Trends in Causes of Death Across Europe and the Island of Ireland

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Aim

- To explore the predominant causes of death across the population of (i) Europe and (ii) Ireland.

Introduction

- Descriptive epidemiology monitors fluctuations in disease prevalence across time and regions. [1]
- Knowing disease trends allows for effective public health interventions and resource allocation.
- Cardiovascular disease is recognised globally as a leading cause of death in landmark studies.[2]
- Limited integration of epidemiology into education and research impacts global health. [3]
- Mortality statistics are crucial to understand disease trajectory, severity and occurrence.
- Ireland's lack of comprehensive mortality trend studies hinders evidence-based policy-making.

Methods

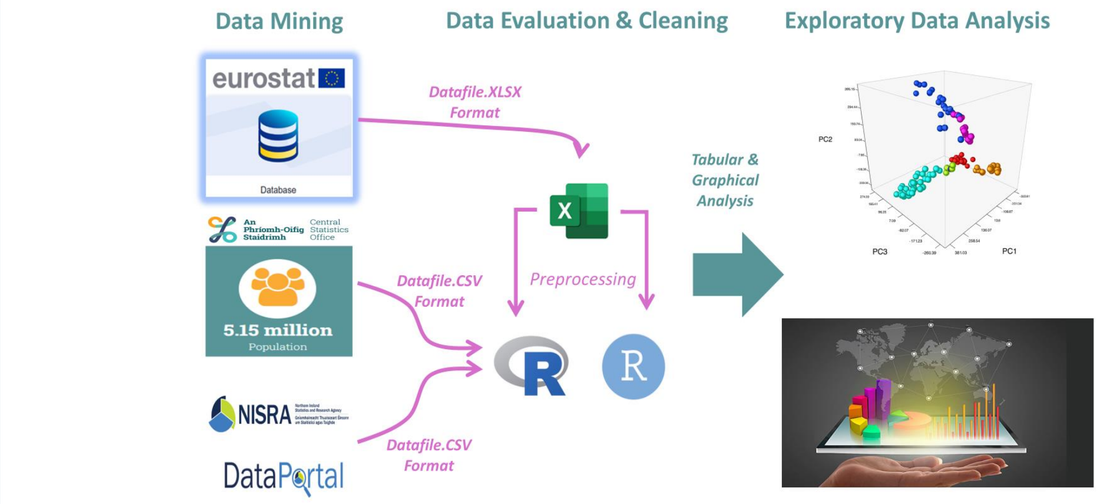


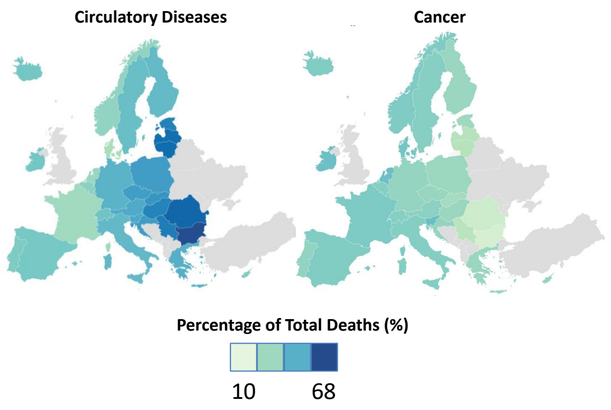
Figure 1. Data from NISRA, CSO and Eurostat was processed in R and Excel. Mortality data from Eurostat, CSO, and NISRA was merged and processed to align formats, handle missing values and combine International Classification of Diseases, 10th Revision (ICD10) codes. Analysis explored mortality trends by cause of death and Principal Component Analysis (PCA) was used to compare death rate data between regions in Europe and Ireland. R studio and Data wrapper were used for data visualisation.

Results Europe

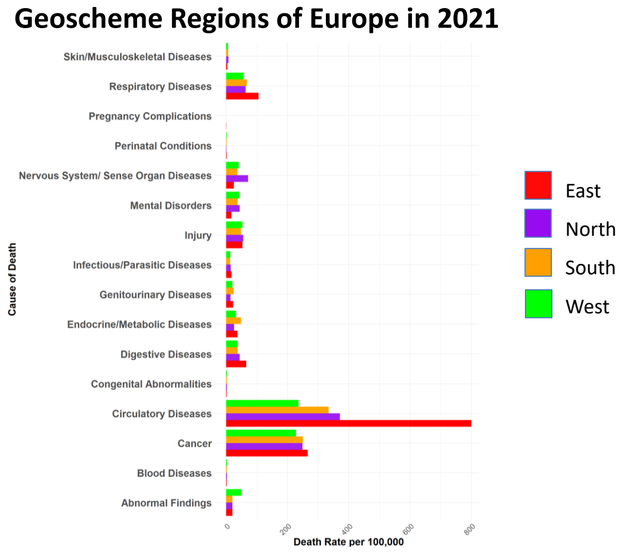
(A) Leading Causes of Death in Europe in 2021

ICD10 Code	Cause of Death	Absolute Deaths	Death rate per 100,000	Fraction of Deaths %	Cumulative Deaths %
I00-I99	Diseases of the circulatory system	1713816	383.40	36.23	36.23
C00-D48	Neoplasms	1193515	267.01	25.23	61.46
J00-J99	Diseases of the respiratory system	324590	72.62	6.86	68.32
V01-Y98	External causes of morbidity & mortality	232125	51.93	4.91	73.23
R00-R99	Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified	230338	51.53	4.87	78.10
K00-K93	Diseases of the digestive system	211168	47.24	4.46	82.56
G00-H95	Diseases of the nervous system, the eye and adnexa and of the ear and mastoid process	201715	45.13	4.26	86.83
F00-F99	Mental and behavioural disorders	190979	42.72	4.04	90.87
E00-E90	Endocrine, nutritional and metabolic diseases	174134	38.96	3.68	94.55

(B) European Circulatory Diseases and Cancer Death Percentages in 2021



(C) Death Rates in the United Nations Geoscheme Regions of Europe in 2021



(D) Insights on European Mortality Using PCA

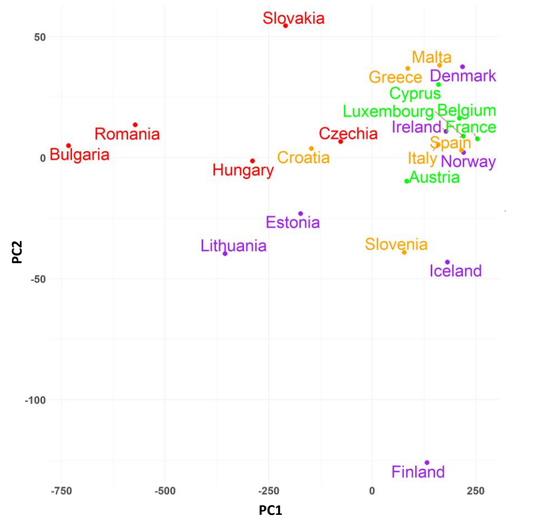


Figure 2. Mortality Data Across Europe by Country and UN EU Geoscheme Regions in 2021. (A) Leading causes of death in Europe accounting for ~95% of total deaths. (B) Difference in circulatory and cancer occurrence from Western to Eastern Europe. (C) Age-standardised death rates per 100,000 across regions of Europe. (D) PCA of age-standardised death rates per 100,000.

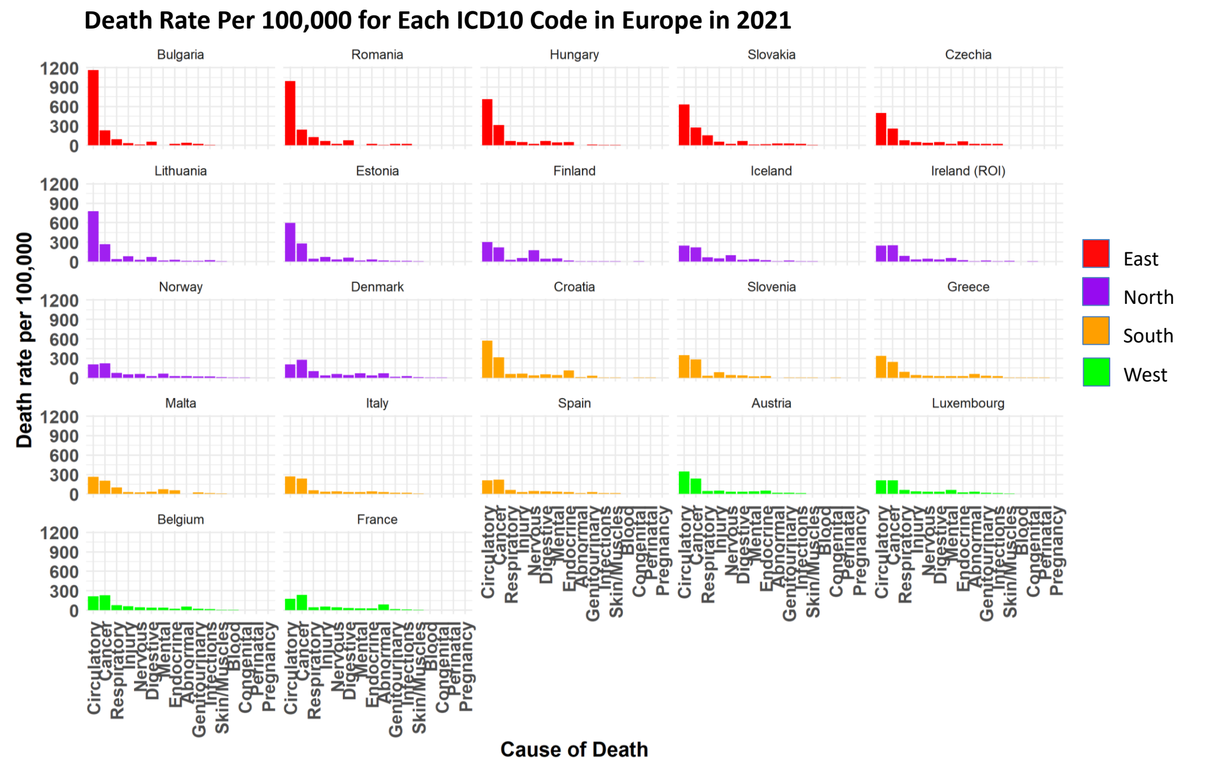


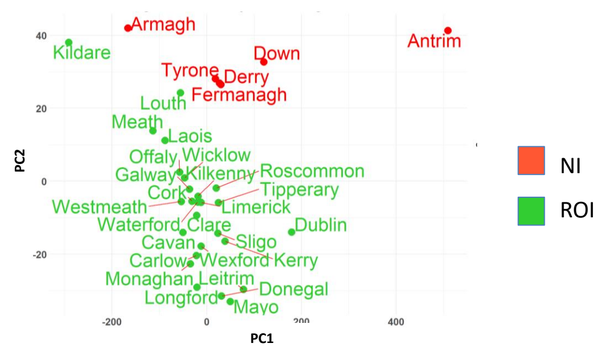
Figure 3. Age standardised Death Rates Per 100,000 In 22 European Countries in 2021. Death rates by cause of death for 22 European countries and by United Nations Geoscheme regions.

Ireland

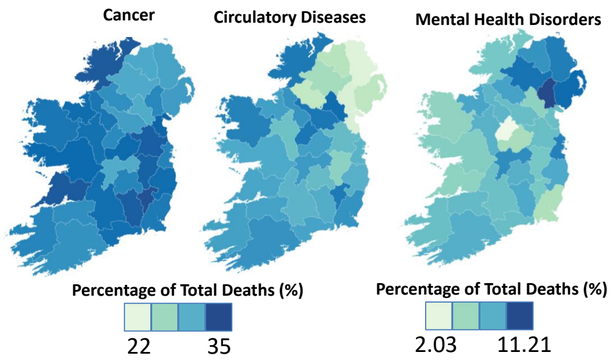
(A) Leading Causes of Death in Ireland in 2019

Cause of Death		ROI		NI		All-Ireland	
ICD10	Description	Rate	%	Rate	%	Rate	%
C00-D48	Neoplasms	200.35	31.62	241.48	29.02	211.78	30.75
I00-I99	Diseases of the circulatory system	181.41	28.63	194.65	23.39	185.09	26.87
J00-J99	Diseases of the respiratory system	79.85	12.60	104.03	12.50	86.57	12.57
F00-F99	Mental and behavioural disorders	39.68	6.26	74.30	8.93	49.30	7.16
G00-H95	Diseases of the nervous system, eye, adnexa, ear and mastoid process	32.33	5.10	57.66	6.93	39.37	5.72

(B) Insights on Irish Mortality Using PCA



(C) Percentages of Cancer, Circulatory Diseases and Mental Health Disorders Across Ireland in 2019



(D) Death Rates in NUTS 2 Regions of Ireland in 2018

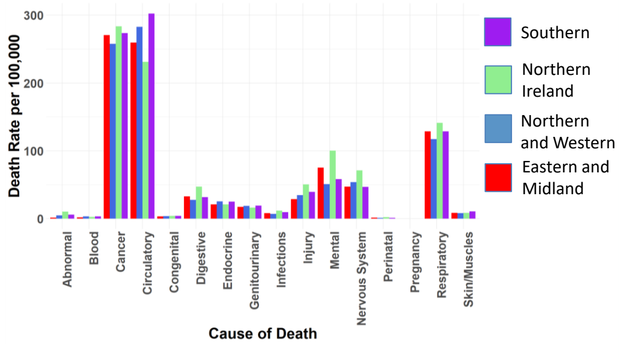


Figure 4. Mortality Data Across Ireland in 2019 and 2018. (A) Leading causes of death in Ireland. (B) PCA of age-standardised death rates in 32 counties of Ireland. (C) Percentages of total deaths of 3 of the most influential disease categories in Northern Ireland (NI) and the Republic of Ireland (ROI). (D) Age-standardised death rates per 100,000 for NUTS 2 regions of Ireland.

Conclusions

- The main causes of death in Europe are circulatory, cancer and respiratory diseases. Nervous system/sense organ diseases and mental disorders are prevalent, particularly in Northern Europe.
- ~60% of deaths are due to circulatory diseases and cancer, underscoring the need to prioritise ongoing efforts to reduce their impact.
- Circulatory diseases dominate particularly in Eastern Europe. Nervous system/sense organ diseases prevail in Northern Europe. Regional risk factors may explain these higher death rates.
- On the island of Ireland, cancer and circulatory diseases are the leading causes of death. Analysis at the county and NUTS 2 region levels reveals variations in local disease prevalence. Deaths due to mental health disorders are higher in NI, possibly influenced by the legacy of the troubles in NI.

Acknowledgements

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Data Sources:

Eurostat: https://ec.europa.eu/eurostat

Central Statistics Office: https://www.cso.ie/

Northern Ireland Statistics and Research Agency: https://www.nisra.gov.uk/

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2. Pett KD et al. The seven countries study. Eur Heart J. 2017;38(42):3119. doi: 10.1093/eurheartj/ehx603
3. Fox MP et al. On the need to revitalize descriptive epidemiology. Am J Epidemiol. 2022;191(7):1174. doi: 10.1093/aje/kwac056.