AN TSEIRBHÍS CHRÓINÉARA
CORONER SERVICE

COVID-19 PANDEMIC REPORT ON CORONER'S INQUIRIES INTO DEATHS: EPIDEMIOLOGY AND TOTAL AND EXCESS MORTALITY IN THE DISTRICT OF KILDARE MARCH TO JUNE 2020.

The Coroner is the independent Judicial Officer of the State responsible for the forensic and medico-legal investigation of certain categories of death in Ireland. The functions and role of the Coroner are set out in the ***Coroners Act 1962-2019****. Novel Coronavirus (2019 nCov or SARS-CoV-2) infection is a notifiable Disease under the* ***Infectious Diseases (Amendment) Regulations 2020*** *and deaths due wholly or partly to a notifiable disease must be reported to the Coroner under* ***Schedule 2, paragraph 13 of the Act****. Under* ***paragraph 23(b) of that Schedule*** *deaths occurring in any public or private institution for the care of elderly or infirm persons with a physical or mental disability, including a nursing home, must also be reported. Further, deaths must be reported where the death occurred in such circumstances as may, in the public interest, require investigation under the* ***Coroners Act 1962-2019 section 16 (1) (a) (v)*** *and also under some of the other categories in that section in conjunction with a Covid-19 question. This report from the Kildare Coroner's District chronicles and analyses the deaths notified to the Coroner during March, April, May and June 2020 during the Covid-19 Pandemic Emergency from the date of the first Covid-19 death on 11th March 2020 to 30th June 2020.*

First Report: August 2020

Executive Summary:

COVID-19 PANDEMIC: REPORT OF CORONER'S INQUIRIES INTO EPIDEMIOLOGY AND TOTAL AND EXCESS MORTALITY IN THE DISTRICT OF KILDARE MARCH TO JUNE 2020.

All Covid-19 deaths and all nursing home and residential home deaths in Ireland must by law be reported to the Coroner, the independent Judicial Officer of the State, in the District in which they occur. This enables accurate and early collation of these death reports. Between 1st January 2015 and 30th June 2020 3,342 deaths were reported to the Coroner's District for Kildare. From 11th March 2020, when the first Covid-19 death occurred in Ireland, to 30th June 2020 there were 1,738 Covid-19 deaths nationally of which 139 were reported in Kildare with 113 (81%) of these deaths in nursing and residential homes. The calculated excess number of deaths notified for January to June 2020 compared with 2015-2019 was 198 (41%) of the 484 total deaths reported with a 131 (45%) excess in the 293 deaths in nursing and residential homes. Covid-19 deaths accounted for 70% and 86% of these excess deaths respectively. Following subtraction of the 18 non-natural cause deaths and 139 Covid-19 deaths from the total excess there remained an unexplained excess of 62 deaths due to natural causes in March to June of 2020 compared with 2015-2019. The peak excess total death percentage was 359% in April 2020, commencing with a small excess in March (30%), continuing into May (63%) and falling again in June (37%). In the nursing and residential home setting those excess death percentages were most marked at 527% in April, with 27% in March, 54% in May and 17% in June. Underlying medical conditions were recorded in 99% of those dying from Covid-19 and the average age of the deceased was 82.5 years with median of 78 years and 55% of those dying were female and 45% male. The clinical epidemiology and documented excess mortality of the reported deaths are chronicled and analysed to learn also about the future challenges with the continuing Covid-19 infection. A centralized national mortality database providing near real-time death certification enhances infectious disease surveillance and prompt clinical epidemiology and mortality excess studies and reduces under-reporting of Covid-19 deaths.

1. Introduction:

The Coroner is the independent Judicial Officer of the State responsible for the forensic and medico-legal investigation of certain categories of death in Ireland. There are 39 Coroner Districts in the State serving a population of 4.9 million. Deaths are reported to the Coroner in the District in which they occur. The functions and role of the Coroner are set out in the *Coroners Act 1962-2019.*[1] SARS-CoV-2 (Covid-19) infection is a notifiable disease under the *Health Care Act 1947 and Infectious Diseases (Amendment) Regulations 2020* and deaths due wholly or partly to a notifiable disease must be reported to the Coroner under *Schedule 2 of the Coroners Act*.[2] Also under that *Schedule* deaths occurring in any public or private institution for the care of elderly or infirm persons with a physical or mental disability, including a nursing home, must be reported. In the five year period 2015-2019, the Kildare District Coroner's Office in Ireland, serving a population of 223,000, enquired into 2,858 deaths in the County, directed 763 post mortem examinations and completed 300 public hearing inquests.[3] In the first six months of 2020 the figures were 484, 74 and 9 respectively (inquest hearings in the State were temporarily suspended on 15th March 2020 due to the Covid-19 Pandemic Emergency Restrictions). The number of Covid-19 deaths reported in the six months was 139 of which 113 occurred in nursing and residential homes.

This observational study was carried out to chronicle and analyse the total number of deaths notified to the Coroner during the period January through June 2020 and to compare these numbers to the same periods in 2015-2019 to ascertain the epidemiology of Covid-19 deaths in Kildare and to calculate excess total mortality, excess deaths due to Covid-19 and excess non-Covid-19 natural deaths during the period. In many countries, the number of Covid-19 deaths in long term residential care facilities has accounted for a large proportion of the total deaths due to the infection. This study reviews care home deaths in some detail to assess that phenomenon further.

2. Methods:

The numbers of notified deaths for the preceding five years in the Coroner's register records 2015 to 2019 (2,858 deaths) have been compared with the 484 deaths to 30th June 2020 and analysed for the months of January to June in those six years. The certification of Covid-19 as a cause of death under the Civil Registration Act 2004 followed the clinical case definition criteria as set down by the World Health Organisation / European Centre for Disease Prevention and Control / Health Protection Surveillance Centre (HPSC) in the categories of clinical, radiological and laboratory criteria.[4] The case classification is divided into: *Possible case* - any person meeting the clinical criteria; *Probable case* - any person meeting the clinical criteria with an epidemiological link or any person meeting the diagnostic criteria; and *Confirmed case* - any person meeting the laboratory criteria. Calculated excess deaths are presented as numbers, percentages and P-scores ([x minus the expected value of x for the population], divided by the expected value for the population).[5,6] The excess deaths were analysed under several categories: total excess, excess from nursing and residential homes and excess natural deaths following exclusion of the non-natural causes and Covid-19 deaths.

3. Results and Analyses:

3.1 Total numbers of deaths notified to the Coroner in January to June 2020

The total and average numbers of deaths reported to the Coroner monthly in the first six months of the years 2015 – 2020 was 1,912 (to 30th June 2020) and are set out in **Figure 1.** Total, average and excess deaths for the first half-years of 2015 - 2020 are shown in **Table 1**.

The number of notified deaths increased dramatically in April 2020 to 188. The 139 deaths arising as a result of Covid-19 mortality are shown by weeks in **Figure 2**.

3.2 Total and excess mortality figures from all notifications

The phenomenon of excess mortality is an important concept for public health and infectious disease epidemiology within the total mortality figure. It is defined as the number of deaths from all causes relative to what would normally have been expected for a given period.[5,6] There were no excess deaths calculated in this study for January to February 2020 when compared with 2015 to 2019. The excess deaths notified to the Coroner in March to June 2020 were greatest in April at 359%. The excess commenced at a lower level from the latter half of March (30%) and then continued after the April peak into May (63%) and June (37%), with an overall 117% for March to June, as illustrated in **Table 2**.

3.3 Total and excess mortality figures from nursing and residential home notifications

The total and average numbers of notified deaths from nursing and residential homes were markedly increased in March to June 2020 compared to 2015 – 2019. The excess notified deaths in those care homes for March – June 2020 were 27%, 527%, 54% and 17% compared to 2015 – 2019 (with overall 142% excess). These numbers are shown in **Figure 3 and Tables 3 and 4**.

3.4 Excess mortality due to natural causes other than Covid-19 infection

The number of deaths and excess deaths notified due to natural causes for March to June 2020 were calculated taking into consideration these figures together with the numbers of autopsies directed which indicated whether deaths in those cases were due to non-natural or natural causes. The non-natural cause deaths and Covid-19 deaths were subtracted for each of the months to give the figures for natural non-Covid-19 deaths with excess of 27%, 100%, 18% and 18% for March, April, May and June compared to 2015-2019 and there remained an unexplained residual excess of 62 deaths out of those remaining due to natural causes (overall 38% residual excess compared to the 2015-2019 such deaths). These are set out in **Table 5.** The corresponding figures are presented in **Table 4** for the nursing and residential homes deaths: natural non-Covid-19 deaths with excess of 17% and 118%, for March and April respectively with none for May and June compared to 2015-2019 (unexplained excess of 28 deaths or overall 28% residual excess).

3.5 Demographics and underlying medical conditions in persons dying from Covid-19 infection

The Coroner's District for Kildare recorded a 459% increase in total notified deaths reported in April 2020, compared with the preceding five years with a corresponding 627% increase in the nursing and residential homes category notified deaths contained within those figures, over the same periods.

Of the total of 139 Covid-19 deaths notified to 30th June 2020 (4 in March 2020, 110 in April 2020, 19 in May 2020 and 6 in June 2020): 113 were residents of nursing and residential homes; 25 occurred in the General Hospital (patients admitted directly from the community); and 1 in the General Community. Of the 139 Covid-19 deaths notified, 103 (74%) were diagnosed by a positive SARS-CoV2 swab (most also with a confirmed clinical history) and the remaining 36 (26%) were confirmed on clinical case history in the absence of a positive swab result (including a small number definitively diagnosed clinically even with a negative swab result having been reported). The average age of the deceased was 82.5 years (range 54 to 99) with median of 78 years. Of the deceased, 77 (55%) were female and 62 (45%) were male which contrasts with the almost even 50% split in the overall national mortality figures reflecting the larger female population in nursing and residential homes. There was a small excess of non-Covid-19 natural deaths notified from nursing homes in March 2020 (17%) compared with a large excess in April 2020 (118%) but none recorded in May or June 2020 (**Table 4**).

Three nursing homes (NH) accounted for 75 (54%) of the 139 Covid-19 notified deaths in Kildare and thus for 66% of 113 the nursing and residential home Covid-19 deaths: NH 1 for 36 deaths, NH 2 for 21 and NH 3 for 18, each comprising a sizeable percentage of their resident population. The next three nursing homes with highest mortality (more than 5 but less than 10 deaths) accounted for 23 deaths, and thus 87% of all nursing and residential home deaths were concentrated in 6 nursing homes.

The associated or underlying medical conditions reported in the 139 persons who died directly from Covid-19 or whose death had Covid-19 as a contributory cause were taken from the original reports to the Coroner detailing clinical conditions. Of the 139 cases notified, 137 (99%) had underlying conditions: 80 (58%) cardiovascular (including hypertension); 78 (57%) dementia; 30 (22%) respiratory; 19 (43%) neurological; 17 (12%) oncological; 15 (11%) diabetes; and 9 (7%) renal.

The HPSC data for underlying medical conditions in cases of death with confirmed Covid-19 in Ireland showed that 92% had conditions: chronic heart disease (42.5%); chronic neurological disease (31.4%); chronic respiratory disease (17.1%); cancer/malignancy (15.1%); and diabetes (14.6%).[7]

4. Discussion:

4.1 Diagnosis of Covid-19 infection

The criteria for the diagnosis of Covid-19 (confirmed, probable or possible case criteria) as a direct or contributory cause of death for the purpose of death registration is critical in comparing national and international epidemiological studies of Covid-19. In a natural cause

death such as pneumonia be it bacterial, viral or specifically SARS-CoV-2 viral pneumonia (Covid-19 pneumonia), the Coroner must be satisfied that the death is due to natural causes and that the attending doctor is in a position to sign with confidence the Death Notification Form (DNF) including the medical cause of death. If the Coroner is so satisfied, then that doctor completes the DNF under the Civil Registration Act 2004 and the Coroner completes a certificate under section 41(2) of that Act confirming the inquiry into the death has been completed.[8] As with many clinical diagnoses, a single criterion or test does not determine the diagnosis of Covid-19. A negative result in swabbing does not exclude the diagnosis. Covid-19 reverse transcription polymerase chain reaction (RT-PCR) testing has been reported to be more than 90% reliable in sensitivity, specificity and accuracy from the medical laboratory perspective. However, the site of the swab (nasal, oropharyngeal) or of a deeper lung sputum specimen; the competence and experience of the healthcarer taking the swab; the viral load in the subject; and the timing of the sample in the pathogenesis of the viral infection all influence the wider accuracy of the result. The incidence of both false negatives and false positives remains a subject of research and is variable with ongoing work by the European Commission in collating diagnostic test performance criteria.[9]

The final diagnosis of Covid-19 is an assessment of clinical probability based on the case criteria and all the clinical information and then becomes the confirmed certified cause of death under the Civil Registration Act requirements. No Covid-19 death in the Kildare Coroner's District, being due to natural causes and with no other circumstances requiring further inquiry, has needed to proceed to *post mortem* examination under Coroner's direction. This has recognised implications for forensic and clinical pathology research but is balanced by both medical and societal practical advantages in less risk of exposure of pathology staff to infection and timely interment and cremation.[10]

The classical symptoms of Covid-19 of cough, fever and shortness of breath were not always the manifestations of the infection in the older population in whom lethargy, withdrawal, sudden general deterioration and gastrointestinal symptoms became recognised as clinical presentations as the pandemic developed. In addition, loss of smell, loss of taste and distortion of taste were also only later recognised as classical symptoms.[4] These less classical symptoms and later recognised symptoms may have led to underdiagnosis of Covid-19 in the older population in the initial periods.

4.2 Reporting of deaths to the Coroner and death certification

In Ireland, a total of 25,474 confirmed cases of Covid-19 were recorded to 30th June. The first confirmed case was on 29th February 2020 and the first confirmed nursing home case was notified on the 16th March. A total of 1,738 deaths nationally due to the infection were notified from the first death on 11th March to 30th June 2020 of which 139 (8% of the national deaths) occurred in the County of Kildare, 113 (81%) of them in nursing and residential homes (being 11% of the national total of 977 nursing home deaths).

In accordance with Coroner's procedure in Ireland when a death is notified to the Coroner in whose geographic district the death occurs, the Coroner inquires into each death by speaking with the healthcare staff in the nursing or residential home (nurse and/or doctor), in the hospital (the attending doctor[s]) or community (the General Practitioner) where the death occurred to ascertain the facts, the circumstances of the death, the clinical and epidemiological details and the medical cause of death. The Coroner's inquiry includes a

question to the responsible healthcarer regarding communication with the family of the deceased about the cause of death and its circumstances. The Coroner's Certificate is forwarded directly to the Registrar of Deaths in the Civil Registration Service and the DNF is presented to the Registrar by the family in due course for the purposes of death registration and their application for the Death Certificate.

The family of a deceased person has up to three months to register the Death with the Civil Registration Service in Ireland, a longer period than in other European Union jurisdictions and the United Kingdom which leads to a longer lag period for the collation of clinical death statistics.[8,11]

All deaths due to a notifiable disease must be reported to the Coroner and all deaths occurring in a nursing home or residential must also be reported. These are different requirements to other similar common law jurisdictions with a coronial system, such as England & Wales, where no such specified requirements exist under statute.[12] The Coroners Service of Ireland published a *Guidance in relation to the Coroners Service and Deaths due to Covid-19 infection* to assist healthcarers with a number of scenarios when a death was being investigated and how a diagnosis of Covid-19 death was confirmed for the purpose of death registration.[13]

4.3 Total increase in death notifications generally and in the nursing and residential homes setting

County Kildare accounts for 4.5% (223,000) of Ireland's national population (4.9 million); had a range from 8% to a peak of 11% of the total of 1,738 national Covid-19 deaths at different times during the Covid-19 Pandemic to date; and a range from 11% to a peak of 16% of the total of 977 national nursing home Covid-19 deaths during the period studied. The Department of Health reported on June 17th 2020 that 18% of the 30,000 nursing home residents nationally had tested positive for SARS-CoV-2.[14] The first nursing home resident confirmed with a Covid-19 diagnosis in Ireland was on 16th March 2020.[14] There are 24 nursing homes (4% of the national 581 homes) caring for 1,701 residents (5.5% of the national nursing home population of 31,250) and an additional number of Long Term Care Facilities in Kildare reporting deaths to the Coroner. Kildare had a disproportionate number of notified Covid-19 deaths most particularly at the peak in April 2020 and continuing into May 2020.[11] Kildare also had the joint second highest reported percentage (6%) of confirmed Covid-19 cases throughout the period studied with the reported figure at 30th June 2020 of 1,488 cases (6%) of a total of 25,474 confirmed cases in Ireland to that date.[15]

4.4 Excess mortality in death notifications generally and in the nursing and residential homes setting

Excess mortality figures must be interpreted with caution in a wider epidemiological context. Thus the observed excess mortality seen in the deaths reported to the Kildare Coroner for January 2018 coincided, particularly amongst those aged 65 years and older, with high levels of influenza circulation.[16] A smaller excess mortality was seen in February 2019 coinciding with another smaller influenza outbreak. These excess deaths are apparent in **Figure 1**.

The excess mortality observed in March through June 2020 in this study coincided with the Covid-19 pandemic and after the seasonal peak in pneumonia and influenza deaths had passed. The overall calculated excess number of total deaths notified for January to June 2020 was 198 (41%) of the 484 total deaths with a 131 (45%) excess from the 293 deaths in nursing and residential homes. The increase in total death notifications in March 2020 may have been an early indicator of unrecognised Covid-19 morbidity and mortality with the increase in the nursing and residential homes category of notified deaths contained within those figures. The peak increase was in April in total notified deaths with smaller increases in May and June 2020, compared with the preceding five years with corresponding increases in the nursing and residential homes category of notified deaths for those months respectively.

The incidence of dementia (Alzheimer's, vascular and mixed) as an underlying condition in those dying from Covid-19 in nursing homes, when separated out from the more general category of chronic neurological disease, was higher than reported in the Covid-19 deaths in general. This reflects the clinical demographics of the nursing homes residential population. The presence of dementia has clinical and social behaviour implications in the setting of managing a Covid-19 outbreak in nursing homes. This will remain a critical consideration in future planning of infection control measures in these settings. Studies of early or premature mortality of those with underlying medical conditions are also required to address the question of life-years lost by this population. Mortality figures may also see some decreases over subsequent months following the excess seen in March to June 2020.

The percentages of excess total deaths, of excess deaths excluding those due to Covid-19 and of excess natural non-Covid-19 deaths recorded for March, May and June 2020 compared to the 2015-2019 averages for those months were greatly less than those seen in the peak figures for April 2020. The 139 Covid-19 deaths accounted for 68% of the total of 204 excess deaths in the March to June 2020 numbers.[5,6] This raises the question as to whether undocumented deaths due to Covid-19 occurred in the nursing homes but were not recognised as being due directly or indirectly to the infection as a consequence of non-classical presentation in the older population and the less intense testing for SARS-CoV-2 in the nursing and residential home setting at that time and were thus under-reported. Focused intense cycles of SARS-Cov-2 testing of residents and staff in nursing and residential homes have since been implemented and should address this diagnostic and surveillance challenge at least in part.[14,17,18] The continuing trends for later May and June were markedly downwards compared to the peak weeks in April 2020 and early May.

The excess mortality seen over March to June 2020 collectively due to natural causes but not attributed to Covid-19 may have been due to: an underdiagnosis of Covid-19 related deaths (non-respiratory symptoms not recognised, atypical presentations etc.); other Covid-19 linked morbidities and mortalities (such as acute myocardial infarction, increased coagulopathy with effects on major organs, acute renal injury etc.); non-Covid-19 morbidities and mortalities; a combination of these factors requiring further examination; or other reasons requiring further examination, including patient underuse of or reduction in general medical services. Examination of these potential causes require further study following this first acute phase of the pandemic.

The downward trend in total deaths and Covid-19 deaths in Kildare notified in May and June compared to April 2020 is large and in line with the national and international trends but remains in excess of the total numbers notified for the same periods in 2015-2019.

4.5 Limitations of this report

The numbers of deaths reported in this analysis relate to one Coroner's District and are therefore regional although they form a sizable proportion of the national figures. The months of March, May and June 2020 have relatively smaller numbers of deaths reported and thus excess figures need to be interpreted carefully. To address these limitations and the year-on-year variations, the figures were examined under a number of headings in the totality and overall trend for both the four months and the half-year of 2020 compared with the corresponding total and monthly numbers from the previous five years 2015-2019 and were found to be consistent with the epidemiological pattern, findings and conclusions of increased mortality and excess mortality.

4.6 Learning from the analysis of Covid-19 deaths and excess mortality

There are 581 registered nursing homes in Ireland, providing care to 31,250 people nationally.[19] Covid-19 deaths in nursing and residential homes have accounted for 61% of all such deaths in Ireland. This pattern has also been seen internationally. The Coroner's reports from Kildare and nationally on mortality and excess mortality may give a guide in assessing the needed resourcing for the nursing and residential home setting to include continuing Covid-19 testing, personal protection equipment and medical and healthcare staffing as measures to be implemented to minimise the risk of a further Covid-19 morbidity and mortality surge together with care plans (including enhanced palliative and end of life care and training) and necessary therapies for these interventions in such an event.[18-21] Coroners' data are a source of near real-time reporting whilst the data are awaited from other sources such as the General Register Office of Ireland (GRO) and the Central Statistics Office of Ireland (CSO) to be collated over subsequent weeks and months. The Covid-19 epidemiology is also regularly updated on the HPSC website.[15] International comparisons of Covid-19 mortality and with particular reference to care home facilities are difficult due to the varying requirements for methods of reporting Covid-19 deaths in different countries.[5,6, 22-25] Excess deaths in the period of the Covid-19 pandemic will only become clearer over time but will require careful analysis and interpretation. Ireland has been cited as having one of the higher Covid-19 nursing home death rates internationally but this may be in part a reflection of the robust and accurate notification system through both the HPSC and the Coroner Service.[24-30] Countries with strong reporting systems and inclusive criteria for Covid-19 death assessment will benefit from their early examination of total and excess mortality in this pandemic.

5. Conclusions:

This report confirms a consistent excess mortality from Covid-19 in March through June 2020 from a number of different analytical perspectives. The Covid-19 pandemic is the largest global pandemic in a century with enormous health, mortality, social and economic consequences. Human society is still in the early stages of learning about this infection and the causative virus SARS-CoV-2. Figures of deaths from Covid-19 are by definition a sad and late metric in the analysis of the course of the pandemic. Further anonymised medical and epidemiological information and evidence from which the figures in the study were drawn remain to be studied from the many tragic individual cases recorded by the Kildare Coroner's office and Coroners' offices nationally through continuing forensic medicine and public health public medicine research. These data and similar data nationally and

internationally need also to be subject to ongoing examination by expert public health epidemiologists with statistical analysis of the more detailed clinical information reports from which mortality figures are derived with clear future challenges still remaining from potential recurrent surges in Covid-19 infection.

It is important and proper to say that each figure or number in the report is much more than a number and refers to a unique and loved individual who died before their time in extraordinary and tragic circumstances often without the usual family and social comforts of our society afforded to those who are ill and approaching the end of their life. Each individual's life and death story was heard and respected with the dignity due to them in the individual consultations undertaken by the Coroner with the healthcarers involved in their care as part of the inquiry into their deaths.

The challenges from Covid-19 still facing society generally and nursing and residential homes more specifically for the foreseeable future will require new plans which are evidence-based and this evidence flows from examining multi-sourced epidemiological data on mortality and morbidity.[14, 17-21] An Expert Panel on Nursing Homes was established in Ireland by the Department of Health on 5th June 2020 to examine the national and international responses to the COVID-19 crisis and the emerging best practice and to make recommendations to the Minister for Health to ensure that all protective Covid-19 response measures are planned for, in light of the expected ongoing Covid-19 risk and impact for nursing and residential homes over the next 6-18 months.[31]

A medical caution must be added relating to later complications from the infection causing later morbidity and mortality in persons who have apparently recovered from the Covid-19 infection but who develop post-viral pathology in major organs such as the lungs, heart and kidneys and also neurological sequelae which will be another source of delayed morbidity and excess mortality requiring future examination.

The necessity for a deeper clinical study of mortality reinforces the need to have a better, centralised national Coroner Service database to provide prompt and accurate epidemiological analysis and certification of deaths reported.[32] Similar near-real time central death investigation databases in different countries would enhance international morbidity and mortality comparisons in the Covid-19 pandemic and future similar occurrences and reduce under-reporting of such deaths in pandemics.[5,6]

References:

1. http://revisedacts.lawreform.ie/eli/1962/act/9/front/revised/en/html. Accessed 26th June 2020.

2. Health Care Act 1947 and Infectious Diseases (Amendment) Regulations 2020. http://www.irishstatutebook.ie/eli/1947/act/28/enacted/en/html. Accessed 26th June 2020.

3. Information website of the Kildare District Coroner. http://kildare.ie/countycouncil/countycoroner/Roleofcoroner/index.html. Accessed 26th June 2020.

4. Health Protection Surveillance Centre Covid-19 case definitions. https://www.hpsc.ie/a-z/respiratory/coronavirus/novelcoronavirus/casedefinitions/. Accessed 26th June 2020.

5. Aron J and Muellbauer J (2020). Measuring excess mortality: England is the European outlier in the Covid-19 pandemic. voxeu.org, CEPR Policy Portal, 18th May 2020. https://voxeu.org/article/excess-mortality-england-european-outlier-covid-19-pandemic. Accessed 22nd June 2020.

6. Aron J, Muellbauer J, Giattino C and Ritchie H (2020). A pandemic primer on excess mortality statistics and their comparability across countries. Our World in Data, June 29 2020. https://ourworldindata.org/covid-excess-mortality. Accessed 30th June 2020.

7. Underlying conditions in confirmed cases of Covid-19 in Ireland. https://www.hpsc.ie/a-z/respiratory/coronavirus/novelcoronavirus/surveillance/underlyingconditionsreports/Underlying%20conditions%20summary.pdf. Accessed 29th June 2020.

8. Civil Registration Act 2004. http://www.irishstatutebook.ie/eli/2004/act/3/enacted/en/html. Accessed 26th June 2020.

9. Diagnostic testing and screening for SARS-CoV-2. https://www.ecdc.europa.eu/en/covid-19/latest-evidence/diagnostic-testing. Accessed 26th June 2020.

10. Royal College of Physicians of Ireland, Faculty of Pathology. Recommendations Relating to Autopsy Practice during the Covid-19 Pandemic (March 2020) and Recommendations Relating to Post-Mortem Examination Practice during the Covid-19 Pandemic (May 2020).

11. Measuring Mortality Using Public Data Sources - CSO - Central Statistics Office. https://www.cso.ie/en/releasesandpublications/br/b-mpds/measuringmortalityusingpublicdatasources/. Accessed 1st July 2020.

12. Chief Coroner Guidance – COVID-19. COVID-19 as a natural cause of death, paras. 17-19. HHJ Mark Lucraft, Chief Coroner, England & Wales, 26th March 2020.

13. Guidance in relation to the Coroners Service and Deaths due to Covid-19 infection, *version 6*. Coroner Service, Ireland, 19th April 2020. http://www.coroners.ie. Accessed 26th June 2020.

14. Paper provided to Special Committee on COVID-19 Response. https://www.gov.ie/en/collection/8d7df-department-of-health-nursing-homes-papers-special-covid-19-committee-june-2020/. Accessed 26th June 2020.

15. Health Protection Surveillance Centre Covid-19 Hub. https://covid19ireland-geohive.hub.arcgis.com. Accessed 1st July 2020.

16. Annual Epidemiological Report for Influenza and Other Seasonal Respiratory Viruses, 2017/2018. https://www.hpsc.ie/a-z/respiratory/influenza/seasonalinfluenza/surveillance/influenzasurveillancereports/previousinfluenzaseasonssurveillancereports/20172018season/Influenza%202017-2018%20Annual%20Summary_Final.pdf . Accessed 26th June 2020.
17. Oireachtas (Parliamentary) Special Committee on Covid 19. https://data.oireachtas.ie/ie/oireachtas/committee/dail/33/special_committee_on_covid-19_response/submissions/2020/2020-06-18_opening-statement-jim-breslin-secretary-general-department-of-health-scc19r-r-0254a_en.pdf. Accessed 26th June 2020.

18. Overview of the Health System Response to Date – Long term residential healthcare settings. Department of Health, Dublin, Ireland, 22nd May 2020. https://www.gov.ie/en/news/7e0924-latest-updates-on-covid-19-coronavirus/#overview-of-the-health-system-response-to-covid-19-ltrcs. Accessed 26th June 2020.

19. Health Information and Quality Authority HIQA (2019) *Overview report on the regulation of designated centres for older persons – 2018.* https://www.hiqa.ie/reports-and-publications/key-reports-and-investigations/overview-report-regulation-designated. Accessed 26th June 2020.

20. World Health Organisation 2020, Infection Prevention and Control guidance for Long-Term Care Facilities in the context of COVID-19 Interim Guidance (21st March 2020)

21. Department of Health, Dublin, Ireland. Ethical considerations relating to long-term residential care facilities. https://www.gov.ie/en/publication/37ef1-ethical-considerations-relating-to-long-term-residential-care-facilities/. Accessed 26th June 2020.

22. EuroMOMO Covid-19 mortality statistics. https://www.euromomo.eu/graphs-and-maps. Accessed 1st July 2020.

23. Preliminary Estimate of Excess Mortality During the COVID-19 Outbreak — New York City, March 11–May 2, 2020. MMWR Morb Mortal Wkly Rep 2020;69:603–605. https://www.cdc.gov/mmwr/volumes/69/wr/mm6919e5.htm?s_cid=mm6919e5_w. Accessed 26th June 2020.

24. European Centre for Disease Control. https://www.ecdc.europa.eu/en/publications-data/surveillance-COVID-19-long-term-care-facilities-EU-EEA. Accessed 26th June 2020.

25. COVID-19: Comparison of Mortality Rates between Ireland and other countries in EU and Internationally. National Public Health Emergency Team, Department of Health, Dublin, Ireland, 26th May 2020.

26. Surveillance of COVID-19 at long- term care facilities in the EU/EEA. European Centre for Disease Prevention and Control, 19th May 2020. https://www.ecdc.europa.eu/sites/default/files/documents/covid-19-long-term-care-facilities-surveillance-guidance.pdf. Accessed 26th June 2020.

27. Comas-Herrera A, Zalkaín J, Litwin C, Hsu AT, Lane N and Fernández J-L (2020) Mortality associated with COVID-19 outbreaks in care homes: early international evidence. Article in LTCCOVID.org, International Long-Term Care Policy Network, CPEC-LSE, 21 May 2020

28. Mortality Census of Long Term Care Residential Facilities 1 January – 19 April 2020. Health Service Executive. Department of Health, Dublin, Ireland, 1st May 2020.

29. Health Protection Surveillance Centre Covid-19 epidemiology statistics. https://www.hpsc.ie/a-z/respiratory/coronavirus/novelcoronavirus/casesinireland/. Accessed 1st July 2020.

30. Horgan-Jones J, Carswell S. The human cost of Covid-19: Ireland's care homes with the most deaths revealed. Irish Times, May 28, 2020 https://www.irishtimes.com/news/ireland/irish-news/the-human-cost-of-covid-19-ireland-s-care-homes-with-the-most-deaths-revealed-1.4264170. Accessed 26th June 2020.

31. Nursing Home Expert Panel. https://www.gov.ie/en/collection/5f703-nphet-covid-19-subgroup-nursing-homes-expert-panel/. Accessed 29th June 2020.

32. McGovern C and Cusack DA. The case for a cost-effective central coronial database following an analysis of coronial records relating to deaths in nursing homes. *Journal of Forensic & Legal Medicine*. 2014; 25; 21-25. https://doi.org/10.1016/j.jflm.2014.04.002

Professor Denis A. Cusack,
Coroner for the District of Kildare,
Cróinéir, Ceantar Chill Dara.

20th August 2020 (Reprint: 9th April 2021).

This report is issued pursuant to the statutory role and functions of the Coroner in receiving and investigating deaths notified to the Coroner in both the individual and public good and interest to assist further in informing appropriate healthcare and operational assessments and measures to be taken in the continuing Covid-19 pandemic emergency.

All data and information in this report have been anonymised.

This report remembers and honours those who have died in the pandemic.

Figures and Tables

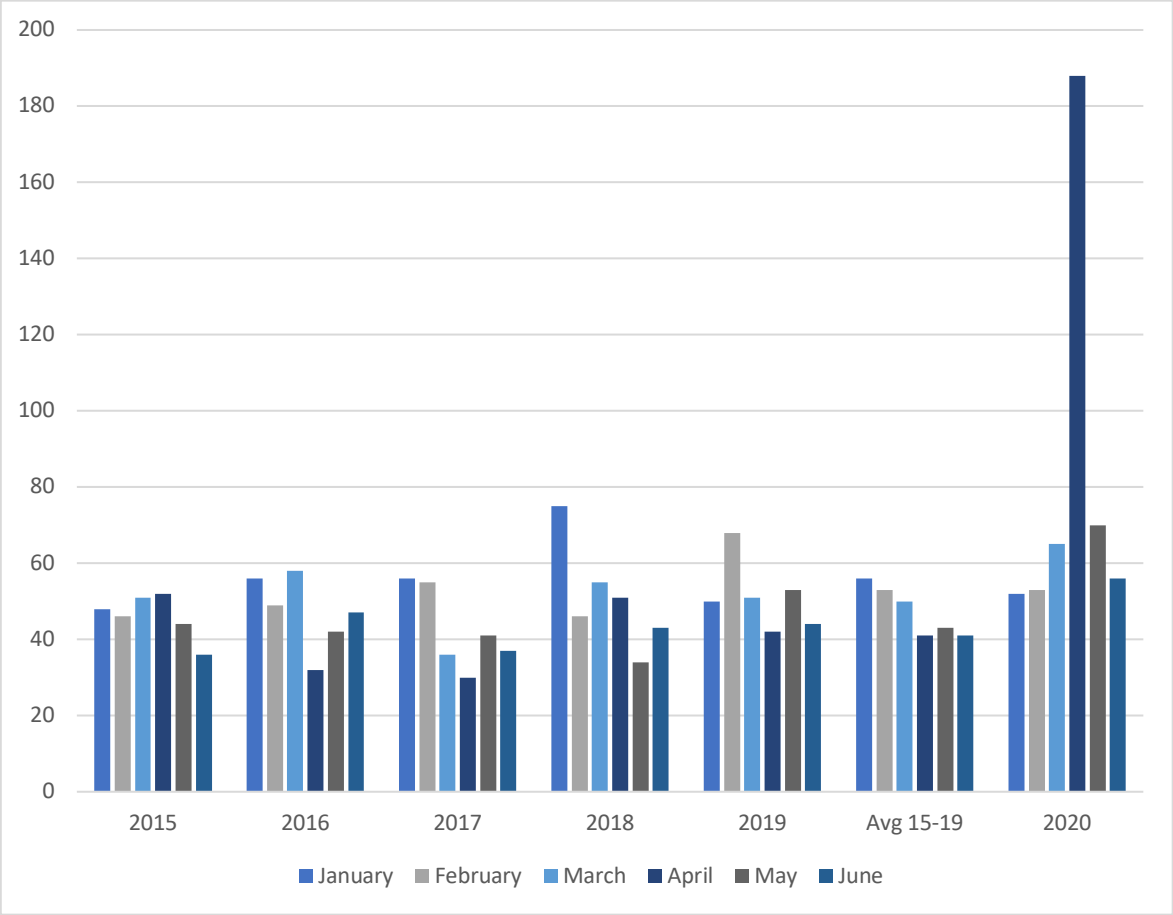

Figure 1. *Total and average numbers of notified deaths monthly 2015 – 2020.*

Table 1. *Total, average and excess numbers of notified deaths in each half-year January to June 2015 – 2020.*

YEAR	2015	2016	2017	2018	2019	Average 2015-19	2020 with excess
DEATHS	277	284	255	304	308	286	484 (169%) Excess 198 (69%) P-score = 0.69

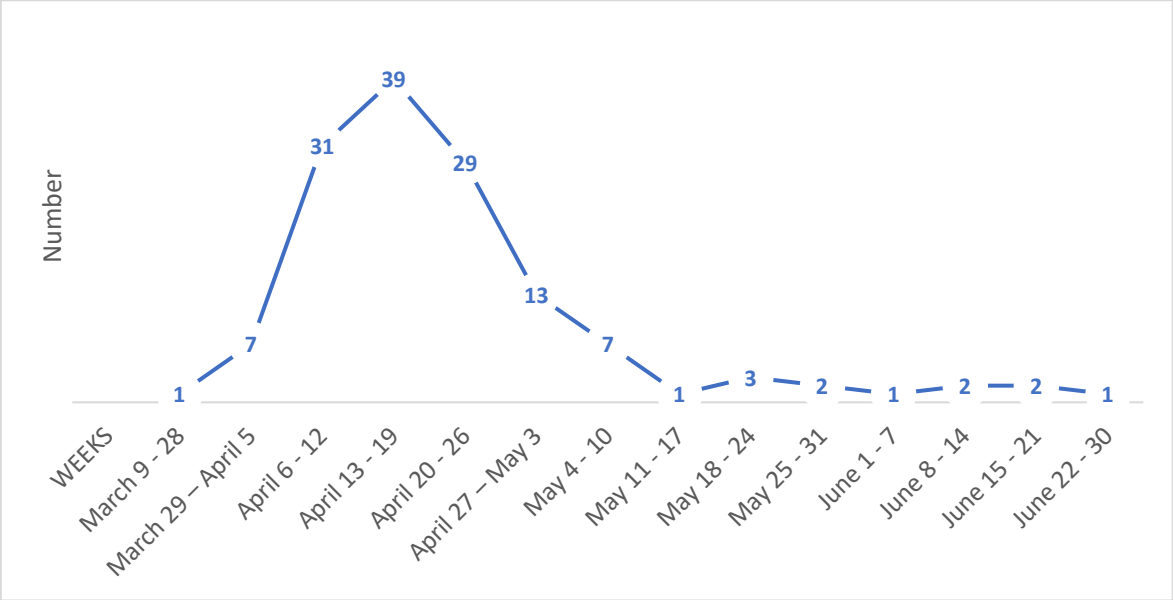

Figure 2. *Notified Covid-19 deaths by weeks.*

Table 2. *All deaths notified March to June 2015 – 2020 with mortality excess and residual (non-Covid-19) mortality excess.*

DEATHS	
MARCH	
Average 2015-2019	50
2020	65 (130%)
Excess	15 (30%) P-score = 0.30
Less 4 Covid-19 deaths:	
residual excess	11 (22%) P-score = 0.22
APRIL	
Average 2015-2019	41
2020	188 (459%)
Excess	147 (359%) P-score = 3.59
Less 110 Covid-19 deaths:	
residual excess	37 (90%) P-score = 0.90
MAY	
Average 2015-2019	43
2020	70 (163%)
Excess	27 (63%) P-score = 0.63
Less 19 Covid-19 deaths:	
residual excess	8 (19%) P-score = 0.19
JUNE	
Average 2015-2019	41
2020	56 (137%)
Excess	15 (37%) P-score = 0.37
Less 6 Covid-19 deaths:	
residual excess	9 (22%) P-score = 0.22
MARCH to JUNE TOTALS	
Average 2015-2019	175
2020	379 (217%)
Excess	204 (117%) P-score = 1.17
Less 139 Covid-19 deaths:	
residual excess	65 (37%) P-score = 0.37

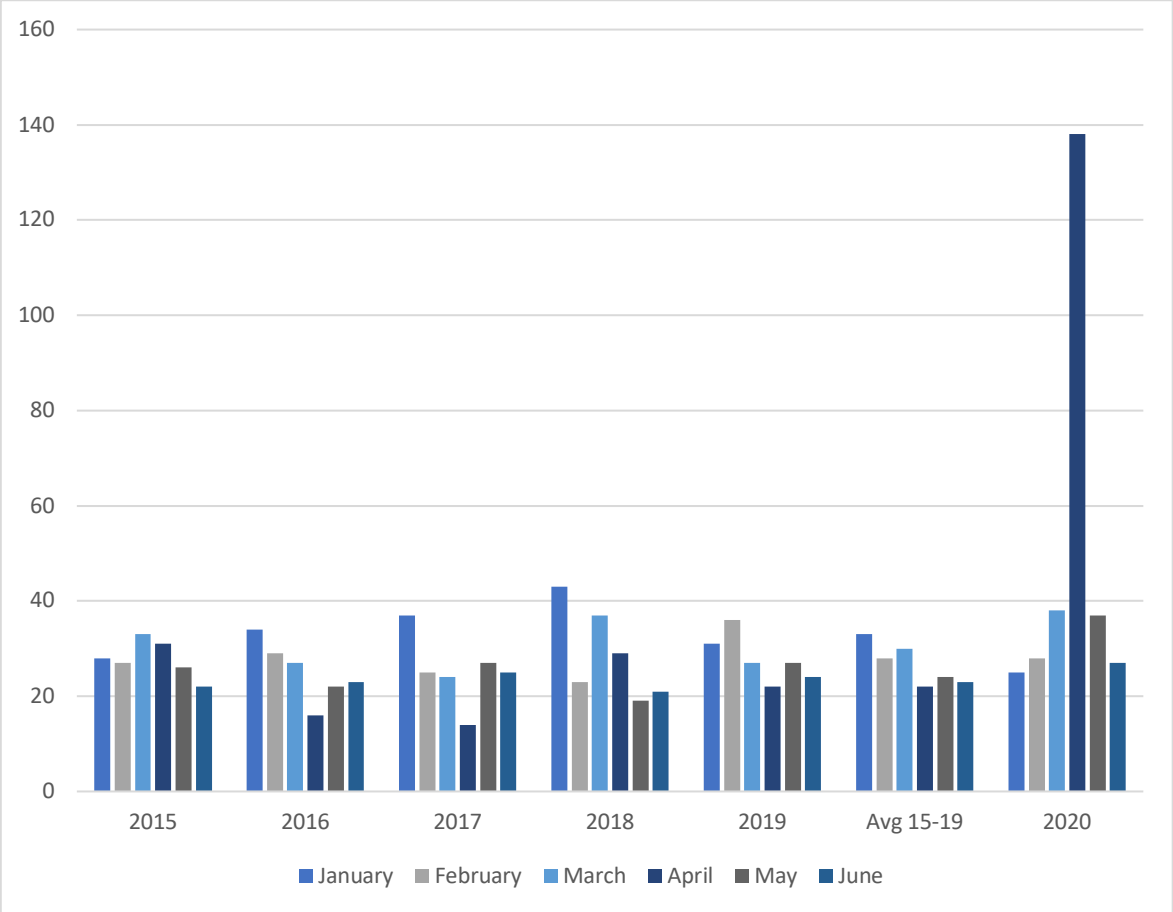

Figure 3. *Total and average numbers of notified deaths monthly from nursing and residential homes 2015-2020.*

Table 3. *Total and average numbers of notified nursing and residential home deaths in each half-year January to June 2015 – 2020.*

YEAR	2015	2016	2017	2018	2019	Average 2015-19	2020 with excess
DEATHS	167	151	152	172	167	162	293 (181%) Excess 131 (81%) P-score = 0.81

Table 4. *Nursing and residential home deaths notified March to June 2015 – 2020 with mortality excess and residual (non-Covid-19) mortality excess.*

DEATHS	
MARCH	
Average 2015-2019	30
2020	38 (127%)
Excess	8 (27%) P-score = 0.27
Less 3 Covid-19 deaths:	
residual excess	5 (17%) P-score = 0.17
APRIL	
Average 2015-2019	22
2020	138 (627%)
Excess	116 (527%) P-score = 5.27
Less 90 Covid-19 deaths:	
residual excess	26 (118%) P-score = 1.18
MAY	
Average 2015-2019	24
2020	37 (154%)
Excess	13 (54%) P-score = 0.54
Less 15 Covid-19 deaths:	
residual excess	None (-2)
JUNE	
Average 2015-2019	23
2020	27 (117%)
Excess	4 (17%) P-score = 0.17
Less 5 Covid-19 deaths:	
residual excess	None (-1)
MARCH to JUNE TOTALS	
Average 2015-2019	99
2020	240 (242%)
Excess	141 (142%) P-score = 1.42
Less 113 Covid-19 deaths:	
residual excess	28 (28%) P-score = 0.28

Table 5. *All deaths notified with non-Covid-19 natural death excess March – June 2015 – 20.*

DEATHS	2015	2016	2017	2018	2019	Avg. 2015-19	2020 with excess
MARCH							
Total deaths	51	58	36	55	51	50	65
Autopsies	10	18	5	11	12	11	10
Non-natural	4	7	1	5	6	5	4
Covid-19	0	0	0	0	0	0	4
Other Natural (non- Covid-19)	47	51	35	50	45	45	57 (127%) Excess 12 (27%) P-score = 0.27
APRIL							
Total deaths	52	32	30	51	42	41	188
Autopsies	16	9	10	12	12	12	12
Non-natural	4	3	1	5	6	4	4
Covid-19	0	0	0	0	0	0	110
Other Natural (non-Covid-19)	48	29	29	46	37	37	74 (200%) Excess 37(100%) P-score = 1.00
MAY							
Total deaths	44	42	40	34	53	43	70
Autopsies	9	11	9	13	12	11	11
Non-natural	5	3	1	5	5	4	5
Covid-19	0	0	0	0	0	0	19
Other Natural (not Covid-19)	39	39	39	29	48	39	46 (118%) Excess 7 (18%) P-score = 0.18
JUNE							
Total deaths	36	47	37	43	44	41	56
Autopsies	7	18	8	15	12	12	16
Non-natural	2	4	1	7	4	3	5
Covid-19	0	0	0	0	0	0	6
Other Natural (not Covid-19)	34	43	37	36	40	38	45 (118%) Excess 7 (18%) P-score = 0.18
MARCH to JUNE							
Total deaths	183	179	143	183	190	176	379
Autopsies	42	56	32	51	48	46	49
Non-natural	15	17	4	22	21	16	18
Covid-19	0	0	0	0	0	0	139
Other Natural (not Covid-19)	168	162	139	161	169	160	222 (139%) Excess 62 (39%) P-score = 0.39