NOCA National Office of Clinical Audit | NAHM National Audit of Hospital Mortality

NATIONAL AUDIT OF HOSPITAL MORTALITY

NATIONAL REPORT 2022 AND 2023

ACKNOWLEDGEMENTS

NOCA National Office of Clinical Audit

Dr Anne Dee
Clinical Lead, National Audit of Hospital Mortality
Royal College of Physicians of Ireland

Deirdre Burke
National Audit of Hospital Mortality Manager
National Office of Clinical Audit

Anna Carrigan
Data Analyst
National Office of Clinical Audit

Professor Simon Jones
International Expert
NYU Grossman School of Medicine

Dr Fionnola Kelly
Head of Data Analytics and Research
National Office of Clinical Audit

Dr Declan McKeown
Consultant in Public Health Medicine and Medical Epidemiologist
Health Service Executive National Health Intelligence Unit

Aisling Connolly
Head of Communications, Operations & Quality Assurance
National Office of Clinical Audit

Dr Inam Ul Haq Khan
Consultant Cardiologist
Regional Hospital Mullingar

Dr Alessandro Franciosi
Respiratory Consultant
St Vincent's University Hospital

Bernie O'Reilly
Patient and Public Interest Representative
National Audit of Hospital Mortality Governance Committee

NATIONAL OFFICE OF CLINICAL AUDIT (NOCA)

NOCA was established in 2012 to create sustainable clinical audit programmes at national level. NOCA is funded by the Health Service Executive's Office of the Chief Clinical Officer and operationally supported by the Royal College of Surgeons in Ireland.

The National Clinical Effectiveness Committee defines national clinical audit as "a cyclical process that aims to improve patient care and outcomes by systematic, structured review and evaluation of clinical care against explicit clinical standards on a national basis" (National Clinical Effectiveness Committee, 2015, p. 2). NOCA supports hospitals to learn from their audit cycles.

CITATION FOR THIS REPORT

National Office of Clinical Audit (2025) *National Audit of Hospital Mortality National Report 2022 and 2023.* Dublin: National Office of Clinical Audit. ISSN 2009-9665 (Electronic)

Accessing electronic copies of this report:
https://www.noca.ie/publications
This report was published on 28th August 2025.

ACKNOWLEDGEMENTS

This report is based on data from patients collected by healthcare providers in the Irish healthcare system. We would like to acknowledge their important contribution to this report and to the National Office of Clinical Audit (NOCA) audit processes.

NOCA greatly appreciates the ongoing commitment and support received from the Health Service Executive. We would especially like to thank Dr Colm Henry, Chief Clinical Officer; Dr Orla Healy, National Clinical Director, National Quality and Patient Safety; and Majella Daly, Assistant National Director, National Centre for Clinical Audit. Thanks also go to the National Health Intelligence Unit (NHIU), Public Health, Health Service Executive (HSE), as well as to the Healthcare Pricing Office (HPO) for its continued support and advice.

This report underwent a single-blind review process. NOCA thanks the reviewers for their contribution to this report.

Special thanks go to the following for their support in the preparation of this report:

- Professor Ronan Margey, Consultant Cardiologist and National Clinical Lead for Irish Heart Attack Audit
- Professor Ken McDonald, Consultant Cardiologist and National Clinical Co-Lead for the HSE National Heart Programme
- Professor Joseph Harbison, Consultant Geriatrician and Stroke Physician, and Clinical Lead of the Irish National Audit of Stroke
- Professor Breda Cushen, National Clinical Lead for the HSE National Clinical Programme for Respiratory

ACKNOWLEDGING SIGNIFICANT CONTRIBUTIONS FROM THE FOLLOWING:

Phone: **+353 1 402 8577**
Email: **nahm@noca.ie**
www.noca.ie

NOCA National Office of Clinical Audit

Dr Anne Dee
National Clinical Lead
National Audit of Hospital Mortality
National Office of Clinical Audit
2nd Floor, Ardilaun House
111 St. Stephen's Green
Dublin 2

26th June 2025

Dear Dr Dee,

On behalf of the NOCA Governance Board, I wish to formally acknowledge receipt of the National Audit of Hospital Mortality Annual Report 2022 and 2023.

We extend our sincere congratulations to you and the entire team, including Audit Manager Deirdre Burke and the Governance Committee, for their dedication in producing this important report.

This report provides a comprehensive analysis of in-hospital mortality in Ireland, examining key clinical conditions with significant impact. The inclusion of an analysis on health inequalities for the first time is a particularly important step towards understanding disparities in hospital outcomes.

This letter serves as the formal endorsement of the NOCA Governance Board for the National Audit of Hospital Mortality Annual Report 2022 and 2023.

Yours sincerely,

Dr Brian Creedon
Clinical Director
National Office of Clinical Audit

National Office of Clinical Audit
2nd Floor
Ardilaun House, Block B
111 St Stephen's Green
Dublin 2, D02 VN51
Tel: + (353) 1 402 8577
Email: auditinfo@noca.ie

CONTENTS

GLOSSARY OF TERMS & ABBREVIATIONS

ACRONYM	MEANING
AMI	acute myocardial infarction
CCS	Clinical Classifications Software
CI	confidence interval
COPD	chronic obstructive pulmonary disease
COVID-19	coronavirus disease 2019
CuSum	cumulative summary control chart
EOL	end of life
HIPE	Hospital In-Patient Enquiry
HIQA	Health Information and Quality Authority
HPO	Healthcare Pricing Office
HSE	Health Service Executive
ICD-10-AM	International Statistical Classification of Diseases and Related Health Problems, Tenth Revision, Australian Modification
IIS	Integrated Information Service
M2	Model 2
NAHM	National Audit of Hospital Mortality. A structured review and evaluation of care as part of the clinical audit cycle.
NCHD	non-consultant hospital doctor
NFA	no fixed abode
NHIU	National Health Intelligence Unit

ACRONYM	MEANING
NOCA	National Office of Clinical Audit
NQAIS	National Quality Assurance Improvement System. A suite of audit and performance-monitoring tools developed by the National Health Intelligence Unit, Public Health, Health Service Executive.
NQAIS NAHM	National Quality Assurance Improvement System National Audit of Hospital Mortality web-based tool
OECD	Organisation for Economic Co-operation and Development
PAS	hospital patient administration systems, including IPMS and BHIS etc
PCI	percutaneous coronary intervention
PPSN	Personal Public Service Number
principal diagnosis	The diagnosis that was established after investigation and found to be responsible for the episode of admitted patient care, as represented by an International Statistical Classification of Diseases and Related Health Problems, Tenth Revision, Australian Modification/Australian Classification of Health Interventions/ Australian Coding Standards
SMR	standardised mortality ratio
UTI	urinary tract infection

FOREWORD

There have been marked improvements in the health of the population of Ireland in recent years. While we now have one of the highest life expectancies in Europe and most people in Ireland are living longer, healthier lives, we know that poorer people have poorer health outcomes. The reform of the Health Service Executive (HSE) brings a new focus to addressing health inequalities while improving health and health services.

This important report from the National Audit of Hospital Mortality gives us new information on six conditions that impact heavily on the Irish health system. Readers will find up-to-date data covering the 10-year period from 2014 to 2023 on the falling rates of deaths in hospital from heart attacks, heart failure and strokes, and a return to pre-pandemic rates of deaths in hospital from chronic obstructive pulmonary disease (COPD) and pneumonia. While the number of deaths is decreasing, the number of people admitted to hospital with some of the above conditions is increasing, reflecting the increase in Ireland's ageing population. To reverse these trends in illness and hospitalisation we need to pay more attention to the prevention of illness. The first principle in developing a sustainable health system is to prevent ill health and health inequalities: these actions will reduce the need for healthcare.

Reducing health inequalities is one of the central goals of the Sláintecare Plan (HSE, 2021) and of Healthy Ireland, the national framework for action to improve health and well-being (Department of Health, 2013). For the first time, this report attempted to measure social inequalities in death rates. The only measure available was medical card status: while there were differences in death rates between people who had medical cards and those who did not, this has limitations as an indicator of poverty or deprivation. Appropriate measurement of inequalities is essential to assess the extent of our problems, identify gaps in our knowledge, develop plans, and evaluate our actions. Assessing, addressing and reporting on inequalities will enable compliance with our legal obligations under the Public Sector Duty.

Among other recommendations, the authors recommend the use of appropriate equity stratifiers – these are ways to identify population subgroups to measure differences in health and healthcare that may be unfair. The whole population in Ireland will benefit from better measurement of what matters in order to improve health and reduce inequalities.

This report is the result of many hours of careful collection, analysis, and interpretation of complex data and bringing it all together in an accessible report. I want to thank all of the contributors for their efforts and dedication. Their work will be used to improve and influence data collection and planning to enable addressing some of Ireland's greatest health challenges.

Dr Diarmuid O'Donovan
Director of National Health Improvement, HSE Public Health

Dr Diarmuid O'Donovan

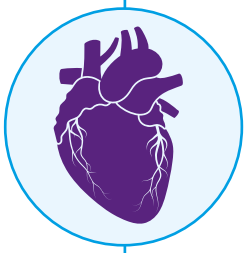
"The whole population in Ireland will benefit from better measurement of what matters in order to improve health and reduce inequalities."

EXECUTIVE SUMMARY

This report from the National Audit of Hospital Mortality (NAHM) presents data from 44 acute hospitals, focusing on 6 diagnoses that have a high burden on the Irish health system. Clinical chapters for the 6 diagnoses show crude mortality figures over the 10-year period from 2014 to 2023, standardised mortality ratio (SMR) funnel plots for both 2022 and 2023, and population pyramids showing the volume of deceased cases. The report also presents crude mortality data on all diagnoses for in-hospital discharges nationally.

For the first time, the NAHM report includes a preliminary analysis of in-hospital crude mortality in the context of a number of potential inequality and equity stratifiers. These include age, sex, medical card status for those aged under 70 years as a proxy for deprivation, public/private healthcare status, and civil status (previously referred to as marital status). When further equity stratifiers become available in the Hospital In-Patient Enquiry (HIPE) dataset, their relevance to in-hospital mortality outcomes will be explored in the context of international evidence and their ability to enhance the NAHM analytical model, which currently includes age, sex and medical card status as parameters. A possible future development would be to use stratifier data from the patient administration system (PAS) to generate a Pobal HP Deprivation Index score, which can be appended to the HIPE record without having to divulge sensitive address data, such as Eircode.

There are six hospital outlier reviews included in the Analysis of SMR outliers chapter. Data quality is the key factor in these outliers, and quality improvement actions in the areas of chart documentation of palliative care and the lack of discharge summary are consistent among them.



KEY FINDINGS

ACUTE MYOCARDIAL INFARCTION

There was a statistically significant reduction in the in-hospital mortality rate for acute myocardial infarction (AMI) over the 10-year period from 2014 to 2023, from 58 deaths per 1,000 discharges in 2014 to 47 deaths per 1,000 discharges in 2023.

Over the 10-year period from 2014 to 2023, there were 1,258 in-hospital female deaths and 1,935 male deaths in cases of AMI. However, the rate of deaths per 1,000 discharges for females was greater.

HEART FAILURE

There was a statistically significant reduction recorded for in-hospital mortality in cases of heart failure for the 10-year period from 2014 to 2023, from 82 deaths per 1,000 discharges in 2014 to 72 deaths per 1,000 discharges in 2023.

ISCHAEMIC STROKE

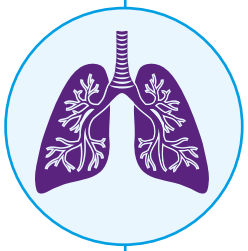
In-hospital mortality in cases of ischaemic stroke reduced significantly (by 42%) between 2014 and 2023, from 109 deaths per 1,000 discharges in 2014 to 63 deaths per 1,000 discharges in 2023.

There has been a continued increase in the numbers of patients presenting to hospital with ischaemic stroke, rising from 5,387 in 2021 to 5,548 in 2022, and to 6,100 in 2023.

HAEMORRHAGIC STROKE

While the 12% decrease in the crude mortality rate for haemorrhagic stroke between 2014 and 2023 was not statistically significant, there has been a decreasing trend in the mortality rate since 2017, with the crude mortality rate decreasing significantly from 335 deaths per 1,000 discharges in 2017 to 266 deaths per 1,000 discharges in 2023.

There has been an increase in discharges of patients with haemorrhagic stroke, from 860 discharges in 2014 to 1,075 discharges in 2023. The increase is most likely related to an ageing and growing population.



CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD)

While there was an increasing trend in the in-hospital crude mortality rate for chronic obstructive pulmonary disease (COPD) cases during the COVID-19 pandemic years 2020–2022, the mortality rate in 2023 has returned to pre-COVID-19 pandemic levels, and overall there is no statistically significant difference between the crude mortality rate of 37 deaths per 1,000 discharges in 2014 and 38 deaths per 1,000 discharges in 2023.

The number of patients discharged with a diagnosis of COPD decreased during the COVID-19 pandemic and is now returning to pre-COVID-19 pandemic numbers, with 14,032 discharges in 2023.

PNEUMONIA

Crude mortality rates for patients with a diagnosis of pneumonia have decreased steadily and significantly since the peak of the COVID-19 pandemic, from 140 deaths per 1,000 discharges in 2021 to 100 deaths per 1,000 discharges in 2023. The number of pneumonia patients presenting with COVID-19 has similarly decreased.

Sex is a statistically significant factor in relation to survival outcomes for patients with a principal diagnosis of pneumonia, based on the results of logistic regression models fitted to Irish in-hospital discharge data for each diagnosis. The finding from the model fitted for pneumonia indicated that the risk of dying from pneumonia is marginally greater for males than for females.

ALL DIAGNOSES

Following a gradual decline since 2014, the crude in-hospital mortality rate for all diagnoses increased in 2020 and 2021 corresponding to the major COVID-19 pandemic waves, and subsequently declined by 2023, but remained significantly higher than the pre-COVID-19 pandemic rates. The National Office of Clinical Audit (NOCA) will explore these patterns in further detail, with the inclusion of 2024 and 2025 data, and publish the findings.

While the number of all diagnoses discharges decreased during the COVID-19 pandemic, they returned to pre-COVID-19 pandemic levels in 2023.

EQUITY STRATIFIERS

There were no data available to NAHM in relation to a patient's Eircode, ethnicity, education level, or occupation. There were differences in death rates according to medical card status. However, as a medical card is not in itself a good proxy for deprivation, it was not possible to say, based on the analysis, whether socioeconomic status was a factor in hospital deaths. In order to enable a more in-depth investigation of in-hospital mortality and the identification of potential health inequalities, more detailed data are required.

OUTLIERS

Documentation of palliative care treatment and accuracy of principal diagnosis have been identified in hospital reviews as areas needing quality improvement.

RECOMMENDATIONS

RECOMMENDATION 1

NOCA will undertake a study into in-hospital crude mortality rates in Ireland, across all conditions, and publish the findings.

RECOMMENDATION 2

NOCA will liaise with the HPO to ensure that when equity stratifiers become available on PAS, they are exported to HIPE and onward to NOCA, in order to enable analysis of potential inequalities in the outcomes of certain groups of inpatients to be carried out.

RECOMMENDATION 3

NOCA will work with the HPO to gather data to carry out geocoding in order to produce small area deprivation codes for analysis of in-hospital mortality based on deprivation.

RECOMMENDATION 4

Each hospital should establish a local working group including clinicians and HIPE coders in order to promote collaboration between the disciplines and ensure that regular checks on the quality of medical chart documentation and subsequent coding are carried out.

RECOMMENDATION 5

A discharge summary specifically for deceased patients should be designed and inserted as a pro forma document in the basic hospital medical chart. It should be completed for all patients who die in hospital and it should include specific information that will enable accurate coding. This will be conducted as a trial in Cork University Hospital for a 6-month period.

POINTS FOR CONSIDERATION/LEARNING

Patient administration systems (PAS) in hospitals should be expanded on an ongoing basis to include feasible equity stratifiers.

INTRODUCTION

The eighth report from the National Audit of Hospital Mortality (NAHM) focuses on patients who were admitted as in-hospital patients for treatment and were discharged during 2022 and 2023. This report represents a move to a biennial national report. It is once again a concise online report, with hyperlinks shown in blue and underlined. To go to the relevant information from the National Office of Clinical Audit (NOCA) or other external sources, just click on the hyperlinks.

There are 44 participating publicly funded hospitals providing data for the NAHM audit, and these hospitals continue to use the National Quality Assurance Improvement System National Audit of Hospital Mortality web-based tool (NQAIS NAHM) in order to examine local patients' mortality data throughout the year for all conditions with which they present to hospital. However, for public reporting, this report only features six key clinical conditions that have a high mortality rate and burden of illness on the Irish health system. These conditions are: acute myocardial infarction (AMI), heart failure, ischaemic stroke, haemorrhagic stroke, chronic obstructive pulmonary disease (COPD), and pneumonia.

Graphs showing crude mortality rates (number of deaths per 1,000 discharges) are shown for the 10-year period from 2014 to 2023. Funnel plots showing the standardised mortality ratio for each of the years 2022 and 2023 are presented in each clinical chapter, and information on how to interpret SMR funnel plots can be found on the NOCA website. Population pyramids showing the volume and distribution of deaths between males and females, and crude mortality rates for males and females, are presented for the first time for the six key conditions. An analysis on all discharged patients is included in the All diagnoses chapter. This is the first time that figures on overall in-hospital patient mortality have been reported by NAHM.

In this report, there has been an attempt to examine inequalities in in-hospital deaths using available data. Within the health service there is increasing awareness of health inequalities and the need to implement Public Sector Duty legislation, which obliges all organisations to assess, address and report on inequalities and discrimination within their service. However, the data needed to do this meaningfully are often not collected and the analysis is limited as a result. (see the chapter Health inequalities: Analysis of in-hospital crude mortality for more details).

It would be welcome to all to not have to again consider coronavirus disease 2019 (COVID-19) in NAHM figures. Unfortunately, however, the impacts of COVID-19 can still be seen in the 2022 data, and its ripple effects are still evident in 2023 data. But findings from 2023 data for the six key conditions in this report do show trends returning to pre-COVID-19 pandemic levels.

"Within the health service there is increasing awareness of health inequalities and the need to implement Public Sector Duty legislation, which obliges all organisations to assess, address and report on inequalities and discrimination within their service."

Four hospitals had statistical outlier findings in 2022 and 2023 data, and reviews have been conducted; these are outlined in the Analysis of SMR outliers chapter along with recommendations and steps to improve data quality. One hospital had a positive outlier and has examined the reasons for this locally. Interaction with hospitals remains very high, with NAHM users engaging very positively with NOCA when conducting the outlier reviews. Sharing of the steps and actions to improve the data should help to inform other hospitals facing similar challenges.

METHODOLOGY

All patients who were treated as inpatients and discharged from acute public hospitals in 2022 and 2023 are included in the NAHM audit. The number of cases included in this report can be found in the clinical chapters. Further information related to the NAHM methodology and inclusion criteria can be found on the NOCA website. Please refer to Table 1 for the source of data for this report. All quoted numbers of deaths refer to in-hospital patients. Deaths in the emergency department are not included in the NAHM audit.

A writing group was established to prepare this report, with support from members of the NAHM Governance Committee and subject matter experts. Details of the structure of NAHM Governance and its committee are available on the NOCA website.

The NAHM audit is supported by the NQAIS NAHM web-based tool, which was developed by the National Health Intelligence Unit (NHIU), Public Health, in the Health Service Executive (HSE), with guidance from subject matter expert Professor Simon Jones. The NQAIS NAHM web-based tool uses extracted data from the Hospital In-Patient Enquiry (HIPE) scheme, which is managed by the Healthcare Pricing Office (HPO), to calculate a standardised mortality ratio (SMR) for all in-hospital discharges based on their principal diagnosis. It is important to note that when a patient dies, the reason they were admitted to hospital for treatment may not be their cause of death. HIPE is the source of national data on discharges from acute hospitals in Ireland. It collects demographic, clinical, and administrative data on discharges from, and deaths in, acute public hospitals nationally. As NQAIS NAHM is an analysis of administrative data from HIPE, it will therefore reflect changes in data collection and coding practices as they occur.

The SMR is calculated by dividing the observed number of deaths by the expected number of deaths for a specific diagnosis and time period in a hospital. This allows hospitals to compare their actual death rate with the rate that would be expected if other factors influencing mortality were considered. The factors taken into account by the NQAIS NAHM web-based tool are:

- **AGE**
- **SEX**
- **PRE-EXISTING CONDITIONS** (Charlson Comorbidity Index (Charlson *et al.*, 1987))
- **IN-HOSPITAL PALLIATIVE CARE TREATMENT**
- **SOURCE OF ADMISSION** (e.g., other acute hospital, home, nursing home)
- **TYPE OF ADMISSION** (e.g., elective, emergency)
- **PREVIOUS EMERGENCY ADMISSIONS** in the last 12 months to the same hospital
- **MEDICAL CARD** (proxy depravation measure)

NAHM is not audited to a specific clinical standard; instead, a hospital's SMR is compared with the national average or expected outcome for a particular condition or diagnosis. However, **NAHM cannot be used for ranking purposes, as no two hospitals have the same patient cohort and case mix**. If a hospital's SMR is outside of expected ranges and it meets the NAHM Governance Committee's definition of an outlier, then a review is requested. The Analysis of SMR outliers chapter has more detailed information. SMR funnel plots are presented for each of the 2 years (2022 and 2023) analysed in this report. Supplementary data on the funnel plots, in alphabetical order by hospital region, are presented in tables for the SMR funnel plots and can be found on the NOCA website. Due to the small numbers of haemorrhagic stroke cases each year, its funnel plot is presented over the 3-year period from 2021 to 2023.

Line charts are used to show trends of crude mortality rates over time, with a 95% confidence interval (CI). Unlike the SMR funnel plots, crude mortality rates have not been adjusted for differences in age profile or comorbidities over time. Where possible, the national average is shown on graphs/charts. Supporting data in tables for crude mortality line charts can be found on the NOCA website.

Population pyramids are used to show the composition of the deceased population by age and sex. The population pyramid graphs in this report present the absolute numbers of deceased cases calculated for each year of age, with female deaths presented on the left-hand side and male deaths presented on the right-hand side of the charts. To aid comparison of the population distribution by gender, side bars have been added to the plots; these indicate the percentages of the male and female deceased populations in the specified age groups.

PRESENTATION OF MORTALITY TRENDS

Use of directly standardised mortality rates was considered as an approach to present national in-hospital mortality trends over time. However, this method was deemed unsuitable for use with the data pertaining to the six key clinical conditions, due to the very low number of cases in the younger age groups. With such low numbers, a single death at a young age will have a very disproportionate effect on the overall mortality rate calculated using this approach, thus making the overall rate appear higher than it should be. Given athat the scope of this NAHM report is to cover all age groups rather than excluding younger age groups from the calculation of directly standardised mortality rates, the use of the crude mortality rate was deemed the more appropriate method for presentation of the national trends.

DATA QUALITY STATEMENT

The data quality statement provides an assessment of the data released for this report, focusing on the data quality dimension of accuracy and reliability, as set out in the Health Information and Quality Authority's (HIQA's) *Guidance on a data quality framework for health and social care* (HIQA, 2018).

Data analysis in this report focuses on the six key diagnoses identified by the NAHM Governance Committee as having a large burden of illness in the Irish population. Inclusion criteria have been set, and data for 2022 and 2023 have been analysed.

TABLE 1: **DATA QUALITY STATEMENT**

DATA SOURCE **Where did the data come from?** 	The source of data for analysis for this report was HIPE, which is a health information system designed to collect information on inpatient and day-case patients discharged from Irish acute public hospitals. The information collected includes clinical, administrative, and demographic data. HIPE clinical coders rely on the documentation in the patient's hospital chart as their primary source for assigning clinical codes according to guidelines and standards in the classification system in use. Diagnoses and procedures are coded using the International Statistical Classification of Diseases and Related Health Problems, Tenth Revision, Australian Modification/Australian Classification of Health Interventions/Australian Coding Standards (ICD-10-AM/ACHI/ACS) (Australian Consortium for Classification Development, 2017). Providing accurate HIPE data on a timely basis is a requirement from hospitals. The HPO transfers anonymised HIPE data to the NHIU for inclusion in the NQAIS NAHM web-based tool quarterly, for analysis.
DATA COVERAGE **Have all participating hospitals contributed data?** 	HIPE data coverage was 100% during the 2022–2023 reporting period. All 44 participating acute hospitals coded cases on their inpatients. However, due to the NAHM inclusion criteria, not all hospitals have data presented in the SMR funnel plots for the six key conditions. This is because some hospitals did not have sufficient numbers of patients with these conditions to ensure accurate analysis publication. However, data from all hospitals are included in the All diagnoses chapter, which presents the crude in-hospital mortality rates and the number of discharges for the 10-year period from 2014 to 2023.
DATA COMPLETENESS **Are all the medical records coded?** 	Completeness is the number of discharged cases returned as 'coded' as a proportion of total discharges reported within each hospital. HIPE data completeness for 2022 was 99%. HIPE data completeness for 2023 was 98.4%.
DATA ACCURACY **How accurate is the data?** 	Hospitals carry out validation of their data prior to sending it to the HPO monthly, for inclusion in the national HIPE file. The HPO then carries out extensive validation and duplication checks in order to ensure data quality. Other data quality activities and data quality tools are in use at local and national HPO level (HPO, 2024). The data used for this report are from closed, validated HIPE files for 2022 and 2023.

ACUTE MYOCARDIAL INFARCTION

The medical term for a heart attack is acute myocardial infarction (AMI). A heart attack is life-threatening and occurs when the supply of blood to the heart is suddenly blocked, which can cause heart muscle cells to die. Further information on AMI is available on the HSE website. Further information on heart attack is available on the Irish Heart Foundation website.

A list of International Statistical Classification of Diseases and Related Health Problems, Tenth Revision (ICD-10-AM) codes included in the AMI diagnoses in the NQAIS NAHM web-based tool is available on the NOCA website. For the purposes of this report, both ST-elevation and non-ST-elevation myocardial infarction cases are combined in the AMI Clinical Classifications Software (CCS) group. Further information on ST-elevation in-hospital mortality in percutaneous coronary intervention (PCI) centres can be found in the *Irish Heart Attack Audit National Report 2022 and 2023* (NOCA 2024a). Professor Ronan Margey, Consultant Cardiologist and National Clinical Lead for the Irish Heart Attack Audit commented: "This NAHM report provides a very useful overview of hospitals' SMRs (expected and actual deaths) and national crude mortality rate for six conditions with high in-hospital mortality in Ireland. It [NAHM] requires standardised data collection with a rigorous risk adjustment model to support hospitals in Ireland. It is reassuring to know that the treatment of AMI is in line with international findings; however, we must also now improve our understanding of the treatment and care of women with a heart attack.".

FINDINGS

Figure 1 presents the crude in-hospital mortality rate for AMI (with 95% CIs), in addition to the number of patient discharges, for the period 2014–2023. There was a statistically significant reduction in the in-hospital mortality rate for AMI over the 10-year period from 2014 to 2023. It decreased from 58.1 deaths per 1,000 discharges in 2014 to 46.5 deaths per 1,000 discharges in 2023 (p = 0.004). There was a small decrease from 48.9 deaths per 1,000 discharges in 2022 to 46.5 deaths per 1,000 discharges in 2023. However, this decrease is not statistically significant (p = 0.54). The supporting table of figures for crude mortality can be found on the NOCA website.

Professor Ronan Margey stated that the current NAHM model reassuringly demonstrates a continued downward trend in in-hospital mortality from AMI, which has seen a steady decrease since the 1970s. For the most part, the decrease is due to a reduction in smoking, improvements in treatment of recognised risk factors for coronary heart disease (such as elevated cholesterol and high blood pressure), and improvements in acute hospital care for heart attack (Bennett *et al.,* 2006). In the 1970s, 65% of adults in Ireland were active smokers, compared with 17% in 2024 (Healthy Ireland, 2024). Improvements in the recognition of and treatments for other risk factors in the population have also had an impact on the management of high cholesterol and high blood pressure. Since 2012, hospital-based care has improved due to the introduction of standardised pathways of care for AMI (in particular for ST-elevation myocardial infarction), with improved access nationally to timely treatment with primary PCI. Patients with ST-elevation myocardial infarction are receiving primary PCI in a more timely fashion, which is the preferred treatment, and this has lowered their mortality rates. There are 24 extra lives saved per 1,000 for patients who receive primary PCI versus clot-busting thrombolysis. Over the past 10 years, patients presenting to hospital with non-ST-elevation myocardial infarction have experienced improved access to enhanced drug combinations and timely access to essential interventions, such as early angiography, coronary artery intervention (PCI or angioplasty/stenting), and bypass surgery where appropriate.

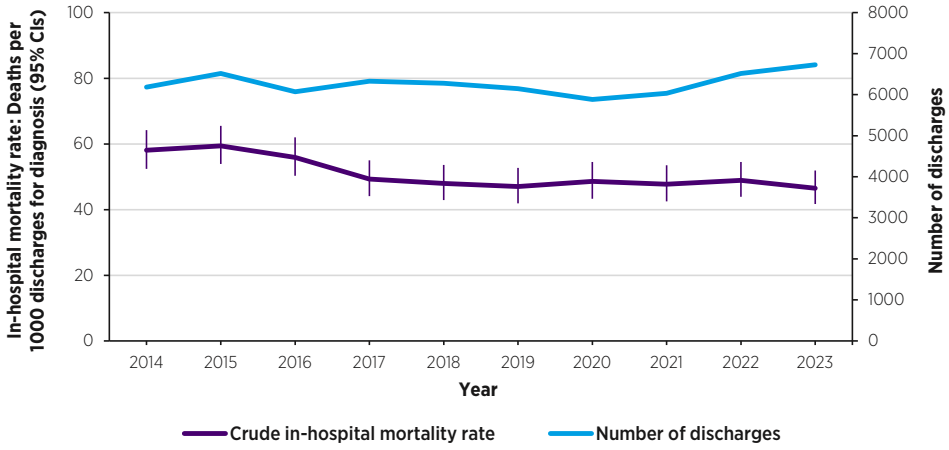


FIGURE 1: NATIONAL IN-HOSPITAL MORTALITY RATE AND NUMBER OF DISCHARGES FOLLOWING A PRINCIPAL DIAGNOSIS OF ACUTE MYOCARDIAL INFARCTION AT DISCHARGE, 2014–2023

Figure 2 presents funnel plots for 2022 and 2023 of the SMRs for hospitals that met the inclusion criteria, along with 99.8% control limits. All hospitals had an SMR within the control limit of 99.8% for AMI for 2022 and 2023, indicating that the SMRs of all hospitals (including the hospitals with small numbers of discharges that are excluded from these graphs) were within the expected ranges. Of the 44 participating hospitals, only 22 met the selection criteria for public reporting in both 2022 and 2023. Tipperary University Hospital, which was included in the 2022 analysis, did not meet the selection criteria for 2023. Portiuncula University Hospital was included in the 2023 analysis, but was not included in the 2022 analysis. The number of cases with a principal diagnosis of AMI that were discharged from these hospitals in 2022 ranged from 113 to 734, accounting for 92% of AMI in-hospital cases nationally in that year. In 2023, the number of cases that were discharged ranged from 101 to 767, accounting for 93% of AMI in-hospital cases nationally in that year.

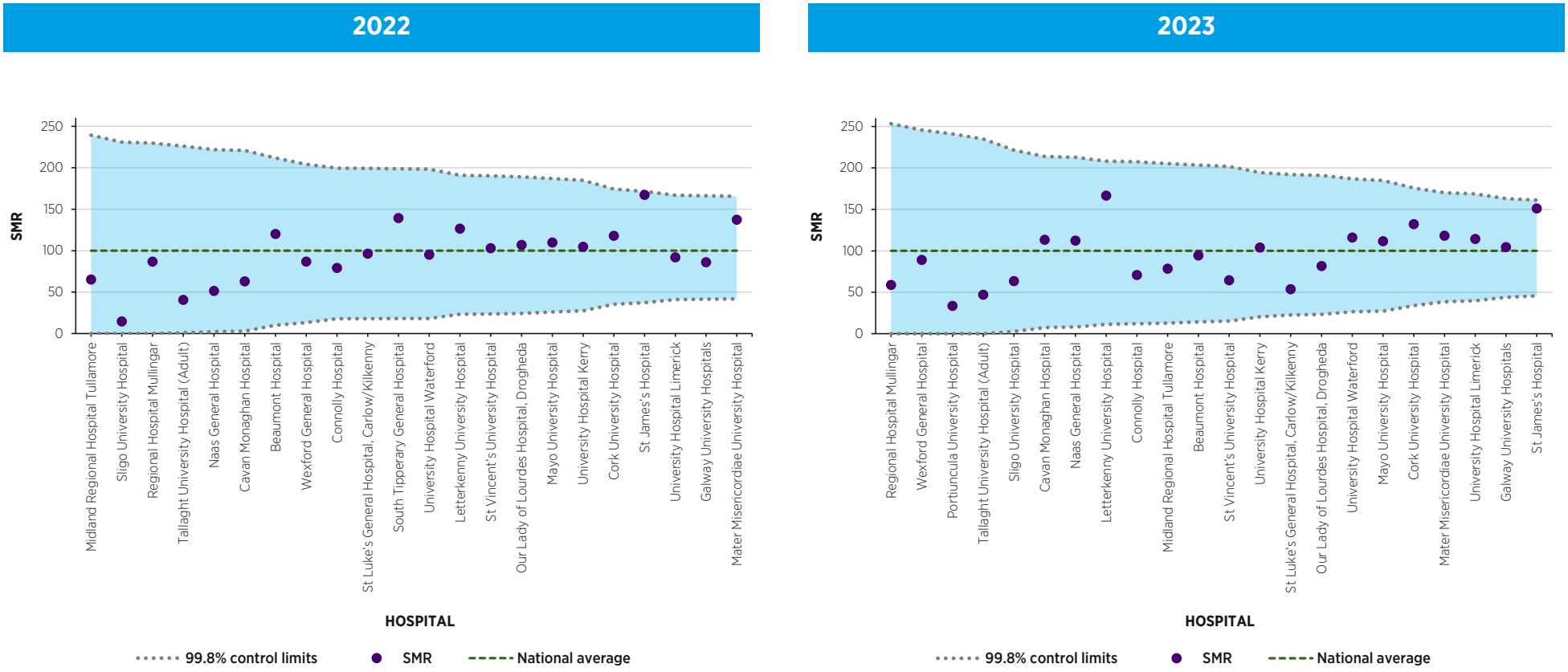


FIGURE 2: NATIONAL IN-HOSPITAL STANDARDISED MORTALITY RATIO FOLLOWING A PRINCIPAL DIAGNOSIS OF ACUTE MYOCARDIAL INFARCTION AT DISCHARGE, 2022 AND 2023

Over the 10-year period from 2014 to 2023, the number of female deaths from AMI was 1,258, while the corresponding number of male deaths was 1,935, as shown in Figure 3. The median age of death in females with AMI over this period was 84 years, while the median age of death for males was 78 years. There was little variance from this for individual years, with the median ages of death for females and males from AMI for 2023 being 84 years and 77 years, respectively. The age distributions for female and male deceased patients are both skewed towards the older age groups, with the female distribution having a higher proportion of deaths in the oldest age group when compared with the male distribution, as shown in Figure 3. Conversely, the male distribution has a higher proportion of deaths in the youngest age group when compared with the female distribution.

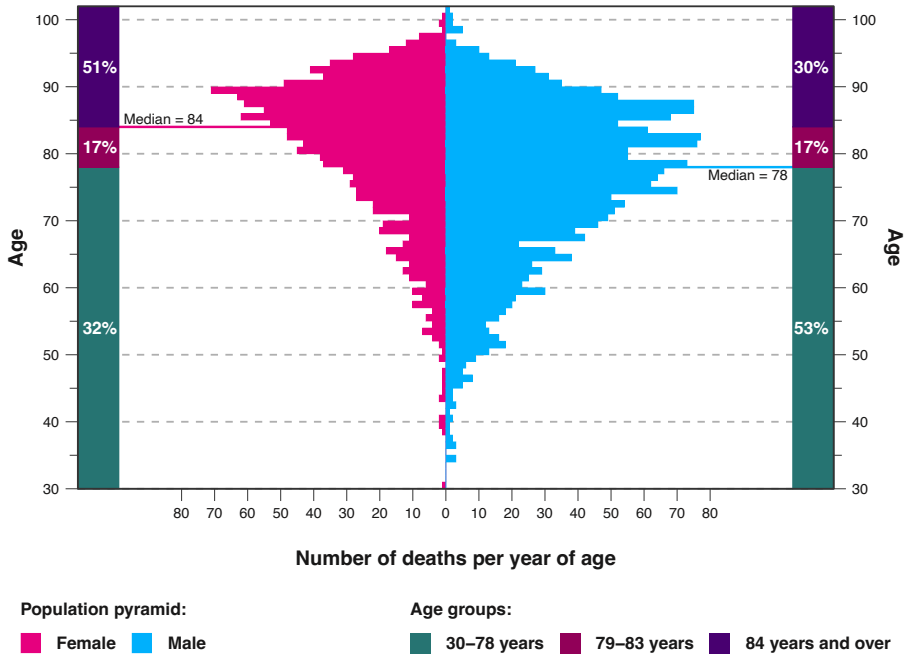


FIGURE 3: POPULATION PYRAMID SHOWING VOLUME AND DISTRIBUTION OF DECEASED CASES BY AGE AND SEX FOLLOWING A PRINCIPAL DIAGNOSIS OF ACUTE MYOCARDIAL INFARCTION, 2014–2023

The percentages on the left- and right-hand margins of the plot indicate the proportion of the respective distribution (female/male) which falls into the age groups as defined by the legend.

Female deaths = 1,258; male deaths = 1,935; total deaths = 3,193.

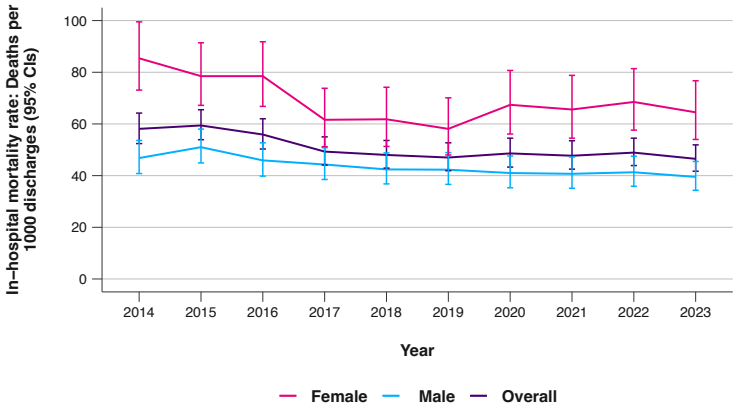


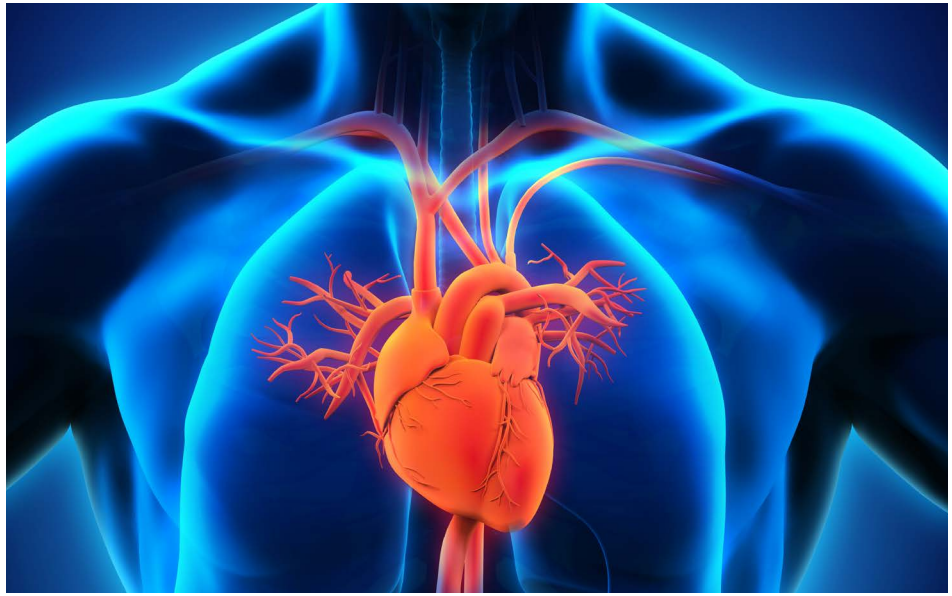
FIGURE 4: NATIONAL IN-HOSPITAL MORTALITY RATE BY SEX FOLLOWING A PRINCIPAL DIAGNOSIS OF ACUTE MYOCARDIAL INFARCTION, 2014–2023

Figure 4 presents the in-hospital crude mortality rates for males and females over the 10-year period from 2014 to 2023, along with the overall crude mortality rate as presented in Figure 1. The in-hospital crude mortality rate calculated over this period for females is 69.1 deaths per 1,000 discharges and is statistically significantly higher than the rate of 43.5 deaths per 1,000 discharges for males ($p < 0.001$). It is important to note in relation to this finding that in any given year there are approximately 2.5 times as many male presentations as female presentations with a principal diagnosis of AMI. The number of deaths (1,258) for females is lower than that for males (1,935). However, the rate of deaths per 1,000 discharges for females is greater. This finding is in line with findings in other western countries (Bosomworth and Khan, 2023).

Additional exploratory analysis for patients with AMI was conducted, which included a new statistical model. The new model suggested there may be a complex relationship between gender and the Charlson Index score. It was found that women may have a higher risk of death than men when their Charlson scores are low. This is a complicated area, and the reasons for these differences are not straightforward, warranting further research. There may be variables that are not included in the NAHM dataset – such as time from symptom onset to seeking medical attention, or the timeliness of medical intervention – that may differ between genders and could explain some of the difference in mortality rates identified between males and females. The evidence shows that females tend to be older than males when they suffer an AMI and have a higher crude mortality rate compared with males. Over the 10-year period from 2014 to 2023, the median age for female presentations with AMI was 73 years, while the median age for male presentations was 65 years. Females also have more subtle, atypical symptoms of AMI, which makes recognition of and response to the symptoms of AMI more difficult and may lead to more conservative treatment as a result. This often leads to delayed calls for help and delays to timely treatment (Mannem et al., 2020; Nguyen et al., 2010). This contributes in part to the higher in-hospital crude mortality rates observed for females compared with males.

HEART FAILURE

Heart failure is a medical condition in which the heart is unable to deliver enough oxygen and nourishment to the body to enable it to work normally, leading to swelling of the legs, a buildup of fluid in the lungs, fatigue, and shortness of breath. Heart failure usually affects people aged over 65 years, and the incidence in Ireland is rising, with the population a little older and more co-morbid compared to 10 years ago. More than 10,000 new cases of heart failure are diagnosed annually in Ireland, with patients requiring frequent hospitalisation. Further information on heart failure is available on both the HSE website and the Irish Heart Foundation website. A list of ICD-10-AM codes for heart failure in the NQAIS NAHM web-based tool is fully defined on the NOCA website.



FINDINGS

A crude in-hospital mortality rate for heart failure for the period 2014–2023 is presented in Figure 5, with 95% CIs, in addition to the number of patient discharges for these years. There was a statistically significant reduction at the 5% level recorded for in-hospital mortality over this period. The crude mortality rate decreased from 82 deaths per 1,000 discharges in 2014 to 72 deaths per 1,000 discharges in 2023 (p = 0.03). There was little year-to-year variation in the crude mortality rates in the intervening years, as evidenced by the extent of overlap of the 95% CIs for each year as shown in Figure 5. Professor Ken McDonald, Consultant Cardiologist and National Clinical Co-Lead of the HSE National Heart Programme, commented that "the reduction in crude mortality over the 10-year period is likely to be as a result of more cardiology involvement in the care of this cohort of patients and also due to better therapies and significant advances in medical management of heart failure over the last 10 years."

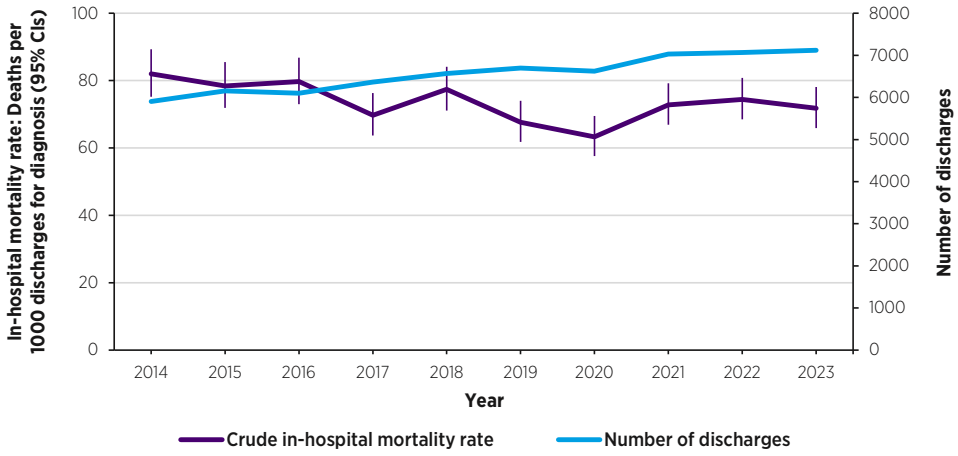


FIGURE 5: NATIONAL IN-HOSPITAL MORTALITY RATE AND NUMBER OF DISCHARGES FOLLOWING A PRINCIPAL DIAGNOSIS OF HEART FAILURE AT DISCHARGE, 2014–2023

Figure 6 presents the SMRs in funnel plots, with 99.8% control limits for 2022 and 2023. Apart from Ennis Hospital, all 44 participating hospitals had an SMR within the control limits of 99.8% for heart failure, indicating that all hospital SMRs (including the hospitals with small numbers of admissions that are excluded from this figure) were within the expected range for both 2022 and 2023. In 2022, for Ennis Hospital, the SMR is below the lower 99.8% control limit, indicating that there were fewer deaths than expected from heart failure at this hospital.

Of the 44 participating hospitals, the same set of 32 hospitals met the public reporting inclusion criteria for heart failure in 2022 and 2023. The number of cases with a principal diagnosis of heart failure discharged from these hospitals in 2022 ranged from 106 to 419, and in 2023 ranged from 102 to 441. The 32 hospitals included had a high number of discharges and account for 98% of cases in Ireland that were discharged with a principal diagnosis of heart failure in both years under analysis. The number of discharges increased from 7,031 cases nationally in 2021 to 7,068 cases nationally in 2022, and increased again to 7,120 cases nationally in 2023.

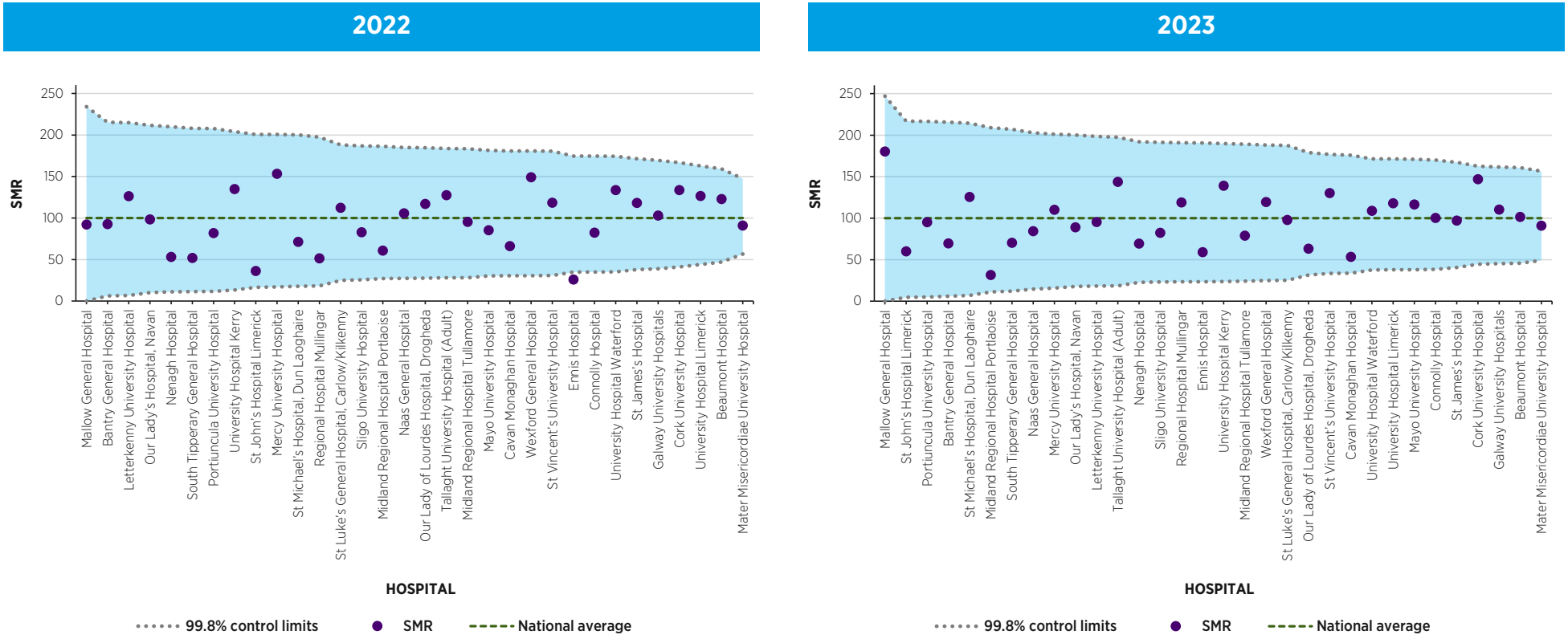


FIGURE 6: NATIONAL IN-HOSPITAL STANDARDISED MORTALITY RATIO FOLLOWING A PRINCIPAL DIAGNOSIS OF HEART FAILURE AT DISCHARGE, 2022 AND 2023

Over the 10-year period from 2014 to 2023, the number of female deaths from heart failure was 2,182, while the corresponding number of male deaths was 2,644, as shown in Figure 7. The median age of death in heart failure for females over this period was 85 years, while the median age of death for males was 82 years. There was little variance from this for individual years, with the median ages of death in heart failure for females and males for 2023 being 86 years and 82 years, respectively. The age distributions for female and male deceased patients are both skewed towards the older age groups, with the female distribution having a higher proportion of deaths in the oldest age group when compared with the male distribution, as shown in Figure 7. Conversely, the male distribution has a higher proportion of deaths in the youngest age group when compared with the female distribution.

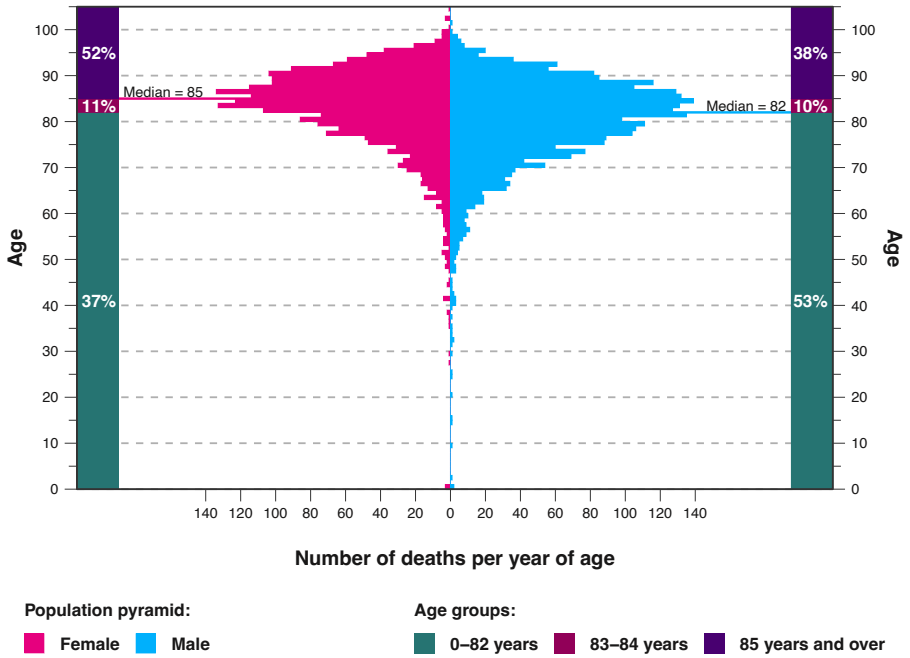


FIGURE 7: POPULATION PYRAMID SHOWING VOLUME AND DISTRIBUTION OF DECEASED CASES BY AGE AND SEX FOLLOWING A PRINCIPAL DIAGNOSIS OF HEART FAILURE, 2014–2023

The percentages on the left- and right-hand margins of the plot indicate the proportion of the respective distribution (female/male) which falls into the age groups as defined by the legend.

Female deaths = 2,182; male deaths = 2,644; total deaths = 4,826.

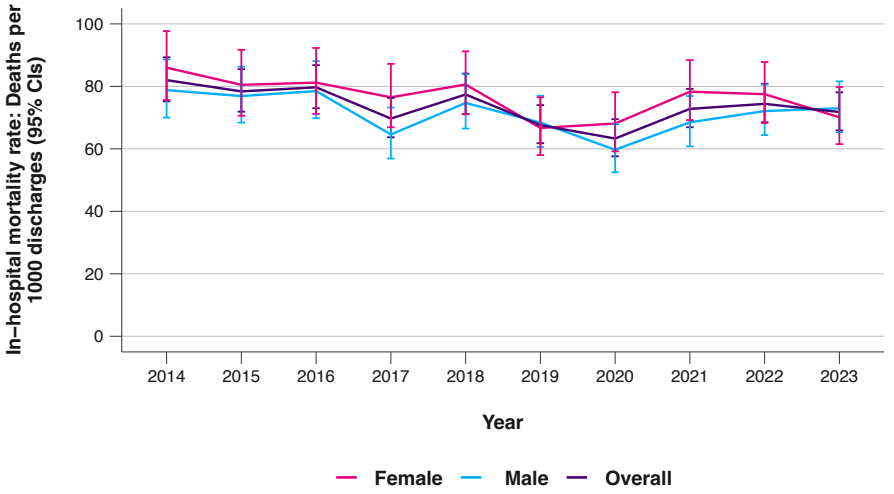


FIGURE 8: NATIONAL IN-HOSPITAL MORTALITY RATE BY SEX FOLLOWING A PRINCIPAL DIAGNOSIS OF HEART FAILURE, 2014–2023

Figure 8 presents the in-hospital crude mortality rate for females and males over the 10-year period from 2014 to 2023, along with the overall crude mortality rate as presented in Figure 5. The in-hospital crude mortality rate calculated over this period for females is 76.4 deaths per 1,000 discharges and is statistically significantly higher at the 5% level than the rate of 71.3 deaths per 1,000 discharges for males (p = 0.02). That said, for the individual years during this period, there is no statistically significant difference between the in-hospital crude mortality rates for females and males, as is illustrated by the extent of overlap of the 95% CIs presented in Figure 8.

ISCHAEMIC STROKE

Ischaemic stroke, the most common type of stroke, occurs when the brain's blood vessels become narrowed or are blocked by blood clots, causing reduced blood flow to the brain (ischaemia). Further information on heart and stroke conditions is available on the HSE website and on the Irish Heart Foundation website.

Ischaemic stroke in NQAIS NAHM web-based tool is based on ICD-10-AM codes and is fully defined on the NOCA website.

FINDINGS

A crude in-hospital mortality rate for the period from 2014 to 2023 for ischaemic stroke is presented in Figure 9, with 95% CIs, in addition to the number of patient discharges for these years. There was a statistically significant reduction (42%) recorded for in-hospital mortality between 2014 and 2023; this decreased from 108.6 deaths per 1,000 discharges in 2014 to 63.0 deaths per 1,000 discharges in 2023 ($p < 0.001$). While there was a decrease in the in-hospital mortality rate per 1,000 discharges from 71.6 in 2022 to 63.0 in 2023, this decrease was not statistically significant ($p = 0.07$). Professor Joseph Harbison, Consultant Geriatrician and Stroke Physician, and Clinical Lead of the Irish National Audit of Stroke, commented that "the improvements in stroke mortality over the last 10 years are potentially due to improvements in treatments available for patients and the management of known risk factors, for example smoking and high blood pressure". There were year-on-year increases in the number of cases discharged from hospitals nationally with a principal diagnosis of ischaemic stroke; this rose from 5,387 in 2021 to 5,548 in 2022, with a further rise to 6,100 in 2023. This marks a continuation of the increasing trend in case numbers for ischaemic stroke over the period 2014–2023.

Professor Harbison further commented "The increase in discharges may be down to a number of factors. There has been a change in how strokes are defined, moving from the World Health Organization to American Heart Association definition, which, due to the availability of advanced imaging, will result in an increase in the number of milder events such as a transient ischaemic attack (TIA) being diagnosed as stroke. Age is another contributing factor to stroke incidence. The number of Irish people over 65 years of age is estimated to have increased by 40% between 2013 and 2023 (Central Statistics Office, 2024b). A third factor to take into consideration is that when a patient is transferred from one hospital to another for treatment and then transferred back to the original hospital for the rest of their stay, they will be counted as having more than one episode of care in HIPE, therefore inflating the number of stroke discharges". A report by King's College London on the burden of stroke in Europe predicts a 34% increase in stroke cases in the European Union by 2035 (Stevens *et al.,* 2017).

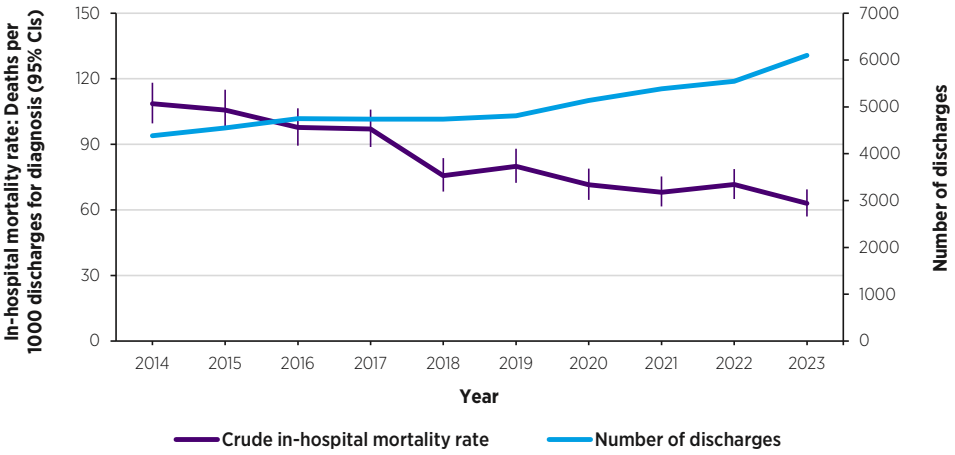


FIGURE 9: NATIONAL IN-HOSPITAL MORTALITY RATE AND NUMBER OF DISCHARGES FOLLOWING A PRINCIPAL DIAGNOSIS OF ISCHAEMIC STROKE AT DISCHARGE, 2014–2023

Twenty-four of the 44 NAHM participating hospitals treat acute stroke patients. Twenty-one of these hospitals met the public reporting inclusion criteria for 2022, and 22 hospitals met these criteria for 2023. In 2023, the additional hospital was Midland Regional Hospital Tullamore, but otherwise the set of hospitals included in the funnel plots is the same for both years (Figure 10). The number of cases with a principal diagnosis of ischaemic stroke discharged from these hospitals in 2022 ranged from 120 to 706 and accounted for 90% of cases with a principal diagnosis of ischaemic stroke discharged in that year. In 2023, the number of such cases discharged ranged from 103 to 808 and accounted for 93% of all cases with a principal diagnosis of ischaemic stroke discharged nationally in 2023. The increase in discharges of patients with a principal diagnosis of ischaemic stroke and the decrease in mortality rates aligns with the Irish National Audit of Stroke findings (NOCA, 2025a). Since the establishment of the National Stroke Clinical Care Programme Model of Care (HSE, 2012), there have been changes in the delivery of acute stroke care through the provision of thrombolysis and thrombectomy and access to stroke units, all of which have contributed to the reduction in mortality rates. The increase in discharges can be attributed to the increase in Ireland's ageing population.

Figure 10 presents the SMRs for these hospitals as funnel plots, with 99.8% control limits for both 2022 and 2023. Apart from Wexford General Hospital in 2022 and Cork University Hospital in 2023, which are statistical outliers, all other hospitals had an SMR within the control limits of 99.8% for ischaemic stroke in both 2022 and 2023 (hospitals with small numbers of cases are excluded from the figure). Two of the 24 hospitals in Ireland that accept acute stroke patients are not included in this analysis, as they did not meet the NAHM inclusion criteria for public reporting.

Please refer to the Analysis of SMR outliers chapter for further details relating to the SMRs for Wexford General Hospital in 2022 and Cork University Hospital in 2023.

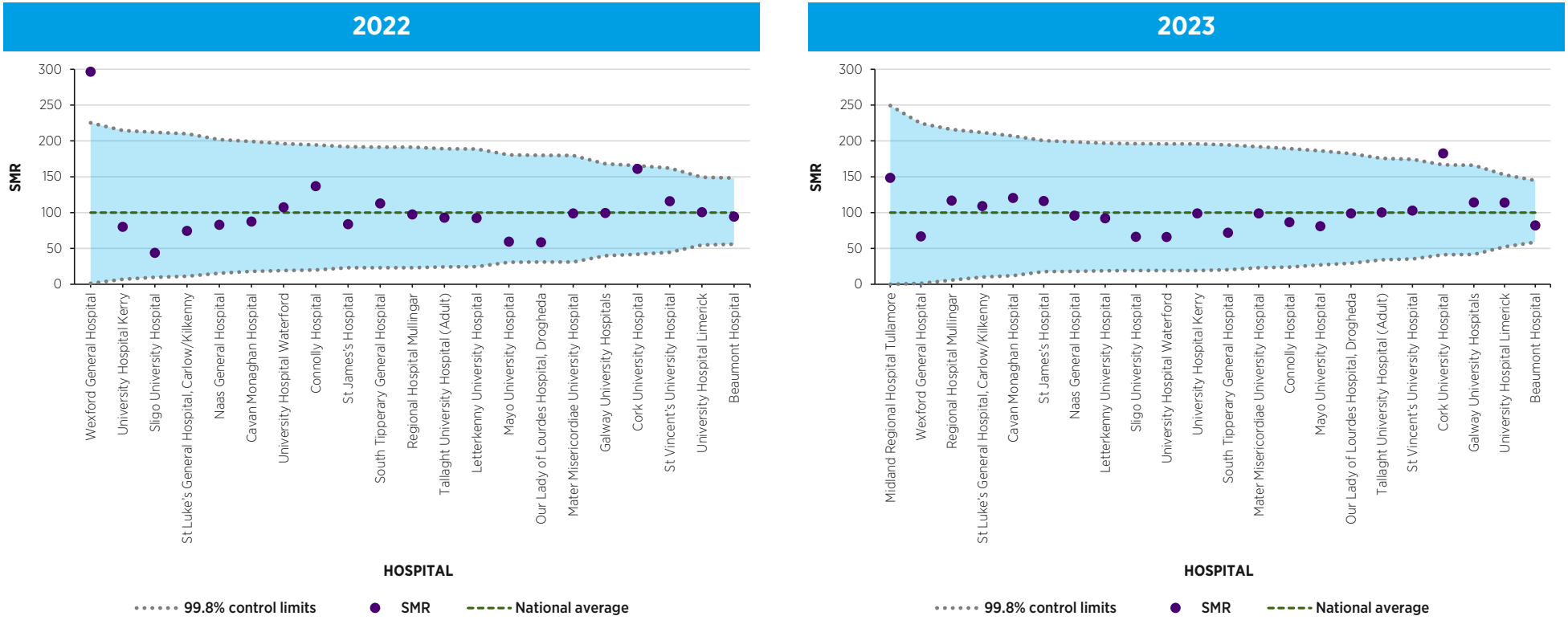


FIGURE 10: NATIONAL IN-HOSPITAL STANDARDISED MORTALITY RATIO FOLLOWING A PRINCIPAL DIAGNOSIS OF ISCHAEMIC STROKE AT DISCHARGE, 2022 AND 2023

Over the 10-year period from 2014 to 2023, the number of female deaths from ischaemic stroke was 2,140, while the corresponding number of male deaths was 1,999, as shown in Figure 11. The median age of death in ischaemic stroke for females over this period was 85 years, while the median age of death for males was 80 years. There is little variance from this for individual years, with the median ages of death in ischaemic stroke for females and males for 2023 being 85 years and 79 years, respectively. The age distributions for female and male deceased patients are both skewed towards the older ages, with the female distribution having a higher proportion of deaths in the oldest age group when compared with the male distribution, as shown in Figure 11. Conversely, the male distribution has a higher proportion of deaths in youngest age group when compared with the female distribution.

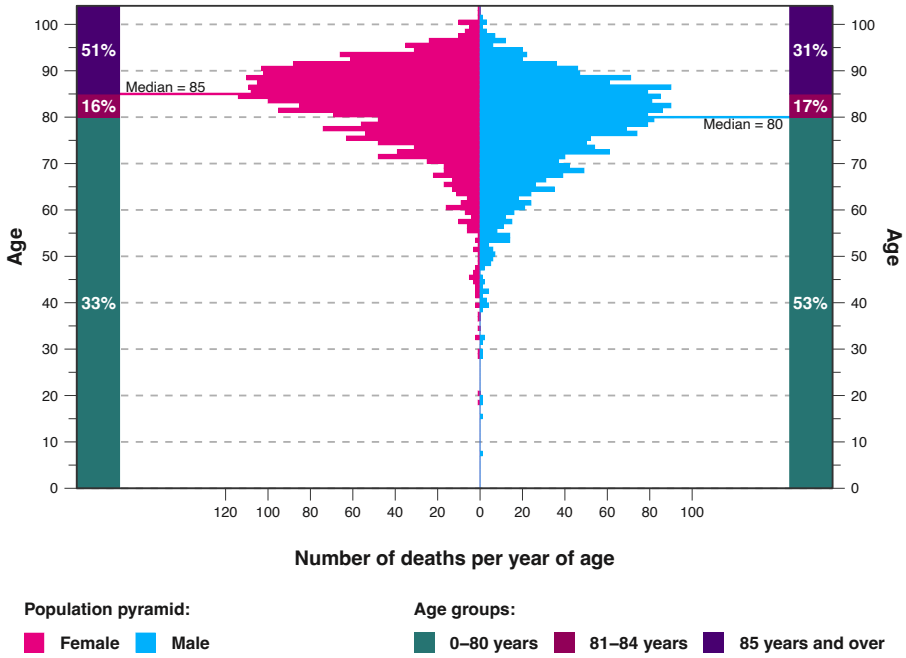


FIGURE 11: POPULATION PYRAMID SHOWING VOLUME AND DISTRIBUTION OF DECEASED CASES BY AGE AND SEX FOLLOWING A PRINCIPAL DIAGNOSIS OF ISCHAEMIC STROKE, 2014–2023

The percentages on the left- and right-hand margins of the plot indicate the proportion of the respective distribution (female/male) which falls into the age groups as defined by the legend.

Female deaths = 2,140; male deaths = 1,999; total deaths = 4,139.

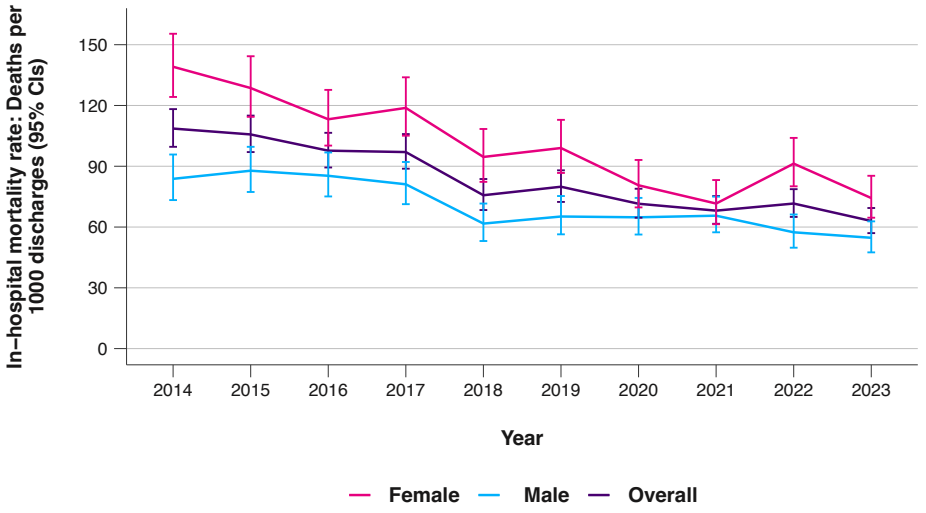


FIGURE 12: NATIONAL IN-HOSPITAL MORTALITY RATE BY SEX FOLLOWING A PRINCIPAL DIAGNOSIS OF ISCHAEMIC STROKE, 2014–2023

Figure 12 presents the in-hospital crude mortality rate for males and females over the period 2014–2023, along with the overall crude mortality rate as presented in Figure 9. The in-hospital crude mortality rate calculated over the 10-year period for females is 99.7 deaths per 1,000 discharges and is statistically significantly higher than the rate of 69.7 deaths per 1,000 discharges for males ($p < 0.001$). This difference can be explained in part by the age of deceased patients as shown in Figure 11, where there is a higher proportion of older female deaths than older male deaths. Results from fitting logistic regression models to Irish in-hospital data for ischaemic stroke show that sex is not a statistically significant factor in determining survival outcomes for patients with a principal diagnosis of ischaemic stroke. The differences in crude mortality rates between males and females can be explained by factors such as the increased longevity in females and comorbidities.

HAEMORRHAGIC STROKE

A haemorrhagic stroke (also known as cerebral haemorrhage or intracranial haemorrhage) usually occurs when a blood vessel in the brain bursts and bleeds into the substance of the brain. In about 5% of cases, the bleeding occurs on the surface of the brain (subarachnoid haemorrhage). Since January 2020, these subarachnoid haemorrhage cases are no longer included in the CCS group 'stroke haemorrhagic' in the NQAIS NAHM web-based tool and are not included in the analysis in this chapter. The ICD-10-AM codes contained in the haemorrhagic stroke CCS group for analysis in this report are fully defined on the NOCA website. More information on stroke is available on the Irish Heart Foundation website, and information on heart and stroke conditions is available on the HSE website.

FINDINGS

Crude in-hospital mortality rates for the period 2014–2023 for haemorrhagic stroke are presented in Figure 13, with 95% CIs, in addition to the number of patient discharges for these years. There was a 12% reduction in the crude mortality rate, from 303 deaths per 1,000 cases in 2014 to 266 deaths per 1,000 cases in 2023. While this decrease is not statistically significant, a decreasing trend can be observed in the mortality rates for the period 2017–2021, after which the trend levels off in 2022 and 2023. There was a statistically significant decrease in the crude mortality rate, from 335 deaths per 1,000 cases in 2017 to 266 deaths per 1,000 cases in 2023 (p = 0.001). Professor Joseph Harbison, Consultant Geriatrician and Stroke Physician, and Clinical Lead of the Irish National Audit of Stroke, stated that "the main reason for the decrease in mortality over the 10-year period for haemorrhagic strokes is likely attributable to organisation of stroke care and the increased availability of stroke units. A patient in a stroke unit is less likely to suffer from complications of stroke and that has an overall impact on mortality for patients". According to the Irish National Audit of Stroke, in 2023, 70% of patients with a stroke were admitted to a stroke unit (NOCA, 2025a). The decrease in mortality rates is lower compared with that for ischaemic stroke, as there are limited acute treatments available for patients with haemorrhagic stroke.

In 2023, a total of 1,075 cases were discharged from hospital in Ireland with a principal diagnosis of haemorrhagic stroke, compared with 975 cases in 2022 and 958 cases in 2021.

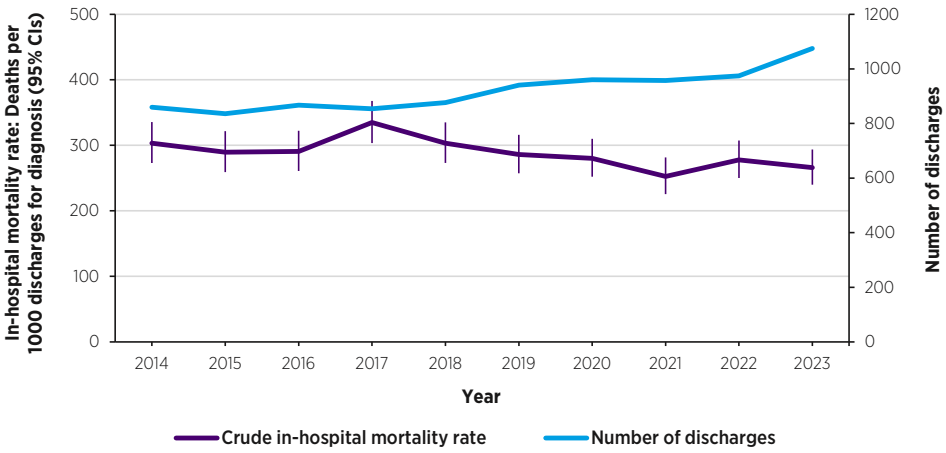


FIGURE 13: NATIONAL IN-HOSPITAL MORTALITY RATE AND NUMBER OF DISCHARGES FOLLOWING A PRINCIPAL DIAGNOSIS OF HAEMORRHAGIC STROKE AT DISCHARGE, 2014–2023

Due to the small numbers of cases with a principal diagnosis of haemorrhagic stroke, data for the 3-year period from 2021 to 2023 were combined and therefore will be presented in one funnel plot. Twenty-two of the 44 NAHM participating hospitals admit acute stroke patients, and only 9 of these met the public reporting inclusion criteria for 2021–2023.

The SMRs for the hospitals that met the inclusion criteria for the 3-year period from 2021 to 2023 is presented in a funnel plot, with 99.8% control limits representing the upper and lower limits of expected variation (Figure 14). Each hospital's control limits are calculated based on that hospital's patient details. All hospitals had an SMR within the expected range for haemorrhagic stroke for the 3-year period (hospitals with small numbers of admissions are excluded from the graph).

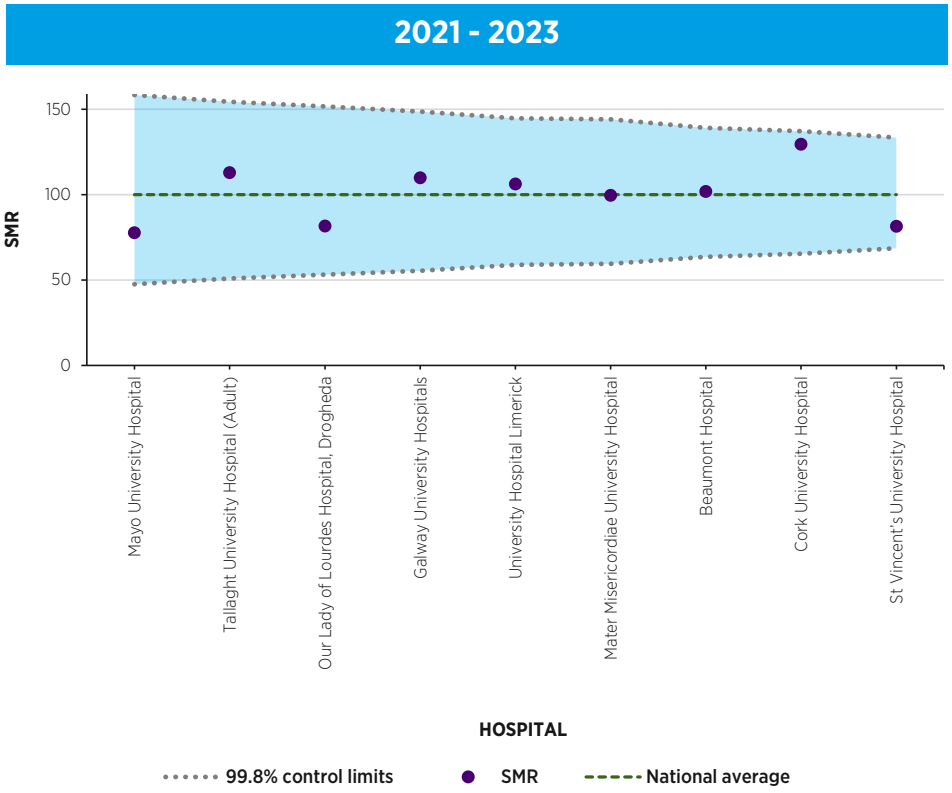


FIGURE 14: NATIONAL IN-HOSPITAL STANDARDISED MORTALITY RATIO FOLLOWING A PRINCIPAL DIAGNOSIS OF HAEMORRHAGIC STROKE AT DISCHARGE, 2021–2023

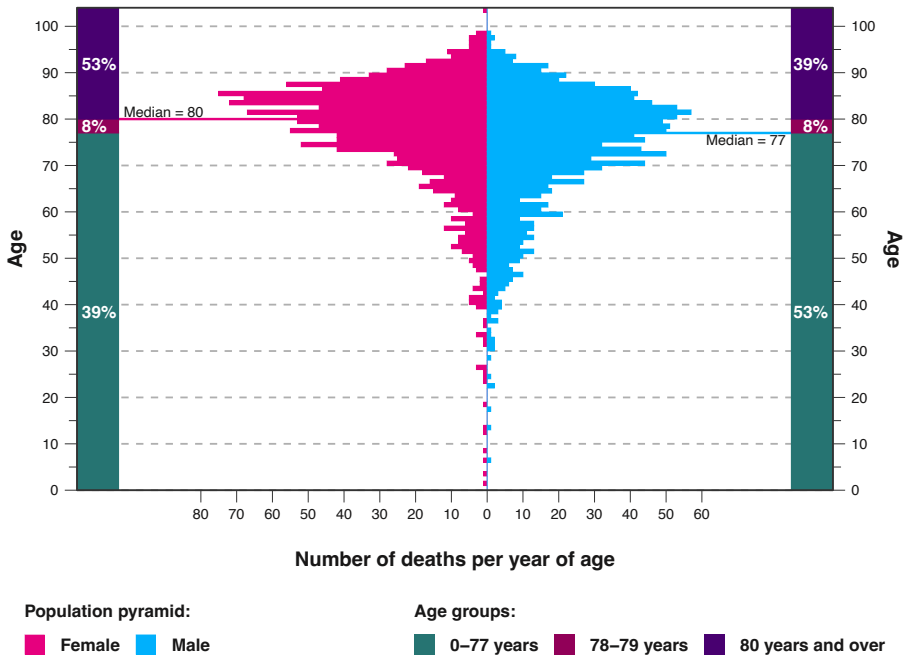


FIGURE 15: POPULATION PYRAMID SHOWING VOLUME AND DISTRIBUTION OF DECEASED CASES BY AGE AND SEX FOLLOWING A PRINCIPAL DIAGNOSIS OF HAEMORRHAGIC STROKE, 2014–2023

The percentages on the left- and right-hand margins of the plot indicate the proportion of the respective distribution (female/male) which falls into the age groups as defined by the legend.

Female deaths = 1,348; male deaths = 1,296; total deaths = 2,644.

The number of cases with a principal diagnosis of haemorrhagic stroke discharged from the 9 participating hospitals in the period 2021–2023 ranged from 100 to 349, accounting for 61% of haemorrhagic stroke cases treated by hospitals nationally during these years.

Over the period 2014–2023, the number of female deaths from haemorrhagic stroke was 1,348, while the corresponding number of male deaths was 1,296, as shown in Figure 15. For females, the median age of death in haemorrhagic stroke over this period was 80 years, while for males the median age of death in haemorrhagic stroke was 77 years. There was little variance from this for individual years, with the median ages of death in haemorrhagic stroke for females and males for 2023 being 81 years and 77 years, respectively. The age distributions for male and female deceased patients are both skewed towards the older age

groups, with the female distribution having a higher proportion of deaths in the oldest age group when compared with the male distribution, as shown in Figure 15. Conversely, the male distribution has a higher proportion of deaths in youngest age group when compared with the female distribution.

Figure 16 presents the in-hospital crude mortality rate for males and females over the period 2014–2023, along with the overall crude mortality rate as presented in Figure 13. The in-hospital crude mortality rate calculated over the 10-year period for females is 314.7 deaths per 1,000 discharges and is statistically significantly higher than the rate of 263.4 deaths per 1,000 discharges for males ($p < 0.001$). That said, however, for many of the individual years in this time period, the difference between the mortality rates for females and males is not statistically significant, as illustrated by the extent of overlap of the 95% CIs presented in Figure 16. Results from fitting logistic regression models to Irish in-hospital data for haemorrhagic stroke show that sex is not a statistically significant factor in determining survival outcomes for patients with a principal diagnosis of haemorrhagic stroke.

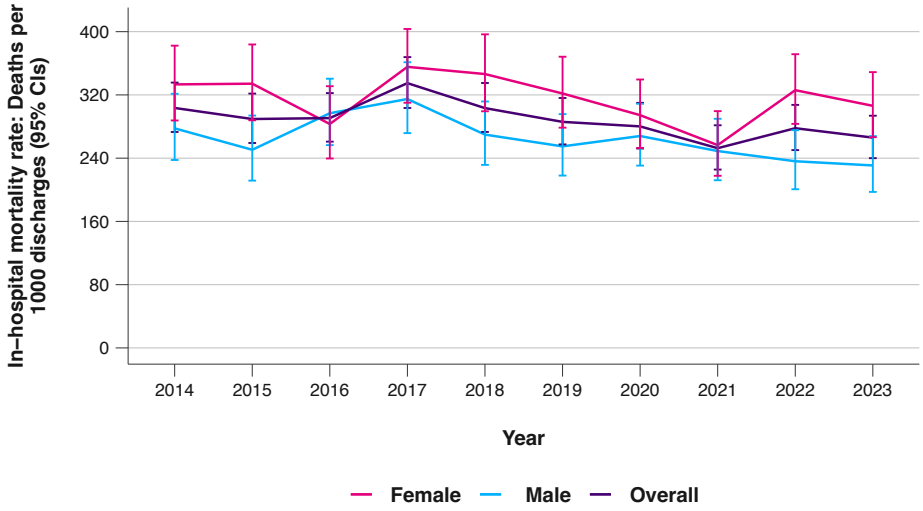


FIGURE 16: NATIONAL IN-HOSPITAL MORTALITY RATE BY SEX FOLLOWING A PRINCIPAL DIAGNOSIS OF HAEMORRHAGIC STROKE, 2014–2023

CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD)

Chronic obstructive pulmonary disease (COPD), is a life-shortening condition and is one of the most common respiratory diseases in Irish adults. It usually affects people aged over 35 years. The disease affects the lungs and is most commonly caused by tobacco smoke, resulting in tissue destruction and airway damage, which often causes a cough and breathlessness. Ireland has an extremely high rate of hospitalisation for COPD in adults. Figures from the Organisation for Economic Co-operation and Development (OECD) show that Ireland had 248 hospital admissions per 100,000 population, which is the third highest rate of hospital admissions across OECD countries in 2021 for adults with asthma and COPD. However, there have been huge reductions since 2011, when the number of hospitalisations in Ireland was 428 per 100,000 admissions (OECD, 2023). More information on COPD is available from the HSE and from the Irish Thoracic Society. The ICD-10-AM codes on COPD in the NQAIS NAHM web-based tool are fully defined on the NOCA website.

FINDINGS

The crude in-hospital mortality rate for the period 2014–2023 for COPD is presented in Figure 17, with 95% CIs, in addition to the number of patient discharges for these years. The COPD crude mortality rate decreased from 42.3 deaths per 1,000 COPD hospital discharges in 2022 to 38.5 deaths per 1,000 COPD hospital discharges in 2023, which from a statistical perspective is not statistically significant (p = 0.13). There is no statistically significant difference between the crude mortality rate of 37 deaths per 1,000 discharges in 2014 and 38 deaths per 1,000 discharges in 2023. The percentage of deaths in 2023 that had a recorded COVID-19 flag associated with them was 13%, compared with 14% in 2022 and 13% in 2021.

Professor Breda Cushen, National Clinical Lead for the HSE National Clinical Programme for Respiratory, commented that "Internationally the COVID period saw a decrease in the number of exacerbations of COPD due to cocooning, mask wearing and reduced exposure to seasonal viruses, etc. As a result, there were fewer patients attending hospital with exacerbations of COPD and Ireland is likely to be no different (Blecker et al., 2021) and those who did tended to be more severely unwell and thus at increased risk of mortality (Pappe et al., 2023)".

The number of discharges decreased significantly from 16,184 in 2019 to 10,087 in 2021. However, since 2021, the number of discharges has been increasing steadily, with 14,032 discharges in 2023. The increasing trend in the in-hospital mortality rate between 2020 and 2022 may reflect inflated mortality rates due to the significant reduction in the number of patients treated in hospital with a diagnosis of COPD combined with more severe illness in those treated where COVID-19 may have been a complicating factor. In 2023, the trends in both hospital discharges and the in-hospital mortality rate suggest a return towards pre-COVID-19 pandemic levels.

Professor Breda Cushen, went on to state "It is too early yet to say if the new national programmes for improving and optimising chronic care for patients with COPD are having an impact on the number of hospitalised cases. These include GP practice-delivered chronic disease management programmes, and an increase in specialist COPD clinical teams and resources across the hospital-community interface. These are coupled with increased access to vaccination, increased vaccine uptake, and greater awareness of the impact of winter viruses leading to more routine mask wearing, etc., by patients".

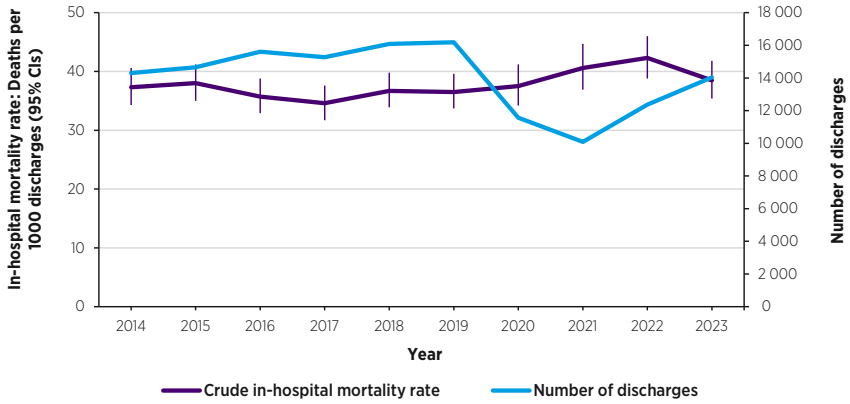


FIGURE 17: NATIONAL IN-HOSPITAL MORTALITY RATE AND NUMBER OF DISCHARGES FOLLOWING A PRINCIPAL DIAGNOSIS OF CHRONIC OBSTRUCTIVE PULMONARY DISEASE AT DISCHARGE, 2014–2023

Of the 44 participating hospitals, the same set of 31 hospitals met the criteria for inclusion in this report in both 2022 and 2023. The number of cases with a principal diagnosis of COPD that were discharged from these hospitals in 2022 ranged from 127 to 699 and account for 97% of cases discharged nationally. In 2023, the number of cases discharged from these hospitals ranged from 171 to 820, also accounting for 97% of cases discharged nationally.

Figure 18 presents the SMRs for these 31 hospitals in funnel plots, with 99.8% control limits (indicating the expected SMR range) for both 2022 and 2023. In 2022, the SMRs for most hospitals were within the expected range (including those hospitals with small numbers of admissions excluded from the graphs). The SMR for Cork University Hospital in 2022 indicates that the observed number of deaths in that hospital was higher than expected, while the SMR for Ennis Hospital in 2022 indicates that there were fewer deaths than expected in that hospital. These cases are further discussed in the Analysis of SMR outliers chapter of this report. In the HIPE data for the full 2023 calendar year, all hospitals (including hospitals with small numbers of admissions that are excluded from Figure 18) were within the expected range. However, Cork University Hospital's outlier status in 2022 continued into 2023, which resulted in that hospital being an outlier again at the beginning of that year. Consequently, it was asked to conduct a further review, which is discussed in the Analysis of SMR outliers chapter of this report.

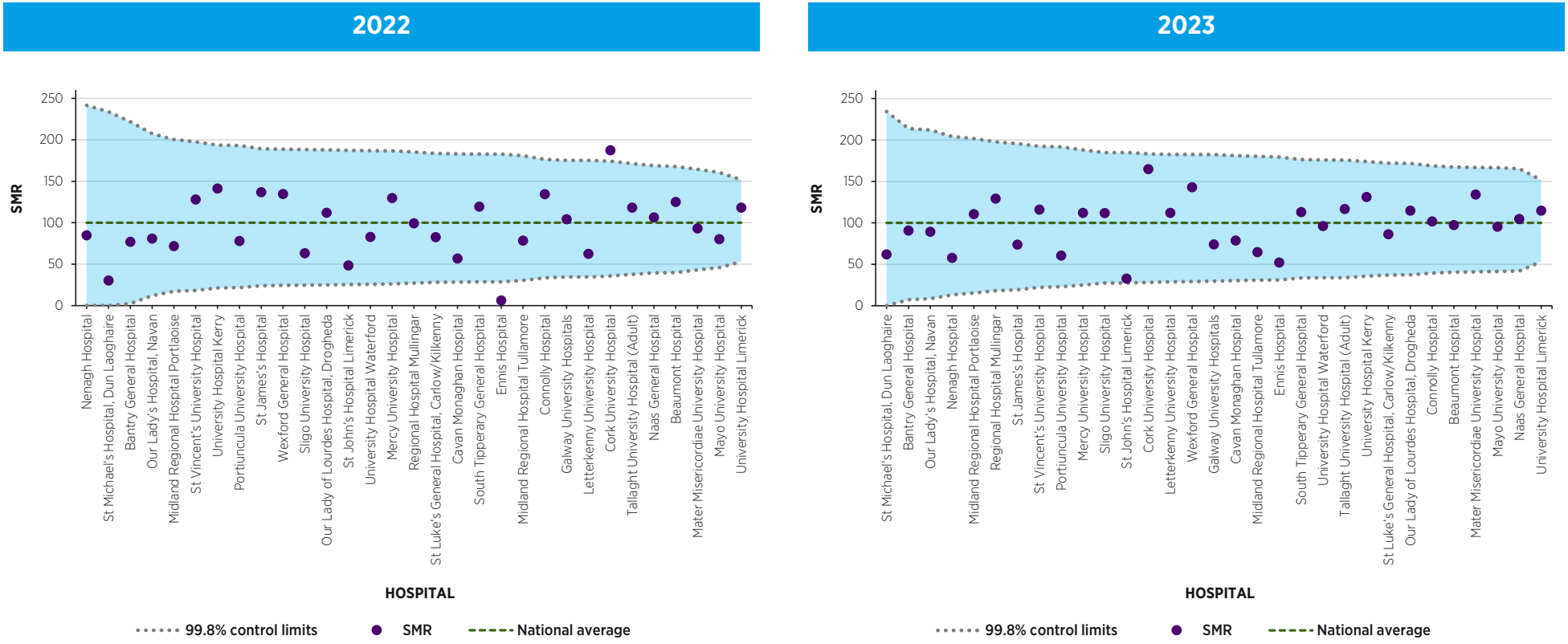


FIGURE 18: NATIONAL IN-HOSPITAL STANDARDISED MORTALITY RATIO FOLLOWING A PRINCIPAL DIAGNOSIS OF CHRONIC OBSTRUCTIVE PULMONARY DISEASE AT DISCHARGE, 2022 AND 2023

Over the period 2014–2023, there were 2,599 female deaths and 2,666 male deaths from COPD, as shown in Figure 19. Overall, the age profile of deaths from COPD and the crude in-hospital mortality rates are similar for males and females. The median age of death in females with COPD over this 10-year period was 78 years, while the median age of death for males with COPD was 77.5 years. There was little variance from this for individual years, with the median ages of death in COPD for females and males for 2023 being 79 years and 78 years, respectively. The age distributions for male and female deceased patients are similar, and both are slightly skewed towards the older ages, as shown in Figure 19.

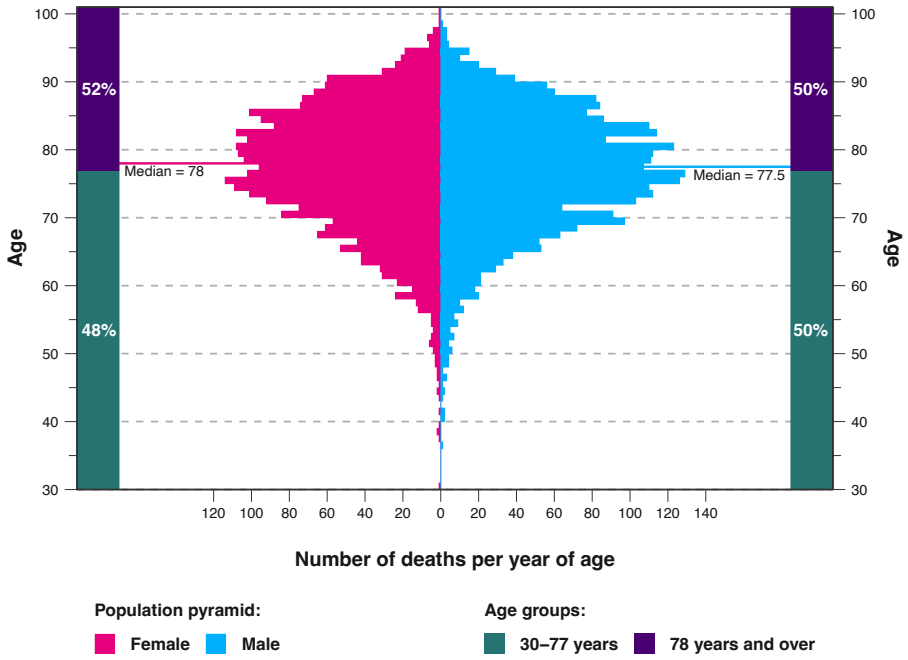


FIGURE 19: POPULATION PYRAMID SHOWING VOLUME AND DISTRIBUTION OF DECEASED CASES BY AGE AND SEX FOLLOWING A PRINCIPAL DIAGNOSIS OF CHRONIC OBSTRUCTIVE PULMONARY DISEASE, 2014–2023

The percentages on the left- and right-hand margins of the plot indicate the proportion of the respective distribution (female/male) which falls into the age groups as defined by the legend.

Female deaths = 2,599; male deaths = 2,666; total deaths = 5,265.

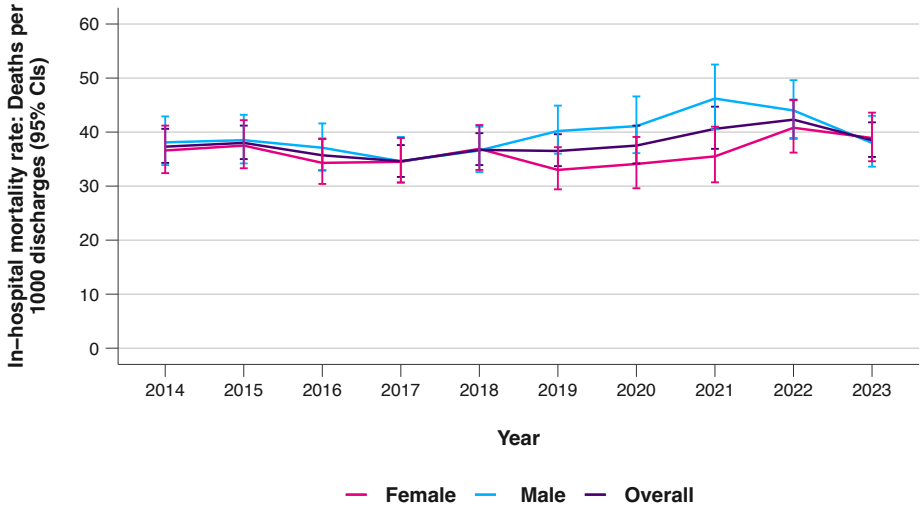


FIGURE 20: NATIONAL IN-HOSPITAL MORTALITY RATE BY SEX FOLLOWING A PRINCIPAL DIAGNOSIS OF CHRONIC OBSTRUCTIVE PULMONARY DISEASE, 2014–2023

Figure 20 presents the in-hospital crude mortality rate for females and males over the period 2014–2023, along with the overall crude mortality rate as presented in Figure 17. The in-hospital crude mortality rate calculated over the 10-year period for males is 39 deaths per 1,000 discharges and is statistically significantly higher than the rate of 36.2 deaths per 1,000 discharges for females (p = 0.005). This difference is evident between the years 2019 and 2021, as shown in Figure 20.

PNEUMONIA

Pneumonia is defined as an acute infection of lung tissue resulting in inflammation with fluid and pus accumulation within the small airways and tiny air sacs of one or both lungs, which can lead to serious complications and can be fatal. Pneumonia is usually the result of bacterial infection, although other viruses, including COVID-19, can also cause pneumonia. More information on pneumonia is available on both the HSE website and on the Irish Thoracic Society website. For at-risk groups, pneumonia can be severe and may require hospital treatment. The most up-to-date figures available from the OECD for the age-standardised mortality rate in pneumonia patients are for the period 2013–2015; these figures show that Ireland had the fifth highest rate of pneumonia in the European Union at 42.1 deaths per 100,000 population, compared with the European Union average of 28.1 deaths per 100,000 population (OECD/European Union, 2018). Pneumonia in the NQAIS NAHM web-based tool is based on several ICD-10-AM codes, which are fully defined on the NOCA website.

FINDINGS

The crude in-hospital mortality rate for pneumonia for the period from 2014 to 2023 is presented in Figure 21, with 95% CIs, in addition to the number of patient discharges for these years.

Following a peak in 2021 of 140 deaths per 1,000 hospital discharges, there have been statistically significant decreases in the in-hospital mortality rate for pneumonia each year since then. Figure 21 shows a 19% decrease from 2022 to 2023 for the in-hospital mortality rate recorded for pneumonia. When asked about the decrease in mortality rates for pneumonia, Professor Breda Cushen, National Clinical Lead for the HSE National Clinical Programme for Respiratory, speculated that it is possible that this is related to the expansion of vaccination programmes, in particular for the influenza vaccine. Pneumonia and flu are closely linked, with many patients with flu developing secondary bacterial infections. The uptake of the influenza vaccine for 2022–2023 was 76.5%, which represents an increasing trend since 2015–2016, when uptake was only 55.4% (Health Protection Surveillance Centre, 2024). The reduction in COVID-19 and high COVID-19 vaccine uptake rates will also have had an impact.. The 2023 rate of 100 deaths per 1,000 hospital discharges was a decrease from 124 deaths per 1,000 hospital discharges in 2022, representing a statistically significant decrease ($p < 0.001$) and bringing the in-hospital mortality rate for pneumonia back in line with those recorded for 2018 and 2019.

The number of cases discharged following a principal diagnosis of pneumonia increased from 14,925 in 2022 to 15,182 in 2023, and aside from 2021 when the number of such discharges was 17,720, the 2023 figure of 15,182 is higher than the number of discharges recorded for any other year in the period 2014–2023.

In 2023, COVID-19 was present in 17% (n=2593) of patients treated with pneumonia; the comparable figures were 32.4% (n=4834) in 2022 and 52.1% (n=9224) in 2021. While the 2023 COVID-19 percentage for pneumonia cases represents a decrease from 2022, it remains the largest percentage of COVID-19 cases among the six key diagnoses presented in this report. The yearly decrease in mortality recorded for pneumonia for the period 2021–2023 coincides with a decrease in the percentage of cases where COVID-19 was present. In addition, when the mortality data are analysed, the percentage of deaths from pneumonia where COVID-19 was present was 24.0% in 2023 (n=365); the comparable figures were 40.4% in 2022 (n=747), 57.3% in 2021 (n=1425), and 31.4% in 2020 (n=517). This suggests that the elevated in-hospital mortality trend in pneumonia cases observed between 2020 and 2022 may be linked with the trend of COVID-19-related pneumonia incidence over these years.

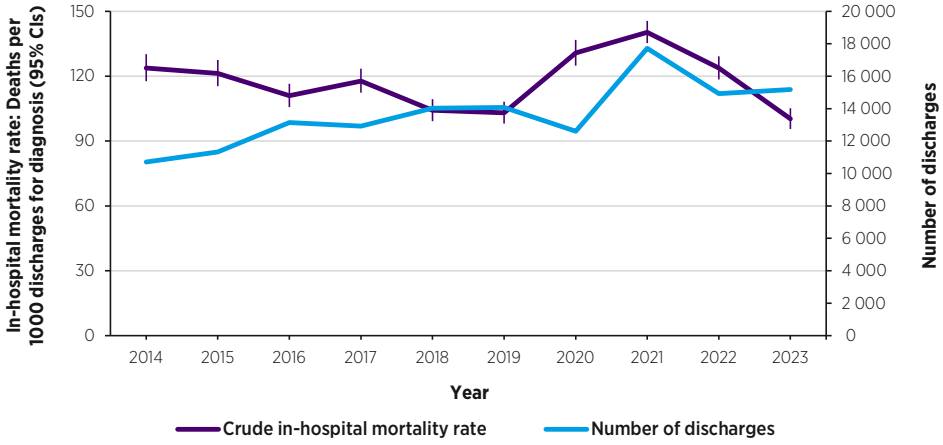


FIGURE 21: NATIONAL IN-HOSPITAL MORTALITY AND NUMBER OF DISCHARGES FOLLOWING A PRINCIPAL DIAGNOSIS OF PNEUMONIA AT DISCHARGE, 2014–2023

Of the 44 participating hospitals in NAHM, 31 met the criteria for public reporting in 2022, and 32 met the criteria in 2023. In 2023, the additional hospital was St John's Hospital.

The number of cases with a principal diagnosis of pneumonia discharged from the 31 included hospitals in 2022 ranged from 108 to 1,111, accounting for 97% of pneumonia cases discharged from hospitals nationally. In 2023, the number of cases discharged from the 32 hospitals eligible for public reporting ranged from 102 to 1,210, also accounting for 97% of cases with a diagnosis of pneumonia discharged from hospitals nationally.

Figure 22 presents the SMRs for hospitals in funnel plots, with 99.8% control limits for both 2022 and 2023. In 2022, all hospitals (including hospitals with small numbers of cases that are excluded from the graph) had an SMR within the control limits of 99.8%, indicating that their SMRs were within the expected range for 2022. In the 2023 calendar year HIPE file data captured for this report, the SMR for St Vincent's University Hospital was outside of the 99.8% upper control limit. However, this is the first occurrence where the SMR for pneumonia was outside the expected upper control limits, and therefore St Vincent's University Hospital does not meet the current definition of a statistical outlier set by the NAHM Governance Committee. The St Vincent's University Hospital pneumonia SMR returned to within expected ranges in the succeeding update of data.

The SMRs for all other hospitals were within the expected ranges for 2023.

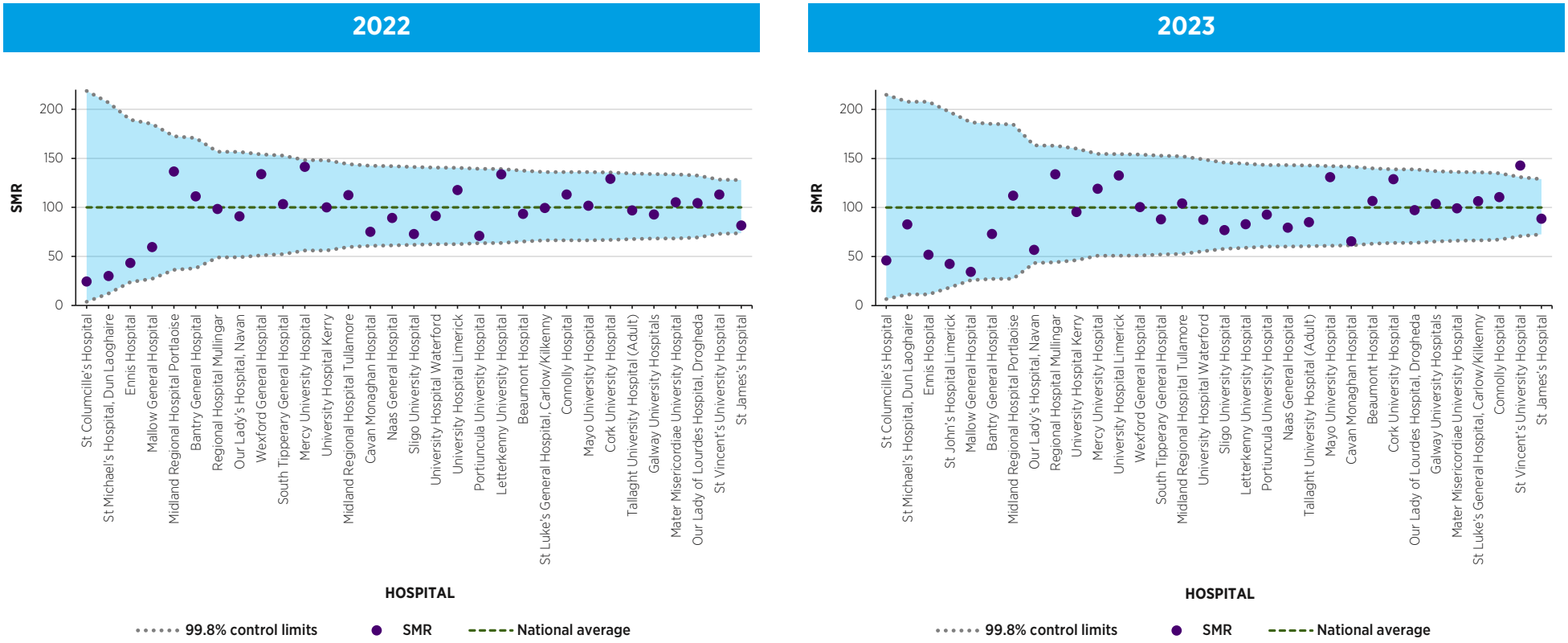


FIGURE 22: NATIONAL IN-HOSPITAL STANDARDISED MORTALITY RATIO FOLLOWING A PRINCIPAL DIAGNOSIS OF PNEUMONIA AT DISCHARGE, 2022 AND 2023

Over the 10-year period from 2014 to 2023, the number of female deaths from pneumonia was 7,167, while the corresponding number of male deaths was 8,932, as shown in Figure 23. The median age of death in pneumonia for females over this period was 83 years, while the median age of death for males was 80 years. There was little variance from this for individual years, with the median ages of death in pneumonia for females and males for 2023 being 82.5 years and 81 years, respectively. The age distributions for male and female deceased patients are both skewed towards the older age groups, with the female distribution having a higher proportion of deaths in the oldest age group when compared with the male distribution, as shown in Figure 23. Conversely, the male distribution has a higher proportion of deaths in youngest age group when compared with the female distribution.

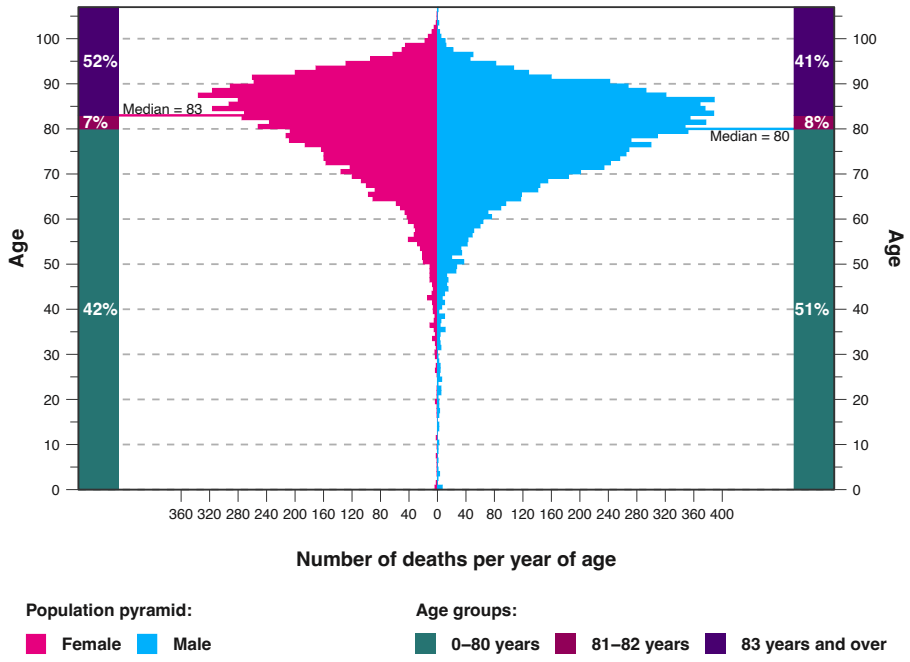


FIGURE 23: POPULATION PYRAMID SHOWING VOLUME AND DISTRIBUTION OF DECEASED CASES BY AGE AND SEX FOLLOWING A PRINCIPAL DIAGNOSIS OF PNEUMONIA, 2014–2023

The percentages on the left- and right-hand margins of the plot indicate the proportion of the respective distribution (female/male) which falls into the age groups as defined by the legend.

Female deaths = 7,167; male deaths = 8,932; total deaths = 16,099.

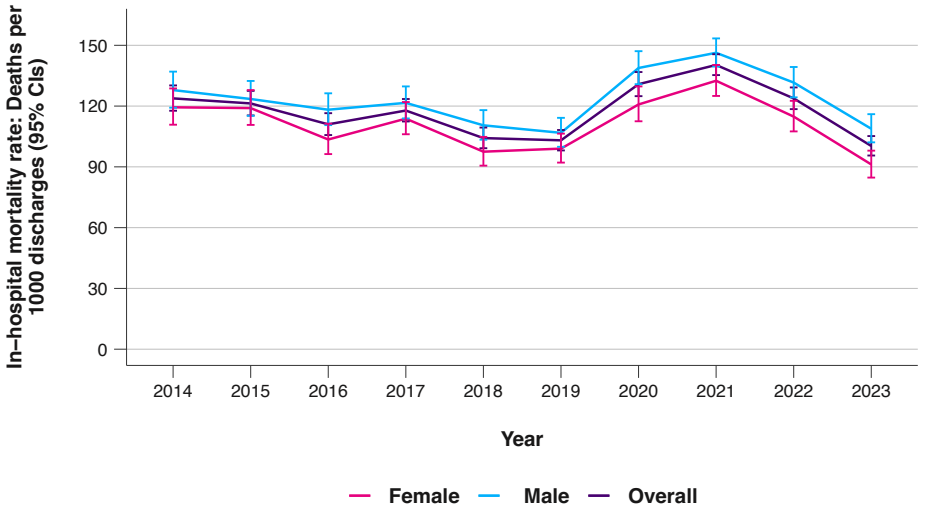


FIGURE 24: NATIONAL IN-HOSPITAL MORTALITY RATE BY SEX FOLLOWING A PRINCIPAL DIAGNOSIS OF PNEUMONIA, 2014–2023

Figure 24 presents the in-hospital crude mortality rate for females and males over the period 2014–2023, along with the overall crude mortality rate as presented in Figure 21. The in-hospital crude mortality rate calculated over this period for males is 124.2 deaths per 1,000 discharges and is statistically significantly higher than the rate of 110.8 deaths per 1,000 discharges for females ($p < 0.001$). In the case of pneumonia, sex is a statistically significant factor in relation to survival outcomes for patients; this is based on the results of logistic regression models fitted to Irish in-hospital discharge data for each diagnosis. The finding from the model fitted for pneumonia indicated that the risk of dying from pneumonia is marginally greater for males compared with females: using males as the reference, the odds ratio for females is 0.88 (95% CI: 0.852,0.903). This finding is in line with findings in other western countries (Barbagelata *et al*., 2020).

ALL DIAGNOSES

Figure 25 displays the crude in-hospital mortality pattern for all diagnoses (based on the principal diagnosis) for the 10-year period from 2014 to 2023. As shown in the figure, the crude mortality rate for all diagnoses declined gradually between 2014 and 2019, increased markedly over 2020 and 2021 (coinciding with the largest COVID-19 pandemic waves), and subsequently declined in 2023 but remained above the pre-COVID-19 pandemic levels. As shown in Figure 26, that pattern contrasts with that seen for the six key diagnostic conditions described elsewhere in this report, which show a gradual decrease or stable trend over the 10-year period from 2014 to 2023; only pneumonia showed an increase during the main COVID-19 pandemic waves, but returned to pre-pandemic levels by 2023. A table of supporting figures can be found on the NOCA website.

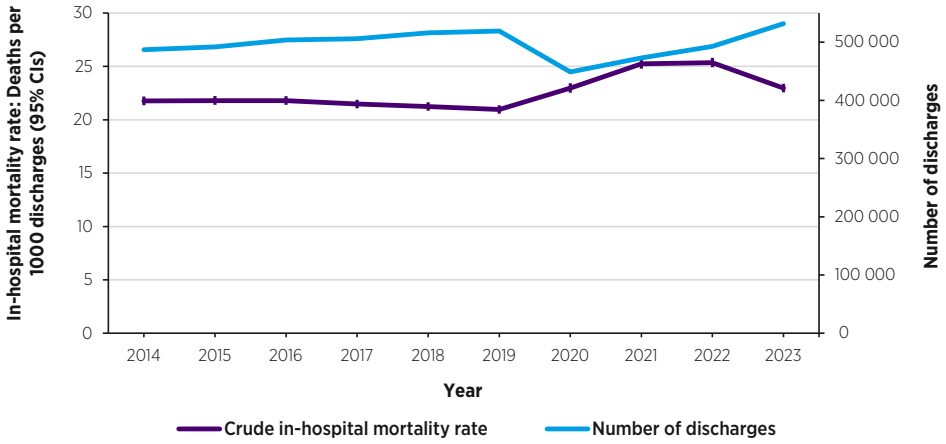


FIGURE 25: COMPARISON OF NATIONAL CRUDE IN-HOSPITAL MORTALITY AND NUMBER OF DISCHARGES, 2014–2023

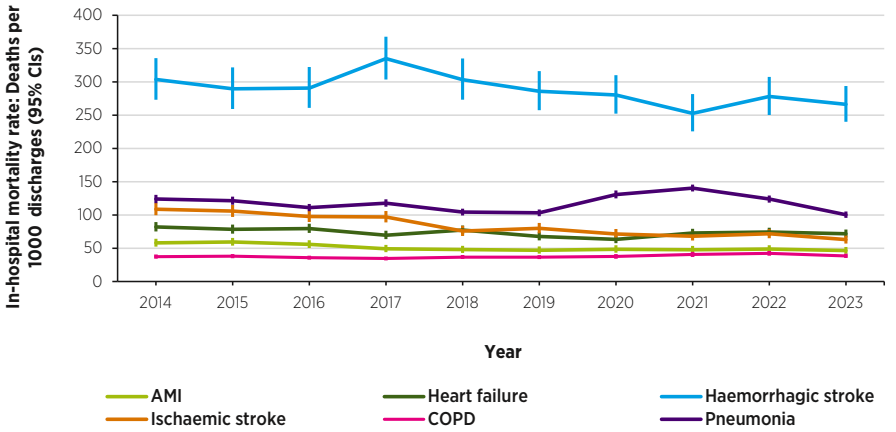


FIGURE 26: COMPARISON OF NATIONAL CRUDE IN-HOSPITAL MORTALITY RATES FOR KEY DIAGNOSES, 2014–2023

A preliminary examination of the 15 major CCS diagnostic groupings identified that the all-diagnoses crude mortality pattern appears to be primarily driven by the broad categories of 'infection' and 'respiratory', as shown in Figure 27. Both of these categories show a steady crude mortality rate between 2014 and 2019, a higher mortality rate during 2020 and 2021, and then a reduction by 2023, but remained above the pre-COVID-19 rates, similar to the all-diagnoses mortality pattern described above. The trend for the 'injury and poisoning' category showed a more stable but slightly increasing rate over time. The ageing population was examined and not found to be a factor. International figures on crude in-hospital mortality rates post-COVID-19 are not available for comparative purposes.

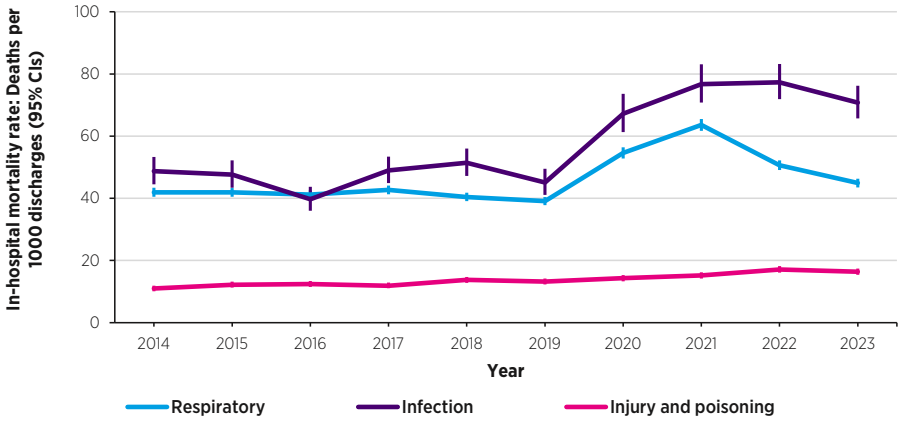


FIGURE 27: NATIONAL CRUDE IN-HOSPITAL MORTALITY RATES FOR CLINICAL CLASSIFICATIONS SOFTWARE 'RESPIRATORY', 'INFECTION', AND 'INJURY AND POISONING' DIAGNOSTIC GROUPS, 2014–2023

The results described above should be interpreted in light of the exploratory analysis that employed crude mortality rates that are based on the principal diagnosis (at admission), which may not reflect the actual cause of death. NOCA will undertake a more sophisticated analysis exploring the individual diagnostic categories, comorbidities, etc., including data from 2024 and 2025, in order to help elicit a deeper understanding of the trends over time and the potential relationships with the COVID-19 pandemic waves. The impact of ongoing areas of healthcare development – such as hospital activity/resources, the development of Trauma Units and hospital bypass protocols, the national clinical programmes, developments in primary care, referral patterns, hospital admission thresholds, changes in hospital chart/electronic health record documentation, and HIPE coding accuracy and depth – may be considered.

RECOMMENDATION 1

NOCA will undertake a study into in-hospital crude mortality rates in Ireland, across all conditions, and publish the findings.

HEALTH INEQUALITIES: ANALYSIS OF IN-HOSPITAL CRUDE MORTALITY

The COVID-19 pandemic has shone a bright light on health inequalities, highlighting the significant differences in the outcomes of some groups in society compared with others (Kerschbaumer *et al.,* 2024; Mheidly *et al.,* 2022). There have also been demographic and population changes in Ireland following Brexit and, more recently, the influx of people seeking international protection from around the world which need to be considered (Central Statistics Office, 2024a). There is international evidence that social inequalities have an impact on the outcomes of in-hospital patients (UK Health Security Agency, 2025; Mathews *et al.,* 2022); however, there are no comparable data for Irish acute hospital services at the time of writing this report.

What are inequalities and inequities in health? Health inequalities are measured differences in health between population subgroups, associated with social advantage or disadvantage. The term health inequity is used to emphasise differences which are considered to be unfair, avoidable or remedial and rooted in the unfair distribution of, or unfair access to, power, wealth and other social resources (Carroll *et al.,* 2021). NOCA has attempted to measure the differences, or inequalities, in in-hospital deaths using the data available.

The World Health Organization states that health inequality monitoring should be a central component of national health information systems (World Health Organization, 2017). In addition, the The Public Sector Equality and Human Rights Duty, contained in Section 42 of the Irish Human Rights and Equality Commission Act 2014, is a legal obligation on public bodies to have regard to the need to eliminate discrimination, promote equality of opportunity and protect the human rights of public sector staff and service users. It requires public bodies to:

- assess, address and report on progress in relation to equality and human rights
- carry out an assessment of equality and human rights issues across functions
- develop policies, plans and actions to address these issues
- report annually on progress and achievements in relation to those actions.

Currently, patient administration systems (PAS) in most HSE hospitals do not routinely collect all of the data variables that would help arrange cases into groups to help measure health inequalities within the Irish healthcare system (equity stratifiers). The data collected vary across hospitals. NOCA sought to use the health equity stratifier variables that are available to NQAIS NAHM (from HIPE data) to analyse the in-hospital population in order to highlight potential inequalities that may need to be explored in more detail. **Conclusions from the analysis on inequalities were limited and should be interpreted with caution, given that there were no data on patients' socioeconomic status derived from their Eircode or address, or data on their ethnicity, education level, or occupation. The authors acknowledge that the results in this report are rudimentary, but they chose to publish the findings in order to emphasise the gaps in the available data. More information is essential for effective analysis and exploration of inequalities in Irish healthcare.** Comparison with international levels of in-hospital mortality under the headings ethnicity, deprivation, education level or occupation is not possible without this important information (Duffy *et al.,* 2022). There is a need for up-to-date expanded demographic data so that everyone, especially patients, will benefit from improvements that will arise from identifying and addressing health inequalities within Ireland. However, it needs to be acknowledged that there are challenges in collecting and validating these stratifier data for all patients, including the potential requirement for a legal basis to ask for this information, and it will take time to become established.

Similarly to NAHM, there are various sectors within the HSE pursuing the same objective: the routine collection of health equity stratifier data. HSE Public Health is advocating for the incorporation of equity stratifiers into routinely collected health datasets. The National Screening Service's *Improving Equity in Screening: Action Plan 2024–2025* sets out one of its focused areas as "agree a minimum set of equity stratifiers" (National Screening Service, 2024, p. 4). The severe acute respiratory infections surveillance programme in Ireland (Marron *et al.,* 2025) has stated that recording equity stratifiers such as ethnicity would strengthen data quality.

As mentioned above, there were limited variables available to NAHM with which to conduct a full analysis of potential inequalities. However, the variables of sex, age, civil status (previously referred to as marital status and which is also regarded as a measure of social capital) (Carroll *et al.,* 2021), medical card (for those aged 69 years and under only), and public/private status (proxy measures of socioeconomic status) were available for analysis. Using these data, crude in-hospital mortality rates were calculated and compared for various combinations of these variables and values.

The analysis presented in this section has been applied to data from all diagnoses in the 10-year period from 2014 to 2023. In many cases, when crude mortality rates are calculated for multiple categories for specific diagnoses, the numbers of cases involved are quite low and the results less clear. Therefore, apart from crude mortality rate by sex, which is presented for each of the six key diagnoses in this report, the health inequality analysis has focused on data from all diagnoses. In the graphs presented in this section (unless otherwise stated), the 'overall' in-hospital crude mortality rate trend line is the national overall rate as presented for all diagnoses in Figure 25.

SEX AND AGE

It is interesting to acknowledge some of the differences that exist in in-hospital mortality between the female and male populations, and how that varies by age.

Over the 10-year period from 2014 to 2023, the number of female deaths from all diagnoses was 51,311, while the corresponding number of male deaths was 60,634. The median age of in-hospital death for females over this period was 80 years, while the median age of death for males was 78 years, as shown in Figure 28. There was little variance from this median for individual years, with the median ages of death for females and males for 2023 being 80 years and 78 years, respectively. The age distributions for male and female deceased patients are both skewed towards the older ages, with the female distribution having a higher proportion of deaths in the older age group than the male distribution, as shown in Figure 28. Conversely, the male distribution has a higher proportion of deaths in the younger age group when compared with the female distribution.

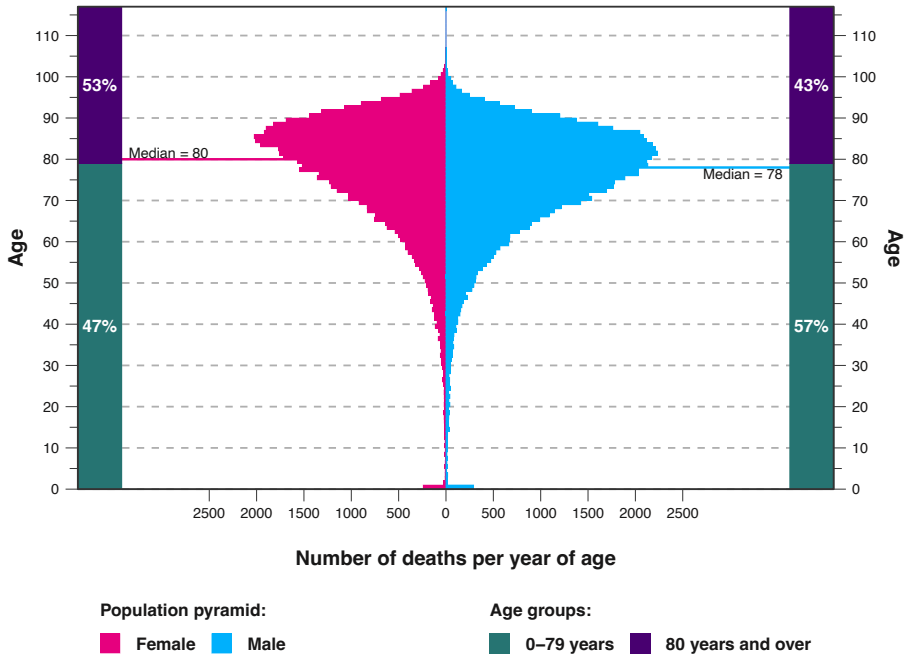


FIGURE 28: POPULATION PYRAMID SHOWING VOLUME AND DISTRIBUTION OF DECEASED CASES BY AGE AND SEX FOR ALL DIAGNOSES, 2014–2023

The percentages on the left- and right-hand margins of the plot indicate the proportion of the respective distribution (female/male) which falls into the age groups as defined by the legend.

Female deaths = 51,311; male deaths = 60,634; total deaths = 111,945.

Figure 29 presents the in-hospital crude mortality rate for females and males over the 10-year period from 2014 to 2023, along with the overall crude mortality rate as presented in Figure 25. The crude in-hospital mortality rate calculated over this period for males is 24.2 deaths per 1,000 discharges and is statistically significantly higher than the rate of 20.8 deaths per 1,000 discharges for females ($p < 0.001$). This is in line with the findings in a report titled *Older people who died in hospital: England 2017* (Public Health England, 2019) and it reflects the greater longevity of females.

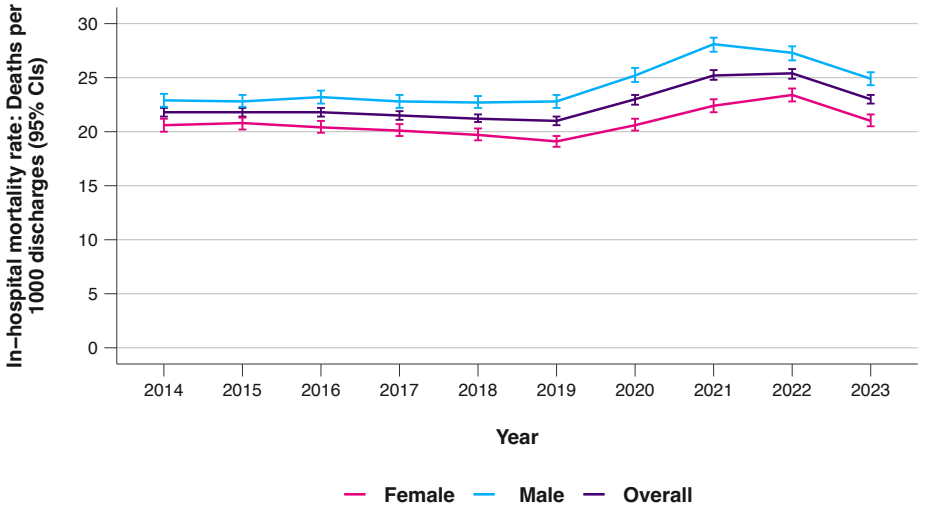


FIGURE 29: NATIONAL IN-HOSPITAL MORTALITY RATE BY SEX FOR ALL DIAGNOSES, 2014–2023

CIVIL STATUS

NOCA examined crude in-hospital mortality rates by civil status (previously referred to as marital status), controlling for sex and age, to see if there were differences between outcomes for patients in different civil status groups.

Of all deceased cases in the period 2014–2023, 91% had a civil status of 'single', 'married', or 'widowed', with extremely low numbers of cases across the other civil status values of 'divorced', 'civil partner', 'former civil partner', 'surviving civil partner', 'other (including separated)', and 'unknown'. For this reason, only the status values of 'married', 'single' or widowed' were reviewed. The age groups for this analysis were defined as 0–34 years, 35–64 years, and 65 years and over. The results for the age group 0–34 years are not presented, as the only civil status category with sufficient numbers to calculate the crude mortality rate in this age group is 'single', making comparison of rates across different civil status categories not possible for this age group.

The results of the analysis of in-hospital crude mortality rates by civil status are presented in Figure 30 for the 35–64 years age group, and in Figure 31 for the 65 years and over age group.

For the age group 35–64 years, the in-hospital crude mortality rates for the 10-year period from 2014 to 2023 for both males and females are statistically significantly higher for patients who are single than for patients who are married. Here, the difference between the mortality rates for single and married patients is greater for males than for females. Specifically, for males, the rate is 13.8 deaths per 1,000 discharges for single patients, compared with a rate of 9.5 deaths per 1,000 discharges for married patients. For females, the rate is 10.1 deaths per 1,000 discharges for single patients, compared with a rate of 7.8 deaths per 1,000 discharges for married patients ($p < 0.001$ for both male and female comparisons). When comparing male/female groups, the 10-year crude mortality rates for male patients are significantly higher than the rates for female patients for both married and single groups ($p < 0.001$ in both cases).

For both males and females, a similar pattern can be observed for patients aged 65 years and over, with the 10-year in-hospital crude mortality rate being statistically significantly higher for patients who are single than for patients who are married. Specifically, for males, the rate is 53.4 deaths per 1,000 discharges for single patients, compared with a rate of 43.2 deaths per 1,000 discharges for married patients. For females, the rate is 48.9 deaths per 1,000 discharges for single patients, compared with a rate of 33.1 deaths per 1,000 discharges for married patients ($p < 0.001$ for both male and female comparisons). Higher still is the 10-year crude mortality rate for widowed patients, which is statistically significantly higher than that for single patients, both male and female. Specifically, for males, the rate is 63.1 deaths per 1,000 discharges for widowed patients, compared with a rate of 53.4 deaths per 1,000 discharges for single patients. For females, the rate is 52.8 deaths per 1,000 discharges for widowed patients, compared with a rate of 48.9 deaths per 1,000 discharges for single patients ($p < 0.001$ for both male and female comparisons). As with the younger age group, the 10-year crude mortality rates are significantly higher for males than for females when comparing the rates for married, single and widowed groups.

These results suggest that the mortality risk is higher for unmarried inpatients than for their married counterparts, and this mortality risk is higher for males than for females. This aligns with demographic research study findings (Wang and Yi, 2023; Robards *et al.*, 2012), and may reflect the benefit of higher levels of social capital (that is, the resources available to individuals through social relationships) experienced by married patients compared with unmarried patients.

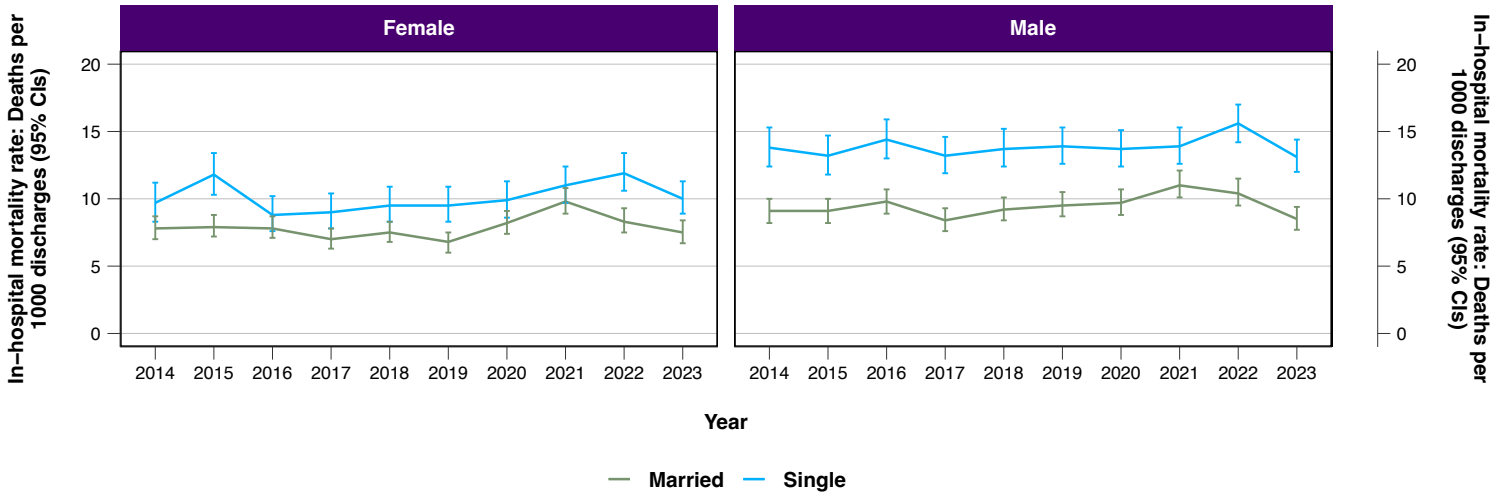


FIGURE 30: COMPARISON OF NATIONAL IN-HOSPITAL MORTALITY RATES FOR ALL DIAGNOSES IN THE 35–64 YEARS AGE GROUP, BY CIVIL STATUS AND SEX, 2014–2023 (TOTAL DEATHS = 13 930)

Total deceased cases by civil status and sex: ***Married:*** *females = 3,572; males = 4,162.* ***Single:*** *females = 2,256; males = 3,940.*

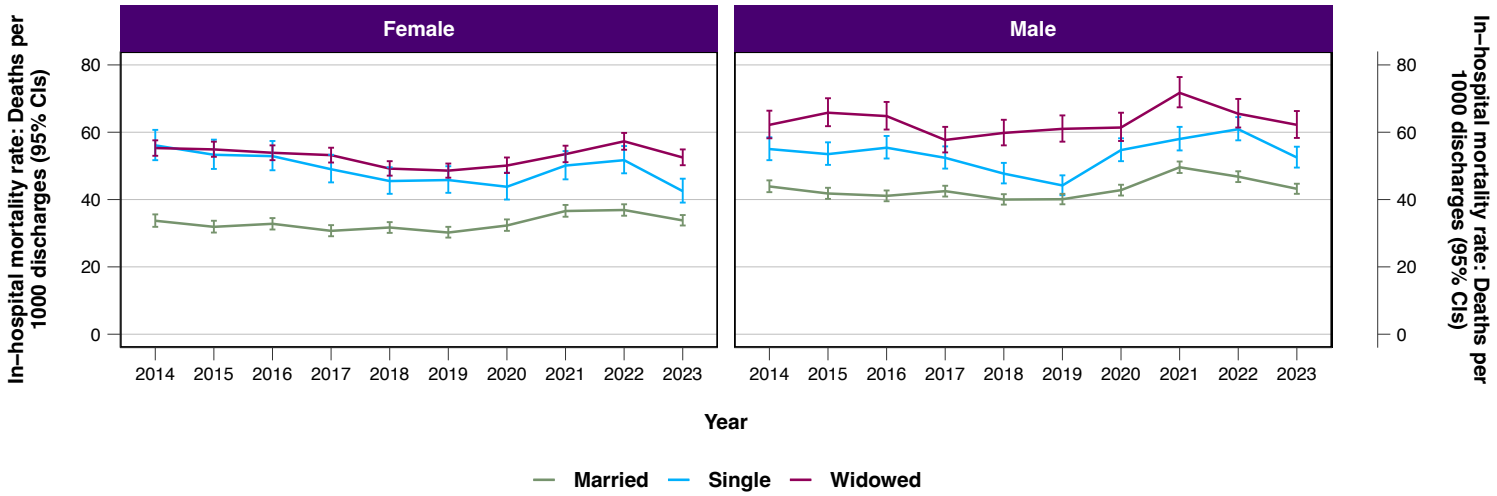


FIGURE 31: COMPARISON OF NATIONAL IN-HOSPITAL MORTALITY RATES FOR ALL DIAGNOSES IN THE 65 YEARS AND OVER AGE GROUP, BY CIVIL STATUS AND SEX, 2014–2023 (TOTAL DEATHS = 85 250)

Total deceased cases by civil status and sex: ***Married:*** *females = 14,527; males = 26,783.* ***Single:*** *females = 5,365; males = 9,746.* ***Widowed:*** *females = 20,017; males = 8,812.*

SOCIOECONOMIC STATUS

Socioeconomic status is widely recognised as an important dimension of inequality and a key variable in measuring inequalities in in- hospital mortality. Medical cards, issued based on means testing, have often been used as a proxy for lower socioeconomic status or deprivation (Guthrie and Bell, 2020; Theocharidou and Mulvey, 2018). However, they are also granted to individuals with severe or terminal illnesses, and are provided on a discretionary basis to certain groups. Additionally, the income threshold for medical card eligibility is significantly higher for those aged 70 years and over, making the card less representative of deprivation for those aged 70 years and over (information on the eligibility for a medical card in Ireland can be accessed from the HSE). **As a result, medical cards are not an ideal measure of socioeconomic status. Nevertheless, given that this was the only available variable for analysis, NAHM used 'medical card' and 'discharge status' as proxy indicators of income level. NAHM sought to identify potential inequalities in patient outcomes based on income, focusing on patients aged 69 years and under.** The national in-hospital crude mortality rates were compared for those with and without medical cards, as well as for patients treated as public versus private.

The total number of deaths in the 0–69 years age group over the 10-year period from 2014 to 2023 was 28,532, which is approximately 25% of all in-hospital deaths in this period (N=111 945). It should be noted that the overall crude mortality rate presented in Figure 32 is the rate for the 0–69 years age group, and as such, it is significantly lower than the national in-hospital crude mortality rate presented in Figure 25, given that average lifespans for both males and females are much higher than 69 years for most groups.

Figure 32 shows the in-hospital crude mortality rate for the period 2014–2023, broken down by medical card status and public/private status at discharge, for patients aged under 70 years. The overall 10-year in-hospital crude mortality rate is statistically significantly higher for inpatients with a medical card who are treated as public patients (11.8 deaths per 1,000 discharges) than for inpatients who do not have a medical card, whether treated as public (6.0 deaths per 1,000 discharges) or private (4.1 deaths per 1,000 discharges) patients. People without a medical card who are treated as public patients have a statistically significantly higher 10-year crude mortality rate than those who are treated as private patients ($p < 0.001$ for all comparisons).

Given the small number of deaths over the period 2014–2023 included in the category of having a medical card and treated privately, the crude mortality rate for this category is not considered for the purpose of this discussion.

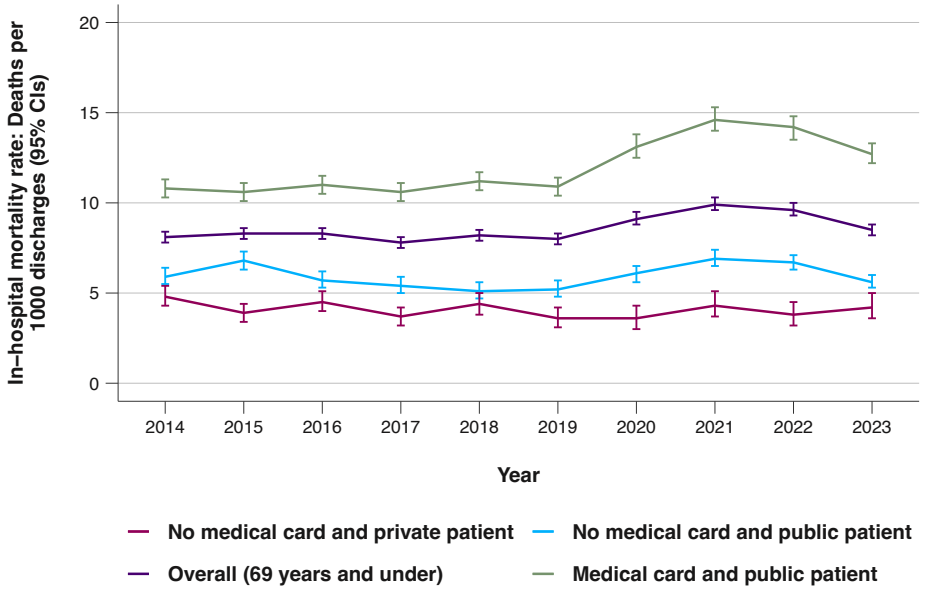


FIGURE 32: COMPARISON OF NATIONAL IN-HOSPITAL MORTALITY RATES FOR ALL DIAGNOSES IN THE 0–69 YEARS AGE GROUP, BY MEDICAL CARD ELIGILIBITY AND PATIENT STATUS AT DISCHARGE, 2014–2023 (TOTAL DEATHS = 28 532)

Total deceased cases: No medical card and private patient = 1,923; no medical card and public patient = 7,509; medical card and public patient = 18,068.

These differences in overall 10-year crude mortality rates would suggest that those who have medical cards have poorer survival outcomes than those who do not.

These results, which are based on a subset of the in-hospital population (those aged under 70 years), suggest that there are possible inequalities in relation to in-hospital mortality for patients based on deprivation (using medical card and public/private status as proxies). However, as mentioned above, medical cards are issued to individuals for a number of other health-related reasons apart from low income, and these individuals are more likely as a group to have poorer health. Therefore, a medical card is not a good proxy for deprivation, in the same way that public/private status is not a good proxy for measuring deprivation because it is not necessarily a reflection of income.

For these reasons, it would be important to examine and identify the effect of socioeconomic status on in-hospital on in-hospital mortality for the entire population based on more suitable data that would enable a more accurate assessment to be performed. Measuring inequalities in a meaningful way will mean that equity stratifier data must be collected in order to identify groups who may have unequal experience of, and outcomes from, care.

The acronym PROGRESS summarises a list of commonly used equity stratifiers which have been adopted and used by international organisations such as Cochrane (Oliver *et al.,* 2008). Since its inception the term has expanded to PROGRESS-PLUS, the suffix PLUS incorporating other important personal and time sensitive characteristics such as age, sexual orientation and disability (Cochrane Equity n.d.). It is recommended that equity stratifiers are systematically collected for the measurement of health inequalities.

PROGRESS stands for:

P	**Place of residence**
R	**Race (ethnicity)**
O	**Occupation**
G	**Gender (sex)**
R	**Religion**
E	**Education**
S	**Socioeconomic status**
S	**Social capital**

An article reviewing the inclusion of equity stratifiers in Ireland refers to the PROGRESS data points and also concluded that there is a need to advocate for agreed equity stratifiers for an Irish population in order to measure and address health inequalities (Carroll *et al*., 2021). The hospital's patient administration system (PAS) should be expanded to include feasible data points from PROGRESS-PLUS. A minimum dataset should be mandatory for completion within the PAS, with no option for 'not specified' in drop-down lists. Not all of these points will be necessary to export for analysis in NAHM but they should be available in the PAS in order to help stratify health outcomes for other audits and data collections.

When these fields are available on a hospital's PAS, the Healthcare Pricing Office (HPO) should include them when extracting data to provide basic demographic information for the HIPE record. NAHM will then be able to assess in-hospital mortality for specific groups of patients presenting for in-hospital treatment and determine whether inequalities in in-hospital deaths exist.

RECOMMENDATION 2

NOCA will liaise with the HPO to ensure that when equity stratifiers become available on PAS, they are exported to HIPE and onwards to NOCA, in order to enable analysis of potential inequalities in the outcomes of certain groups of inpatients to be carried out.

Mandatory recording of a patient's full address and a specific field for Eircode entry in the hospital's PAS are required in order to facilitate the capture of data and thus enable geocoding to be carried out to assign a deprivation index to each case record using the Pobal HP Deprivation Index model (Pobal, n.d.). The capture of the Eircode in the PAS is improving steadily, and this field should be more reliable for analysis in the future. As the seeding and recording of the Personal Public Service Number (PPSN) improves across the health service, our ability to match and link records using the Individual Health Identifier will also improve. The NHIU in the HSE has proposed a method to link an individual's Eircode to the small area in which they reside so that in the future, when the data become available, there will be a function to link the Pobal HP Deprivation Index score to the patient's record. In order to protect an individual's confidentiality, NOCA/NAHM will then only receive the Pobal HP Deprivation Index score. When these data are available, they will enable NOCA to assess whether there are inequalities in in-hospital mortality before investigating the suitability for inclusion in the NAHM risk model.

RECOMMENDATION 3

NOCA will work with the HPO to gather data to carry out geocoding in order to produce small area deprivation codes for analysis of in-hospital mortality based on deprivation.

QUALITY IMPROVEMENT & DATA MANAGEMENT

CONNOLLY HOSPITAL has provided a list of three actions that have been taken to address the quality improvement steps identified in quality improvement case study No 1. Included in National Audit of Hospital Mortality Annual Report 2021 (NOCA, 2023a).

ACUTE LOWER RESPIRATORY INFECTION

THESE ACTIONS ARE:

1. A learning notice was circulated to medical teams involved in inpatient care in order to advise that more granular and precise information is required in respect of the patient's principal diagnosis throughout their medical records. The learning notice was completed and circulated to all medical staff in September 2022.

2. The term 'LRTI' (lower respiratory tract infection) should be avoided in cases where treatment for exacerbation of COPD or pneumonia is being provided. This will help avoid mis- and underrepresentation of the complexity of the patient's condition and pre-existing health status, which could result in alternate HIPE coding. A learning notice was circulated to all medical staff in September 2022.

3. Consideration should be given to including education around the HIPE coding system to non-consultant hospital doctors (NCHDs) as part of the induction programme. The HIPE Manager and Clinical Director have scheduled HIPE coding education sessions to cover documentation in the medical record and resultant ICD-10-AM coding.

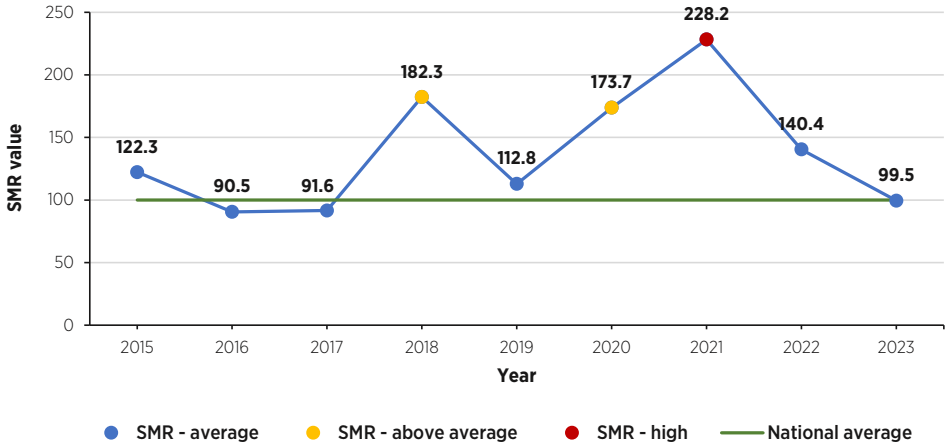


FIGURE 33: CONNOLLY HOSPITAL STANDARDISED MORTALITY RATIOS FOLLOWING ADMISSION WITH A PRINCIPAL DIAGNOSIS OF LOWER RESPIRATORY INFECTION, 2015–2023

BEAUMONT HOSPITAL has provided an update on the progress of the quality actions outlined in case study No 2 relating to COPD, included in National Audit of Hospital Mortality Annual Report 2021 (NOCA, 2023a).

CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD)

THE FOUR BEAUMONT HOSPITAL QUALITY ACTIONS ARE:

1. NQAIS NAHM data are reviewed at every data upload received from NOCA, and are discussed at the hospital's Clinical Metrics and Clinical Effectiveness meetings which are chaired by the lead Clinical Director.

2. Where a yellow or red alert is identified, a healthcare record review is conducted for both HIPE/coding accuracy and clinical management of the patient. Findings are reported back through the established governance structures.

3. Following the high SMR alert, significant engagement with respiratory clinicians has taken place. This included awareness of the coding procedure, review of the principal diagnosis, and the preparation of detailed discharge letters. Random audits were also undertaken by NCHDs in relation to the documentation created throughout the patients' episodes of care. This engagement has resulted in the maintenance of a normal SMR for the COPD diagnosis, as shown in Figure 34.

4. Education and communication with the hospital HIPE coding department continues with regard to the palliative care coding and the requirements on this, with improvement noted on the recording of palliative care codes across all diagnoses.

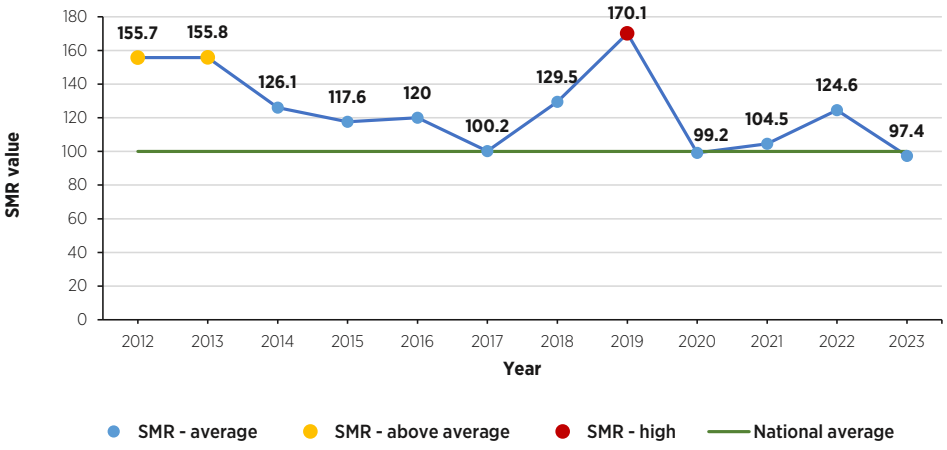


FIGURE 34: BEAUMONT HOSPITAL STANDARDISED MORTALITY RATIOS FOLLOWING ADMISSION WITH A PRINCIPAL DIAGNOSIS OF CHRONIC OBSTRUCTIVE PULMONARY DISEASE, 2012–2023

ANALYSIS OF SMR OUTLIERS

An outlier in NAHM is defined as where the SMR for a specific diagnosis exceeds the expected value, falling outside the 99.8% confidence intervals, and a corresponding CuSum (control chart) breach exceeds the 99.8% control limits. A statistical outlier is considered to occur if both the high SMR and CuSum breach are observed in two consecutive quarterly data releases. If this occurs, then the hospital is requested to conduct a review of the data and send a report to NOCA. Identification of an outlier does not imply that the hospital is delivering poor-quality care; rather, it indicates that the observed result deviates from expected values and that this difference calls for further investigation.

There were six high outliers during the period 2022–2023. In 2022, St Vincent's University Hospital was an outlier in heart failure and Wexford General Hospital was an outlier in ischaemic stroke. Cork University Hospital was an outlier in COPD for both 2022 and 2023 and was an outlier in urinary tract infection (UTI) and ischaemic stroke for 2023. There were two low outliers in Ennis Hospital, for heart failure and COPD, both in 2022.

All the reviews on high statistical outliers identified cases where the principal diagnosis needed to be changed, and this is reflective of all NAHM reviews conducted to date. No hospital review has identified that all of the data being examined are correct. There may be several reasons why changes are needed. For example, it can be difficult to pinpoint the principal diagnosis among other comorbidities and complexities a patient presents with. Application of the palliative care code Z51.5 in HIPE (one of the factors included in the NAHM risk model) is sometimes not possible because the recognised wording – 'palliative care', 'end of life care' or 'terminal care' – is not written in the medical record, despite palliative care treatment being provided. Consistency in the application of the palliative care code has been an ongoing concern for NAHM. Examples of reviews identifying cases where palliative care treatment was provided but could not be coded can be found in the Analysis of SMR outliers chapter. The NAHM Governance Committee is undertaking an extensive review of palliative care and its inclusion in the NAHM risk model. For the reasons above, the documentation in the medical chart and its subsequent coding should be routinely discussed and validated among the clinicians and coders.

Collaboration between clinicians and the hospital HIPE coders is essential in order to ensure that accurate data are available for audits of all types, both local and national. Hospital reviews carried out for NAHM indicate that collaboration between consultants, NCHDs, and local HIPE coders is still not taking place in most cases. This is evident from the number of changes to principal and secondary diagnoses identified when a chart is reviewed.

A local working group should be established in each participating hospital. This group should comprise both clinicians at all levels who write up notes in patient medical charts and HIPE coders; the group should meet weekly or fortnightly. An agreed number of random charts coded by HIPE should be discussed with clinicians in order to confirm that the HIPE coding is correct. The learnings from these sessions will help clinicians to understand the levels of specificity and accuracy needed so that their intended diagnosis is applied. NCHDs, who frequently write up medical notes, should be involved in these sessions so that they can learn from any changes identified. Inaccurate data in a patient's medical record affect efficiency throughout the hospital and its activities, including patient diagnosis, future treatment, financial diagnosis related group (DRG)s, internal audit, etc. The collaboration between clinicians and coders described above will also help to improve the accuracy of the discharge summary.

RECOMMENDATION 4

Each hospital should establish a local working group including clinicians and HIPE coders in order to promote collaboration between the disciplines and ensure that regular checks on the quality of medical chart documentation and subsequent coding are carried out.

In 2013, the Health Information and Quality Authority (HIQA) published a report titled *National Standard for Patient Discharge Summary Information*, which called for a discharge summary to be prepared for all discharged patients, including those who die. Despite this, hospital reviews carried out for NAHM reveal that in some hospitals discharge summaries are seldom present in deceased patients' charts (for example, see the Wexford General Hospital (page 45) and Cork University Hospital outlier reviews (page 47).

The inclusion of a discharge summary in the medical record assists the HIPE coders and may prevent the need for manual searching through pages of notes and deciphering numerous comorbidities and treatments. It helps to ensure that the principal diagnosis, among other data items, is correctly identified. Without a patient discharge summary, the coding of charts is more complicated and open to inaccuracies due to a lack of clarity.

It is recommended that a working group comprising relevant stakeholders be established to design a discharge template specific to deceased patients. This will be done on a trial basis in Cork University Hospital for 6 months, and the related impacts on data quality will be measured. In addition to the information included in the standard template provided in the HIQA report titled *National Standard for Patient Discharge Summary Information,* this could include items that are continually changed as a result of NAHM data quality reviews; for example, What is the principal diagnosis? What is the source of admission? Are all secondary diagnoses recorded? Was the patient on an end-of-life pathway? Did the patient receive palliative care treatment? Who completed the discharge summary – was it a member of the team caring for the patient at the time of death?

RECOMMENDATION 5

A discharge summary specifically for deceased patients should be designed and inserted as a pro forma document in the basic hospital medical chart. It should be completed for all patients who die in hospital and it should include specific information that will enable accurate coding. This will be conducted as a trial in Cork University Hospital for a 6-month period.

A working group – including NOCA's Head of Quality & Development, as well as Audit Managers and Analysts – is in the process of updating the NOCA procedure PRO 18: Monitoring of statistical outliers in national clinical audit and registries. New guidance will also be developed in order to assist hospitals when responding to NAHM signals and preparing outlier reviews for NOCA.

ENNIS HOSPITAL: LOW OUTLIER IN 2022

Ennis Hospital was a low outlier (i.e. a positive outlier) in both heart failure and COPD for 2022. Ennis Hospital was asked for insights into why that might be for COPD, and if there were any learnings that could be brought to other jurisdictions.

THE FOLLOWING POINTS WERE SHARED:

There is a dedicated respiratory advanced nurse practitioner (ANP) and recently a clinical nurse specialist (CNS) in place, and therefore excellent diagnosis and ongoing care are provided for patients with COPD.

These specialists work closely with the medical assessment unit (MAU) and inpatients in Ennis Hospital, and they also review most of the COPD inpatients in the hospital.

COPD patients are followed up in a nurse-led clinic in order to ensure proper management of their chronic disease, such as a correct medication regime and pulmonary rehabilitation.

Good multidisciplinary teamwork is in place with physiotherapists, dieticians, pharmacists and other healthcare professionals.

Education is provided for respiratory nurses at both the acute and community levels.

ST VINCENT'S UNIVERSITY HOSPITAL
OUTLIER IN HEART FAILURE FROM OCTOBER 2021 TO SEPTEMBER 2022

Data released in November 2022 identified St Vincent's University Hospital (SVUH) as an unconfirmed statistical outlier in heart failure from October 2021 to September 2022. During that period, there were 245 discharges, with 18.6 expected deaths predicted by the NAHM risk model. The observed actual number of heart failure deaths via HIPE classification was 35. As an unconfirmed statistical outlier was observed, NOCA policies require that a review be conducted and included in the next NAHM national or annual report for learning purposes.

SVUH initiated a senior clinician-led desktop review of healthcare records for all 35 cases where death was the outcome, using a standardised mortality audit tool which examined principal and secondary diagnoses, cause of death, and other factors that impact on in-hospital mortality (e.g. age, gender, palliative care, COVID-19 status, etc.).

Data quality and quality of care were reviewed concurrently. **No unexpected deaths or gaps in care were identified during this process.**

Following the review of healthcare records by a speciality consultant, a report focusing on principal diagnosis observed that 27 of the 35 records reviewed were assigned a different principal diagnosis when compared with the HIPE source data, which were based on HPO guidelines. It is noted that there can be discrepancies between the clinician's view of principal diagnosis and the HIPE definition: the diagnosis established after study to be chiefly responsible for occasioning an episode of admitted patient care. Healthcare Pricing Office (2024b) page 60.

Furthermore, the sequencing of documentation within the medical record affects the coding of the principal diagnosis, as per HPO guidelines. The review report also noted that of the cohort examined, all had life-limiting comorbidities and, in the majority of cases, death was due to disease progression. The remainder had palliative and/or "do not attempt cardio pulmonary resuscitation" (DNACPR) recorded. Several cases also presented with COVID-19. The review team were reassured that no gaps in clinical care were observed and it was noted that the unconfirmed statistical outlier was primarily due to data quality (principal diagnosis indicated within the healthcare record).

The NAHM Governance Committee requested that an audit of all 35 cases be carried out by the HPO, which manages the collection of the HIPE data, in order to ensure that any changes made were in accordance with HIPE definitions. A chart review of all 35 cases, with HPO and clinician input, was carried out in Q3 2023. The review concluded that 19 of the 35 cases should have their principal diagnosis changed following the clinician input arising from the initial in-house review.

"It is noted that there can be discrepancies between the clinician's view of principal diagnosis and the HIPE definition: the diagnosis established after study to be chiefly responsible for occasioning an episode of admitted patient care. Healthcare Pricing Office (2024b) page 60."

SVUH and NOCA analysis has ascertained that the reason for the observed unconfirmed heart failure outlier was due to data classification.

NOCA conducted an analysis of the revised data following the review, replicating the situation at the time of the unconfirmed outlier and making changes identified by the hospital. The SMR value for heart failure was re-analysed in line with the revised categorisation. Subsequently, the SMR decreased to 113 and the number of observed deaths decreased to 16, bringing them into expected ranges. Analysis was also carried out in order to determine the impact of 19 of the 35 cases being allocated to other principal diagnosis cohorts. Reallocation resulted in minimal impacts on other diagnostic groups following this re-analysis.

The results must be considered in the context of the data reviewed; this is because only records where death was the outcome were examined. The high proportion of records reviewed requiring a change to their principal diagnosis (54%) may imply that further review may be beneficial, particularly where there are multiple comorbidities noted. In 2024, the HPO conducted a wider audit with the HIPE coding team in SVUH in order to examine the principal diagnosis of the records in question.

SVUH ACTION

THE KEY SVUH ACTION IS AS FOLLOWS:

Examine potential routes to improve data validation and/or data quality review in order to support continuous quality improvement within the organisation.

SVUH RECOMMENDATION

HIPE coders in SVUH should liaise with clinician groups, where necessary and feasible, in order to ensure that the principal diagnosis is accurately assigned for all cases, particularly where multiple comorbidities are evident.

Education provision relating to the national reporting guidelines for HIPE data for clinical staff should be examined locally.

Education provision relating to the national reporting guidelines for HIPE data for clinical staff should be examined nationally.

WEXFORD GENERAL HOSPITAL
OUTLIER IN ISCHAEMIC STROKE FROM JANUARY TO DECEMBER 2022

Wexford General Hospital was an outlier in ischaemic stroke during the period January to December 2022. There were a total of 125 discharges with a principal diagnosis of ischaemic stroke during this period, with 22 patients deceased. The expected number of deaths calculated by the NAHM risk model was 7.4. The mean age of death was 79 years, and the range was from age 47 years to 90 years.

Five of the 22 deceased cases were identified as requiring a change to their principal diagnosis. Therefore, a total of 17 patients were reviewed.

Wexford General Hospital prepared a report describing the cohort of reviewed patients, many of whom were very frail or unstable on admission, had suffered severe strokes, and had a significant medical history and multiple medical comorbidities. Most of the patients had suffered total anterior circulation infarcts, which are large strokes, associated with ongoing high mortality rates. None of these patients were candidates for potentially lifesaving thrombolysis or thrombectomy for several reasons, including the frailty of the patients, multiple medical comorbidities, or being outside the time window for treatment. Many were recognised as being at the end of life very shortly after admission.

In all of these cases, palliative care was appropriately administered, and death was expected. In 10 cases, the secondary diagnoses did not align with what was recorded on HIPE, and such diagnoses included Stage 4 lung cancer in one patient's case, thus changing the expectation of a full recovery from a stroke.

Following review of the medical records, 13 cases were identified in the report as having received palliative care treatment, although this was not documented sufficiently to enable it to be coded in HIPE. The hospital report noted that 5 of the 17 reviewed cases had palliative care coded on HIPE. However, the number captured in NAHM was only three.

NOCA conducted a manual analysis and recalculations of the revised data to exclude the five cases where the principal diagnosis which was coded was incorrect, as well as to capture the palliative care code for the additional two patients (in order to bring the number coded as receiving palliative care up to the five noted on the hospital report). Taking these changes into consideration, the analysis shows that the SMR value for ischaemic stroke brings the number of deceased patients back into the expected range, and therefore ischaemic stroke would no longer be an outlier.

"Following review of the medical records, 13 cases were identified in the report as having received palliative care treatment, although this was not documented sufficiently to enable it to be coded in HIPE."

NOCA's analysis ascertained that the reason for the outlier in ischaemic stroke was due to principal diagnosis and documentation of the wording 'palliative care' in the medical record.

The HPO, which oversees the local collection of HIPE data in hospitals, was requested to conduct a review of the 22 cases involved. A chart-based review found that the hospital had correctly identified the principal diagnosis of ischaemic stroke in 17 of the cases. A review of palliative care coding identified a further seven cases that should have had palliative care code Z51.5 assigned. Those seven cases had comfort care/ measures noted in the charts, which on its own does not qualify for assignment of palliative care code Z51.5. The review also noted that end-of-life care (EOLC) was not easily identifiable in the charts and could easily be overlooked by HIPE coders.

It can be surmised that the SMR would significantly decrease further if the additional five cases identified by the HPO review had been correctly documented in order to enable the capture of the palliative care code for all of the patients who were on the end-of-life pathway.

The review of patient records has highlighted excellent documentation of communication, but has also shown areas for improvement in the documentation of the precise nature of the care that is being given to the patient following a devastating and irreversible acquired neurological injury.

WEXFORD GENERAL HOSPITAL IDENTIFIED THE FOLLOWING AREAS FOR IMPROVEMENT:

- HIPE standards for the coding of ischaemic stroke and of palliative care have been communicated via senior management, and have also been incorporated into a newly developed pro forma document. HIPE coders have developed an information document containing the most frequently used terms and associated conditions. This is presented regularly at medical education sessions.
- The coding of palliative care provision and involvement was absent in 13 out of 17 reviewed cases.

  ACTION: Following consultation, the HPO, have confirmed there is a coding rule that has been available that states "EOLC"/"end of life care" and "terminal care" are synonymous terms used to describe episodes of palliative care.
- It is also noted that the secondary diagnoses recorded on HIPE for the Irish National Audit of Stroke did not align in 10 cases.

  ACTION: Medical pro forma documents have been introduced in Wexford General Hospital, and these are a very useful source of secondary diagnoses for the HIPE coding department.
- It is also observed that formal (i.e. dictated) discharge summaries were absent in 11 cases. It has been observed that the medical records of deceased patients are returned to the medical records department once coded and not sent to clinicians to have the discharge summary completed.

  ACTION: This is an area for improvement that has been initially explored with senior management. It is also an area that will require further audit and monitoring. Audit of the discharge summaries is ongoing.
- There will be collaboration between all relevant stakeholders, including clinicians, medical records personnel, HIPE personnel and administration support personnel, in order to streamline these quality improvements
- Audits and quality improvement projects will be central to assessing the rate of change and the success thereof.

In all cases, it was highlighted that good practice was evidenced within the medical notes of sensitive and timely discussions with families, involvement of the specialist palliative care team, and recognition of the needs of the dying patient.

In summary, the hospital are satisfied that the care given was appropriate, and that there were no clinical concerns regarding the care and treatment given to individual patients.

CORK UNIVERSITY HOSPITAL
OUTLIER IN COPD FROM APRIL 2022 TO MARCH 2023

Cork University Hospital had an unconfirmed statistical outlier from April 2022 to March 2023 for COPD. NOCA engaged with the hospital, requesting a review of the data. The COPD SMR and cumulative summary control chart (CuSum) remained high, and a further review of data was sought from the hospital for the full 2023 calendar year. The COPD SMR reverted to above average in the data to the end of 2023 that have been used for the National Audit of Hospital Mortality National Report 2022 and 2023.

Both reviews were conducted by a clinical team, examining patient medical records, clinical notes, radiology imaging and post mortem reports where applicable.

The findings of the 2022 review identified that only 33% of the cases under review had a correct diagnosis of COPD. Of these 33% of cases, 86% had a do not attempt resuscitation (DNAR) recorded on the medical record; however, despite best medical care, 14% of these patients deteriorated and received appropriate management in the Intensive Care Unit (ICU). In 64% of these cases, the patient had end-of-life syringe drivers. However, only one-half of these patients had palliative care coded on HIPE. The review found that 66% of cases did not have a principal diagnosis of COPD exacerbation. Instead, the diagnoses identified were pneumonia, congestive cardiac failure, metastatic malignancies, sepsis, and pulmonary fibrosis exacerbation. The vast majority (51%) of cases to be changed were to the pneumonia diagnosis group. The 2023 review had similar findings to the 2022 percentages described above. Both COPD reviews contained the following:

RECOMMENDATIONS FOR QUALITY IMPROVEMENT

1. **This audit highlights the need for a dictated summary/formal electronic discharge summary of all patients, including those who are deceased, in order to help accurately characterise the patient's principal diagnosis and thus improve the accuracy of HIPE coding.**
2. **Coding will be aided by this discharge summary and any related material, including death certificate or post-mortem autopsy results in the case of an unexplained death.**

CORK UNIVERSITY HOSPITAL
OUTLIER IN COPD FROM APRIL 2022 TO MARCH 2023

NOCA ACTIONS

NOCA conducted a manual analysis in order to establish the impact on the SMR when those cases identified as having a different principal diagnosis were changed, and to establish the impact that the addition of the deaths had on the diagnosis group they were changed to.

Various simulations were carried out: excluding records where the patient had multiple admissions or where cases were discharged alive, only including viral pneumonia cases, and excluding other pneumonia cases. The result of the simulations demonstrates that while correcting the errors identified for patients with a principal diagnosis of COPD, bringing the SMR value to an acceptable level, the corrections resulted in the SMR for pneumonia becoming a statistical outlier. Work is ongoing to investigate the overall respiratory signals for this period in Cork University Hospital and to determine whether it is due to data quality issues or whether there are other currently unknown underlying factors to be taken into consideration. NOCA and the NAHM Governance Committee are continuing to work with Cork University Hospital respiratory clinicians, as well as the quality and patient safety team and the HIPE management team, to further investigate the audit findings for COPD and respiratory conditions overall and put plans in place to address the quality improvement and data management actions identified.

NOCA will work with Cork University Hospital to establish a working group in order to design and implement a discharge summary proforma specifically for deceased patients. NOCA thanks Cork University Hospital for agreeing to trial this important quality improvement initiative.

CORK UNIVERSITY HOSPITAL
OUTLIER IN UTI FROM JANUARY TO DECEMBER 2023

A review of 27 deceased UTI cases was carried out by the Clinical Director of Cork University Hospital. First, the 24 charts available for review were examined in order to establish whether there were any areas where the data were incorrect. Of these 24 cases, 11 were identified as having an alternative principal diagnosis, 7 of them being changed to the sepsis agent Clinical Classifications Software (CCS) diagnosis group. Care received by the patients with sepsis was examined, taking the Sepsis 6 bundle into consideration, and there was no concern with the care provided in any of the cases.

Second, there was under-coding of the secondary diagnosis identified; in 12 cases, the Charlson Comorbidity Index score was lower than it should have been, and in another 5 cases, the coding was incomplete. The correct identification of all secondary diagnoses may have impacted on the predicted outcome of those patients had all the information been clearly documented.

Third, in 11 of the deceased cases, the patient was deemed to have received palliative care treatment, but this was not coded as such due to the terminology used in the medical record. Some examples of the terms used instead of palliative care were 'prioritise comfort', 'comfort care', 'stop active treatment', 'comfort main priority of care' and 'at ceiling of care'.

Taking the above information into consideration, Cork University Hospital believes that the outlier signal relates to the coding of the medical records.

The UTI signal returned to within normal ranges in the subsequent updates.

RECOMMENDATIONS FOR QUALITY IMPROVEMENT

1. **Increase the use of the sepsis form to facilitate coders. This is because the term 'urosepsis' is used in cases of sepsis with a urinary tract source, and despite meeting sepsis criteria, coders are unable to code as sepsis due to the terms used in the chart.**
2. **There is a requirement for a detailed discharge summary for patients who die, but unfortunately, this is often omitted, and again this is a hindrance to coders.**

NOCA ACTIONS

NOCA carried out a manual analysis on the outlier signal, taking the above information into account, in order to establish the impact on the SMR when those cases identified as having a different principal diagnosis and palliative care code were changed and also to determine the impact the addition of the deaths had on the diagnosis group they were changed to.

When the 11 cases identified as not having the correct principal diagnosis were taken out of the risk-adjusted mortality calculations for UTI, the SMR returned to within acceptable levels (i.e. within the 95% control limits). Reassigning seven cases into the sepsis agent ccs diagnosis group raises the sepsis agent SMR beyond the 95% upper control limit, but it is still within the 99.8% upper control limit. As the correct principal diagnoses for the remaining four cases are four different diagnoses, the impact of reassigning these cases on the SMR for these diagnoses is negligible.

Correcting the coding of 11 records identified as having received palliative care treatment reduces the UTI SMR to within the 99.8% upper control limit.

CORK UNIVERSITY HOSPITAL
OUTLIER IN ISCHAEMIC STROKE FROM JANUARY TO DECEMBER 2023

Cork University Hospital had a high SMR for ischaemic stroke in updates of data to the end of September 2023 and also at the end of December 2023, and it is therefore an outlier for the calendar year 2023. A review of ischaemic stroke data was conducted by a consultant in geriatric medicine, who commented that:

> In April 2022, [Cork University Hospital] established a 24/7 regional thrombectomy service serving all patients in Munster. Also, the eligibility criteria for thrombectomy expanded in the past year based on the most recent evidence. As a result, there was an increase in ischaemic stroke admissions to [Cork University Hospital] and these admissions were more complex and had more severe stroke syndromes with a higher risk of mortality.

This gives context to the outlier. The initial step was to look at data quality – assessment of data coverage, and the completeness and accuracy of the cases coded – in order to establish whether data were the reason for the unconfirmed outlier.

Overall coding for the principal and secondary diagnosis was accurate. However, for two cases, it was identified that ischaemic stroke should not have been the principal diagnosis.

In 22 cases, palliative care treatment was provided, but due to the terminology documented in the medical record, the palliative care code could not be applied by HIPE coders.

Cork University Hospital further commented that:

> Many patients spend more than 24 hours on an emergency department trolley awaiting a bed in the acute stroke unit. The lack of off-site stroke rehabilitation beds in the region is negatively impacting on patient flow and egress. The acute stroke unit does not meet nursing safe staffing recommendations. The [Cork University Hospital] acute stroke unit does not have a protected and available hyperacute stroke bed for patients who have received intravenous thrombolysis or thrombectomy. As a result, these patients often spend prolonged periods of time in the emergency department or interventional radiology recovery bay awaiting a bed. This increases the risk of adverse events, including death.

The SMR for ischaemic stroke in Cork University Hospital remained high in subsequent data releases to NAHM.

RECOMMENDATIONS FOR QUALITY IMPROVEMENT

A quality improvement approach to improving documentation of palliative care was planned to be rolled out in 2024, so that the coding team can be more accurate.

The following change interventions would improve stroke care in Cork University Hospital:

- **availability of off-site stroke rehabilitation beds in order to enhance egress from the acute stroke unit and expedite patient flow**
- **adherence to the nursing safe staffing recommendations for an acute stroke unit**
- **consistent availability of a hyperacute stroke unit bed.**

NOCA ACTIONS

NOCA carried out a manual analysis in order to consider the revised principal diagnosis for two cases. Removing these two cases improved the SMR, but it remained outside the upper 95% control limits. A total of 22 cases were identified by clinicians as having received palliative care treatment, but did not have the palliative care code applied in HIPE. When these data were corrected, it brought the ischaemic stroke SMR to within an acceptable range. NOCA and the NAHM Governance Committee will work with the Cork University Hospital HIPE management and quality and patient safety team to address the documentation of palliative care in the medical record and implement quality improvement actions.

AUDIT UPDATE

NAHM INDEPENDENT REVIEW

The NOCA Governance Board commissioned an independent review of the NQAIS NAHM tool (NOCA, 2022) in order to establish whether NAHM is still effective in terms of healthcare quality assurance and improvement. The review made 12 recommendations under the following headings: model, web-based tool, and public reporting. Several of the recommendations required an independent statistical researcher to conduct analysis. Simon Jones, Professor of Population Health (Research) at the Center for Healthcare Innovation and Delivery Science, Department of Population Health, NYU Grossman School of Medicine, conducted the analysis during 2023 and 2024.

While most aspects of the analysis were straightforward, other elements were more complex. The majority of the analysis has been completed and recommendations have been presented to the NOCA Governance Board for amendments to the NQAIS NAHM web-based tool and modelling. However, further analysis is necessary regarding statistical outlier identification in order to explore alternative data analysis methods for smaller Model 2 (M2) hospitals within the NQAIS NAHM web-based tool. The current and proposed methods require extreme outlier conditions in smaller hospitals before a signal is triggered, which may limit the detection of issues or outliers. Funding is being sought to continue the analysis and explore whether the proposed alternative statistical approaches will give more statistical power than the SMR.

The smaller enhancements recommended for the web-based tool have already been implemented, including user definitions for hover-over phrases, the removal of the 'COVID-19 past' flag, and the addition of hospital-acquired condition flags. A business case will be prepared to secure funding for the agreed proposed changes to the NQAIS NAHM model and methodology. This work should be carried out in 2025.

30-DAY MORTALITY

NOCA is working with the Integrated Information Service (IIS) to explore possible solutions for the collection of audit data, including data to provide 30-day mortality statistics for the NQAIS NAHM web-based tool.

"While most aspects of the analysis were straightforward, other elements were more complex. The majority of the analysis has been completed and recommendations have been presented to the NOCA Governance Board for amendments to the NQAIS NAHM web-based tool and modelling."

RECOMMENDATIONS

RECOMMENDATION 1

NOCA will undertake a study into in-hospital crude mortality rates in Ireland, across all conditions, and publish the findings.

Rationale (which finding does this refer to?)
Chapter All Diagnoses - the crude in-hospital mortality rate shows a significant 6% increase for the 10-year period 2014 to 2023. The rate for 2023 remained statistically significantly higher than the crude in-hospital mortality rates in the years prior to 2020 and the COVID-19 pandemic. This increase is unexpected based on the mortality trends analysed for the six key conditions used in the report. There are no comparable international rates. Internationally, the trend in patterns of mortality since COVID-19 are similar, however, the population used for those studies are not based on in-patients and therefore not comparable to NAHM findings.
What actions should be taken
NOCA will undertake to conduct a study using a broader scope of data than that used for the NAHM report, and which will consider the potential impact of elements such as hospital activity/ resources, the development of Trauma Units and hospital bypass protocols, the Clinical Programmes, developments in primary care, referral patterns, hospital admission thresholds, changes in hospital chart/electronic health record documentation and HIPE coding accuracy and depth, etc. The study will use data from 2014 to 2023 with the addition of 2024 and 2025. A more in-depth analysis is required to achieve an understanding of the time trends and the potential relationships with the COVID-19 pandemic waves.
Who will benefit from this action/recommendation?
The healthcare system NQAIS NAHM
Who is responsible for implementing this action/recommendation?
NOCA
When should this be implemented?
As soon as 2025 data becomes available for analysis – circa May 2026.
Evidence base for recommendation
NOCA conducted preliminary analysis of the data, seeking indications as to what may have contributed to the crude mortality rate not returning to pre COVID-19 levels in 2023. The ageing population was examined and does not appear to be a factor. Analysis of the 15 CCS major diagnostic groupings used in NQAIS NAHM provides some indication as to the areas which are likely to have contributed to the increase in the mortality rate. While this analysis highlighted the broad categories of “respiratory” and “infection” as areas for further investigation, it does not explain the factors contributing to the increase in crude in-hospital mortality. A more sophisticated analysis is required to get a clearer understanding of these factors.

RECOMMENDATION 2

NOCA will liaise with the HPO to ensure that when equity stratifiers become available on PAS, they are exported to HIPE and onward to NOCA, in order to enable analysis of potential inequalities in the outcomes of certain groups of inpatients to be carried out.

Rationale (which finding does this refer to?)

The Health inequalities: Analysis of in-hospital crude mortality describes the shortage of health equity stratifier variables available to NAHM (from HIPE data) with which to carry out meaningful analysis on mortality for distinct groups of inpatients in Irish acute hospitals.

The Public Sector Duty "is a legal obligation on public bodies, contained in Section 42 of the Irish Human Rights and Equality Commission Act 2014, to have regard to the need to eliminate discrimination, promote equality of opportunity and protect the human rights of public sector staff and service users. It requires public bodies to Assess, address and report on progress in relation to equality and human rights

- carry out an assessment of equality and human rights issues across functions;
- develop policies, plans and actions to address these issues; and
- report annually on progress and achievements in relation to those actions." (Irish Human Rights and Equality Commission, n.d.)

However, in many cases it is not possible to assess equality or equity, as the appropriate data are not collected.

There are currently no useable patient administration system (PAS) or HIPE fields available to NQAIS NAHM that provide data to stratify patients based on Eircode, ethnicity, education level, or occupation. It is therefore not possible for NAHM to assess in-hospital mortality for specific groups of patients presenting to hospital for treatment, and to determine whether inequalities in in-hospital deaths exist.

There is a code for no fixed abode (NFA) in HIPE, but this code has extremely low completeness and is therefore not sufficient for meaningful analysis of those patients. Housing status may be a more relevant question to ask, so that those who are living in hostels or temporary shelter can be properly identified.

In order to be able to make international comparisons on in-hospital mortality for specific groups of people, more detailed data are required.

What actions should be taken

The HPO should include feasible equity stratifiers when extracting data from the PAS in order to provide basic demographic information for the HIPE record as and when this becomes available. Ideally, these fields should be mandatory within PAS, with no option for 'not specified' in drop-down lists. Examples from the PROGRESS PLUS list include:

- **P**lace of residence
- **R**ace (ethnicity)
- **O**ccupation
- **G**ender (sex)
- **R**eligion
- **E**ducation
- **S**ocioeconomic status
- **S**ocial capital (marital status).

Who will benefit from this action/recommendation?
All patients and their families, but particularly those who are disadvantaged The healthcare system
Who is responsible for implementing this action/recommendation?
The HPO, with assistance from NOCA
When should this be implemented?
As soon as data is available from hospital PAS systems.
Evidence base for recommendation
Irish Human Rights and Equality Commission (n.d.) Public Sector Duty eLearning: Equality and Human Rights in the Public Service. Available from: https://www.ihrec.ie/elearning/ [Accessed 5 September 2024]. Health inequality monitoring should be a central component of national health information systems (World Health Organization, 2017). Including equity identifiers in routine data collection assists decision-makers in prioritising and investing in evidence-informed interventions for better and more equitable patient outcomes (Hirsch *et al.* 2023). To date, there has been little or no research on ethnic inequalities in mortality in the Irish context (Duffy *et al.*, 2022).

RECOMMENDATION 3

NOCA will work with the HPO to gather data to carry out geocoding in order to produce small area deprivation codes for analysis of in-hospital mortality based on deprivation.

Rationale (which finding does this refer to?)
The Health inequalities: Analysis of in-hospital crude mortality in this report describes the shortage of health equity stratifier variables available to NAHM (from HIPE data) with which to carry out meaningful analysis on in-hospital mortality for distinct groups of patients in Irish acute hospitals. Deprivation is a significant variable for calculation of the projected mortality outcome for inpatients. Currently, the medical card is used within NQAIS NAHM as a proxy for deprivation levels, and area of residence data are only available at county or city level within NQAIS NAHM. These data points do not provide meaningful insights into deprivation levels. NAHM is seeking geocoding of addresses to apply deprivation indices by small area, so that potential inequalities based on these factors can be measured. The Pobal HP Deprivation Index may be considered, as this is already established in Ireland. The mandatory collection of full address and separate field for Eircode is necessary for geocoding in order to assign the deprivation index of the small area of residence and, possibly combined with other information (e.g. employment status), would allow for the assessment of inequality of in-hospital mortality by deprivation level.
What action should be taken
The HPO should include full address and separate Eircode fields when extracting data from the PAS in order to provide basic demographic information for the HIPE record. Geocoding of these fields should be carried out to allow the Pobal HP Deprivation Index score to be linked to the patients record. In order to protect an individual's confidentiality, NOCA/NAHM will then only receive the Pobal HP Deprivation Index score. When these data are available, they will enable NOCA to assess whether there are inequalities in in-hospital mortality before investigating its suitability for inclusion into the NAHM risk model. Hospitals should expand the collection of data in the PAS in order to ensure mandatory collection of the full address and collect the Eircode as a separate field.
Who will benefit from this action/recommendation?
All patients and their families The healthcare system
Who is responsible for implementing this action/recommendation?
The HPO, with assistance from NOCA
When should this be implemented?
As soon as data is available.
Evidence base for recommendation
Correct and complete geocoding enables the efficient and accurate characterisation of patients according to the sociodemographic and environmental health impacts that may exist at their home address (Tyris et al., 2024). The Eircode routing key could not be used for analysis in this report as the variable was only populated for 19% of records in 2023, 7% in 2022, and 2% in 2021.

RECOMMENDATION 4

Each hospital should establish a local working group including clinicians and HIPE coders in order to promote collaboration between the disciplines and ensure that regular checks on the quality of medical chart documentation and subsequent coding are carried out.

Rationale (which finding does this refer to?)
Collaboration between clinicians and HIPE coders is essential in order to ensure that accurate data are available for audits of all types, both local and national. Hospital reviews carried out for NAHM indicate that collaboration between consultants, NCHDs and local HIPE coders is still not taking place in most hospitals. This is evident from the number of changes to principal and secondary diagnoses identified when charts were reviewed. None of the outlier reviews carried out for NAHM to date have identified that all of the data being reviewed were correct. The documentation in the medical chart, and its subsequent coding, should be routinely discussed and validated among the clinicians and coders. Inaccurate data in the medical record impacts on efficiency throughout the hospital and its activities, including patient diagnosis, future treatment, financial diagnosis related group (DRG)s internal audit, etc.
What action should be taken
A local working group should be established in each hospital. It should include both clinicians at all levels who write up notes in patient medical charts and HIPE coders, and they should meet weekly or fortnightly. An agreed number of random charts coded by HIPE coders should be discussed with clinicians in order to confirm that the coding is correct. The learnings from these sessions will help clinicians to understand what level of specificity and accuracy is needed, so that their intended diagnosis is applied and coded. NCHDs who frequently write up medical notes, along with consultants, should be involved in these sessions to learn from any changes identified.
Who will benefit from this action/recommendation?
The healthcare system Clinicians Patients and their families HIPE coders and the HPO
Who is responsible for implementing this action/recommendation?
Hospital management
When should this be implemented?
As soon as practicable
Evidence base for recommendation
Improved collaboration – including, for example, targeted education sessions for junior clinicians, consultants and clinical coding staff – can improve the accuracy of inpatient clinical coding, enhancing the accuracy and specificity of data collection, enabling more efficient data collection and improved analysis and interpretation of findings (Radhakhrishnan *et al*., 2024). In a UK based report, it was found that the interaction between coders and doctors is crucial to ensuring effective coding. "We improved coding accuracy where we identified errors in an average of 32.5% of admissions each month leading to an improvement in the quality of patient documentation" (Abdulla *et al*., 2020).

RECOMMENDATION 5

A discharge summary specifically for deceased patients should be designed and inserted as a pro forma document in the basic hospital medical chart. It should be completed for all patients who die in hospital and it should include specific information that will enable accurate coding. This will be conducted as a trial in Cork University Hospital for a 6-month period.

Rationale (which finding does this refer to?)

The first NAHM Annual Report, *National Audit of Hospital Mortality Report* (NOCA, 2016), recommended that a patient discharge summary should be completed for every in-hospital mortality in order to further improve the accuracy of HIPE data.

Despite that recommendation, and the *National Standard for Patient Discharge Summary Information* (HIQA, 2013), hospital reviews carried out for NAHM reveal that in most situations, discharge summaries are seldom present in deceased patients' charts, particularly where there is no electronic health record available.

The lack of a discharge summary makes the coding of charts more complicated and open to inaccuracies, due to a lack of clarity where there is conflicting information. General practitioners may not be made aware of the patient's death, and therefore their records may not be up to date.

What action should be taken

It is proposed that a national working group be established in conjunction with Cork University Hospital to design a discharge template specifically for deceased patients in order to capture the relevant information needed for HIPE and enable charts to be coded accurately and in a timely fashion.

The template should include information set out in the HIQA *National Standard for Patient Discharge Summary Information.* This publication contains relevant information for coding, with additional items specific to those who are deceased. Such items are often difficult for HIPE coders to determine from the medical notes as there is an element of interpretation involved, which the HIPE coders cannot undertake.

Some examples of these items include the following:

- What is the principal diagnosis?
- Was the patient on an end-of-life pathway?
- Was the patient provided with palliative care treatment? (Treatment will need to be defined.)
- What is the source/type of admission?
- Are all secondary diagnoses recorded?
- Who completed the discharge summary? Was it a member of the team treating the patient at the time of death?

The discharge template should be printed and available in hospitals and completed for all deceased patients.

The working group will also be asked to consider who will take ownership for the completion of the discharge summaries for the deceased patients, and how. The charts for deceased patients are regularly returned to medical records department rather than to the relevant consultants for completion. The working group will consider how can that practice be reversed.

The recommendations from the working group should be implemented as a quality improvement initiative trial in Cork University Hospital over a period of 6 months.

Who will benefit from this action/recommendation?
HIPE coders and the HPO NQAIS NAHM The healthcare system Families of deceased inpatients General practitioners
Who is responsible for implementing this action/recommendation?
Hospital management
When should this be implemented?
As soon as it can be put in place
Evidence base for recommendation
The HIQA *National Standard for Patient Discharge Summary Information* (HIQA, 2013) The Wexford General Hospital outlier review on ischaemic stroke and the Cork University Hospital outlier review on COPD in the Analysis of SMR outliers chapter of this report

CONCLUSION

This report covers the 2-year period 2022–2023. In addition to examining the hospital mortality data for the six key conditions that the NAHM reports publicly on, this report endeavoured to also look at potential inequalities in hospital deaths. The report also separated male and female deaths for the first time, and presented these data in population pyramids for ease of understanding.

The first point of note is that deaths in hospitals for the six key diagnoses, or are trending towards, pre-COVID-19 pandemic rates. NOCA has undertaken to carry out a study on all cause mortality to investigate the reasons why the crude mortality rates remain above 2019 levels. Over the 2-year period 2022–2023, a number of outliers were fully investigated. The issue of data quality arose frequently in these investigations, and it is clear that the lack of a discharge summary for deceased individuals in hospitals makes the work of HIPE coders much more difficult and increases the likelihood of inaccuracies. This has led to the recommendation that a discharge summary with a principal diagnosis and all secondary diagnoses should be provided for all deceased patients. A number of outliers continue to be fully investigated in order to ensure that quality of care issues are not a feature in these outliers, and where there is any concern, that this is fully addressed.

With regard to inequalities, the main finding was that there is a shortage of equity equity stratifier data points collected to enable a robust analysis of potential inequalities in in-hospital deaths to be carried out. A patient's medical card status is insufficient as a proxy for deprivation, as medical cards are issued for many chronically unwell individuals in addition to being means tested. However, the results of the analysis of hospital deaths by medical card status do raise questions that should be answered by carrying out more detailed analysis. This can only be achieved by the collection of data at the patient's point of entry to the hospital and, at an absolute minimum, by collecting data on their socioeconomic status, ethnicity, and educational level.

The commitment and support shown for the NQAIS NAHM web-based tool from the participating hospitals, and users within those hospitals, is evident in the work that has gone into examining the causes of outliers in the various hospitals. The NAHM Governance Committee thanks them for ensuring that mortality rates in Ireland are being monitored.

A lot of work has been done over the course of 2024 on examining the feasibility of implementing the changes recommended by the independent review of NAHM that was carried out in 2022. The NAHM Governance Committee would also like to thank all those involved in this work.

Finally, the NAHM Governance Committee looks forward to implementing further improvements in the methodology of NAHM over the coming years.

"The first point of note is that deaths in hospitals for the 6 key diagnoses, or are trending towards, pre-COVID-19 pandemic rates. NOCA has undertaken to carry out a study on all cause mortality to investigate the reasons why the rates remain above 2019 levels."

REFERENCES

Abdulla, S., Simon, N., Woodhams, K., Hayman, C., Oumar, M., Howroyd, L.R. and Sethi, G. (2020) Improving the quality of clinical coding and payments through student doctor–coder collaboration in a tertiary haematology department. *BMJ Open Quality*, 9(1), e000723. Available from: https://doi.org/10.1136/bmjoq-2019-000723 [Accessed 5 September 2024].

Australian Consortium for Classification Development (2017) *The International Statistical Classification of Diseases and Related Health Problems, Tenth Revision, Australian Modification (ICD-10-AM/ACHI/ACS).* 10th edn. Darlinghurst, NSW: Independent Hospital Pricing Authority.
Available from: https://www.ihacpa.gov.au/resources/icd-10-amachiacs-tenth-edition [Accessed 28 February 2023].

Barbagelata, E., Cillóniz, C., Dominedò, C., Torres, A., Nicolini, A. and Solidoro, P. (2020) Gender differences in community-acquired pneumonia. *Minerva Medica*, 111(2), pp. 153-165.
Available from: https://pubmed.ncbi.nlm.nih.gov/32166931/ [Accessed 15 November 2024].

Bennett, K., Kabir, Z., Unal, B., Shelley, E., Critchley, J., Perry, I., Feely, J. and Capewell, S. (2006) Explaining the recent decrease in coronary heart disease mortality rates in Ireland, 1985–2000. *Journal of Epidemiology & Community Health, 60(4), pp. 322-327*. Available from: https://doi.org/10.1136/jech.2005.038638 [Accessed 25 March 2025].

Blecker, S., Jones, S.A., Petrilli, C.M., Admon, A.J., Weerahandi, H., Francois, F. and Horwitz, L.I. (2021) Hospitalizations for chronic disease and acute conditions in the time of COVID-19. *JAMA Internal Medicine,* 181(2), pp. 269-271. Available from: https://doi.org/10.1001/jamainternmed.2020.6823 [Accessed 28 May 2025].

Bosomworth, J. and Khan, Z. (2023) Analysis of Gender-Based Inequality in Cardiovascular Health: An Umbrella Review. *Cureus*, 15(8), e43482.
Available from: https://doi.org/10.7759/cureus.43482 [Accessed 8 August 2024].

Carroll, C., Evans, K., Elmusharaf, K., O'Donnell, P., Dee, A., O'Donovan, D. and Casey, M. (2021) A review of the inclusion of equity stratifiers for the measurement of health inequalities within health and social care data collections in Ireland. *BMC Public Health*, 21(1), 1705. Available from: https://doi.org/10.1186/s12889-021-11717-5 [Accessed 15 October 2024].

Central Statistics Office (2024a) Population and Migration Estimates, April 2024. Cork: Central Statistics Office.
Available from: https://www.cso.ie/en/releasesandpublications/ep/p-pme/populationandmigrationestimatesapril2024/keyfindings/ [Accessed 18 November 2024].

Central Statistics Office (2024b) *Press Statement Older Persons Information Hub 2024.* Available from: https://www.cso.ie/en/csolatestnews/pressreleases/2024pressreleases/pressstatementolderpersonsinformationhub2024 [Accessed 27 March 2025].

Charlson, M.E., Pompei, P., Ales, K.L. and MacKenzie, C.R. (1987) A new method of classifying prognostic comorbidity in longitudinal studies: development and validation. *Journal of Chronic Diseases*, 40(5), pp. 373-383. Available from: http://www.aqc.ch/download/HSM_Suppl_8_charlson.pdf [Accessed 2 September 2024].

Cochrane Equity (n.d.) PROGRESS-Plus. Available from: https://methods.cochrane.org/equity/projects/evidence-equity/progress-plus [Accessed 11 October 2024].

Department of Health, 2013. *Healthy Ireland: A Framework for Improved Health and Wellbeing 2013–2025*. [online]
Available at: https://www.gov.ie/en/publication/e8f9b1-healthy-ireland-framework-2019-2025/ [Accessed 7 February 2025].

Duffy, K., Connolly, S., Nolan, A. and Maître, B. (2022) *Unequal Chances? Inequalities in Mortality in Ireland*. Dublin: Economic and Social Reasearch Institute.
Available from: https://www.esri.ie/publications/unequal-chances-inequalities-in-mortality-in-ireland [Accessed 4 September 2024].

Guthrie, G.D. and Bell, S. (2020) Deprivation and kidney disease—a predictor of poor outcomes. *Clinical Kidney Journal*, 13(2), pp. 128-132.
Available from: https://doi.org/10.1093/ckj/sfz151 [Accessed 9 January 2025].

Health Information and Quality Authority (2013) *National Standard for Patient Discharge Summary Information*. Dublin: Health Information and Quality Authority.
Available from: https://www.hiqa.ie/sites/default/files/2017-01/National-Standard-Patient-Discharge-Summary.pdf [Accessed 2 September 2024].

Health Information and Quality Authority (2018) *Guidance on a data quality framework for health and social care*. Dublin: Health Information and Quality Authority.
Available from: https://www.hiqa.ie/sites/default/files/2018-10/Guidance-for-a-data-quality-framework.pdf [Accessed 2 September 2024].

Health Protection Surveillance Centre (2024) *Seasonal Influenza Vaccine Uptake in Ireland, 2023–24*. Available from: https://www.hpsc.ie/a-z/respiratory/influenza/seasonalinfluenza/vaccination/influenzaandadults65yearsandolder/Seasonal%20Influenza%20Vaccine%20Uptake%20in%20Ireland,%202023-24.pdf [Accessed 1 April 2025].

Health Service Executive (2012) *Stroke Clinical Care Programme: Model of Care*. Dublin: Health Service Executive.
Available from: https://www.hse.ie/eng/services/publications/clinical-strategy-and-programmes/stroke-model-of-care.pdf [Accessed 18 November 2024].

Health Service Executive (HSE), 2025. *How much you can earn*. [online]
Available at: https://www2.hse.ie/services/schemes-allowances/medical-cards/applying/how-much-you-can-earn/ [Accessed 10 February 2025].

Health Service Executive (HSE), 2021. *Sláintecare Implementation Strategy and Action Plan 2021–2023*. [online]
Available at: https://www.artsandhealth.ie/policies-strategies/slaintecare-implementation-strategy-action-plan-2021-2023/ [Accessed 7 February 2025].

Health Service Executive (n.d.) Acute Coronary Syndrome.
Available from: https://www.hse.ie/eng/about/who/cspd/ncps/national-heart-programme/acs/ [Accessed 11 October 2024].

Health Service Executive (n.d.) Chronic obstructive pulmonary disease (COPD) - Overview.
Available from: https://www2.hse.ie/conditions/copd/copd-overview/ [Accessed 11 October 2024].

Health Service Executive (n.d.) Heart Failure.
Available from: https://www.hse.ie/eng/about/who/cspd/ncps/national-heart-programme/heart-failure/ [Accessed 11 October 2024].

Health Service Executive (n.d.) Overview: Pneumonia.
Available from: https://www2.hse.ie/conditions/pneumonia/ [Accessed 11 October 2024].

Health Service Executive (n.d.) Stroke.
Available from: https://www.hse.ie/eng/about/who/cspd/ncps/stroke/ [Accessed 11 October 2024].

Healthcare Pricing Office (2024a) *HIPE Data Quality Statement For 2023 HIPE Data*. Dublin: Healthcare Pricing Office.
Available from: https://hpowp.com/data-quality-statement-2023/ [Accessed 27 August 2024].

Healthcare Pricing Office (2024b) *HIPE Data Dictionary 2024*. Dublin: Healthcare Pricing Office.
Available from https://hpo.ie/hipe/hipe_data_dictionary/HIPE_Data_Dictionary_2024_V16.0.pdf [Accesed 18 November 2024].

Healthy Ireland (2024) Healthy Ireland Survey 2024. Available from: https://www.gov.ie/en/publication/d1ab3-healthy-ireland-survey-2024/#smoking [Accessed 26 March 2025].

Hirsch, B.K., Stevenson, M.C. and Givens, M.L. (2023) Evidence Clearinghouses as Tools to Advance Health Equity: What We Know from a Systematic Scan. *Prevention Science,* 24(4), pp. 613-624.
Available from: https://doi.org/10.1007/s11121-023-01511-7 [Accessed 5 September 2024].

Irish Heart Foundation (n.d.) Heart Attack. Available from: https://irishheart.ie/heart-and-stroke-conditions-a-z/heart-attack/ [Accessed 11 October 2024].

Irish Heart Foundation (n.d.) Heart Failure.
Available from: https://irishheart.ie/heart-and-stroke-conditions-a-z/heart-failure/ [Accessed 11 October 2024].

Irish Heart Foundation (n.d.-) What exactly is a stroke?
Available from: https://irishheart.ie/your-health/learn-about-stroke/ [Accessed 11 October 2024].

Irish Human Rights and Equality Commission (n.d.) Public Sector Duty eLearning: Equality and Human Rights in the Public Service.
Available from: https://www.ihrec.ie/elearning/ [Accessed 5 September 2024].

Irish Thoracic Society (n.d.) COPD.
Available from: https://irishthoracicsociety.com/lung-disease/copd/ [Accessed 11 October 2024].

Irish Thoracic Society (n.d.) Pneumonia.
Available from: https://irishthoracicsociety.com/lung-disease/pneumonia/ [Accessed 11 October 2024].

Kerschbaumer, L., Crossett, L., Holaus, M. and Costa, U. (2024) COVID-19 and health inequalities: The impact of social determinants of health on individuals affected by poverty. *Health Policy and Technology*, 13(1), 100803. Available from: https://doi.org/10.1016/j.hlpt.2023.100803 [Accessed 18 November 2024].

Mannem, S., Rattanawong, P., Riangwiwat, T., Vutthikraivit, W., Putthapiban, P., Sukhumthammarat, W., Kanitsoraphan, C. and Chongsathidkiet, P. (2020) Sex difference and outcome after percutaneous intervention in patients with chronic total occlusion: a systematic review and meta-analysis. *Cardiovascular Revascularization Medicine, 21(1), pp. 25-31.*
Available from: https://doi.org/10.1016/j.carrev.2019.03.003 [Accessed 21 May 2025].

Marron, L., Duffy, R., O'Donnell, J. and Domegan, L. (2025) An evaluation of the severe acute respiratory infection surveillance system in Ireland. *BMC Public Health*, 25(1), 492. Available from: https://doi.org/10.1186/s12889-025-21645-3 [Accessed 1 April 2025].

Mathews, L., Ding, N., Mok, Y., Shin, J.-I., Crews, D.C., Rosamond, W.D., Newton, A.-K., Chang, P.P., Ndumele, C.E., Coresh, J. and Matsushita, K. (2022) Impact of socioeconomic status on mortality and readmission in patients with heart failure with reduced ejection fraction: The ARIC study. *Journal of the American Heart Association*, 11(18), e024057. Available from: https://doi.org/10.1161/JAHA.121.024057 [Accessed 21 May 2025].

Mheidly, N., Fares, N.Y., Fares, M.Y. and Fares, J. (2022) Emerging Health Disparities during the COVID-19 Pandemic. *Avicenna Journal of Medicine*, 13(1), pp. 60-64. Available from: https://doi.org/10.1055/s-0042-1759842 [Accessed 18 November 2024].

National Office of Clinical Audit (2016) *National Audit of Hospital Mortality Report*. Dublin: National Office of Clinical Audit. Available from: https://d7g406zpx7bgk.cloudfront.net/27c16b42a4/nahm_report_final.pdf [Accessed 11 October 2024].

National Office of Clinical Audit (2022) *An independent review of the National Audit of Hospital Mortality*. Dublin: National Office of Clinical Audit. Available from: https://s3-eu-west-1.amazonaws.com/noca-uploads/general/Revised_Final_NAHM_26.08.2022.pdf [Accessed 11 October 2024].

National Office of Clinical Audit (2023) *Inclusion Criteria for NAHM Public Reportin*g. Available from: https://a.storyblok.com/f/265949/x/e051fb8835/nahm-inclusion-criteria-for-public-reporting.pdf

National Office of Clinical Audit (2023a) *National Audit of Hospital Mortality Annual Report 2021*. Available from: https://d7g406zpx7bgk.cloudfront.net/65752fdf6d/nahm_annual_report_2021_final.pdf [Accessed 18 November 2024].

National Office of Clinical Audit (2023b) *National Audit of Hospital Mortality (NAHM) Information on SMR Funnel Plot*. Available from: https://a.storyblok.com/f/265949/x/c89fbd1d99/nqais-nahm-information-on-smr-funnel-plot.pdf

National Office of Clinical Audit (2023c) *National Audit of Hospital Mortality Annual Report ICD-10-AM Codes Included in Six Key Clinical Classification Software (CCS) Diagnoses*. Dublin: National Office of Clinical Audit. Available from: https://a.storyblok.com/f/265949/x/7c70cee8b3/nahm-icd-10-am-codes-included-in-6-key-ccs-diagnoses.pdf

National Office of Clinical Audit (2024a) *Irish Heart Attack Audit National Report 2022 and 2023*. Dublin: National Office of Clinical Audit. Available from: https://d7g406zpx7bgk.cloudfront.net/x/d3bdc5fecd/irish-heart-attack-audit-national-report-2022-2023-final.pdf [Accessed 10 December 2024].

National Office of Clinical Audit (2024b) *NAHM Governance Structure*. Available from: https://a.storyblok.com/f/265949/x/5651d1dd1b/nahm-governance-structure-2022_2023.pdf

National Office of Clinical Audit (2024c) *National Audit of Hospital Mortality Methodology*. Available from: https://a.storyblok.com/f/265949/x/4ef9ed8c33/nahm-methodology-v2-2024.pdf

National Office of Clinical Audit (2024d) *Participating Hospitals in NQAIS NAHM by Health Region*. Dublin: National Office of Clinical Audit.
Available from: https://a.storyblok.com/f/265949/x/c2723eb20a/participating-hospitals-in-nqais-nahm-by-health-region.pdf

National Office of Clinical Audit (2025a) *Irish National Audit of Stroke: National Report 2023*. Dublin: National Office of Clinical Audit.
Available from: https://d7g406zpx7bgk.cloudfront.net/x/6b5072d754/irish-national-audit-of-stroke-national-report-2023-finalv2.pdf [Accessed 27 March 2025].

National Office of Clinical Audit (2025b) *Tabular presentation of crude mortality NAHM Annual Report 2022 and 2023*.
Available from need new link when published

National Office of Clinical Audit (2025c) *Tabular presentation of SMR funnel plots NAHM Annual Report 2022 and 2023*.
Available from need new link when published

National Screening Service (2024) *Improving Equity in Screening: Action Plan 2024–2025.* Dublin: Health Service Executive.
Available from: https://assets.hse.ie/media/documents/Improving_Equity_in_Screening_Action_Plan_2024-2025.pdf [Accessed 1 April 2025].

Nguyen, H.L., Saczynski, J.S., Gore, J.M. and Goldberg, R.J. (2010) Age and sex differences in duration of prehospital delay in patients with acute myocardial infarction: a systematic review. *Circulation: Cardiovascular Quality and Outcomes*, 3(1), pp. 82-92. Available from: https://doi.org/10.1161/CIRCOUTCOMES.109.884361 [Accessed 21 May 2025].

Organisation for Economic Co-operation and Development (2023) *Health at a Glance 2023: OECD Indicators*. Paris: OECD Publishing.
Available from: https://doi.org/10.1787/7a7afb35-en [Accessed 11 November 2024].

Organisation for Economic Co-operation and Development/European Union (2018) *Health at a Glance: Europe 2018: State of Health in the EU Cycle*. Paris: OECD Publishing.
Available from: https://doi.org/10.1787/health_glance_eur-2018-en [Accessed 26 January 2023].

Oliver, S., Kavanagh, J., Caird, J., Lorenc, T., Oliver, K., Harden, A., Thomas, J., Greaves, A. and Oakley, A. (2008) *Health promotion, inequalities and young people's health: A systematic review of research*. London: EPPI-Centre, Social Science Research Unit, Institute of Education, University of London.
Available from: https://eppi.ioe.ac.uk/cms/Portals/0/PDF%20reviews%20and%20summaries/Inequalities%20Young%20People%20R2008Oliver.pdf [Accessed 19 November 2024].

Pappe, E., Hammerich, R., Saccomanno, J., Sgarbossa, T., Pohrt, A., Schmidt, B., Grah, C., Eisenmann, S., Holland, A., Eggeling, S., Stanzel, F., Witzenrath, M. and Hübner, R.-H. (2023) Impact of Coronavirus Disease 2019 on Hospital Admissions, Health Status, and Behavioral Changes of Patients with COPD. *Chronic Obstructive Pulmonary Diseases*, 10(3), pp. 211-223.
Available from: https://doi.org/10.15326/jcopdf.2022.0383 [Accessed 28 May 2025].

Pobal "n.d." The Pobal HP Deprivation Index, Available from: https://www.pobal.ie/pobal-hp-deprivation-index/ [Accessed 8 January 2025].

Public Health England (2019) *Older people who died in hospital: England 2017*. London: Public Health England.
Available from: https://www.gov.uk/government/publications/older-people-who-died-in-hospital-england-2017/older-people-who-died-in-hospital-england-2017#other-resources
[Accessed 9 January 2025].

Radhakrishnan, S.T., Perry, R., Misra, S., Ray, S., Ruban, A., Quayson, B.I., Fofaria, R., Hudovsky, A. and Williams, H.R.T. (2024) Targeted education for clinicians and clinical coding staff improves the accuracy of clinical coding: A quality improvement project. *Future Healthcare Journal*, 11(1), 100127.
Available from: https://doi.org/10.7861/fhj.2023-0021 [Accessed 5 September 2024].

Robards, J., Evandrou, M., Falkingham, J. and Vlachantoni, A. (2012) Marital status, health and mortality. *Maturitas*, 73(4), pp. 295-299.
Available from: https://doi.org/10.1016/j.maturitas.2012.08.007 [Accessed 18 November 2024].

Stevens, E., Emmett, E., Wang, Y., McKevitt, C. and Wolfe, C. (2017) *The Burden of Stroke in Europe: The challenge for policy makers.* London: Stroke Alliance for Europe. Available from: https://kclpure.kcl.ac.uk/portal/files/86248389/The_Burden_of_Stroke_in_Europe_Challenges_for_policy_makers.pdf [Accessed 27 March 2025].

Theocharidou, L. and Mulvey, M.R. (2018) The effect of deprivation on coronary heart disease mortality rate. *Bioscience Horizons: The International Journal of Student Research*, 11, hzy007.
Available from: https://doi.org/10.1093/biohorizons/hzy007 [Accessed 9 January 2025].

Tyris, J., Dwyer, G., Parikh, K., Gourishankar, A. and Patel, S. (2024) Geocoding and Geospatial Analysis: Transforming Addresses to Understand Communities and Health. *Hospital Pediatrics,* 14(6), pp. e292-e297. Available from: https://doi.org/10.1542/hpeds.2023-007383 [Accessed 5 September 2024].

UK Health Security Agency (2025) *Health inequalities in health protection report 2025*.
Available from: https://www.gov.uk/government/publications/health-inequalities-in-health-protection-report/health-inequalities-in-health-protection-report-2025 [Accessed 21 May 2025].

Wang, L. and Yi, Z. (2023) Marital status and all-cause mortality rate in older adults: a population-based prospective cohort study. *BMC Geriatrics*, 23(1), 214.
Available from: https://doi.org/10.1186/s12877-023-03880-8 [Accessed 18 November 2024].

World Health Organization (2017) *National health inequality monitoring: a step-by-step manual*. Geneva: World Health Organization.
Available from: https://iris.who.int/bitstream/handle/10665/255652/9789241512183-eng.pdf [Accessed 4 September 2024].

NOCA National Office of Clinical Audit

Phone: **+353 1 4028577**
Email: **nahm@noca.ie**

www.noca.ie