ESRI
RESEARCH SERIES
Number 213, May 2025

AN INSTITIÚID UM THAIGHDE EACNAMAÍOCHTA AGUS SÓISIALTA
ESRI ECONOMIC & SOCIAL RESEARCH INSTITUTE

Projections of national demand and bed capacity requirements for public acute hospitals in Ireland, 2023–2040: Based on the Hippocrates model

AOIFE BRICK, THEANO KAKOULIDOU AND HARRY HUMES

Projections of national demand and bed capacity requirements for public acute hospitals in Ireland, 2023–2040: Based on the Hippocrates model

Aoife Brick

Theano Kakoulidou

Harry Humes

May 2025

RESEARCH SERIES

NUMBER 213

Available to download from www.esri.ie

https://doi.org/10.26504/rs213

ABOUT THE ESRI

The Economic and Social Research Institute (ESRI) advances evidence-based policymaking that supports economic sustainability and social progress in Ireland. ESRI researchers apply the highest standards of academic excellence to challenges facing policymakers, focusing on ten areas of critical importance to 21st century Ireland.

The Institute was founded in 1960 by a group of senior civil servants led by Dr T.K. Whitaker, who identified the need for independent and in-depth research analysis. Since then, the Institute has remained committed to independent research and its work is free of any expressed ideology or political position. The Institute publishes all research reaching the appropriate academic standard, irrespective of its findings or who funds the research.

The ESRI is a company limited by guarantee, answerable to its members and governed by a Council, comprising up to 14 representatives drawn from a cross-section of ESRI members from academia, civil services, state agencies, businesses and civil society. Funding for the ESRI comes from research programmes supported by government departments and agencies, public bodies, competitive research programmes, membership fees and an annual grant-in-aid from the Department of Public Expenditure NDP Delivery and Reform.

Further information is available at www.esri.ie.

THE AUTHORS

Aoife Brick is a Senior Research Officer at the Economic and Social Research Institute (ESRI) and an Adjunct Associate Professor at Trinity College Dublin (TCD). Theano Kakoulidou is a Research Officer at the ESRI and an Adjunct Assistant Professor at TCD. Harry Humes was a Research Assistant at the ESRI when contributing to this work.

ACKNOWLEDGEMENTS

Financial support for this research was provided by the Department of Health. The authors thank the members of the Steering Group of the ESRI/Department of Health Research Programme in Healthcare Reform for their support, input and encouragement. The authors particularly thank Christopher Ryan, Terence Hynes and Ruth Gahan, of the Department of Health, for their assistance with this research project. In addition, staff at the Healthcare Pricing Office have provided substantial assistance in the provision of the acute hospital data which formed the basis of the analysis in the report. The authors are also grateful to the many officials of the Department of Health, Health Service Executive – particularly staff at HSE Business Intelligence Unit Acute, National Treatment Purchase Fund – who assisted with this research. Policymakers, data providers and stakeholders contributed important context and understanding to this research. The authors also acknowledge the contributions of colleagues at the ESRI. Valuable comments on the text and suggestions for revision were provided by three anonymous reviewers. We thank all those who provided contributions while acknowledging that the authors bear sole responsibility for the analyses and interpretations presented.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

FOREWORD

This report was prepared by researchers at the Economic and Social Research Institute (ESRI) for the Department of Health. The report is published as an ESRI Research Series report and is one of three reports that update projections of demand and capacity using the Hippocrates model. This report analyses demand for public acute hospital services in 2023 and projects demand and bed capacity requirements to 2040.

The Hippocrates model was developed at the ESRI under the Department of Health/ESRI Research Programme in Healthcare Reform. The Hippocrates model is a tool that can: inform health and social service planning in Ireland; inform financial planning for the healthcare system; inform planning for capacity, services and staffing; identify future demand pressures; and provide a framework in which to analyse the effects of potential system changes and reforms. The latest project was overseen by the Department of Health with input from the Health Service Executive (HSE).

The ESRI is responsible for the quality of this research, which has undergone peer review prior to publication. This report was prepared by Dr Aoife Brick, Dr Theano Kakoulidou and Harry Humes, and reflects their expertise and views. The views expressed in this report are not necessarily those of other ESRI researchers, the Minister for Health, Department of Health or organisations represented on the ESRI/Department of Health Research Programme Steering Group.

May 2025

ABBREVIATIONS AND ACRONYMS

ALOS	Average length of stay
AMAU	Acute medical assessment unit
CDM	Chronic disease management
COPD	Chronic obstructive pulmonary disease
COVID-19	Coronavirus disease
CSO	Central Statistics Office
DRG	Diagnosis-related group
DTOC	Delayed transfer of care
ED	Emergency department
ESRI	Economic and Social Research Institute
EU	European Union
GP	General practitioner
HIPE	Hospital In-Patient Enquiry scheme
HIQA	Health Information and Quality Authority
HPO	Healthcare Pricing Office
HR	HSE Health Region
HSE	Health Service Executive
HSE BIU	Health Service Executive Business Intelligence Unit
ICU	Intensive care unit
LOS	Length of stay
MDC	Major diagnostic category
NHS	National Health Service
NICE	National Institute for Health and Care Excellence
NTPF	National Treatment Purchase Fund
OECD	Organisation for Economic Co-operation and Development
OPD	Outpatient department
OR	Occupancy rate
PET	Patient experience time dataset
SAFER	National Standards for Safer Better Healthcare
SYOA	Single year of age
TILDA	The Irish Longitudinal Study on Ageing

EXECUTIVE SUMMARY

INTRODUCTION

Historic underinvestment, coupled with a growing and ageing population, has led to capacity constraints in public acute hospitals in Ireland. This is evidenced by ageing infrastructure, large waiting lists and long waiting times for elective treatment, as well as pressure on unscheduled care services and high inpatient occupancy rates (ORs). Due to the time and resources required to build new infrastructure, change service delivery models and provide the requisite levels of staffing, it is crucial that demand projection exercises are regularly undertaken to provide a medium- to long-term perspective on future requirements. Evidence-based capacity planning is essential to ensure safe and effective delivery of healthcare.

As part of the Department of Health/Economic and Social Research Institute (ESRI) Research Programme in Healthcare Reform, over the past ten years the ESRI has developed the Hippocrates projection model. Previous analyses have applied Hippocrates to provide medium- to long-term projections of healthcare demand, bed capacity, expenditure and workforce requirements. This recent work, completed under the healthcare reform programme, has used the model to provide up-to-date projections for three service areas – public acute hospitals, general practice and older people's services – to 2040. All care in public acute hospitals is considered in this report, regardless of whether it is publicly or privately financed.

Building on the existing modelling framework, the broad objectives of this report are to:

- provide updated base year activity profiles for *public acute hospital services* for 2023, incorporating new population projections based on Census 2022; and
- project demand (emergency department (ED) and outpatient department (OPD) attendances, day and inpatient discharges/bed days) and bed capacity (day and inpatient) requirements nationally to 2040.

Hippocrates projections are influenced by the model of service delivery, data availability and quality, as well as the policy environment in the base year. This analysis was conducted during a period of uncertainty in health services. Following a drop in activity rates for hospital services during the COVID-19 period, services have since experienced high levels of year-on-year volume growth. For some services, recent activity rates per 1,000 population have returned to pre-COVID-19 levels, while for others, rates are higher than pre-COVID-19. It is unclear if the current activity rates will persist, or if these changes are a post-COVID-19 recovery effect, or are potentially due to more comprehensive data collection.

Despite fluctuations in activity rates in recent years, previously published Hippocrates projections for admitted care, based on 2015 data, have proved to be a reliable guide to actual activity levels in 2023. However, it is acknowledged that projections should be regularly reviewed given ongoing changes in the data environment, service delivery models, including capacity expansion, and the introduction of the Health Service Executive (HSE) Health Regions. This is especially the case for outpatient services, where the data environment is particularly problematic and trends over time are difficult to accurately interpret.

METHODS

We use the Hippocrates model to project demand for four public acute hospital services in this report: ED attendances, OPD attendances, day patient discharges and inpatient discharges/bed days. We also estimate requirements for day and inpatient bed capacity.

The starting point for the modelling is to estimate activity rates in 2023 by age (single year of age (SYOA) for most services) and sex. Demand is projected by multiplying activity rates by projected population. Population projections to 2040 are provided by the ESRI's demographic model based on assumptions in relation to fertility, mortality and net migration. Demand in each projection year for day and inpatient services is then converted to bed capacity requirements by applying an OR.

Like previous Hippocrates analyses, this update must address uncertainty. Alternative projection scenarios, which vary assumptions related to population change, healthy ageing and a range of potential policy changes, are developed for each service. Assumptions are grouped to provide projections of demand and bed capacity under status quo, and low-pressure and high-pressure scenarios. We also define a 'progress' scenario, where we examine the effect of addressing important dimensions of the Sláintecare reforms, such as waiting list management, removing private practice from public hospitals and reducing potentially avoidable hospitalisations. In addition, we apply a range of occupancy rates across the scenarios – to both acknowledge uncertainty in the underlying data and model the impact of reaching a lower rate (e.g. 90% and 85%) by 2040. Further sensitivity analyses are undertaken to test the sensitivity of our projections to changes in key assumptions.

Importantly, the report does not forecast demand or capacity; rather it provides a medium- to long-term guide to requirements based on clear assumptions in relation to the evolution of key drivers of demand and capacity.

OVERVIEW OF FINDINGS

The population of Ireland is projected to increase from 5.3 million in 2023 to between 5.9 and 6.3 million people by 2040, with the proportion of those aged 65 and over projected to increase from 15 per cent to around 21 per cent. In this context, Table ES.1 presents the projected additional demand and bed capacity requirements in 2040 and associated growth rates. Average annual growth rates provide a guide to the smoothed level of growth required to meet 2040 demand and bed capacity requirements – year-on-year demand may vary. The lower and upper range of the projection scenarios are presented. We project significant growth requirements across all services, with the highest growth projected for inpatient bed days and beds. Inpatient bed requirements are projected to increase by between 4,400 and 6,800 by 2040; with an average annual growth of between 1.9 and 2.8 per cent.

TABLE ES.1 Base year demand and bed capacity and additional requirements, 2040

	2023	Projected additional requirements across scenarios (min – max)	
		2040	Average annual growth
	N ('000)	N ('000)	%
ED attendances	1,641	333–444	1.1–1.4
OPD attendances	4,563	950–1,298	1.1–1.5
Day patient			
Discharges	1,205	302–442	1.3–1.9
Inpatient			
Discharges	652	145–253	1.2–1.9
Bed days[a]	3,860	1,217–2,133	1.6–2.6
	N	N	%
Beds	**14,027**	**5,091–7,780**	**1.8–2.6**
Day patient	2,606	653–955	1.3–1.9
Inpatient[a]	11,421[b]	4,430–6,825	1.9–2.8

Notes: a Excludes AMAU sameday discharges.
b These are bed requirements in 2023 based on inpatient activity recorded in HIPE 2023 (excl. AMAU sameday) and the HSE BIU acute reported national occupancy rate for 2023.

Sources: PET, 2023; HSE Specialty Costing 2023, HSE BIU Acute 2023; HIPE, 2023; NTPF, 2024; ESRI population data, 2024; authors' calculations.

POLICY IMPLICATIONS

The main finding of this report is that, due to a growing and ageing population, demand and bed capacity requirements in public acute hospital services will significantly increase between now and 2040. While all projection exercises have an element of uncertainty, even the lower end of the projected requirements range will require a large increase in capacity. This necessitates substantial ongoing investment in infrastructure and staffing to meet this future demand and to address the consequences of past underinvestment, including large backlogs for elective care and high inpatient occupancy rates.

In addition to new capacity requirements, which are acknowledged in the Acute Hospital Inpatient Bed Capacity Expansion Plan, other initiatives will be important in trying to mitigate some of the demand pressure. Initiatives such as the new surgical hubs and elective-only hospitals should enhance efficiency and reduce waiting lists. Continued investment in primary, community and long-term care should lead to more patients being treated in more clinically appropriate settings, which in turn should lead to a reduction in hospital admissions or a shortening of hospital stays. However, it is too early to determine the impact of these measures.

The time lag inherent in the provision of new infrastructure and training/ recruitment of the additional staff required to operate services means that monitoring progress will be important to ensure that capacity will meet demand requirements in a timely manner. Significant improvement in the data landscape is an essential component of this effort. In particular, the lack of appropriate data regarding OPD attendance means that projections for that service area are less precise than for other areas. The rollout of the individual health identifier, improvements in the breadth and quality of the data collected, and the ability to follow the patient journey across the health system will enhance demand modelling and support effective planning. It is important that modelling is updated on an ongoing basis as new and improved data become available.

CHAPTER 1

Introduction

1.1 OVERVIEW

In 2023, there were over 1.8 million discharges from public acute hospitals and non-capital expenditure reached €9.3 billion across the totality of acute hospital activity (Department of Health, 2025a). With significant population growth and ageing projected (Bergin and Egan, 2024), Ireland is set to face increased demand for healthcare; this will mean higher expenditure and increased workforce requirements (Wren et al., 2017; Department of Health and PA Consulting, 2018; Keegan et al., 2020; Walsh et al., 2021; May et al., 2022; Connolly and Flanagan, 2024). Comprehensive and ongoing capacity planning is essential so that services can meet future requirements.

Historic underinvestment (Hennessy et al., 2021) has led to capacity constraints, as evidenced by ageing infrastructure (Shine and Hennessy, 2022), large waiting lists and long waiting times for elective treatment (Brick and Connolly, 2021). This is further compounded by significant pressure on unscheduled care services and high inpatient occupancy rates (OECD, 2023a). Several initiatives are underway to address these issues in the acute hospital setting and achieve the goals set out in Sláintecare, such as reducing waiting times and increasing capacity. These include the Acute Hospital Inpatient Bed Capacity Expansion Plan, the annual Waiting List Action Plan and the Urgent and Emergency Care Operational Plan (Department of Health, 2024a; HSE, 2024a; Department of Health, 2025b). However, significant time and resources are required to build new infrastructure (O'Connor, 2025), change service delivery models (e.g. reorientate care away from the acute hospital setting) and provide the requisite levels of staffing. This makes it crucial that demand projection exercises are undertaken regularly to provide a medium- to long-term perspective on future requirements to facilitate planning (Charlesworth et al., 2024).

With this medium- to long-term perspective in mind, the Hippocrates projection model has been developed over the past ten years at the Economic and Social Research Institute (ESRI). Funded through a joint research programme with the Department of Health, the model aims to assist policymakers in identifying demand pressures and to support future planning across the health service.[1] Previous analyses have applied Hippocrates to project healthcare demand, bed capacity, expenditure and workforce requirements (Wren et al., 2017; Keegan et al., 2020; Keegan et al., 2021; Walsh et al., 2021; Keegan et al., 2022; Connolly et

[1] Hippocrates was extended in 2022, as part of research funded by the HSE, to project national and regional workforce requirements for public acute hospitals (Keegan et al., 2022).

al., 2023; Connolly and Flanagan, 2024) for an expanding range of services. The model currently covers public and private acute hospitals, inpatient psychiatric services and primary, community and long-term care.

This is one of a series of new reports using the Hippocrates model to provide up-to-date projections for three service areas: public acute hospitals, general practice (Connolly et al., 2025) and older people's care (Walsh and Kakoulidou, 2025). Focusing on public acute hospitals, this report estimates national activity profiles for 2023 (base year) and provides medium- to long-term projections of service demand and bed capacity requirements to 2040.[2] These projections incorporate new ESRI population projections and an extended range of demand and capacity assumptions.

This analysis was conducted during a period of uncertainty in health services. Following a drop in activity rates for hospital services during the COVID-19 period (Table 1.1), services have experienced high levels of year-on-year volume growth. For some services, activity rates per 1,000 population have returned to pre-COVID-19 levels, while for others, rates are higher than pre-COVID-19. It is unclear if the current activity rates will persist or if these changes are a post-COVID-19 recovery effect, or are potentially due to more comprehensive data collection.

Previously published Hippocrates projections for public acute hospital services have proved to be a reliable guide to medium-term requirements. Using a 2015 base year, Wren et al. (2017) projections for day patients, inpatients and inpatient bed days in the closest scenarios were within 0.3 per cent, 3.0 per cent and 0.7 per cent deviations respectively, compared to the actual outturn in 2023.[3] As a medium-term projection tool, Hippocrates has performed well. However, uncertainty is always present. To account for this, we include a range of assumptions, scenarios and sensitivity checks. Given the significant changes in the healthcare system in recent years, projections are not necessarily 'once and done', but should be regularly reviewed considering new developments.

Importantly, the report does not forecast demand or capacity; rather, it provides medium- to long-term projections of requirements based on clear assumptions in relation to the evolution of key drivers of demand and capacity.

2 The year 2040 is the end year for the analysis to align with Project Ireland 2040, the Government's long-term development strategy. Project Ireland 2040 incorporates both the National Planning Framework and the National Development Plan. See https://www.gov.ie/en/department-of-public-expenditure-ndp-delivery-and-reform/campaigns/project-ireland-2040/.

3 We do not have data for ED or OPD to allow for an accurate comparison.

1.2 OBJECTIVES

Building on the existing modelling framework, the objectives of this report are to:

- provide updated activity profiles for emergency department (ED), outpatient (OPD) attendances,[4] and day patient and inpatient discharges/bed days for 2023 (base year), incorporating new ESRI population estimates based on Census 2022; and
- project demand (ED and OPD attendances, day and inpatient discharges/bed days) and bed capacity (day and inpatient) requirements nationally to 2040.

1.3 CONTEXT

The Hippocrates model uses activity profiles from a single base year as its starting point. The base year for this analysis is 2023, the most recent year for which all required data were available to the research team. The projections are based on how care was delivered in that year, given the resources and capacity available, as well as the accuracy and consistency with which details of that care was recorded. Trend analysis can be valuable to observe how activity levels and, importantly, activity rates change over time. For this reason, we examine trends in ED (including injury units) attendance volumes and rates, and day and inpatient discharge/bed day volumes and rates between 2019 and 2024 – the latter being the latest year for which provisional aggregate data were available for analysis.[5] These services have the most consistent data quality over time. Following a detailed examination of the data available regarding OPD attendance, it emerged that issues with data comparability over time do not allow for meaningful conclusions to be drawn on trends. Table 1.1 presents public acute hospital activity volume and rates per 1,000 population over the period by service.

Comparing activity from 2019 to 2024 (provisional), we find that although overall activity levels have increased for all services, rates per 1,000 population present a mixed picture.[6] ED attendances and day patient discharges have seen increases of 12.7 per cent and 2.7 per cent respectively. Conversely, inpatient discharges and bed days have decreased by 2.7 per cent and 1.2 per cent respectively. This highlights that different aspects of the system have developed differently over time, making it challenging to determine whether these differences are due to increased demand, changes in the data captured, or post-COVID-19 effects.

Emergency department attendances: The volume and rate of ED attendances fell in 2020 but surpassed pre-COVID-19 levels by 2022. The rate remained consistent

4 This includes attendances at injury units.
5 We were not able to use 2024 for the projections, since more detailed data are required.
6 The proportion of the population aged 65 and over – who are typically heavy users of the healthcare system – increased by 1.5 percentage points between 2019 and 2024 (from 14.1% to 15.6%). This demographic shift is expected to lead to a modest rise in activity rates, assuming all other factors remain constant.

between 2022 and 2023, with a significant increase reported for 2024. An examination of hospital level data shows that the latest increase is concentrated in a small number of hospitals, particularly injury units.

TABLE 1.1 Public acute hospital activity ('000) and activity rates per 1,000 population, 2019–2024

	2019	2020	2021	2022	2023	2024	% Δ 2019-24
	N (Rate)	N (Rate)	N (Rate)	N (Rate)	N (Rate)	N (Rate)	N% (Rate%)
ED attendances[a,b]	1,463 (295)	1,239 (246)	1,422 (280)	1,607 (310)	1,642 (311)	1,789 (332)	22.3 (12.7)
Day patient discharges[c]	1,119 (226)	929 (185)	1,026 (202)	1,123 (217)	1,205 (228)	1,247 (232)	11.5 (2.7)
Inpatient discharges	646 (130)	566 (113)	597 (118)	612 (118)	652 (123)	682 (127)	5.6 (-2.7)
Elective	90 (18)	69 (14)	71 (14)	76 (15)	86 (16)	86 (16)	-5.1 (-12.6)
Emergency	391 (79)	352 (70)	375 (74)	384 (74)	402 (76)	424 (79)	8.5 (0.0)
Maternity[d]	108 (90)	98 (80)	104 (85)	99 (79)	99 (78)	101 (78)	-6.4 (-12.8)
AMAU (sameday)	57 (12)	47 (9)	47 (9)	53 (10)	65 (12)	71 (13)	24.5 (14.7)
Inpatient bed days	3,675 (730)	3,237 (634)	3,401 (661)	3,701 (704)	3,926 (731)	3,948 (721)	7.4 (-1.2)
Elective	532 (107)	434 (86)	433 (85)	460 (89)	511 (97)	499 (93)	-6.1 (-13.4)
Emergency	2,799 (564)	2,510 (499)	2,657 (524)	2,939 (567)	3,095 (586)	3,118 (580)	11.4 (2.7)
Maternity	288 (239)	247 (203)	264 (216)	249 (200)	254 (200)	260 (201)	-9.8 (-16.0)

Notes: The data presented are those used in Hippocrates and may vary slightly from published figures; an explanation of the data and methods can be found in Chapter 3.
a Includes injury units.
b An examination of hospital level data shows that the increase between 2023 and 2024 is concentrated in a small number of hospitals, particularly injury units.
c Includes maternity day patients.
d Maternity rates per 1,000 population are calculated from the female population aged 15–49 years.

Sources: PET 2019–2024; Injury units 2019–2024; HIPE, 2019–2024; CSO population data, 2019–2024; authors' calculations. HIPE data for 2024 are provisional (February 2025).

Day patient discharges: The volume and rate of day patient discharges fell between 2019 and 2020, with COVID-19 having a substantial impact on activity. A recovery in discharge volumes was observed in the following years, with 2023 seeing a higher volume and rate per 1,000 population than 2019. The increase in the rate per 1,000 was much lower than the increase in the volume over time (2.7% and 11.5% respectively) implying much of the growth has been due to population growth.

Elective inpatient discharges: Volumes and rates per 1,000 population experienced the largest fall (24%) and slowest recovery of the admitted services between 2019 and 2020, with both remaining lower than pre-COVID-19 levels in 2024. The lower figure in 2022 was partially offset by activity outsourced to private hospitals under the Safety Net Agreement.[7] This amounted to about 18,500 day patients and 7,000 elective inpatients; this activity is not included in the figures presented.[8] Activity outsourced to private hospitals in 2023 was substantially lower, at 1,800 day patients and 1,600 inpatients.[9] In 2024, the discharge rate remained 12.6 per cent below the 2019 rate. It is worth noting that these data do not capture activity in

7 The Safety Net Agreement was introduced as a COVID-19 response measure to increase capacity by accessing private treatment in the private system. For more information see https://www.hse.ie/eng/about/personalpq/pq/2022-pq-responses/march-2022/pq-11193-22-david-cullinane.pdf.

8 Personal communication from HPO, February 2024.

9 Personal communication from HPO, June 2024.

private hospitals, where there may be a growing number of patients who were previously treated in public hospitals.

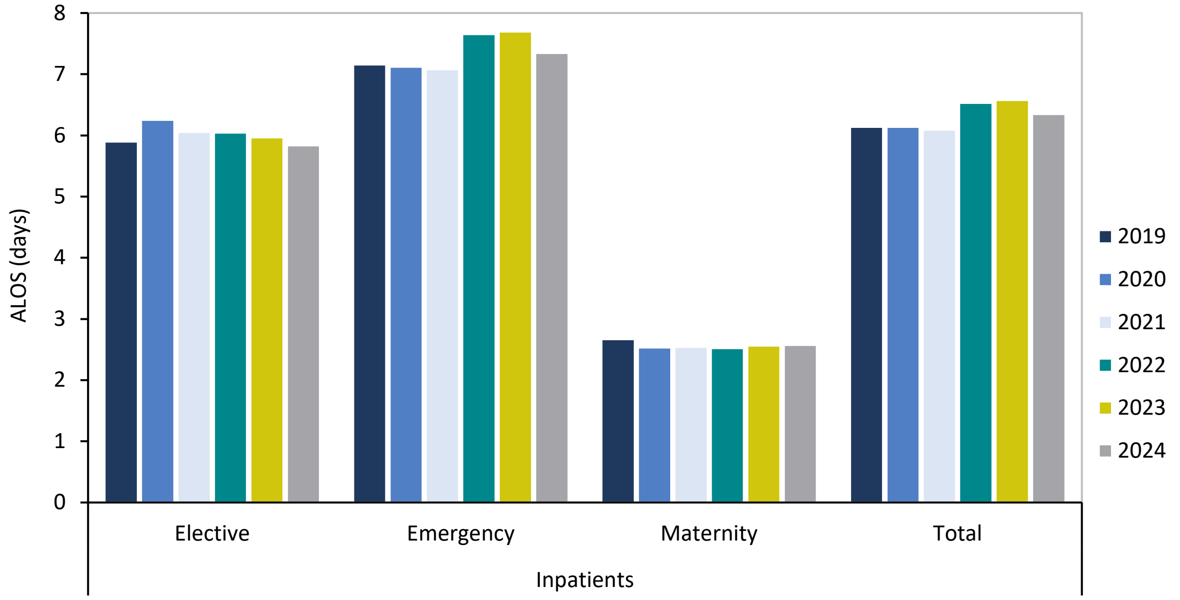
Emergency inpatient discharges: While there was also a decrease in the emergency inpatient discharge rate between 2019 and 2020 (10%), it was less than that observed for elective inpatients. The number of emergency discharges increased by 8.5 per cent since 2019, but the discharge rate per 1,000 population in 2024 was the same as it was in 2019.

Maternity inpatient discharges: In line with the number of births, maternity discharges and discharge rates fell over the period.[10]

Inpatient bed days: The number of inpatient bed days increased by 7.4 per cent between 2019 and 2024, but the bed day rate per 1,000 population decreased by 1.2 per cent. This is driven by the decrease in elective and maternity bed days. Emergency inpatient bed days increased by 11.4 per cent over the period, with a 2.7 per cent increase in the bed day rate.

Inpatient average length of stay (ALOS): Figure 1.1 presents the ALOS by patient type. While ALOS for elective and maternity patients was relatively stable over the period, this was not the case for emergency inpatients. While emergency inpatient ALOS was not impacted in 2020–2021, a significant increase in ALOS was observed in 2022 (from 7.1 to 7.7 days), which remained in 2023. Provisional data for 2024 show that this reduced significantly in that year (down to 7.3 days), again demonstrating the volatility of metrics in the short term.

FIGURE 1.1 Inpatient average length of stay, 2019–2024



Notes: Excludes AMAU sameday discharges.
In this analysis, inpatient bed days are standardised such that the minimum stay is equal to one (including sameday inpatients).
Source: HIPE, 2019–2024; authors' calculations. HIPE data for 2024 are provisional (February 2025).

10 CSO population estimates (persons in April); see https://data.cso.ie/table/PEA01.

1.4 OVERVIEW OF THE IRISH ACUTE HOSPITAL SYSTEM

The Irish acute hospital system is situated within a complex healthcare system, which has a mixture of public and private ownership, delivery and financing, and many eligibility categories governing access to care. Several entities have a role in the design, delivery and monitoring of public acute hospital services. The functions of the Department of Health include: providing strategic leadership and policy direction for the Irish healthcare system; undertaking effective governance and performance oversight; and collaborating to ensure that health priorities are achieved (Department of Health, 2023b). The Health Service Executive (HSE) manages and delivers, or arranges to be delivered on its behalf, public health and social care services (HSE, 2021a). The Healthcare Pricing Office (HPO) sits within the National Finance and Procurement Division of the HSE and is responsible for the management of activity-based funding in Irish public acute hospitals. It is also responsible for the management of four key Irish healthcare datasets – the Hospital In-Patient Enquiry (HIPE) scheme, the National Perinatal Reporting System, Specialty Costing Data, and Patient Level Costing Data (HPO, 2022). The Health Information and Quality Authority (HIQA) is an independent authority established with a statutory role to set and monitor compliance with national standards (National Standards for Safer Better Healthcare) for the quality and safety of Irish health and social care services (HIQA, 2024). The National Treatment Purchase Fund (NTPF) is an independent statutory body; its key functions relating to public acute hospitals are the collection, collation and validation of information on those waiting for public hospital treatment, and the purchase of treatments for individual patients with the target of reducing waiting list numbers (NTPF, 2022).

Hospitals in Ireland may have statutory, voluntary or private (for profit) ownership. Statutory hospitals are owned and funded by the HSE. Voluntary hospitals, usually established by religious organisations or independent boards, are primarily state funded. Many of the largest acute hospitals are owned by voluntary organisations. In this report, statutory and voluntary hospitals are collectively referred to as public acute hospitals. Privately financed acute care (private health insurers or out-of-pocket payments) is provided in both public and private hospitals. All care in public acute hospitals is considered in this report regardless of whether it is publicly or privately financed.[11] Private hospitals are not in scope for this report.

Eligibility for public acute hospital services is based on ordinary residence. Residents are entitled to services either free or at reduced cost. Medical card holders receive full eligibility, while non-medical card holders must pay for self-referred ED and injury unit attendances. There are no charges for public day

11 'Public/private status refers to whether the patient saw the consultant on a public or private basis. It does not relate to the type of bed occupied nor is it an indicator of private health insurance' (HPO, 2023, p. 12).

patient or inpatient care.[12] Private patients receiving care in public acute hospitals are liable for a per diem room/day case charge and must pay for consultant services. These charges may be paid out of pocket or through private health insurance. In 2023, 30.5 per cent of the population had a medical card and 45 per cent were covered by private health insurance (Department of Health, 2025a).

In this report, we analyse activity in the 49 public acute hospitals in Ireland, all of which participated in the HIPE scheme in 2023.[13] Public acute hospitals in Ireland may differ in the care they provide: 37 hospitals are categorised as *Model 2*, *Model 3* or *Model 4*.[14] The 11 *Model 2* hospitals cater to lower-risk patients; they do not have an ED or intensive care unit (ICU). Many provide a wide range of diagnostic services, but not all offer surgical care. The 17 *Model 3* hospitals provide a broad range of acute services on a 24/7 basis, including critical care. Nine *Model 4* hospitals are tertiary referral centres; some provide supra-regional care with an extensive range of services and can cater for the most complex cases (HSE NDTP, 2024). The remaining hospitals include: three paediatric hospitals, which offer care exclusively to children and younger people; four standalone maternity hospitals, which primarily provide maternity and neonatal care; and five specialist hospitals (e.g. orthopaedic). This report presents findings for four primary forms of public acute hospital activity: ED and OPD attendances, day patient discharges and inpatient discharges (bed days).

The delivery of hospital services is currently emerging from a period of organisational change. From 2013, hospital services were organised around seven Hospital Groups (Higgins, 2013). This structure aimed to address the challenges in planning and financial accountability at the regional level, which arose following the abolition of the health boards and the establishment of the centralised HSE in 2004/2005 (Government of Ireland, 2019). However, organising acute service delivery around these Hospital Groups created issues in relation to population-based health planning. Specifically, Hospital Groups were not aligned with the nine geographical catchment areas for community care delivery, the Community Health Organisations. In fact, Hospital Groups were developed without any geographical boundaries or catchments to organise care delivery (Government of Ireland, 2019).

To address this issue and enable an integrated approach to service planning and care delivery, the Sláintecare report called for the establishment of regional healthcare bodies (Houses of the Oireachtas Committee on the Future of Healthcare, 2017), based on the alignment of Hospital Groups and Community

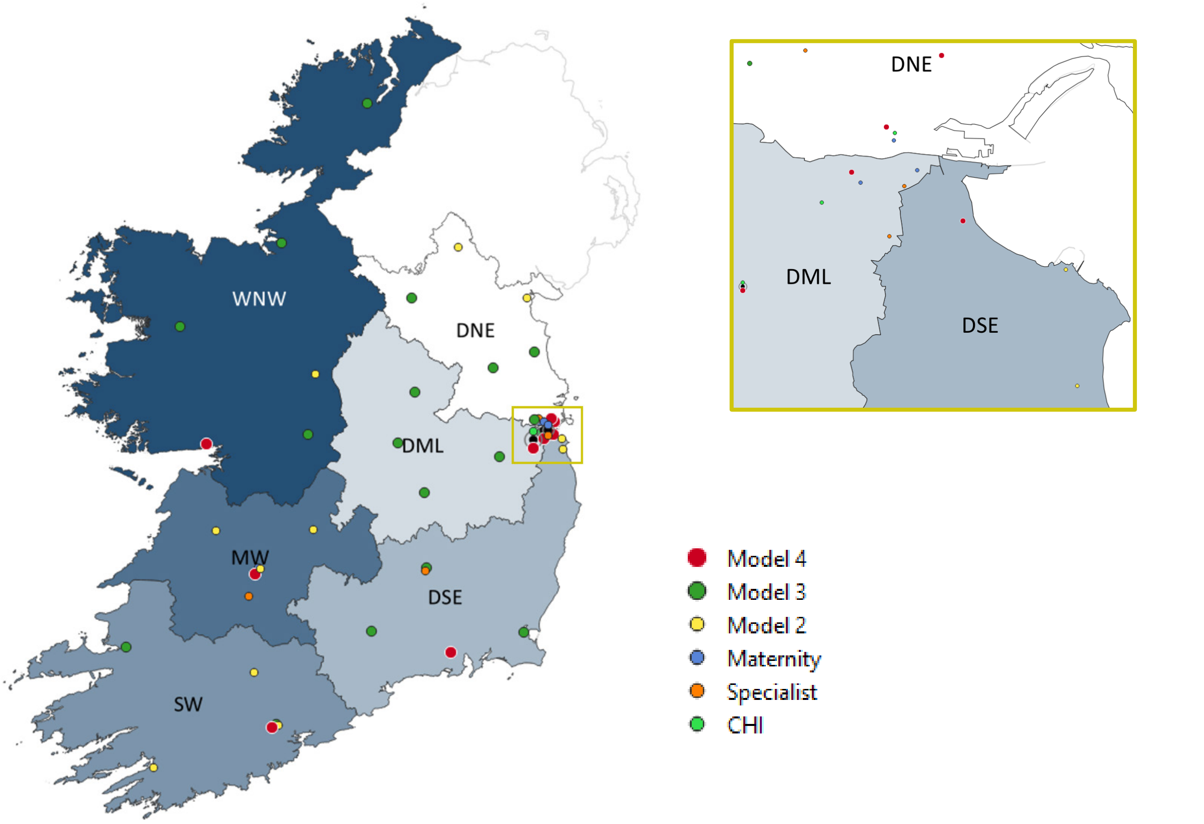
12 Public inpatient fees were abolished on 17 April 2023. See https://www.hse.ie/eng/about/who/acute-hospitals-division/patient-care/hospital-charges.

13 See Appendix A for a full list of included hospitals.

14 Model 1 hospitals are community and/or district hospitals and do not have surgery, emergency care, acute medicine (other than for a select group of low-risk patients) or critical care. They are not included in this analysis.

Health Organisation structures. The delivery of acute and non-acute services around the country is now organised around six HSE Health Regions, each with defined geographic boundaries (Figure 1.2) (HSE, 2023b). For acute services, these boundaries were informed by the extent to which hospitals in a region serve patients who live in that region. Each of the six regions is led by a regional executive officer who reports directly to the chief executive officer. Each region has its own budget and is responsible for local decision-making, including the coordination and delivery of care.

FIGURE 1.2 Map of public acute hospitals in Ireland, 2023

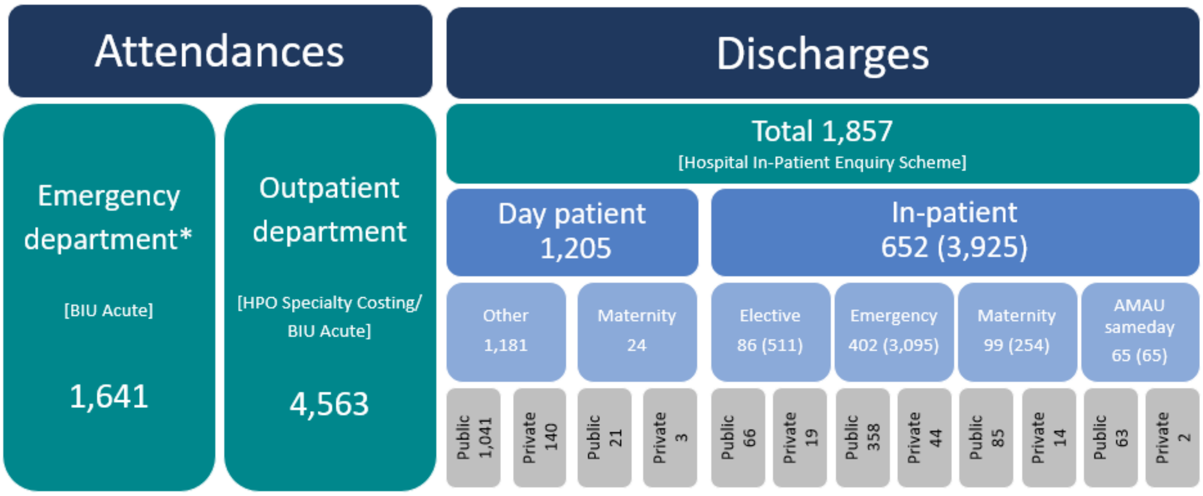


Note: CHI=Children's Health Ireland.

1.5 ACTIVITY IN IRISH ACUTE HOSPITALS, 2023

The development of projections first requires a detailed picture of the services provided in Irish public acute hospitals in 2023. Figure 1.3 summarises the services analysed in this report. In 2023, there were 1.64 million attendances at EDs and injury units, and an estimated 4.56 million OPD attendances. The number of day and inpatient discharges reported to HIPE surpassed 1.86 million for the first time in 2023. Day patient activity accounted for 65 per cent of total discharges, while inpatient activity for 35 per cent. Most inpatient activity related to emergency care (62%), followed by elective care (13%), maternity care (15%), and those admitted to and discharged from an acute medical assessment unit (AMAU) on the same day (10%). Across day-patient and inpatient services, most activity related to public (as opposed to private)[11] discharges (88%).

FIGURE 1.3 Activity ('000) in public acute hospitals, 2023



Notes: Data source in brackets and bed days in parentheses.
* Includes injury unit attendances.
Sources: HSE BIU Acute, 2023; HPO Specialty Costing 2023; HIPE, 2023; authors' calculations.

1.6 MODEL SCOPE AND MODELLING APPROACH

The Hippocrates model has been designed to be broad in scope. The first report by Wren et al. (2017), which projected demand from 2015 to 2030, included a broad range of health and social care services (acute hospital, primary, community and long-term care), as well as public and private services (including private hospitals and privately purchased general practitioner (GP) visits, home support hours and other non-acute care services). This report focuses on public acute hospitals, providing updated national activity profiles (2023) and revised projected demand and capacity requirements to 2040. Separate analyses provide projections of demand and capacity for general practice and older people's care (Connolly et al., 2025; Walsh and Kakoulidou, 2025).

Hippocrates has been developed as a macro-simulation model. Macro-simulation models, or cell-based models, represent a significant class of component-based models, which group individuals into cells according to key attributes, such as age and sex, and project from that basis. The model is bottom-up in nature; capacity projections are developed from a demand base in 2023. We model demand projections primarily based on projected demographic changes and assumptions about the relationship between life-year gains and healthcare use. Projected demand for admitted care is then converted to bed capacity requirements by applying occupancy rates.

Since any projection exercise must address uncertainty, alternative projection scenarios are developed for each service analysed, and sensitivity analyses are undertaken to test the sensitivity of our projections to changes in key assumptions. The alternative demand and capacity projection scenarios vary assumptions related to population change, healthy ageing and occupancy rates. Assumptions are grouped to provide projections of demand and capacity under status quo, and low-pressure and high-pressure scenarios.[15]

Similar to previous analyses using Hippocrates, we also define a 'progress' scenario where we examine the effect of addressing important dimensions of the Sláintecare reforms – such as waiting list management and a reduction in potentially avoidable hospitalisations, which remain policy priorities (Government of Ireland, 2023; Department of Health, 2025b).

The report uses version 6 of the Hippocrates model and is automated using R programming language, with subsidiary analysis undertaken in SPSS and Microsoft Excel.

1.7 STRUCTURE OF THE REPORT

The remainder of the report is structured as follows:

- Chapter 2 provides the background to the analysis. It examines the drivers of healthcare demand and capacity along with Irish and international evidence supporting the Hippocrates assumptions.
- Chapter 3 describes the Hippocrates modelling methodology, projection scenarios and data sources.
- Chapter 4 presents findings for our analysis of activity in 2023 by service.
- Chapter 5 presents projected public acute hospital demand and bed capacity requirements to 2040.
- Finally, Chapter 6, which concludes, provides sensitivity analyses on the findings by varying the main assumptions. It summarises and discusses the findings presented in the report. The chapter also presents policy implications arising from the analysis.

15 The high-pressure scenario also includes an additional assumption on waiting list management.

CHAPTER 2

Background

2.1 INTRODUCTION

This chapter provides the background and evidence that informs the development of the Hippocrates projection modelling framework described in Chapter 3. As much of the evidence has been covered extensively in previous Hippocrates reports and academic papers (Wren et al., 2017; Keegan et al., 2018; Keegan et al., 2020; Keegan et al., 2021; Keegan et al., 2022), here we summarise the main issues relating to the drivers of acute hospital services demand and capacity, and update based on the latest available evidence.

2.2 DRIVERS OF HEALTHCARE DEMAND

The factors driving the demand for healthcare services can be split into three categories: demographic drivers, such as the relationships between population growth and ageing, and health and ageing; non-demographic drivers including income and technology; and policy drivers, such as the enhancement of primary care, the removal of private activity from public hospitals and the management of waiting lists.

2.2.1 Demographic and non-demographic drivers

A range of demographic and non-demographic drivers will directly influence future demand for healthcare services.[16] Population size, structure and health (healthy ageing) are the main demographic factors that influence healthcare demand. For example, an increase in the proportion of older adults in the population is expected to raise the demand for health services (Wren et al., 2017; Brick and Keegan, 2020b; European Commission, 2024; Shine and Hennessy, 2024).

While an increase in life expectancy is expected to increase demand for health services, the health status of individuals during these additional years is crucial in determining the demand for health services. On this point, three alternative hypotheses have been proposed in the literature and summarised by Przywara (2010): *expansion of morbidity*; *dynamic equilibrium*; and *compression of morbidity* (Figure 2.1).

Expansion of morbidity takes the most pessimistic view and assumes that any additional life years gained over the projection horizon are spent in poor health; it

[16] This is described in detail in previous Hippocrates reports (Wren et al., 2017; Keegan et al., 2020; Walsh et al., 2021).

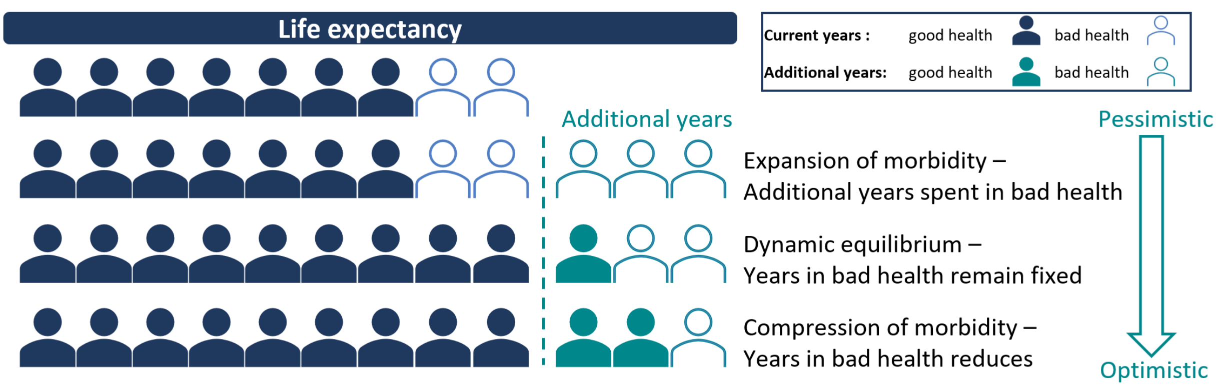
is modelled by holding activity rates constant over the projection horizon. This is an 'as is' assumption and is applied in the status quo scenario.

Dynamic equilibrium assumes that increasing life expectancy is accompanied by a reduction in disability and the severity of the consequences of chronic diseases, due to advances in medical technology. It is modelled such that for every one-year increase in life expectancy, the associated age-specific activity rate profile shifts back one age year. For example, if life expectancy increases by one year between 2023 and 2040, the care demanded by an 85 year old in 2040 will be the same as that demanded by an 84 year old in 2023.

Compression of morbidity takes the most optimistic view by assuming that the number of years spent in poor health reduces. It is modelled by assuming the gain in health status exceeds the gain in life expectancy by 50 per cent.

A fourth assumption, *moderate healthy ageing,* employed in previous Hippocrates modelling, models gains in health set at 50 per cent of the gain in life expectancy. Past European Union (EU) ageing reports (European Commission, 2017; 2020) used this in their sensitivity analyses, while the most recent report incorporates it in their main projections (European Commission, 2024). Conversely, studies for the UK and Ireland indicate an increase in the years spent in poor health, especially for people living longer with chronic diseases and major illness (Rocks et al., 2021; May et al., 2022; Kallestrup-Lamb et al., 2024; May et al., 2024). For example, Watt et al. (2023) project a 37 per cent increase in the number of people living with major illness in the UK between 2019 to 2040, whereas May et al. (2024) project a 70 per cent increase in the number of older people with serious illness in Ireland from 2020 to 2040.

FIGURE 2.1 Health and ageing hypotheses



Source: Author illustration from summary presented in Przywara (2010).

The lack of consensus on which theory is consistent with past trends suggests that projections should focus on the hypotheses most closely aligned with the service under consideration. In addition, there is a lack of evidence on which theory may apply in the Irish context. In Wren et al. (2017), the *dynamic equilibrium* scenario was applied in the case of public acute hospital activity demand projections,[17] while more recently a combination of *moderate healthy ageing* and *dynamic equilibrium* has been applied across scenarios (Keegan et al., 2020; Keegan et al., 2022).

Several non-demographic drivers of healthcare demand have been highlighted by research (Keegan et al., 2020), with national income and technological change being among the most crucial. Higher levels of national income are associated with increased demand for health services (Charlesworth and Johnson, 2018), though the impact of technological change is less clear. While advancements in technology can enhance the effectiveness and productivity of the healthcare system, they can also expand the range of treatable conditions, thereby increasing demand (Socha-Dietrich, 2021).

Recently, the impact of climate change has been acknowledged as a potential driver of healthcare demand. There are several ways in which this might manifest, including a rise in climate-related health conditions such as respiratory illnesses, heat-related illnesses, and cardiovascular or lung diseases (Duffy et al., 2024; European Commission, 2024). With the currently available data, it is not possible to explicitly model the impact of climate change in Hippocrates (independently of existing assumptions), but the issue will be kept under review for future iterations of the model.

2.2.2 Policy drivers

The Sláintecare report recommends extensive policy reforms, including shifting the focus of care delivery from a hospital-centric system to one in which there is greater emphasis on primary and community care (Houses of the Oireachtas Committee on the Future of Healthcare, 2017). The introduction of universal general practitioner (GP) care might increase primary care demand, while potentially decreasing demand for acute care, either due to early detention and intervention or timely treatment outside of hospitals (Keegan et al., 2020). Additionally, recommendations to move private activity out of public hospitals are, if implemented, expected to lower public acute care demand (Keegan et al., 2021). On the other hand, the target waiting times of 10 weeks for outpatient department (OPD) appointments and 12 weeks for admitted treatment[18] are linked to increased demand, mostly in the early years of implementation due to the required

17 No healthy ageing (*expansion of morbidity* scenario) is also used for the status quo scenario.
18 See https://www.hse.ie/eng/about/who/acute-hospitals-division/waiting-list-action-plans/.

reduction in the existing backlog (Brick and Keegan, 2020a). Finally, achieving target rates for performing surgeries as day cases is expected to make hospitals more efficient (HSE et al., 2011), but the impact on bed capacity is expected to be minimal as inpatient activity is moved to day beds. The sections below describe the policy options in detail, including changes to models of care and their expected impact on healthcare demand.

Potentially avoidable hospitalisations

A key component of the Sláintecare reform proposals concerns a 'shift to the left' or 'right care, in the right place, at the right time' (Government of Ireland, 2021) – ultimately a reorientation of service delivery towards general practice and community-based services to provide care closer to people's homes and reduce pressure on acute hospitals.

The Health Service Executive (HSE) has recently established the Enhanced Community Care Programme to increase community healthcare services and reduce pressures on hospital services. Its key component is the Chronic Disease Management (CDM) Programme introduced in 2020, which is aimed at preventing and managing chronic diseases (type 2 diabetes, asthma, chronic obstructive pulmonary disease (COPD), cardiovascular disease) within general practice and which is available to adult GP visit card and medical card holders. From the start of the programme, and until the end of 2023, 400,000 individuals were enrolled in the treatment programme, giving an overall uptake rate of 80 per cent.[19] Additionally, in 2023, 120,000 assessments were conducted for patients with an undiagnosed chronic disease or who were found to be at the risk of developing one.[20] The HSE reports that 91 per cent of chronic disease patients enrolled in the CDM Programme are now routinely managed in primary care (HSE, 2023a). It has also been reported that a 16 per cent reduction in chronic disease admissions per 100,000 population was observed between 2019 and 2023 compared to a 3.5 per cent reduction in all other medical admissions, possibly due in part to the impact of the CDM Programme (HSE, 2024c).

It is, however, too early to determine the impact of the programme on hospital activity. A systematic review of international studies found that in three out of four identified studies, enhanced chronic disease management in primary care was associated with decreased use of hospital services (Alyousef et al., 2022). For example, a study from Estonia found that shifting chronic disease management from hospital to primary care increased primary care use and decreased inpatient admissions, although this decrease was not consistent across all disease groups or patients (Atun et al., 2016). While the shift to CDM consultations was positive for

19 Personal communication with the HSE.
20 For more details on CDMP see Connolly et al. (2025).

patients with diabetes, hypertension, COPD and ischaemic heart disease, this was not the case for heart failure, for which inpatient admission rates increased.

Another aspect to consider is the role of potentially avoidable hospitalisations in current hospital care delivery. These relate to conditions where the need for secondary care is reduced or prevented by timely and appropriate ambulatory or primary care. International evidence reviews have highlighted associations between rates of avoidable hospitalisation and primary care accessibility and quality (Gibson et al., 2013; Rosano et al., 2013; van Loenen et al., 2014; Rosano et al., 2016; van Loenen et al., 2016). In an Irish context, McDarby and Smyth (2019) and Kakoulidou et al. (forthcoming) have identified a number of conditions currently treated in hospital for which evidence exists regarding appropriate treatment or prevention outside hospital, both for adults and children. These should thus be considered as areas for priority primary care investment. Keegan et al. (2020) showed that, in 2018, the three most common potentially avoidable hospital conditions (vaccine-preventable influenza and pneumonia, COPD and urinary tract infections) accounted for over 600,000 inpatient bed days, amounting to over €400 million in expenditure (excluding any emergency department (ED) related costs).

Private activity out of public hospitals

One of the recommendations of the Sláintecare report is the removal of private activity from public hospitals to increase capacity to treat public patients (Houses of the Oireachtas Committee on the Future of Healthcare, 2017). In most OECD countries, although doctors are allowed to treat both public and private patients, private patients are treated in completely separate facilities (Mueller and Socha-Dietrich, 2020). One of the main arguments for removing the private activity is to ensure equal provision of services to all patients, irrespective of their insurance status. Studies for Australia have shown that private patients spend more time in intensive care units (ICUs) and receive more procedures than comparable public patients (Shmueli and Savage, 2014). Additionally, it has been found internationally that public patients wait substantially longer for procedures undertaken in public hospitals compared to private patients (Australian Institute for Health and Welfare, 2017). Unfortunately, given the currently available data, it is not possible to check if this is the case in the Irish context (Brick and Connolly, 2021). However, as suggested in the report of the Independent Review Group established to examine private activity in public hospitals (Independent Review Group, 2019), private patients in public hospitals admitted through emergency departments, belonging to particular specialities (e.g. obstetrics, paediatrics) or having high levels of complexity are likely to remain within the public system over the medium term due to the lack of comparable alternative provision within private hospitals. Given these limitations, Keegan et al. (2021) estimated that such reform is expected to have limited capacity benefits.

Waiting list management

Waiting lists are a feature of healthcare systems, formed when the demand for elective services outstrips supply. The length of time patients are waiting for treatment, rather than the size of the waiting list, is a key performance metric across health systems (OECD, 2020). The consequences of waiting for patient health and quality of life have been documented extensively, including in the Irish context (Connolly, 2019). There are several reasons why waiting lists, and in particular long waiting times, might arise: there may not be enough capacity in the system (e.g. beds or staff), or the system may be operating inefficiently.

For several decades, the Irish healthcare system has had the challenge of managing increasingly larger waiting lists and longer waiting times for elective services. Managing waiting times was further exacerbated by the cancellation of all but urgent elective treatment during the COVID-19 pandemic. While this situation arose in many countries over that period (OECD, 2023b), pre-pandemic accumulated backlogs in Ireland exacerbated the issue. Data on waiting lists in Ireland (see Appendix B) show that even before the onset of COVID-19, the system was struggling to control this problem. There were high patient volumes overall and the proportion of patients waiting for longer than 12 weeks was high, particularly for OPD services. The increase in the accumulated backlog for OPD services gave a false impression that progress was being made on the clearance of day and inpatient waiting lists, but this accumulation was stemming the flow of additions to the admitted care lists. Recent data have shown that as OPD backlogs (patients waiting more than 12 weeks) are being cleared, additions to the day and inpatient lists are increasing. It is encouraging, however, that while the total size of the day and inpatient lists are increasing, the backlog is relatively stable.

Many countries have introduced policies to reduce waiting times; such policies often include setting maximum waiting time targets and guarantees (Mueller and Socha-Dietrich, 2020; OECD, 2020; 2023b), the effectiveness of which has been questioned (Siciliani et al., 2013). In Ireland, the Sláintecare implementation strategy proposed a target waiting time of 10 weeks for OPD appointments and 12 weeks for day and inpatient treatment (Houses of the Oireachtas Committee on the Future of Healthcare, 2017). These targets, reiterated in the current Programme for Government, remain ambitious given the scale of current lists (Department of the Taoiseach, 2025). A Waiting List Action Plan has been published annually since 2021 in an effort to take a multi-annual approach to tackling waiting lists. The plan outlines annual and multiannual targets to be achieved through delivering capacity, reforming scheduled care and enabling scheduled care reform (Department of Health, 2025b). Accounting for this unmet demand in future projections of demand, capacity, workforce and expenditure is essential (Keegan et al., 2020; Rocks et al., 2021; Keegan et al., 2022).

2.3 HEALTHCARE CAPACITY FACTORS

Healthcare capacity within the hospital system is primary influenced by two factors: hospital bed occupancy rates (ORs) and average length of stay (ALOS). International guidelines typically reference a target of 85 per cent for inpatient OR, which is associated with a decreased risk of adverse patient outcomes and lower infection rates. Lowering ALOS by investing in short-term non-acute care (step-down services), long-term residential care and home support services can also enhance acute hospital efficiency.

2.3.1 Occupancy rate

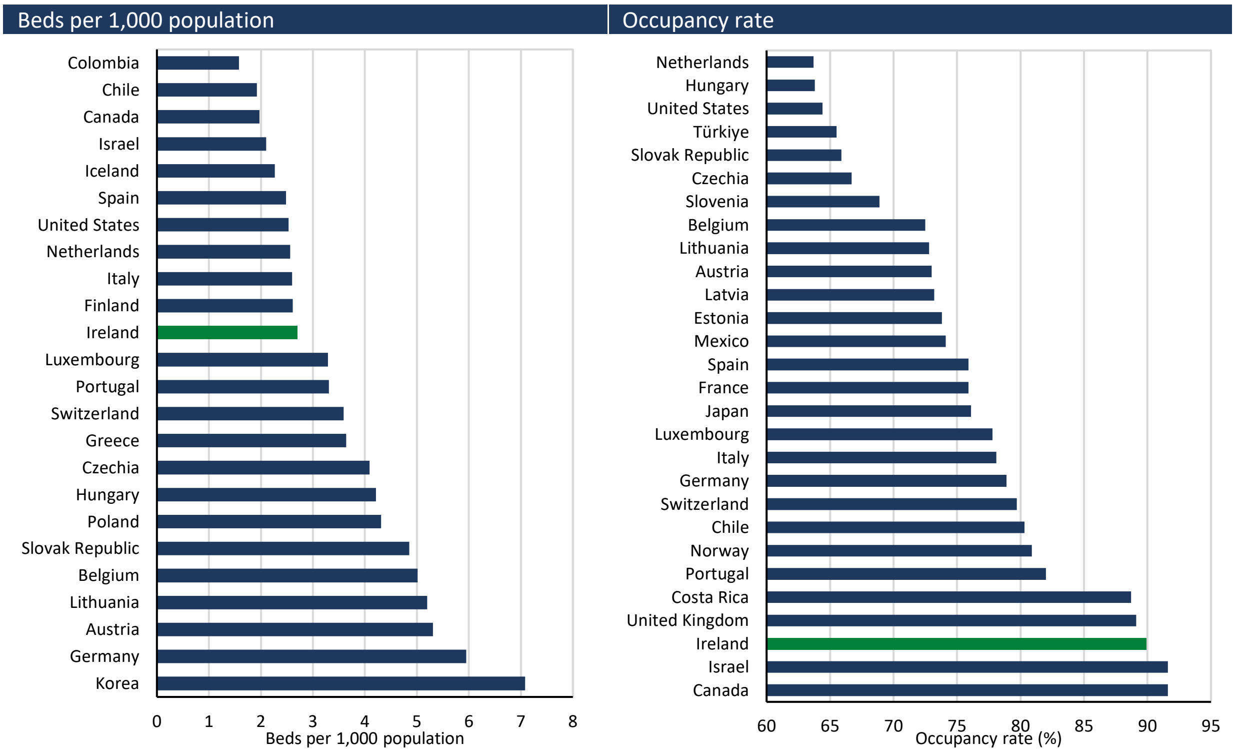
Hospital bed management plays a pivotal role in ensuring quality patient care, efficient resource utilisation and operational effectiveness in healthcare facilities. With escalating healthcare expenditure globally, measuring hospital efficiency has garnered significant attention from researchers. The COVID-19 pandemic emphasised the need for adaptable bed utilisation to address sudden surges in, for example, intensive care demand.

The optimal balance between occupancy and available beds is influenced by various factors, including patient demand, hospital capacity, staffing levels and clinical outcomes. In 2019, Ireland reported 2.9 hospital beds per 1,000 population, compared to the OECD average of 4.4 (Figure 2.2).[21] Furthermore, public hospitals in Ireland are currently operating at close to full capacity. Figure 2.2 shows that Ireland had one of the highest bed ORs (89.9%) across 27 OECD countries in 2019, far exceeding the OECD average of 76.3 per cent. Following a consistent trend in recent years (Keegan et al., 2018; Walsh and Brick, 2023), these indicators highlight Ireland's lower bed capacity compared to international comparators.

High bed ORs are linked to the spread of drug-resistant infections, risks to the well-being of hospital staff and higher patient mortality rates (Boden et al., 2016; Findlay, 2019; Bosque-Mercader and Siciliani, 2023). An OR of 85 per cent is often referenced as optimal (De Bruin et al., 2010; National Audit Office, 2013), above which health systems are considered a risk to patient safety (Bagust et al., 1999; Ravaghi et al., 2020). Recent papers, however, question the suitability of a national 85 per cent target, citing hospital-specific factors such as size or specialisation-dependent risk (NICE, 2018; Findlay, 2019; Proudlove, 2020). Findlay (2019) argues that an 87 per cent OR for all general and acute beds might be more appropriate for the UK. This rate is also used by the Health Foundation in their recent bed capacity projections (Rachet-Jacquet et al., 2023), whereas NICE (2018) suggests a 92 per cent target.

21 Due to COVID-19, we expect the figures from 2020 to 2022 to be affected by the pandemic. For this reason, and due to unavailability of more recent data, we compare bed capacity in 2019.

FIGURE 2.2 Acute (curative) hospital beds per 1,000 population and occupancy rate (%) in OECD countries, 2019



Sources: Beds per 1,000 population: See https://data-viewer.oecd.org/?chartId=5bf1b434-bb71-4255-9d86-2a12b3517f77.
Occupancy rate: https://data-viewer.oecd.org/?chartId=ec5d6390-2d1d-4d84-88a3-5677665f4941.

2.3.2 Length of stay reduction

Lowering ALOS is often seen as an indicator of efficiency improvement, as shorter hospital stays reduce the overall cost per discharge. ALOS can be influenced by many factors including the model of care, consistent application of the National Standards for Safer Better Healthcare (SAFER) care protocols (HIQA, 2024), green days,[22] early supported discharge and 24/7 hospitals with an emphasis on weekend service levels. There are several ways that length of stay (LOS) can potentially be reduced. For example, LOS reduction can potentially be achieved through the utilisation of new technology (Rocks et al., 2021) or by shifting care from acute hospital settings to more affordable post-acute care as soon as clinically appropriate.

Evidence suggests that investing in short-stay step down services, long-term residential care and home support can decrease the demand for hospital services by, for example, reducing delayed transfers of care (DTOC) (Forder, 2009; Deraas et al., 2011; Gaughan et al., 2017). For instance, Gaughan et al. (2015) using evidence from England, estimate that a 10 per cent increase in care home beds could reduce social care DTOCs by between 6 and 9 per cent. Walsh et al. (2020) show that home support for older people can be an effective substitute for hospital care and estimate that a 10 per cent increase in home support per capita is

22 A green day is when a patient receives essential acute care that advances their treatment and brings them closer to discharge, compared to a red day when a patient receives little or no value adding acute care (NHS, 2016).

associated with an LOS reduction of 1.2–2.1 per cent for those with long LOS who may be categorised as a DTOC. Keegan et al. (2018) model the impact of reducing ALOS by 10 per cent in Ireland, estimating an 8 per cent reduction in bed requirements. LOS reductions are also modelled by Rachet-Jacquet et al. (2023) for England. They find that an annual 1 per cent ALOS decrease, together with shifting 1 per cent of inpatient activity to day case annually, can lead to 47,000 fewer additional beds needed in 2030/2031, a decrease of 67 per cent compared to the main scenario.

2.4 SUMMARY

This chapter provides the background and evidence that inform the development of the projection modelling framework for Hippocrates. Drivers of healthcare demand include these factors: demographic (population growth, structure and ageing); non-demographic (most pronounced among them income and technology); and policy (mostly derived from the Sláintecare report). Capacity factors include bed occupancy rate and ALOS.

CHAPTER 3

Hippocrates projection methods and data

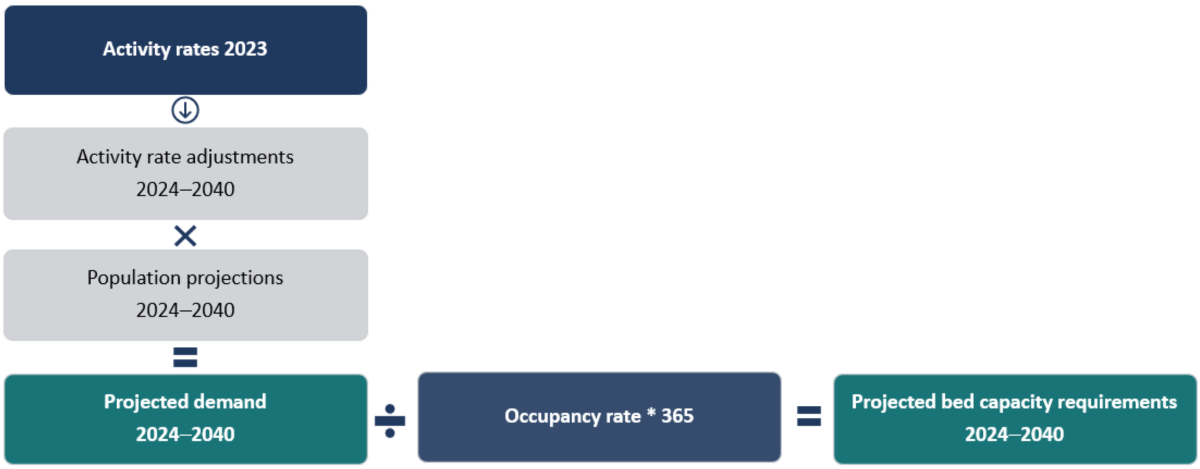
3.1 INTRODUCTION

This chapter describes the Hippocrates projection methodology and provides an overview of the data and methods employed. First, it briefly describes the data and methods used to generate the activity rate profiles for public acute hospitals in the new base year, 2023, highlighting any changes compared to previous iterations.[23] Second, it outlines how activity rates are adjusted to account for assumptions related to: population growth and ageing; healthy ageing; potentially avoidable hospitalisations; removing private activity from public hospitals; waiting list management; increasing the proportion of elective care delivered as day case; occupancy rates; and length of stay (LOS) reductions.

3.2 PROJECTION METHODOLOGY

Figure 3.1 presents a diagrammatic representation of steps involved in applying Hippocrates to project demand and bed capacity. The first step in developing projections in Hippocrates is to develop the 2023 age- and sex-specific activity rate profiles for each service under consideration (e.g. emergency department (ED) attendances, inpatient discharges). Rates are then adjusted based on a range of evidence-based assumptions, which have been developed and enhanced over the lifetime of the model. Following this, adjusted rates are multiplied by population projections to provide estimates of demand requirements in a projection year. Finally, bed capacity requirements for day and inpatient beds are calculated by dividing the estimated aggregate bed days by 365 times the assumed occupancy rate (Keegan et al., 2018). The sections that follow discuss each step in detail.

FIGURE 3.1 Hippocrates model – Diagrammatic representation, 2023–2040



Source: Authors' representation of the Hippocrates model.

23 A detailed description can be found in Brick and Keegan (2020b).

3.3 DEVELOPMENT OF ACTIVITY RATE PROFILES FOR 2023

Activity rates are calculated by dividing activity volumes by corresponding populations in the base year. The calculations are undertaken at the most disaggregated level possible given the underlying data available, preferably single year of age (SYOA). As discussed in Wren et al. (2017), age aggregation has the consequence of understating the projections, particularly where demand is concentrated in older ages. The data and methods used to calculate activity rates vary by service and are each discussed below.

3.3.1 Emergency department attendances

Data: The main source of data for this analysis is the patient experience time (PET) 2023 dataset. PET captures patient-level attendance data from all EDs in public acute hospitals. In a change to previous iterations of Hippocrates projections, this is supplemented with figures on injury unit attendances to provide a more complete, although not exhaustive,[24] picture of unscheduled care. All data were provided by the HSE Business Intelligence Unit – Acute (BIU Acute).

Methods: SYOA and sex activity rates for 2023 were developed by combining ED and injury unit attendances and dividing them by the corresponding 2023 population. Utilisation profiles for 2023 are presented in Chapter 4 as attendances and attendances per 1,000 population by 5-year age group and sex. The activity is referred to as ED for the remainder of the report.

3.3.2 Outpatient department attendances

Data: There has not been any development in the data available on outpatient department (OPD) attendances since the last iteration of Hippocrates projections.[25] There continues to be no single dataset that captures the totality of activity undertaken in OPD. We use the number of OPD attendances reported for 2023 as part of the Healthcare Pricing Office (HPO) specialty costing returns, and supplement this for hospitals outside the activity-based funding system with the number of attendances reported to HSE BIU Acute. Due to the lack of patient profiles in these datasets, waiting list data from the National Treatment Purchase Fund (NTPF), activity data from the Hospital In-Patient Enquiry (HIPE) Scheme, and OPD attendance patterns in NHS England (NHS Digital, 2023) are used to estimate

---

24 Unscheduled attendances outside of the ED and injury unit (also known as 'other emergency presentations' HSE Acute KPI A95 (HSE, 2022), and presentations at standalone maternity units in Dublin and Cork and at the Royal Victoria Eye and Ear Hospital are not included in the analysis. Detailed data on these attendances (e.g. age) are not currently available. In 2022, collectively they accounted for c. 120,000 attendances (personal communication, HSE BIU Acute, 2023).

25 Some hospitals reported attendances to selected health and social care professional clinics in 2023 (e.g. physiotherapy, occupational therapy, nutrition/dietetics). While the reporting of this activity is welcome, only a few hospitals reported this activity and thus are not included in this analysis. Notably, almost 70 per cent of these reported attendances occurred in four hospitals. We also observe inconsistency in the recording of maternity-related outpatient attendances across hospitals.

an age and sex profile for attendances, similar to the approach taken in previous Hippocrates reports.

Methods: The methods used to estimate the OPD activity profiles are described in detail in Brick and Keegan (2020b). Activity profiles for 2023 are presented as attendances and attendance rates per 1,000 population by 5-year age group and sex.

3.3.3 Day and inpatient discharges and bed days

Data: The HIPE scheme, managed by the HPO, is an information system that records administrative and clinical data on discharges from, and deaths in, public acute hospitals in Ireland. For the purposes of this analysis, we use data on discharges between 1 January 2023 and 31 December 2023.[26] Patient information used to produce our activity profiles are age, sex, patient type (day and inpatient), admission type (elective, emergency, sameday acute medical assessment unit (AMAU),[27] and maternity),[28,29] public/private status,[30] and length LOS in days.[31,32]

Methods: Measures of activity presented are discharges, bed days and discharge and bed day rates per 1,000 population. Given the unique profile of maternity discharges, as per previous reports, they are considered separately in the demand projections.[33] AMAU sameday discharges are also considered separately.

3.4 ADJUSTMENT OF ACTIVITY RATES, 2024–2040

Once activity rates have been established for 2023, a series of assumptions are applied in the projection scenarios, which adjust activity rates across the projection horizon. In Chapter 2, we outlined the evidence supporting each of these assumptions and below we describe how these assumptions are operationalised in Hippocrates.

26 In 2023, a small volume of activity (c. 1,800 day patients and 1,600 inpatients) was outsourced to private hospitals. These data are recorded in the Access to Care Portal, managed by the HPO. Since we lack detailed information on this activity and the volume is too small to significantly impact activity or bed capacity projections, it is not included in the analysis.

27 Sameday discharges from AMAUs are recorded as emergency inpatients in HIPE. They are admitted as an emergency to the AMAU and are discharged from there on the same day. These discharges are identified by the HPO for the purpose of this analysis, using ward identifiers in the HIPE dataset.

28 'Admitted in relation to their obstetrical experience (from conception to six weeks post-delivery)' (HPO, 2023, p. 64).

29 We observe inconsistency in the recording of maternity day patient discharges across hospitals.

30 'Public/private status refers to whether the patient saw the consultant on a public or private basis. It does not relate to the type of bed occupied nor is it an indicator of private health insurance' (HPO, 2023, p. 12).

31 As per Wren et al. (2017), in this analysis 'sameday' inpatients (i.e. inpatients admitted and discharged on the same day) are given an LOS of 1. We do not exclude them from the analysis nor do we attach a part day LOS (e.g. 0.5) to their period of care. The same methodology is applied by HSE BIU Acute when calculating inpatient occupancy rates.

32 Trolley use is an important issue on Irish public hospital. Due to an absence of a common patient identifier, we cannot track patients through their hospital visit and accurately capture their transition from ED to a trolley to a bed. A description of relevant data and limitations are presented in Appendix C. Bed day estimates calculated in the appendix are not incorporated into the model as they would overlap with the occupancy rate assumptions.

33 Maternity discharges are separated into day and inpatient discharges; no distinction is made in HIPE between elective and emergency maternity inpatients.

3.4.1 Population growth and ageing

Three population projection scenarios are considered in our analysis. The data and methods used to develop these updated projections using the Economic and Social Research Institute's (ESRI) regional demographic model, based on the Central Statistics Office (CSO) Census of Population 2022, are described in detail in Bergin and Egan (2024).[34] Table 3.1 provides an overview of the main assumptions for each demographic scenario. In summary, the scenarios are based on assumptions around the three key drivers of population change: mortality, migration[35] and fertility.

The only difference between the three scenarios is in the migration assumption. In the central scenario, net immigration is projected to average +35,000 per annum up to 2030 and 20,000 per annum thereafter. The low (high) scenario assumes 10,000 less (more) per annum. The mortality assumption, which includes an increase in life expectancy at birth for males (females) from 81.1 (84.6) in 2022 to 84.2 (87.1) in 2040, and the fertility assumption, with a constant total fertility rate of 1.65, remain the same across all scenarios.

TABLE 3.1 Summary of main assumptions for population scenarios

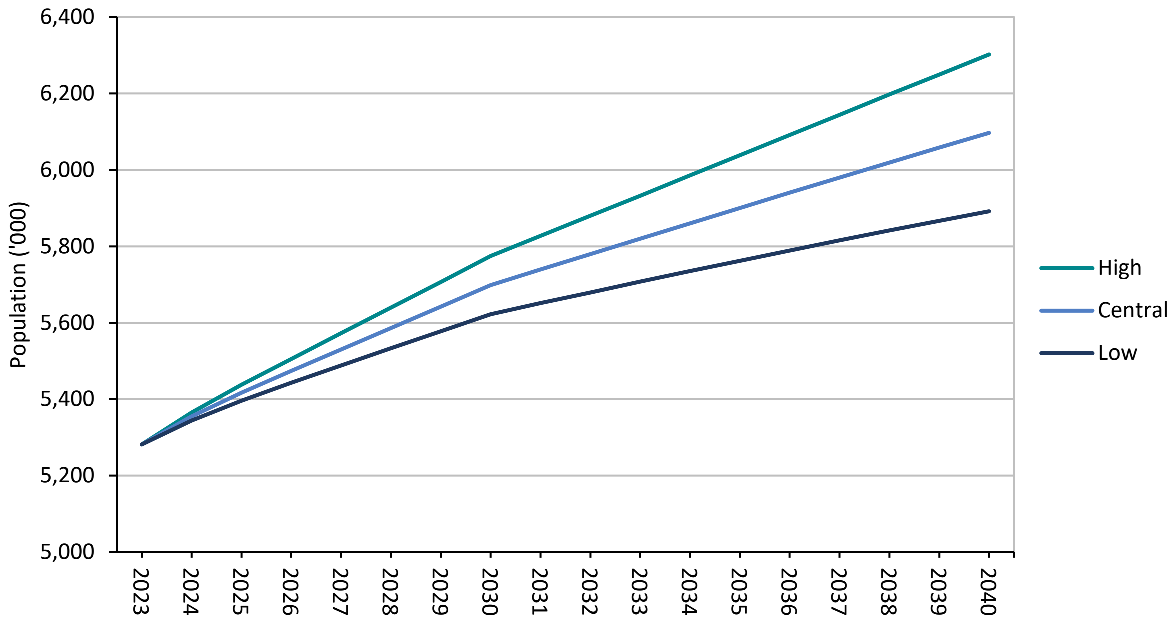
Assumptions	Central	Low	High
Mortality	Life expectancy at birth for males (females) is expected to increase from 81.1 (84.6) in 2022 to 84.2 (87.1) for males (females) in 2040.	No change from central scenario.	No change from central scenario.
Migration	Net immigration to average +35,000 p.a. to 2030 (higher at +45,000 in the short term) and +20,000 p.a. thereafter.	Net immigration to average +25,000 p.a. to 2030 (higher at +35,000 in the short term) and +10,000 p.a. thereafter.	Net immigration to average +45,000 p.a. to 2030 (higher at +55,000 in the short term) and +30,000 p.a. thereafter.
Fertility	Total fertility rate is unchanged at 1.65 over the period.	No change from central scenario.	No change from central scenario.

Note: p.a.=per annum.
Source: Bergin and Egan (2024).

Figure 3.2 illustrates the total population each year between our base year and 2040, across the central, low and high population projections. Given the nature of the assumptions applied, the low and high scenarios are equidistant from the central. The change in the population trajectory post 2030 in each scenario reflects the longer-term assumptions for net migration. In the central scenario, the population is expected to increase by 815,000 by 2040, an average annual population growth rate of 0.85 per cent per annum. In the low scenario, the increase by 2040 would be 610,000, with an average annual growth rate of 0.65 per cent, while in the high scenario, an increase of 1.02 million is projected, reflecting average annual growth of 1.04 per cent per annum.

34 The authors provided additional tables for the purpose of this analysis.
35 This is based on projections from the ESRI's macroeconometric model COSMO, in which migration is determined by the relative attractiveness of Ireland to alternative labour markets (Bergin and Egan, 2024).

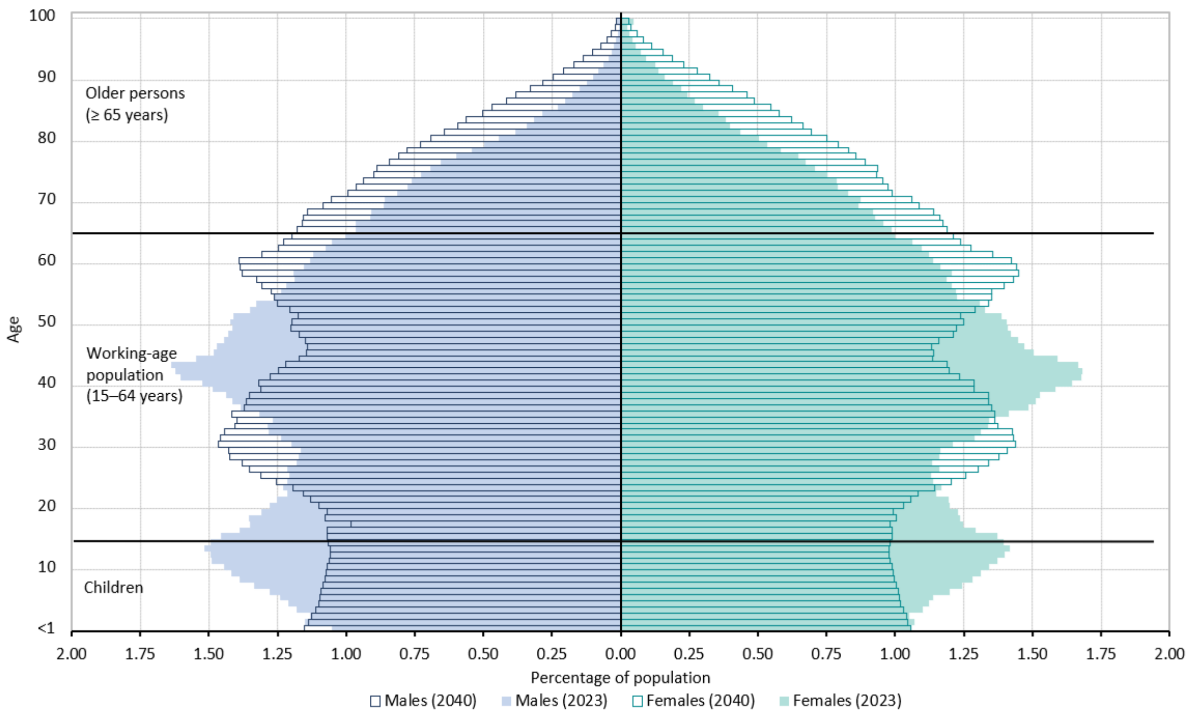
FIGURE 3.2 Total population – Low, central, and high population growth scenarios



Source: Bergin and Egan (2024) – Additional data provided by the authors.

Figure 3.3 illustrates the change in the age structure of the population between 2023 and 2040 based on the central scenario. Similar patterns are observed for both males and females, with decreases in the proportions of the projected population aged under 25 years and for those aged 35–50 years, and increases in the proportions of those aged 25–34 years and over 50 years.

FIGURE 3.3 Central scenario – Population age pyramids for 2023 and 2040 (% of population)



Source: Bergin and Egan (2024) – Additional data provided by the authors.

Table 3.2 provides a summary of the population scenarios by age and sex. In 2023, approximately 87,000 people were aged 85 years and over, projected to more than double by 2040 – to about 204,000 people. In terms of the impact of these population projections on the demand for care, of note are the changes in the youngest and oldest age categories. In all three scenarios, a decrease in the number of children aged 0–14 years is projected (from -0.5% to -9.9%) and significant increases in the number of adults aged 65–84 years (from 51.1% to 53.1%) and 85+ years (from 133.1% to 136.2%). These are again highlighted by the decrease in the young-age dependency ratio (from 0.29 to 0.25) and significant increase in the old-age dependency ratio (from 0.23 to 0.34).

TABLE 3.2 Summary of population projections by age, sex and scenario, 2023–2040

	2023		2040								
			Central			Low			High		
	N ('000)	%	N ('000)	%	% Δ 2023–2040	N ('000)	%	% Δ 2023–2040	N ('000)	%	% Δ 2023–2040
Male	**2,606**		**2,992**		**14.8**	**2,889**		**10.9**	**3,095**		**18.8**
0–14	517	19.8	489	16.3	-5.3	465	16.1	-10.0	513	16.6	-0.7
15–64	1,710	65.6	1,889	63.1	10.5	1,814	62.8	6.1	1,964	63.4	14.9
65–84	347	13.3	526	17.6	51.8	523	18.1	50.7	530	17.1	52.8
85+	33	1.3	88	2.9	164.7	87	3.0	162.8	88	2.9	166.6
Female	**2,675**		**3,105**		**16.1**	**3,003**		**12.2**	**3,207**		**19.9**
0–14	495	18.5	470	15.1	-5.1	446	14.9	-9.9	493	15.4	-0.4
15–64	1,754	65.6	1,951	62.8	11.2	1,877	62.5	7.0	2,026	63.2	15.5
65–84	372	13.9	568	18.3	52.4	564	18.8	51.5	571	17.8	53.3
85+	54	2.0	117	3.8	116.2	116	3.9	114.8	117	3.7	117.5
Total	**5,282**		**6,097**		**15.4**	**5,892**		**11.6**	**6,302**		**19.3**
0–14	1,012	19.2	959	15.7	-5.2	911	15.5	-9.9	1,006	16.0	-0.5
15–64	3,464	65.6	3,840	63.0	10.9	3,691	62.6	6.6	3,989	63.3	15.2
65–84	719	13.6	1,094	17.9	52.1	1,087	18.5	51.1	1,101	17.5	53.1
85+	87	1.6	204	3.4	134.6	203	3.4	133.1	206	3.3	136.2
Dependency ratios											
Young-age	0.29		0.25			0.25			0.25		
Old-age	0.23		0.34			0.35			0.33		

Note: The young-age dependency ratio is the ratio of the number of young people at an age when they are normally economically inactive (under 15 years old) compared to the working-age population (those aged 15–64), while the old-age dependency ratio refers to the number of older people at an age when they are generally economically inactive (over 65 years old) compared to the working-age population.

Source: Bergin and Egan (2024) – Additional data provided by the authors.

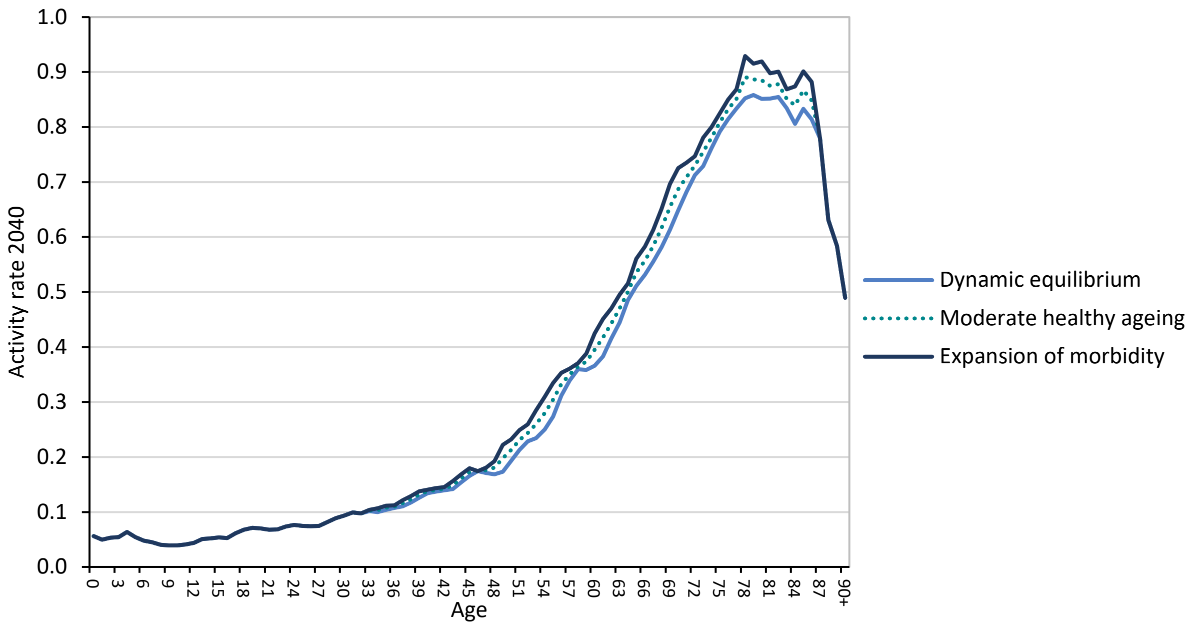
3.4.2 Healthy ageing

Data: Population and life expectancy estimations from the ESRI (Bergin and Egan, 2024) – Additional tables provided by the authors.

Methods: Healthy ageing applies to all services except maternity for those aged 35 years and older (Section 3.3). Healthy ageing adjustments are made to account for the fact that, as life expectancy increases, not all additional life years may be spent in bad health (Wren et al., 2017). To simulate these effects, we shift age- and sex-specific activity curves to the right, in proportion to projected life-expectancy change. This is based on an approach adopted by the European Commission (European Commission, 2014; 2017; 2023) and previously applied in Wren et al. (2017), Keegan et al. (2020) and Keegan et al. (2022).

Model assumptions: In addition to our assumption in which activity rates do not change (*expansion of morbidity* hypothesis), the *dynamic equilibrium* hypothesis and a *moderate healthy ageing* assumption are also applied (see description in Section 2.2.1). An illustrative example of how these assumptions operate is provided in Figure 3.4.

FIGURE 3.4 Healthy ageing – Illustrative example of the impact of healthy ageing shifts on activity rate distribution in 2040



Note: Authors' representation.

3.4.3 Potentially avoidable emergency hospitalisations

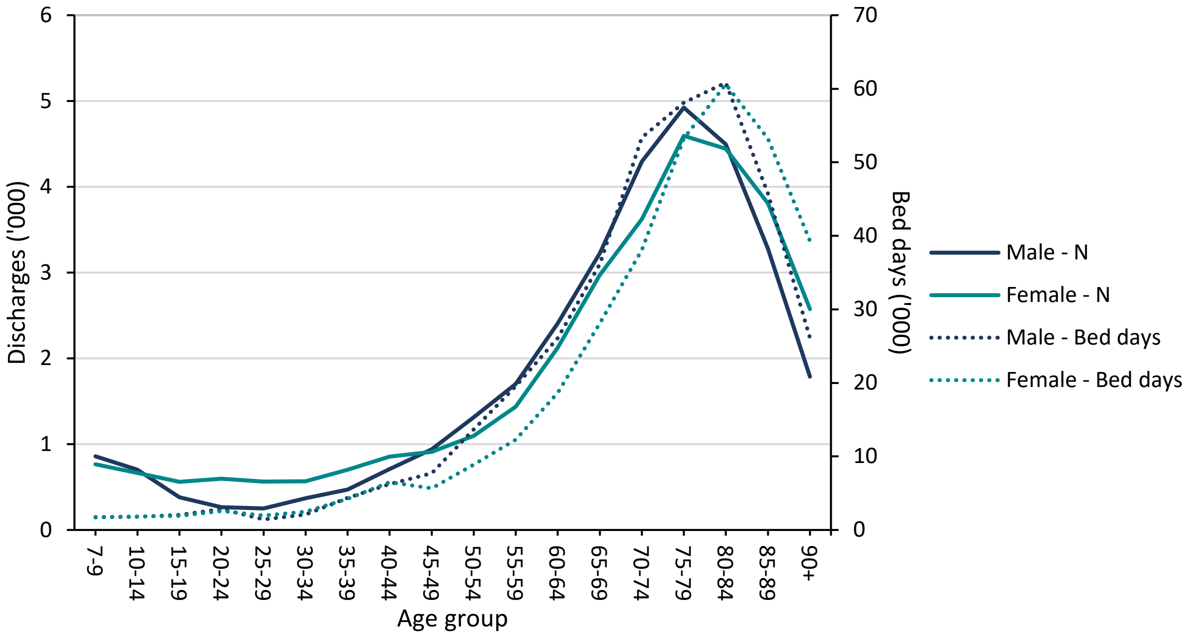
Data: Potentially avoidable discharges are identified for emergency inpatient discharges in HIPE data for those aged seven years and older.

Methods: There have been three key changes to the methodology for identifying potentially avoidable emergency hospitalisations in this iteration of the model. First, we now only apply to those 16 years and older the conditions identified in the literature and included in our previous research (Keegan et al., 2020; Keegan et al., 2022). Second, from the initial list of 21 conditions, the three most common conditions identified in HIPE (vaccine-preventable influenza and pneumonia, chronic obstructive pulmonary disease (COPD) and urinary tract infections (including pyelonephritis)) were included in the main modelling scenarios. This has now been expanded, with four additional chronic diseases included for adults: congestive cardiac failure, diabetes complications, angina and asthma. These conditions, together with COPD, are included in the Chronic Disease Management (CDM) Programme, which was introduced in 2020 (HSE, 2020).

Finally, we apply a different list of child-specific conditions to children aged 7 to 15 years, while children aged 6 years or under are excluded, based on recent research from Kakoulidou et al. (forthcoming).[36] These include the three most common conditions identified: dehydration and gastroenteritis, acute upper respiratory infections and vaccine-preventable influenza and pneumonia. Asthma is also included as it is a named condition covered by the free GP visit card for children.[37]

Figure 3.5 shows the age-specific discharges and bed days in 2023 for all included conditions. Of total discharges, 49.6 per cent are male and they account for 50.4 per cent of bed days; the age profiles for males and females are relatively similar. Almost 68 per cent of discharges and 78 per cent of bed days relate to the 65+ age group.

FIGURE 3.5 Potentially avoidable emergency hospitalisations – Age- and sex-specific discharges and bed days, 2023



Source: HIPE, 2023; Authors' calculations.

Model assumptions: In our main modelling scenario, we assume a 25 per cent linear reduction of the potentially avoidable hospitalisation discharge rate,[38] from 2024 to 2040. We also assume a corresponding reduction in bed days, based on the median LOS for these discharges in the base year.[39] This implies that by 2040 improved investment in, and access to, effective non-acute care will have reduced the overall rate of avoidable hospitalisations by 25 per cent relative to 2023.

36 Kakoulidou et al. (forthcoming) discuss that there is evidence of higher risk aversion among doctors when treating children younger than seven years old compared to older people.

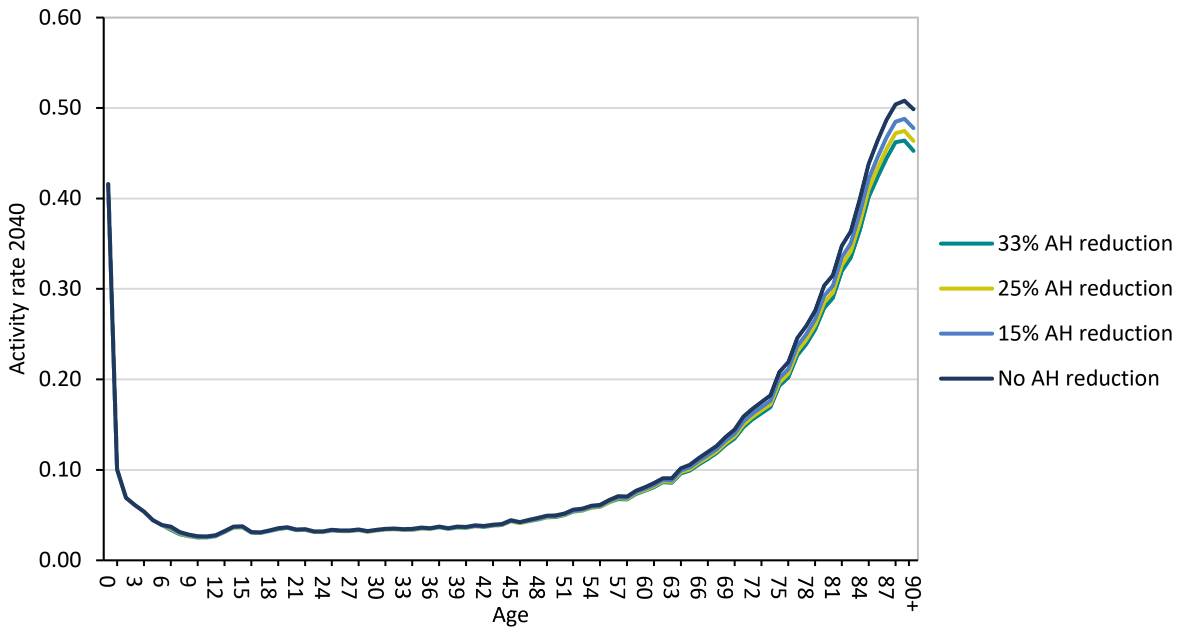
37 See Appendix D for clinical coding and discharge/bed day volumes for the selected conditions in 2023.

38 The reduction is applied to emergency and AMAU inpatient discharges.

39 See Appendix D for the cumulative distribution of emergency inpatient discharges and bed days for selected avoidable hospitalisations, 2023.

Equivalent reductions in ED attendances are also modelled. Additional sensitivity analyses assume 33 per cent and 15 per cent reductions in the discharge rate (Table 6.2). An illustrative example of how these assumptions operate is provided in Figure 3.6.

FIGURE 3.6 Potentially avoidable emergency hospitalisations – Illustrative example of the impact of various values of rate reductions on the activity rate distribution in 2040



Note: AH=Potentially avoidable emergency hospitalisation rate.
Source: HIPE, 2023, Authors' calculations.

3.4.4 Private activity out of public hospitals

Data: Private day and elective inpatient activity in HIPE.

Methods: Based on methods developed, and described in detail, in Keegan et al. (2021), the volume of private patient activity that could potentially be removed from public hospitals in the medium-term is estimated.[40] In summary, focusing only on day and elective inpatient activity, two scenarios start from an initial set of four assumptions. First, no emergency or maternity activity will transfer. Second, no children under one year or any paediatric specialties will move. Third, no discharge with a major diagnostic category (MDC) of 'mental diseases and disorders', 'burns', 'unassignable to MDC', or 'pre-MDC' will transfer. Finally, no discharge with a neoplasm diagnosis in one of the eight designated cancer centres of excellence will move to a private hospital.

Of the remaining elective discharges, it is unlikely all of these could be treated in private hospitals. In the absence of detailed data on the activity currently undertaken in private hospitals, which would allow for detailed estimates to be

40 See Appendix E, Figures E.3 and E.4, for trends in private day and inpatient activity.

calculated, an additional assumption is applied in which varying proportions of discharges are assumed to move based on the relative complexity of their diagnosis-related group (DRG). DRGs enable 'the disaggregation of patients into homogenous groups, which undergo similar treatment processes and incur similar level of resource use' (HPO, 2024b, p. 89). We identify relatively complex DRGs by calculating the average (complexity) weighted unit for elective discharges within each DRG. In addition to the initial exclusions, we specify two alternative scenarios with varying levels of transfer for this analysis:

- Central: Do not transfer discharges with a mean weighted unit greater than median for all DRGs;
- High: Do not transfer discharges with a mean weighted unit greater than the 75th percentile for all DRGs.

Figure 3.7 shows the age distribution of the day patient discharges and elective inpatient discharges/bed days deemed eligible for transfer to private hospitals under the two scenarios compared to total private patient activity and the four initial exclusions.

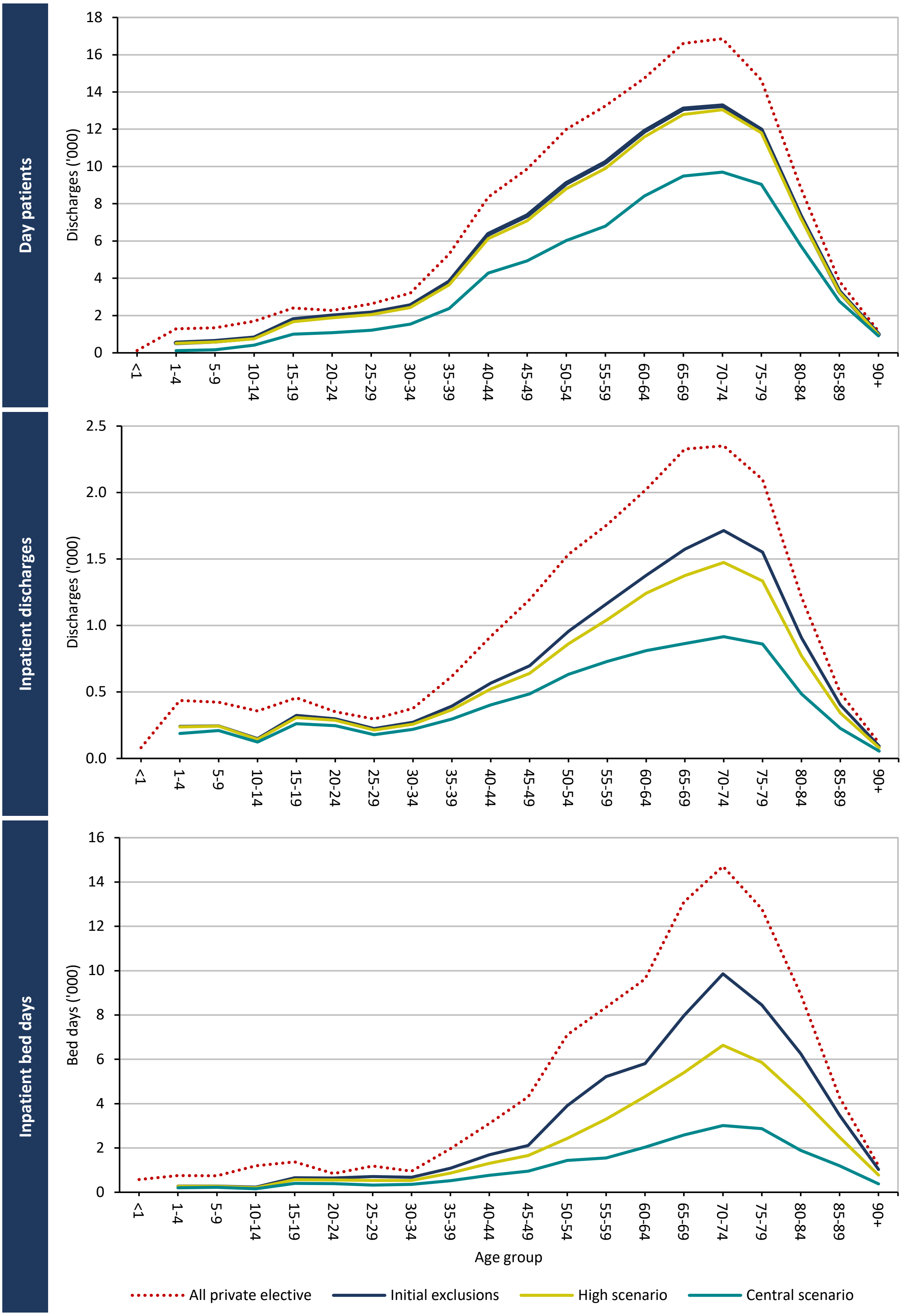
Model assumption: In the main modelling scenario we apply the central scenario in Table 3.3. We model the full activity shift to take place incrementally over a five-year period: 2026–2030. In the sensitivity analysis, we model removing, in addition to the initial exclusions, the 75th percentile DRG assumption over a seven-year period: 2026 to 2032.

TABLE 3.3 Private activity out of public hospitals – Private discharges in public acute hospital for transfer to private hospitals by patient type and scenario, 2023

Scenarios	Discharges and bed days to transfer		
	Day patients	Elective inpatients	
	N ('000)	N ('000)	Bed days ('000)
Total private elective activity	140	19	97
Initial exclusions	109	13	60
High scenario: Initial exclusions plus DRG 75th percentile	106	12	42
Central scenario: Initial exclusions plus DRG median	76	8	21

Note: For a detailed description of the methods, see Keegan et al. (2021).
Source: Authors' calculations, based on HIPE (2023).

FIGURE 3.7 Private activity out of public hospitals – Private discharges in public hospital for transfer to private hospitals: Age-specific distribution by patient type and scenario



Note: For a detailed description of the methods, see Keegan et al. (2021).
Source: Authors' calculations, based on HIPE (2023).

3.4.5 Increase in proportion of elective care delivered as day case

Increasing the provision of elective treatment as day rather than inpatient care, where it is clinically appropriate, is widely acknowledged as an appropriate way of improving the use of hospital resources. In 2023, the proportion of elective care for adults (20–74 years) delivered as day case in public acute hospitals was 93.7 per cent.

Model assumption: We model an increase in the proportion of elective care delivered as day case to 95 per cent. This is modelled as a 0.2 percentage point increase in the day case proportion per annum and a proportionate reduction in elective inpatient discharges and a one-day reduction in bed days, assuming that the most likely cases to transfer are those staying one night.[41] The implication of this will be a higher average length of stay (ALOS) for the remaining elective inpatients over time, which is the pattern observed historically.

3.4.6 Waiting list management

Data: Data utilised relate to waiting list records for outpatients, day patients and inpatients between January 2015 and December 2024, provided by the NTPF.[42] The analysis employs monthly data on the total list size, number waiting more than 12 weeks,[43] and the number of monthly additions to each list.[44]

Methods: The methods used to incorporate waiting lists into the Hippocrates model remain unchanged and are described, along with the limitations, in detail in Brick and Keegan (2020a), with the main components of the calculations summarised here. For an examination of waiting list trend data employed in the calculations, see Appendix B.

Growth rate calculations: We calculate the total list growth rate and the additions growth rate. These growth rates are the mean of year-on-year growth rates calculated for each month over a specified period. Given the turbulence over the COVID-19 period we examine two growth rate periods. First, we use rates from the March 2015–February 2020 period (high-clearance assumption) and in the second estimate, we additionally include the more recent January 2022–December 2024 period (low-clearance assumption).

41 A 0.2 percentage point increase reflects the average increase observed over the five years pre-COVID-19 – 2015–2019.

42 There have been no substantive changes in the collection or reporting of waiting list data since the last iteration of Hippocrates; for example, there remains no integration between the outpatient and day/inpatient lists.

43 Sláintecare sets a 10-week waiting-time target for OPD appointments. However, the data available for analysis at the time of writing allowed us to model a 12-week target for all services.

44 In the latest tranche of data provided by the NTPF, the methodology for the calculation of monthly additions to the list has been amended. The old method for calculation substantively underestimated the number of monthly additions and has been corrected. This means that any previously published work using the old NTPF methodology is not comparable with future output.

Estimating non-recurring activity: The analysis assumes that waiting list pressures will stop growing at the end of December 2025. We apply the total list growth rate (additions growth rate) to the total number waiting (additions) in each month between January 2024 and December 2024 to estimate the projected total list size (manageable list size) at the end of December 2025 in each month.

Differentials between the projected total list size and manageable list size provide estimates of the size of the non-recurring activity or backlog requiring clearance. This is calculated separately for each of the OPD, day patient and inpatient waiting lists. The non-recurring activity is the mean of the monthly backlog estimates over the period January–December 2024. This varies based on the growth rate scenario under consideration.

Estimating recurring activity: The differential between the projected list size based on the total list growth rate and that based on the additions growth rate estimates the extra activity above the trend required to stop waiting times from growing. This is calculated separately for each of the OPD, day patient and inpatient waiting lists. The estimated total additional activity is distributed by age and sex by applying the age and sex distribution of the appropriate waiting list at the end of December 2024. These activity volumes are then converted to a rate by dividing by age- and sex-specific population volumes. This allows for any required recurring additional activity to be adjusted in line with projected population growth.

Estimating bed day requirements: In a previous analysis we estimated the additional expenditure required to reduce the waiting lists to the point that cases are seen or treated within 12 weeks and the lists are maintained within this limit (Brick and Keegan, 2020a). In this case we are estimating bed day requirements. The estimation process is the same, but rather than estimating average complexity weighted units from HIPE activity, we estimate average bed day requirements by age and sex.

Outpatient conversion: A proportion of OPD attendances will require further treatment, but there are no data available on the conversion rate from first time OPD appointment to the day or inpatient lists. For that reason, we use two conversion rates previously utilised for Ireland – 33.3 per cent and 20 per cent, in two scenarios (Brick and Keegan, 2020a; Keegan et al., 2020). Once the conversion volume has been calculated, 85 per cent are allocated to day patient and 15 per cent to inpatient based on the best available, although imperfect, data.

Table 3.4 outlines the calculated full list and additions growth rates for the low and high clearance growth rate spans. As the full list trend is only greater than the additions trend for outpatients in both cases, additional recurring activity to keep waiting times manageable is only required for outpatients (outpatient conversion).

TABLE 3.4 Waiting list management – Full list and additions growth trend

	Low clearance Mar 2015–February 2020 and January 2022–December 2024		High clearance March 2015–February 2020	
	Full list	Additions	Full list	Additions
OPD	5.1%	3.8%	9.0%	2.0%
Day patient	3.9%	4.8%	3.4%	3.4%
Inpatient	1.0%	1.2%	-0.2%	0.7%

Source: NTPF 2015–2023; authors' calculations.

Model assumptions: Two waiting list management scenarios have been constructed for this analysis. The 'low-clearance' scenario reflects lower non-recurring backlog and recurring activity, and a lower outpatient conversion rate (20%) over a longer period (seven years). The 'high-clearance' scenario reflects a higher non-recurring backlog and recurring activity, and a higher outpatient conversion rate (33.3%) over a shorter period (five years). Table 3.5 outlines the scale of the activity (first-time OPD appointments, discharges and bed days) to clear the waiting list backlog and maintain waiting times at 12 weeks for all services. The waiting list management scenarios are set into effect in 2026. The non-recurring backlog activity is reduced by 2030 or 2032, depending on the scenario, whereas the recurring activity is converted to a rate and remains throughout the projection horizon.

TABLE 3.5 Waiting list management – Scenarios

	Low clearance[a]		High clearance[b]	
	N	Bed days	N	Bed days
	('000)	('000)	('000)	('000)
Non-recurring backlog				
OPD	401.4	-	442.0	--
Day patient[c]	122.3	-	180.0	-
Inpatient[c]	28.9	115.5	38.5	154.1
Additional recurring activity – Per annum[d]				
OPD	7.3	-	40.4	-
Day patient[c]	1.2	-	11.5	-
Inpatient[c]	0.2	0.9	2.0	8.3

Notes:
a Growth rate calculation span: March 2015–February 2020 and January 2022–December 2024.
Backlog calculation: The average of the estimated backlog at the end of each month between January 2024 and December 2024.
Outpatient conversion: 20%–85% to day patient, 15% to inpatient.
b Growth rate calculation span: March 2015–February 2020.
Backlog calculation: The average of the estimated backlog at the end of each month between January 2024 and December 2024.
Outpatient conversion: 33.3%–85% to day patient, 15% to inpatient.
c Includes outpatient conversion.
d Adjusted for population in subsequent years.

Sources: HIPE, 2023; NTPF 2015–2023; authors' calculations.

3.4.7 Length of stay reduction

Previous output from the Hippocrates model (Keegan et al., 2018) projecting inpatient bed capacity assumed a 10 per cent reduction in ALOS. This assumption was based upon analysis of ALOS across Organisation for Economic Co-operation and Development (OECD) countries. In this iteration, we examine the available evidence in the Irish context for that assumption and make some adjustments based on the results.

Data: Two data sources are used for the analysis: HIPE and delayed transfers of care (DTOC) data from the HSE BIU Acute.

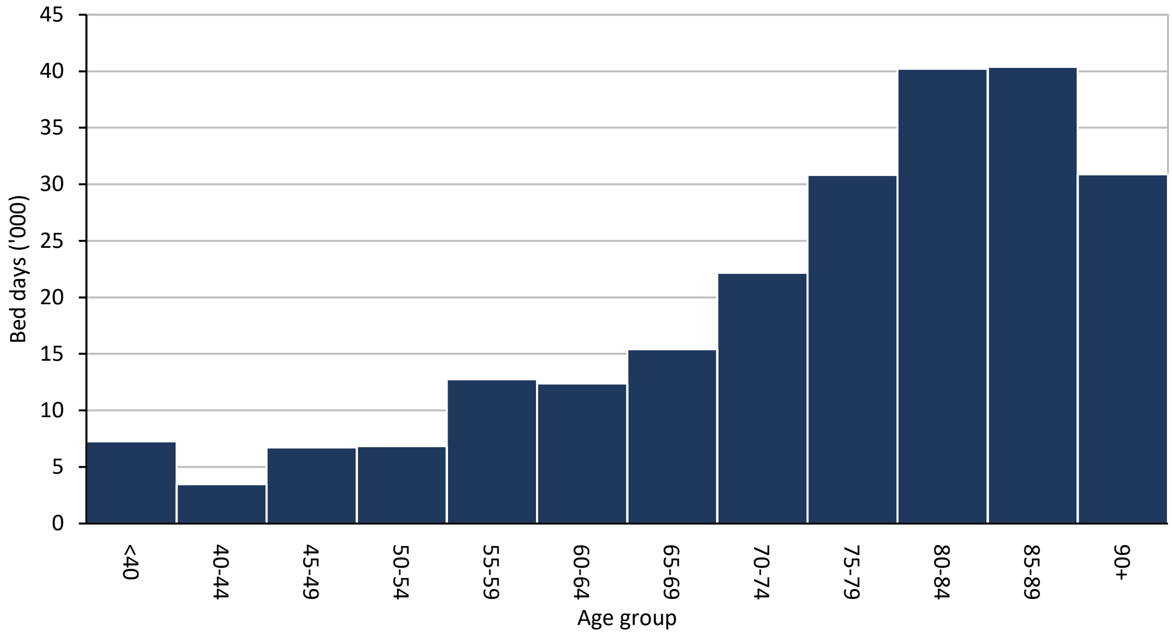
Methods: The following analysis examines potential areas for bed day savings in 2023 from two different sources: DTOC and high outliers.

Delayed transfers of care: A potential source of bed day savings in acute hospitals relates to patients who are deemed clinically fit for discharge from the acute setting, but their transfer of care has been delayed. The DTOC dataset is a live system that collects data at hospital level (Department of Health, 2018) and is part of the urgent and emergency care report aimed at monitoring hospital capacity.[45] However, this dataset lacks clinical information and does not indicate whether the patient was an elective or emergency admission. Additionally, the DTOC and the HIPE datasets are entirely separate, as a clinically fit for discharge flag is not currently operational in the HIPE data. The missing link between these two datasets adds uncertainty to the estimates.

We estimated that the delay in discharging adults (16 years and older) deemed clinically fit for discharge from the acute setting accounted for c. 230,000 bed days in 2023. Figure 3.8 illustrates the distribution of these bed days by five-year age groups. Those aged 75 years and over accounted for about 140,000 (62%) of the bed days. In most of these cases patients are awaiting placements in a variety of step-down, rehabilitation, long-term residential care or home support services, or are awaiting funding approval for same (Department of Health, 2018).

45 For more information see https://www2.hse.ie/services/urgent-emergency-care-report/.

FIGURE 3.8 Length of stay reduction – DTOC bed days by age, 2023



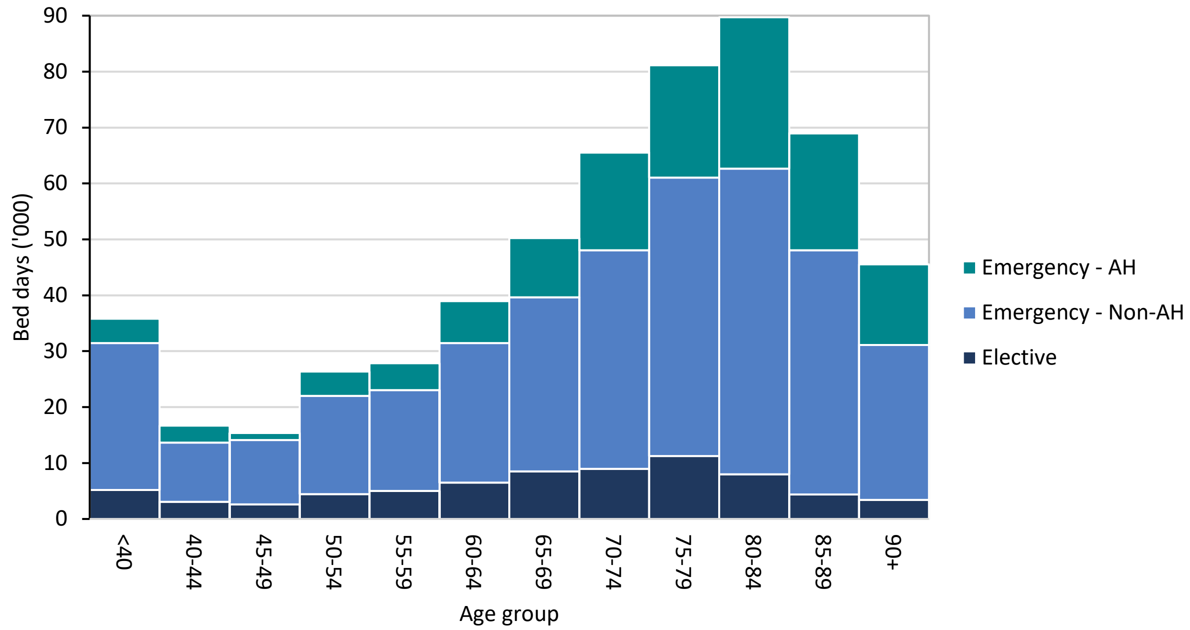
Source: HSE BIU Acute, 2023.

High outliers: An alternative way to examine LOS outliers within the HIPE data is to identify inpatient discharges where LOS is high relative to the mean LOS for the post-discharge assigned DRG. We identify high outliers by first calculating the mean of the log-transformed LOS for each DRG.[46] In each DRG, *extreme high outliers* (a) are identified as inpatient discharges whose LOS is greater than the mean plus three times the standard deviation. The mean LOS is then recalculated with the extreme high outliers excluded. Further *high outliers* (b) are identified as discharges where the LOS is greater than the mean LOS plus twice the standard deviation. Total high outliers are a combination of the extreme high outliers (a) and the remaining high outliers (b).

Using this method, in 2023 discharges identified as high outliers accounted for 562,000 bed days, about 25 per cent of which were categorised as potentially avoidable hospitalisations (see Section 3.4.3). Figure 3.9 illustrates the age distribution of these high outlier bed days by patient type: elective, emergency (high outlier and avoidable hospitalisation) and emergency (high outlier only).

46 A similar method is described by the HPO as part of their price setting process (HPO, 2015).

FIGURE 3.9 Length of stay reduction – High outlier bed days by age, 2023



Source: Authors' calculations using HIPE, 2023.

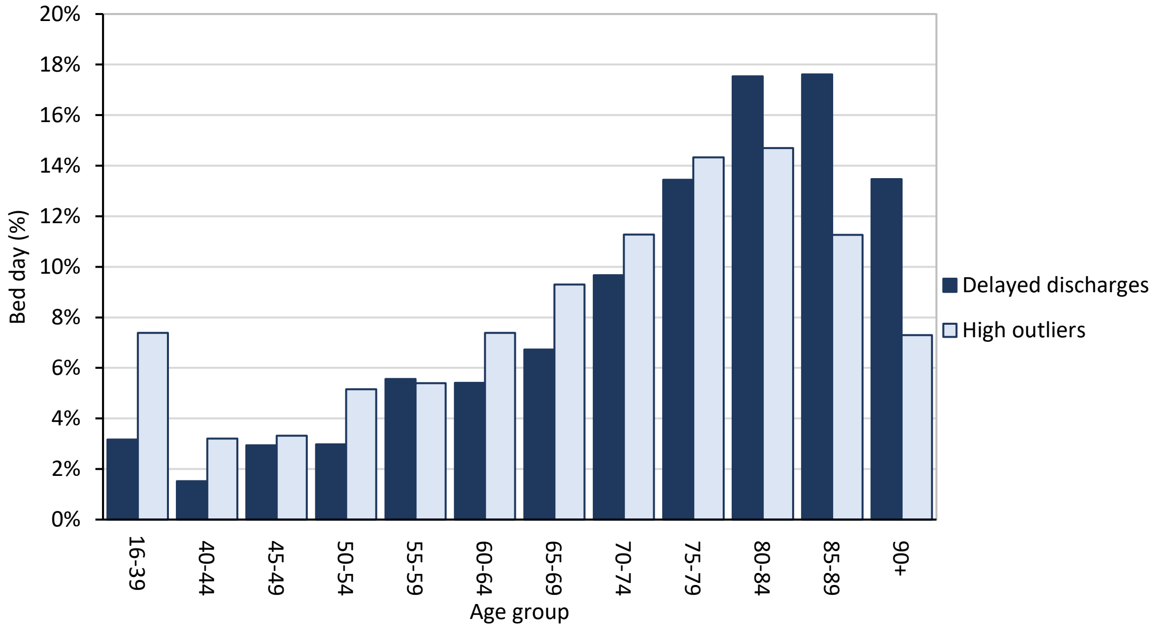
There are several reasons a discharge could be a high outlier within their DRG. For example, there could be clinical reasons requiring a longer hospital stay. However, it is also possible that some patients are clinically fit for discharge, but a non-clinical reason is leading to a delayed transfer to non-acute care (Department of Health, 2018). As discussed above, it is not currently possible to identify such cases in HIPE as there is no *clinically fit for discharge* variable operational in the dataset. However, recently HIPE has begun to collect information on the type of post-acute care received. In 2023, we find that for elective and emergency inpatients (excluding maternity and AMAU sameday), 25 per cent of bed days relate to discharges whose care was transferred to another (non-acute) setting. For those identified as high outliers, this increases to 41 per cent. This suggests that a relatively high proportion of discharges identified as high outliers may be DTOCs. Focusing on high outliers, excluding those identified as potentially avoidable hospitalisations to avoid double counting, this analysis has identified potential savings of between 136,000 and 316,000 bed days if the LOS of each discharge was reduced to the mean plus 2* standard deviation upper trim point of the DRG.

Model assumption: In the absence of a flag in HIPE to identify DTOCs, we must assume that there is some overlap between potentially avoidable hospitalisations, high outliers and DTOCs. Given the age and volume patterns for the bed days of those identified as high outliers and DTOCs, discussed above and shown in Figure 3.10, we model different LOS reductions for electives and emergency, and differentiate the reduction rate by age. The relevant LOS are reduced linearly, with the converging reduction rate achieved in 2040. More specifically, we model:

- a 5 per cent LOS reduction for all elective discharges aged 16 years and over; and
- a 5 per cent LOS reduction for emergency discharges aged 16–74 and 10 per cent thereafter.

In the sensitivity analysis (Table 6.2), we additionally model the impact of reducing LOS for emergency discharges of patients 74 years and over by 15 per cent.

FIGURE 3.10 Length of stay reduction – DTOC and high outlier bed day age distribution, 2023



Note: High outlier profile excludes potentially avoidable hospitalisations.
Source: HIPE, 2023; HSE BIU Acute, 2023.

3.5 CAPACITY RELATED ASSUMPTIONS

3.5.1 Occupancy rate

Occupancy rate estimates are a key input to Hippocrates for the conversion of demand projections to bed capacity requirements.

Data: The national inpatient bed occupancy rates applied were calculated by HSE BIU Acute for 2019–2023 and are presented in Table 3.6.[47] Day bed occupancy rates were calculated by the authors based on HSE BIU Acute reported treatment capacity and activity data from HIPE. In Appendix F, we go into more detail on occupancy rate data issues, which if addressed, could potentially lead to improvements in bed projections in the future.

Methods: To optimally apply occupancy rate, we need to align, as closely as possible, activity data from HIPE to bed type from HSE BIU Acute. Currently, the activity recorded by HSE BIU Acute to estimate occupancy rates does not fully align

[47] The HSE BIU Acute calculation for bed occupancy is: (bed days used – AMAU same day discharges)*100/(bed days available).

with HIPE data. This misalignment between the two datasets may lead to suboptimal projections of bed requirements. Additionally, the only bed data available is total day and inpatient beds, with no additional information on whether the inpatient beds are designated for maternity or paediatrics. Such beds may have different occupancy rates to general adult acute beds (Findlay, 2019). Finally, occupancy rates do not include AMAU sameday beds. To align activity with beds, we also exclude this AMAU activity from our bed projections, but we do project demand for this service separately. As the data environment improves it may be possible for projections to be more nuanced.

TABLE 3.6 National day patient and inpatient bed occupancy rate, 2019–2023

Year	Day patient occupancy rate	Inpatient occupancy rate (average annual)[a]
2019	134.9%	94.5%
2020	111.1%	81.2%
2021	118.0%	86.0%
2022	124.6%	90.9%
2023	126.7%	92.6%[b]

Notes: a Excludes sameday AMAU discharges and National Rehabilitation Hospital data.
b OR for one hospital was not available at the time of writing; this was estimated by the authors based on bed availability and activity recorded in HIPE.
Sources: HIPE 2019–2023; HSE BIU Acute 2019–2023; Inpatient OR HSE BIU Acute 2019–2023; authors' calculations.

Model assumptions: In our main modelling scenarios, three inpatient occupancy rates are considered. In the first instance, the reported 2023 inpatient occupancy rate of 92.6 per cent is applied and assumed to remain constant to 2040. In alternative scenarios, the occupancy rate reduces linearly to 90 per cent and 85 per cent by 2040. The day patient rate is set at its 2023 rate of 126.7 per cent. Given uncertainty surrounding occupancy rates in the base year, our sensitivity analysis models alternative starting values for 2023 of 90 per cent and 95 per cent for inpatient beds, and 140 per cent for day patient beds (Table 6.2).

3.6 PROJECTION SCENARIOS

The analysis presented in this report follows previous Hippocrates-based output and other healthcare projection exercises (e.g. Charlesworth and Johnson, 2018; Lorenzoni et al., 2019; European Commission, 2023; Rachet-Jacquet et al., 2023) by combining the assumptions discussed in the above sections into a range of scenarios.

Table 3.7 provides a summary of the assumptions included in the four projection scenarios presented in this report. The 'status quo' scenario applies the central population projection and current occupancy rates; no healthy ageing (*expansion of morbidity)* or additional demand assumptions are applied. The 'low-pressure' scenario also applies the central population projection, but demand evolves in line with more optimistic healthy ageing effects (*dynamic equilibrium*). Under the 'high-pressure' scenario, demand evolves in line with higher projected population growth (defined by higher net immigration) and no healthy ageing. This scenario also incorporates the 'low-clearance' waiting list management assumption and a lower occupancy rate for inpatients (90%) achieved by 2040.

TABLE 3.7 Projection scenarios

	Services impacted	Scenarios			
		Status quo	Low pressure	High pressure	Progress
Demand assumptions					
1. Population growth and age structure	All	Central	Central	High	Central
2. Healthy ageing	All[a]	-	DE	-	MHA
3. Potentially avoidable emergency hospitalisations	ED and emergency inpatient	-	-	-	25% rate reduction to 2040
4. Elective inpatient to day case	Elective day and inpatient	-	-	-	Increase by 0.2% per annum to 95%
5. Private out of public hospitals	Elective day and inpatient private	-	-	-	Central
6. Waiting list management	OPD, public elective day and inpatient	-	-	Low-clearance	High-clearance
7. LOS reduction	Inpatient[b]	-	-	-	Yes
Bed capacity assumption					
8. 2040 occupancy rate	Day patient	126.7%	126.7%	126.7%	126.7%
	Inpatient[c]	92.6%	92.6%	90%	85%

Notes: MHA=Moderate healthy ageing. DE=Dynamic equilibrium.
a We do not apply healthy ageing shifts to maternity care.
b Excluding maternity and sameday AMAU.
c Excludes sameday AMAU.

Finally, we also specify a 'progress' scenario, which presents the potential implications of implementing a range of policy goals including models of care change. These include the reorientation of care to non-acute and community settings and from inpatient to day case treatment, the removal of private care from public hospitals, and more ambitious waiting list management. The scenario also includes a more ambitious 85 per cent occupancy rate target for 2040, and an LOS reduction for both elective and emergency inpatients. For this scenario, we revert to a central population scenario and apply the more optimistic *moderate healthy ageing* assumption.

3.7 SUMMARY

This chapter provides a detailed description of the projection methods applied in this report. The methods build on those previously developed for the Hippocrates model, and incorporate additional evidence and data, where available. The chapter outlines the data and methods used to calculate base-year service-level activity profiles, and the assumptions underlying the demand and bed capacity projections.

CHAPTER 4

Findings: Activity profiles, 2023

4.1 INTRODUCTION

This chapter presents activity profiles for all services for 2023. The services examined are public acute hospital outpatient department (OPD) attendances, emergency department (ED) attendances, day patient and inpatient discharges and inpatient bed days. Maternity discharges are presented separately throughout.

4.2 ATTENDANCES

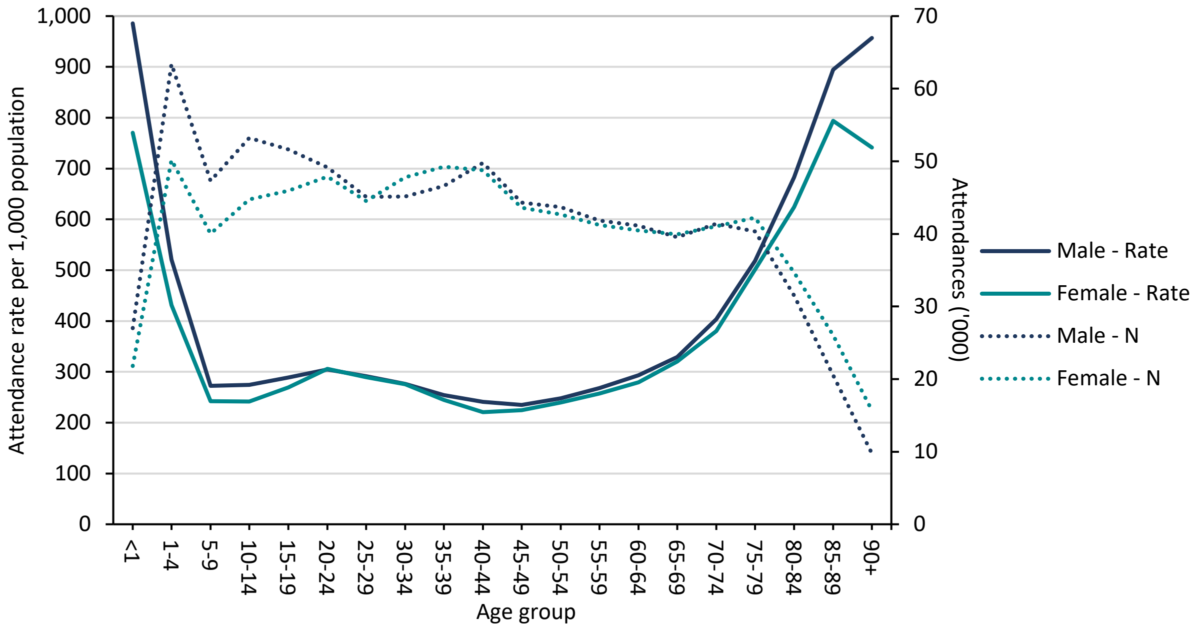
4.2.1 Emergency department

In 2023, there were 1.64 million ED attendances in public acute hospitals in Ireland.[48] Age-specific data are disaggregated by sex, in Figure 4.1. Almost 51 per cent of attendances are male and for most of the age distribution utilisation patterns are very similar for males and females. For adults, the number of attendances marginally decreases with age for both sexes between 20 and 79 years, with more significant decreases thereafter. There are relatively high attendance rates among young children, particularly those aged less than five years. Rates generally remain between 200 and 300 per 1,000 population up to the age of 65–69 years, at which point significant increases in rates are observed. Males attend the ED at marginally higher rates than females for most of the age distribution, with notable differences in the youngest (<1 years) and oldest (90+) age groups.[49] The highest attendance rates are: 986 per 1,000 population for males aged <1 year; and 794 per 1,000 population for females aged 85–89 years.

48 Includes visits to injury units.

49 Reason for attendance is not currently available in PET so it is not possible to explain why this is the case. A similar pattern is observed in NHS data (Office for National Statistics, 2023).

FIGURE 4.1 ED – Age- and sex-specific attendances and attendance rates per 1,000 population, 2023



Sources: HSE BIU Acute, 2023; ESRI population data, 2024; authors' calculations.

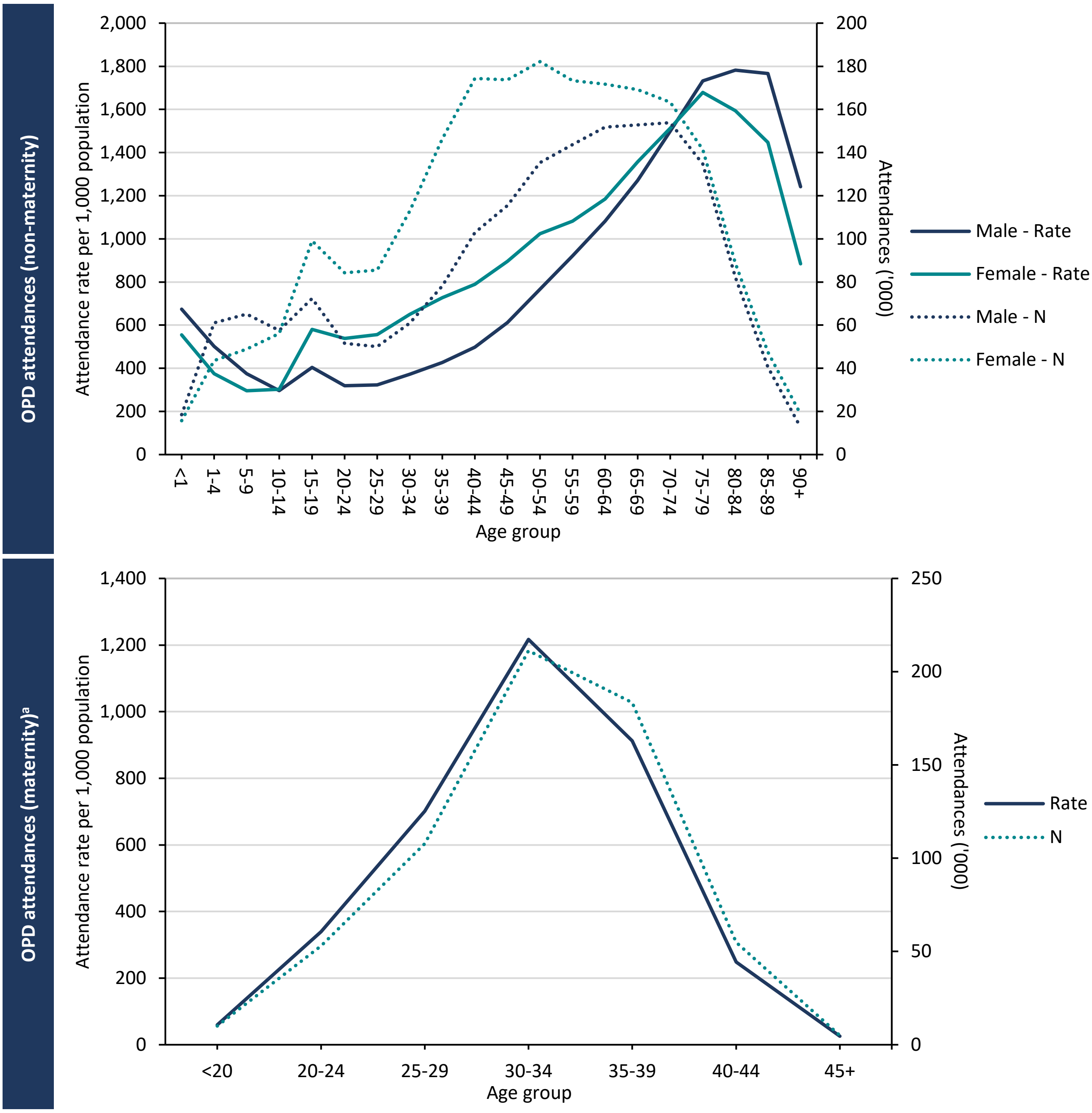
4.2.2 Outpatient department

In 2023, we estimate that there were 3.94 million non-maternity outpatient attendances in public acute hospitals.[50] Estimated age- and sex-specific attendances and attendance rates per 1,000 population are presented in Figure 4.2. Except for the very youngest and oldest age groups, females attend the OPD with higher frequency and at a higher rate than males, even when maternity-related attendances are excluded.[51] For females (excluding maternity), attendance peaks at 50–54 years while attendance rates peak at 75–79 years. For males, attendance peaks at 70–74 years and attendance rates at 80–84 years. There were 626,000 maternity-related attendances at public hospital OPD clinics in 2023. Both the number of attendances and the attendance rate peak at 30–34 years.

50 When interpreting the OPD analysis, attention must be given to the data quality and completeness issues discussed in Section 3.3.2.

51 See Brick and Keegan (2020b), Appendix 1, for further analysis.

FIGURE 4.2 OPD – *Estimated* age- and sex-specific attendances and attendance rates per 1,000 population, 2023



Note: a Maternity attendance rates are calculated from the female population aged 15–49 years.
Sources: HSE Specialty Costing 2023; HSE BIU Acute 2023; ESRI population data, 2024; authors' calculations.

4.3 DISCHARGES AND BED DAYS

There were 1.86 million discharges from public acute hospitals in 2023, or 352 per 1,000 population. This represents the highest number of discharges ever recorded in the Hospital In-Patient Enquiry (HIPE) scheme.[52] Table 4.1 presents a summary of discharges and bed days by patient type and the proportion that were private in 2023.[53] Almost 65 per cent of patients are classified as day patients and 35 per cent as inpatients. Emergency inpatients accounted for 61.7 per cent of inpatient discharges and 78.8 per cent of inpatient bed days in 2023, compared to elective inpatients accounting for 13.1 per cent of total inpatient discharges and 13 per cent of inpatient bed days. Approximately 12 per cent of day patients, inpatients and inpatient bed days related to private patients. This varied by patient type, with 22.7 per cent of elective inpatients (19.0% bed days) being private, compared to 10.9 per cent of emergency inpatients (10.4% bed days).

TABLE 4.1 Discharges and bed days by patient type, 2023

	Discharges				Inpatient bed days			
	N ('000)	%	Rate per 1,000[a]	% private	N ('000)	%	Rate per 1,000[a]	% private
Day patients	**1,205**	**100**	**228**	**11.9**	**-**	**-**	**-**	**-**
Excluding maternity	1,181	98.0	224	11.9	-	-	-	-
Maternity	24	2.0	19	14.0	-	-	-	-
Inpatients	**652**	**100**	**123**	**12.2**	**3,926**	**100**	**743**	**11.8**
Elective	86	13.1	16	22.7	511	13.0	97	19.0
Emergency	402	61.7	76	10.9	3,095	78.8	586	10.4
Maternity	99	15.2	78	14.3	254	6.5	200	17.1
AMAU sameday[b]	65	10.0	12	3.0	65	1.7	12	3.0
Total	**1,857**	**-**	**352**	**12.0**	**-**	**-**	**-**	

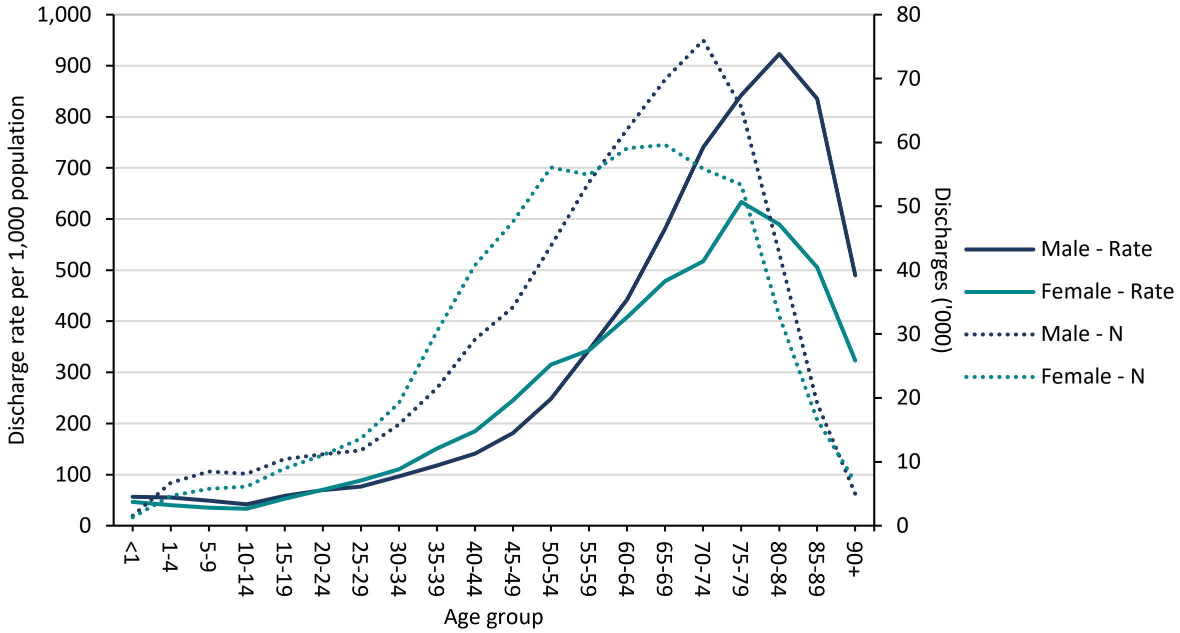
Notes: a Maternity discharge and bed day rates are calculated from the female population aged 15–49 years.
b AMAU sameday cases are included in both the discharge and bed day figures as they are included in the HIPE data. As with all sameday inpatients, we allocate a bed day of one to each discharge. This activity is not included in the available bed/occupancy rate data and therefore is not included in our bed day or bed projections.
Sources: HIPE, 2023; ESRI population data, 2024; authors' calculations.

4.3.1 Day patients

In 2023, 1.18 million day patient (excluding maternity) discharges were recorded in public acute hospitals, 50.5 per cent of whom were male. Figure 4.3 presents age- and sex-specific discharges, and discharges per 1,000 population. The number of discharges increase with age, peaking at 70–74 years for males and 65–69 for females. Discharges are higher for males than females (excluding maternity) in the younger (under 25 years) and older (60 years and over) age cohorts. Discharge rates per 1,000 population follow a similar pattern for males and females, but peak slightly later and at notably higher levels for males (923 per 1,000 population at 80–84 years) than females (633 per 1,000 population at 75–79 years).

52 See Section 1.2 for an analysis of activity trends in HIPE between 2019 and 2024.
53 'Public/Private status refers to whether the patient saw the consultant on a private or public basis. It does not relate to the type of bed occupied nor is it an indicator of private health insurance' (HPO, 2023, p. 10).

FIGURE 4.3 Day patient (excl. maternity) – Age- and sex-specific discharges and discharge rates per 1,000 population, 2023



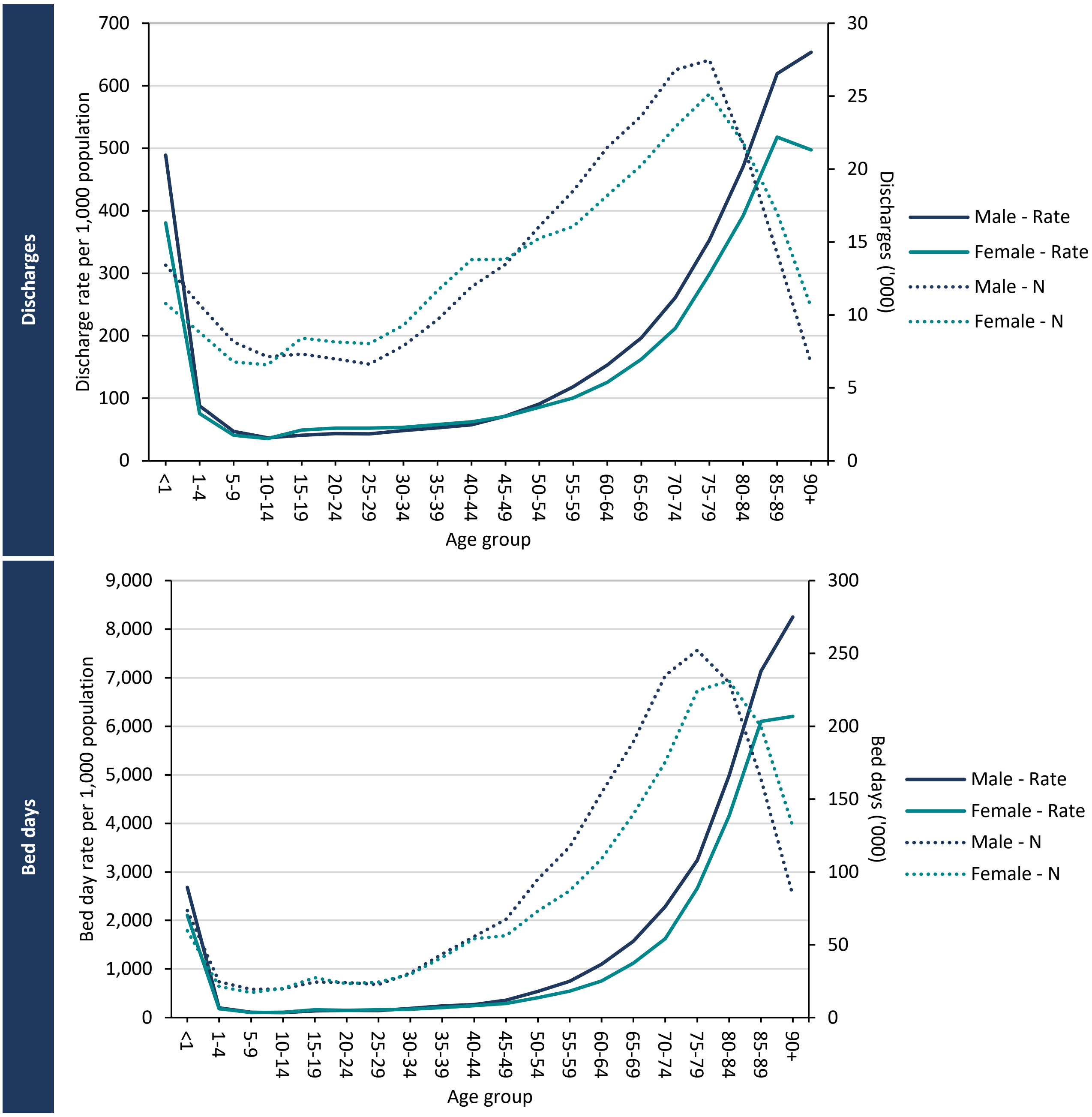
Sources: HIPE, 2023; ESRI population data, 2024; authors' calculations.

4.3.2 Inpatients

In 2023, there were 553,000 inpatients (excluding maternity) discharged from public acute hospitals, with 3.67 million associated bed days. Almost 51 per cent of discharges and 52 per cent of bed days were associated with males. Figure 4.4 presents age- and sex-specific discharges, as well as bed days and associated rates per 1,000 population. Discharge and bed day volumes, and rates for males and females, follow similar trajectories across the age distribution. Discharge and bed day volumes and rates are relatively high for those aged less than 1 year,[54] at which point we observe decreases followed by stability until an upward trajectory is observed from 30 years for discharges and 45 years for bed days. Discharge volumes peak for males and females at 75–79 years, while discharge rates peak at 90 years and over for males (654 per 1,000 population), and 85–89 years for females (518 per 1,000 population). Bed day volumes peak at 75–79 for males, and 80–84 for females, while bed day rates peak at 90 years and over for both males (8,250 per 1,000 population) and females (6,203 per 1,000 population). Discharge and bed day rates for males and females are very similar at younger ages, but from 50 years onwards discharge and bed day rates are consistently higher for males than females.

54 A large proportion of discharges aged <1 year in 2023 is in the admission type 'newborn' in HIPE (51.7% of total inpatients). These are patients aged 0–27 days who are categorised as inpatients following delivery due to conditions such as being preterm, respiratory issues, neonatal jaundice, or observation for infection. It should be noted that well newborn babies are not recorded as discharges in HIPE (Irish Coding Standard 1607).

FIGURE 4.4 Inpatients (excluding maternity) – Age- and sex-specific discharges/bed days and discharge/bed day rates per 1,000 population, 2023

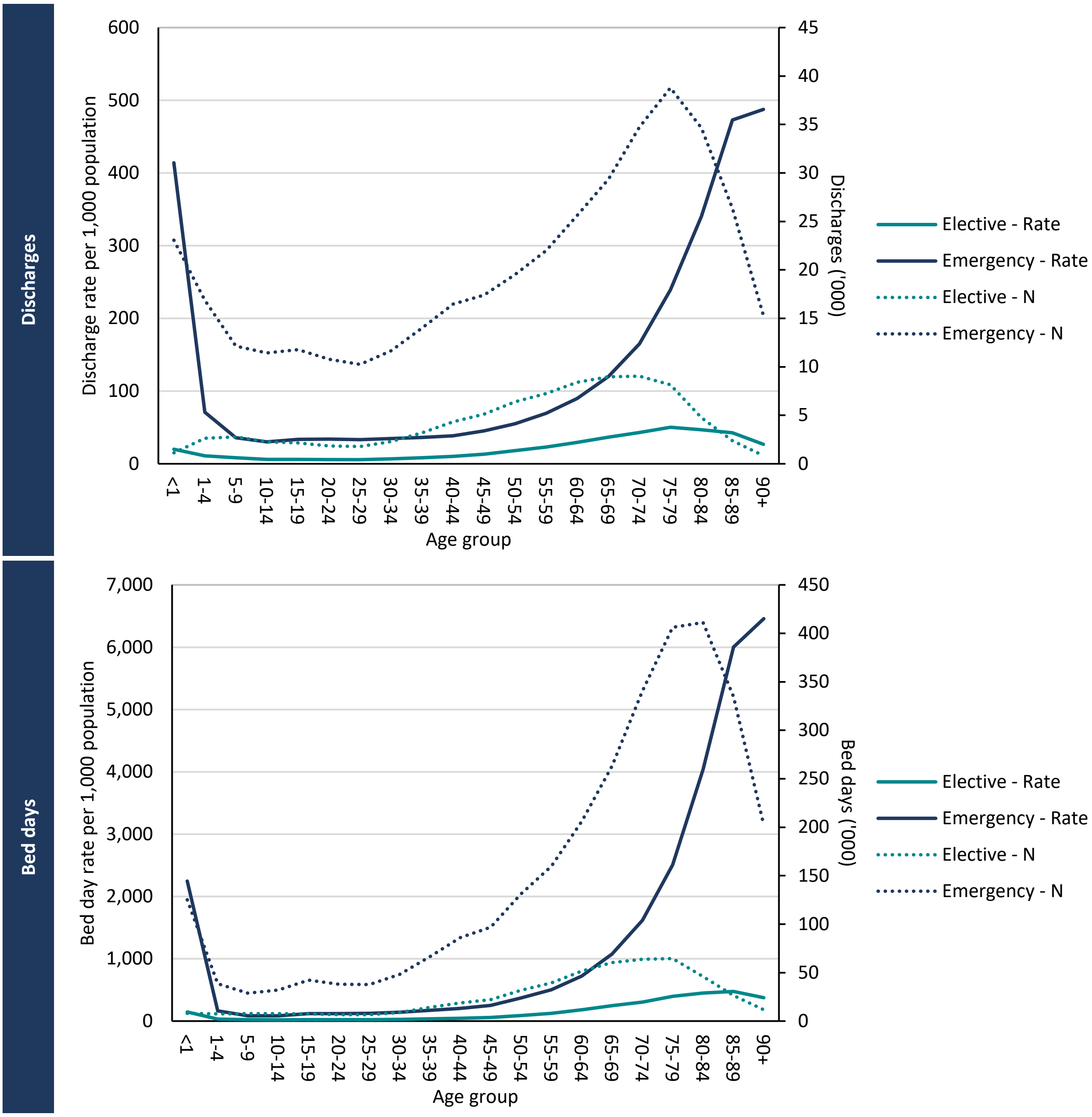


Sources: HIPE, 2023; ESRI population data, 2024; authors' calculations.

Elective and emergency

Figure 4.5 presents age-specific inpatient discharges and bed days and their associated rates per 1,000 population by elective and emergency (excluding acute medical assessment unit (AMAU) sameday) admission type. Emergency discharges account for almost five times the number of discharges and six times the number of bed days as elective inpatients. The distribution of the discharge and bed day rates by age for both elective and emergency inpatients show higher levels at <1 year, followed by a decrease and stability. Levels begin to increase substantively for elective inpatients from 45 years while large increases for emergency inpatients are not observed until 60+ years.

FIGURE 4.5 Inpatients (excl. maternity) – Age-specific discharges/bed days and discharge/bed day rates per 1,000 population by elective and emergency admission type, 2023

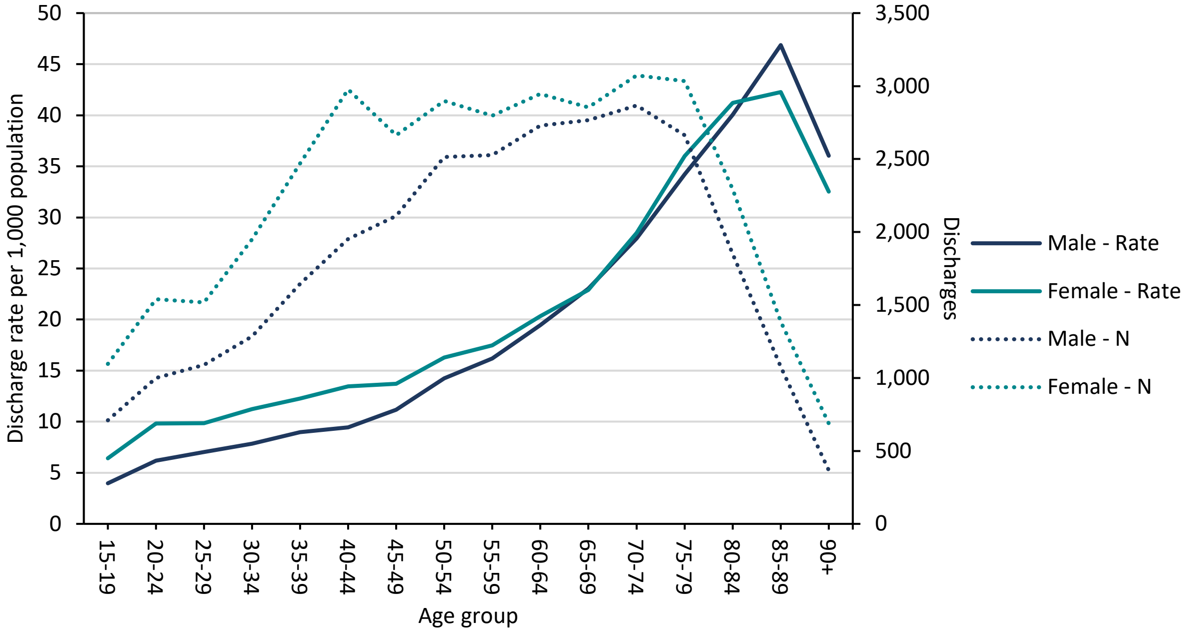


Sources: HIPE, 2023; ESRI population data, 2024; authors' calculations.

Acute medical assessment units – Sameday

In 2023, there were 65,000 patients admitted to and discharged from AMAU wards on the same day. The highest numbers of discharges are concentrated in the 40–79 age range (Figure 4.6), with similar patterns for males and females. Discharge rates per 1,000 population increase with age; they are higher for males than females in the younger age cohorts but are very similar at older ages, peaking at 85–89 years for both (males – 47, females – 42 per 1,000 population).

FIGURE 4.6 AMAU sameday – Age- and sex-specific discharges and discharge rates per 1,000 population, 2023



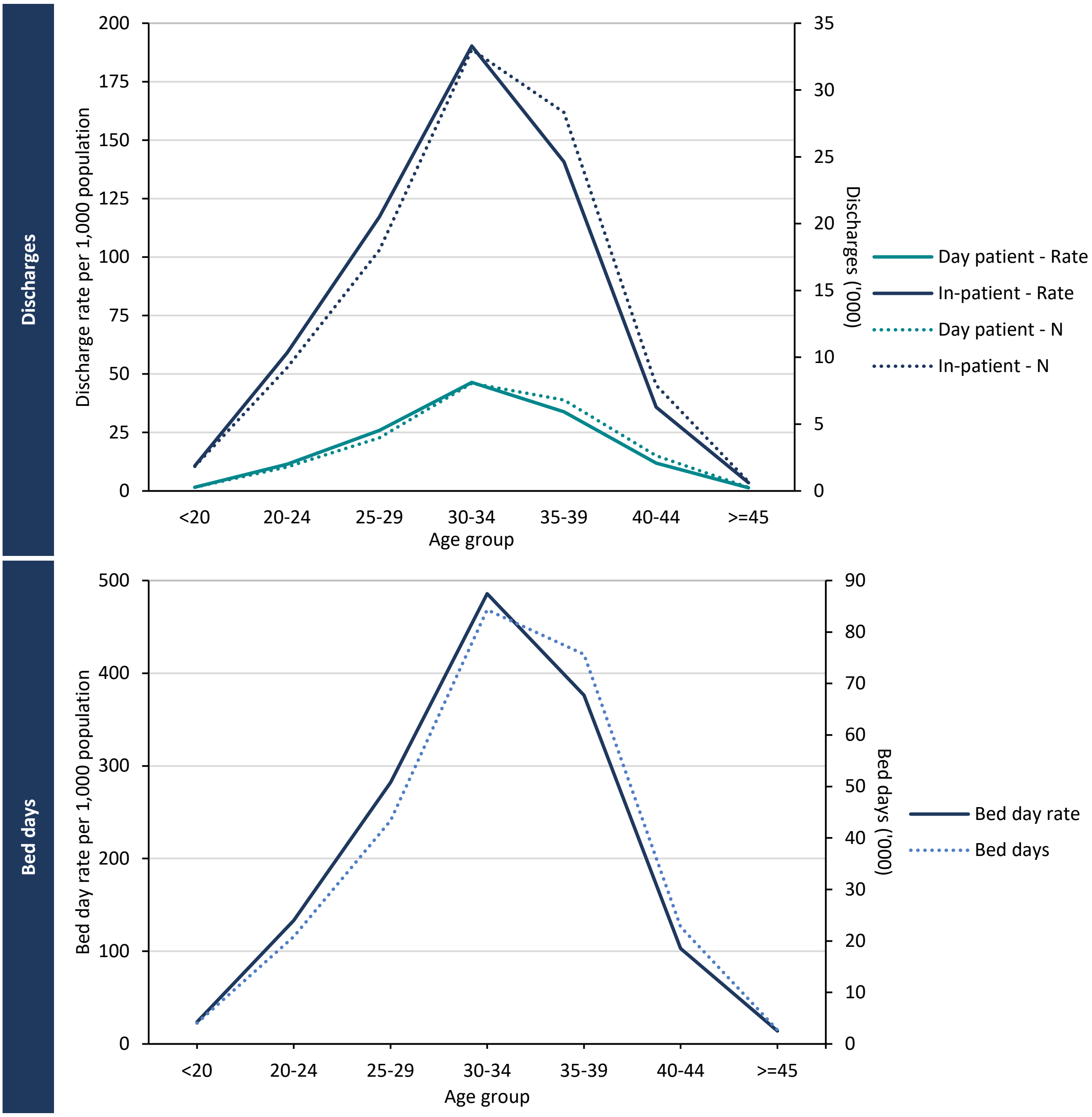
Sources: HIPE, 2023; ESRI population data, 2024; authors' calculations.

4.3.3 Maternity

In HIPE, maternity discharges are those who were 'admitted in relation to their obstetrical experience (from conception to six weeks post-delivery)' (HPO, 2024b, p. 136). Maternity discharges capture both delivery and non-delivery episodes of care. All delivery episodes of care are classified as inpatients and, for maternity discharges, there is no distinction between elective and emergency inpatients. In 2023, about 24,000 day patients,[55] and 99,000 inpatients, were classified as maternity. Approximately 53,000 maternity inpatient discharges (53.7%) were classified as delivery.[56] The age-specific distributions of maternity day and inpatient discharges, bed days and their associated rates (Figure 4.7) follow the same pattern, with each peaking at 30–34 years.

55 We observe inconsistency in the recording of maternity day patient discharges across hospitals.
56 Discharge in HIPE with an additional diagnosis code of Z37 'outcome of delivery'.

FIGURE 4.7 Maternity patients – Age-specific discharges and discharge rates per 1,000 population, 2023



Note: Maternity discharge rates are calculated from the female population aged 15–49 years.
Source: HIPE, 2023; ESRI population data, 2024; authors' calculations.

4.4 SUMMARY

This chapter presents updated activity profiles for services provided in public acute hospitals in 2023. Activity rates for most services are highest in the older age cohorts, which will be particularly impacted by population ageing. These profiles provide the foundation for demand and bed capacity projections to 2040, generated by the Hippocrates model presented in Chapter 5 and Chapter 6.

CHAPTER 5

Findings: Demand and bed capacity projections, 2023–2040

5.1 INTRODUCTION

This chapter presents findings for projected public acute hospital demand and bed requirements to 2040. The services presented are emergency department (ED) attendances, outpatient department (OPD) attendances, day patient and inpatient discharges, as well as day patient and inpatient beds. Inpatient activity is further disaggregated into elective, emergency and maternity discharges. Projections are based on the methodology described in Chapter 3. Using the 2023 demand profiles developed in Chapter 4 as a starting point, four scenarios (summarised in Table 5.1), which include assumptions relating to population growth and ageing, healthy ageing and a selection of policy related changes, are applied over the projection horizon to 2040 to provide a range of demand and bed requirement estimates.

It is important to reiterate that the model generates projections and not forecasts. These results provide medium- to long-term estimates of demand and bed capacity requirements based on the specified assumptions and scenarios. In the short term, demand may vary due to unanticipated demand pressures, for example a particularly impactful influenza/pneumonia season. In this chapter, we present additional requirements for each service, total growth and the average annual growth from 2023 to 2040. The average annual growth rates are reported to provide a guide to the smoothed level of growth required to meet 2040 demand and bed capacity requirements. These may appear low given recent year-on-year volume growth (see Section 1.2), but they are similar to actual average annual growth rates observed between 2011 and 2023, as demonstrated in Appendix G.

TABLE 5.1 Summary of projection scenarios

			Scenarios			
			Status quo	Low pressure	High pressure	Progress
Demand assumptions						
1.	Population growth and age structure		Central	Central	High	Central
2.	Healthy ageing[a]		-	✓	-	✓
3.	Potentially avoidable emergency hospitalisations		-	-	-	✓
4.	Elective inpatient to day case		-	-	-	✓
5.	‘Private out of public’ hospitals		-	-	-	✓
6.	Waiting list management		-	-	✓	✓
7.	LOS reduction[b]		-	-	-	✓
Bed capacity assumption						
8.	2040 occupancy rate	Day patient	126.7%	126.7%	126.7%	126.7%
		Inpatient[c]	92.6%	92.6%	90%	85%

Notes: a We do not apply healthy ageing shifts to maternity care.
b Excluding maternity and sameday AMAU.
c Excludes sameday AMAU.

5.2 DEMAND PROJECTIONS

5.2.1 Emergency department

Table 5.2 presents projected demand requirements for ED attendances under our four scenarios summarised in Table 5.1.[57] Our status quo scenario, which assumes activity rates remain constant throughout the projection horizon and makes no healthy ageing adjustments, projects 383,000 additional attendances by 2040, or over 2 million total attendances. This reflects a growth rate of 23.3 per cent or average annual growth of 1.2 per cent. Our remaining scenarios provide a projection range of between 333,000 and 444,000 additional attendances, reflecting average annual growth rates of between 1.1 and 1.4 per cent. In the case of ED attendances, the combined impact of the progress scenario assumptions (policy options and moderate healthy ageing) mirrors our low-pressure scenario in which we assume a more optimistic healthy ageing assumption (dynamic equilibrium).

TABLE 5.2 ED attendances – Demand requirements by projection scenario, 2023–2040

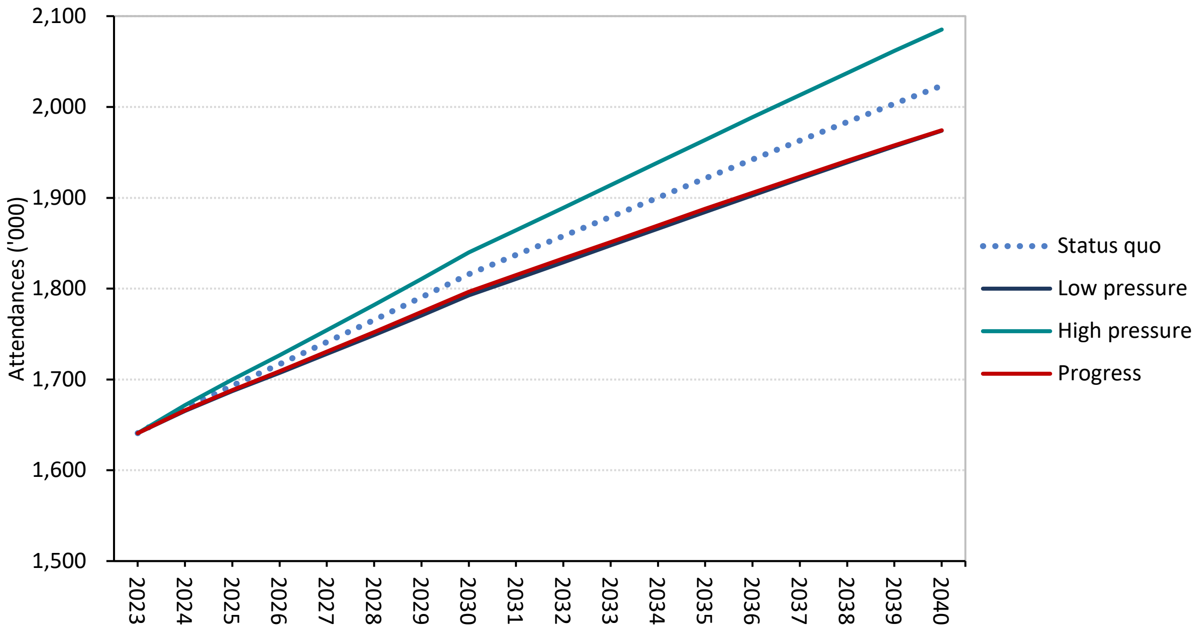
Scenarios	2023	2040		Total growth 2023–2040	Average annual growth 2023–2040
		Projected additional	Total		
	N ('000)	N ('000)	N ('000)	%	%
Status quo	1,641	383	2,023	23.3	1.2
Low pressure		333	1,974	20.3	1.1
High pressure		444	2,085	27.1	1.4
Progress		333	1,974	20.3	1.1

Sources: HSE BIU Acute, 2023; ESRI population data, 2024; authors' calculations.

Figure 5.1 presents the projected demand requirements over the projection horizon. For each scenario, the annual demand requirements are higher in the earlier years, which reflects higher assumed net immigration during this period.

57 Projected age-specific attendances by scenario are presented in Appendix H.

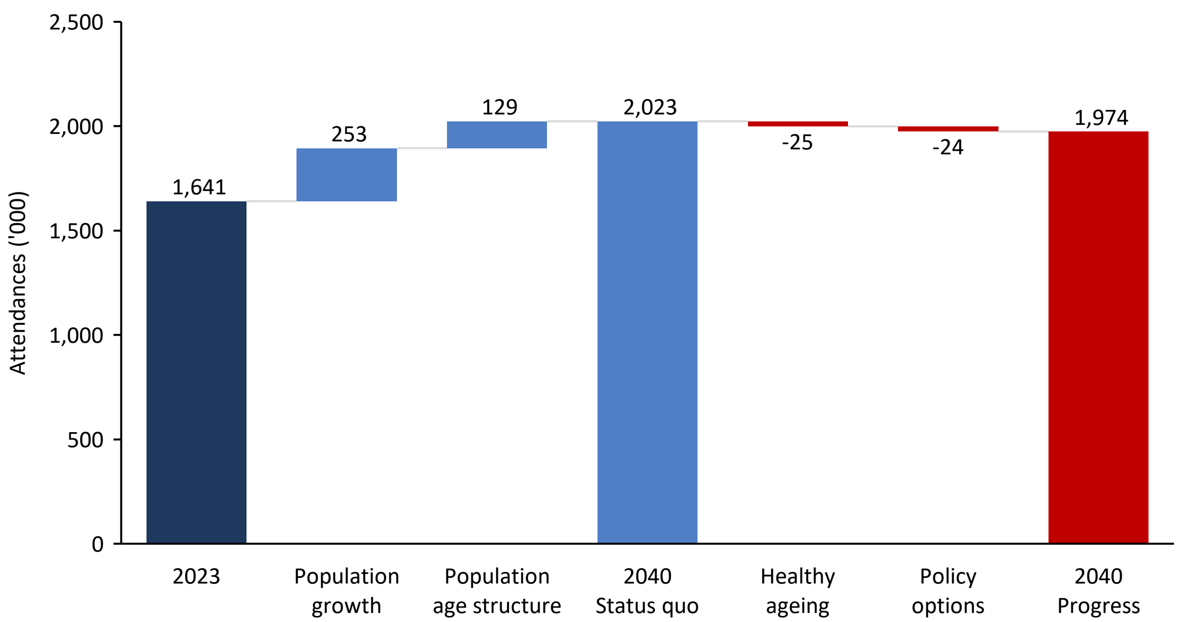
FIGURE 5.1 ED attendances – Demand requirements by projection scenario, 2023–2040



Sources: HSE BIU Acute, 2023; ESRI population data, 2024; authors' calculations.

Looking more closely at the drivers of demand growth in the status quo and progress scenarios, Figure 5.2 decomposes projected growth into its constituent drivers. We see that the main driver is population growth followed by age structure. In the progress scenario, these demand drivers are mitigated by the application of a *moderate healthy ageing* assumption and a reduction in attendances through the application of the potentially avoidable hospitalisation assumption. The greater role of population growth is not surprising given the age-specific utilisation rate profile for ED attendances presented in Figure 4.1.

FIGURE 5.2 ED attendances – Decomposition of attendances growth by projection scenario, 2023–2040



Sources: HSE BIU Acute, 2023; ESRI population data, 2024; authors' calculations.

5.2.2 Outpatient department

Table 5.3 presents projected demand requirements for total OPD attendances in 2040 across the scenarios.[58] Our status quo scenario projects about 1.1 million additional attendances by 2040, leading to a total of 5.7 million attendances. This reflects a growth rate of 24.6 per cent or an average annual increase of 1.3 per cent. Our remaining scenarios provide a projection range of between 950,000 and 1.3 million additional attendances, reflecting average annual growth of between 1.1 and 1.5 per cent.

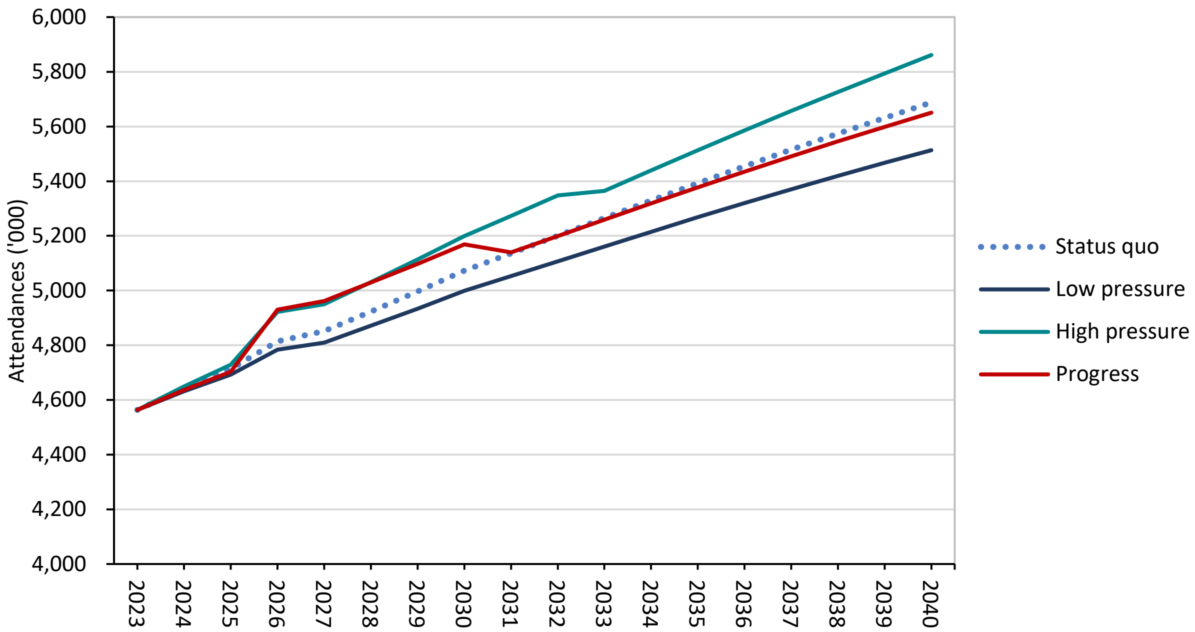
TABLE 5.3 OPD attendances – Demand requirements by projection scenario, 2023–2040

Scenarios	2023	2040		Total growth 2023–2040	Average annual growth 2023–2040
		Projected additional	Total		
	N ('000)	N ('000)	N ('000)	%	%
Status quo	4,563	1,125	5,688	24.6	1.3
Low pressure		950	5,513	20.8	1.1
High pressure		1,298	5,861	28.4	1.5
Progress		1,087	5,650	23.8	1.3

Sources: HPO Specialty Costing, 2023; HSE BIU Acute, 2023; NTPF, 2024; ESRI population data, 2024; authors' calculations.

Similar to the projections for ED attendances, all scenarios project higher growth requirements in the earlier years when net immigration figures are higher (Figure 5.3). In the case of the high pressure and progress scenarios, the increase in requirements is clearly visible in the early years; this is because of the assumed reduction in the non-recurring waiting list backlogs (see Table 3.5).

FIGURE 5.3 OPD attendances – Demand requirements by projection scenario, 2023–2040

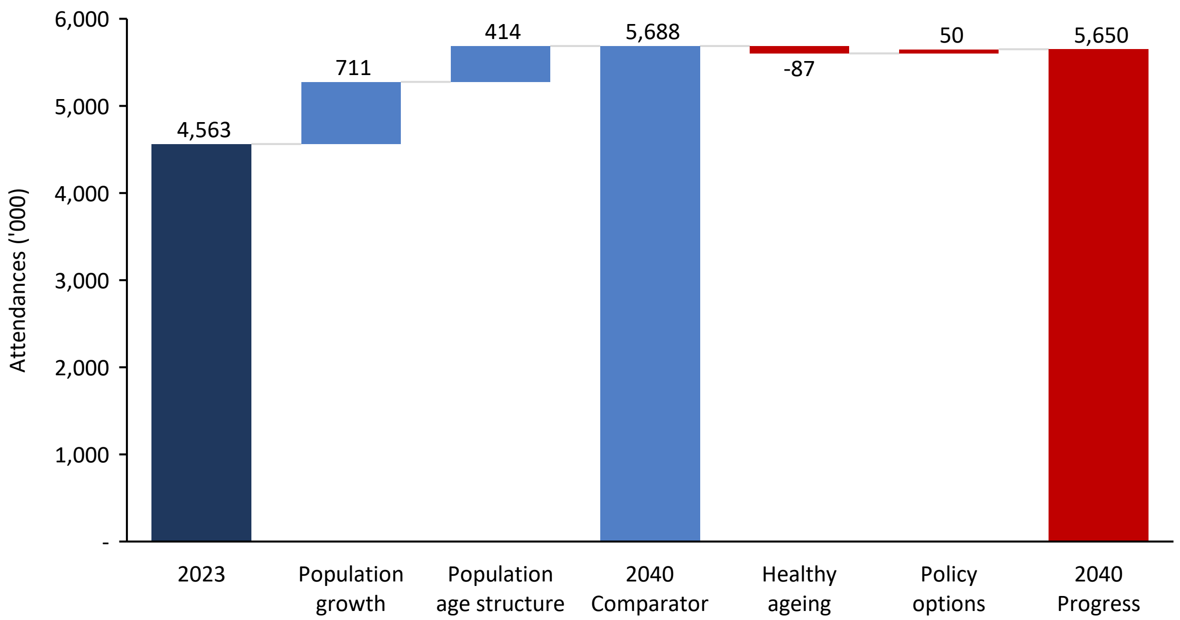


Sources: HPO Specialty Costing, 2023; HSE BIU Acute, 2023; NTPF, 2024; ESRI population data, 2024; authors' calculations.

58 Projected age-specific attendances by scenario are presented in Appendix H.

Figure 5.4 decomposes the projected change in demand for OPD attendances for both the status quo and progress scenarios. Like ED attendances, the primary driver of demand growth is population growth followed by changes in the population age structure. The impact of moderate healthy ageing and policy options in 2040 (with the waiting list backlog assumed to be cleared by 2030) is minimal, with the two assumptions almost counteracting each other.

FIGURE 5.4 OPD attendances – Decomposition of attendances growth by projection scenario, 2023–2040



Sources: HPO Specialty Costing, 2023; HSE BIU Acute, 2023; NTPF, 2024; ESRI population data, 2024; authors' calculations.

5.2.3 Discharges and bed days

Day patients

Table 5.4 presents demand requirements in 2023 and 2040 for total day patient discharges (including maternity) across the four scenarios and by the public/private status of patients.[59] Our status quo scenario for total day patients projects requirements for an additional 410,000 discharges with a range of between 302,000 and 442,000 in the progress and high-pressure scenarios respectively. Cumulative growth rates across the scenarios range from 25.1 per cent in the progress scenario and 36.7 per cent in the high-pressure scenario. The growth rate in the status quo scenario (34%) is higher than that observed for ED (23.3%) and outpatient attendances (23.7%), reflecting the utilisation profile of discharges presented in Figure 4.3. Average annual growth over the period for total day patients ranges from 1.3 per cent in the low-pressure and progress scenarios to 1.9 per cent in the high-pressure scenario.

59 Projected age-specific discharges by scenario are presented in Appendix H.

Similar growth rates are observed for public and private discharges across the scenarios except for the progress scenario. Disaggregating the projections in this way clearly illustrates the impact of the *private activity out of public hospitals* assumption, which is applied to private discharges in the progress scenario. The reduction in the private patient rate in the earlier years of the projection horizon, together with the *shift from inpatient to day case*, means that, by 2040, there is a reduction of 41.4 per cent in private patient discharges compared to 2023, though the overall volume impact is small.

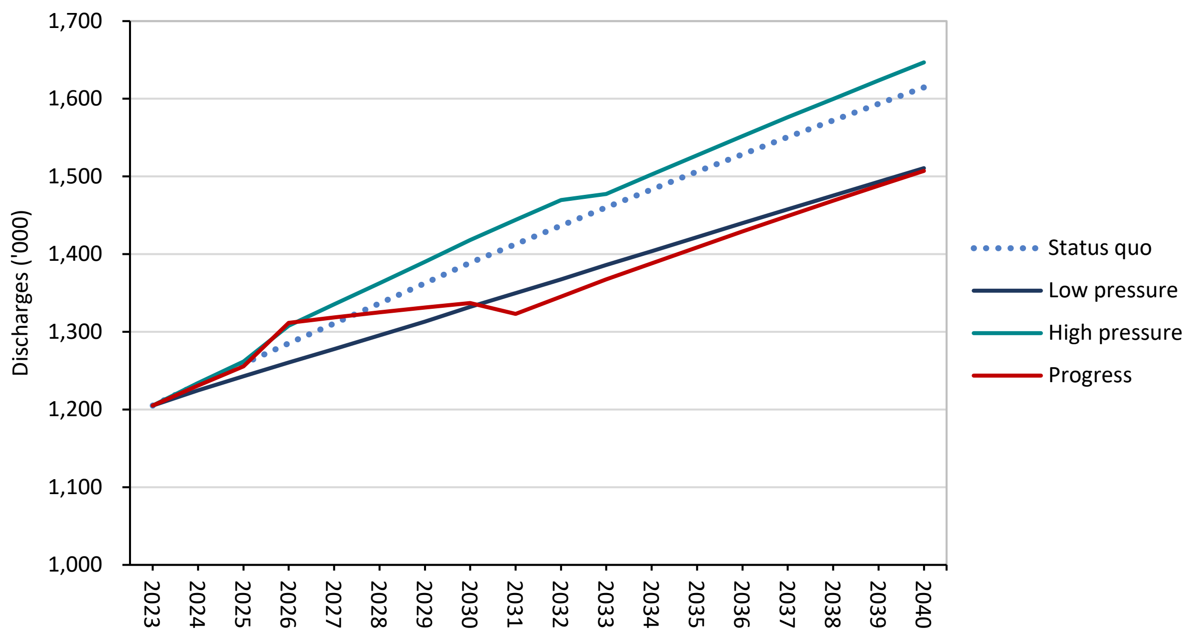
TABLE 5.4 Day patient discharges – Demand requirements by public/private status and projection scenario, 2023–2040

Scenarios	2023	2040		Total growth 2023–2040	Average annual growth 2023–2040
		Projected additional	Total		
	N ('000)	N ('000)	N ('000)	%	%
Public					
Status quo	1,061	361	1,422	34.0	1.7
Low pressure		271	1,333	25.6	1.3
High pressure		390	1,451	36.7	1.9
Progress		362	1,423	34.1	1.7
Private					
Status quo	144	49	192	33.8	1.7
Low pressure		34	178	23.8	1.3
High pressure		52	196	36.2	1.8
Progress		-60	84	-41.4	-3.1
Total					
Status quo	1,205	410	1,615	34.0	1.7
Low pressure		306	1,511	25.4	1.3
High pressure		442	1,647	36.7	1.9
Progress		302	1,507	25.1	1.3

Sources: HIPE, 2023; NTPF, 2024; ESRI population data, 2024; authors' calculations.

Figure 5.5 illustrates the demand requirements for day patient discharges over the projection horizon. There is higher average annual growth in the earlier period in the status quo and low-pressure scenarios, again reflecting the higher net immigration assumptions. The significant deflating effect of the most optimistic healthy ageing assumption on demand is evident in the low-pressure scenario. In the high-pressure scenario, the combined pressures of higher net immigration and the low-clearance waiting list management assumptions lead to significantly higher demand requirements in the earlier period. In the earlier period for the progress scenario, we see evidence of the counteracting assumptions, which simultaneously reduce (*healthy ageing* and *private activity out of public hospitals)* and increase (*shift from inpatient to day case* and *waiting list management)* demand pressures.

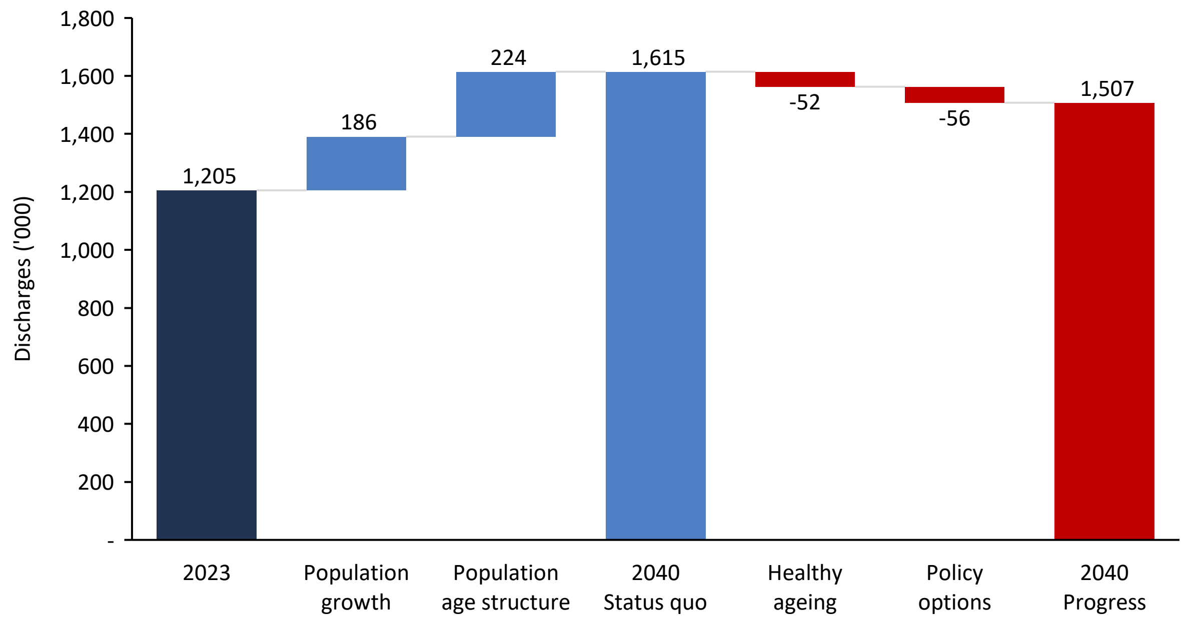
FIGURE 5.5 Day patient discharges – Demand requirements by projection scenario, 2023–2040



Sources: HIPE, 2023; NTPF, 2024; ESRI population data, 2024; authors' calculations.

Figure 5.6 illustrates the main contributors to growth in the status quo and progress scenarios in 2040. Compared to ED and OPD attendances, there is more of a balance between the impact of population growth and population ageing on day patient discharges. This is due to the underlying demand profile of this service (Figure 4.3), particularly the high level of use in older age groups. We can also see that healthy ageing and policy options have a much smaller impact than the demographic drivers.

FIGURE 5.6 Day patient discharges – Decomposition of demand growth by projection scenario, 2023–2040



Sources: HIPE, 2023; NTPF, 2024; ESRI population data, 2024; authors' calculations.

Inpatients

Table 5.5 presents projected demand requirements for total inpatient discharges in 2040 across the scenarios by the public/private status of patients.[60] The status quo scenario for total inpatient projects requirements for an additional 230,000 discharges, with a range of between 145,000 and 253,000 in progress and high scenarios respectively. Growth rates across the scenarios range from 22.2 per cent in the progress scenario and 38.8 per cent in the high scenario. The growth rate in the status quo scenario (35.2%) is similar to that for day patient discharges. The average annual growth between 2023 and 2040 ranges from 1.2 per cent in the progress scenario to 1.9 per cent in the high-pressure scenario.

As expected, the biggest difference in growth rates between public and private discharges is observed in the progress scenario, where we again see the impact of the *private activity out of public hospitals* assumption. The reduction in the private patient rate in the earlier years of the projection horizon, together with the *shift from inpatient to day case*, means that by 2040 there has been growth of just 4.6 per cent in private patient discharges compared to 2023.[61]

TABLE 5.5 Inpatient discharges – Demand requirements by public/private status and projection scenario, 2023–2040

Scenarios	2023	2040		Total growth 2023–2040	Average annual growth 2023–2040
		Projected additional	Total		
	N ('000)	N ('000)	N ('000)	%	%
Public					
Status quo	573	203	776	35.5	1.8
Low pressure		161	734	28.1	1.5
High pressure		224	797	39.1	2.0
Progress		141	714	24.6	1.3
Private					
Status quo	79	26	106	33.4	1.7
Low pressure		19	98	23.8	1.3
High pressure		29	108	36.8	1.9
Progress		4	83	4.6	0.3
Total					
Status quo	652	230	882	35.2	1.8
Low pressure		181	833	27.7	1.4
High pressure		253	905	38.8	1.9
Progress		145	797	22.2	1.2

Sources: HIPE, 2023; NTPF, 2024; ESRI population data, 2024; authors' calculations.

Further examining projections for inpatient discharges by admission type, we can clearly see the impact of the differences in the underlying demand profiles in 2023 (Table 5.6). For emergency inpatient discharges, where activity rates are particularly high at older ages, we see the highest growth over the period in the status quo scenario at 40.9 per cent, or 2 per cent average annual growth. This

60 Projected age-specific discharges by scenario are presented in Appendix H.

61 In the same period, the public inpatient activity has increased 20 percentage points more than private activity, showing the impact of *private activity out of public hospitals*.

compares with 31.9 per cent for elective inpatients and 16 per cent for maternity discharges. The impact of the progress scenario assumptions is most impactful for elective inpatient discharges, for which we observe a 12.5 per cent reduction in demand requirements over the period, or a 0.8 per cent average annual reduction, due to the combined impact of the *shift from elective inpatient to day cases* and *private activity out of public hospitals* assumptions.

TABLE 5.6 Inpatient discharges – Demand requirements by admission type and projection scenario, 2023–2040

Scenarios	2023	2040		Total growth 2023–2040	Average annual growth 2023–2040
		Projected additional	Total		
	N ('000)	N ('000)	N ('000)	%	%
Elective					
Status quo	86	27	113	31.9	1.6
Low pressure		20	106	23.3	1.2
High pressure		30	116	34.9	1.8
Progress		-11	75	-12.5	-0.8
Emergency					
Status quo	402	164	567	40.9	2.0
Low pressure		127	530	31.7	1.6
High pressure		176	578	43.8	2.2
Progress		122	524	30.2	1.6
AMAU sameday					
Status quo	65	22	87	33.8	1.7
Low pressure		17	83	26.8	1.4
High pressure		24	89	36.6	1.9
Progress		18	84	27.9	1.5
Maternity[a]					
Status quo	99	16	115	16.0	0.9
High pressure		23	122	23.1	1.2

Note: a We do not apply healthy ageing shifts to maternity care and therefore the results for the low-pressure and progress scenarios are equal to the status quo.
Sources: HIPE, 2023; NTPF, 2024; ESRI population data, 2024; authors' calculations.

Table 5.7 presents projections for inpatient bed days (excluding acute medical assessment unit (AMAU) sameday) across the four scenarios.[62] We see considerably higher growth rates for bed days than for discharges due to long lengths of stay at older ages. Total growth rates vary from 31.5 per cent in the progress scenario to 55.3 per cent in the high-pressure scenario. In the progress scenario, we see the impact of the *LOS reduction*, which when combined with the other progress scenario assumptions requires average annual growth of 1.6 per cent, compared with 2.5 per cent in the status quo scenario.

TABLE 5.7 Inpatient bed days – Demand requirements by admission type and projection scenario, 2023–2040

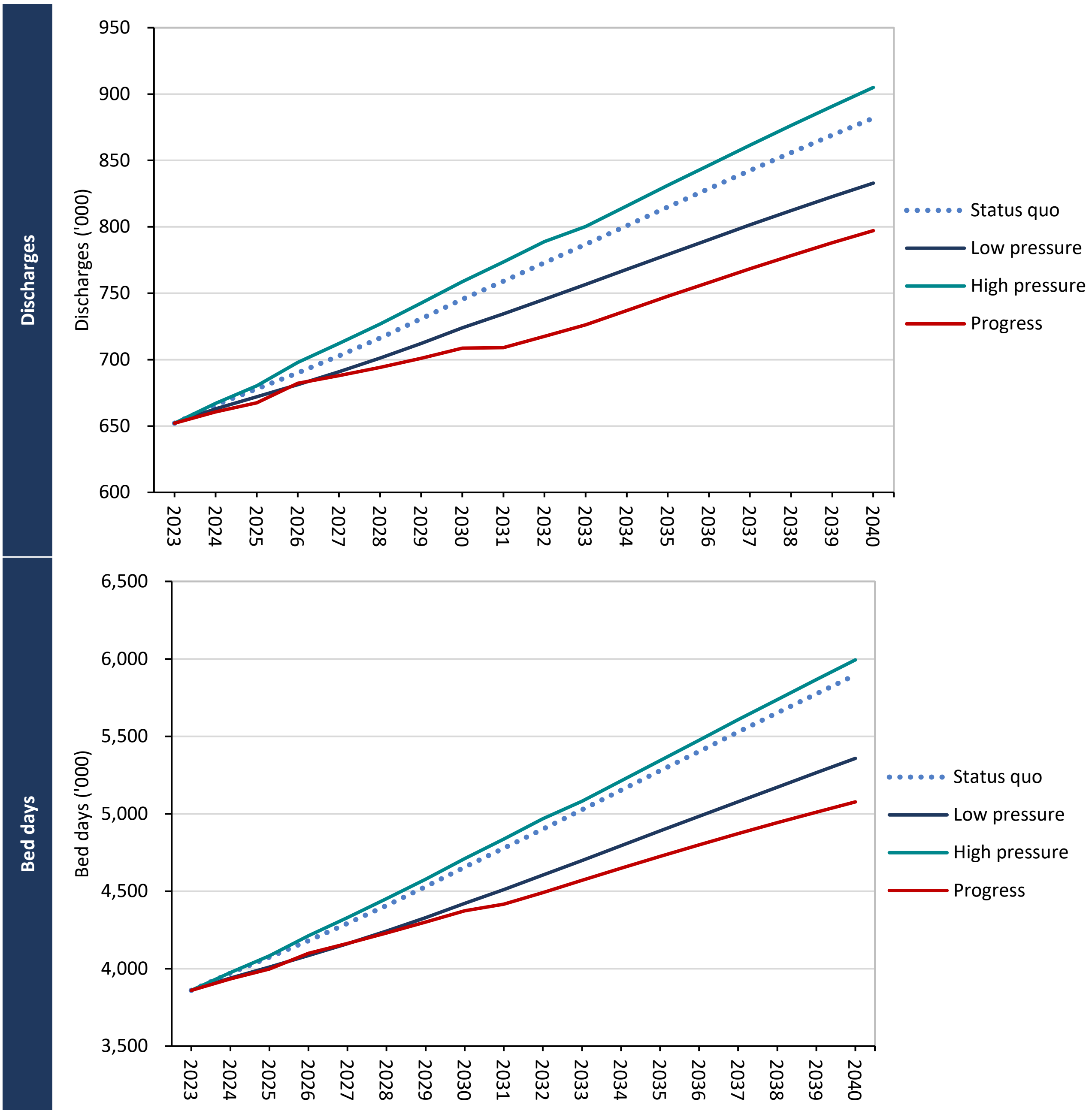
Scenarios	2023	2040		Total growth 2023–2040	Average annual growth 2023–2040
		Projected additional	Total		
	N ('000)	N ('000)	N ('000)	%	%
Status quo	3,860	2,036	5,896	52.7	2.5
Low pressure		1,497	5,358	38.8	1.9
High pressure		2,133	5,994	55.3	2.6
Progress		1,217	5,077	31.5	1.6

Note: Excludes AMAU sameday bed days.
Sources: HIPE, 2023; NTPF, 2024; ESRI population data, 2024; authors' calculations.

62 Projected age-specific bed days by scenario are presented in Appendix H.

Figure 5.7 illustrates the additional demand requirements for inpatient discharges and bed days over the projection horizon. We observe higher growth requirements in the earlier period of the horizon across all scenarios for both discharges and bed days. Particularly high additional requirements are observed in the status quo and high-pressure scenarios due to the underlying age distribution of activity. This also explains, particularly for bed days, why projections for the status quo and high-pressure scenarios are similar.

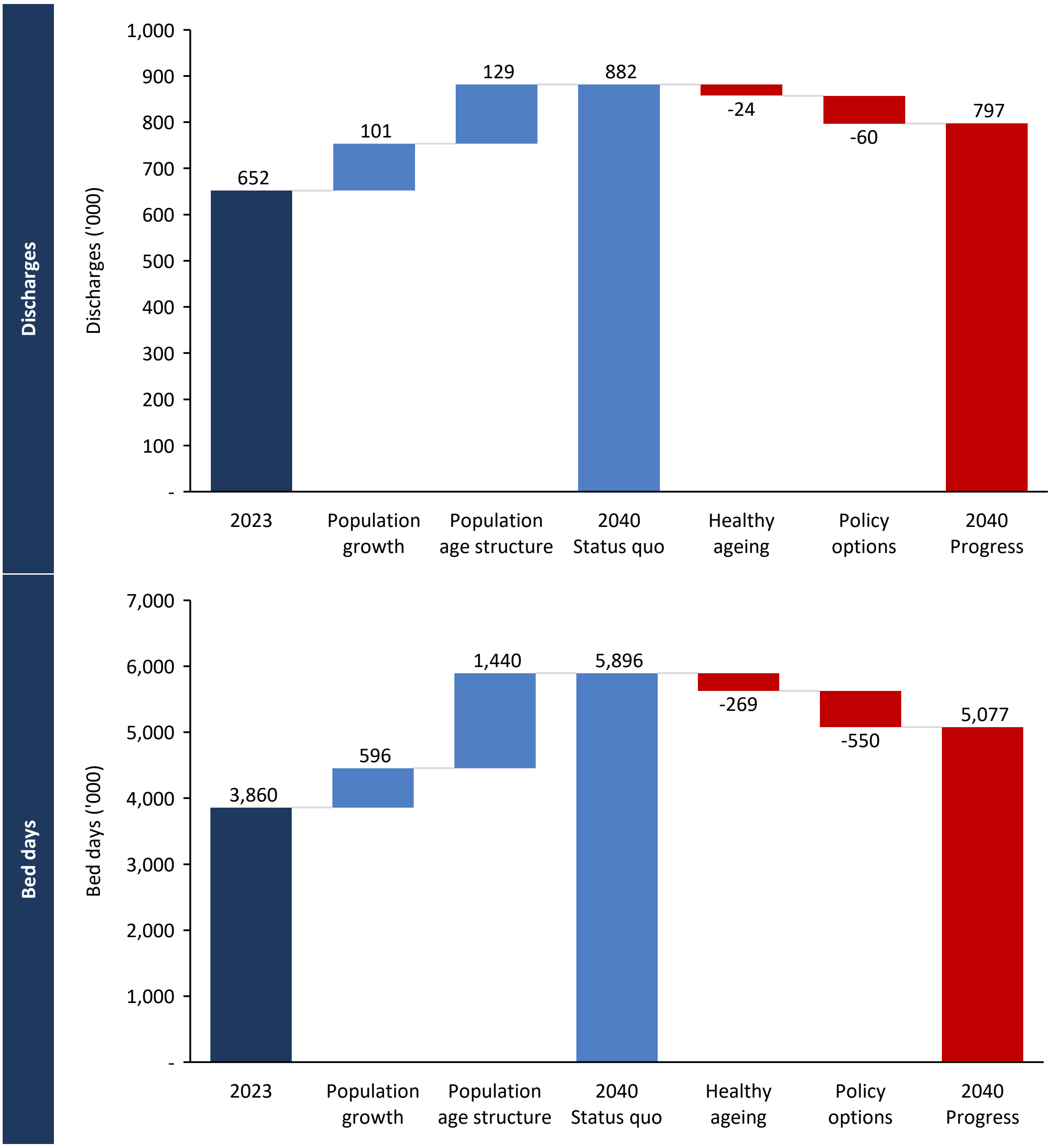
FIGURE 5.7 Inpatient discharges and bed days – Demand requirements by projection scenario, 2023–2040



Note: Bed days exclude AMAU sameday.
Sources: HIPE, 2023; NTPF, 2024; ESRI population data, 2024; authors' calculations.

We continue by separately examining the demand drivers for inpatient discharges and bed days in the status quo and progress scenarios (Figure 5.8). In the status quo scenario, population growth contributes 44 per cent to the growth in discharges compared to 56 per cent for population age structure. For bed days, 71 per cent of growth is accounted for by changes in the population age structure, again highlighting longer length of stay (LOS) in older age groups. We also find that the healthy ageing and policy assumptions only partially counteract the increase in demand requirements due to the demographic drivers.

FIGURE 5.8 Inpatient discharges and bed days – Decomposition of demand growth by projection scenario, 2023–2040



Note: Bed days exclude AMAU sameday.
Sources: HIPE, 2023; NTPF, 2024; ESRI population data, 2024; authors' calculations.

5.3 BED CAPACITY PROJECTIONS

Table 5.8 presents estimated bed capacity requirements across the projection scenarios. Estimated bed requirements for 2023 are based on reported activity in 2023 and the occupancy rate calculated by the authors in the case of day patient beds or provided by the Health Service Executive (HSE) in the case of inpatient beds. For day patient beds, the assumed occupancy rate remains at the 2023 rate (126.7%) throughout the projection horizon. For inpatient beds the occupancy rate remains the same throughout the projection horizon in the status quo and low-pressure scenarios (92.6%). In the high-pressure and progress scenarios, it reduces to 90 per cent and 85 per cent respectively by 2040.

Projected growth requirements for day patient beds are between 25.0 per cent and 36.7 per cent in the progress and high-pressure scenarios respectively; or 1.3 per cent to 1.9 per cent average annual growth. For inpatient beds, growth requirements are higher than for day patient beds and in the range of 38.8 per cent to 59.8 per cent; or 1.9 per cent to 2.8 per cent average annual growth. This corresponds to additional bed requirements of between 661 to 955 for day patients and 4,430 to 6,825 for inpatients.[63]

TABLE 5.8 Beds – Capacity requirements by bed type and projection scenario, 2023–2040

Scenarios	Estimated 2023	2040		Total growth 2023–2040	Average annual growth 2023–2040
		Projected additional	Total		
	N	N	N	%	%
Day beds					
Status quo	2,606	886	3,491	34.0	1.7
Low pressure		661	3,267	25.4	1.3
High pressure		955	3,564	36.7	1.9
Progress		653	3,259	25.0	1.3
Inpatient beds[a]					
Status quo	11,421[b]	6,024	17,445	52.7	2.5
Low pressure		4,430	15,851	38.8	1.9
High pressure		6,825	18,246	59.8	2.8
Progress		4,943	16,364	43.3	2.1
Total beds					
Status quo	14,027	6,909	20,936	49.3	2.4
Low pressure		5,091	19,118	36.3	1.8
High pressure		7,780	21,807	55.5	2.6
Progress		5,596	19,623	39.9	2.0

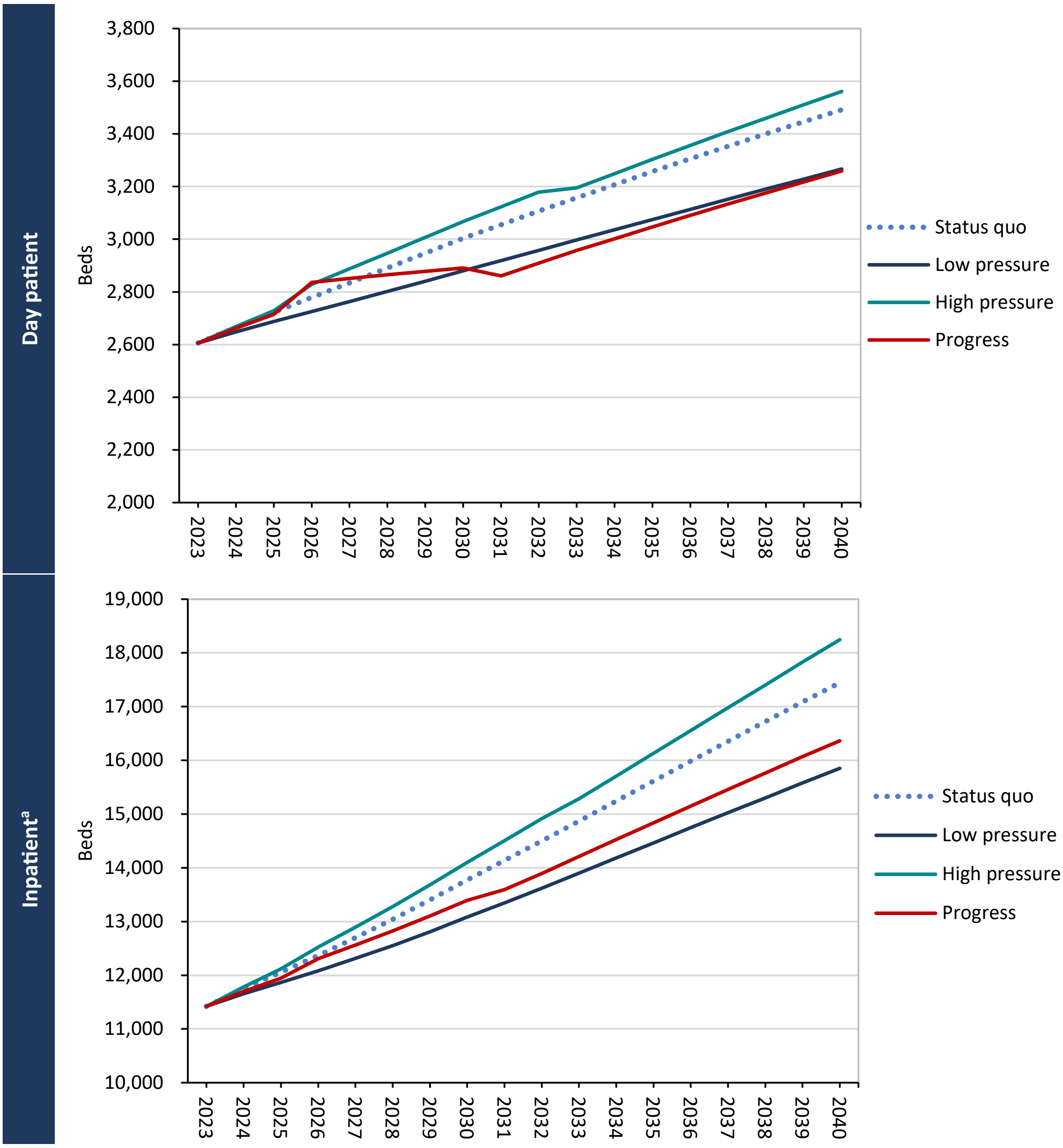
Notes: a These are bed requirements in 2023 based on inpatient activity recorded in HIPE 2023 (excluding AMAU sameday) and the HSE BIU Acute reported national occupancy rate for 2023.
b Inpatient calculations exclude AMAU sameday.
Sources: HIPE, 2023; NTPF, 2024; HSE BIU Acute, 2023; ESRI population data, 2024; authors' calculations.

Figure 5.9 illustrates the change in bed capacity requirements over the projection horizon. For day patient beds, the impact of waiting list management in the high-pressure scenario in the earlier time period is clear, with day patient bed

63 In 2023, Model 4 hospitals in Ireland had an average of 140 day patient beds and 620 inpatient beds, while Model 3 hospitals averaged 50 day patient beds and 250 inpatient beds.

requirements surpassing those in the other scenarios from 2027 onwards. In the progress scenario, the introduction of the *private patients out of public hospitals* assumption combined with the *waiting list management* assumption has a moderating impact on bed requirements, with requirements in 2031 significantly lower than in the status quo scenario. For inpatient beds, the impact of waiting list management is more difficult to see as the number of bed days required are comparatively low compared to overall inpatient bed day demand.

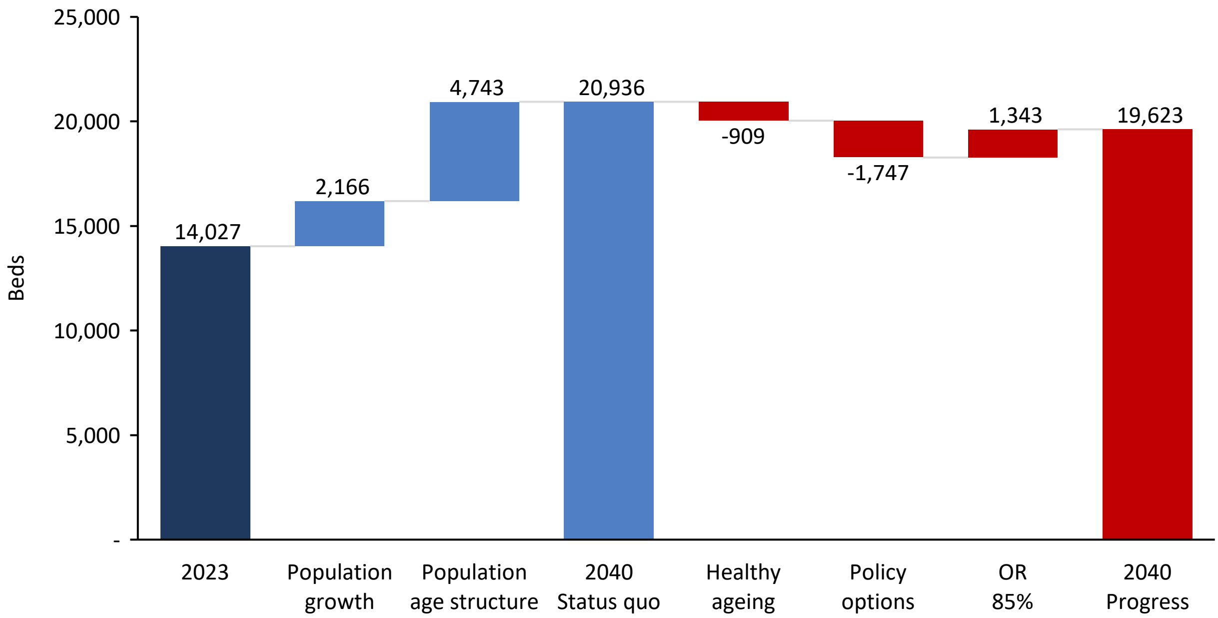
FIGURE 5.9 Beds – Capacity requirements by bed type and projection scenario, 2023–2040



Note: a Inpatient calculations exclude AMAU sameday.
Sources: HIPE, 2023; NTPF Fund, 2024; HSE BIU Acute, 2023; ESRI population data, 2024; authors' calculations.

Figure 5.10 illustrates the drivers of growth in total bed requirements (day case and inpatient beds) in the status quo and progress scenarios. Population age structure is by far the biggest driver, accounting for over two-thirds of growth in the status quo scenario. This is partially offset in the progress scenario through a combination of the healthy ageing assumption and the various policy related assumptions, most importantly the inpatient LOS reduction. Importantly, here we see the effect of the application of an optimistic inpatient occupancy rate target of 85 per cent by 2040, which leads to higher bed requirements.

FIGURE 5.10 Beds – Decomposition of capacity growth by projection scenario, 2023–2040



Note: Inpatient calculations exclude AMAU sameday.
Sources: HIPE, 2023; NTPF, 2024; HSE BIU Acute, 2023; ESRI population data, 2024; authors' calculations.

5.4 SUMMARY

Building on age- and sex-specific demand profiles developed in Chapter 4, this chapter presents demand and bed capacity projections based on four defined projection scenarios. The projections vary assumptions relating to population growth and age structure, healthy ageing and a range of policy-related changes. The chapter highlights the significant impact of demographic pressures on future healthcare demand requirements and the potential importance of policy interventions in mitigating this demand. The projections provide valuable insights for planning and resource allocation in the healthcare sector, which is discussed in Chapter 6.

CHAPTER 6

Summary and conclusion

6.1 INTRODUCTION

This report uses the Economic and Social Research Institute (ESRI) Hippocrates model to provide updated demand and bed capacity projections for public acute hospital services to 2040. The analysis updates the Hippocrates base year activity profiles for emergency department (ED) and outpatient department (OPD) attendances, day patient discharges, and inpatient discharges and bed days to 2023. Under a set of clearly defined scenarios, it also projects demand and bed capacity to 2040. In considering its findings, it is important to note that we model projections, not forecasts, of public acute hospital demand and bed capacity requirements. Projected requirements are based on underlying assumptions in relation to the evolution of service demand and possible policy changes. Over the short term, demand may vary from year to year due to, for example, unanticipated shocks or political decisions on budgetary allocation of resources. In the following sections, we provide a summary of the main findings. Additional analyses are also presented that demonstrate the sensitivity of our projections to changes in key assumptions.

6.2 SUMMARY FINDINGS

Table 6.1 presents a summary of the projection findings reported in Chapter 5. We project significant growth across all services considered in the analysis. For ED and OPD attendances, overall growth between 2023 and 2040 is projected to be 20 to 28 per cent, with average annual growth of 1.1 to 1.5 per cent. For admitted activity, projected growth is higher, particularly due to the age profile of these services presented in Chapter 4. Total growth of between 22 and 39 per cent for day and inpatient discharges is projected, with up to 55 per cent growth projected for inpatient bed days. Average annual growth for these services is projected to be between 1.2 and 2.6 per cent.

An additional requirement of between 653 to 955 day patient and 4,430 to 6,825 inpatient beds, is projected, with average annual growth of 1.3 to 1.9 per cent, and 1.9 to 2.8 per cent, respectively. The higher projected growth rates for inpatient beds are driven by the 85 and 90 per cent 2040 occupancy rate target assumptions.

As highlighted by the decomposition analysis presented in Chapter 5, the biggest driver of growth for all services is the population's projected growth and, particularly, changing age structure by 2040. In the projection scenarios, we apply the central and high population scenarios, which project growth of between 15.4

and 19.3 per cent in the total population between 2023 and 2040, implying increases of between 815,000 and 1 million people. In addition to this overall growth, substantive changes are projected to occur in the structure of the population. Of most significance to the services covered by this analysis, the proportion of the population aged 65 years and over is projected to increase from 15.2 per cent in 2023 to around 21 per cent in 2040.

TABLE 6.1 Projected demand and capacity range by service, 2023–2040

	2023	2040		Total growth 2023–2040	Average annual growth 2023–2040
		Additional demand	Total demand		
	N ('000)	N ('000)	N ('000)	%	%
ED attendances	1,641	333–444	1,974–2,085	20.3–27.1	1.1–1.4
OPD attendances	4,563	950–1,298	5,513–5,861	20.8–28.4	1.1–1.5
Day patient					
Discharges	1,205	302–442	1,507–1,647	25.1–36.7	1.3–1.9
Inpatient					
Discharges	652	145–253	797–905	22.2–38.8	1.2–1.9
Bed days[a]	3,860	1,217–2,133	5,077–5,994	31.5–55.3	1.6–2.6
	N	N	N	%	%
Beds	**14,027**	**5,091–7,780**	**19,118–21,807**	**36.3–55.5**	**1.8–2.6**
Day patient	2,606	653–955	3,259–3,561	25.1–36.7	1.3–1.9
Inpatient[a]	11,421[b]	4,430–6,825	15,851–18,246	38.8–59.8	1.9–2.8

Notes: a Excludes AMAU sameday.
b These are bed requirements in 2023 based on inpatient activity recorded in HIPE 2023 (excluding AMAU sameday) and the HSE BIU Acute reported national occupancy rate for 2023.

Sources: PET, 2023; HSE Specialty Costing 2023, HSE BIU Acute 2023; HIPE, 2023; NTPF, 2024; ESRI population data, 2024; authors' calculations.

6.3 SENSITIVITY ANALYSIS – BED CAPACITY

The uncertainty arising from any projections exercise means that it is prudent to undertake sensitivity analysis. To illustrate the impact of varying individual assumptions independently of others, we run multiple separate analyses to see the impact on bed capacity requirements (Table 6.2).

Demand assumptions: First, we vary our population and healthy ageing assumptions. The high/low population assumptions increase bed requirements by ±1.7 per cent. The *moderate healthy ageing* assumption has a much stronger impact, reducing bed requirements by 4.3 per cent in 2040, or about 900 beds.

The population projections employed in this report assume a constant fertility rate of 1.6 to 2040. This fertility rate is higher than the one assumed in the Central Statistics Office's (CSO) population projections (1.55 to 1.3 by 2037).[64] Additionally, given the recent trend of a falling total fertility rate (Department of Health, 2025a), it might be an overestimation. For this reason, a sensitivity analysis includes an alternative central population scenario in which the fertility rate reduces to 1.4 by

64 See https://www.cso.ie/en/releasesandpublications/ep/p-plfp/populationandlabourforceprojections2023-2057/fertilityassumptions/.

2031 and remains constant thereafter. The updated projections present different results only for newborns/children and not for maternity services, as there is currently no link between these activity rates in the model (see Section 6.4). This lower fertility rate reduces bed requirements by 0.6 per cent in 2040.

Our potentially avoidable hospitalisations and 'private out of public' hospitals assumptions individually reduce bed requirements by between 1.2 and 2.5 per cent, or 250 and 550 beds. The shift from elective inpatient to day case activity has a minimal impact on total beds, as inpatient beds are substituted by day patient beds.[65] The largest negative impact on bed requirements is found for the length of stay (LOS) reduction assumptions. These assumptions reduce bed requirements by between 5.7 and 7.2 per cent, or 1,200 and 1,500 beds compared to the status quo scenario.

As discussed in Section 1.2, we have observed some changes in utilisation patterns over time, particularly following the COVID-19 pandemic. Of most significance to the bed capacity projections are the reduction in the elective inpatient rate per 1,000 population and the increase in emergency inpatient average length of stay (ALOS) in 2022 and 2023. As it is not possible to say if these changes are a post-COVID-19 anomaly or a permanent change in utilisation patterns, we model two sensitivities utilising the 2019 profiles. In the first one, we apply the 2019 elective inpatient rates, and in the second one, we apply the 2019 single year of age (SYOA) and sex data regarding emergency inpatient ALOS to 2023 activity. These assumptions have the individual impacts of increasing bed requirements for elective inpatients (1.7% or 350 beds) and reducing bed requirements for emergency inpatients (-2.6% or 550 beds) – a net of about 200 fewer additional beds.

Occupancy rate assumptions: In the analysis, we apply the 2023 national level occupancy rates, provided by Health Service Executive Business Intelligence Unit – Acute (HSE BIU Acute), to calculate bed requirements over the projection horizon. Given the importance of these rates, we perform several sensitivities presented in Table 6.2. First, we adjust the 2040 target inpatient occupancy rate for the status quo scenario to 90, and 85 per cent from the original 92.6 per cent. Converging the occupancy rate to 90 per cent by 2040 increases bed requirements by 2.4 per cent, or 500 beds, while converging to 85 per cent increases requirements by 7.5 per cent, or 1,500 beds.

65 A small decrease of 0.1 per cent or 22 beds is due to the different occupancy rates of day patient compared to inpatient beds.

TABLE 6.2 Sensitivity analysis – Effect on projected additional bed capacity requirements of varying key assumptions

Fewer beds — More beds

		Beds			% difference from status quo
		DP	IP	Total	
Status quo scenario 2040		3,491	17,445	20,936	
Effect of changing one assumption on 2040 beds:[a]					
Population growth and ageing					
Population – High scenario		66	285	351	1.7
Population – Low scenario		-66	-285	-351	-1.7
Healthy ageing – Moderate healthy ageing		-112	-797	-909	-4.3
Fertility rate – Reduce to 1.4 by 2031 and constant to 2040		-13	-118	-131	-0.6
Potentially avoidable hospitalisations rate reduced					
15%		-	-249	-249	-1.2
25%		-	-427	-427	-2.0
33%		-	-534	-534	-2.5
Private out of public hospitals					
Central scenario: Initial exclusions plus DRG median		-228	-90	-318	-1.5
High scenario: Initial exclusions plus DRG 75th percentile		-313	-183	-495	-2.4
Shift from elective inpatient to day case					
0.2 ppt increase in the day case proportion per annum to 95%		60	-82	-22	-0.1
LOS reduction					
Elective inpatients 5% and emergency 10% inpatients		-	-1,186	-1,186	-5.7
Elective inpatients 5% and emergency 15% inpatients		-	-1,508	-1,508	-7.2
2019 alternative activity metrics					
Elective inpatient discharge rates		-	353	353	1.7
Emergency inpatient ALOS		-	-546	-546	-2.6
Occupancy rate 2040					
Inpatient occupancy rate reduced to 90% by 2040		-	504	504	2.4
Inpatient occupancy rate reduced to 85% by 2040		-	1,560	1,560	7.5
Occupancy rate 2023[b]	2023 beds				
IP OR 2023 90% – No change by 2040	IP 11,751	-	174	174	2.4
IP OR 2023 90% – Reduced to 85% by 2040	IP 11,751	-	1,230	1,230	7.5
IP OR 2023 95% – No change by 2040	IP 11,132	-	-152	-152	-2.1
IP OR 2023 95% – Reduced to 85% by 2040	IP 11,132	-	1,848	1,848	7.5
DP OR 2023 140% – No change by 2040	DP 2,358	-84	-	-84	-1.6

Notes: DP=Day patient; IP=Inpatient. OR=Occupancy rate.
a We do not present varying assumptions in relation to waiting list management as the 2040 effect on demand/beds is small relative to other drivers and its impact mostly affects the earlier years, when the backlog was being cleared.
b For the projections with different ORs in 2023, the 2040 bed requirements presented do not account for differences arising in 2023. For example, the 330 bed differential between the beds estimated at the reported inpatient OR for 2023 (11,421) and the beds estimated at a 90% occupancy rate (11,751).

Sources: HIPE, 2023; NTPF, 2024; HSE BIU Acute, 2023; ESRI population data, 2024; authors' calculations.

Second, there is some uncertainty as to the accuracy of the reported inpatient occupancy rate for 2023 (see Appendix F). Currently, activity data and available bed information do not align optimally, as they are sourced from different providers. Additionally, the occupancy rate is not provided by bed type, such as maternity, paediatric, elective and emergency beds. This lack of specificity might lead to the underestimation of bed requirements for general acute adult beds, which can occur if the occupancy rate is distorted by the inclusion of paediatric or maternity beds, into which general adult patients cannot be admitted. To examine the impact of a different starting inpatient occupancy rate, we estimate the impact of a 90 and 95 per cent occupancy rate in 2023. Starting from the lower occupancy rate of 90 per cent and converging to 85 per cent by 2040 increases the bed requirements compared to the status quo scenario by 7.5 per cent, or 1,250 beds. If, on the other hand, the starting inpatient occupancy rate is in effect higher, at 95 per cent, reducing to 85 per cent by 2040 requires 1,850 more beds compared to the status quo scenario. Finally, if the starting day patient occupancy rate is 140 per cent instead of the estimated 126.7 per cent for 2023, and assuming no change over the projection horizon, 80 fewer beds are required in 2040 – 1.6 per cent fewer beds compared to the status quo scenario.

6.4 LIMITATIONS

Like any modelling exercise, this analysis is subject to some limitations, which we outline thematically below. It is important to reiterate that the projections are based on the pattern of service utilisation in 2023. Changes to demand may arise, for example, from new conditions, increases in rates of chronic disease, or changes to treatment pathways.

Unscheduled care attendances: In the analysis, we examine unscheduled care, ED and injury unit attendances. Currently this is a combination of two separate datasets. While some injury units report their data to the patient experience time (PET) dataset, at this point in time not all of them do. Some hospitals report their injury unit data as part of their ED data, with no distinction made between the two. Ideally, in future iterations of the modelling, we would project injury unit and ED attendances separately, with all activity reported through PET and that allows for a clear distinction between different types of activity. Our ability to examine trends over time has been limited by such data quality issues, particularly the ability to unpick the drivers of increases in attendances and whether they can be attributed to more complete and comparable data, new service provision, or non-demographic demand growth pressures.

OPD: While it should be noted that data availability and quality are constantly improving, substantive challenges remain. Detailed administrative data are available for some services already (HIPE – day and in-patient) and are improving for others (PET – ED). Nonetheless, in the case of OPD attendances, data remain limited. There are two main issues. First, not all OPD activity is captured, even in the most aggregated data available. Moreover, the extent to which this activity is captured varies across hospitals and over time. This means that there is uncertainty around the 2023 volume of attendances included in the modelling and the growth trend over time. As with unscheduled care attendances, it is currently not possible to disentangle the drivers of demand growth and identify any non-demographic growth pressures. Second, administrative age- and sex-specific data on public OPD attendances in Ireland do not exist. This necessitated the use of a variety of data sources to estimate the underlying activity profiles, which limits the precision of the projections concerned.

Issues around the quality and breadth of the OPD data also impede our ability to analyse the potential for a shift in activity from a day patient to an OPD setting, as there are no data available on the type of activity currently being undertaken. An action arising from the Sláintecare Implementation Strategy was to examine the use of activity-based funding for outpatient services (Government of Ireland, 2021; HSE, 2021b). This work is being undertaken by the Healthcare Pricing Office (HPO) in conjunction with HSE Acute Hospitals and HSE BIU Acute. Initially, this work aims to define a minimum OPD dataset (Collins, 2024), which will include an outpatient classification field. This dataset will provide all the demographic and clinical information in a consistent way across all hospitals. Such a dataset will be invaluable for projection modelling when it is rolled out across all hospitals.

Delayed transfers of care: While it is widely acknowledged that there is potential for bed day savings by transferring patients who are clinically fit for discharge to a more appropriate non-acute setting in a timely manner (Department of Health, 2018), the data are not available to monitor this process in a detailed way. The HIPE dataset does not have an operational metric to capture 'clinically fit for discharge', and the only dataset capturing the bed days lost due to delayed transfers of care (DTOC) has no clinical data available. The insights such a variable could provide for non-acute care planning would be invaluable.

Unique patient identifier: The lack of a unique patient identifier is a significant limitation that impacts all public health services, not just public acute hospitals. Even within a single hospital context, it is not possible to link the patient pathway through the various services. For example, for an emergency inpatient admission, it is not possible to link the ED record to the HIPE record or follow-up OPD attendance. For a day patient or elective inpatient, we are unable to follow them from their addition to an OPD waiting list (NTPF) to their OPD attendance (HSE BIU Acute) and the subsequent day or inpatient waiting list record (NTPF) and treatment (HIPE). This also means that it is not possible to calculate the total waiting time from referral to treatment. A specific example of the impact of this limitation is the inability to gauge the impact of, and changes in, chronic disease presentations. Having these data linked would allow for a more nuanced picture of service utilisation to be constructed.

Occupancy rate: Chapter 5 and the sensitivity analyses in Table 6.2 demonstrate that the occupancy rate used to convert activity into bed requirements in the model is a critical input. In all scenarios, we model the 2023 HSE reported rate for inpatients as our starting point.[66] However, an analysis of the underlying data suggests a misalignment between the HIPE data used for generating underlying utilisation profiles and the activity data reported to HSE BIU Acute for calculating the occupancy rate. To ensure confidence in the annual occupancy rate, it is essential to align activity data and available bed information. In addition, having occupancy rates by bed type would allow for more accurate and targeted bed projections. It would be optimal to have occupancy rates for maternity, paediatric, elective and emergency beds that could be aligned to activity. This approach would prevent the underestimation of bed requirements for general acute adult beds, which can occur if the occupancy rate is distorted by the inclusion of paediatric or maternity beds, into which general adult patients are not admitted.

Critical care beds: As previously mentioned, the analysis in this report does not differentiate between the various types of beds in public acute hospitals, except for day patients and inpatients. The data currently incorporated into the Hippocrates model do not allow for a sub-analysis of maternity, paediatric or critical care beds. However, the National Office of Clinical Audit collect data (the Irish National ICU Audit) that could allow for critical care beds to be separately projected. While beyond the scope of the current report, this would be an important exercise for future research given the surge in demand for these services observed during the COVID-19 pandemic.

Maternity projections: Projections of demand for maternity services are currently based only on population change in the associated female age cohort. Projections would benefit from separate maternity-specific research into how factors such as fertility rate, maternal ageing, immigration and changing clinical complexity may impact demand for maternity care. For example, the increasing caesarean section rate could have a significant impact on service demand and staffing requirements, even in the context of a falling birth rate. In the 10-year period from 2013 to 2022, the caesarean section rate increased by 32 per cent to 38 per cent, and to 40 per cent for primiparous women (HPO, 2024a).

Potentially avoidable hospitalisations: One of the key assumptions underlying the progress scenario is that the implementation of the Enhanced Community Care Programme in primary care, along with assumed reductions in, for example, vaccine-preventable influenza and pneumonia, will lead to a reduction in the hospitalisation rate for a range of conditions. It is acknowledged, however, that it is too early to tell how effective the interventions will be in reducing hospitalisations, and that this should be reviewed once more data become available.

66 OR data were not available for one hospital at the time of writing; in this case, it was estimated by the authors based on bed availability and activity recorded in HIPE.

Healthy ageing: As discussed in Chapter 2, there is a lack of data or evidence in the Irish context as to which healthy ageing assumption is most appropriate to apply. As a result, we have applied various assumptions in the analysis to provide a range. Future projections would benefit from more evidence on healthy ageing that is specific to Ireland.

Waiting lists: It was outside the scope of the current analysis to consider specialty requirements of those on waiting lists, and the analysis was undertaken at an aggregate level. The mix of specialty requirements may impact the time required to reduce waiting lists, particularly if a significant number of patients are awaiting treatment requiring highly specialised staff.

Demand fluctuations: It should be noted that year-on-year demand may fluctuate, and that average annual growth rates are reported as a guide to the smoothed level of growth required to meet 2040 demand and bed capacity requirements (see Appendix G). Macro simulation models such as Hippocrates tend to provide a reliable guide to requirements over the medium term (Charlesworth and Johnson, 2018) and previously published Hippocrates projections have shown this to be the case for admitted care.[67] Using a 2015 base year, Wren et al. (2017) projections for day patients, inpatients and inpatient bed days were within 0.3 per cent, 3.0 per cent and 0.7 per cent respectively in the closest scenarios compared to the actual outturn in 2023.

6.5 Policy implications, reflections and conclusions

The main finding of this report is that demand and bed capacity requirements for public acute hospital services will increase significantly by 2040, primarily due to a growing and ageing population. These findings have important implications for service planning, future staffing and capital investment.

Even the lower end of the bed projection estimates, the low-pressure scenario, outlines requirements for an additional 5,100 beds, including 4,430 inpatient beds, by 2040. Adding to the status quo scenario assumptions related to the achievement of Sláintecare goals, a slightly healthier population, and a bed occupancy rate of 85 per cent, the progress scenario estimates additional requirements of almost 5,600 beds while also requiring substantial investment in primary and social care.

The Acute Hospital Inpatient Bed Capacity Expansion Plan (Government of Ireland, 2024), published in May 2024 and developed in line with the Department of

67 We do not have data for ED and OPD to allow for an accurate comparison.

Health's Strategic Health Investment Framework (Department of Health, 2024a), sets out a programme of expansion with a total planned increase of 3,378 new beds (excluding the National Rehabilitation Hospital) between 2024 and 2031. If delivered, this would surpass the projected upper range of additional requirements for 2031 presented in this report (Figure 5.9). This is the level of ambition needed to reach the projected 2040 requirements. It is worth noting that the average annual growth requirements range for inpatient beds now projected (1.9% to 2.8%) are close to estimates by Keegan et al. (2018) (2015–2030: 1.5% to 2.6%).

Productivity improvements can play an important role in offsetting increasing demand pressures (Charlesworth et al., 2024). Progress is being made in improving the efficiency of elective services, with the first surgical hub having opened in 2020 at the Reeves Centre in Tallaght Hospital (Department of Health, 2024b).[68] A second hub, linked to St. James' Hospital, opened at Mount Carmel Hospital in early 2025, with several others confirmed as being in development (North Dublin, Galway, Cork, Waterford and Limerick) and one under consideration in the North West (Department of Health, 2025b; HSE, 2025). While it is too early to assess their impact, a recent evaluation of English surgical hubs in the National Health Service (NHS) has found they can increase treatment volumes and improve efficiency, particularly for high-volume, low-complexity procedures (Clarke, 2024).

Another initiative, the implementation of the National Perioperative Patient Pathway Enhancement Programme, seeks to improve operating theatre access and flow. This, coupled with the development of elective-only hospitals and continued commissioning of services from the private sector, should increase ringfenced capacity in coming years (Department of Health, 2025b). The elective-only hospitals in Cork, Dublin and Galway, if correctly resourced, should allow for the required specialisation to increase throughput and reduce variation in models of care across hospitals. Variation in day surgery rates across hospitals has been highlighted as an issue both nationally (Department of Health, 2023a; HSE, 2024b; Brick et al., 2025) and internationally (Lafortune et al., 2012; Leroy et al., 2017; OECD, 2023a).

Careful monitoring of progress will be important, and the annual focus on waiting list management through the Waiting List Action Plans has shown to be beneficial. The announcements that the National Treatment Purchase Fund (NTPF) will begin the collection, validation and reporting of radiology waiting lists and the implementation of best practice reporting are welcome developments (Department of Health, 2025b). Best practice reporting will allow for more useful

68 'A surgical hub is a ring-fenced surgical facility containing operating theatres, treatment rooms, beds and other services necessary to deliver ambulatory, minor and day case procedures. The primary purpose of surgical hubs is to enhance day case surgery and ambulatory capacity in order to address waiting list pressures' National Clinical Programme in Surgery (2023), p. 5.

comparisons to be made both nationally and internationally (Brick and Connolly, 2021). These changes and significant investments in elective care are welcome and should improve waiting times and patient outcomes (OECD/European Commission, 2024).

There is a clear requirement for a more intensive focus on the drivers of emergency inpatient care. In 2023, emergency inpatients accounted for almost five times the discharges and six times the bed days of elective inpatients. There is also evidence that the LOS of these patients has been increasing. It is evident from the sensitivity analyses presented in Table 6.2 that levers impacting emergency inpatients have a greater mitigating impact on increasing bed requirements than those impacting elective activity. Getting a detailed understanding of the demand drivers for emergency care is important for capacity planning.

Our analysis of potentially avoidable hospitalisations has highlighted several conditions that have a significant impact on inpatient bed days. Of note is the impact of vaccine-preventable influenza and pneumonia, with pneumonia being the biggest driver. Data from The Irish Longitudinal Study on Ageing (TILDA) Wave 5 show that less than one-third of those 65 years and over had received a pneumococcal vaccination (TILDA, 2024). Recent influenza vaccination data show that overall rates for those 65 years and over had almost reached the 75 per cent target (74.3%) for the 2024/2025 season. Of concern, however, is the county-level variation; for example, in Roscommon just 41.9 per cent of those over 60 years were vaccinated compared to 74 per cent in Wexford (HPSC, 2025). Also of note is the low uptake rates among healthcare workers. The latest published data for the 2023/2024 season show an uptake rate of 50.8 per cent in public hospitals; slightly higher for medical/dental staff (66.1%) and lower for nursing staff (49.4%). The rate is even lower for staff in public long-term care facilities, at just 42.2 per cent (HPSC, 2024).

The HSE Urgent and Emergency Care Operational Plan targets improvements in the patient pathway for unscheduled care. The plan sets out actions under four pillars: hospital avoidance, ED operations, in-hospital care delivery and discharge management (HSE, 2024a). The combined bed day and bed savings that could be achieved by targeting the conditions identified in the potentially avoidable hospitalisations and DTOC/high outlier analyses could partially offset the increasing requirements from the growing and ageing population and waiting list management. Of course, these savings in the acute system will require investment in primary, community and long-term care (Charlesworth et al., 2024). The recent introduction of the Enhanced Community Care Programme, particularly through its chronic disease management component and Integrated Care for Older People Programme, is expected to further reduce hospital admissions by managing (chronic) conditions more effectively in the community. Additionally, investing in short-stay non-acute beds, rehabilitation beds, long-term residential care and home support (Walsh et al., 2020) can help reduce hospital demand through acute hospital avoidance and decreasing DTOCs, thus providing services to the older population in the most clinically appropriate location. Telemedicine initiatives such as remote patient monitoring, virtual wards,[69] and virtual outpatient appointments (Department of Health, 2024c), also have the potential to improve efficiency.

The projected increase in bed requirements is substantial, and our decomposition analysis in our status quo scenario shows that the main driver is the changing population age structure rather than population growth. While there may be some uncertainty surrounding the size of the population due to fluctuating migration, population ageing is essentially bedded in. Previous population projections have proven to be very accurate for older age groups and there is no reason to believe that this might change over our projection horizon. Work by Layte et al. (2009) projected that, by 2021, 15.4 per cent of the population would be 65 years or over; in Census 2022 it was 15.1 per cent. While the demands facing the system are substantial, there are positives to take from the analysis, particularly the opportunity to see and plan for this growth in advance.

The required infrastructure expansion, whether it is in the form of new hospitals or additions to existing facilities, forms part of broader infrastructure requirements across the economy (Conroy and Timoney, 2024). These include deficits in housing, transport, electricity, water and climate action, among others. While additional expenditure will be required, perhaps a greater challenge will be the availability of construction capacity, particularly workers (Barrett and Curtis, 2024). These constraints will require investment prioritisation across the economy.

The training and retention of staff required to operate services is also an important challenge. Previous projections from the Hippocrates model have detailed the significant increases in staff required to meet future service demand (Keegan et al., 2022). Addressing this future demand will be challenging and requires a multi-faceted approach. Demand side policies, such as achieving evidence-supported grade- and skill-mix, can help (e.g. Taskforce on Staffing and Skill Mix for Nursing (2018; 2022)). On the supply side, a recent OECD report highlighted that, in 2023, 43 per cent of doctors in Ireland and 52 per cent of nurses were foreign trained, while significant numbers of Irish-trained professionals are migrating. The OECD argue that this raises both equity and sustainability concerns. This is combined with a reported downturn in applications to nursing education, a general decrease in student interest in healthcare professions, and difficulties in retaining existing staff (OECD/European Commission, 2024). These issues highlight the importance of strategic workforce planning.

69 https://www.hse.ie/eng/about/who/strategic-programmes-office-overview/national-virtual-ward-programme/.

It is acknowledged that the data available to inform the analysis could be improved, and that such challenges exist to a greater or lesser extent for any projection exercise. A significant benefit of the Hippocrates model is the ability to update the modelling, if new and/or better data become available. This would be particularly beneficial in a number of circumstances: where there is a new Census of Population; with the introduction of an individual health identifier, which would allow researchers to analyse the entirety of a patient journey within and across services; or should significant changes in utilisation rates be observed. Such work could be undertaken under the Joint Research Programme between the ESRI and the Department of Health, allowing for ongoing capacity reviews and improvements to projection assumptions as new data become available.

REFERENCES

Alyousef, M., C. Naughton, C. Bradley and E. Savage (2022). 'Primary healthcare reform for chronic conditions in countries with high or very high human development index: A systematic review', *Chronic Illness*, Vol. 18, No. 3, pp. 469-487, https://doi.org/10.1177/17423953211059143.

Atun, R., I. Gurol-Urganci, T. Hone, L. Pell, J. Stokes, T. Habicht, K. Lukka, E. Raaper and J. Habicht (2016). 'Shifting chronic disease management from hospitals to primary care in Estonian health system: Analysis of national panel data', *J Glob Health* Vol. 6, No. 2, 020701, https://doi.org/10.7189/jogh.06.020701.

Australian Institute for Health and Welfare (2017). *Private health insurance use in Australian hospitals 2006–07 to 2015–16: Australian Hospital Statistics*.

Australian Institute on Health and Welfare (2020). *National healthcare agreement: PI 18–Selected potentially preventable hospitalisations, 2019*, retrieved 29 July, 2020, https://meteor.aihw.gov.au/content/index.phtml/itemId/698904.

Bagust, A., M. Place and J.W. Posnett (1999). 'Dynamics of bed use in accommodating emergency admissions: Stochastic simulation model', *BMJ*, Vol. 319, No. 7203, pp. 155-158, https://doi.org/10.1136/bmj.319.7203.155.

Barrett, A. and J. Curtis (eds.) (2024). *The National Development Plan in 2023: Priorities and capacity*, ESRI Survey and Statistical Series 123, Dublin: ESRI, https://doi.org/10.26504/sustat123.

Bergin, A. and P. Egan (2024). *Population projections, the flow of new households and structural housing demand*, ESRI Research Series 190, Dublin: ESRI, https://doi.org/10.26504/rs190.

Boden, D.G., A. Agarwal, T. Hussain, S.J. Martin, N. Radford, M.S. Riyat, K. So, Y. Su, A. Turvey and C.I. Whale (2016). 'Lowering levels of bed occupancy is associated with decreased inhospital mortality and improved performance on the 4-hour target in a UK District General Hospital', *Emerg Med J*, Vol. 33, No. 2, pp. 85-90, https://doi.org/10.1136/emermed-2014-204479.

Bosque-Mercader, L. and L. Siciliani (2023). 'The association between bed occupancy rates and hospital quality in the English National Health Service', *Eur J Health Econ*, Vol. 24, No. 2, pp. 209-236, https://doi.org/10.1007/s10198-022-01464-8.

Brick, A. and S. Connolly (2021). 'Waiting times for publicly funded hospital treatment: How does Ireland measure up?', *Econ Soc Rev*, Vol. 52, No. 1, pp. 41-52.

Brick, A. and C. Keegan (2020a). *Paying more to wait less: Estimating the cost of reducing Ireland's public hospital waiting lists*, ESRI Working Paper Series 688, Dublin: ESRI, https://www.esri.ie/system/files/publications/WP688_0.pdf.

Brick, A. and C. Keegan (2020b). *Utilisation of public acute hospital services in Ireland – Baseline analysis for the Hippocrates model*, ESRI Survey and Statistical Series 100, Dublin: ESRI, https://doi.org/10.26504/sustat100.

Brick, A., B. Walsh, T. Kakoulidou and H. Humes (2025). 'Variation in day surgery rates across Irish public hospitals', *Health Policy*, Vol. 152, 105215, https://doi.org/10.1016/j.healthpol.2024.105215.

Charlesworth, A. and P. Johnson (eds.) (2018). *Securing the future: Funding health and social care to the 2030s*, London: The Institute for Fiscal Studies, https://doi.org/10.1920/re.ifs.2019.0143.

Charlesworth, A., L. Rachet-Jacquet and S. Rocks (2024). 'Short of capacity? Why the government must address the capacity constraints in the English National Health Service', *Health Affairs Scholar*, Vol. 2, No. 1, https://doi.org/10.1093/haschl/qxad091.

Clarke, G.M. (2024). *Surgical hubs: Key to tackling hospital waiting lists?*, London: Health Foundation, https://www.health.org.uk/features-and-opinion/blogs/surgical-hubs-key-to-tackling-hospital-waiting-lists.

Collins, L. (2024). *ABF 2024 – OPD Update*. *2024 ABF Conference*, Limerick: Healthcare Pricing Office, https://hpowp.com/wp-content/uploads/2024/05/ABF_2024_12_Slides_Lorna_Collins-1.pdf.

Connolly, S. (2019). 'What harm a poor healthcare system?', *Jesuit Centre for Faith and Justice*, Vol. 83, https://www.jcfj.ie/article/what-harm-a-poor-healthcare-system/.

Connolly, S. and E. Flanagan (2024). *Current and projected demand for nurses working in general practice in Ireland*, ESRI Research Series 180, Dublin: ESRI, https://doi.org/10.26504/rs180.

Connolly, S., T. Kakoulidou and E. McHugh (2025). *Projections of national demand and workforce requirements for General Practice in Ireland, 2023–2040: Based on the Hippocrates model*, ESRI Research Series 215, Dublin: ESRI, https://doi.org/10.26504/RS215.

Connolly, S., C. Keegan, S. O'Malley and M. Regan (2023). *Extending eligibility for general practitioner care in Ireland: Cost implications*, ESRI Research Series 156, Dublin: ESRI, https://doi.org/10.26504/rs156.

Conroy, N. and K. Timoney (2024). *Ireland's infrastructure demands*, Working Paper Series No. 23, Dublin: Irish Fiscal Advisory Council, https://www.fiscalcouncil.ie/occasional-research/#WPs.

De Bruin, A.M., R. Bekker, L. Van Zanten and G.M. Koole (2010). 'Dimensioning hospital wards using the Erlang loss model', *Annals of Operations Research*, Vol. 178, pp. 23-43, https://doi.org/10.1007/s10479-009-0647-8.

Department of Health (2018). *Independent expert review of delayed discharges*, https://assets.gov.ie/10858/b63d907d251d47d4a5a58ccbc0f280fc.pdf.

Department of Health (2023a). *Elective hospitals – Programme overview*, Dublin: Department of Health, https://assets.gov.ie/251385/9068daff-0133-402c-a0d6-3aebbac47f5c.pdf.

Department of Health (2023b). *Department of Health Statement of Strategy 2023 – 2025*, Dublin: Department of Health, https://www.gov.ie/en/publication/49239-department-of-health-statement-of-strategy-2023-2025/.

Department of Health (2024a). *Strategic Healthcare Investment Framework*, Dublin: Department of Health, https://assets.gov.ie/302093/886b1693-ef6e-4702-bb68-cd3106e98611.pdf.

Department of Health (2024b). *2024 Waiting List Action Plan*, Dublin: Department of Health, https://assets.gov.ie/289019/28c3240b-66bb-415b-9d5a-37b57eae7cd1.pdf.

Department of Health (2024c). *Digital for Care: A Digital Health Framework for Ireland 2024–2030*, Dublin, https://assets.gov.ie/293780/5c6e1632-10ed-4bdc-8a98-51954a8da2d0.pdf.

Department of Health (2025a). *Health in Ireland: Key trends 2024*, Dublin: Department of Health, Dublin, https://www.gov.ie/en/press-release/8168c-minister-for-health-publishes-health-in-ireland-key-trends-2024/.

Department of Health (2025b). *2025 Waiting List Action Plan*, Dublin: Department of Health, https://assets.gov.ie/319078/05b1b89d-6e96-4f1a-9e82-57a5c494ec44.pdf.

Department of Health and PA Consulting (2018). *Health Service Capacity Review 2018*, Dublin: Department of Health, https://assets.gov.ie/10132/7c2a2299ca924852b3002e9700253bd9.pdf.

Department of the Taoiseach (2025). *Programme for Government 2025 – Securing Ireland's Future*, Dublin: Department of the Taoiseach, https://assets.gov.ie/317849/77762230-8dbf-4995-ad02-dc7ea8057979.pdf.

Deraas, T.S., G.R. Berntsen, T. Hasvold and O.H. Forde (2011). 'Does long-term care use within primary health care reduce hospital use among older people in Norway? A national five-year population-based observational study', *BMC Health Serv Res*, Vol. 11, https://doi.org/10.1186/1472-6963-11-287.

Duffy, K., K. de Bruin, L. Henry, C. Kweku-Kyei, A. Nolan and B. Walsh (2024). *Health impacts of climate change and mitigation policies in Ireland*, ESRI Research Series 188, Dublin: ESRI, https://doi.org/10.26504/rs188.

European Commission (2014). *The 2015 ageing report: Underlying assumptions and projection methodologies*, Brussels: European Commission, https://doi.org/10.2765/76255.

European Commission (2017). *The 2018 ageing report: Underlying assumptions and projection methodologies*, Brussels: European Commission, https://doi.org/10.2765/286359.

European Commission (2020). *The 2021 ageing report: Underlying assumptions and projection methodologies*, Brussels: European Commission, https://doi.org/10.2765/733565.

European Commission (2023). *The 2024 ageing report: Underlying assumptions and projection methodologies*, Brussels: European Commission, https://doi.org/10.2765/960576.

European Commission (2024). *The 2024 ageing report: Economic and budgetary projections for the EU Member States (2022–2070)*, Brussels: The European Commission, https://doi.org/10.2765/022983.

Findlay, R. (2019). 'Time to stop talking about bed occupancy', https://blog.gooroo.co.uk/2019/01/time-to-stop-talking-about-bed-occupancy/.

Forder, J. (2009). 'Long-term care and hospital utilisation by older people: An analysis of substitution rates', *Health Econ*, Vol. 18, No. 11, pp. 1322-1338, https://doi.org/10.1002/hec.1438.

Gaughan, J., H. Gravelle and L. Siciliani (2015). 'Testing the bed-blocking hypothesis: Does nursing and care home supply reduce delayed hospital discharges?', *Health Econ* 24, Suppl 1, pp. 32-44, https://doi.org/10.1002/hec.3150.

Gaughan, J., H. Gravelle and L. Siciliani (2017). 'Delayed discharges and hospital type: Evidence from the English NHS', *Fiscal Studies*, Vol. 38, No. 3, https://doi.org/10.1111/j.1475-5890.2017.12141.

Gibson, O.R., L. Segal and R.A. McDermott (2013). 'A systematic review of evidence on the association between hospitalisation for chronic disease related ambulatory care sensitive conditions and primary health care resourcing', *BMC Health Serv Res*, Vol. 13, 336, https://doi.org/10.1186/1472-6963-13-336.

Government of Ireland (2019). 'Minister for Health confirms restructuring of health services and delivers key Sláintecare commitment', press release, 17 July, https://www.gov.ie/en/press-release/95394a-minister-for-health-confirms-restructuring-of-health-services-and-de/.

Government of Ireland (2021). *Sláintecare Implementation Strategy and Action Plan 2021–2023*, Dublin, https://www.gov.ie/ga/foilsiuchan/6996b-slaintecare-implementation-strategy-and-action-plan-2021-2023/.

Government of Ireland (2023). *Sláintecare Action Plan 2023*, Dublin: Department of Health, https://assets.gov.ie/251347/e0cc4c23-ce8a-49f0-9ffc-d9220000bbcb.pdf.

Government of Ireland (2024). *Acute Hospital Inpatient Bed Capacity Expansion Plan 2024–2031*, Dublin: Department of Health, https://assets.gov.ie/294828/9ffb3b62-6e30-4b08-980a-54e3aaa30ed1.pdf.

HPO (2015). *Introduction to the price setting process for admitted patients,* Version 1, Dublin: Health Service Executive (Healthcare Pricing Office).

HPO (2016). *Activity in acute public hospitals in Ireland annual report, 2015*, Version 1, Dublin: Health Service Executive (Healthcare Pricing Office), https://hpowp.com/wp-content/uploads/2024/03/HIPE_Report_2015.pdf.

HPO (2020). *Activity in acute public hospitals in Ireland annual report, 2019*, Dublin: Health Service Executive (Healthcare Pricing Office), https://hpowp.com/wp-content/uploads/2024/03/HIPE_Report_2019.pdf.

HPO (2022). *Data Quality Framework*, Dublin: Healthcare Pricing Office, https://www.hpo.ie/DQ/Data_Quality_Framework-Healthcare_Pricing_Office.pdf.

HPO (2023). *Activity in acute public hospitals in Ireland annual report, 2022*, Dublin: Health Service Executive (Healthcare Pricing Office), https://hpowp.com/wp-content/uploads/2024/03/2022_HIPE_Annual_Report.pdf.

HPO (2024a). *Perinatal statistics report, 2022*, Dublin: Health Service Executive (Healthcare Pricing Office), https://hpowp.com/nprs_annual_reports/.

HPO (2024b). *Activity in acute public hospitals in Ireland annual report, 2023*, Dublin: Health Service Executive (Healthcare Pricing Office), https://hpowp.com/abf/hipe_annual_report_latest/.

HPSC (2024). *Uptake of the seasonal influenza vaccine in acute hospitals and long-term care/residential facilities in Ireland from 2011–2012 to 2023–2024*, Health Protection Surveillance Centre, Health Service Executive, https://www.hpsc.ie/a-z/respiratory/influenza/seasonalinfluenza/vaccination/vaccineuptakeinhcwsandresidentsofltcfs/Seasonal Flu Vaccine Uptake in Hospitals LTCFs-2023-2024-July 2024_Final_1.pdf.

HPSC (2025). *Influenza vaccine uptake in Ireland in 2024–2025 season: 2nd September – 16th February 2025*, Health Protection Surveillance Centre, Health Service Executive, https://www.hpsc.ie/a-z/respiratory/influenza/seasonalinfluenza/vaccination/Seasonal Influenza Vaccine Uptake in Ireland Week 7 2025.pdf.

HSE (2020). *Chronic Disease Treatment Programme*, Health Service Executive, https://www.hse.ie/eng/about/who/gmscontracts/2019agreement/chronic-disease-management-programme/chronic-disease-management-treatment-programme.pdf.

HSE (2021a). *Code of Governance*, Dublin: Health Service Executive, https://assets.hse.ie/media/documents/hse-code-of-governance-2021.pdf.

HSE (2021b). *Activity Based Funding Programme: Implementation Plan 2021–2023*, Dublin: Health Service Executive, https://www.hse.ie/eng/services/publications/activity-based-funding-abf-programme-implementation-plan-2021-2023.pdf.

HSE (2022). *Acute division – Key performance indicator metadata 2022*, Dublin: Health Service Executive.

HSE (2023a). *The second report of the Structured Chronic Disease Management Treatment Programme in General Practice*, Dublin: Health Service Executive, https://www.hse.ie/eng/services/publications/the-second-report-of-the-structured-chronic-disease-management-treatment-programme-in-general-practice.pdf.

HSE (2023b). *Introducing the HSE's new Health Regions*, https://web.archive.org/web/20231130100644/https://assets.hse.ie/media/documents/Introducing_HSE_Health_Regions.pdf.

HSE (2024a). *HSE Urgent and Emergency Care Operational Plan 2024: Q2 2024–Q1 2025*, https://about.hse.ie/api/v2/download-file/file_based_publications/Urgent_and_Emergency_Care_Operational_Plan_2024.pdf/.

HSE (2024b). *Management data report – December 2023*, Dublin: Health Service Executive, https://www.hse.ie/eng/services/publications/performancereports/management-data-report-december-2023.pdf.

HSE (2024c). *Sláintecare programme board meeting 13: Minutes*, https://assets.gov.ie/297692/22ddc3c1-466b-46ef-8918-760ef7462fac.pdf.

HSE (2025). *National Service Plan 2025*, Health Service Executive, https://about.hse.ie/publications/hse-national-service-plan-2025/.

HSE NDTP (2024). *Surgery medical workforce in Ireland 2024–2038*, Health Service Executive and National Doctors Training and Planning, https://www.hse.ie/eng/staff/leadership-education-development/met/plan/specialty-specific-reviews/surgery-medical-workforce-in-ireland.pdf.

HSE, RCSI and College of Anaesthetists of Ireland (2011). *Model of care for elective surgery including implementation guide*, Dublin: Royal College of Surgeons in Ireland, http://hdl.handle.net/10147/325605.

Hennessy, M., C. Shine and E. Walker (2021). *Health capital investment in Ireland – Analysis of historical capital investment in healthcare*. *Spending review 2021*, Dublin: Department of Health, https://assets.gov.ie/206317/ce9a23c8-b518-4725-872f-ada306756c64.pdf.

Higgins, J.R. (2013). *The establishment of hospital groups as a transition to independent hospital trusts*, Dublin: Department of Health, http://health.gov.ie/wp-content/uploads/2014/03/IndHospTrusts.pdf.

HIQA (2024). *National Standards for Safer Better Healthcare*. *Version 2 – September 2024*, Dublin: Health Information and Quality Authority, https://www.hiqa.ie/sites/default/files/2017-01/Safer-Better-Healthcare-Standards.pdf.

Houses of the Oireachtas Committee on the Future of Healthcare (2017). *Sláintecare report*, Dublin: Houses of the Oireachtas, https://assets.gov.ie/22609/e68786c13e1b4d7daca89b495c506bb8.pdf.

Independent Review Group (2019). *Report of the independent review group established to examine private activity in public hospitals*, Dublin: Department of Health, https://assets.gov.ie/26529/aed7ee0317ff49a7a609974772cf2191.pdf.

Kakoulidou, T., A. Brick, J. Fitzsimons, C. Keegan, L. O'Halloran and B. Walsh (forthcoming). 'The expansion of free primary care to children and avoidable hospitalisations in Irish public hospitals'.

Kallestrup-Lamb, M., A. Marin, S. Menon and J. Søgaard (2024). 'Aging populations and expenditures on health', *The Journal of the Economics of Ageing*, Vol. 29, 100518, https://doi.org/10.1016/j.jeoa.2024.100518.

Keegan, C., A. Brick, A. Bergin, M.-A. Wren, E. Henry and R. Whyte (2020). *Projections of expenditure for public hospitals in Ireland, 2018–2035, based on the Hippocrates model*, ESRI Research Series 117, Dublin: ESRI, https://doi.org/10.26504/rs117.

Keegan, C., A. Brick, E. Henry and A. Bergin (2021). 'Projected private hospital expenditure in Ireland, 2018–2035: What role for demographics, cost, and Sláintecare?', *The International Journal of Health Planning and Management*, https://doi.org/10.1002/hpm.3381.

Keegan, C., A. Brick, G. Rodriguez and L. Hill (2022). *Projections of workforce requirements for public acute hospitals in Ireland, 2019–2035: A regional analysis based on the Hippocrates model*, ESRI Research Series 147, Dublin: ESRI, https://doi.org/10.26504/rs147.

Keegan, C., A. Brick, B. Walsh, A. Bergin, J. Eighan and M. Wren (2018). 'How many beds? Capacity implications of hospital care demand projections in the Irish hospital system, 2015-2030', *The International Journal of Health Planning and Management*, Vol. 34, No. 1, https://doi.org/10.1002/hpm.2673.

Lafortune, G., G. Balestat and A. Durand (2012). *Comparing activities and performance of the hospital sector in Europe: How many surgical procedures performed as inpatient and day cases?*, Paris: OECD Publishing, https://www.oecd.org/health/Comparing-activities-and-performance-of-the-hospital-sector-in-Europe_Inpatient-and-day-cases-surgical-procedures.pdf.

Layte, R., M. Barry, K. Bennett, A. Brick, E. Morgenroth, C. Normand, J. O'Reilly, S. Thomas, M. Wiley and M.-A. Wren (2009). *Projecting the impact of demographic change on the demand for and delivery of health care in Ireland*, ESRI Research Series 13, Dublin: ESRI, https://www.esri.ie/publications/projecting-the-impact-of-demographic-change-on-the-demand-for-and-delivery-of-health-care-in-ireland/.

Leroy, R., C. Camberlin, M. Lefèvre, K. Van den Heede, C. Van de Voorde and C. Beguin (2017). 'Variability in elective day-surgery rates between Belgian hospitals – Analyses of administrative data explained by surgical experts', *International Journal of Surgery*, Vol. 45, pp. 118-124, https://doi.org/10.1016/j.ijsu.2017.07.075.

Lorenzoni, L., A. Marino, D. Morgan and C. James (2019). *Health spending projections to 2030: New results based on a revised OECD methodology,* OECD Health Working Paper No. 110, Paris: OECD Publishing, https://doi.org/10.1787/5667f23d-en.

May, P., C. Normand, S. Matthews, R.A. Kenny, R. Romero-Ortuno and B. Tysinger (2022). 'Projecting future health and service use among older people in Ireland: An overview of a dynamic microsimulation model in The Irish Longitudinal Study on Ageing (TILDA)', *HRB Open Res*, Vol. 5, No. 21, https://doi.org/10.12688/hrbopenres.13525.2.

May, P., C. Normand, S. Smith, F. Moriarty, M. Ward, K. Ryan, B.M. Johnston, R. Romero-Ortuno, R.A. Kenny and R.S. Morrison (2024). 'How many people will live and die with serious illness in Ireland to 2040? Estimated needs and costs using microsimulation', *The Journal of the Economics of Ageing*, Vol. 29, https://doi.org/10.1016/j.jeoa.2024.100528.

McDarby, G. and B. Smyth (2019). 'Identifying priorities for primary care investment in Ireland through a population-based analysis of avoidable hospital admissions for ambulatory care sensitive conditions (ACSC)', *BMJ Open*, Vol. 9, No. 11, e028744, https://doi.org/10.1136/bmjopen-2018-028744.

Mueller, M. and K. Socha-Dietrich (2020). *Reassessing private practice in public hospitals in Ireland. An overview of OECD experiences*, OECD Health Working Paper No. 118, Paris: OECD Publishing, https://doi.org/10.1787/111171d3-en.

National Audit Office (2013). *Emergency admissions to hospital: Managing the demand*, London: National Audit Office, https://www.nao.org.uk/wp-content/uploads/2013/10/10288-001-Emergency-admissions.pdf.

National Clinical Programme in Surgery (2023). *Surgical hubs: Clinical guidance*, Dublin: Royal College of Surgeons in Ireland, https://www.rcsi.com/surgery/-/media/feature/media/download-document/dublin/news/surgical-hubs-clinical-guidance.pdf.

NHS (2016). 'Rapid improvement guide to: Red and green bed days', https://www.england.nhs.uk/south/wp-content/uploads/sites/6/2016/12/rig-red-green-bed-days.pdf.

NHS Digital (2023). *Hospital outpatient activity 2022–23*, NHS England, https://digital.nhs.uk/data-and-information/publications/statistical/hospital-outpatient-activity/2022-23.

NICE (2018). *Emergency and acute medical care in over 16s: Service delivery and organisation*, National Institute for Health and Care Excellence, https://www.nice.org.uk/guidance/ng94.

NTPF (2022). *Strategic Plan 2023 – 2025*, Dublin: The National Treatment Purchase Fund, https://www.ntpf.ie/app/uploads/2024/11/NTPF-Strategic-Report-2023-2025-English.pdf.

O'Connor, P. (2025). *Hospital construction costs*, Parliamentary Budget Office, PBO Economic Modelling and Policy Costing Unit, https://data.oireachtas.ie/ie/oireachtas/parliamentaryBudgetOffice/2025/2025-01-30_hospital-construction-costs_en.pdf.

OECD (2020). *Waiting times for health services: Next in line*, OECD Health Policy Studies, Paris: OECD Publishing, https://doi.org/10.1787/242e3c8c-en.

OECD (2023a). *Health at a glance 2023: OECD indicators*, Paris: OECD Publishing, https://doi.org/10.1787/7a7afb35-en.

OECD (2023b). *Ready for the next crisis? Investing in health system resilience*, OECD Health Policy Studies, Paris: OECD Publishing, Paris, https://doi.org/10.1787/1e53cf80-en.

OECD (2023c). 'OECD health statistics 2024. Sources and methods. Ireland reference year 2022 healthcare activities', https://stats.oecd.org/wbos/fileview2.aspx?IDFile=90f59a90-4054-4d1a-9eff-b2eb2bcb47e2.

OECD/European Commission (2024). *Health at a glance: Europe 2024 | State of health in the EU cycle*, Paris: OECD Publishing, https://doi.org/10.1787/b3704e14-en.

Office for National Statistics (2023). *Inequalities in accident and emergency department attendance, England: March 2021 to March 2022*, Office for National Statistics, https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/healthcaresystem/articles/inequalitiesinaccidentandemergencydepartmentattendanceengland/march2021tomarch2022/pdf.

Proudlove, N.C. (2020). 'The 85% bed occupancy fallacy: The use, misuse and insights of queuing theory', *Health Serv Manage Res*, Vol. 33, No. 3, pp. 110-121, https://doi.org/10.1177/0951484819870936.

Przywara, B. (2010). *Projecting future health care expenditure at European level: Drivers, methodology and main results*, Brussels: European Commission, http://ec.europa.eu/economy_finance/publications/economic_paper/2010/pdf/ecp417_en.pdf.

Rachet-Jacquet, L., S. Rocks and A. Charlesworth (2023). 'Long-term projections of health care funding, bed capacity and workforce needs in England', *Health Policy*, Vol. 132, 104815, https://doi.org/10.1016/j.healthpol.2023.104815.

Ravaghi, H., S. Alidoost, R. Mannion and V.D. Belorgeot (2020). 'Models and methods for determining the optimal number of beds in hospitals and regions: A systematic scoping review', *BMC Health Serv Res*, Vol. 20, No. 1, p. 186, https://doi.org/10.1186/s12913-020-5023-z.

Rocks, S., G. Boccarini, A. Charlesworth, O. Idriss, R. McConkey and L. Rachet-Jacquet (2021). *REAL Centre Projections: Health and social care funding projections 2021*, London: The Health Foundation, https://doi.org/10.37829/HF-2021-RC18.

Rosano, A., C.A. Loha, R. Falvo, J. van der Zee, W. Ricciardi, G. Guasticchi and A.G. de Belvis (2013). 'The relationship between avoidable hospitalization and accessibility to primary care: a systematic review', *Eur J Public Health*, Vol. 23, No. 3, pp. 356-360, https://doi.org/10.1093/eurpub/cks053.

Rosano, A., W. Ricciardi and J. van der Zee (2016). 'Analysis of the role of general practice in preventing avoidable hospitalisation through a multilevel approach', *Epidemiology, Biostatistics and Public Health*, Vol. 13, No. 2, https://doi.org/10.2427/11778.

Shine, C. and M. Hennessy (2022). *Health capital investment in Ireland – An analysis of healthcare infrastructure capacity spending review 2022*, Department of Health, https://assets.gov.ie/233730/806d73da-f9e9-40d1-91b8-1a7041516509.pdf.

Shine, C. and M. Hennessy (2024). *Hospital performance: An examination of trends in activity, expenditure and workforce in publicly funded acute hospitals in Ireland*, IGEES Analytical Paper 2024, Department of Health, https://assets.gov.ie/static/documents/an-examination-of-trends-in-activity-expenditure-and-workforce-in-publicly-funded-acut.pdf.

Shmueli, A. and E. Savage (2014). 'Private and public patients in public hospitals in Australia', *Health Policy*, Vol. 115, No. 2-3, pp. 189-195, https://doi.org/10.1016/j.healthpol.2014.01.008.

Siciliani, L., M. Borowitz and V. Moran, Eds. (2013). *Waiting time policies in the health sector what works?* Paris: OECD Health Policy Studies, OECD Publishing. https://doi.org/10.1787/9789264179080-en.

Socha-Dietrich, K. (2021). 'Empowering the health workforce to make the most of the digital revolution', OECD Health Working Paper No. 129, https://doi.org/10.1787/37ff0eaa-en.

Taskforce on Staffing and Skill Mix for Nursing (2018). *Framework for safe nurse staffing and skill mix in general and specialist medical and surgical care settings in adult hospitals in Ireland 2018: Final report and recommendations by the Taskforce on Staffing and Skill Mix for Nursing*, Dublin: Department of Health, https://assets.gov.ie/10054/14bb1eb59fc04bfb9fb9bffd9d2ee352.pdf.

Taskforce on Staffing and Skill Mix for Nursing (2022). *Framework for safe nurse staffing and skill mix in adult emergency care settings in Ireland 2022: Final report and recommendations by the Taskforce on Staffing and Skill Mix for Nursing*, Dublin: Department of Health, https://assets.gov.ie/226687/1a13b01a-83a3-4c06-875f-010189be1e22.pdf.

TILDA (2024). *The Irish Longitudinal study on Ageing (TILDA) Wave 5, 2018. [dataset]. Version 5.5*, Irish Social Science Data Archive SN:0053-06, www.ucd.ie/issda/data/tilda/wave5.

van Loenen, T., M.J. Faber, G.P. Westert and M.J. Van den Berg (2016). 'The impact of primary care organization on avoidable hospital admissions for diabetes in 23 countries', *Scand J Prim Health Care*, Vol. 34, No. 1, pp. 5-12, https://doi.org/10.3109/02813432.2015.1132883.

van Loenen, T., M.J. van den Berg, G.P. Westert and M.J. Faber (2014). 'Organizational aspects of primary care related to avoidable hospitalization: A systematic review', *Fam Pract*, Vol. 31, No. 5, pp. 502-516, https://doi.org/10.1093/fampra/cmu053.

Walsh, B. and A. Brick (2023). *Inpatient bed capacity requirements in Ireland in 2023: Evidence on the public acute hospital system*, QEC Research Note, Dublin: ESRI, https://doi.org/10.26504/rn20230101.

Walsh, B. and T. Kakoulidou (2025). *Projections of national demand and bed capacity requirements for older peoples' care in Ireland, 2022–2040: Based on the Hippocrates model*, ESRI Research Series 214, Dublin: ESRI, https://doi.org/10.26504/RS214.

Walsh, B., C. Keegan, A. Brick, S. Connolly, A. Bergin, M.-A. Wren, S. Lyons, L. Hill and S. Smith (2021). *Projections of expenditure for primary, community and long-term care in Ireland 2019–2035, based on the Hippocrates model*, ESRI Research Series 126, Dublin: ESRI, https://doi.org/10.26504/rs126.

Walsh, B., S. Lyons, S. Smith, M.A. Wren, J. Eighan and E. Morgenroth (2020). 'Does formal home care reduce inpatient length of stay?', *Health Econ*, https://doi.org/10.1002/hec.4158.

Watt, T., A. Raymond, L. Rachet-Jacquet, A. Head, C. Kypridemos, E. Kelly and A. Charlesworth (2023). *Health in 2040: Projected patterns of illness in England*, The Health Foundation, https://doi.org/10.37829/HF-2023-RC03.

Wren, M.-A., C. Keegan, B. Walsh, A. Bergin, J. Eighan, A. Brick, S. Connolly, D. Watson and J. Banks (2017). *Projections of demand for healthcare in Ireland, 2015–2030*, *First report from the Hippocrates model*, ESRI Research Series 67, Dublin: ESRI, https://doi.org/10.26504/rs67.

APPENDICES

APPENDIX A PUBLIC ACUTE HOSPITALS

TABLE A.1 Hospitals included in the analysis by HSE Health Region and county, 2023

Health Region	Model	County
HR DNE | HSE Dublin and North East		
Beaumont Hospital (incl. St Joseph's Hospital, Raheny)	Model 4	Dublin
Cavan General Hospital	Model 3	Cavan
Connolly Hospital	Model 3	Dublin
Louth County Hospital	Model 2	Louth
Mater Misericordiae University Hospital	Model 4	Dublin
Monaghan Hospital	Model 2	Monaghan
National Orthopaedic Hospital, Cappagh	Specialist	Dublin
Our Lady of Lourdes Hospital	Model 3	Louth
Our Lady's Hospital	Model 3	Meath
Rotunda Hospital	Maternity	Dublin
HR DML | HSE Dublin and Midlands		
Coombe Women and Infants University Hospital	Maternity	Dublin
Midland Regional Hospital, Mullingar	Model 3	Westmeath
Midland Regional Hospital, Portlaoise	Model 3	Laois
Midland Regional Hospital, Tullamore	Model 3	Offaly
Naas General Hospital	Model 3	Kildare
St. Luke's Regional Oncology Network – including St. Luke's Radiation Oncology Network centres located in Beaumont and St. James's Hospitals	Specialist	Dublin
St. James's Hospital	Model 4	Dublin
Tallaght Hospital – Adult	Model 4	Dublin
HR DSE | HSE Dublin and South East		
Lourdes Orthopaedic Hospital, Kilcreene	Specialist	Kilkenny
National Maternity Hospital	Maternity	Dublin
Royal Victoria Eye and Ear Hospital	Specialist	Dublin
St. Columcille's Hospital	Model 2	Dublin
St. Luke's General Hospital	Model 3	Kilkenny
St. Michael's Hospital	Model 2	Dublin
St. Vincent's University Hospital	Model 4	Dublin
Tipperary General Hospital	Model 3	Tipperary
University Hospital Waterford	Model 4	Waterford
Wexford General Hospital	Model 3	Wexford
HR SW | HSE South West		
Bantry General Hospital	Model 2	Cork
Cork University Hospital – incl. Cork University Maternity Hospital	Model 4	Cork
Mallow General Hospital	Model 2	Cork
Mercy University Hospital	Model 3	Cork
South Infirmary Victoria University Hospital	Model 2	Cork
University Hospital Kerry	Model 3	Kerry
HR MW | HSE Mid West		
Croom Orthopaedic Hospital	Specialist	Limerick
St. John's Hospital	Model 2	Limerick
UL Hospitals, Ennis	Model 2	Clare
UL Hospitals, Nenagh	Model 2	Tipperary
University Hospital Limerick	Model 4	Limerick
University Maternity Hospital Limerick	Maternity	Limerick
HR WNW | HSE West and North West		
Galway University Hospitals	Model 4	Galway
Letterkenny University Hospital	Model 3	Donegal
Mayo University Hospital	Model 3	Mayo
Portiuncula Hospital	Model 3	Galway
Roscommon County Hospital	Model 2	Roscommon
Sligo University Hospital	Model 3	Sligo
CHI | Children's Health Ireland		
Children's Health Ireland (Crumlin, Temple Street, Tallaght)	Paediatric	Dublin

Note: Hospitals participating in HIPE that are excluded are Peamount Hospital, Incorporated Orthopaedic Hospital Clontarf, St Finbarr's Hospital and National Rehabilitation Hospital.
Source: HSE, 2023b.

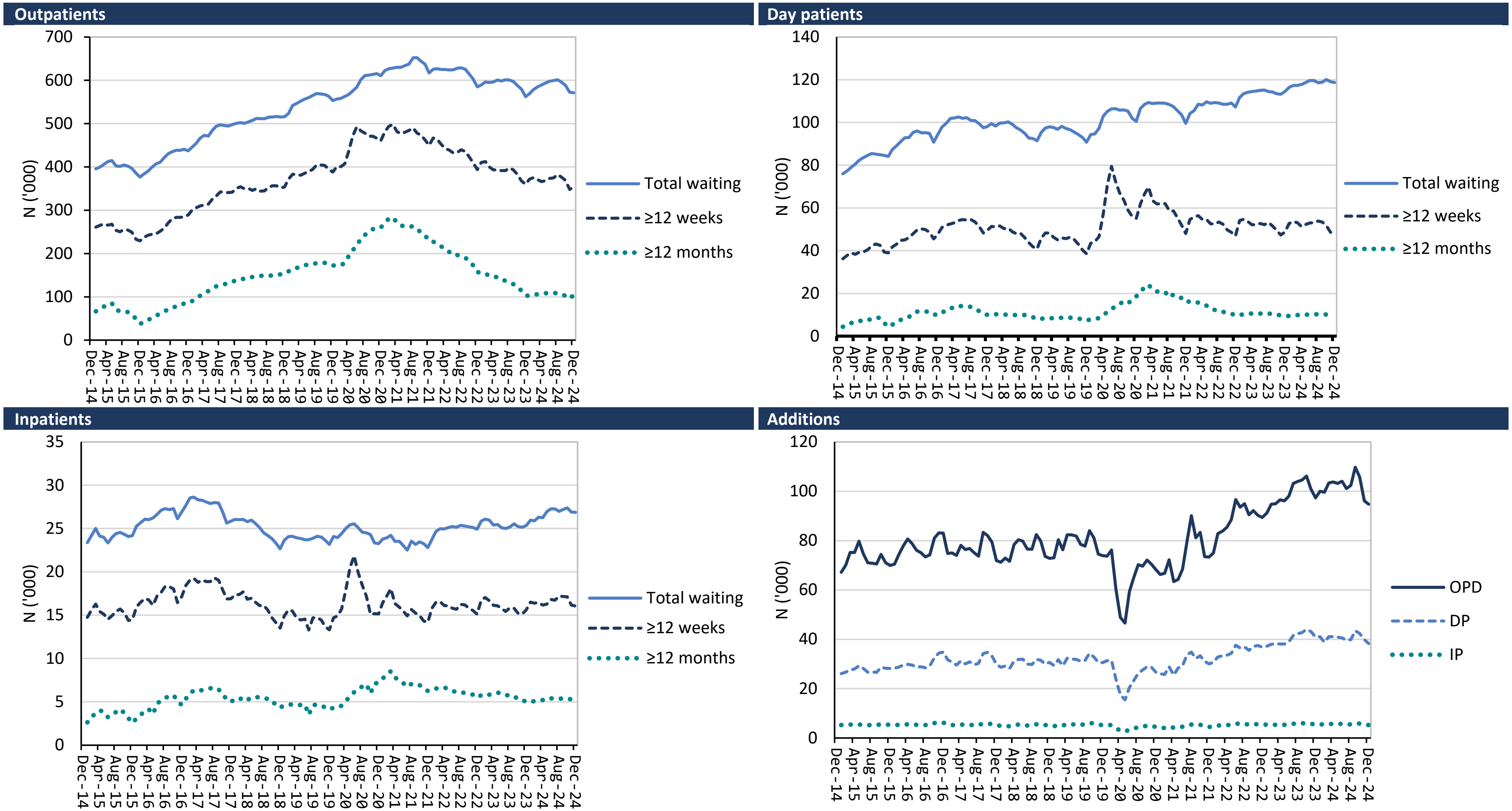
APPENDIX B WAITING LIST TRENDS, 2015–2024

Figure B.1 shows the length of the waiting lists and the number of additions to each list between 2015 and 2024 by month for each service. In December 2024 there were 572,000 on the waiting list for a first-time outpatient appointment; this was a reduction from the COVID-19 peak of 652,000 (September 2021) but still higher than December 2019 (553,000). Prior to the COVID-19 pandemic, the total list had been increasing year on year since 2016, despite the numbers of additions remaining relatively stable. There has been a notable decrease in the backlog proportion (proportion of patients waiting ≥12 weeks) since Quarter 2 of 2021. This was as high as 84 per cent in June 2020 and now sits at 62 per cent, the lowest proportion since 2016. The proportion waiting ≥12 months for an appointment has also reduced. The December 2024 figure of 18 per cent is the lowest proportion since 2016.

For day patients, the number of additions and the total list size were relatively stable pre-COVID-19 but both have continuously increased in the post-COVID-19 recovery period. However, the backlog proportion continues to fall and is now lower than it was pre-COVID-19. For inpatients, the total list size is higher than it was immediately prior to the COVID-19 period but lower than the 2017 peak. For both services the proportion waiting ≥12 months has recovered to pre-COVID-19 levels of c. 8 per cent for day patients and c. 20 per cent for inpatients.

The progress achieved in reducing the size of the outpatient waiting list and improving waiting times for appointments is having a contrary effect on the other lists at present. During COVID-19, the cancellation of outpatient department (OPD) activity meant that a bottleneck built at the OPD point in the treatment pathway. Patients who would otherwise have been seen and referred to the day or inpatient lists were not being moved on. These patients are now being seen and referred, and increases are observed in inpatient and particularly the day patient additions and the total list size. It is difficult to know at this point whether the currently observed increases in the day and inpatient additions will persist and if this is something more than a COVID-19 recovery period effect.

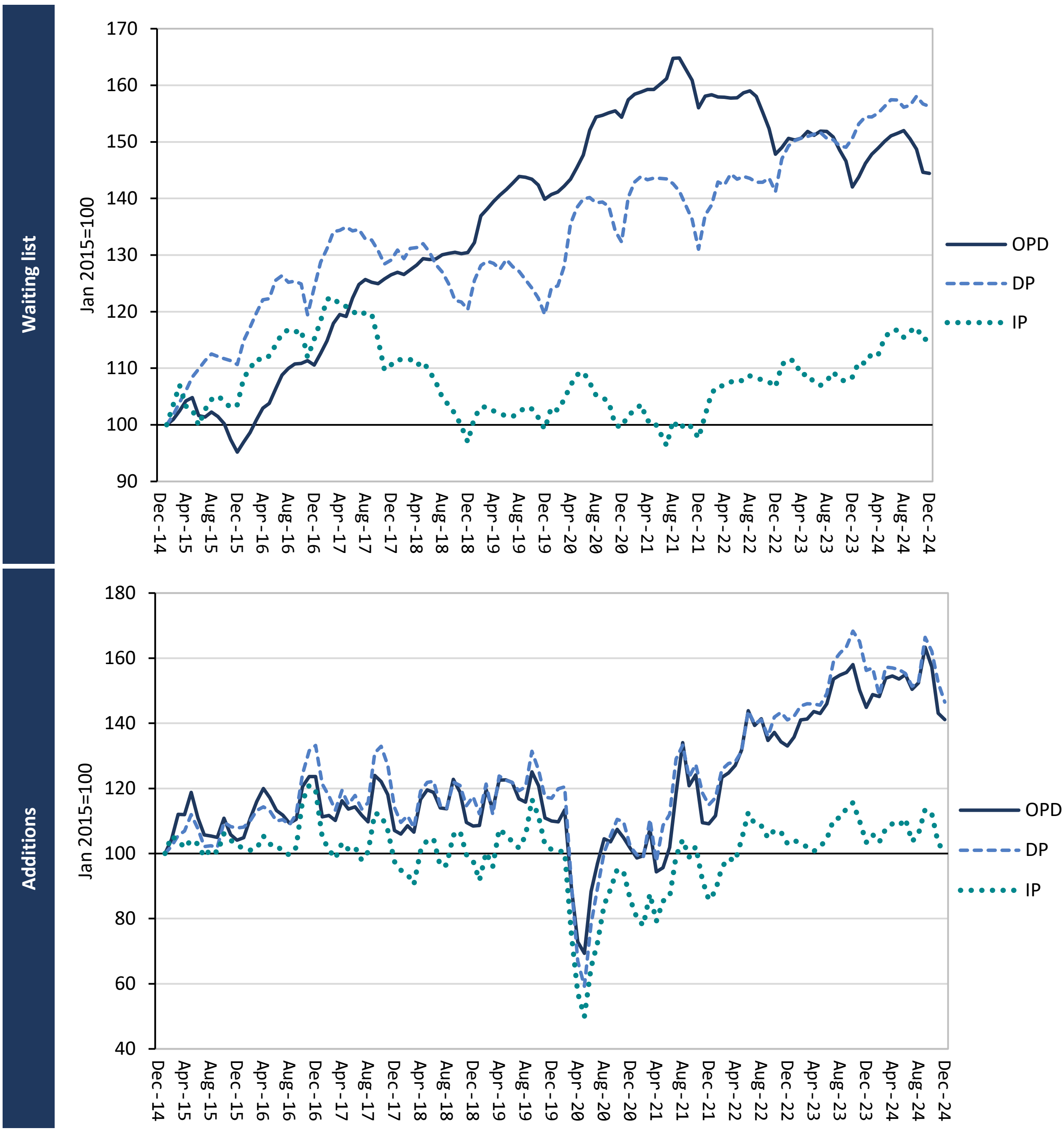
FIGURE B.1 Waiting list size and number of additions by month, 2015–2024



Sources: NTPF, 2015–2024; authors' calculations.

Figure B.2 shows the change in the relative size of the waiting list and the number of additions compared to 2015.

FIGURE B.2 Waiting list and additions growth, 2015–2024 (January 2015=100)



Sources: NTPF, 2015–2024; authors' calculations.

APPENDIX C TROLLEY USE

The use of trolleys to deal with patient flow issues is an ongoing issue in Irish hospitals. Persistently high inpatient bed occupancy rates means there can often be a deficit of beds for those emergency department (ED) patients requiring admission. The following analysis examines the available data on trolley use and delayed admission from EDs using two datasets: TrolleyGAR and patient experience time (PET). This analysis is for information purposes only and is not formally included in the Hippocrates model as it would overlap with the occupancy rate (OR) assumptions.

The TrolleyGAR dataset contains aggregate figures on the number of patients on trolleys in EDs and wards in public hospitals. Data are reported to TrolleyGAR three times daily (8am, 2pm and 8pm). At each time point, the number of patients waiting 0–6 hours, 6–9 hours, 9–18 hours, 18–24 hours and ≥24 hours is reported. Table C.1 provides an estimate of the total number of patients waiting on trolleys in 2023. It is an estimate as there is a possibility that the >=24-hour category may be double counting some patients who remain on trolleys for >=24 hours.

TABLE C.1 TrolleyGAR patients awaiting admission at 8am, sum of daily figures in 2023

	2023 | 8am
	N
Total	121,548
0–6hrs	36,521
6–9hrs	16,958
9–18hrs	28,695
18–24hrs	5,986
>=24hrs	22,419
% >24 hours	18%

Source: HSE, 2023; authors' calculations.

Unfortunately, these data are not linked to the individual-level ED dataset (PET), and importantly PET does not currently have an indicator for whether, and if so for how long, a patient was on a trolley. That is, the PET calculation includes time that the ultimately admitted patients appropriately waited for assessment or tests while in the ED. While there is a variable in the dataset indicating the time at which the decision to admit was made, this is not universally returned at this time. This means that neither dataset has the requisite data to provide an accurate picture of bed requirements by patient age and sex.

Given these data limitations, a set of assumptions have been developed to estimate bed capacity requirements of patients on trolleys. As the PET data include the age and sex of patients, it is used rather than TrolleyGAR to establish an estimate. In 2023, c. 370,000 patients had a discharge destination of 'admitted to ward' in the PET dataset; of those c. 145,000 had been in the ED for more than 12 hours (Table C.2). We apply a bed day requirement of 0.5 days for those waiting 12–24 hours, 1 day for those waiting 24–48 hours, 2 days for those waiting 48–72 hours and 3 days for those waiting ≥72 hours. This allows for the estimation of an age and sex profile of the inpatient bed day requirement had patients been admitted in a timelier manner.

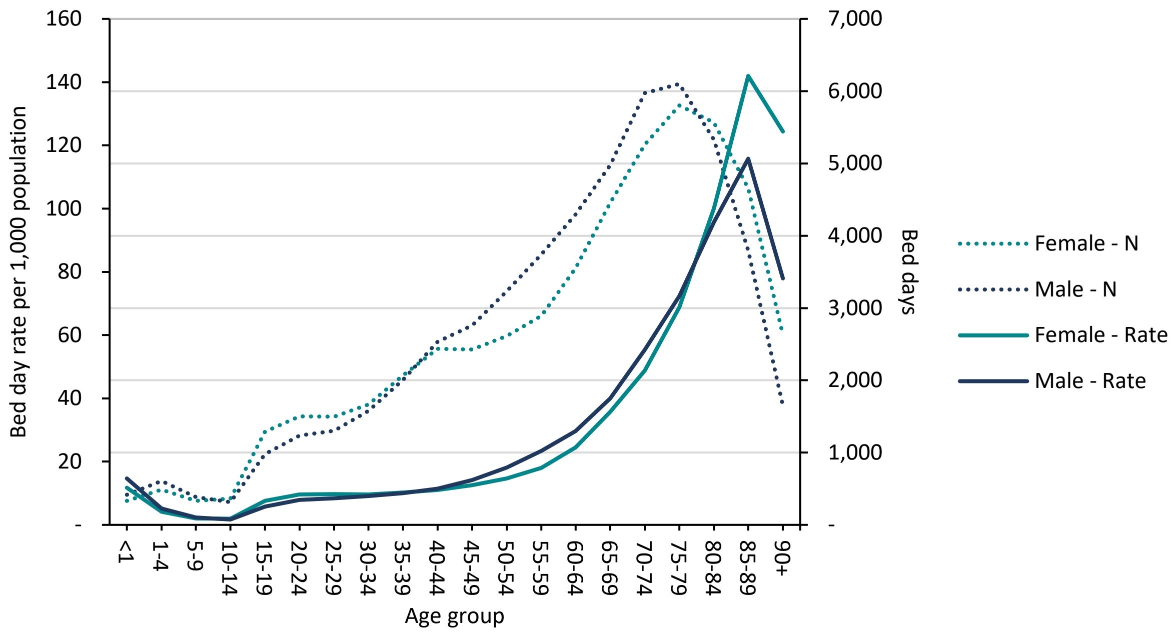
TABLE C.2 ED – Number of patients waiting ≥12 hours from arrival to admission and estimated inpatient bed day requirements, 2023

	N	Bed day estimates	Bed days
>12 hours from ED attendance to admission			
12–24 hours	98,822	x 0.5 days	49,411
24–48 hours	38,953	x 1 day	38,953
48–72 hours	6,003	x 2 days	12,006
>=72hours	1,556	x 3 days	4,668
Total	**145,334**		**105,038**

Sources: HSE BIU Acute, 2023; authors' calculations.

Figure C.1 shows the age- and sex-specific distribution of the estimated bed day requirements. The number of bed days and the bed day rate increase with age, and follow a similar distribution for both males and females. There is a notable difference in the rates between sexes at the oldest ages.

FIGURE C.1 ED – Age- and sex-specific estimated inpatient bed day requirements, 2023



Sources: HSE BIU Acute, 2023; ESRI population, 2024; authors' calculations.

APPENDIX D POTENTIALLY AVOIDABLE EMERGENCY HOSPITALISATIONS, 2023

Clinical coding and discharge and bed day volume, 2023

The International Classification of Diseases Tenth Revision diagnosis codes were used to identify the final included conditions in Hospital In-Patient Enquiry (HIPE), outlined in Table D.1.[70] In addition, the table presents the number of emergency inpatient (excluding maternity) discharges and bed days in 2023. The conditions selected for inclusion in the model collectively account for 73 per cent of discharges and 85 per cent of bed days of all potentially avoidable hospitalisations recorded in 2023.[71] Vaccine preventable influenza and pneumonia accounted for 36 per cent of the discharges and 55 per cent of the bed days for the included adult conditions in 2023.

TABLE D.1 Potentially avoidable emergency hospitalisations – diagnosis codes, discharges, bed days, 2023

Condition	ICD-10-AM diagnosis codes[a]	Emergency inpatient (excl. maternity)	
		Discharges	Bed days
		N	N
CHILDREN (7-15 years)			
Dehydration and gastroenteritis	A00–A09, K52.9, R11	1,097	2,004
Influenza and pneumonia (vaccine-preventable)	Any DX (excl. ADX D57) of:	662	3,744
Acute upper respiratory infection	J00–J03, J06	949	1,705
Asthma	J45-J46	561	1,166
ADULTS (16+ years)			
Influenza and pneumonia (vaccine-preventable)	Any DX (excl. ADX D57) of: J09- J11, J13-J14, J16.8, J18.1, J18.8-J18.9	22,221	384,460
Urinary tract infections, including pyelonephritis	N10-N12, N13.6, N39.0	13,421	124,813
GP Chronic Disease Management Programme			
COPD	J40-J44	13,149	101,611
Congestive cardiac failure	I50, I11.0, J81	6,900	74,251
Diabetes complications	E10.0–E10.8, E11.0–E11.8, E13.0–E13.8, E14.0–E14.8	4,133	43,431
Asthma	J45-J46	2,137	8,032
Angina	Excl. ADX blocks 1820-2140: I20, I24.0, I24.8-I24.9	2,340	8,846
Total[b]		**65,226**	**711,075**

Notes: DX: diagnosis; ADX: additional diagnosis.
a Principal diagnosis unless otherwise stated.
b A discharge is counted as one if one or more of the conditions are recorded.

Sources: HIPE, 2023; McDarby and Smyth, 2019; Australian Institute on Health and Welfare, 2020; Kakoulidou et al., forthcoming; authors' calculations.

Bed day reduction calculation

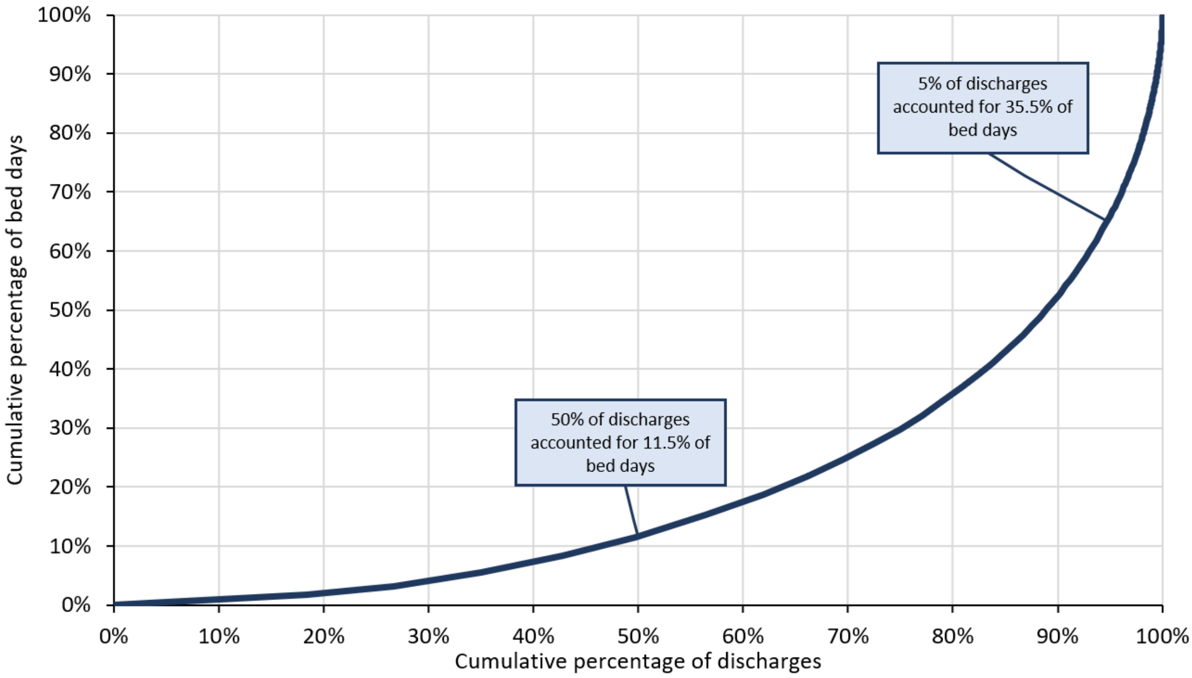
In the main scenario, we model a 25 per cent reduction in the potentially avoidable hospitalisations rate to 2040. For these discharges a large number of bed days tend to be recorded by a relatively small group of patients. Figure D.1 shows that just 5 per cent of discharges accounted for 35.5 per cent of bed days for the selected

70 The list of conditions for adults is available in Keegan et al. (2020) and the full list for children is available in Kakoulidou et al. (forthcoming).

71 In total, 89,719 discharges and 834,727 bed days were identified as potentially avoidable emergency hospitalisations from the full list of conditions in 2023.

conditions in 2023. This suggests that, in practice, a 25 per cent reduction in hospitalisations will likely result in a smaller proportionate reduction in bed days. To reflect this, we assume that the avoidable bed days associated with a 25 per cent reduction in discharges equals the median length of stay (LOS) for avoidable discharges multiplied by the number of potentially avoidable discharges to be removed. This corresponds to a c. 12 per cent reduction in bed days. To incorporate the effect of population change on demand, bed days associated with all avoidable discharges are converted into a rate and (from 2024 onwards) linearly reduced through the projection horizon converging on a 12 per cent reduction by 2040. This reduction is applied across all age and sex groups.

FIGURE D.1 Cumulative distribution of emergency inpatient discharges and bed days for selected avoidable hospitalisations, 2023



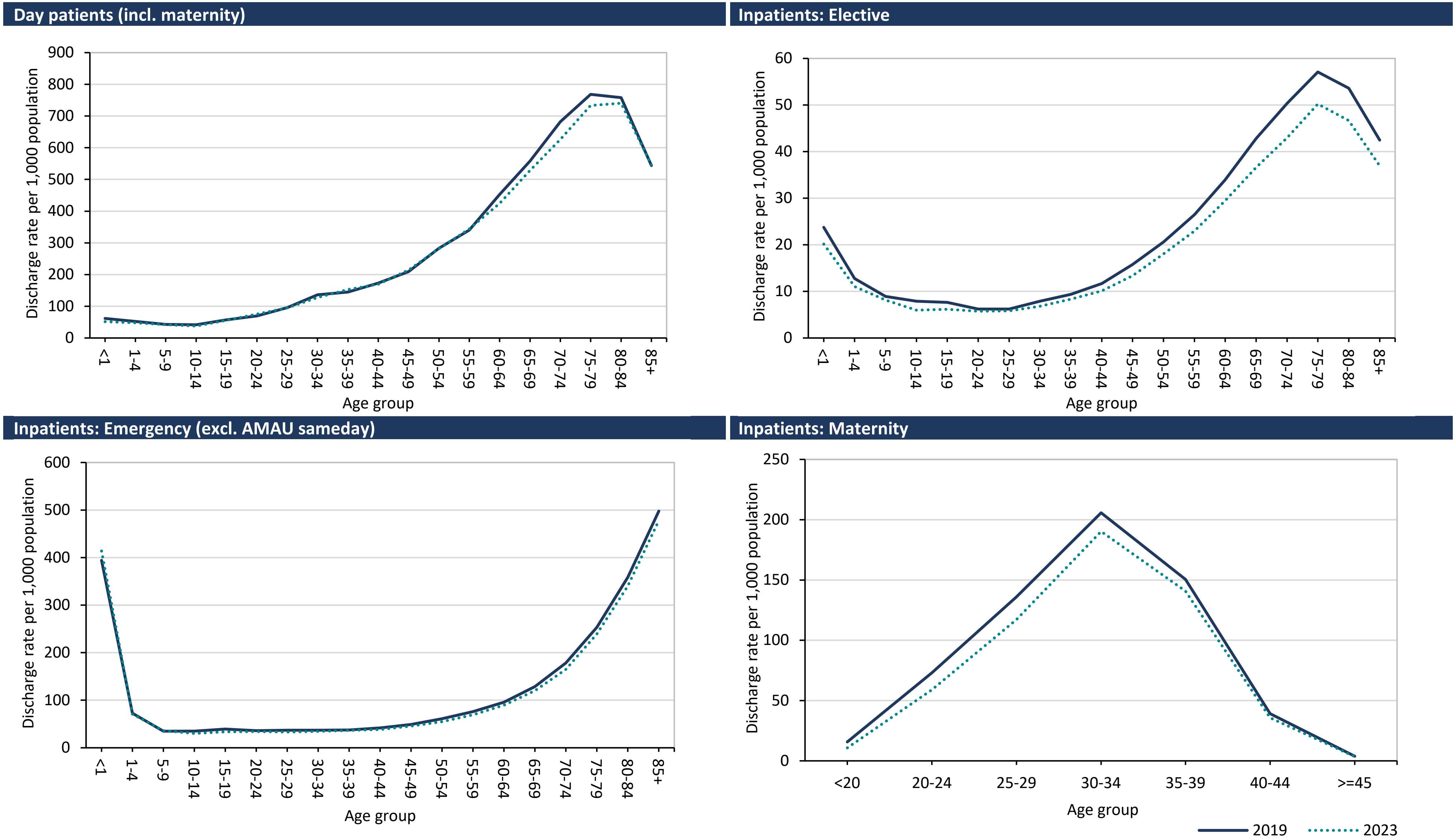
Source: HIPE, 2023; authors' calculations.

APPENDIX E CHANGES IN ADMITTED ACTIVITY PROFILES, 2019–2023

Age specific discharge rates, 2019–2023

Figure E.1 presents age-specific discharge rates by patient type in 2019 and 2023. Day patient discharge rates are similar across the two years for those <60 years, at which point rates diverge with 2023 being lower than 2019 up to 85 years. For those aged 85+ years the rates are similar in both years. For inpatients, emergency discharge rates are very similar across the age distribution in 2019 and 2023. Discharge rates for elective inpatients were lower in 2023 than in 2019 at most points of the age distribution. However, 2023 does reflect a recovery from the COVID-19 period, coupled with a reduction in the outsourcing of elective activity to private hospitals. The fall in discharge rates for maternity discharges again reflects the fall in births over the period.

FIGURE E.1 Age-specific discharge rates per 1,000 population by patient type, 2019 and 2023

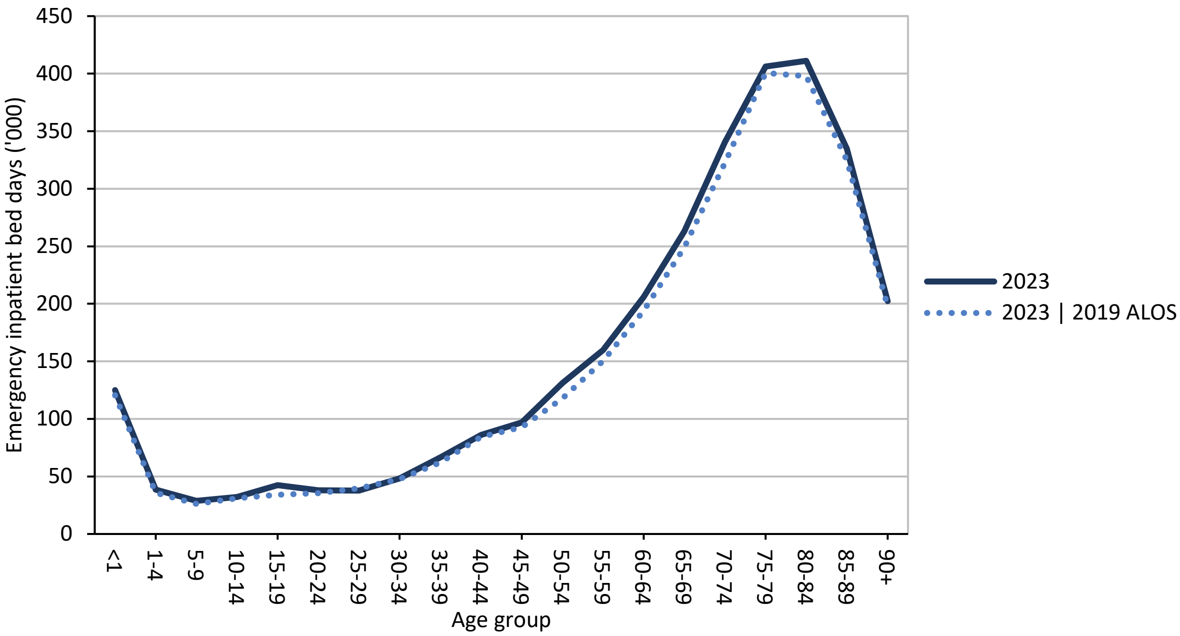


Sources: HIPE, 2019–2023; CSO population data, 2019–2023; authors' calculations.

Impact of changing ALOS

Provisional data for 2024 show that average length of stay (ALOS) for emergency inpatients has reduced to 7.3 days from a high of 7.7 days in 2022 and 2023. This suggests that there is some volatility in ALOS. To see the impact of changing ALOS across the age distribution, we apply the single year of age (SYOA) and sex ALOS in 2019 to 2023 activity in Figure E.2; we observe that emergency inpatient bed days reduce by c. 130,000 bed days (-4.2%).

FIGURE E.2 Emergency inpatient: Age-specific bed days



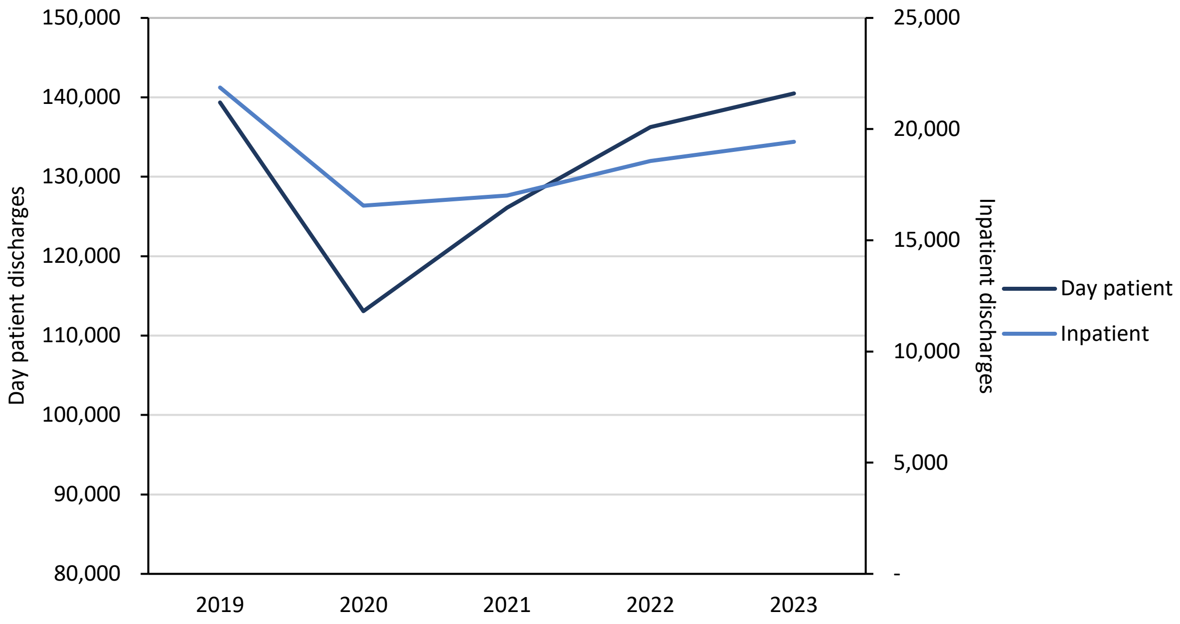
Note: Excludes AMAU sameday.
Sources: HIPE, 2019-2023; authors' calculations.

Private patients in public hospitals: A closer look

Day and elective inpatients

Figure E.3 illustrates the trend in the volume of private day and elective inpatient discharges between 2019 and 2023. As expected, there is a drop in activity in 2020 with gradual recovery in the following years. The recovery for day patients was faster than that for inpatients, and has surpassed 2019 volumes. For inpatients the volume of discharges in 2023 remains less than the 2019 level.

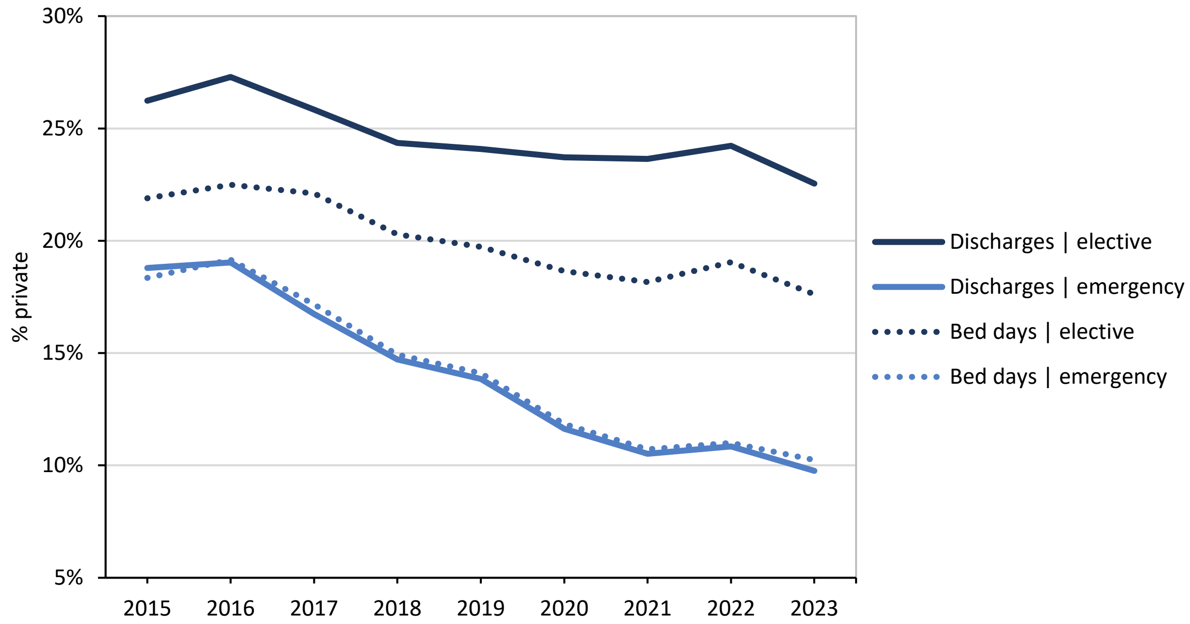
FIGURE E.3 Private day and elective inpatient discharges, 2019-2023



Sources: HIPE, 2019-2023; authors' calculations.

A trend worthy of attention concerns the proportion of elective and emergency inpatients designated as private. We examine this over a longer period (2015–2023) in Figure E.4. For elective inpatients, particularly since 2018, this proportion has remained relatively stable, at between 23 and 24 per cent of discharges and 18 to 20 per cent of bed days. However, for emergency inpatients there has been a marked decrease in the proportion of patients designated as private; between 2019 and 2023 it decreased from 14 per cent to 10 per cent for both discharges and bed days. Looking over the longer period (2015–2023), it has fallen by 8 percentage points for emergency inpatient discharges and 4 per cent for elective patients.

FIGURE E.4 Percentage of private inpatients by admission type, 2015–2023



Note: Excludes AMAU sameday.
Sources: HIPE, 2015-2023; authors' calculations.

APPENDIX F OCCUPANCY RATE

The occupancy rate (OR) is the variable that translates activity in public acute hospitals to bed requirements, using the following formula:

$$\text{Bed requirements}_t = \frac{\text{Total bed days}_t}{365 \times \text{Occupancy Rate}}$$

In previous analyses, the Irish OR reported by the Organisation for Economic Co-Operation and Development (OECD) was used to translate demand into capacity requirements. To accurately estimate capacity requirements for public acute hospitals, the OECD somatic curative OR — which excludes psychiatric hospitals — is needed. Currently, the OECD provides comparative information only on curative ORs (Figure 2.2). The difference between curative and somatic ORs is substantial, being around 7 percentage points in the most recent years (Table F.1). Differences between Health Service Executive Business Intelligence Unit (HSE BIU) Acute and OECD curative (somatic) ORs are also significant, ranging from 1.9(3.2) pp in 2020(2021) to 4.9(11.7) percentage points in 2022.

Another issue is the inconsistency in activity data reported by some hospitals to HSE BIU Acute and through HIPE. Using HIPE activity data for 2023, we estimate an OR of 89.7 per cent compared to 92.6 reported by HSE BIU Acute (Table F.1). Hospitals report activity independently to HSE BIU Acute and typically report higher levels of activity compared to HIPE. For some hospitals the differences are small but for others a large proportion of bed days are impacted. One potential way to capture a more accurate OR would be to include bed availability in HIPE data, providing a single source of information on bed utilisation and hence ORs in Ireland. Ideally these data would be separated by bed type; for example paediatric, general adult, maternity and critical care.

TABLE F.1 Inpatient occupancy rate, HSE and OECD, 2019–2023

Year	HSE BIU Acute (%)[a]	HIPE (%)[b]	OECD curative (%)[c]	OECD somatic (%)[d]
2019	94.5	-	89.9	88.8
2020	81.2	-	79.3	70.0
2021	86.2	-	89.9	83.0
2022	90.9	-	86.0	79.2
2023	92.6	89.7	n/a	n/a

Notes: a Inpatient calculations exclude AMAU sameday cases.
b Authors' calculation.
c Occupancy rates for public hospitals only. Accessed by the authors in November 2024.
d Excludes psychiatric hospitals and private hospitals. Accessed by the authors in November 2024.

Sources: HSE BIU Acute, 2023; HIPE, 2023; OECD, 2023c.

APPENDIX G INTERPRETING GROWTH RATES, 2011–2023

Hippocrates is a medium- to long-term projection model and output from the model should be viewed in that context. Year-on-year growth rates may vary, as evidenced in Table G.1. This shows the difference between year-on-year growth calculations and average annual growth. The average annual growth rates reported provide a guide to the smoothed level of growth over the period, by focusing on the start and end point of the period. Taking emergency inpatients discharges as an example, year-on-year growth fluctuates, showing large growth in particular years (2011–2012, 2022–2023), and average annual growth (2.2% in the period 2011–2023 and 1.4% in the period 2015–2023) falls within the range projected by the latest Hippocrates scenarios (1.6% to 2.2%).

TABLE G.1 Year-on-year growth and average annual growth, HIPE 2011–2023

	Published data from HIPE Annual Reports												
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Total discharges	**1,473**	**1,545**	**1,554**	**1,593**	**1,664**	**1,704**	**1,719**	**1,737**	**1,771**	**1,500**	**1,628**	**1,740**	**1,862**
Day patient discharges	881	918	932	961	1,030	1,061	1,077	1,086	1,121	930	1,027	1,125	1,206
Inpatient discharges	592	627	622	632	634	644	642	651	650	570	600	615	656
Elective	105	107	103	100	99	96	96	97	94	72	74	79	89
Emergency	360	392	400	412	417	432	434	443	448	400	422	437	467
Maternity	127	127	119	119	118	115	111	111	108	98	104	99	99
Inpatient bed days	3,470	3,526	3,481	3,532	3,623	3,651	3,680	3,711	3,728	3,282	3,439	3,747	3,988

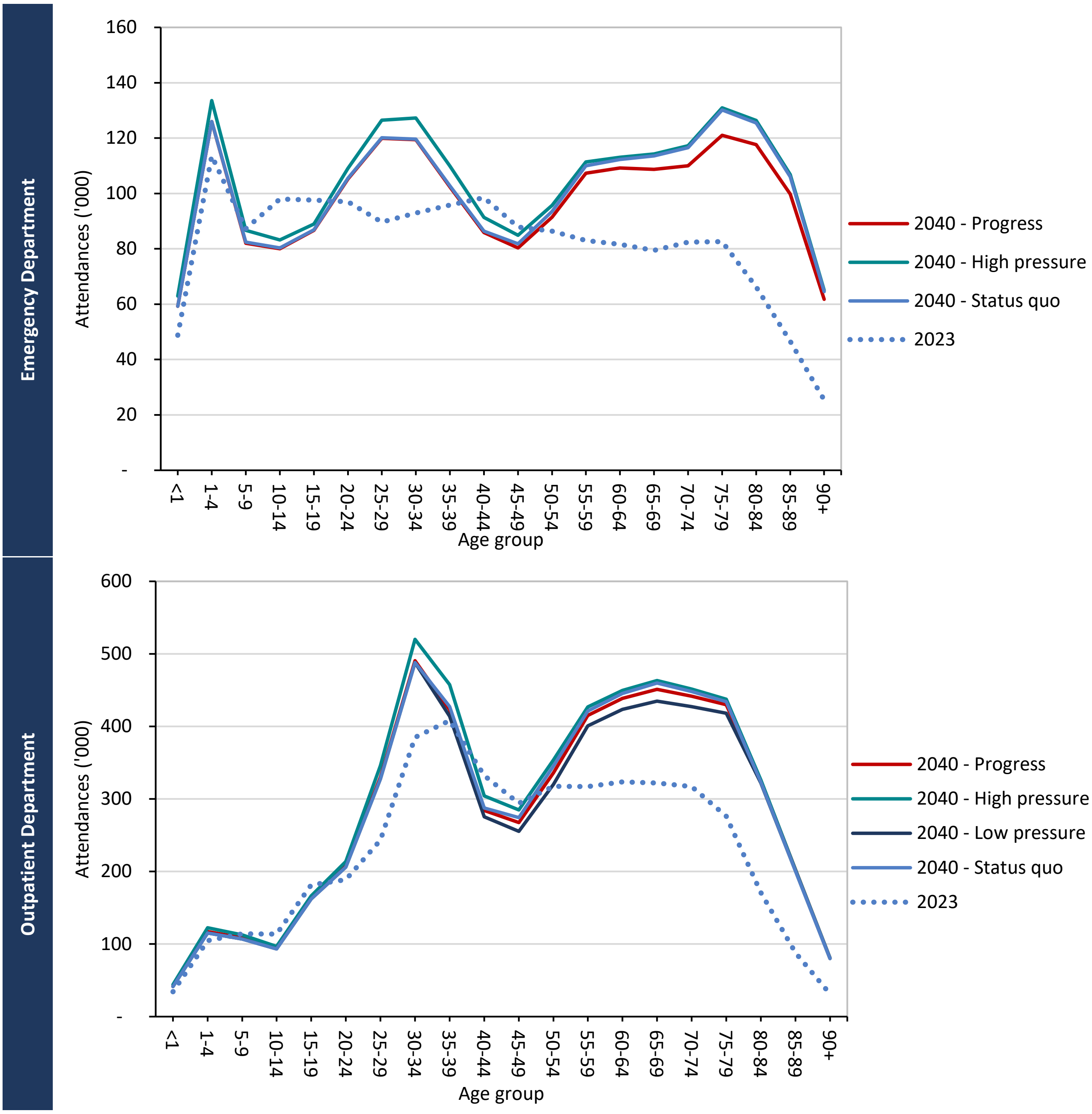
	Year-on-year growth (%) – ESRI Calculations												Average annual growth (%)	
	2011–2012	2012–2013	2013–2014	2014–2015	2015–2016	2016–2017	2017–2018	2018–2019	2019–2020	2020–2021	2021–2022	2022–2023	2011–2023	2015–2023
Total discharges	**4.9**	**0.6**	**2.5**	**4.5**	**2.4**	**0.8**	**1.1**	**1.9**	**-15.3**	**8.5**	**6.9**	**7.0**	**2.0**	**1.4**
Day patient discharges	4.2	1.5	3.1	7.2	3.0	1.5	0.9	3.2	-17.0	10.4	9.5	7.3	2.7	2.0
Inpatient discharges	5.9	-0.7	1.6	0.4	1.5	-0.4	1.5	-0.1	-12.4	5.4	2.4	6.6	0.9	0.4
Elective	2.6	-3.7	-2.9	-1.2	-3.2	0.2	0.8	-2.7	-23.2	2.8	6.3	12.6	-1.3	-1.3
Emergency	8.9	2.1	3.0	1.2	3.6	0.4	2.1	1.1	-10.9	5.7	3.6	6.9	2.2	1.4
Maternity	-0.1	-6.7	0.4	-1.2	-2.0	-3.7	-0.5	-2.6	-9.4	6.3	-5.0	0.4	-2.1	-2.1
Inpatient bed days	1.6	-1.3	1.5	2.6	0.8	0.8	0.9	0.4	-11.9	4.8	9.0	6.4	1.2	1.2

Notes: There was a substantive change in the coding of day cases in 2014.
The figures presented in the table may differ slightly from those included in Hippocrates due to the exclusion of a small number of long-stay hospitals and the National Rehabilitation Hospital, which are included in HIPE.

Sources: Table 1.1: HPO, 2016, 2020, 2024b; authors' calculations.

APPENDIX H AGE-SPECIFIC DEMAND PROJECTIONS 2023–2040 BY SCENARIO

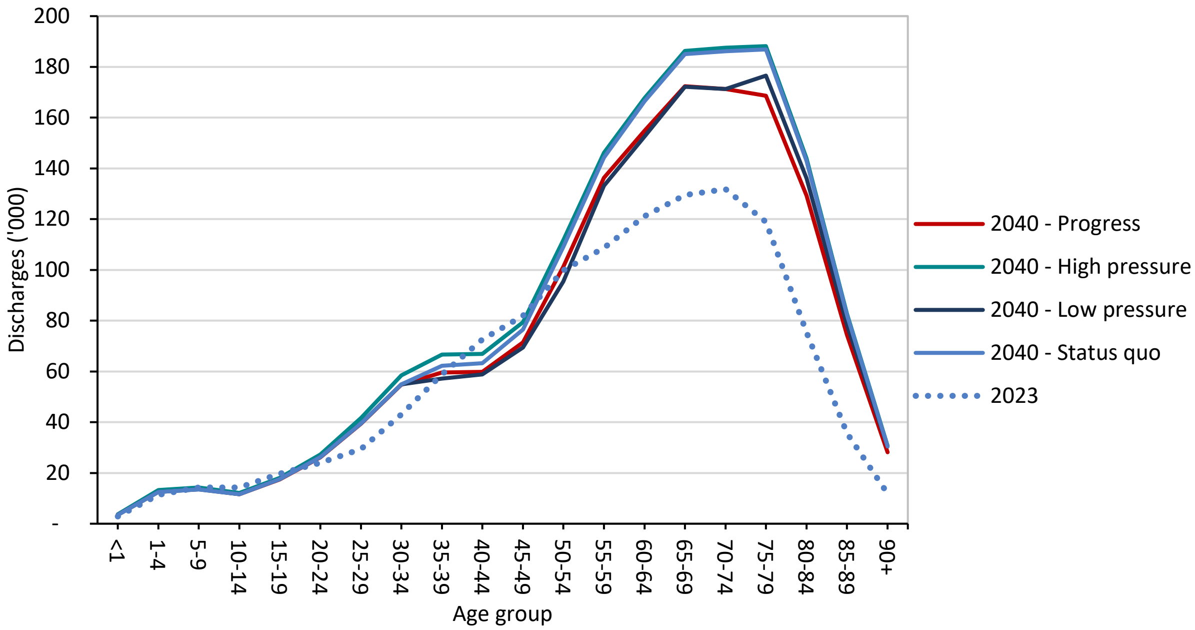
FIGURE H.1 ED and OPD – Age-specific attendances by scenario, 2023 and 2040



Notes: ED: We do not present the age distribution for the 2040 - Low scenario as it mirrors closely that of the progress scenario for demand.

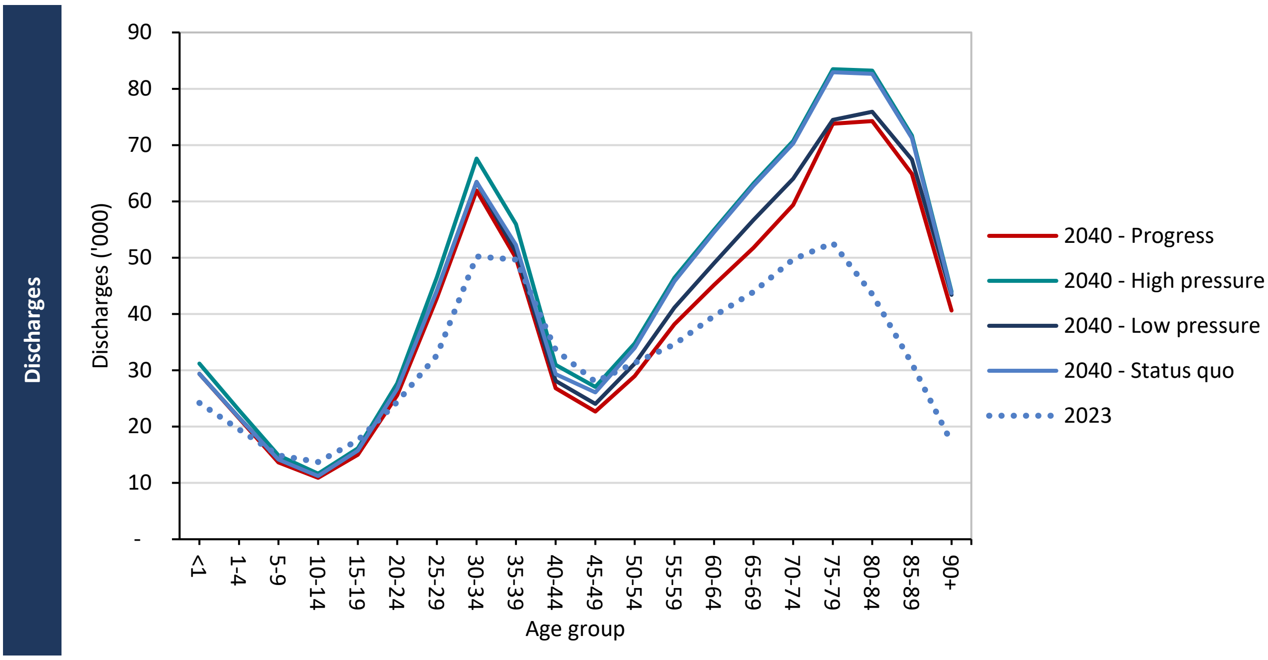
Sources: ED: HSE BIU Acute, 2023.
OPD: HPO Specialty Costing, 2023; HSE BIU Acute, 2023; NTPF, 2024.
ESRI population data, 2024; authors' calculations.

FIGURE H.2 Day patient – Age-specific discharges by scenario, 2023 and 2040

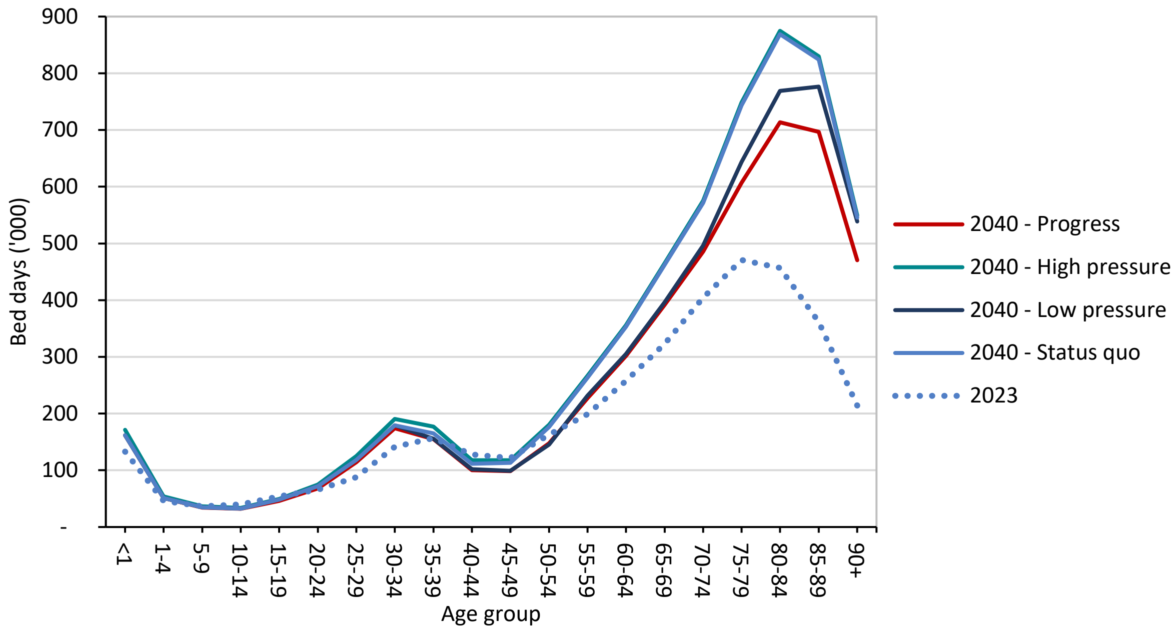


Sources: HIPE, 2023; NTPF, 2024; ESRI population data, 2024; authors' calculations.

FIGURE H.3 Inpatient – Age-specific discharges and bed days by scenario, 2023 and 2040



Bed days



Sources: HIPE, 2023; NTPF, 2024; ESRI population data, 2024; authors' calculations.

AN INSTITIÚID UM THAIGHDE EACNAMAÍOCHTA AGUS SÓISIALTA
ESRI ECONOMIC & SOCIAL RESEARCH INSTITUTE

Economic & Social Research Institute

Whitaker Square
Sir John Rogerson's Quay
Dublin 2

Telephone: +353 1 863 2000
Email: admin@esri.ie
Web: www.esri.ie

An Institiúid um Thaighde Eacnamaíochta agus Sóisialta

Cearnóg Whitaker
Cé Sir John Rogerson
Baile Átha Cliath 2

Teileafón: +353 1 863 2000
Ríomhphost: admin@esri.ie
Suíomh Gréasáin: www.esri.ie