Health Information and Quality Authority

An tÚdarás Um Fhaisnéis agus Cáilíocht Sláinte

Protocol for descriptive analysis of COVID-19 epidemiological indicators and associated contextual factors in European countries

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Safer Better Care

Protocol for descriptive analysis of COVID-19 key epidemiological indicators and associated contextual factors in European countries

Health Information and Quality Authority

About the Health Information and Quality Authority

The Health Information and Quality Authority (HIQA) is an independent statutory authority established to promote safety and quality in the provision of health and social care services for the benefit of the health and welfare of the public.

HIQA's mandate to date extends across a wide range of public, private and voluntary sector services. Reporting to the Minister for Health and engaging with the Minister for Children, Equality, Disability, Integration and Youth, HIQA has responsibility for the following:

- **Setting standards for health and social care services** — Developing person-centred standards and guidance, based on evidence and international best practice, for health and social care services in Ireland.

- **Regulating social care services** — The Chief Inspector within HIQA is responsible for registering and inspecting residential services for older people and people with a disability, and children's special care units.

- **Regulating health services —** Regulating medical exposure to ionising radiation.

- **Monitoring services** — Monitoring the safety and quality of health services and children's social services, and investigating as necessary serious concerns about the health and welfare of people who use these services.

- **Health technology assessment** — Evaluating the clinical and cost-effectiveness of health programmes, policies, medicines, medical equipment, diagnostic and surgical techniques, health promotion and protection activities, and providing advice to enable the best use of resources and the best outcomes for people who use our health service.

- **Health information** — Advising on the efficient and secure collection and sharing of health information, setting standards, evaluating information resources and publishing information on the delivery and performance of Ireland's health and social care services.

- **National Care Experience Programme** — Carrying out national service-user experience surveys across a range of health services, in conjunction with the Department of Health and the HSE.

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1 Purpose and aim

At the request of the Department of Health, the Health Information and Quality Authority (HIQA) will undertake a descriptive analysis of epidemiological indicators in order to describe the burden of COVID-19 as it has occurred across a range of European countries. The purpose of this protocol is to outline the process by which HIQA, with the support of an expert advisory group (EAG), will conduct the descriptive analysis.

2 Process outline

Four distinct steps in the process have been identified. These are listed below and described in more detail in sections 2.1 to 2.4:

1. Identify and collate key epidemiological indicators and contextual factors
2. Describe and present the epidemiological and contextual factor data
3. Quality assurance of report
4. Summarise the findings.

Due to a lack of directly comparable data and methodological challenges in determining cause and effect, comparative assessments of the performance of each country or statistical investigations of the underlying reasons for patterns or trends in the data will not be undertaken.

2.1 Identify and collate key epidemiological indicators and contextual factors

The data will be collated for the period from 1 January 2020 up to 30 November 2021. This period has been selected based on detection of the first confirmed case of 2019-nCoV in Europe (24 January 2020)[1] and prior to the emergence of the Omicron variant (the burden of which is still evolving).[2]

Primary indicators

As requested by the Department of Health, this descriptive analysis will focus on the following key indicators:

- confirmed cases of COVID-19
- hospital admissions with COVID-19
- intensive care unit (ICU) admissions with COVID-19
- reported COVID-19 deaths

- excess mortality.

The descriptive analysis will use centralised and publicly available data sources that contain data across European countries. The Our World in Data (OWID) COVID-19 data repository (available from: https://ourworldindata.org/coronavirus) will be used for the number of cases, hospital admissions, ICU admissions and deaths.[3] Estimates of excess mortality will be obtained from the European Mortality Monitoring Project (EuroMOMO) database (available from: https://www.euromomo.eu/).[4] These primary sources will be supplemented by data from the Organisation for Economic Co-operation and Development (OECD),[5] World Health Organisation (WHO),[6] and Health Protection Surveillance Centre (HPSC).[7] These data sources are described below in more detail.

Cases, hospital admissions, ICU admissions and deaths

Case numbers and deaths in the OWID database are collated by the COVID-19 Data Repository under the Center for Systems Science and Engineering at Johns Hopkins University.[8] These data are collated from a variety of official websites including governmental, international, national and subnational agencies across the world. Data on ICU admissions and hospitalisations in Europe are primarily collected from those published by the European Centre for Disease Prevention and Control (ECDC),[9] but also include data reported by national institutions.

Excess mortality

Excess mortality represents the difference between the total deaths observed and the expected number of deaths during the same period of time. Estimates of excess mortality will differ according to how expected mortality is computed (for example, differing methods used for estimating variance based on historical data). Excess mortality also relies on timely and accurate information on all deaths and not just notifiable cause-specific deaths. Mortality is subject to variability due to chance, seasonal effects, and external circumstances (such as the COVID-19 pandemic) among other factors. Any attempt to forecast mortality should incorporate uncertainty due to chance variation, seasonal effects, and any underlying secular trends, but ideally not the impact of COVID-19, which is what we are interested in detecting.

Data on Irish-specific excess mortality will be provided by the Health Protection Surveillance Centre (HPSC). For the present descriptive European analysis, estimates of excess mortality will be sourced from EuroMOMO (available from: https://www.euromomo.eu/).[4] EuroMOMO is a European mortality monitoring activity that aims to detect and measure excess mortality related to seasonal influenza, pandemics, extreme weather events and other public health threats.

Presently, 29 European countries or subnational regions, including Ireland, participate in the collaboration, which is supported by the ECDC and the WHO and hosted by Statens Serum Institut in Denmark. The database is populated with official national mortality statistics which are provided weekly from the 29 European countries or subnational regions within the collaborative network. The methodology applied by EuroMOMO to estimate excess mortality follows a defined algorithm based on a time series model with a Poisson distribution to the reported data, and adjusted for incomplete reporting in the most recently submitted data.[10] The input data are based on registered deaths and include demographic details, which enable age-sex standardisation.

EuroMOMO publishes neither the country-level excess mortality figures, nor the standard deviations used in their calculation. Therefore, an Ireland-specific analysis of excess mortality following the EuroMOMO algorithm will be requested from the HPSC, the national agency that represents Ireland in the EuroMOMO collaboration.[7] The z-scores (that is, excess mortality expressed as the number of standard deviations from the expected number of deaths) of individual countries will be presented to visually depict Ireland's temporal trend alongside those of the full range of European countries included within this analysis, in order to illustrate where periods of mortality were above or below expected values, and to allow for some comparison of patterns. However, direct comparisons between Ireland and any one country will not be undertaken.

Contextual indicators

The nationally reported indicators of the burden associated with COVID-19 are influenced by a wide range of contextual factors that differ across countries. For example, testing capacity, testing policies, mortality case definitions and mortality reporting can vary substantively between countries in addition to variation in the underlying demographics. Therefore, efforts will be made to collate and present information on a limited number of contextual factors that are likely to have impacted observed trends. These factors will include:

- population age
- population density
- household size
- hospital capacity
- test positivity rate
- COVID-19 vaccination coverage

- stringency index[1].

These data will mainly be accessed from the OWID COVID-19 data repository.[11] When data on specific contextual factors of interest are not available from OWID, additional sources will be used, including Eurostat[12] and the Organisation for Economic Co-operation and Development (OECD).[5] The indicators collected by each data source are presented in Table 1 along with details of the European countries for which such data are available.

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[1] A composite measure, expressed on a scale from 0 to 100 calculated by OWID, based on school and workplace closures, cancellation of public events, restrictions on public gatherings, closures of public transport, stay-at-home requirements, public information campaigns, restrictions on internal movements, and international travel controls.[5]

Table 1. Indicators and countries that will be collated from each database

Database	Key indicators	Contextual indicators	European countries included in analysis
EuroMOMO	▪ Excess mortality	N/A	Austria, Belgium, Denmark, England, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Netherlands, Norway, Portugal, Scotland, Spain, Sweden, Switzerland, Ukraine, Wales
OWID	▪ Confirmed cases of COVID-19 ▪ COVID-19 hospital admissions ▪ ICU admissions with COVID-19 ▪ Reported COVID-19 deaths	▪ Proportion of population aged ≥65 years and ≥70 years ▪ Median age ▪ Population density ▪ Test positivity rate ▪ Vaccination coverage ▪ Hospital capacity ▪ Stringency index	Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Ukraine, United Kingdom
Eurostat	N/A	▪ Household size	Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Spain, Sweden, Switzerland
OECD	▪ Reported COVID-19 deaths	▪ Vaccination coverage	Austria, Belgium, Bulgaria, Croatia, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, United Kingdom
WHO	▪ Reported COVID-19 deaths	N/A	Austria, Belgium, Croatia, Cyprus, Czechia, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, United Kingdom
HPSC	▪ Excess mortality	N/A	Ireland

Key: EuroMOMO – European Mortality Monitoring Project; HPSC – Health Protection Surveillance Centre; N/A – not applicable; OECD – Organisation for Economic Co-operation and Development; OWID – Our World in Data; WHO – World Health Organisation.

Source URLs:

- EuroMOMO (available from: https://www.euromomo.eu/)
- OWID (available from: https://ourworldindata.org/coronavirus)
- ECDC (available from: https://www.ecdc.europa.eu/en/cases-2019-ncov-eueea)

- Eurostat (available from: https://ec.europa.eu/eurostat/web/main/data/database)
- OECD (available from: https://stats.oecd.org/)
- WHO (available from: https://covid19.who.int/)

2.2 Describe and present the epidemiological and contextual factor data

The data analysis will be restricted to descriptive presentation using graphical plots and or tables. It should be noted that the analysis approach described below will be influenced by the available data. Therefore, the approach described should be viewed as provisional.

Primary indicators

Confirmed COVID-19 cases

Cases will be presented using trend graphs to illustrate, over time:

  i.   the 14-day rolling daily average of new cases per 1,000,000 population

  ii.   cumulative cases per 1,000,000 population.

The average cumulative rate of cases per 1,000,000 population across the 27 EU member states (EU-27) will also be highlighted in the cumulative graph, if there is sufficient data coverage for the included European states to calculate a representative average.

Hospitalisations related to COVID-19

Where sufficient country-level data are available, hospital admissions will be presented using trend graphs to illustrate, over time:

  i.   the number of new weekly hospital admissions per 1,000,000 population.

However, this may not be feasible given the high volume of missing data for weekly hospital admissions across countries.

Hospital occupancy will be presented using trend graphs to illustrate, over time:

  i.   the 14-day rolling daily average of patients with COVID-19 in hospital per 1,000,000 population.

ICU admissions associated with COVID-19

Where sufficient country-level data are available, ICU admissions will be presented using trend graphs to illustrate, over time:

  i.   the number of new weekly ICU admissions per 1,000,000 population.

However, this may not be feasible given the high volume of missing data for weekly ICU admissions across countries.

ICU occupancy with COVID-19 will be presented using trend graphs to illustrate, over time:

    i.   the 14-day rolling daily average of patients occupying ICU beds per 1,000,000 population.

Reported COVID-19 deaths

Reported COVID-19 deaths will be presented using trend graphs to illustrate, over time:

    i.   the 14-day rolling daily average of new deaths per 1,000,000 population

    ii.   the cumulative deaths per 1,000,000 population.

The average number of deaths across the EU-27 will be also be highlighted in the cumulative graph, if there is sufficient data coverage for the included European states to calculate a representative average. Where available, a breakdown of COVID-19 deaths that occurred in people aged 65 and older will also be presented.

Excess mortality

Pooled excess mortality will be presented using trend graphs to illustrate, over time:

    i.   Irish-specific excess deaths

    ii.   excess deaths, expressed in terms of z-scores, across European countries.

The estimated excess mortality for Ireland will also be presented on these graphs and stratified by age group, as appropriate.

Contextual indicators

Population age

The proportions of the population aged 65 and over and aged 70 and over, and the median age for each European country will be presented in bar charts based on the most recent year of data available.

Population density

Population density for each European country will be presented in bar charts based on the most recent year of data available.

Household size

The distribution of household sizes for each European country will be presented in bar charts based on the most recent year of data available.

Test positivity rate

The test positivity rate of individual European countries will be presented using trend graphs over time, with the positivity rate for Ireland highlighted. Although it is acknowledged that the positivity rate is a function of testing capacity, testing policy and contact tracing policy, this indicator illustrates the stress on the testing system. This rate varied significantly in countries throughout the pandemic.

COVID-19 vaccination coverage

The vaccination rate of individual European countries will be presented using trend graphs over time, with the vaccination rate for Ireland highlighted. Vaccination coverage will be presented in terms of the total population that is fully vaccinated, or that has received a booster vaccination. Full vaccination coverage in the population aged 70-79 years and aged 80 years and older will also be presented.

Hospital capacity

Country-level hospital per 1,000 population will be presented in bar or column charts, based on most recent year available.

Stringency index

The stringency index for each country will be presented using trend graphs over time, with the index for Ireland highlighted.

2.3 Quality assurance of report

Key indicator data will be verified for consistency by cross-referencing with data available from the ECDC (available from: https://www.ecdc.europa.eu/en/covid-19/data).[13] The transcription of all data, coding and graphical displays will be verified by a second analyst. The content of the report will be quality assured by the Senior Management Team of HIQA's HTA directorate in accordance with HIQA's HTA quality assurance framework.

2.4 Summarise the findings

A descriptive report will be prepared by HIQA in which the data will be described and interpreted narratively. Limitations of the data will also be described. The draft report will be circulated and presented to HIQA's COVID-19 EAG. The EAG's

feedback will be incorporated into a final report which will be provided to the Department of Health.

References

1. Bernard Stoecklin S, Rolland P, Silue Y, Mailles A, Campese C, Simondon A, et al. First cases of coronavirus disease 2019 (COVID-19) in France: surveillance, investigations and control measures, January 2020. Euro surveillance : bulletin Europeen sur les maladies transmissibles = European communicable disease bulletin. 2020;25(6).
2. European Centre for Disease Prevention and Control. Timeline of ECDC's response to COVID-19 2022 [Available from: https://www.ecdc.europa.eu/en/covid-19/timeline-ecdc-response].
3. Our World in Data. Coronavirus Pandemic (COVID-19) 2022 [Available from: https://ourworldindata.org/team?country=].
4. EUROMOMO. EuroMOMO Bulletin 2022 [Available from: https://www.euromomo.eu/].
5. Organisation for Economic Co-operation and Development (OECD). OECD Statistics 2022 [Available from: https://stats.oecd.org/].
6. World Health Organization. WHO Coronavirus (COVID-19) Dashboard 2022 [Available from: https://covid19.who.int/].
7. Health Protection Surveillance Centre (HPSC). COVID-19 in Ireland: Guidance and surveillance data 2022 [Available from: https://www.hpsc.ie/].
8. Ritchie H. Our World in Data switches to Johns Hopkins University as our main data source for COVID-19 cases and deaths 2020 [Available from: https://ourworldindata.org/covid-data-switch-jhu].
9. European Centre for Disease Prevention and Control. Data on hospital and ICU admission rates and current occupancy for COVID-19 2022 [Available from: https://www.ecdc.europa.eu/en/publications-data/download-data-hospital-and-icu-admission-rates-and-current-occupancy-covid-19].
10. EUROMOMO. Methods 2022 [Available from: https://www.euromomo.eu/how-it-works/methods].
11. Our World in Data. Covid-19 data. GitHub2022.
12. European Statistical Office (Eurostat). Database 2022 [Available from: https://ec.europa.eu/eurostat/web/main/data/database].
13. European Centre for Disease Prevention and Control. Download COVID-19 datasets 2022 [Available from: https://www.ecdc.europa.eu/en/covid-19/data].