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Measuring Mortality During the Covid-19 Pandemic

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Scope

- This presentation describes work undertaken from mid-March 2020 to November 2020
- To develop an accurate “near real-time” count of deaths in the Republic of Ireland during the pandemic
- Falls short of the standards required of Official Statistics
- Nonetheless, it has become a surprisingly accurate Frontier Statistic

Challenge & Context

- Collect timely, inclusive and accurate information on deaths

Solution, in short

- Monitor death notices, using RIP.ie

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Historical Comparisons

A Journal of the Plague Year

- Daniel Defoe's Fictional account of London's bubonic plague (*1665*), published in 1722
- Tale begins in September 1664, when rumours circulate of the return of 'pestilence' to Holland
- Next comes the first suspicious death in London, in December, and then, come spring……

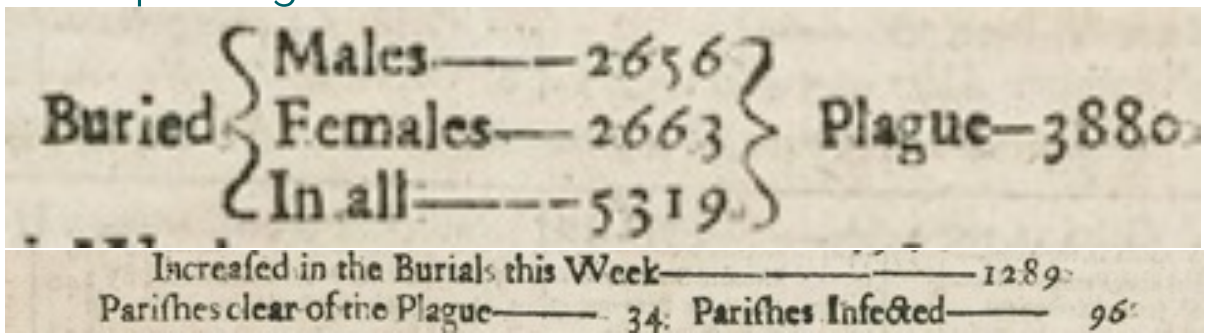
A Journal of the Plague Year

- …Defoe describes how *death notices* posted in local parishes have taken an ominous rise.

Source: https://www.bbc.com/culture/article/20200413-what-can-we-learn-from-pandemic-fiction

A Week of Parish Death Notices, London, 1665

- "Bill of Mortality" showing Death Tally of all city parishes for the week of Aug. 15-22, 1665, when the plague had infected 96 of the 130 parishes reporting.

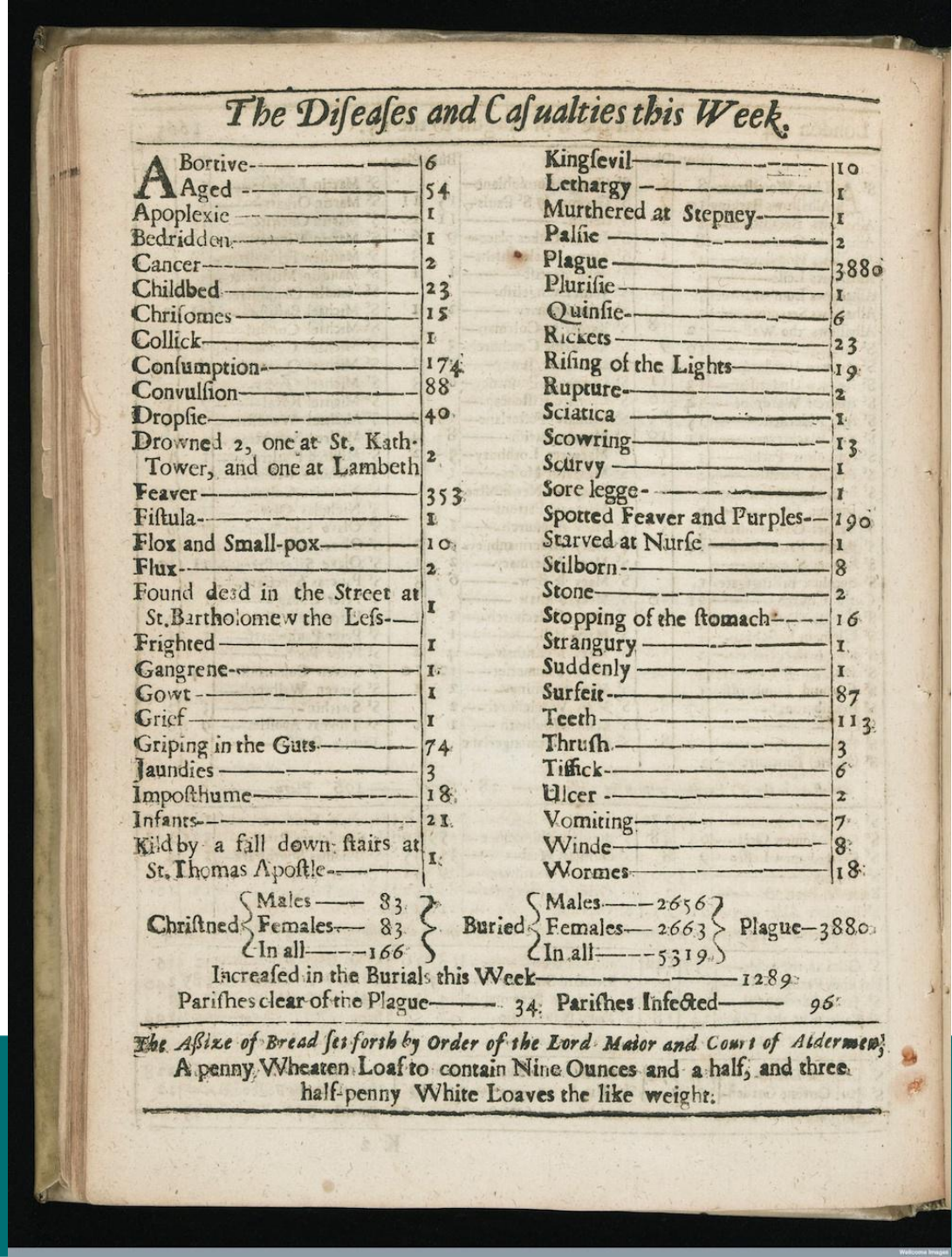


Buried { Males——2656 / Females—2663 / In all——5319 } Plague—3880

Increaſed in the Burials this Week——1289

Pariſhes clear of the Plague——34 Pariſhes Infected——96

- Source: https://slate.com/human-interest/2014/01/bill-of-mortality-document-shows-death-toll-during-the-great-plague-of-london.html, reviewing Shakespeare's Restless World: An Unexpected History in Twenty Objects, by Neil McGregor, ISBN: 9780670026340



The Diſeaſes and Caſualties this Week.

Abortive	6	Kingſevil	10
Aged	54	Lethargy	1
Apoplexie	1	Murthered at Stepney	1
Bedridden	1	Paliſie	2
Cancer	2	Plague	3880
Childbed	23	Pluriſie	1
Chriſomes	15	Quinſie	6
Collick	1	Rickets	23
Conſumption	174	Riſing of the Lights	19
Convulſion	88	Rupture	2
Dropſie	40	Sciatica	1
Drowned 2, one at St. Kath. Tower, and one at Lambeth	2	Scowring	13
		Scurvy	1
Feaver	353	Sore legge	1
Fiſtula	1	Spotted Feaver and Purples	190
Flox and Small-pox	10	Starved at Nurſe	1
Flux	2	Stilborn	8
Found dead in the Street at St. Bartholomew the Leſs	1	Stone	2
		Stopping of the ſtomach	16
Frighted	1	Strangury	1
Gangrene	1	Suddenly	1
Gowt	1	Surfeit	87
Grief	1	Teeth	113
Griping in the Guts	74	Thruſh	3
Jaundies	3	Tiſſick	6
Impoſthume	18	Ulcer	2
Infants	21	Vomiting	7
Kild by a fall down ſtairs at St. Thomas Apoſtle	1	Winde	8
		Wormes	18

Chriſtned { Males—83 / Females—83 / In all——166 }

Buried { Males——2656 / Females—2663 / In all——5319 } Plague—3880

Increaſed in the Burials this Week——1289

Pariſhes clear of the Plague——34 Pariſhes Infected——96

The Aſſize of Bread ſet forth by Order of the Lord Maior and Court of Aldermen:

A penny Wheaten Loaf to contain Nine Ounces and a half, and three half-penny White Loaves the like weight.

“A Method of Dealing with Unregistered Deaths”

- Journal of the American Statistical Association
- Volume 10, **1907**, Issue 80
- Marshall Langton Price M.D., State Board of Health, Maryland, U.S.A.
- “The…method is founded upon……”

“A Method of Dealing with Unregistered Deaths”

- “…death notices appearing in local papers.
- The method has been used recently to determine the efficiency of registration in the registration areas, and
- is in general more accurate and complete than that obtained by the [Maryland census] enumerators.”

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Death Registration in Ireland

Death Registration in Modern Ireland

- Not the responsibility of a modern census enumerator, who counts people alive and in the state on census night, once every 5 years
- Death registration is a statutory requirement, with individuals' responsibilities set out in The Civil Registration Act 2004
- http://www.irishstatutebook.ie/eli/2004/act/3/enacted/en/html

Civil Registration Act 2004

- 37.—(1) When a death occurs in the State, it is the duty of
  - (a) *a relative of the deceased* who has knowledge of the required particulars in relation to the death, and
  - (b) if there is no such relative who can be found or every such relative is incapable through ill health of complying with this subsection, *each other qualified informant*, unless he or she reasonably believes that another qualified informant has complied with it in relation to the death
  - within 3 months from the date of the death to give to any registrar the required particulars of the death in the form standing specified for the time being by an tArd-Chláraitheoir.

Current Registration practice poses difficulty

- Three months is quite long, especially during a pandemic
- Lengthy delays can be experienced, for example, due to involvement of the Coroner, Gardaí, DPP, HSA
- Ratio of deaths to coroners is highest in Dublin, meaning higher workloads
- Registered Deaths as a percentage of actual deaths is clearly affected by personal compliance with the Act
- Non-compliance could be due to a variety of factors
- https://www.cso.ie/en/releasesandpublications/in/vs/informationnoteontheimplicationsofcovid-19ontheprocessingofdeathcertificates/

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www.rip.ie

www.rip.ie

- Privately-owned company
- Has become a popular website to notify deaths and provide funeral details
- Used by Irish and Northern Irish citizens and expatriates
- 150,000 hits per day
- (The CSO are grateful to RIP.ie for permission to use their website)

www.rip.ie

- Only funeral directors can post a notice using a secure login, ensuring the data is of good quality and duplicates are rare
- Irish custom of holding funerals within two to three days following death
- Notices are placed in a fast and efficient manner, **usually within 1 day of death**
- Think of radio death announcements, but digital

Sample Death Notice Structure (Mock-up)

Address(es)

Names, including maiden names and nicknames

The death has occurred of Martin Aaron

Annagassan, Louth / Borris Carlow

Aaron, Martin (9 South Street, Annagassan, Co. Louth and formerly of Borris, Co. Carlow). Suddenly, but peacefully, in the presence of his loving family. Beloved husband of Anne (nee Moran) and father of Martin, Leo, Anita and Jane; sadly missed and lovingly remembered by his wife, daughters, sons, brother Jim and Tom, sisters Alice (O'Connor), Molly (Dolan) and Nellie (Lavelle), grandchildren, daughters-in-law, son-in-law, nieces, nephews, sisters-in-law, brothers-in-law, cousins and a large circle of friends.

Rest in Peace.

Reposing at The Community Mortuary Chapel tomorrow evening, Friday, from 5.30pm with removal at 8pm to St. Monica's Church, Durrin. Requiem Mass on Saturday at 11.30am. Burial afterwards in the adjoining cemetery.

"Metadata": includes various information such as **place of death**, e.g. "Peacefully at home", "Suddenly. In the wonderful care of XYZ Nursing Home"

Publication Date

Date Published: Monday 1st January 2016

Date of Death: Saturday 30th December 2015

Date of Death

Source: http://ripservices.ie/FamilyNotices/DeathNotice_Ack.htm

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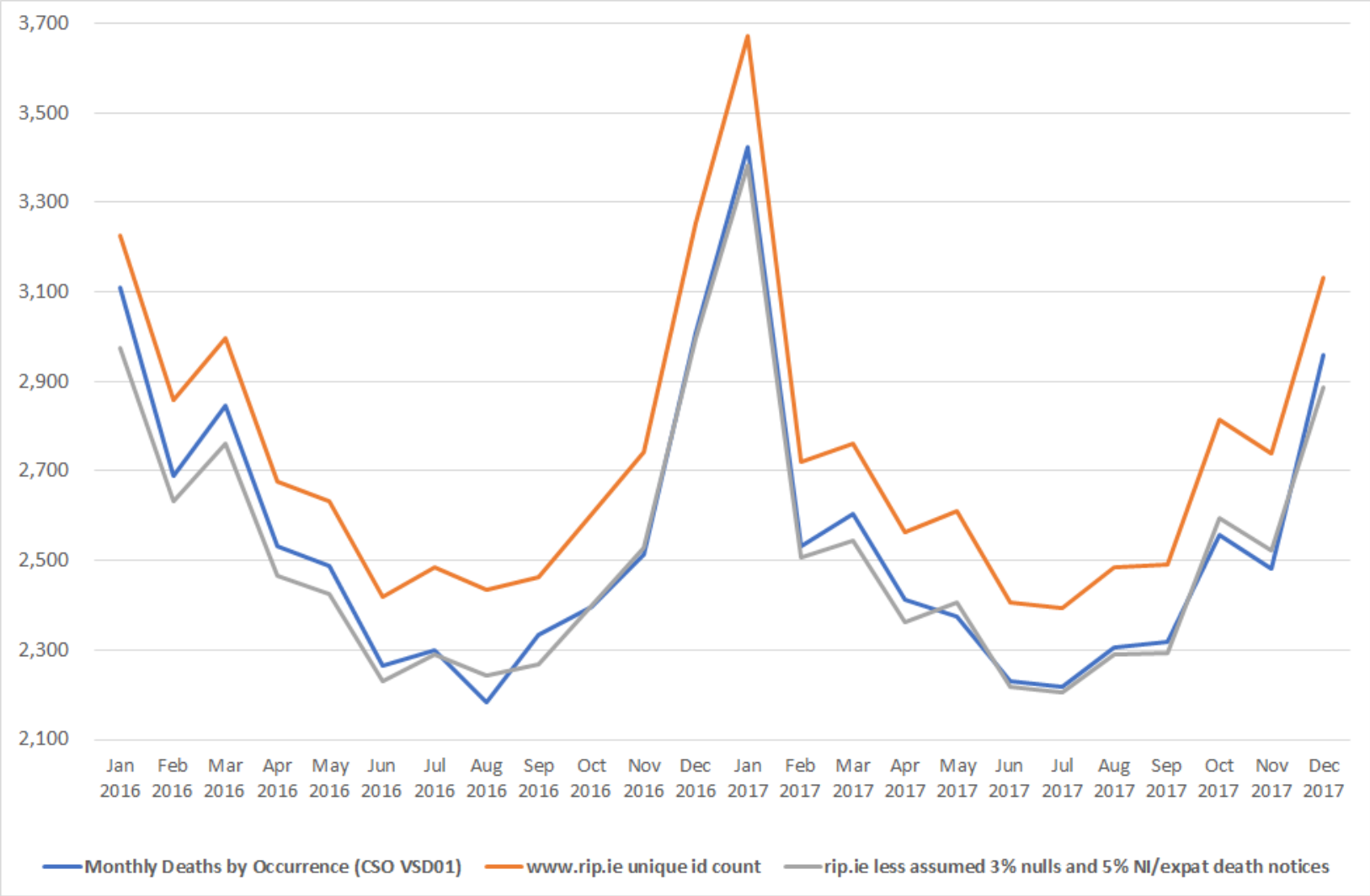
Evaluation of the novel Data Source

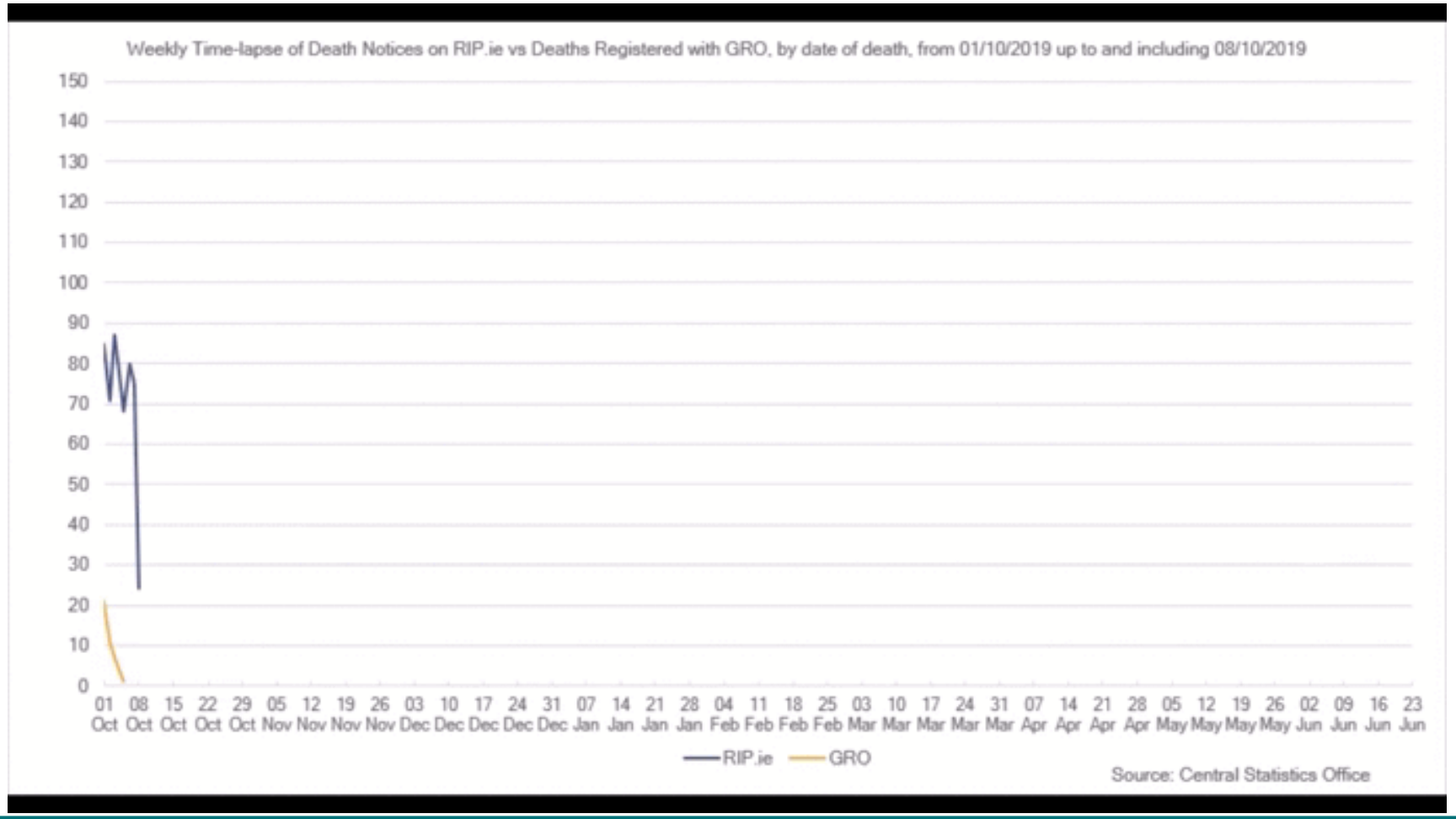
Monthly Deaths by Occurrence (CSO) vs rip.ie death notices January 2016 to December 2017



Correlation > 0.99

www.cso.ie

Weekly Time-lapse comparison of Death Registrations vs Death Notices (Rip.ie) October 1st 2019 to 30th June 2020



Considerations

- All-cause mortality
- No indication of cause of death or underlying conditions
- Early reports of heavier death toll amongst Black, Asian and Minorities.
- No age at death
- Is it an inclusive data source?
- Registration offices closed and increased coronial involvement due to deaths in nursing homes lengthen registration delays

Evaluating inclusion

- In order to ascertain the usage of RIP.ie contact was made with a number of organisations representing minority groups in Ireland.
- Twenty-two embassies were contacted, representing the largest 22 non-Irish nationalities in 2016
- According to Pavee Point, who represent the Traveller and Roma communities, most information about Traveller deaths are spread by word of mouth and by phone and social media.
- Other contacted include
  - the Irish Refugee Council regarding Direct Provision
  - Polish chaplaincy in Dublin
  - Three homeless representative organisations
  - The Islamic Foundation of Ireland

Burial and Crematoria Registers

- The Islamic Foundation of Ireland indicated that the Irish Islamic community around Dublin leased a burial ground from South Dublin County Council (SDCC)
- SDCC maintain a database of burials
- Inspired by this suggestion, electronic burial and cremation records were checked for the majority of Dublin
- Outside of Dublin, there is not the same availability of electronic records

Peer Engagement

- The data source was being analysed by other organisations, including HIQA, the Society of Actuaries, the University of Maynooth amongst others
- Engagement with these analysts to discuss and better understand the data
- Webinar with Society of Actuaries and Maynooth
- Their different approaches used statistical and mathematical modelling
- Ours was rigorous in collection (each notice was read)
- Similar results achieved initially, though the choice of method used to calculate excess mortality can result in wider variations

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Methods

Approach

- Scrape regularly (web-scraping)
- Read all death notices
- Clean & Classify
- Tabulate
- 12 months complete – October 2019 to September 2020
- Time consuming but good quality results and provides reliable training and test-data for potential automated classification

Scraped Variables

- Unique ID
- Names
- Addresses (sometimes Northern Ireland, overseas)
- Date of Publication
- Date of Death (sometimes missing)
- Metadata aka Death Notice or Obituary(often informative)

Url Structure & Unique Id

- The Unique Id is an incremental numeric variable, e.g. 1,2,3 etc.
- This was exploited to implement the webscrape
- Facilitates simple and effective record keeping

Twelve months of notices read

- October 2019 to September 2020 inclusive
- Time-consuming methodology, but high quality
- 34,279 in total
- Made up of 32,104 Irish, 2,175 NI/Overseas Notices

Using Index Numbers to Determine Number of Monthly Notices

- Hovering mouse over record and reading off number for first and last record of month gives the total number of notices **published** for that month plus the total number of **nulls** for that month
- Number published is not the same as the number of deaths which have **occurred** in that month

Derived Variable - Gender

- Circa 1,100 names were manually coded
- Personal pronouns etc: As metadata contains “hints” as to the gender, e.g. “née”, “mother of”, “husband to” etc., it was useful in a formulaic means of classification. This was initially checked against the 1,100 and is superior as ambiguous names (e.g. Pat, Fran) would otherwise need manual intervention
- Combination of both yields high accuracy, requiring rare manual coding

Northern Ireland Death Notices

- NI deaths often contain UK postcode, all of which begin with “BT” in the 6 counties
- Deceased may have an address on each side of border
- Therefore, metadata (death notice) is searched for mention of 6 counties or string “BT”.
- Best to read each suspected NI death notice as it can be a legitimate RoI death
- NI deaths make up just under half of non-RoI deaths
- Publication Lag ≈ **1.3 Days**

Overseas Deaths

- Generally occur in expatriate strongholds
- UK: London, Manchester, Birmingham
- North America: New York, New Jersey, Massachusetts, Toronto
- Antipodes: New Zealand, Australia
- Common to find death notices for emigrant missionaries
- Likely holiday deaths, e.g. Spain, are deemed to be Irish deaths and relevant to Irish official statistics, unlike expat deaths where the deceased had made a new life there e.g. married, had children – often clear from the metadata, negligible
- Just over half of non-RoI deaths
- Publication Lag ≈ **11.7 days**

Place of Death – Manually Coded

- Each death notice is read to determine place of death
  - If Overseas (expatriate) or Northern Ireland then it is removed
  - Otherwise, it is coded to Hospice, Hospital, Nursing Home, At Home or Other
  - Other includes Accidents, on Holiday or Other Residential e.g. Convents, Assisted Living

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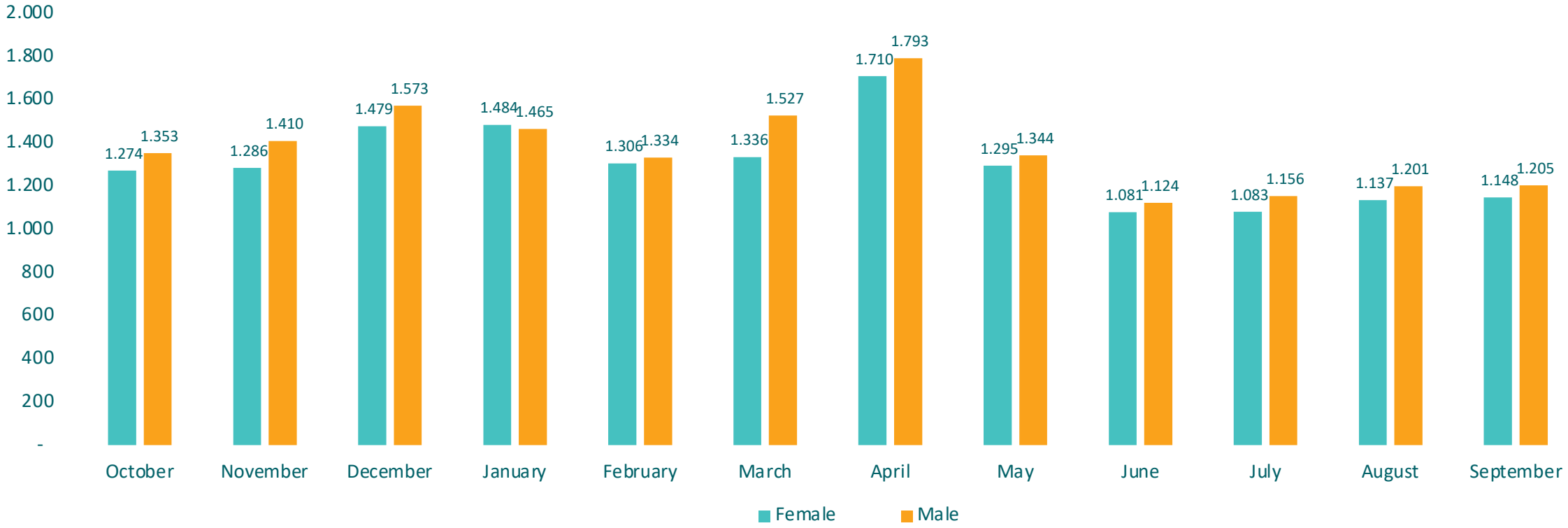
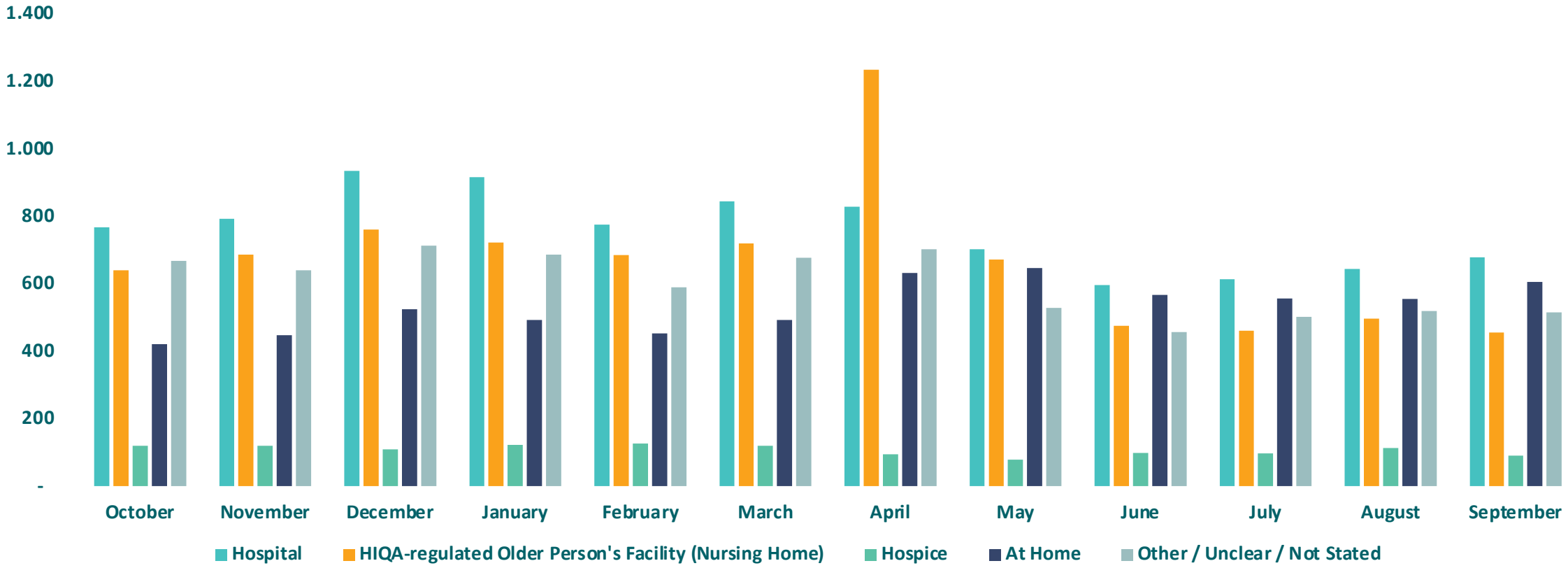
Results

Cleaned Death Notices by Gender, by Month (n = 32,104) October 2019 to September 2020, Source www.rip.ie



Cleaned Death Notices by Place of Death, by Month (n = 32,104) October 2019 to September 2020, Source www.rip.ie



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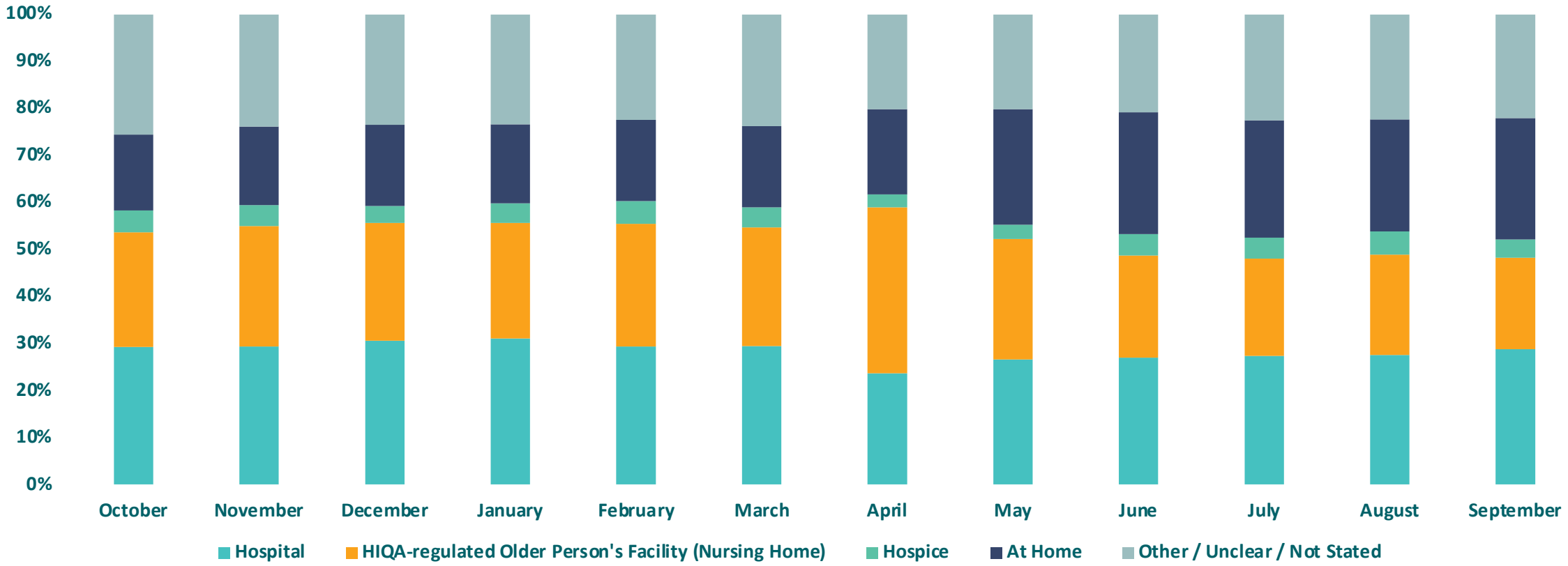
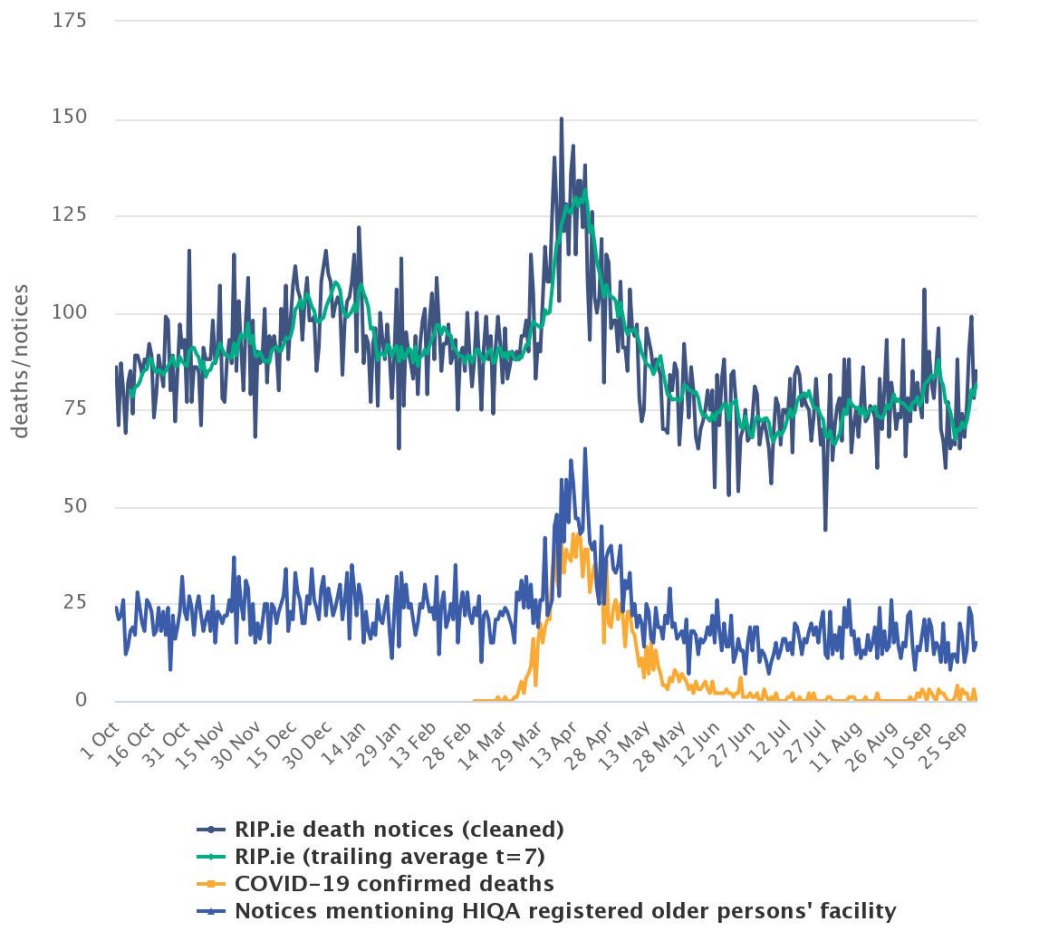


Capturing the First wave, by day

- Death notices plotted against
- Notified Covid-19 deaths
- Nursing Home Deaths
- See more at:
- https://www.cso.ie/en/releasesandpublications/fb/b-mpds/measuringmortalityusingpublicdatasources2019-2020/

Figure 1 Analysis of Mortality Trends Using Public Data Sources, 2019 – 2020



Source: CSO Ireland

Excess Mortality – Public Understanding

- Technically speaking, it's "Excess Death Notices"
- "What if" scenario
- Public and media tended to conflate Excess Mortality with Deaths Involving Covid-19 (reported by DoH)
- *"CSO reports fewer excess deaths than Dept of Health"* (RTÉ)
- Not the same thing
  - One is an **estimate** of difference in deaths due to **all causes**
  - The other is a **count** of deaths involving **a single cause**
- Depends on methodology
- Can be negative, e.g., if a nation's population is in decline

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How close was rip.ie to Official Statistics?

Official Statistics

- Based on registered deaths, which have a statutory limit of 3 months for registration. However, unnatural deaths can take much longer.
- As a result, it is standard practice for the CSO to wait 22 months from the end of the reference year, to publish deaths by occurrence for that year. (Death registrations are published faster)
- So how did the data we published based on death notices for 2020 compare to the true picture?

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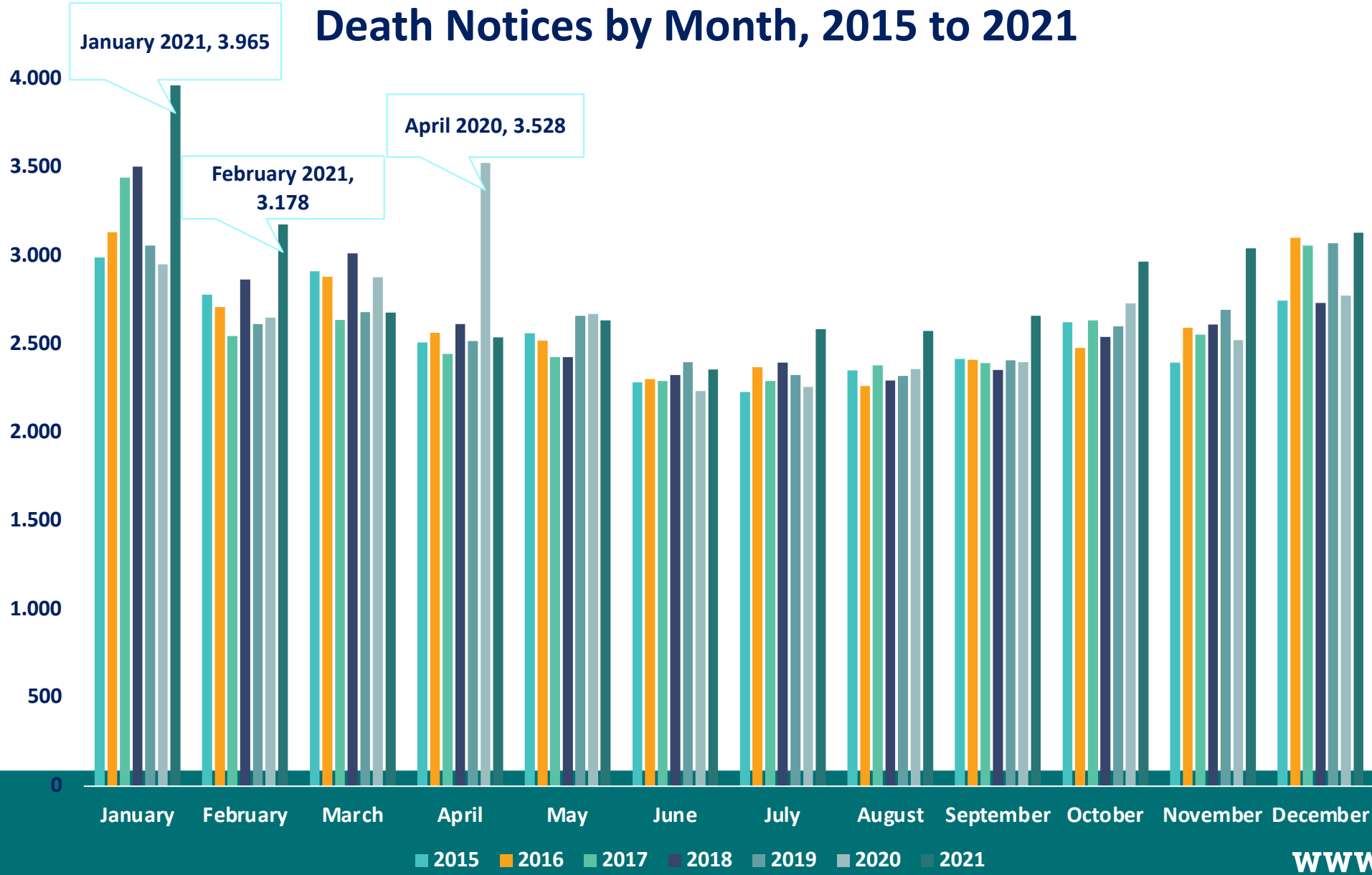
Further Development

Further Integration

- Process has been adopted by Vital Statistics division in CSO Head office, Cork, headed by Brian Ring
- Machine Learning algorithm developed to automatically remove Northern Irish and Overseas death notices by Conor Crowley (place of death no longer determined), trained on read death notices
- Used to provide timelier estimates of mortality to Eurostat, in line with many of our European counterparts
- Two releases since – one by Aidan McCarthy in Spring 2021 and a another by Robert Kelly in February 2022
- Source of next graph:
  - https://www.cso.ie/en/releasesandpublications/fb/b-mpds/measuringmortalityusingpublicdatasources2019-2021october2019-december2021/

Death Notices by Month, 2015 to 2021



Weekly Death Notices Oct 2019 to Dec 2021

- Ensemble of manually classified and machine (learning) classified notices
- Plotted against weekly Covid deaths
- See more at:
- https://www.cso.ie/en/releasesandpublications/fb/b-mpds/measuringmortalityusingpublicdatasources2019-2021october2019-december2021/

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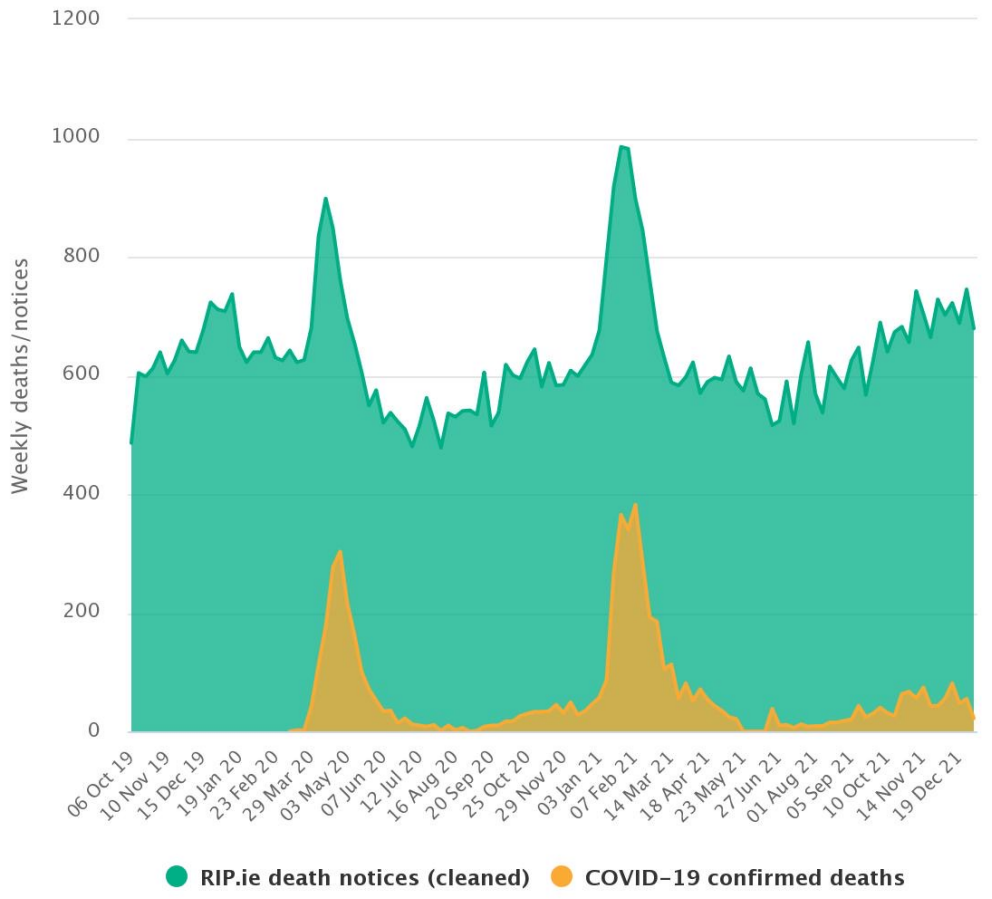

Source: CSO Ireland

Thank You

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