Methodological Note – All-cause, Excess and Covid-19 deaths

All-cause death statistics

For the most part, civil registration systems in OECD countries mean that death registers are eventually complete. However, there remain some limitations in comparing total deaths – particularly when assessing the most recent data and comparing deaths over a short period. Therefore, **caution should be excercised in cross-country comparisons** for the following reasons.

Date of occurrence vs. date of registration: Figures for some countries may refer to the date a death is registered (e.g. United Kingdom) rather than the actual date of death. While statistics referring to registration can be adjusted to date of death, and will be compatible over a longer period, the use of statistics based on registration can affect comparisons over short periods of time. Delays in registering deaths can be impacted by public holidays and weekends. Additionally, there can be delays in registering deaths occurring in care homes and in the community, or where an examination of cause of death may be required. Weekly statistics may not always be based on a standard week, for example, counting deaths from Saturday to Friday rather than Monday to Sunday. Changes to registration procedures and the delay between the occurrence and registration of a death may also have changed over the course of the pandemic for some countries. This may impact weekly estimates of excess deaths that are based on date of registration rather than date of occurrence.

Under-reporting and revisions: Due to delays in registering deaths, the numbers reported for the latest periods (days or weeks) can be subject to varying levels of completeness, both by week and by country. Incomplete or late reporting from some provinces or regions (because of different information systems, for example) may result in significant underestimates of the total number of deaths in that country, and therefore excess mortality. Some countries (e.g. the United States) may adjust their series to estimate the total number of deaths for the latest reporting periods.[1] It is important to be aware of unadjusted and adjusted series, as well as to regularly update the time series to account for revisions.

Methodology to calculate excess mortality

The calculation of weekly excess deaths contained follows a simple and easily interpretable calculation comparing the number of deaths recorded for a week against the *expected* number of deaths over the same week. The percentage change from the expected value (the P-score) is generally deemed "transparent and comparable" (Aron et al., 2020). The expected number of deaths is based on the average number of deaths for the same week over recent years (in this case the previous five years, 2015-19). This baseline could be considered a lower estimate of the expected number of deaths since both population growth and an ageing population would be expected to push up the number of deaths observed each year. For example, New Zealand saw its population grow by around 9% since 2015, with the number of people aged 65 and over increasing by 18%.

Significant events such as severe flu seasons, heatwaves, natural disasters, etc. might have significantly impacted the number of deaths over a period, affecting the underlying average. Comparing current levels of mortality against this baseline may, in effect, either under- or over-estimate the level of excess mortality. The current method has the advantage of being transparent in basing the calculations on the actual number of reported deaths rather than any adjusted values. **Importantly, given the impact of COVID-19 to the overall number of weekly deaths in 2020, the average deaths for the period 2015-2019 continues to be used to calculate excess deaths in 2021.**

[1] https://www.cdc.gov/nchs/nvss/vsrr/covid19/excess_deaths.htm.

Refinements of the methodology should take into account national variations in the underlying death rates by employing confidence intervals, as well as considering demographic and seasonal trends. Starting from Farrington et al. (1996[2]), several epidemiological studies have calculated standardised scores (z-scores) of deaths, showing by how many standard deviations the weekly number of deaths is above or below the national baseline. A similar strategy has been followed by the consortium Euro-Momo (Nielsen et al., 2012[3]), while Enki et al. (2016[4]) compare the performance of different algorithms to derive scores and detect disease outbreaks.

There are two main advantages to the use of standardised scores: i) they provide essentially a confidence interval to gauge the magnitude of mortality deviations; and ii) they account for trends in mortality rates across years, as well as for seasonal trends within years. On the other hand, standardised scores are more difficult to communicate to the broader public.

Key issues in comparing reported COVID-19 deaths

The measurement and reporting of total numbers of COVID-19 related deaths can vary across countries. Some of the issues affecting comparability can be linked to the setting of death, the availability of testing, as well as different practices of coding and reporting.

Prior to widespread testing, reported COVID-19 deaths tended to focus on patients who had been admitted to hospital, had undergone a test to confirm the presence of COVID-19, and could easily and quickly be recorded through usually centrally-based hospital information systems. This exposed differences between countries in capturing COVID-19 related deaths in other settings (i.e. care homes and community).

Delays in compiling deaths in care homes can reflect the sheer number as well as the diversity of establishments. Community-based deaths usually go through a different and lengthier procedure compared to hospital deaths, with registration at a local administrative level before information is reported centrally.

Box 1. ICD codes for COVID-19

According to WHO guidelines, “COVID-19 death is defined for surveillance purposes as a death resulting from a clinically compatible illness in a probable or confirmed COVID-19 case, unless there is a clear alternative cause of death that cannot be related to COVID disease (e.g. trauma)”. Separate codes were issued for cause of death by testing or by clinical or epidemiological diagnosis.

- An emergency ICD-10 code of ‘U07.1 COVID-19, virus identified’ is assigned to a disease diagnosis of COVID-19 confirmed by laboratory testing.
- An emergency ICD-10 code of ‘U07.2 COVID-19, virus not identified’ is assigned to a clinical or epidemiological diagnosis of COVID-19 where laboratory confirmation is inconclusive or not available.
- Both U07.1 and U07.2 may be used for mortality coding as cause of death. See the International guidelines for certification and classification (coding) of COVID-19 as cause of death at the link below.
- In ICD-11, the code for the confirmed diagnosis of COVID-19 is RA01.0 and the code for the clinical diagnosis (suspected or probable) of COVID-19 is RA01.1.

Source: https://www.who.int/classifications/icd/covid19/en/ and https://www.who.int/classifications/icd/Guidelines_Cause_of_Death_COVID-19-20200420-EN.pdf?ua=1.

Deaths occurring in hospital will almost certainly have been subject to a test, with positive cases confirmed and registered as COVID-19 related deaths. In care homes and in the community, depending on the testing practice and capacity, there may be no confirmed infection, and therefore the death certificate may mention

only a suspected case of COVID-19, or COVID-19 as a contributory factor. This can result in both under- and over-reporting of the number of deaths caused by COVID-19. The World Health Organization (WHO) published international guidelines on coding and certification of deaths due to COVID-19, which recommended the inclusion of suspected/probable cases in data reporting on deaths (Box 1). Not all countries have adapted their coding practices accordingly.

Countries vary in the administrative processes of formally reporting deaths with different time delays between the moment of death, the reporting of death, and the inclusion of reported deaths in nationally reported statistics. The issue of incomplete reporting is a problem not only for COVID-19 related deaths but also when examining overall patterns of mortality with figures for the most recent periods that are in some cases subject to significant under-reporting (as discussed above). The depth of coding of the main cause and associated causes of death may also differ, to the extent that COVID-19 is mentioned on the death certificate.

References

Aron, J. et al. (2020), A pandemic primer on excess mortality statistics and their comparability across countries, Our World in Data, https://ourworldindata.org/covid-excess-mortality.

Enki, D. et al. (2016), "Comparison of Statistical Algorithms for the Detection of Infectious Disease Outbreaks in Large Multiple Surveillance Systems", No. 11, Public Library of Science (PLoS), http://dx.doi.org/10.1371/journal.pone.0160759.

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Nielsen, J. et al. (2012), "Pooling European all-cause mortality: methodology and findings for the seasons 2008/2009 to 2010/2011", Epidemiology and Infection, Vol. 141/9, pp. 1996-2010, http://dx.doi.org/10.1017/s0950268812002580.

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Dataset available in OECD.Stat at
http://stats.oecd.org/Index.aspx?DataSetCode=HEALTH_MORTALITY.
Detailed data sources available here.

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