (non- | Dec 22nd 2020 | Aug 12th 2020- present | | Jun 30th 2020 | | | |
| | | banned) | | (general ban w exception foreign | | Jul 2nd 2020 (NON EU ONLY) | I | Mar 12th 2020-Jun 15th 2020 | Mar 20th 2020 (no non-EU/Schengen |
| | Free travel green Sep 15th 2020 | Free travel green list Sep 15th 2020 | | nationals, those living in perceived low-risk countries) | Nov 20th 2020 | Jul 29th 2020 (EEA EU ban)-Aug 31st 2020 | Country remains closed Jan 2021 (aside from pre- | | area travellers) |
| | | Nov 12th 2020 (advised not to return home for xmas) | | | -Dec 24th 2020 | Oct 22nd 2020 (Areas outside EEA EU)-January 31st 2021 | travellers approved for essential travel only) | | |
| Need for test before entering country | Oct 12th 2020 | N/A - being introduced 16th Jan 2021 | N/A | N/A | N/A | N/A | N/A | Jun 15th 2020 | N/A |
| Test on Arrival | Oct 12th 2020 | Nov 29th 2020 (quarantine then test within 5 days) | N/A | Jun 22nd 2020 | N/A | N/A | Apr-20 | Jun 27th 2020 | Jun 15th 2020 |
| Quarantine on arrival into country ADVISED | Mar 12th 2020 | Mar 16th 2020 Green list Jul 9th 2020 : no quarantine. Northern Ireland Travellers also exempt. | Jul 10th 2020 if arriving from outside of common travel area (GB, RoI, Isle of Man) | Mar 12th 2020 | Jun 8th 2020 | N/A | Quarantine ENFORCED | Mar 12th 2020 | Apr 24th 2020 |
| Borders / Personal Travel Restrictions | Mar 16th 2020-Jul 13th 2020 | 2km Travel bubbles for citizens unless essential worker Mar28th 2020 (subsequently | N/A | Mar 15th 2020- May 12th 2020 (foreign nationals), Jun 15th 2020 (Denmark/Finland) Jul 15th 2020 (low | 5 mile Travel bubble for citizens Jun 19th 2020- Jul 3rd 2020 | N/A | Country remains closed Jan 2021 (aside from pre- authorised travellers approved for escential travel | N/A | N/A |
| Masks Enforced | January 7th 2021- August 13th 2020 | revised to 5km) August 10th 2020 | July 10th 2020 | incidence schengen region open) August 17th 2020 | June 22nd 2020 | December 18th 2020 | only) N/A | N/A | August 14th 2020 |

Mandatory (i.e. enforced) quarantine is not commonplace in the countries examined, although it is not without precedent internationally (e.g. South Korea, Australia and New Zealand). [Ref i-iii]

5 Territories & Key Statistics (ranked by COVID-19 mortality, data to 09-01-2021)

The following sections detail countries/territories of the NPA, in addition to key statistics as of the 9th of January, 2021. Large variations are seen between infection rates (more accurately, case detection rates) and mortality rates.

An additional measure of interest is the case fatality proportion (CFP), simply calculated by dividing number of deaths by number of cases and expressing it as a percentage. Early in the pandemic, all countries that experienced significant outbreaks presented data with relatively high CFP rates due to the fact that sicker patients attending hospital were prioritised for testing.

Scotland is an outlier in that its case fatality proportion has remained high throughout the pandemic. While other countries have seen their CFP fall precipitously as more people are tested, and thus less severe infections are documented, Scotland's has remained relatively high. This could relate to lower accessibility of testing or potentially highlights a population or health system at greater risk of dying from COVID-19.

5.1 Greenland



|) | popn. 57k | | | | | |
|---|-----------------|----|---------------|------|---|---------------|
| | COVID-19 cases | 29 | (rate/100,000 | 50.9 |) | case fatality |
| | COVID-19 deaths | 0 | (rate/100,000 | 0.0 |) | proportion |
| | | | | | | 0.0% |

Greenland, an autonomous territory of Denmark, confirmed its first case of COVID-19 on the 16th of March 2020. The first infected patient lived in the capital, Nuuk, and was placed in home isolation. Eleven cases were detected in the following 30 days, all in Nuuk. These cases were all isolated at home, and all survived. Flights into and out of the country, in addition to domestic flights for citizens, were discouraged. The only flights that remain operational are those to Copenhagen, Denmark. On the 28th of March, the government prohibited the sale of alcoholic drinks until the 15th of April. In step with Denmark, Greenland guickly closed it borders to tourists.

On the 24th of May, SARS-CoV-2 was again detected in Greenland in a traveler returning from Denmark, who had recently recovered from COVID-19 whilst in Denmark. While not anticipated to be an infectious risk, as a precaution they were placed in quarantine. This scenario again arose in early June, and again the person was placed in quarantine.

Greenland has imported only a handful of cases over the past 7 months, with a spike seen at the end of December, where 6 people tested positive in quick succession in the settlement Ilulissat. The 6 people came from 3 unrelated households, and all cases were detected on testing performed 5 days after arrival as part of follow-up testing designed to allow people to cut short their 14-day isolation period following arrival. Of note all 6 had arrived in Greenland with recent negative tests, as dictated by travel restrictions currently in place. Greenland has had no deaths due to COVID-19 thus far.

5.2 The Faroe Islands



popn. 49k COVID-19 cases COVID-19 deaths

646 1

(rate/100,000

(rate/100,000 1327.1) 2.1

case fatality proportion 0.2%

The Faroe Islands, a self-governing archipelago in the North Atlantic (in the kingdom of Denmark), reported its first case COVID-19 was on the 4th March 2020 in a citizen returning from France. Lockdown measures were introduced on March 12th to contain the spread of the Covid-19 coronavirus in the Faroe Islands. Widespread societal restrictions were advised by the territory's public health authorities, including encouragement to work from home if possible, to restrict travel to essential trips only. Schools and colleges were closed and the government appealed to all bars, cafes and restaurants to close by 22:00 daily.

Temporary border control on entry to the Faroe Islands from abroad was introduced on the 17th of March. Lockdown was gradually lifted starting the 9th of April and the last positive test during the first wave of COVID-19 was registered on the 22nd of April.

After 104 days without any known cases of COVID-19, one was confirmed on the 4th of July in a returning traveller. There have so far been two waves of COVID-19 cases in the Faroe Islands. The first was in March–April and the second wave of COVID-19 began on the 4th of August. The Faroese strategy in handling the COVID-19 epidemic complied with the official recommendations by the WHO applying an active suppression strategy with liberal testing and rapid isolation of cases and their close contacts. The rapid resurgence of a second wave of COVID-19 in the Faroes was attributable to loosened border restrictions where, on June 15, regulations were changed from 14 days quarantine for travelers to a single negative test at the border. This did not immediately lead to a rise in identified cases.

However, following large gatherings, e.g. private parties, and the national festival (July 28/29), a large outbreak of COVID-19 occurred presumably because infected individuals who had tested negative at the border had participated.

5.3 Iceland



TEXT TO FOLLOW

5.4 Norway



Ireland recorded its first confirmed case of COVID-19 on the 29th Feb 2020 in a citizen returned from Northern Italy. Adequate testing systems took some time to be established. High rates of infection in older age groups and in nursing homes/residential settings in March and April led to relatively high numbers of COVID-19 deaths. However, surge capacity in state-run and private hospitals was not overwhelmed by the first wave.

Widespread societal restrictions, including restriction of movement and closure of schools, were gradually relaxed over the summer of 2020 as COVID-19 cases and deaths remained relatively low.

Nationwide "Level 5" (the most restrictive level) lockdown was re-introduced on the 21st October 2020 to control spread of SARS-CoV-2 in a second wave. These restrictions, in addition to a more expansive and robust testing strategy, accompanied by better shielding of older age groups allowed health authorities to quickly regain control and the country experienced relatively few deaths during this wave in October and November.

However, relaxation of widespread societal restrictions over the Christmas period has seen a much different scenario unfold, with a very dramatic rise in cases in the first weeks of 2021. Due to the maturation of the SARS-CoV-2 testing system as the pandemic has unfolded, Ireland's case numbers undoubtedly better reflect disease burden in communities during this third wave, and it has been striking how quickly the situation has deteriorated.

The huge rise in cases, in a very short period of time, has seen hospitalisations and ICUs quickly become saturated with patients with severe COVID-19 illness. This has seen cancellation of elective work and planned operations in hospitals, and mortality has again begun to rise. This ominous start to the new year reminds us that COVID-19, left unchecked, can rapidly become a huge problem for a healthcare system.



TEXT TO FOLLOW

25



An older population and high obesity rates (see Table 1) may indicate a population at more risk from COVID-19, when compared to the other countries featured in this report. However, as in other countries, a large determinant of mortality from COVID-19 is if large numbers of older patients contract the disease. COVID-19 found its way into Scottish care homes early in the pandemic [ref https://www.thelancet.com/journals/lanhl/article/PIIS2666-7568(20)30012-X/fulltext], with very large Excess deaths seen in the initial stages of the pandemic 2020 (see Section 3).

Large discrepancies exist between reporting of deaths in the UK. The Office of National Statistics (ONS) have, from early on in the pandemic, included deaths registered where COVID-19 is mentioned on the death certificate by the certifying doctor.

6 NPA regions versus Non-NPA regions (data to 09-01-2021)

Many countries post regular updates about geographical breakdown of COVID-19 cases and deaths in order to inform and engage the public. Analysing these data can give us important information about a country's COVID-19 response. We aim to examine if rurality and low population density is protective against COVID-19 infection and death.

Looking at the map of Ireland, Northern Ireland and Scotland shown below, we can see that where COVID-19 activity is high, deaths follow. However, interestingly in Ireland darker blue areas (cases) do not necessarily end up as dark red areas as seen in Scotland. Similarly, Northern Ireland is detecting lots of cases, but again, deaths don't seem to be happening to the same degree as in the densely populated areas of Scotland. This again likely reflects under-testing or more unchecked spread in Scotland, possibly in conjunction with more nursing home outbreaks and/or a more vulnerable population.

| COUNTRY (ordered by Deaths per capita) | Total Number of COVID-19 Cases + (per capita) | Total Number of COVID-19 Deaths + (per capita) | NPA regions Cases | NPA regions Deaths | non-NPA regions Cases | non-NPA regions Deaths | |
|--|---|---|----------------------|-----------------------|--------------------------|------------------------------|--|
| | | | | | | | |
| Greenland [57k] | 29 (50.9) | 0 (0.0) | All (-) | All (-) | - (-) | - (-) | |
| Faroe Islands [49k] | 646 (1327.1) | 1 (2.1) | All (-) | All (-) | - (-) | - (-) | |
| Iceland [339k] | 5,880 (1734.4) | 29 (8.6) | All (-) | All () | - (-) | - (-) | |
| Ireland [4.9m] | 140,727 (2869.6) | 2,336 (47.6) | 46,849 (2840.0) | 384 (23.3) | 104,077 (3344.1) | 1,712 (55.0) | |
| Northern Ireland [1.8m] | 87,588 (4807.2) | 1,460 (80.1) | 68,655 (4429.1) | 1,186 (76.5) | 17,195 (5005.8) | 274 (79.8) | |
| Scotland [5.4m] | 150,649 (2762.2) | 5,108 (93.7) | 6164 (1136.3) | 237 (43.7) | 144,485 (2936.2) | 6837 (138.9) | |
| | | | | | | | |



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7 Policy implications

7.1 Policy Roadmaps and Progress to date

COVID-19 is a novel coronavirus-mediated disease that is posing global problems ever since it was first detected in the city of Wuhan in China in December 2019. As a result, every country and region are struggling to learn as much as possible, as quickly as possible, in order to mount an effective public health response to halt viral spread insofar as possible. Countries were quick to recognise the potential harmful effects of the virus for the health of their populations and their economies.

It is apparent that a "One-size-fits-all" solution is not appropriate particularly in the context of the emergence of additional waves of COVID-19. However, what has happened in China, Taiwan, Singapore and New Zealand and more closely in Iceland and the Faroe Islands demonstrates that an effective and aggressive public health response including quarantine, social distancing, and isolation of infected populations can contain the COVID-19 epidemic. However, the most successful combination of elements and the sequence in which they are deployed within this public health response has yet to be established.

The COVID-19 pandemic has had a varied spread and impact on different NPA regions and countries. Areas. However, no region or community has remained untouched by the effects of pandemic. As expected in areas of low population density and low levels of population movement such as the Arctic and the high North, low numbers of cases (e.g. Greenland, Faroe Islands) have been noted. As population density increases and particularly in urban areas the risk associated with COVID-19 appears to increase. But there have been notable exceptions to this with some rural and low density population areas disproportionately affected largely due to over-dispersion events (e.g. Faroes mid-Summer festival).

7.2 Advantages and Disadvantages specific to Rural and Remote Regions

i) Low Population Density

On the whole, low population density appears to be an advantage when it comes to reducing transmission of COVID-19 which is dependent on person to person transfer. However, low population density also means reduced access to health care services and medical staff which makes managing COVID-19 morbidity and mortality much more challenging. As a result, access to testing and medical care of an infected individual is

more difficult than in high population density settings such as urban areas where medical care and staff tend to be concentrated according to the inverse care law ("The availability of good medical care tends to vary inversely with the need for it in the population served"[3]) which still is highly relevant to the NPA regions and countries today particularly in a time of a pandemic.

ii) Low accessibility

Low accessibility or rurality again appears to be advantageous in terms of reducing transmission of COVID-19 which is dependent on person to person transfer as not only is population density low in such areas but the overall movement of individuals in and out of such areas is also lower. There are of course exceptions to this seen when such regions are seasonal holiday destinations for large segments of the urban population. This movement of people over the Summer period of 2020 has been associated with COVID-19 dispersion events across such regions (eg: Ireland's Wild Atlantic Way; Iceland's Ring Road?; more specific examples). However, as restrictions come into force, such communities become increasingly isolated and important economic activities such as tourism on which many such areas are dependent suffer disproportionately.

iii) Low Economic Diversity

NPA regions and countries are often dependent on a small number of forms of economic activity such as tourism or primary industries such as agriculture or fishing. Some of these activities do not permit a "work from home" option and have been given exemptions in most cases in terms of COVID-19 restrictions (eg: agricultural and fishing activities in all NPA regions and countries) and as a result economic activity in these sectors has not suffered significantly. However, certain sectors such as tourism on which these communities depend strongly have not received such exemptions and have suffered disproportionately.

In summary, the NPA region is simultaneously benefitting from a uniquely advantageous socio-economic make-up and geography, and therefore easier to protect, but is also highly vulnerable.[1]

8 Recommendations

- 1. Priorities: There are many in public health but the those that should be considered first are: Get the people onside; identify and protect the vulnerable
- 2. Crisis management: A number of important principles to remember which come from Change theory:
- a. This is a high-anxiety, low-trust situation (A "burning platform" if you will)
- b. "The Vision": where are we trying to get to...a clear pathway with signpost along the way.
- c. "What can we do tomorrow": provide concrete advice, a clear action(s) to take and ask people to take direct responsibility themselves for undertaking that action: get a chloth mask and wear in crowded public places
- 3. Communication: Many successful countries and regions have demonstrated the following key principles in communication with the populations: Tell the unadulterated truth; don't sidestep question as often happens in political arenas but instead answer questions directly; do not be afraid to describe the statistics as the public can follow but at the same time keep the human element and cost of the pandemic front and centre.

We should encourage people to remember that the vast majority of people are compliant with measures and it is dangerous to bombard people with pessimistic messages that may lead people to believe the battle is lost

- Public health measures: Covid-19 has an overdispersed model of spread and hence the conditions that drive its spread have been variously described as the 5Ps (People in Prolonged Poorly-ventilated Proximity without Protection) or the
 - a. Masks
 - b. Schools
 - c. Contacts

While COVID-19 has severely impact national economies, generating a new crisis, some overall lessons can be taken for NPA areas. First, there are **opportunities emerging in the post-COVID context especially linked with digitisation, new workplace practices and re-skilling**. With the population in isolation it becomes increasingly important to connect and prioritising the diffusion of fast broadband in peripheral areas can provide alternative work and social opportunities. Remote work, or re-skilling of employees or unemployed individuals during lockdown, and even the organisation of online cultural events are examples of such. **It is also a way to rethink current businesses and sectors to adapt to the new demands.** In a successful example, the Faroe Islands have

developed virtual tours that enable users to use a computer game-like tool to explore the island in the comfort of their home2.

The promotion of local products and activities is also a growing trend with the pandemic. Besides consumers now preferring local grocery shops to big commercial facilities, and local products from producers they trust, there is an emergence of new practices in tourism (e.g. staycation, mobile homes) and a prevalence of outdoor, social-distancing abiding activities (e.g. hiking). Peripheral and remote areas in the NPA area are uniquely privileged because of their abundance of natural landscapes and their remoteness to be able to attract tourism in this new context. With the proper safety measures, this can be an opportunity for the marketing of these areas.

The current NPA programme has already shown significant initiative, commitment and capacity to quickly respond to issues raised by COVID-19. **The NPA COVID-19 Response Group**, founded by the late Dr David Heaney and comprised of partners from across the NPA area working in a wide range of health, research, technology and public sector organisations, came together quickly drawing on their past cooperation experiences of working in the NPA. [1]

9 Conclusions

- Open data can inform the general public and healthcare workers about their own regional and national response to the COVID-19 pandemic
- While being mindful of differences and nuances inherent in non-standardised testing, deaths in recording and reporting, Open data can facilitate comparisons of countries' approaches to managing COVID-19 waves
- Elements of strategies that seem to be important to control the spread of COVID-19:
 - Lockdowns widespread restrictions, while a blunt instrument, work to reduced viral spread
 - Clear, transparent, <u>consistent</u> communication from those in public office, including information about potential severity of illness and effects on other healthcare
 - Solid public health advice (handwashing, masks, social distancing, reducing travel and social contacts) and more recent advice around dispersion models such as improved ventilation, strict avoidance of mass gatherings etc.
 - Border control (14 day quarantine or day 5 to 6 PCR test for newly arrived travellers)

Additional Information

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Ethical approval

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Competing interests

All authors declare that they have no competing interests.

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Maybe for masks

An evidence review of face masks against COVID-19

Jeremy Howard, Austin Huang, Zhiyuan Li, Zeynep Tufekci, Vladimir Zdimal, Helene-Mari van der Westhuizen, Arne von Delft, Amy Price, Lex Fridman, Lei-Han Tang, Viola Tang, Gregory L. Watson, Christina E. Bax, Reshama Shaikh, Frederik Questier, Danny Hernandez, Larry F. Chu, Christina M. Ramirez, Anne W. Rimoin Proceedings of the National Academy of Sciences Jan 2021, 118 (4) e2014564118; DOI: 10.1073/pnas.2014564118