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Hospital Performance: An Examination of Trends in Activity, Expenditure and Workforce in Publicly Funded Acute Hospitals in Ireland.

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Foreword

The Department of Health and the HSE are responsible for delivering the highest standard of care to the greatest number of people from the investment provided by government. Healthcare productivity is a key consideration in efforts to achieve this goal. The more productive we are, the more patients we treat, the less time they have to wait and the better outcomes we can achieve.

Over the past decade there has been a step change in health funding, from €13.7bn in 2014 to €22.8bn in 2024. Over 50,000 healthcare staff have been added to the public service. There have been real improvements in healthcare infrastructure including rollout of 174 primary care centers and over 1,000 new beds in our acute system. We have improved access to care, expanded eligibility and reduced waiting lists.

After such rapid growth, and the impact of the COVID-19 pandemic, we must look more deeply at how our current structures promote or inhibit the effective and sustainable use of resources. This is necessary, both to respond to the needs of the population now and put us in a better position to meet the rising healthcare demands from population growth and ageing.

This paper provides a clear view of how publicly funded hospital activity has responded to additional expenditure. It establishes a baseline on acute care productivity, and highlights where activity improvements are possible based on a “whole-of-site” analysis. The identified divergence between resourcing and activity is a major concern. We must respond coherently with clarity on how targeted improvements can be made to service delivery in the acute setting. In doing so we will listen to staff who are best placed to identify where change can be delivered.

As a service we must be as open and transparent as possible. Not to facilitate blame, but to encourage and support improvement. We are committed to publishing more performance information so that the public are informed on the challenges and progress being made.

The paper will guide our work in the Productivity Taskforce. Firstly, to agree a condensed set of acute productivity indicators capable of tracking progress. Secondly, we must re-dedicate ourselves to better data for better decision-making. Finally, we understand that a mixture of targeted capital and current investment may be required to unlock productivity improvements in hospitals. We will prioritise additional investment that can eliminate bottlenecks - in ICT, diagnostics, theatre availability, bed capacity and staffing to deliver activity growth and productivity improvements. The stepping up of the new Health Regions will also have a role to play as integration of care will be required to solve some of the issues effecting the hospital system.

Evidence-based policy making and decision-making supported by data analysis are key enablers of effective healthcare reform. Our organisations must be ready and able to produce, challenge, and implement research-led recommendations, as this will ultimately enable us to achieve a more accessible, safer and productive health service for the betterment of all.

Robert Watt, Bernard Gloster

The image shows two handwritten signatures in black ink. The signature on the left is 'Robert Watt' and the signature on the right is 'Bernard Gloster'.

Rationale

- Over the last decade there has been a considerable increase in health expenditure from €14.1bn in 2013 to €23.6bn in 2022.
- It is well established that population growth and ageing in Ireland will increase healthcare demand and resourcing requirements (e.g see OECD (2023), Department of Finance (2021) and European Commission (2021)).
- The Irish Fiscal Advisory Council (2023) has highlighted the need to improve the setting of medium-term expenditure ceilings by the Department of Public Expenditure, NDP Delivery and Reform, and the control of expenditure allocated by the health service.
- In response to these pressures there is a fundamental requirement to ensure that the maximum amount of patient care is delivered for the available funding in the healthcare system.
- This work will inform the joint Ministerial Productivity Programme which is tasked with improving productivity and value for money to meet growing healthcare demands within sustainable funding parameters.

Summary

- This paper examines trends in and the relationship between acute care inputs, in terms of workforce and expenditure, and outputs in terms of activity at a national and hospital level in the publicly funded acute care system between 2016 and 2022.
- This paper identifies the importance of measuring Acute Hospital performance against trends in workforce, expenditure and activity, to provide a “whole-of-site” view of productivity.
- While it provides new lense on productivity, further work will be undertaken to improve data and account for factors that impact health system performance including patient acuity and cost in Emergency Department (ED) and Outpatient settings, capital infrastructure and ICT availability, and patient quality and outcome metrics.
- The period of analysis for the paper intersects with the commencement of the COVID-19 pandemic, which had a significant impact on hospital activity and expenditure over the latter years we examine (2020 – 2022). Over this period there were 62,000 admissions to hospital with COVID-19 present.
- While the focus of this analysis is on trends in hospital activity and expenditure, it should be acknowledged that not all hospital investment results in additional activity. Initiatives such as Infection Control and the Safe Staffing Framework improve patient and staff experience with a minimal impact on hospital activity.
- Between 2016 and 2022 there were increases in activity across all acute service areas (3% inpatient complexity adjusted discharges, 10% day-case complexity adjusted discharges, 20% ED attendances, 2.6% Outpatient presentations).
- When we combine these based on their relative costs and adjust for the complexity of treatment this equates to a 3.8% increase in overall activity, compared to an inflation adjusted rise in expenditure of 45% (nominal rise of 68%) and a 29% increase in staffing numbers.
- Closing the gap between acute hospital inputs and complexity adjusted outputs will be the focus of the Productivity Taskforce supported by regular publication of analysis in this area.

Findings

Acute Hospital Expenditure

- Nominal Acute Hospital Expenditure over the period 2016-2022 has risen from €4.4 billion to €7.37 billion, an increase of ~€3bn (+68%).
- Real Acute Hospital Expenditure over the period 2016-2022 has risen from €4.4 billion to €6.37 billion controlling for Consumer Price Index inflation over the period of 15.7%, a growth of 45%. Nationally agreed public sector pay agreements have resulted in an increase in health expenditure above CPI over this same period.
- The annual nominal growth rate of expenditure increases has risen from 7.33% over the period 2016-2019 to 10% over the period 2020-2022, with expenditure provided for the COVID-19 response contributing to this increased rate of growth.
- The pay bill accounts for 65% of the total growth in expenditure over this period. This growth is inclusive of national pay awards, increments, overall increases in staff and changes in workforce composition including the prioritised recruitment of consultants over the period.

Capacity and Occupancy

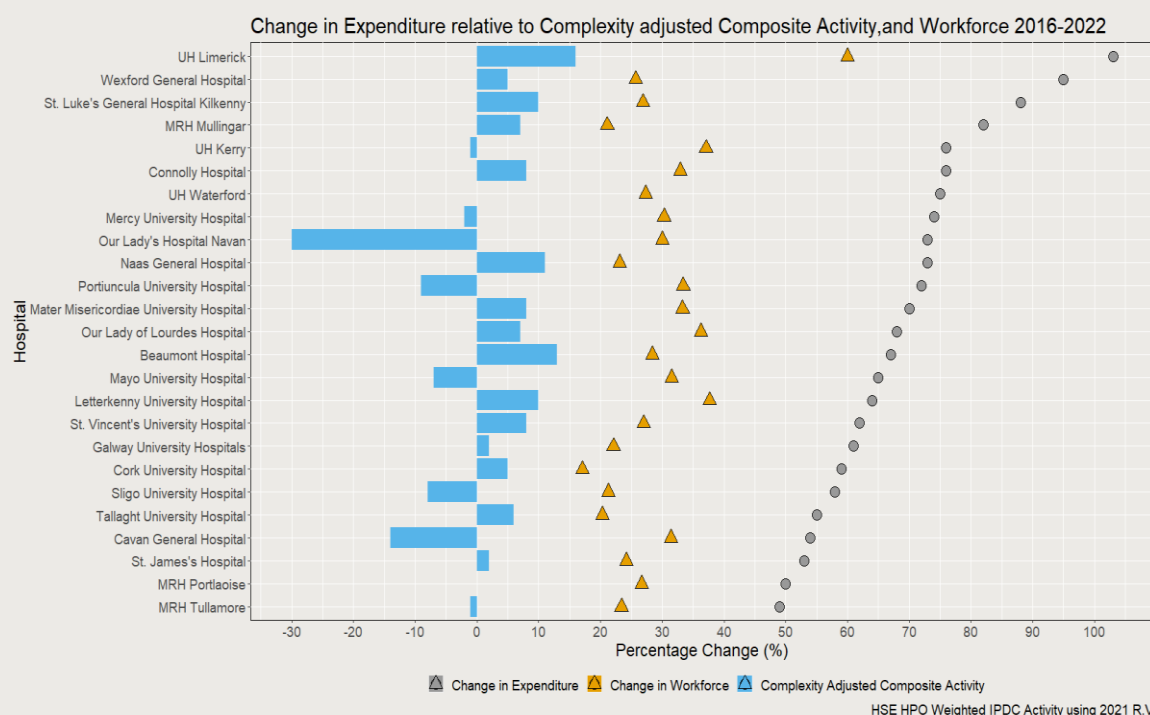
- The number of funded beds occupied or ready and available for occupation ("open beds") in the Acute system has risen from 10,592 in 2016 to 11,581 beds in 2022, an increase of 989 inpatient beds.
- Occupancy has decreased from 94.6% in 2016 to 92.3% in 2022. This may reflect a move towards a safer level of occupancy, with the literature identifying occupancy rates of 85% to be a safe level which leaves additional capacity for surge events. Occupancy was above this 85% range in 32 out of 48 sites in 2022.
- Length of Stay has increased, rising from a national average per patient of 5.7 days in 2016 to 6.4 days in 2022, with this rise partially attributable to the impact of COVID-19 on patient care needs.
- Population ageing has been shown to have a demonstrable impact on resource utilisation and capacity in the acute care system. Based on authors analysis of HIPE data this is also the case, with for example a 21-year-old emergency admission having an average length of stay of 2.84 days, versus an average length of stay of 11.9 days for an 85-year-old emergency admission. In addition, our analysis shows that persons aged over 65 currently make up 15% of the total population while consuming 58% of all Inpatient bed days.

Workforce

- Total Acute Workforce has increased from 53,819 in April 2016 to 69,262 in April 2022, growth of 29%.
- Nursing has experienced the largest nominal increase in workforce, rising from 20,902 to 26,494 WTE over the period.
- Out of a total of 15,443 hires over the period, 10,170 are medical, nursing and health & social care professionals (66% of total) while the remainder are in roles more closely related to administration.
- The relative number of clinically aligned workforce per inpatient bed has increased across all sites from an average of 3.23 in 2016 to 3.81 in 2022.

Activity:

- **Inpatient Discharges:** 623,000 inpatient discharges were delivered in 2022. This constitutes a 3.5% decrease in activity relative to 2016. Adjusting this for increased patient complexity results in a 3% growth in weighted inpatient discharges.
- **Day-Case Discharges:** 1.12 million day-case discharges were delivered in 2022. This constitutes a 6.3% increase in activity relative to 2016. Adjusting this for increased patient complexity results in a 10% growth in weighted day-case discharges.
- **Outpatient Attendances:** 3.4 million outpatient appointments were delivered in 2022. This constitutes a 2.7% increase in activity relative to 2016.
- **Emergency Presentations:** 1.66 million emergency presentations were seen in 2022. This constitutes a 21% increase in activity relative to 2016.
- **Composite Activity:** This paper presents a novel way of understanding the above activity in a single composite indicator at whole of site level. "Composite" activity (aggregate Inpatient, Day-Case, Outpatient and Emergency, weighted by unit costs for each area), adjusted for patient complexity, has increased by 3.8% over the period 2016 to 2022.
- Changes in activity at a site level are variable, with many sites experiencing reductions in nominal activity across one or more activity areas over the period.
- Non-complexity adjusted Inpatient Discharges over the period have decreased. However, the length which patients stay, and the number of bed days used has risen.



Productivity

- Our analysis shows the large divergence present in all sites between the expenditure and workforce provided, relative to the growth in either separate activity metrics or “composite” activity. In most cases, the divergence is significant, with the percentage growth in composite activity between 2016 and 2022 either negative, or two times behind workforce growth, and up to three times behind real expenditure growth over the same period.
- The Cost per Unit of composite activity has increased across all sites over the period 2016-2022. This provides further evidence that the cost of delivery of activity has risen over time within the publicly funded acute care system, although further analysis will be needed to fully understand the determinants of this change (including improvements to the health system that do not necessarily increase activity, such as improvements to patient and staff experience).

Recommendations

I. Improve Hospital Performance

The analysis presented shows a clear variation in performance across sites both in expenditure management and in the delivery of activity. This highlights the need to examine productivity within publicly funded acute hospitals to see how activity levels can be improved. The report will also inform the productivity taskforce in setting KPIs in hospitals to establish a performance expectation for additional investment.

II. Targeted Site Level Research

There is large variation in the conversion of inputs, such as expenditure and workforce, into activity across hospitals. Site level analysis should be undertaken, including qualitative research to understand what differences exist between these sites, and how best to ensure that additional resources result in increased and improved hospital services.

III. International Review of Performance

The divergence in the conversion of hospital inputs to outputs appears to be a problem shared by other health systems. For example, a similar report on the UK NHS has demonstrated the emergence of a similar “productivity puzzle” within their acute hospital facilities. An extension of this research could therefore examine activity, workforce and expenditure trends in other healthcare systems, with the goal of informing Ireland’s response to the observed divergence reported here.

IV. Improved Staff Reporting

At present staff report at a cost centre basis, with limited information available as to what specific area they work in. To improve our understanding of where staff work the provision of an additional variable identifying what clinical area of the hospital staff work in would enable a better understanding of site level differences and therefore their contribution to activity.

V. Improved Financial Reporting

The implementation of the Integrated Financial Management System (IFMS) by the HSE will likely deliver a more granular level of financial reporting to the Department. This is imperative for the development of more detailed analysis on cost drivers, enabling the identification of cost drivers and potential savings at a sub-expenditure line level.

VI. A focus on the Swift Implementation of OPD Clinical Coding and Emergency Presentation Clinical Coding

The provision of additional information on the reasons for OPD or Emergency Department presentations, alongside associated costs for each type of presentation will allow for a more detailed understanding of the relative characteristics of patients treated in each hospital, and the potential cost differences emerging from differences in patient acuity. This will aid service planning and will enable a more accurate understanding of the composition and complexity of care delivered by site in these settings, an important factor when considering cross-hospital performance rankings on the conversion of expenditure to activity.

VII. Revision of Key Performance Indicator Measures:

The paper emphasises the need to explore and improve publicly funded acute care productivity. As part of this approach, the Productivity Taskforce should consider how to structure a revised set of key performance indicators for the acute care system to better identify opportunities for, and drive performance improvement. This could utilise existing KPIs within the HSE Management Data Reports, alongside other analytics (such as the development of the HPVP system).

VIII. Activity Based Funding (ABF)

ABF is an internationally recognised system of healthcare funding which can assist in further understanding productivity at a site and procedure level. There is an opportunity to ensure that funding follows performance and that existing cost differentials in the provision of the same care are reduced or eliminated to the greatest extent possible.

IX. Further Research on Hospital Productivity

The analysis provided raises areas for further research in a number of contexts. research questions which may help us to understand and improve hospital productivity include:

- i. Differences in capital infrastructure and diagnostics availability on hospital throughput.
- ii. The admission of a high-number of emergency department patients on overall patient cost.
- iii. The outsourcing and conversion of inpatient to day case care on average length of stay and hospital resource use.
- iv. Differences in hospital IT infrastructure and its associated impact on patient throughput.
- v. Changing staff experience, training and characteristics on patient and staff experience and hospital throughput.
- vi. Analysis and comparison of hospital activity, expenditure and workforce developments at a model specific level (e.g, maternity, elective, etc) as well as comparing these developments across each HSE Health Region.

Contents

1	Introduction	8
2	Methodology.....	10
2.1.1	Inflation Adjustments.....	12
2.2	Limitations.....	12
3	Acute Hospital Activity	13
3.1	National-Level Acute Hospital Activity.....	13
3.2	Outpatient Activity (New and Return Appointments)	13
3.3	Inpatient and Day case Activity.....	15
3.4	Weighted Inpatient and Day case Activity	16
3.5	Unscheduled Care	19
3.6	Activity in the First 8 Months 2016-2023.....	21
3.7	Hospital Level Analysis	24
4	Acute Hospital Capacity and Occupancy.....	32
4.1	Occupancy.....	36
4.2	Discharges per Bed.....	37
5	Acute Hospital Expenditure	40
5.1	Non-Pay & Pay Hospital Expenditure	40
5.2	Trends and Regional Variation in Aggregate Acute Expenditure.....	43
5.3	Inflation and its Impact on the Health Budget.....	46
6	Acute Hospital Workforce	49
6.1	National Workforce Trends and Composition	49
6.2	Workforce Growth by Hospital	51
7	Activity and Expenditure Changes 2016-2022	56
8	Policy Findings.....	61
9	Policy Recommendations	64
10	Bibliography	67

1 Introduction

Acute care is where a patient is treated for a brief but severe episode of illness. In Ireland, the acute care system encompasses all activity delivered within hospitals, including scheduled inpatient care, unscheduled / emergency care, maternity care services, outpatient, and diagnostic services. In recent years, the publicly funded acute care system in Ireland has been the subject of consistent reform efforts in response to high patient wait times for scheduled and unscheduled care and rising expenditure. The vision for healthcare set out in the Sláintecare report, and embodied by ongoing Sláintecare reforms is one in which patient treatment is focussed on community-care interventions rather than treatment within hospitals. This has led to a series of reforms impacting the delivery of care in acute settings in Ireland, including; the provision of [Enhanced Community Care](#) services, wherein specialist assessment, diagnosis and treatment of patients is provided outside of a hospital setting; the introduction of “[Health Regions](#)” which integrate acute, primary and social care governance into one organisation for each region¹ and the introduction of [Population Based Resource Allocation](#), which will distribute available healthcare resources across each health region according to population need in order to promote efficiency and equity in health outcomes and a fairer allocation of resources across patient populations. The introduction of Health Regions will also enhance the monitoring and management of performance of the health and acute care system in Ireland, with variances, in outputs and patient outcomes in each region relative to expenditure more directly attributable to Health Region performance².

In addition to these reforms, the acute system has also been the subject of closer interrogation and inspection, with long waits in unscheduled care, high patient waiting lists for scheduled care and outpatient services, and the need for increased future acute care service delivery capacity all prompting policymakers and the political system to more closely examine how services are delivered. It is well established that the growth and ageing of the population in Ireland will increase demand on our healthcare system and its resourcing requirements (e.g see [OECD \(2023\)](#), [Department of Finance \(2021\)](#) and [European Commission \(2021\)](#)). For example, the Department of Finance anticipates a rise in the level of expenditure on health and long-term care of 62% between 2019 and 2070 (from 8.6% of GNI* in 2019 to 14% of GNI* in 2070).

¹ This replaces the six hospital groups and nine Community Healthcare Organisations which were previously tasked with delivering acute and community care services within their own respective geographies.

² As in contrast to the current system, funding will be aligned to population health needs, enabling more effective assessment of the conversion of inputs (expenditure and workforce) into outputs (healthcare services delivered) and outcomes (population health status).

Most recently, there was a large expenditure over of €964 million in 2023 and a lower than anticipated budget settlement for the health sector. The Irish Fiscal Advisory Council (2023) has highlighted the contribution of inadequate and opaque spending forecasts and poor expenditure controls to the occurrence of overruns of this type. In terms of inadequate forecasting, IFAC states that the health system forecasts that were provided do not adequately take account of the cost of maintaining the existing level of service delivered by the health service in Ireland, resulting in allocations below a level that could be anticipated in advance. From an expenditure control perspective, poor controls allowed the health sector to hire unplanned additional staff, as well as provide additional services at a higher cost per service than initially planned.

Having commissioned initial productivity data last year, and in response to these issues, the Minister for Health convened the Productivity Programme Taskforce, chaired by the Department of Health Secretary General and the HSE CEO to drive savings and efficiencies across the service. The actions carried out by the Taskforce will help ensure the fiscal sustainability of the Irish health system, with strategic analysis of the sector providing guidance on where high-level productivity improvements can be made and patient services maximised for the funding available. This report, commissioned by the Minister for Health constitutes the first major publication of the Programme and illustrates how data-driven analysis can support health system productivity and policymaking. In particular, its analysis of the relationship between acute care inputs and outputs over time at a national and hospital level designates areas for further research and performance improvement through investment and intervention. The Minister of Health is committed through the Productivity Programme to building on this analysis and approach, with further publications focussed on health system performance planned for later this year.

2 Methodology

The primary method of analysis undertaken in this research note was the compiling and visualisation of monthly reported data provided from various sources by the Health Service Executive (HSE), these include the following:

- HSE Acute Hospital Run Rates (provided by the Department of Health Financial Performance Unit)
- HSE Management Data Reports (MDRs)
- HSE Staff Census (provided by National HR Directorate of the HSE to the Department of Health Statistics and Analytics Unit)
- HSE Health Statistics (provided by HSE Acute BIU to the Department of Health Statistics and Analytics Unit)
- Hospital In-patient Enquiry Database (HIPE)
- Patient Experience Time Dataset

These data were then cleaned and analysed using R studio. The primary outputs of this analysis are visualisations which provide an understanding of how activity, workforce and expenditure have changed over the period 2016 – 2022. The period chosen is due to data constraints and relevance, with HSE run rates being provided only over this period and metrics such as weighted units not being available in MDRs prior to 2016. Another feature of this paper is the development of the ‘Composite Activity’ metric. This metric was developed to provide a high-level illustration of aggregated, cumulative activity provided in each hospital setting to aid comparative analysis across facilities. The development of this composite metric was based on the use of 2018 HSE Healthcare Pricing Office (HPO) costs for the delivery of inpatient, day case, outpatient and Emergency Department Care (See Table 2.1), costs which are currently used to allocate resources across the acute system. Inpatient care was counted as 1 unit of activity, with the other types of activity weighted relative to their respective unit cost divided by the average cost of an inpatient episode of care. Based on the unit cost values (provided in Table 2.1), the weighting for each other type of activity delivered in hospitals relative to inpatient care is as follows³:

³ These unit costs are used to derive a relative ratio of value of care for inpatient activity relative to other activity types in public hospitals. This means that the use of 2018 rather than 2022 unit costs is of low importance, as the ratio of costs from one activity type to another has not greatly changed since 2018.

- An Emergency Department episode is equal to 0.06 inpatient discharges.⁴
- A patient discharged as a day-case is equal to 0.18 inpatient discharges.
- A patient seen in an outpatient setting is equal to 0.03 inpatient discharges.

To account for variations in the complexity of care delivered across hospitals, inpatient and day case care in each hospital are scaled relative to a hospital's case-mix index (e.g see Figure 3.14), with this allowing for more accurate account of complexity adjusted composite activity across hospitals than the nominal figures. The use of the composite metric allows for the comparison of site performance over time using a singular variable to reflect activity-based performance. While this provides an advantage from a communications perspective, it also means that hospital-level composite activity has a strong weighting towards inpatient and day case discharges, relative to OPD appointments and ED presentations. Although this is directly reflective of the costs of each constituent part of activity in the acute care system, it could be argued that a higher weighting could instead be applied to OPD, ED and Day-case activity in line with Sláintecare objectives to increase care provided in these contexts. This is a noted limitation of the analysis provided in this report.

Table 2.1: Unit Costs by Service, 2015 - 2018

	<i>ED Presentation</i>	<i>OPD Appointment</i>	<i>Day case Episode of Care</i>	<i>Inpatient Episode of Care</i>
<i>2015</i>	€263	€142	€733	€4,555
<i>2016</i>	€270	€156	€754	€4,602
<i>2017</i>	€294	€163	€856	€4,794
<i>2018</i>	€298	€171	€885	€4,985

Source: HPO Specialty Costing Data & HIPE 2015-2018 as cited in Keegan et al. (2020).

Given the variations in the level of case mix⁵ which sites deliver, the application of a case mix indicator was applied as an additional approach to adjust and control for the variation in complexity of care being delivered. This approach involved weighting the inpatient and day case activity across each of the sites relative to the case mix index for each of these forms of activity for each site in 2016 and 2022.

⁴ While these values represent average unit costs, there may be significant variation in the cost of particular patients in each of these settings, for example treatment of high acuity in-patients (e.g, heart transplant patients) or the presentation of persons to ED who subsequently have a long wait time before admission / discharge.

⁵ The types of procedures/treatment being delivered.

2.1.1 Inflation Adjustments

We considered different options to control for inflation of non-pay expenditure in the publicly funded acute setting including the application of Consumer Price Inflation (CPI) over the period, obtained from the Central Statistics Office (CSO), or the application of a GNP deflator plus one percent per annum in line with Irish Fiscal Advisory Council (IFAC)⁶ methodologies. For clarity and ease of use it was determined that the CPI deflator was the most appropriate measure of inflation for this analysis, however it is acknowledged that the inflation facing the publicly funded healthcare system may be in excess of CPI.

2.2 Limitations

This report uses national and hospital-level acute care data over an extended timeframe and is primarily concerned with aggregate changes in high-level expenditure, activity, and workforce metrics. As such, this report is unable to provide a perspective which fully takes account of various nuances that influence these high-level outcomes. This leads to various limitations with the analysis, including but not limited to:

- The impact of COVID-19 on expenditure, activity, and patient flow in acute hospitals.
- The effect of the Ukrainian Temporary Directive on demand for services in Acute settings.
- The changes in service delivery across hospital groups, wherein activity and care of a certain complexity is shifted between sites, with this having a corresponding impact on non-complexity adjusted activity over time.
- Measuring the total effect of demographic change on the Acute Hospital system.
- Only some hospitals have maternity units, with these hospitals being reported alongside hospitals with no maternity or paediatric function. Given that birth rates have decreased in Ireland, this may in some part result in a relative reduction in inpatient discharges in certain hospital sites over others.
- This paper uses data provided at a point in time from a variety of sources, drawing primarily on a HSE data request received by authors in August 2023. As a result, some figures reported in this report may differ from more updated information due to revisions of figures.

⁶ [LTM-Methodology-Report.pdf \(fiscalcouncil.ie\)](https://www.fiscalcouncil.ie/LTM-Methodology-Report.pdf)

3 Acute Hospital Activity

3.1 National-Level Acute Hospital Activity

This section provides an overview of aggregated activity in publicly funded acute hospitals in Ireland by examining trends in emergency department attendances, outpatient attendances, inpatient discharges, and day case discharges between 2016 and 2022. Day case and Inpatient activity are additionally provided with a weighting that takes account the relative complexity of each procedure being received by a given patient derived known as weighted inpatient and weighted day-case discharges (These are derived directly from HSE Management Data Reports for each year and were provided to authors by the HSE Business Information Unit). The weighting applied to each discharge is based on a grouping process undertaken by the HSE Healthcare Pricing Office, with the inclusion of these metrics allowing for the identification of cases where hospitals have been subject to more or less complex care than previous years (relative to the unweighted figures). Sections 3.2-3.5 provide an overview of activity over the period 2016-2022, based on limitations with data availability in 2023. Section 3.6 presents an analysis of activity over the period January to August 2016-2023. This enables the presentation of how activity is trending in 2023, to provide the reader an insight into activity within the most recent year. This is important given that the COVID-19 pandemic, and HSE Cyber Attack both impacted performance in the acute system between 2020 and 2022. While the impact of these issues continues into 2023, the inclusion of 2023 figures provide the reader with more context for the potential performance impact of these events⁷.

3.2 Outpatient Activity (New and Return Appointments)

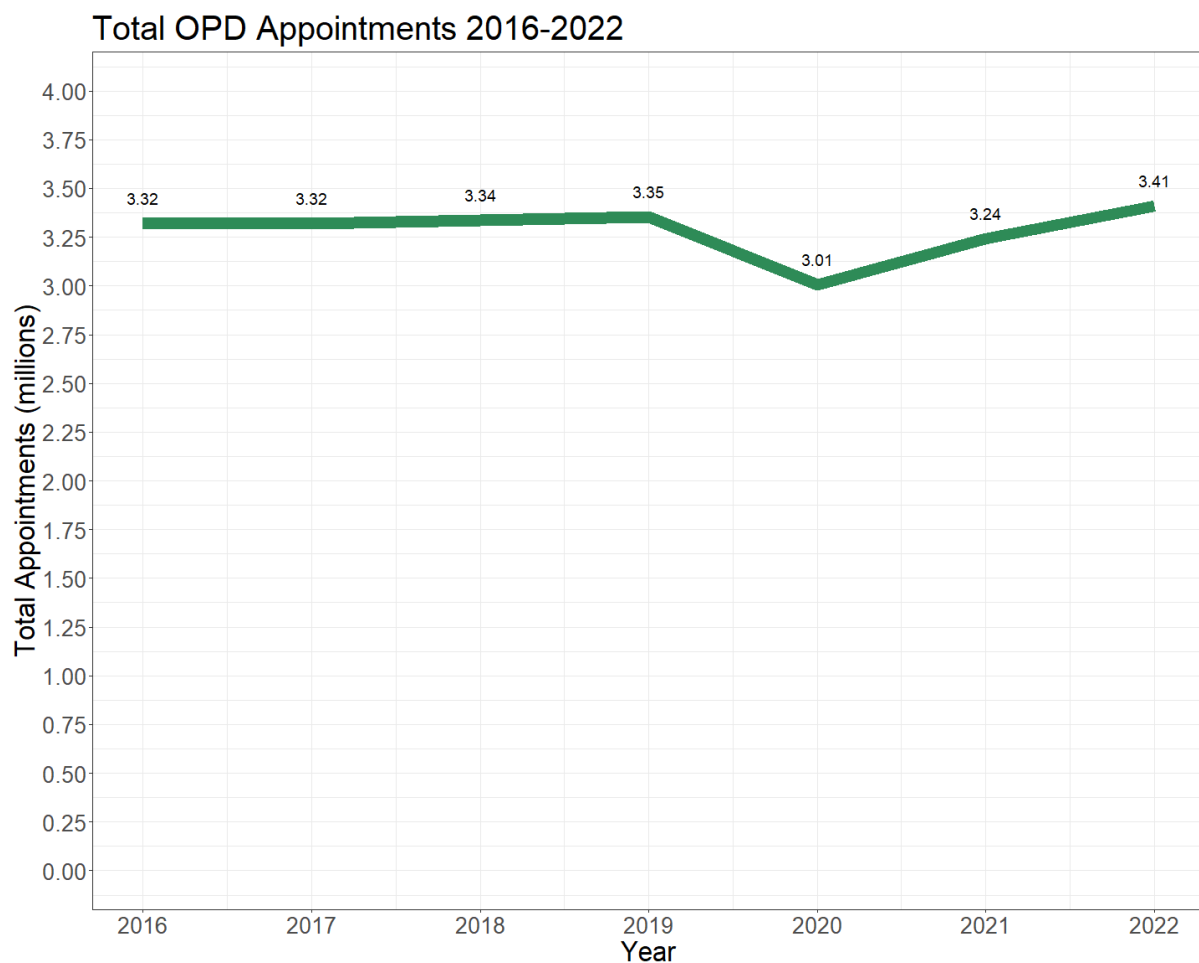
Figure 3.1 provides an overview of Outpatient Activity from 2016 – 2022. Summarising activity over the period we can see that:

- Outpatient Activity was at an all-time high in 2022 with a total of 3.4 million appointments. This is approximately 60,000 appointments above 2019, the previous record number of appointments.
- The impact of Covid-19 on OPD activity is clear, with 347,000 less appointments provided in 2020 than in the year prior.
- Over the period 2016-2022, outpatient activity has increased by a total of 2.7%.

⁷ The inclusion of 2023 figures also allow for any potential lag in activity relative to a contemporary increase in investment (such as during the COVID-19 pandemic) to be observed. The comparison of weighted units reported within HSE Management Data Reports across years is not possible due to the methodology applied in such reports.

The number of patients waiting for outpatient appointments has increased over this period, rising from 437,558 in December 2016 to 584,626 in December 2022⁸. As mentioned, this growth in waiting lists is partially attributable to the decline in activity experienced during the COVID-19 pandemic. Key factors which can influence the rate of patients seen at outpatient clinics include demographic pressures, workforce availability, the rate of hospital led cancellations and, the rates of patients who do not attend OPD appointments, although the exploration of each of these factors is beyond the scope of this paper.

Figure.3.1: Total Outpatient Activity



Source: HSE-BIU Data, Author's Calculations

⁸ Authors Calculations based on publicly available NTPF OPD data, available at: <https://www.ntpf.ie/home/outpatient.htm>

3.3 Inpatient and Day case Activity

Figure 3.2 below illustrates the level of activity for both day case⁹ and inpatients delivered in publicly funded hospitals in Ireland over the period 2016-2022. This data was collated from HIPE extracts held within the Department¹⁰ provided by the HSE Healthcare Pricing Office.

- In total cumulative activity has risen from 1.71¹¹ million episodes in 2016 to 1.75 million episodes in 2022. This increase is attributable to a higher level of day case activity, which has increased over the period by 66,528. In contrast, inpatient episodes of care have decreased by 22,475.
- The onset of COVID-19 alongside advances in clinical practice may have resulted in a greater level of procedures being delivered on a day case basis, leading to a corresponding reduction in inpatient care provided. The move towards an increased delivery of activity on an ambulatory basis is a key policy objective of the HSE¹² in line with the implementation of Sláintecare reform.
- While there has been a reduction in the level of inpatient discharges, this has not resulted in a lower level of bed days used across the system, with 3.87 million bed days used in 2022 (HSE Health Statistics 2022), an increase of 250,000 bed days (+684 beds¹³) used relative to 2016. The growth in bed days used could be driven by a longer average length of stay (ALOS) for patients, averaging 6.4 days in 2022, up from 5.7 days in 2016¹⁴. Understanding the drivers of increased ALOS is worthy of further exploration in the context of considerations to improve hospital productivity in Ireland, although the reasons for this growth are beyond the scope of this paper. The impact of the COVID-19 pandemic have been identified as one of the key drivers of this growth, with data provided by the HPO demonstrating an ALOS of 4.8 days for non-covid, general hospital bed patients, versus 15.4 days for equivalent COVID patients¹⁵.

⁹A day case is a patient who is admitted to hospital on an elective basis for care and/or treatment which does not require use of a hospital bed overnight and who is discharged as scheduled.

¹⁰ HIPE Extracts may have slight differences in values to those reported in annual Management Data Reports due to continuous revisions of data. HIPE Extracts were viewed as the most appropriate source for this project by authors due to the additional information provided for each patient discharge within the dataset.

¹¹ Numbers are rounded to two decimal places.

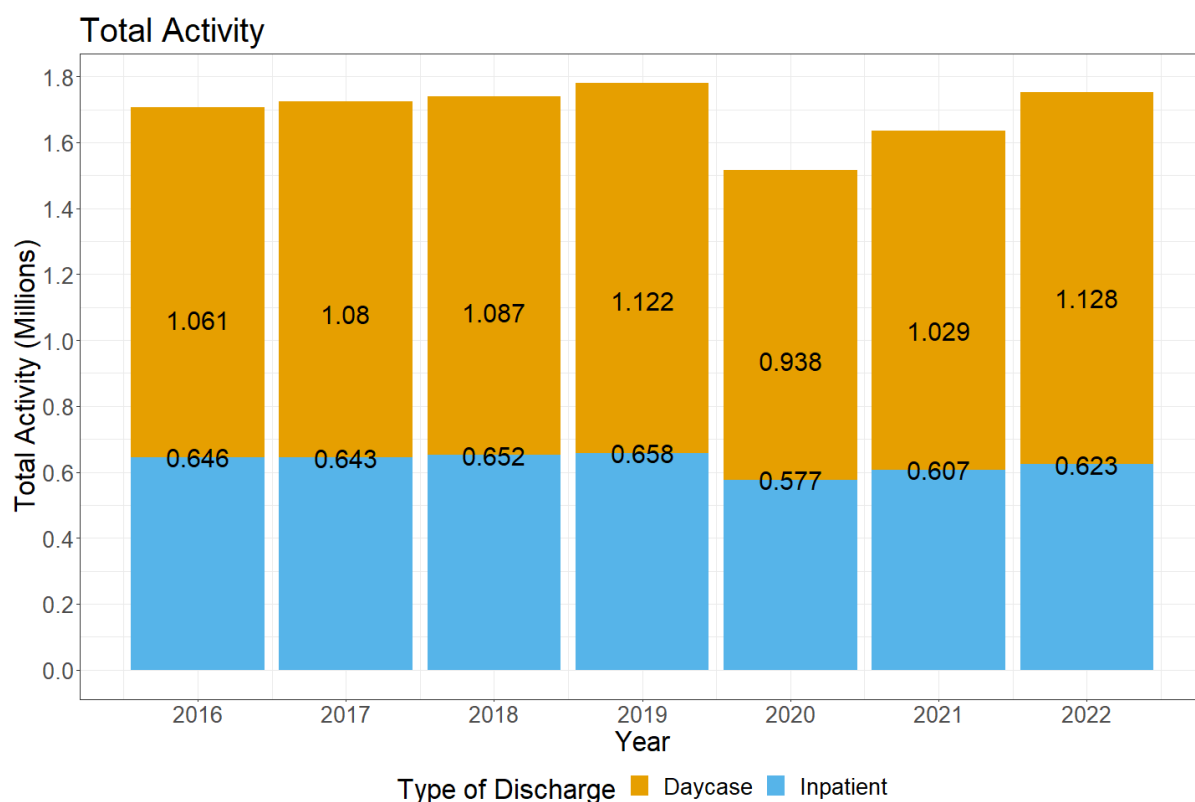
¹² <https://www.hse.ie/eng/about/who/cspd/ncps/acute-medicine/resources/ambulatory-care-framework-excluding-data.pdf>

¹³ This figure is obtained by dividing the total number of additional beds 250,000 by 365 days, to obtain a daily additional bed used figure.

¹⁴ These figures have been obtained from HSE Health Statistics 2016/2022 as submitted to the Department of Health by the HSE Acute BIU.

¹⁵ The equivalent ALOS for non-covid ICU patients was 12.7 days, versus 39 days for ICU patients with COVID-19, although patients who are likely to be infected with COVID-19 may already have a longer length of stay independent of the infection, preventing us from attributing the difference in ALOS to COVID-19 alone.

Figure.3.2: Total Inpatient and Daycase Episodes of Care 2016-2022



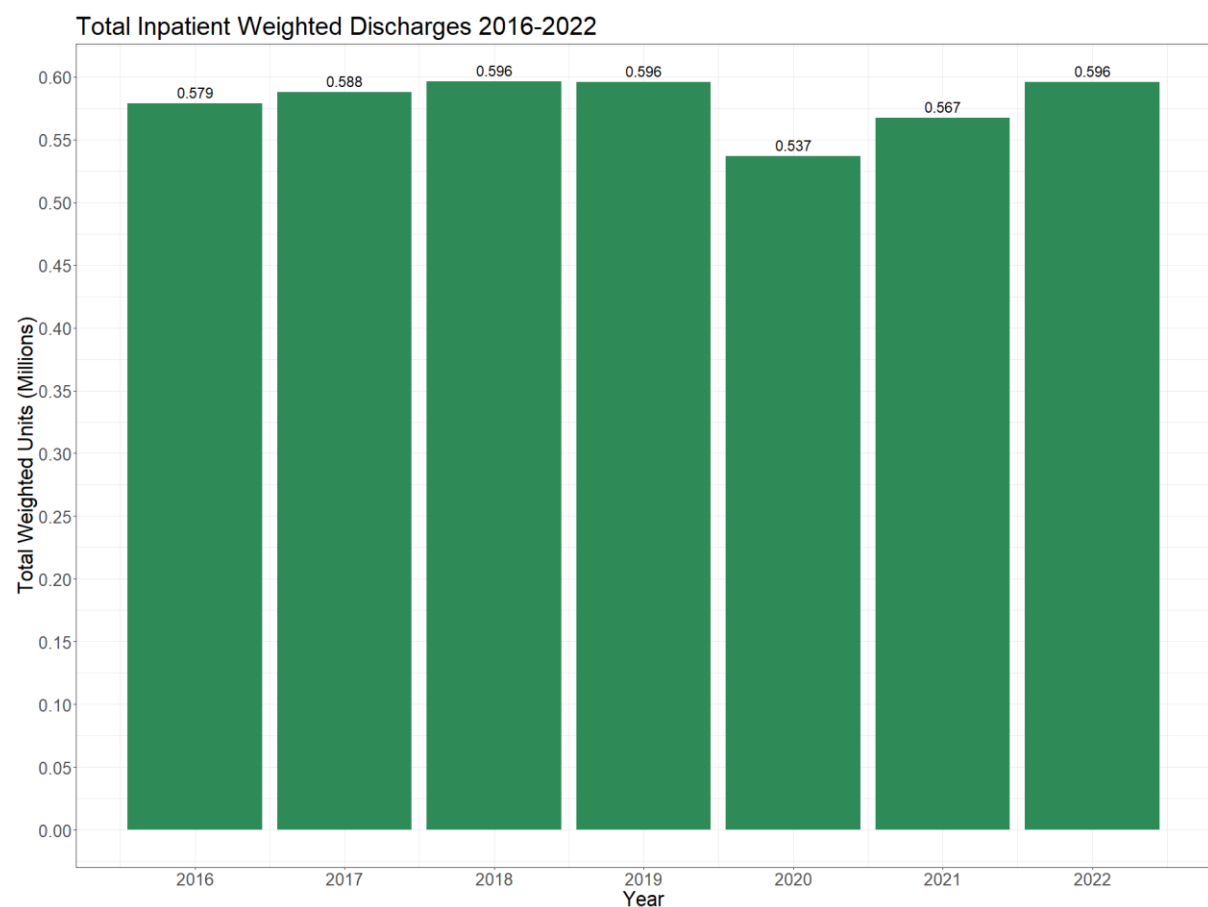
Source: HSE-HIPE 2016-2022, Author's Calculations

3.4 Weighted Inpatient and Day case Activity

The activity figures provided allow for an examination of the number of patients treated within publicly funded hospitals each year in Ireland. However, patients, even those admitted to hospital, can receive treatments of varying levels of complexity depending on need, with these differing treatments demanding different levels of hospital resources and beds available. For example, Heart Transplants (DRG = A05Z) have an average price of delivery in 2023 of €190,059 and an average length of stay of 77.8 days. This compares to hip replacements of intermediate complexity (DRG = IO3B) with a price of delivery of €12,679 and an average length of stay of 7.5 days. It follows that treating all patient discharges as equivalent on a year to year or hospital by hospital basis may be misleading in terms of the real level of activity delivered in each. To counteract this limitation, we can instead make reference to “weighted units” for both inpatient and day case discharges which take these deviations into account. Specifically, weighted units account for both the volume of care delivered in each hospital to admitted patients, and the relative complexity of that care. For example, in a situation where the acute care system delivers less inpatient care overall than the previous year but delivers procedures which are more resource intensive than the previous year (e.g, heart transplants rather than cataract surgery) then the nominal inpatient discharges figure (LHS) would fall, while the weighted units figure (RHS)

could rise assuming the additional complexity counteracts the fall in nominal volumes. The relative value of each procedure is determined by its resource use and is detailed in the Activity Based Funding Pricing List published each year from the Healthcare Pricing Office (HPO, 2023). The analysis below presents the relative change in complexity across time, this information was provided by the Healthcare Pricing Office, the data provided is based in 2021, and therefore the relative complexity across time is comparable.

Figure.3.3: Change in Inpatient Weighted Units



Source: HSE-BIU Data, Author's Calculations

Figure.3.3 provides an illustration of the change in weighted inpatient activity over the period 2016 - 2022. This graphic provides the following insights:

- In 2022, the highest level of weighted inpatient discharges is recorded.

- The onset of Covid-19 resulted in a decrease in weighted units by 9.5%, a nominal decrease in weighted units of 56,000 from 596,000 to 537,000¹⁶.
- The level of weighted units in 2022 was 3% higher than the equivalent level in 2016 (596,000 weighted units, versus 579,000 in 2016).

Changes in the complexity of care delivered are associated with additional costs and represent changes in the types of care being delivered. In 2016 and 2022 each episode of care had an average complexity of 1.06 and 1.1 weighted units respectively. This finding shows that patients were moderately more complex on average in 2022 over 2016 (+3%), with this potentially being reflective of population ageing and the impact of the COVID-19 pandemic.

In Figure 3.4, below the change in weighted day case activity is presented. Similar to 3.3, we can interpret changes in weighted units on a year-to-year basis, and relative to nominal activity recorded in the same year. We see that:

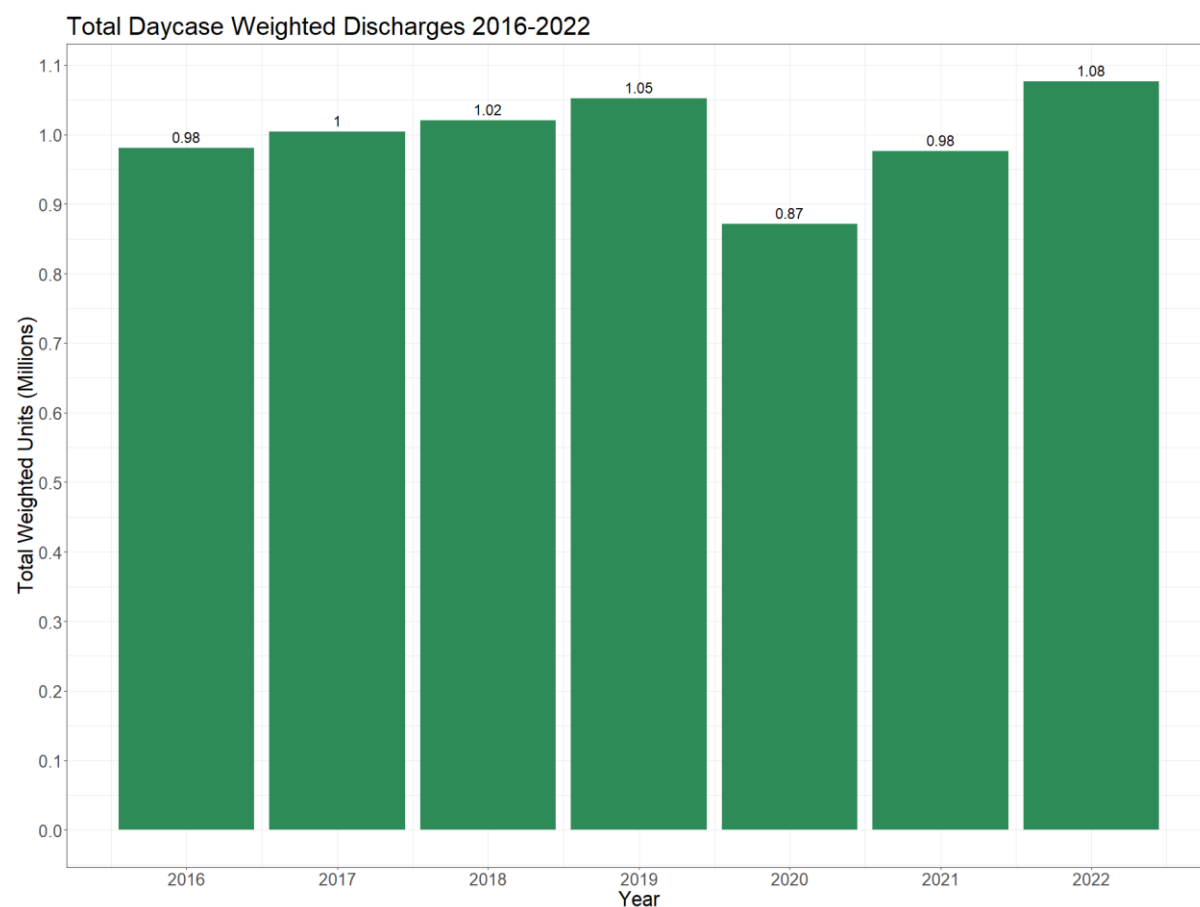
- Weighted Units peaked in 2022 with 1.08m units of care delivered, with this level of activity being 10% above 2016.
- Weighted Units in 2022 were 2.3% above 2019, with 0.99m units of care delivered in 2019.
- The effect of COVID-19 on day case weighted units is clear, with weighted units in 2020 being 11% below the level of activity in 2016, this represents a decrease of 110,000 weighted treatments.

The Weighted Units metric provided is reflective of both the level of complexity of care delivered, and the number of patients seen in a period. As before, we can remove the influence of the number of patients seen in each period to derive a measure of relative procedure complexity for each year. Through this, we observe that the average complexity per patient in 2016 was 0.94 weighted units, while in 2022 this was 0.97 weighted units¹⁷ (+2.8%).

¹⁶ Numbers are rounded to nearest thousand.

¹⁷ It must be noted that the clinical coding used over the period 2016-2019 differs from 2020-2023 and this may have a direct but minor impact on the relative complexity of procedures.

Figure.3.4: Change in Day case Weighted Units



Source: HSE-BIU Data, Author's Calculations

3.5 Unscheduled Care

Total presentations to Emergency Departments and Local Injury Units over the period 2016-2022 are recorded in the Patient Experience Time (PET) dataset, in contrast to admitted inpatients which appear in the HIPE dataset. While the focus of the following graphics is national-level emergency department presentations, an in-depth analysis of the patient characteristics of these presentations has been completed by authors and is available as a Spending Review published in September 2023¹⁸.

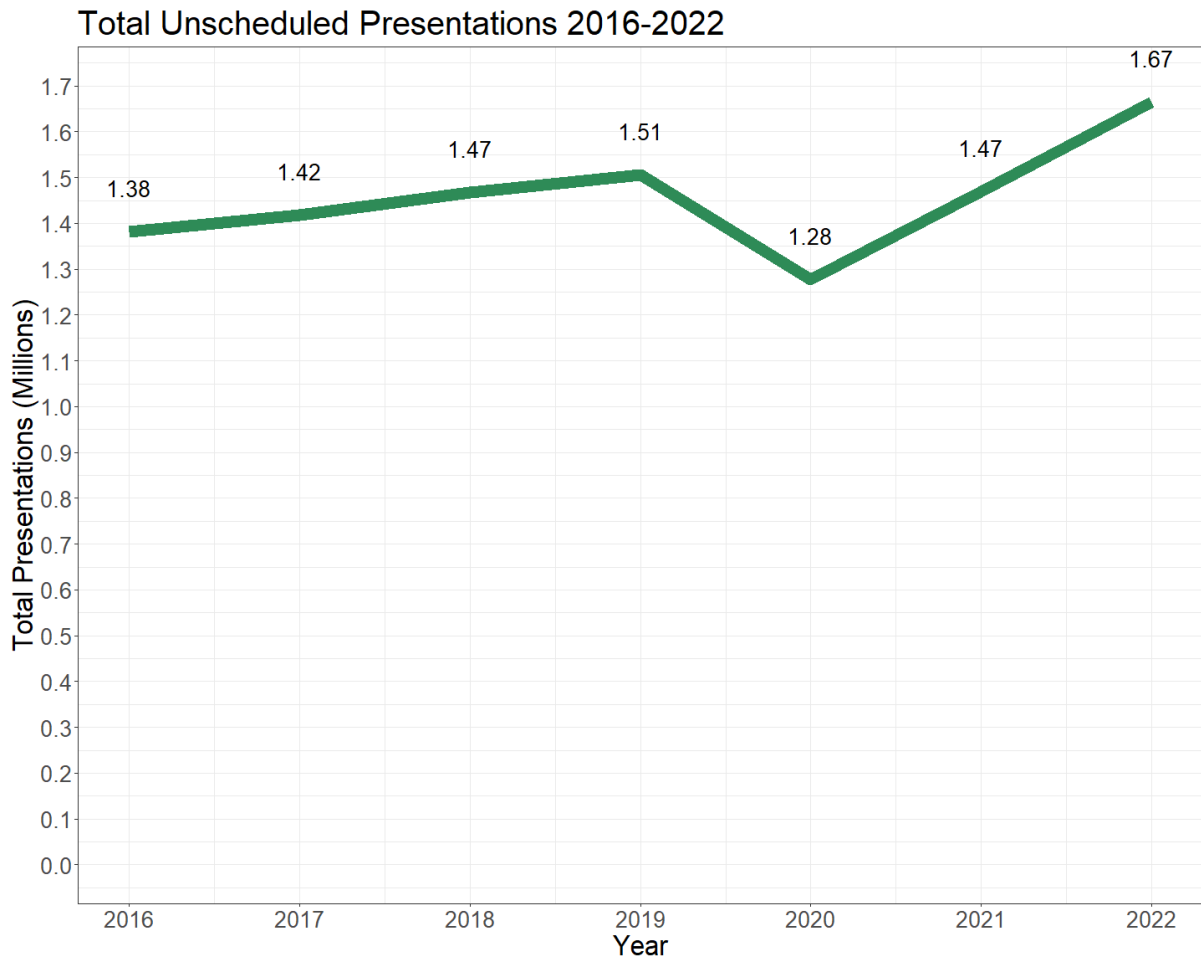
Figure 3.5 presents the total number of presentations to Emergency Departments and Injury Units over the period 2016-2022. We observe the following in relation to the graphic:

- Activity over the period 2016-2019 consistently increased, with a clear dip in activity in 2020 due to the onset of COVID-19.
- Activity in 2021 begins to recover from the demand shock which occurred due to COVID-19.

¹⁸ See Shine & Hennessy (2023)

- Activity in 2022 is the highest over the period examined, with 1.67 million presentations.

Figure.3.5: Total Emergency Presentations 2016-2022



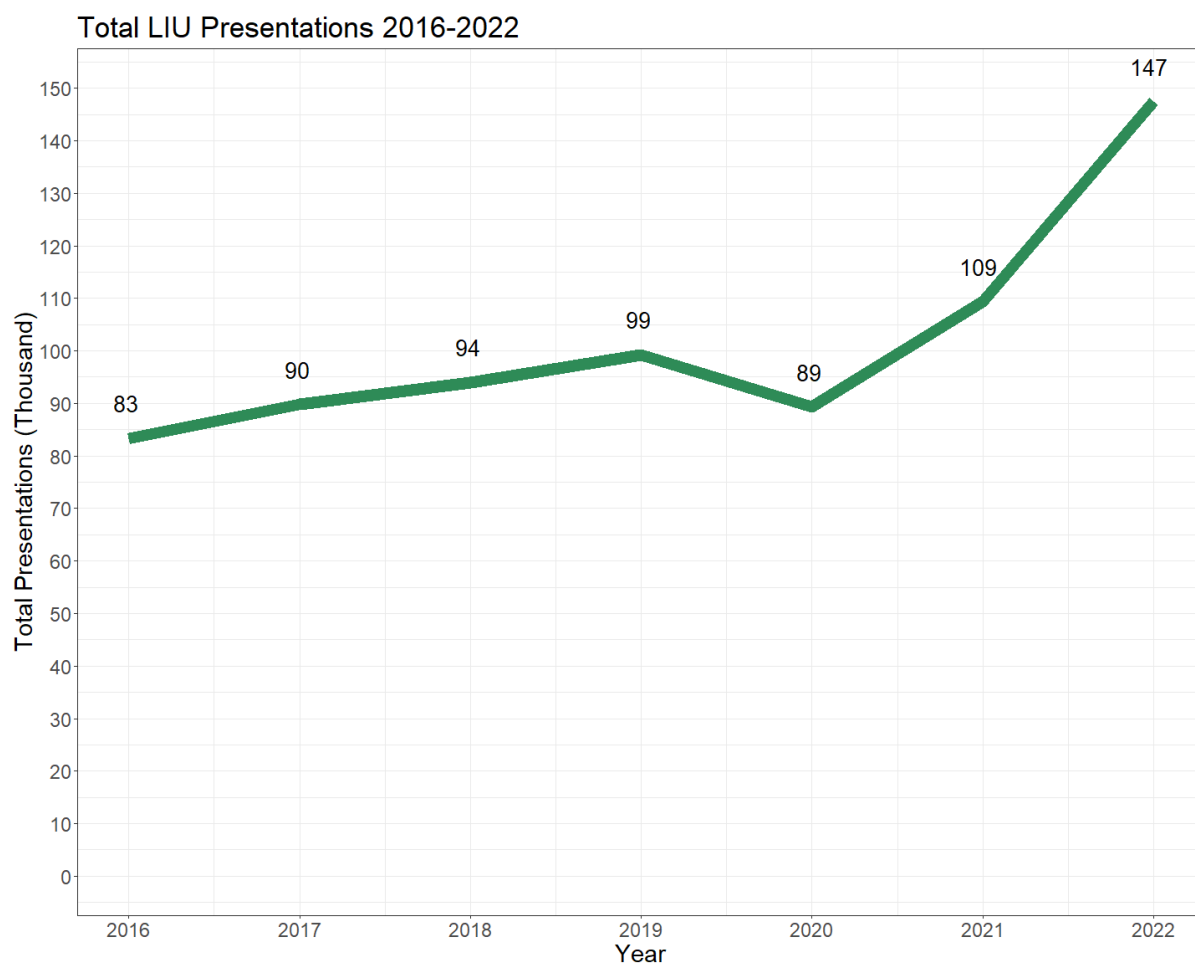
Source: HSE-BIU Data, Author's Calculations

Figure.3.6, below presents the total number of Local Injury Unit presentations¹⁹ over the period 2016-2022. A similar trend to Emergency Department activity is evident:

- Growth in Local Injury Unit presentations has been consistent over the period 2016-2019, with a decrease in activity seen in 2020 versus the level of activity in 2019.
- Activity has increased significantly over the period 2019-2022 rising from 89,265 to 147,419, an increase of 65%.

¹⁹ This contains sites, which only have a Local Injury Unit and is contingent on the level of reporting present across time. Over the reference period the number of Injury Units has increased within the sample.

Figure.3.6: Total LIU Presentations 2016-2022



Source: HSE-BIU Data, Author's Calculations

3.6 Activity in the First 8 Months 2016-2023

To further develop our understanding of aggregate national activity in publicly funded hospitals in Ireland this subsection aims to evaluate how activity in 2023 has trended relative to the same reference period 2016-2022. Due to FORSA industrial action impacting the reporting of healthcare system metrics in Ireland past August, authors were unable to provide information on 2023 activity past this date. To resolve this, we normalise the values to a full year measure so allow for appropriate comparison²⁰. Over the course of this subsection, we discuss trends in the following:

- Outpatient Appointments
- Inpatient Discharges
- Day case Discharges

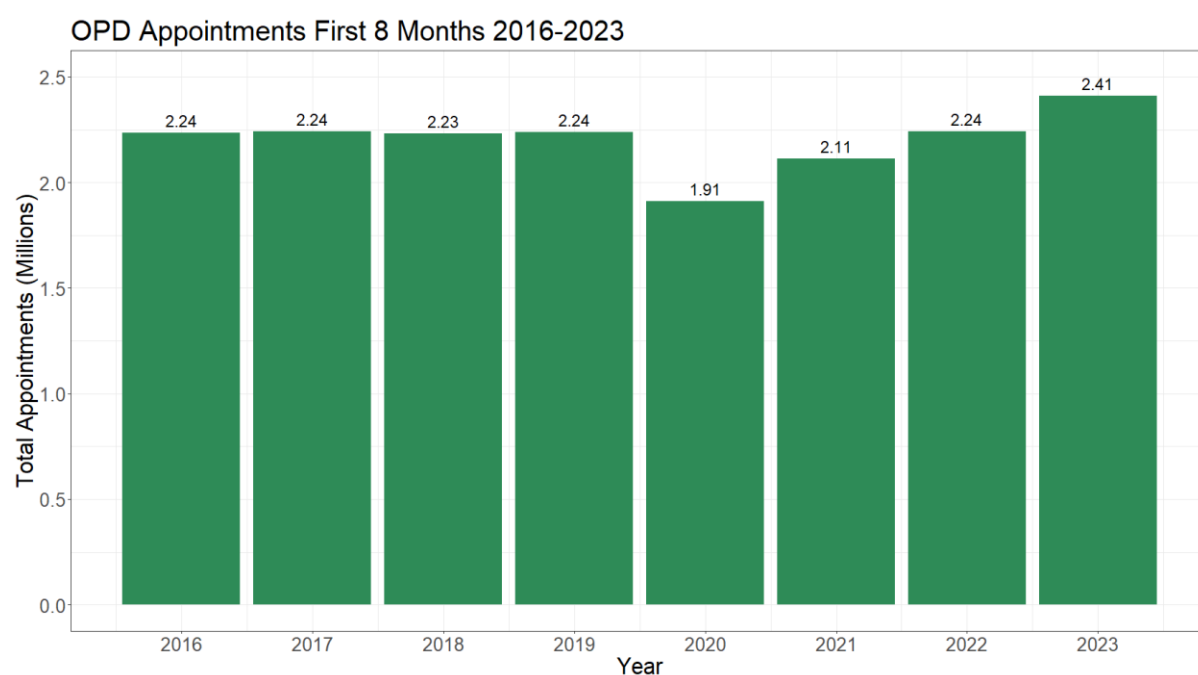
- Emergency Department Attendances

As seen when discussing the national high-level trends over the period 2016-2022, the effect of COVID-19 on activity levels in 2023 is clear. The examination of how activity has trended in 2023 to August provides further context on health system performance after the strong impact of the COVID-19 pandemic during its first two years.

Figure 3.7, presents outpatient activity over the reference period including 2023, demonstrating the following:

- Activity in 2023 (YTD) is noticeably above activity in all previous years (YTD), with activity being 7.5% above 2022.
- Over the period 2016-2019 activity was relatively consistent over the first 8 months of the year.

Figure.3.7: Outpatient Appointments First 8 Months 2016-2023

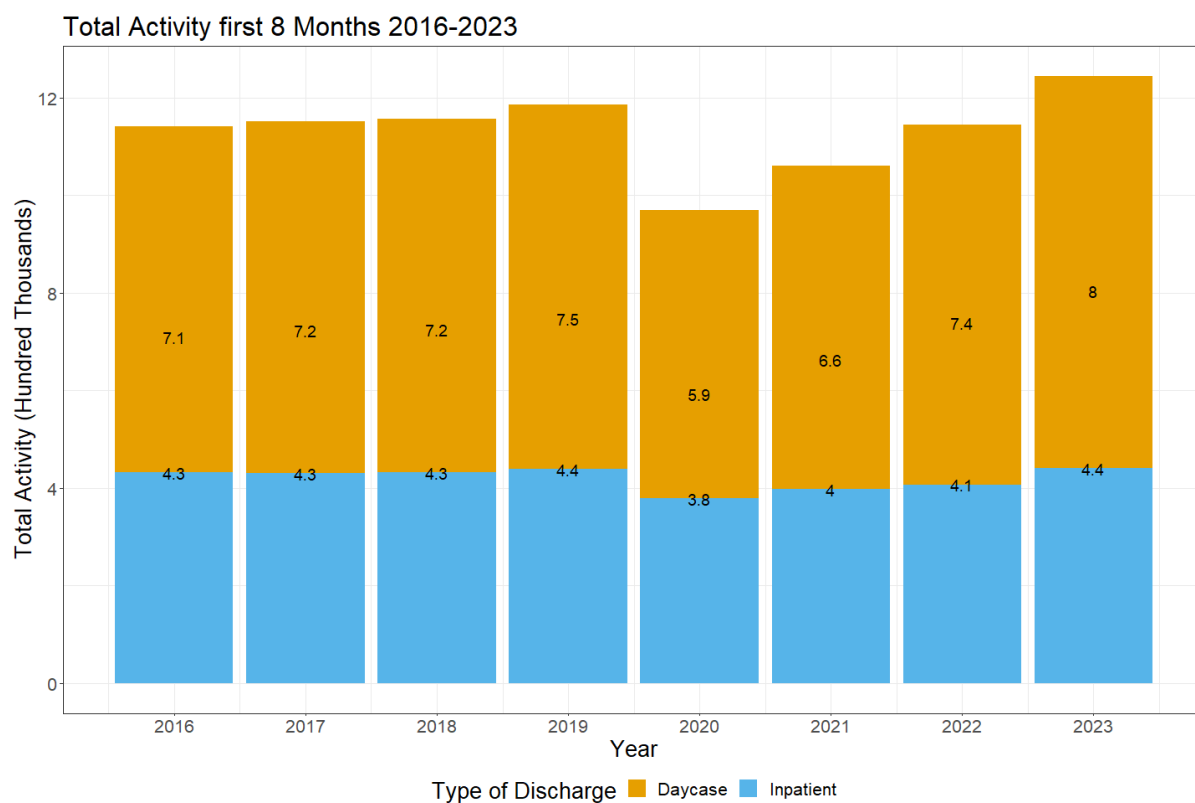


Source: HSE-BIU Data, Author's Calculations

Figure 3.8 presents the number of presentations in the first eight months of inpatient and day case episodes of care. Once more it becomes clear that 2023 is trending above activity seen previously.

- Inpatient discharges are at a record level over this period, 8.4% above 2022 and marginally above the level of discharges in 2019 (0.45%), the previous maximum.
- Day case activity has increased over the period 2016-2023 rising from 709,966 to 803,499 an increase of 13% over this period.

Figure.3.8: Total Inpatient and Daycase Discharges first 8 Months 2016-2023

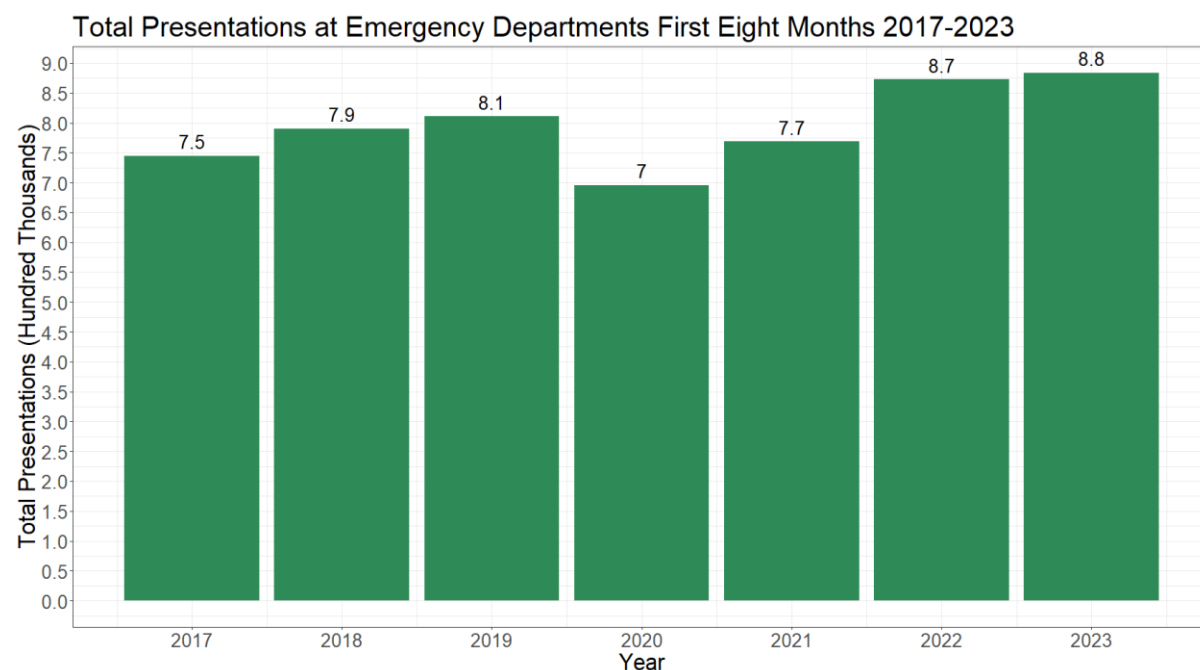


Source: HSE HPO HIPE 2016-2023, Author's Calculations

Figure 3.9 presents the total number of presentations at Emergency Departments over the first 8 months for the period 2017-2023²¹. This analysis shows that activity in 2023 is tracking the levels of activity in 2022 closely, with presentations 1% higher than their 2022 level (+10,700). Activity has grown over the period 2017-2023, increasing by 137,668 presentations over the first 8 months.

²¹ The source of this data did not contain 2016.

Figure.3.9: Total Presentations at Emergency Departments First Eight Months 2017-2023



Source: HSE-PET Database, Author's Calculations

3.7 Hospital Level Analysis

This subsection evaluates how Hospital Activity has changed across the Model 3 and Model 4 Hospitals. In each case, we contrast the relative change in activity observed in this section with changes in expenditure and staffing over the same period, as provided in Section 7.

Because of low volumes of activity for some metrics, this section excludes activity recorded in Maternity hospitals, Childrens Health Ireland, specialist hospitals and Model 2 hospitals. While a limitation, we note that Model 3 and 4 Hospitals provided 78% of Inpatient Activity, 75% of outpatient Appointments, and 77% of Day case procedures in 2022. Given that some Model 3 and 4 hospitals provide specialist services and maternity care, which is not provided in all sites, this could lead to divergences in activity delivered by hospital given that this activity type depends on birth rates in the population. It is foreseen that any further analysis in this space will evaluate performance of hospitals on both a site basis and within their HSE Health Region. This will allow for stakeholders to identify the impact of movement of activity from larger sites to the smaller sites (Model 2), counteracting a noted limitation to this analysis. The composition of care across sites will also vary, with some hospitals treating patients of higher acuity and therefore resource intensity than others. This will have a knock-on impact on the amount of discharges a hospital can achieve in a period. We examine the following metrics for each hospital included in our analysis:

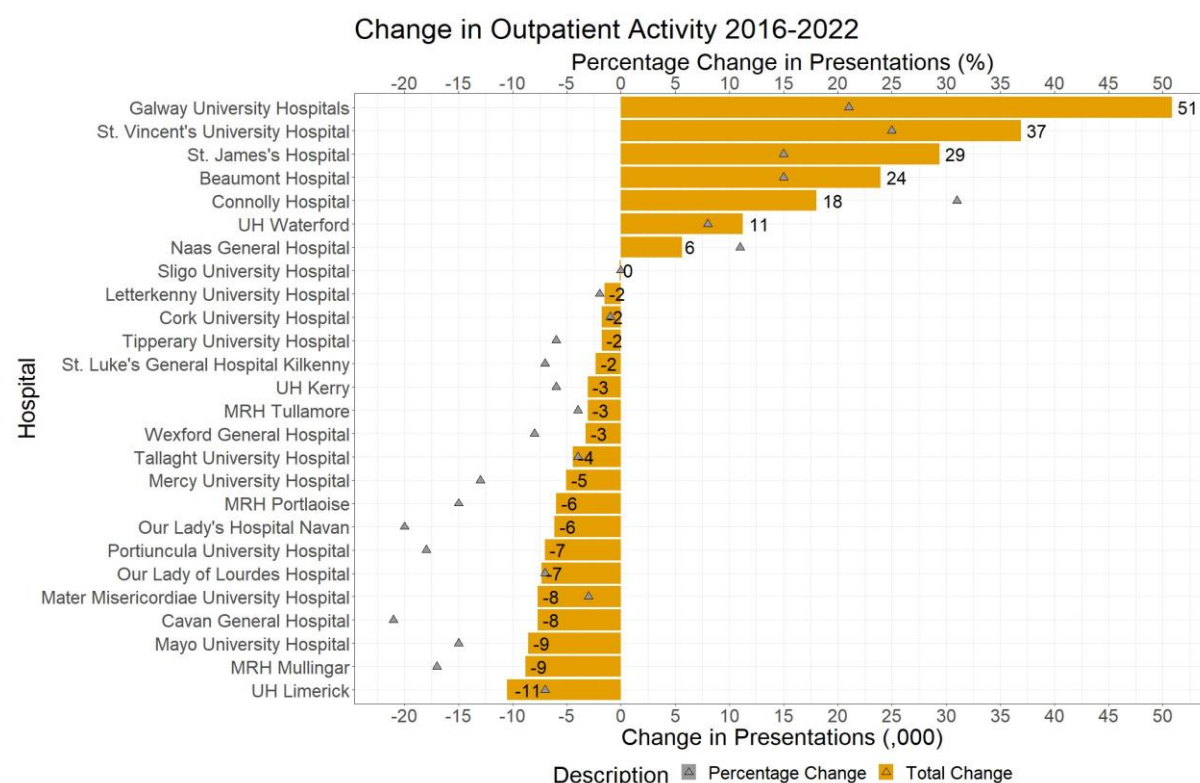
- Total Outpatient Activity and Changes in Activity

- Total Inpatient Unweighted Activity and Changes in Activity
- Total Day case Unweighted Activity and Changes in Activity
- Total Emergency Department Activity and Changes in Activity

Figure 3.10 provides a combination chart which combines both the quantum of nominal change and percentage change in Outpatient appointments over the period 2016-2022 at a hospital level. We can observe that the large increases in nominal activity do not necessarily relate to a commensurate percentage increase in activity due to differences in hospital-size and the relative levels of patients seen in each. We can interpret the graphic as follows:

- Galway University Hospital experiences the largest increase in activity, with an additional 51,000 appointments delivered versus 2016. This equates to an increase of 22% in activity.
- On the other hand, numerous sites have experienced reductions in outpatient appointments, including UH Limerick which has a reduction of 11,000 appointments versus 2016 (a reduction of 6%).
- Increases in activity occurs in only 7 sites, of which 5 are Model 4 Hospitals. These sites have cumulatively delivered an additional 175,955 visits in 2022 relative to 2016.
- The remaining 19 sites have experienced reductions in activity, totalling 96,000 visits in 2022 relative to 2016.

Figure.3.10: Change in Outpatient Activity 2016-2022



Source: HSE-BIU Data, Author's Calculations²²

Figure 3.11 presents a combination chart of Day Case Activity over the period 2016-2022, once more showing both the nominal and percentage change in activity. The graphic demonstrates a sizeable difference in activity across publicly funded hospitals over the period, including:

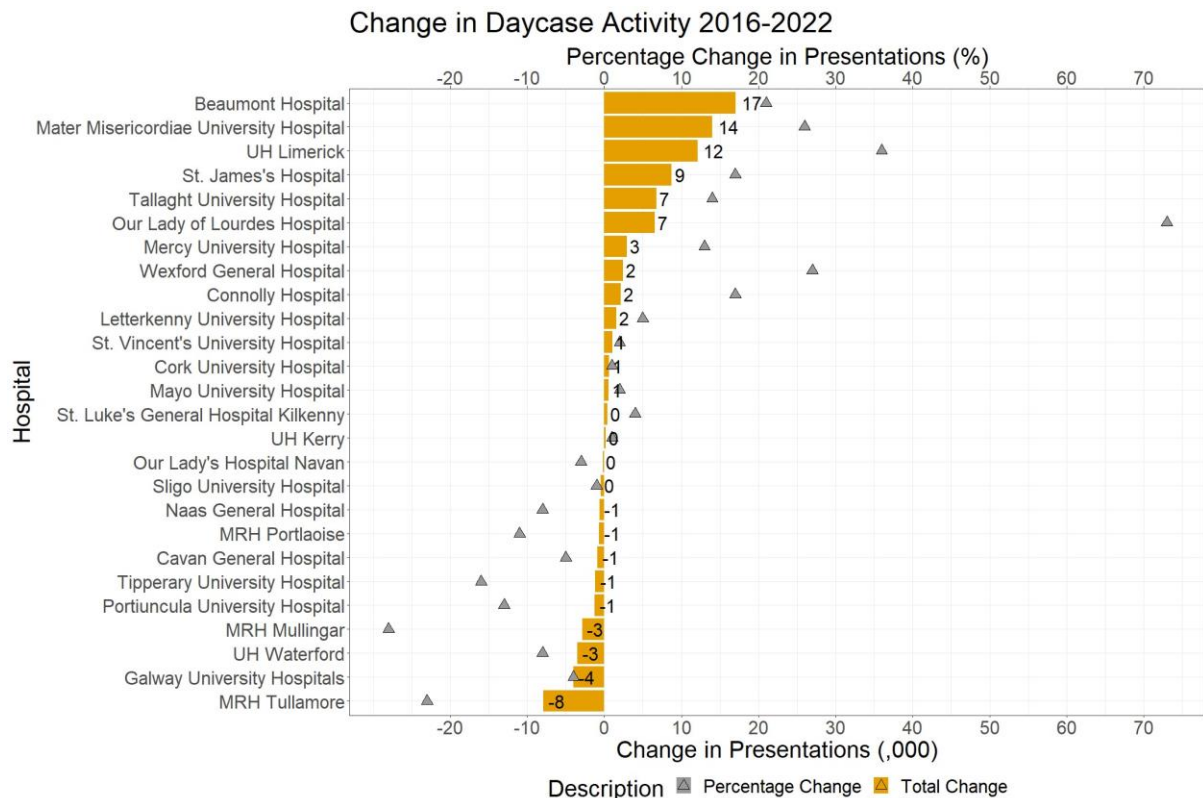
- MRH Tullamore has experienced a reduction in day case procedures totalling 8,000 (-24%).
- Beaumont has experienced an increase of 17,000-day case procedures (21%)²³.
- Our Lady of Lourdes Hospital Drogheda has experienced a pronounced increase in ambulatory care with an increase of 73% from delivering an additional 6,565 procedures.
- In total 11 sites have experienced a decrease in activity, of which two are Model 4's (Waterford & Galway). Cumulatively this equates to a reduction in 23,000 day-case discharges in 2022 versus 2016 in these publicly funded hospitals.
- 15 sites have increased activity, with this total increase amounting to an additional 77,000 episodes of care.

²² Many of these sites deliver maternity care therefore a reduction in activity may be directly related to a reduction in birth rate over this period.

²³ It is likely that due to changes in reporting practices the true increase in Beaumont is circa. 11,000 cases due to the reporting of St. Josephs Raheny as part of Beaumont in latter years.

- A key question for the productivity taskforce will be how Unscheduled Care is affecting the delivery of Scheduled Day procedures, and whether sites are using day beds to treat Unscheduled Admissions.
- Alongside this, a key operational task for the HSE will be the developing a deep understanding of the factors which may explain the changes in the levels of activity at sites identified in this analysis.

Figure.3.11: Change in Day case Activity 2016-2022



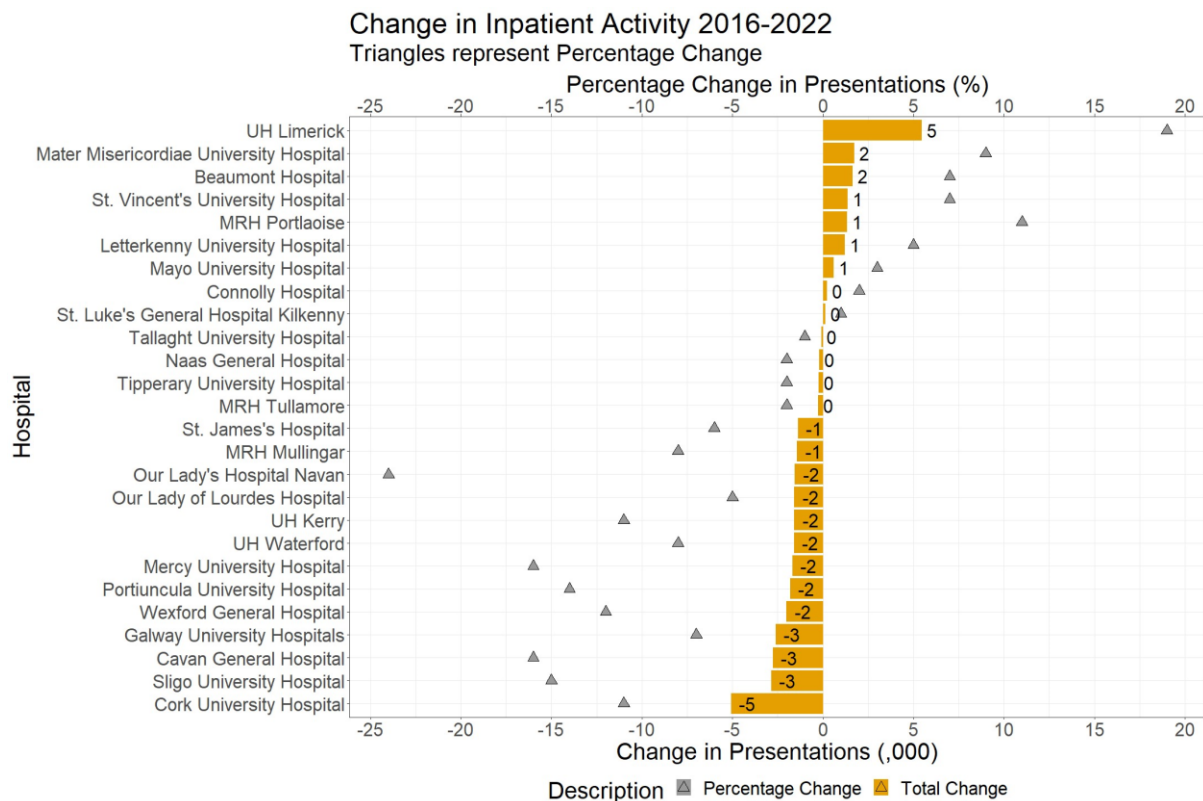
Source: HSE-BIU Data, Author's Calculations

Figure 3.12 presents the change in Inpatient Discharges (HSE Management Data Report KPI: A3) over the period 2016-2022. We observe the following:

- Seventeen sites have experienced decreases in the volume of discharges, of which 4 are Model 4 hospitals.
- The remaining 8 sites have experienced a total increase in discharges of 17,365. However, a reduction of 28,714 discharges occurs across 17 other sites.
- University Hospital Limerick experiences the greatest increase in activity, with an additional 5,000 discharges (18%). This may be related to the significant increase in bed capacity in UH Limerick over the same period, a theme explored in more detail in the next section.

- The relative changes in activity across sites varies and may be related to changes in length of stay, delayed transfers of care or hospital capacity among other factors.

Figure.3.12: Change in Inpatient Activity 2016-2023



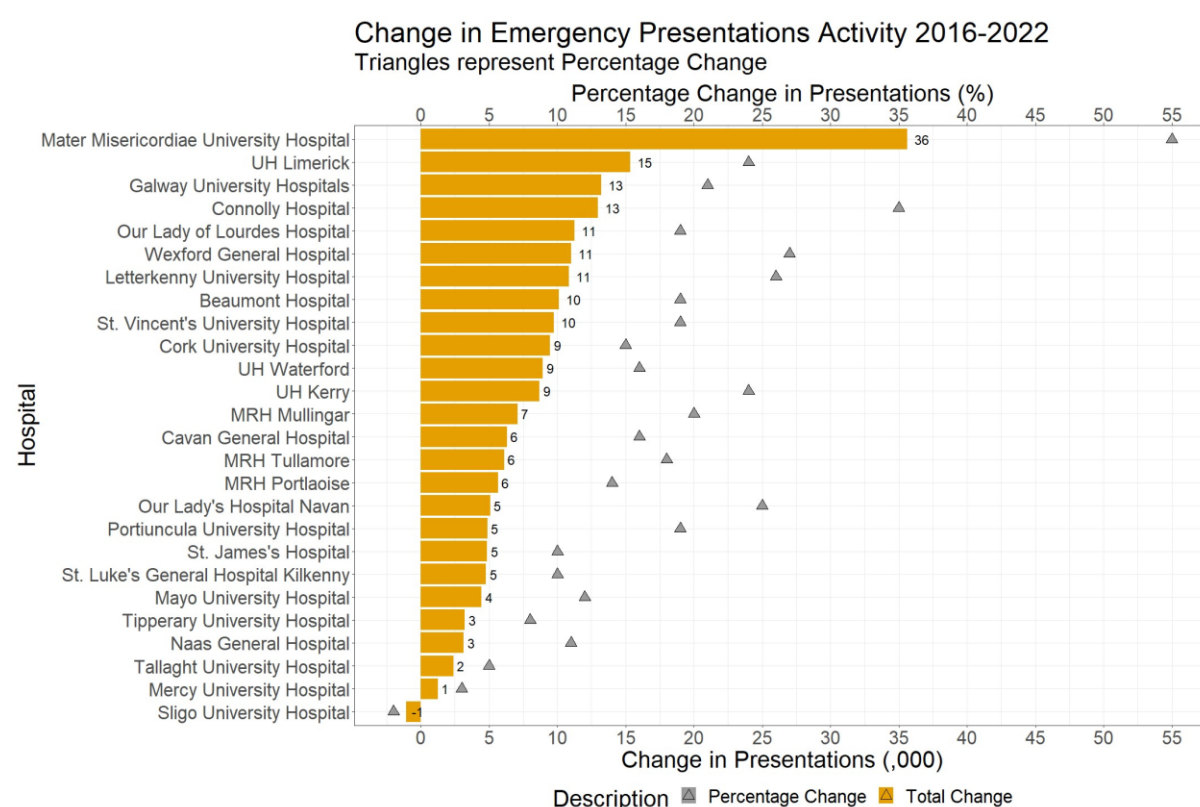
Source: HSE-BIU Data, Author's Calculations

Figure 3.12 presents the change in Emergency Department presentations over the period 2016-2022. Overall, most sites experience an increase in presentations over the period. We can observe the following:

- Activity has grown significantly in numerous sites with the mean increase in annual presentations being 8,657.
- Over this period five sites have experienced greater than a 20% increase in presentations.
- A further fifteen sites have experienced an increase of greater than 10%.
- Only Sligo University Hospital experiences a decrease in emergency presentations, with this decrease being minor (1%).
- The Mater experienced an increase in presentations of 36,000 over the reference period, given that the Mater has both an Injury Unit (Smithfield) and an Emergency Department, further investigation into the split of this growth between each setting is warranted.

While virtually all publicly funded hospitals have experienced an increase in emergency department presentations, this growth is highly uneven across publicly funded hospitals. Such uneven growth trends pose a challenge for policymakers given the need to align hospital resourcing with contemporary patient demand. Further work will be required to for example understand how trends in increased emergency department attendance align with the outcomes of Census 2022 and whether this growth has been proportional to population growth in a respective region .In sites with a high growth in presentations, analysis into the drivers of this demand such as patient referral type and triage score should be undertaken to identify interventions for reducing demand and providing appropriate and timely treatment to these groups, with this approach also explored in previous work on the topic (see Shine and Hennessy (2023)).

Figure.3.12: Change in Emergency Presentations Activity 2016-2023²⁴



Source: HSE-BIU Data, Author's Calculations

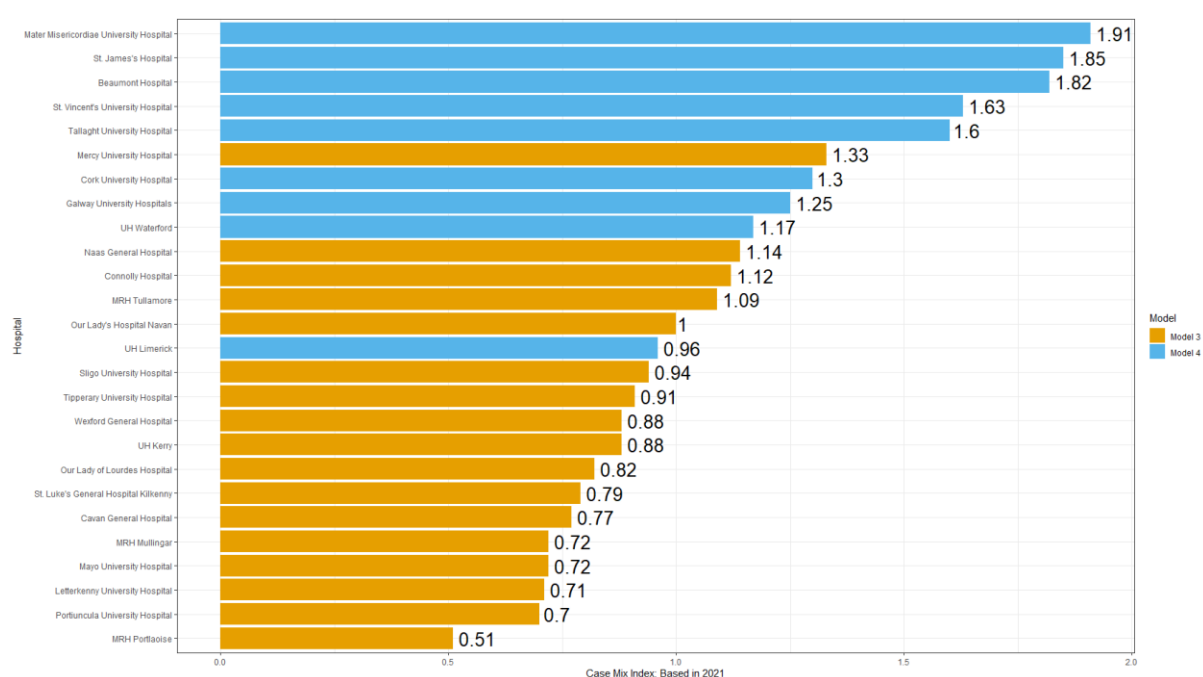
To provide an additional understanding of the case mix of activity which is delivered across Model 3 and 4 hospitals. Figure 3.13 below presents the Inpatient Case mix Index 2022. It becomes apparent that large centres of excellence delivering specialist services such as the Model 4 hospitals in Dublin

²⁴ Note that no adjustment can be provided for the complexity or acuity of patients arriving at emergency departments, as funding for emergency presentations in each hospital is provided via a block grant.

have the most complex case mix (basket of care), with the Mater, St. James, Beaumont, St. Vincents and Tallaght all delivering care with a case mix index of greater than 1.5 in 2022. Over the total reference period, an average increase in the Case mix index of 3.3% for inpatients is observed.

The relative complexity of patients indicates both their cost intensity and the relative level of resource utilisation which a patient consumes. The use of Activity Based Funding is a globally accepted method for healthcare funding and the mechanism used to assign patient complexity is commonly used internationally. Therefore, evaluating a hospital's performance relative to the composition of care it delivers is a potentially strong mechanism for improving cost efficiency. Given that pricing is completed in each of the Hospital Groups, a greater level of comparison and understanding of procedures where large variance in costs occurs may provide potential areas for performance improvement through cost saving. This approach is already carried out by the Healthcare Pricing Office, who conduct an annual benchmarking exercise comparing regional variation in the cost of delivery of Diagnostic Related Groups (DRGs).

Figure.3.13: Inpatient Case Mix Index 2022

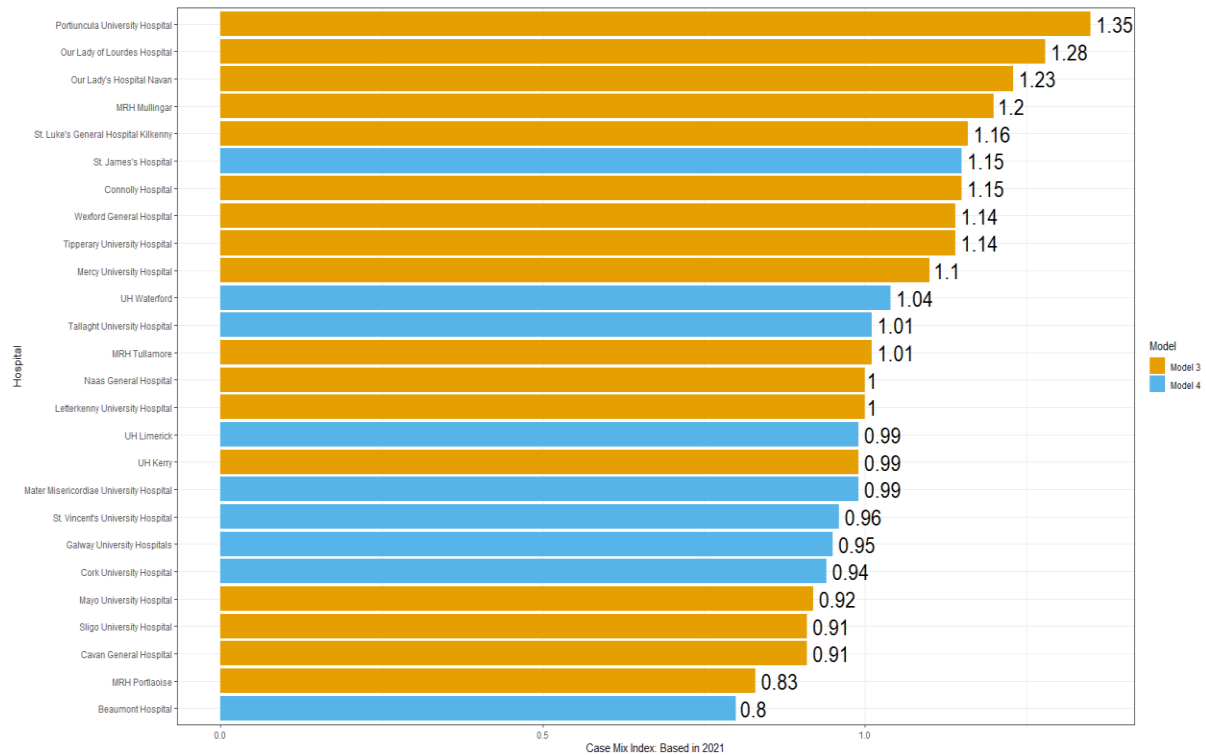


Source: HSE HPO CMI

The case mix index for day case procedures in 2022 is provided in Figure.3.14. We can see that Model 3 sites are delivering more complex day procedures on average than Model 4 sites, with this being partially attributable to some sites delivering high volumes of activity such as chemotherapy and haemodialysis. The casemix index of a given hospital will be highly driven by the presence or absence

of such high volume treatments. As above, we observe a 2.8% increase for the case-mix index for day patients over our reference period.

Figure.3.14: Day Case Mix Index 2022



Source: Authors Calculations using HSE MDR 2022

4 Acute Hospital Capacity and Occupancy

Inpatient hospital beds and hospital occupancy are key determinants of the level of admitted patient activity which can be delivered within in hospitals. For example, the Health Service Capacity Review 2018 forecasted the need to deliver 122,000 additional inpatient treatments (from 589,000 in 2016 to 712,000 in 2031) and 500,000 more day-case procedures (from 1,100,000 in 2016 to 1,600,000 in 2031) by 2031, designating a requirement of 5,700 additional inpatient beds to meet this demand under the baseline scenario²⁵ (Department of Health, 2018). This section provides an analysis of changes in inpatient beds and bed occupancy (the utilisation rate of these beds in a given period) in each hospital over our reference period to contextualise the developments in activity presented in section 3. we use data obtained from the annual Health Statistics Reports collated by the HSE BIU over the period 2016-2022 to achieve this.

Over the period 2016-2022, acute hospital inpatient beds increased from 10,592 to 11,581 an increase of 989. Alongside this increase in capacity there has been strong population growth and demographic change in Ireland, with the population increasing in size from 4.76m in 2016 to 5.15m in 2022 and a shift in the average population age from 37.4 to 38.8²⁶. The impact of population growth and population ageing on healthcare utilisation is significant. While the impact of population growth on healthcare utilisation is intuitive, ageing can also demonstrably impact the resources required to treat the population in acute settings. For example, a 21-year-old emergency admission has an average length of stay of 2.84 days, whereas an 85-year-old emergency admission has an average length of stay of 11.9 days²⁷. In addition, persons aged over 65 currently make up 15% of the total population²⁸ while consuming 58% of all Inpatient bed days. It follows that the composition of admissions in terms of demography plays a significant role in dictating the relative volume of discharges a site may have. The HPO publishes annual work on in this area, evaluating the effects of demographic change on the Acute Hospital system (for example, see Collins, 2024).

²⁵ This assumes no service reconfiguration, such as the treatment of greater numbers of patients in the community.

²⁶ All data contained within this section is from the Health Statistics Reports provided to the Department by the HSE Acute BIU

²⁷ Authors calculations using HIPE 2022

²⁸ Census 2022

Figure 4.1 below outlines the relative percentage growth in inpatient capacity at a hospital level over this period. We can observe the following in relation to these changes in capacity²⁹:

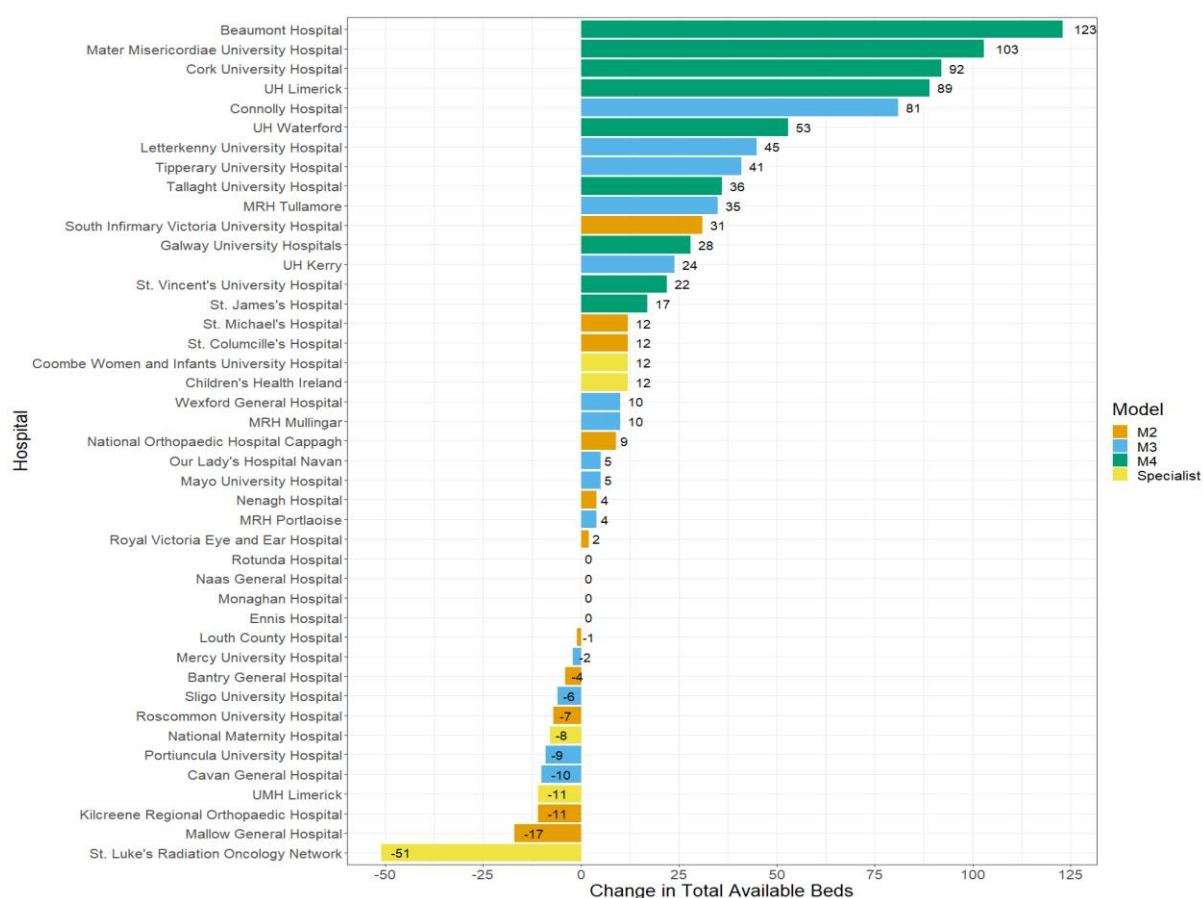
- Beaumont has experienced the largest nominal growth in capacity, gaining an additional 123 inpatient beds³⁰.
- Numerous sites have experienced a decrease in available inpatient beds, with this attributable to factors including:
 - Replacement and refreshment
 - Staffing
 - Infection Control and Prevention

Changes in capacity evidently have an impact on the level of care which a site may deliver alongside factors such as theatre capacity, diagnostics, and patient flow (i.e., length of stay, discharge pathways etc.). Community care provision, for example, the availability of public health nursing, physio and primary care supports can also impact the level of care a site may deliver as these supports can facilitate earlier discharge.

²⁹ Some sites have been omitted where data quality issues exist a query is outstanding with the HSE on this issue.

³⁰ It is likely part of this increase is attributable to the addition of St Joseph's Raheny to Beaumont's reporting. In 2016 St Josephs had 16 beds according to the Health Statistics Report.

Figure.4.1: Change in Inpatient Capacity 2016-2022³¹



Source: HSE BIU Health Statistics 2016/2022

To provide a concise overview of where additional capacity has been delivered and where capacity has diminished, Table 3.1 provides a summary of the change in beds between 2016 and 2022. It can be seen that growth in capacity is most prominent in Model 4 and Model 3 settings relative to Model 2 and Maternity settings. Overall, 98% of the additional available beds which have been added to the health system have been within with Model 3 and 4 sites, with Model 4 sites experiencing 62% of the growth in beds over this period.

³¹ The change in capacity within St Lukes Radiation Oncology Network is due to the reclassification of the beds within its Lodge.

Table.3.1: Changes in Available Beds by Site Type 2016-2022³²

Type	Change in Total Inpatient Beds
Other	20
Model 4	527
Model 3	346

Source: HSE BIU Health Statistics 2016/2022

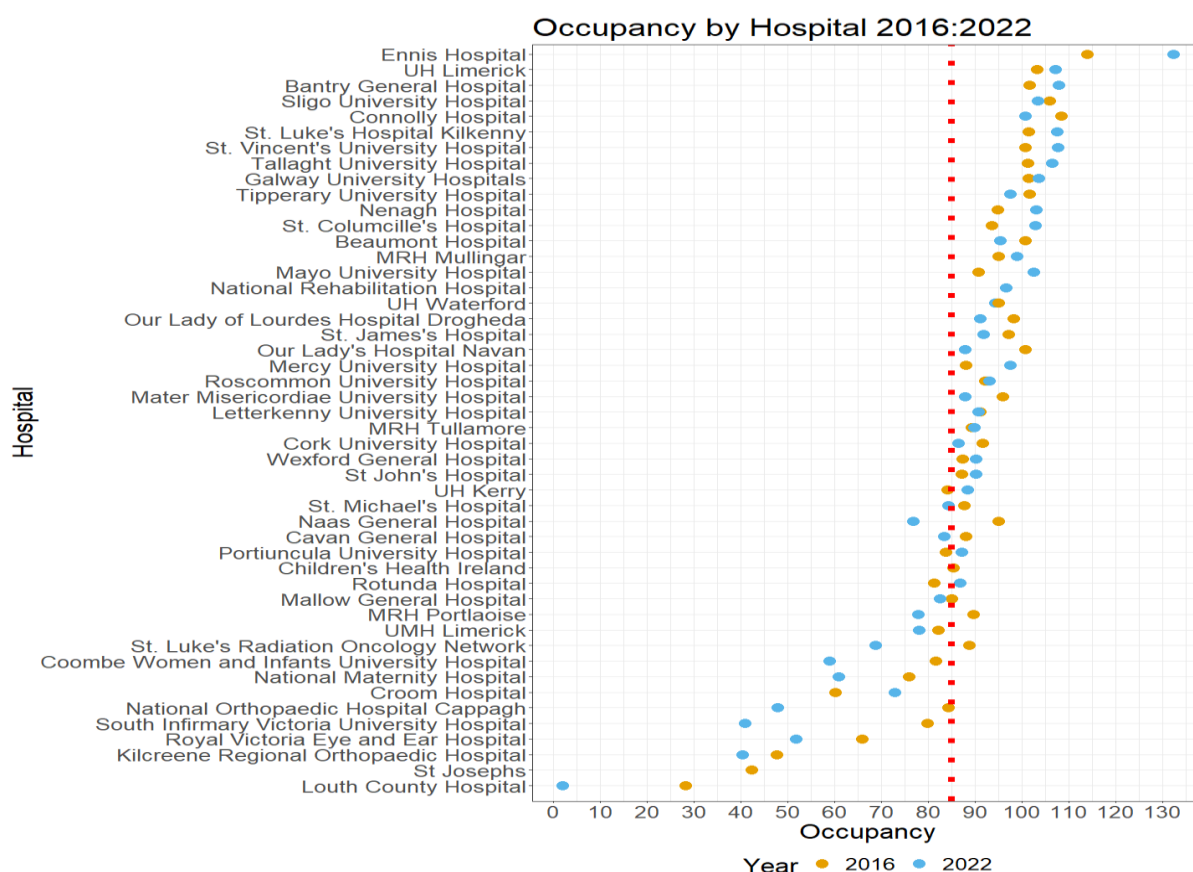
³² ICU Beds are not reporting within the HSE Available Beds Reports and therefore not discussed within this analysis.

4.1 Occupancy

Figure 4.2 below presents the relative occupancy³³ for each hospital in 2016 and 2022. The red line represents an occupancy rate of 85% which is seen as an upper threshold occupancy rate³⁴. We can see the following:

- In 2016 Occupancy was above 85% in 33 out of the 48 sites, in 2022 this decreased to 32 out of 48 sites³⁵.
- In both years, 12 sites experienced occupancy rates greater than or equal to 100% occupancy³⁶.
- Ennis Hospital³⁷ experiences the highest level of occupancy in both periods, well in excess of 100%, with occupancy rates of 113% and 132% respectively.

Figure.4.2: Occupancy by Hospital 2016/2022



Source: HSE BIU Health Statistics 2016/2022

³³ As provided within the HSE Health Statistics Reports

³⁴ e.g. see NICE (2018).

³⁵ Monaghan Hospital does not report an occupancy rate in either year, while Cork University Maternity Hospital occupancy levels are reported alongside CUH figures.

³⁶ This occurs when extra, temporary beds are placed on wards to deal with contemporary demand.

³⁷ Ennis is used to provide stepdown care by UH Limerick, alongside having a Medical Assessment Unit.

4.2 Discharges per Bed

Figure 4.3 presents the number of inpatient discharges (as per Health Statistics) per bed in each hospital. This metric can be viewed as a simple measurement of relative hospital efficiency in the utilisation of its capacity. As acknowledged elsewhere however, measures such as this do not take into account variations in the acuity of patient's being received (which is a key determinant of patient average length of stay, among other measures) or the quality of patient care being provided. The relative number of discharges per bed is likely related to the case mix of patients which a hospital treats. Sites which deal with lower acuity care will likely have higher levels of discharges than sites delivering high complexity care. We observe the following in relation to this metric:

- Ennis Hospital³⁸ has significantly increased the flow of patients over the reference period, with 90 discharges per bed in 2016 rising to 173 discharges per bed in 2022.
- Total discharges per bed is intrinsically linked to the complexity of patients being treated but can also be due to inefficient use of capacity. As seen below sites with high complexity patients such as the Mater have relatively low rates of discharge per bed in comparison with, for example, maternity hospitals which deal with a lower average complexity of care³⁹.

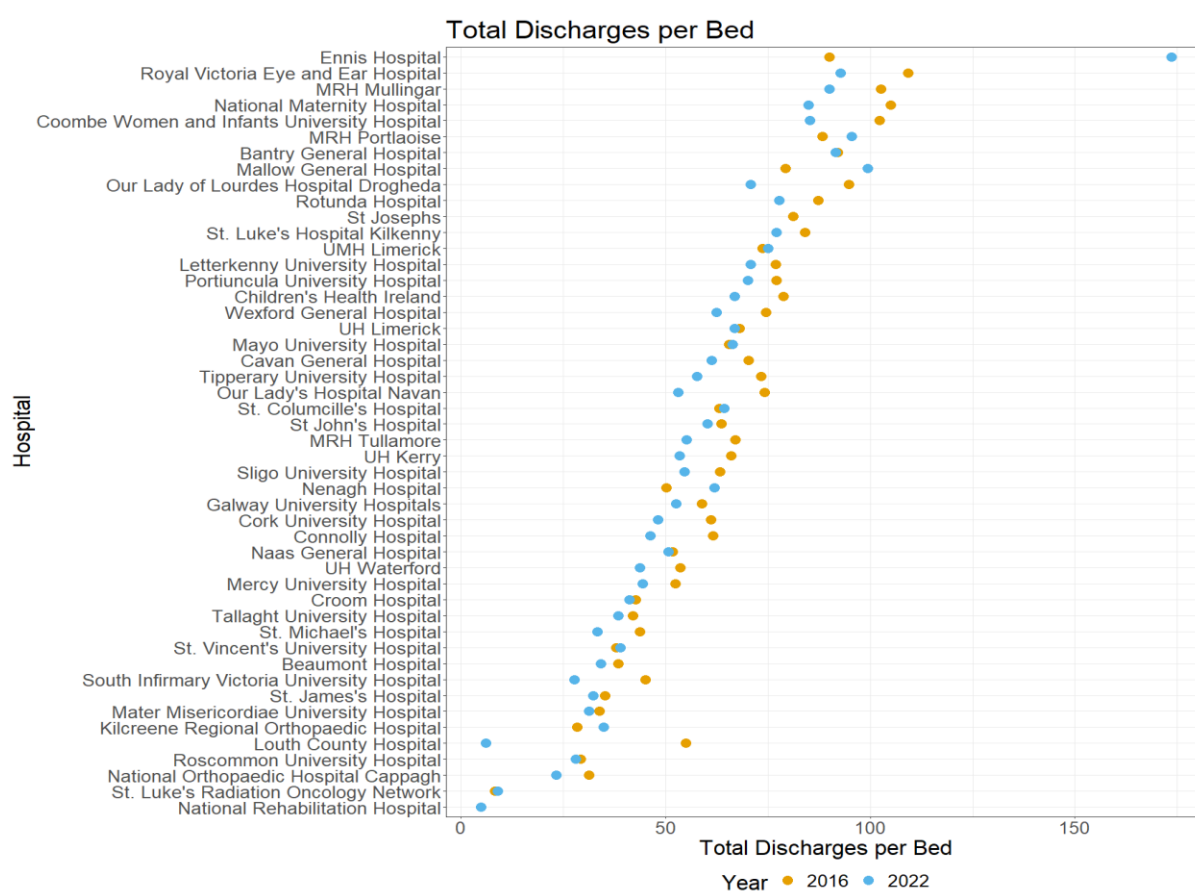
The variation we observe across hospitals in discharges per bed is attributable to a variety of factors, including:

- I. Increased Length of Stay;
- II. Increased Complexity of patients;
- III. Reduced levels of activity;
- IV. Increased levels of activity;
- V. The case mix of patients being treated;
- VI. Reduced rates of delayed transfer of care.

³⁸ Ennis Hospital has a Medical Assessment Unit which is targeted towards patients suitable for short treatment in an acute setting, alongside delivering step down care for University Hospital Limerick. This therefore explains the high patient flow in this site, relative to others analysed.

³⁹ Based on site level total inpatient weighted units delivered

Figure.4.3: Total Discharges per Bed 2016/2022



Source: HSE BIU Health Statistics 2016/2022

Table 4.1 reflects the change in Length of Stay⁴⁰ over the Model 3 and 4 Hospitals over the period 2016 relative to 2022. This provides a longitudinal comparison of how length of stay is changing. From inspecting the table some clear inferences arise. These include:

- Only 3 of the 26 sites experienced a reduction in length of stay. Sites which experienced a reduction in length of stay have seen on average a reduction of 0.7 days per patient.
- Of the 23 sites which experienced an increase in length of stay, Mercy University Hospital experienced a 32.7% increase, which equating to an additional 1.97 bed days per patient.

Understanding the explanatory factors for the changes in length of stay observed will be a central consideration for reforms aiming to improve hospital productivity. To understand such factors, a mixed-methods approach including qualitative evaluation of patient flow would need to be undertaken, with factor including the transition of lower complexity care to day case activity potentially resulting in the average length of stay across sites increasing. One potential driver of the change in length of stay

⁴⁰ As obtained from HSE Health Statistics 2016/2022

observed over the period may be the outsourcing of large volumes of low complexity work, although further data and information would be needed to in which areas this practice is most common and its associated impact on length of stay.

Table.4.1: Length of Stay 2016/2022 (Model 3/4 Hospitals)

HOSPITAL	LENGTH OF STAY 2016	LENGTH OF STAY 2022	CHANGE IN LENGTH OF STAY
ST. JAMES'S HOSPITAL	9.96	10.34	3.8%
BEAUMONT HOSPITAL	9.59	10.15	5.8%
TALLAGHT UNIVERSITY HOSPITAL	8.86	10.12	14.2%
MATER MISERICORDIAE UNIVERSITY HOSPITAL	10.29	10.11	-1.7%
ST. VINCENT'S UNIVERSITY HOSPITAL	9.72	10.09	3.9%
MERCY UNIVERSITY HOSPITAL	6.02	7.99	32.7%
CONNOLLY HOSPITAL	6.44	7.93	23.1%
UH WATERFORD	6.49	7.88	21.5%
GALWAY UNIVERSITY HOSPITALS	6.21	7.09	14.2%
SLIGO UNIVERSITY HOSPITAL	6.03	6.83	13.3%
CORK UNIVERSITY HOSPITAL	5.49	6.56	19.5%
TIPPERARY UNIVERSITY HOSPITAL	5.07	6.17	21.7%
UH KERRY	4.65	6.03	29.6%
OUR LADY'S HOSPITAL NAVAN	4.96	6.01	21.3%
MRH TULLAMORE	4.87	5.94	22.0%
MAYO UNIVERSITY HOSPITAL	5.074	5.85	15.3%
UH LIMERICK	5.39	5.81	7.8%
NAAS GENERAL HOSPITAL	6.70	5.52	-17.7%
WEXFORD GENERAL HOSPITAL	4.27	5.27	23.3%
ST. LUKE'S HOSPITAL KILKENNY	4.42	5.08	14.9%
CAVAN GENERAL HOSPITAL	4.58	4.96	8.3%
OUR LADY OF LOURDES HOSPITAL DROGHEDA	3.78	4.69	24.1%
LETTERKENNY UNIVERSITY HOSPITAL	4.26	4.67	9.6%
CHILDREN'S HEALTH IRELAND	3.87	4.6	18.9%
PORTIUNCULA UNIVERSITY HOSPITAL	3.84	4.43	15.1%
MRH MULLINGAR	3.38	4.0	18.6%
MRH PORTLAOISE	3.69	2.9	-19.7%

Source: Authors Calculations using HSE BIU Health Statistics 2016/2022

5 Acute Hospital Expenditure

5.1 Non-Pay & Pay Hospital Expenditure

This section examines change in expenditure in the publicly funded acute care system over the period 2016-2022. This analysis focuses on the use of HSE run-rates data to understand where the biggest increases in expenditure on healthcare services have occurred over time and examines this growth at a hospital level. Our intention is to identify where a hospital's level of resourcing has changed over the period, with this likely having implications for the level of care a hospital is able to deliver. The increase in resourcing of the sector over our reference period was very materially significant, with nominal expenditure in publicly funded acute hospitals rising from €4.4 billion in 2016 to €7.3 billion in 2022, and inflation adjusted expenditure rising from €4.4 billion to €6.37 billion. This further motivates the examination of both expenditures in each hospital over the period and its measurable impact in terms of patients treated.

Table 5.1 and Table 5.2 present the non-pay and pay expenditure over the period 2016-2022 for publicly funded acute hospitals in Ireland, as well as the change over time for each budget line item. Summarising the trends in expenditure over the period, we note the following in relation to the interpretation of both tables:

- Figures presented in this sub-section are nominal, i.e. unadjusted for inflation. Over our reference period (2016-2022), CPI Inflation was 15.7%⁴¹. Expenditure relative to CPI inflation is accounted for in Section 5.3.
- Numerous shocks have occurred over our reference period that have had a material impact on public acute care expenditure and service delivery in hospitals in Ireland, including the COVID-19 pandemic, the HSE Cyber-attack and the increased number of refugee arrivals from Ukraine as a result of the commencement of the war in Ukraine. These developments have had an associated impact on hospital expenditure.
- The ongoing deterioration of ageing health and IT infrastructure may contribute to inefficiencies in care planning and delivery, resulting in increased expenditure in hospitals.

Table 5.1 provides an overview of how non-pay expenditure has changed over the period 2016-2022 on a national level. We observe the following as headline insights from the table presented:

- Overall non-pay expenditure has increased from €1.74 billion in 2016 to €2.74 billion in 2022, an increase of 55%.

⁴¹ <https://visual.cso.ie/?body=entity/cpicalculator>, December 2016-December 2022

- Clinical expenditure has increased by 44% on average of this period, with medical equipment experiencing the largest increase of 170%.
- Non-Clinical expenditure has experienced an average increase of 77%, with Bad and Doubtful Debts experiencing the largest increase totalling 187%.

Table.5.1 Non-Pay Expenditure 2016/2022⁴²

Vote Subhead	2016 (,000)	2022 (,000)	% Change
Clinical	€1,164,704	€1,682,341	44%
<i>Bloods / Blood Products</i>	€95,059	€101,913	7%
<i>Drugs & Medicines</i>	€415,073	€642,257	55%
<i>Laboratory</i>	€148,231	€221,235	49%
<i>Medical / Surgical Supplies</i>	€378,227	€508,705	34%
<i>Medical Gases</i>	€7,613	€10,080	32%
<i>Other Medical Equipment</i>	€30,466	€82,213	170%
<i>Supplies & Contract Other Med Equip</i>	€41,420	€48,242	16%
<i>X Ray/Imaging</i>	€48,614	€67,695	39%
Non-Clinical	€580,866	€1,026,702	77%
<i>Bad & Doubtful Debts⁴³</i>	€16,950	€48,718	187%
<i>Catering</i>	€42,022	€64,184	53%
<i>Cleaning & Washing</i>	€94,539	€159,471	69%
<i>Computer</i>	€33,168	€52,429	58%
<i>Education & Training</i>	€13,442	€29,702	121%
<i>Furniture Crockery & Hardware</i>	€7,545	€13,853	84%
<i>Heat Power & Light</i>	€50,462	€77,806	54%
<i>Maintenance</i>	€56,608	€132,532	134%
<i>Office Expenses Rent/Rates</i>	€83,133	€130,376	57%
<i>Miscellaneous</i>	€30,826	€59,699	94%
<i>Other</i>	€40,877	€96,849	137%
<i>Professional Services</i>	€85,743	€113,975	33%
<i>Transport (Patients)</i>	€25,552	€47,109	84%
Grand Total	€1,745,570	€2,709,044	55%

Source: Department of Health Financial Performance Unit based on HSE Reports, Author's Calculations

⁴² Does not include hospital income (which would reduce aggregate hospital expenditure).

⁴³ Changes in Accounting policy within the HSE may provide an explanation of the noticeable increase in this subhead. Income is now recognized when the invoice is issued and not when the income was received.

Table 5.2 presents the growth of pay expenditure over the period 2016-2022. The overall growth of 53% in this expenditure line can be contrasted with the 29% growth in the acute hospital workforce over the same period, with the composition of this change in workforce further explored in Section 6. Further discussion on the inflationary effects of wage inflation over this period is discussed below in Section 5.3. We observe the following in relation to pay expenditure:

- Total pay expenditure has increased from €3.5 billion in 2016 to €5.4 billion in 2022, a nominal increase of €1.9 billion (+53%).
- Basic pay is the core driver of this growth, accounting for 70% of pay expenditure growth.
- Overtime has experienced a significant growth over the period, rising by 73.6%. While it is beyond the scope of this work, this may be partially attributable to the reduction in core hours as a result of the reversal of the Haddington Road agreement.

Table.5.2 Pay Expenditure 2016/2022⁴⁴

<i>Vote Subhead (€,000s)</i>	<i>2016</i>	<i>2022</i>	<i>%Change</i>	<i>Nominal Change</i>
<i>Total Pay</i>	€3,536,656	€5,410,509	53.0%	€1,873,853
<i>Allowances</i>	57,645	98,028	70.1%	40,382
<i>Arrears/Other</i>	13,933	25,290	81.5%	11,357
<i>Basic Pay</i>	2,555,634	3,872,616	51.5%	1,316,982
<i>Locum/Agency</i>	205,697	264,158	28.4%	58,461
<i>Night Shift</i>	55,564	86,190	55.1%	30,625
<i>On Call</i>	72,942	100,547	37.8%	27,605
<i>Overtime</i>	175,242	304,259	73.6%	129,017
<i>PRSI Employers</i>	280,443	480,641	71.4%	200,198
<i>Weekend/PH</i>	119,554	178,781	49.5%	59,227

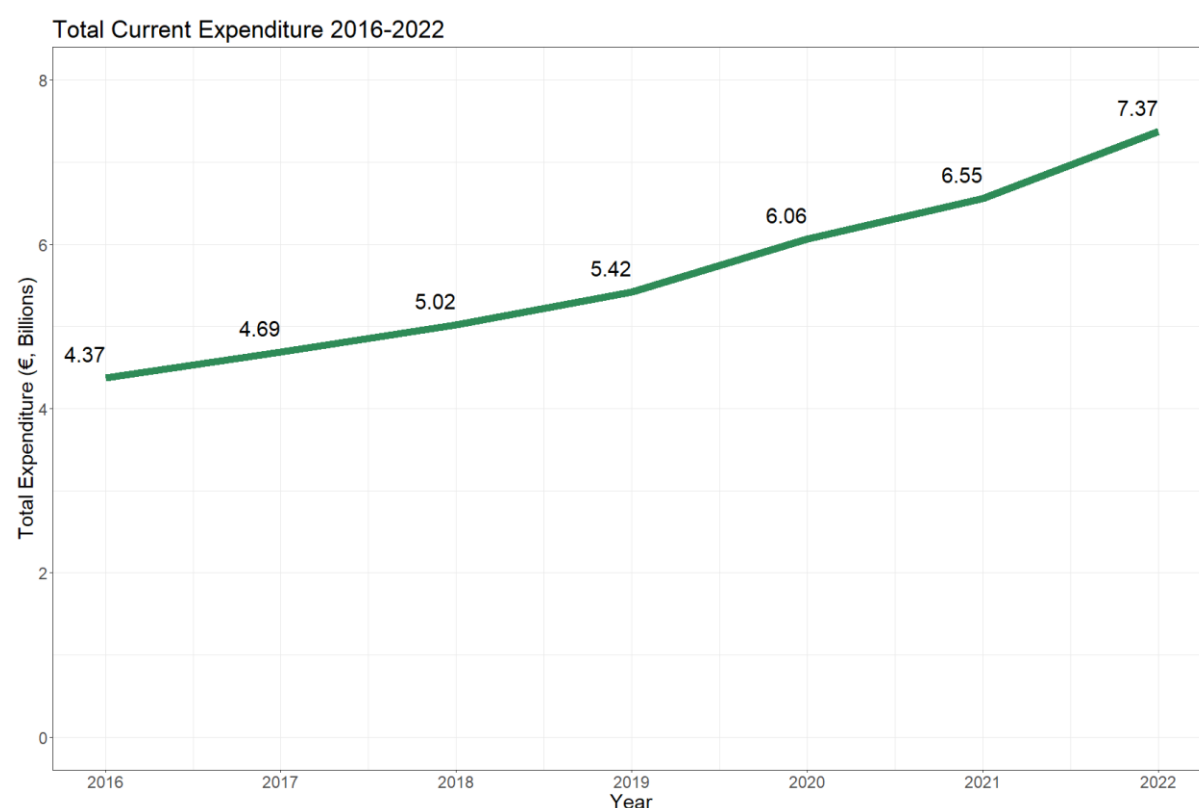
Source: Department of Health Financial Performance Unit based on HSE Reports, Author's Calculations

⁴⁴ Does not include hospital income (which would reduce aggregate hospital expenditure).

5.2 Trends and Regional Variation in Aggregate Acute Expenditure

Figure 5.1 below presents the total expenditure per annum over the period 2016-2022 within the Acute Hospital system⁴⁵. Prior to the onset of COVID-19 the acute budget was growing at an average rate of 7.33%. Over the period 2020-2022 in contrast, expenditure has grown at an average rate of 10%.

Figure 5.1: Nominal Increase in National Expenditure in Acute Hospitals 2016-2022⁴⁶



Source: Department of Health Financial Performance Unit based on HSE Reports, Author's Calculations

Finally, Figure 5.3 and Figure 5.4 provide an overview of the change in expenditure at a hospital level over our reference period⁴⁷. Some insights which arise from reflecting on these graphics include:

- The total growth in expenditure is concentrated in Model 4 sites relative to model 3. Out of a total expenditure increase of €3bn, the increase in Model 4 hospitals is €1.4bn (+69%), compared to €0.94bn (+66%) in Model 3 facilities.
- In nominal terms, total expenditure in UH Limerick has more than doubled (with the largest nominal increase in expenditure over this period totalling €199million). When inflation is taken

⁴⁵ The information below doesn't include expenditure within Hospital Group HQs, National Offices or other cost centres within the HSE Acute Run Rates which do not deliver patient care.

⁴⁶ This doesn't include expenditure incurred outside Acute Hospitals but within the Acute Hospitals directorate.

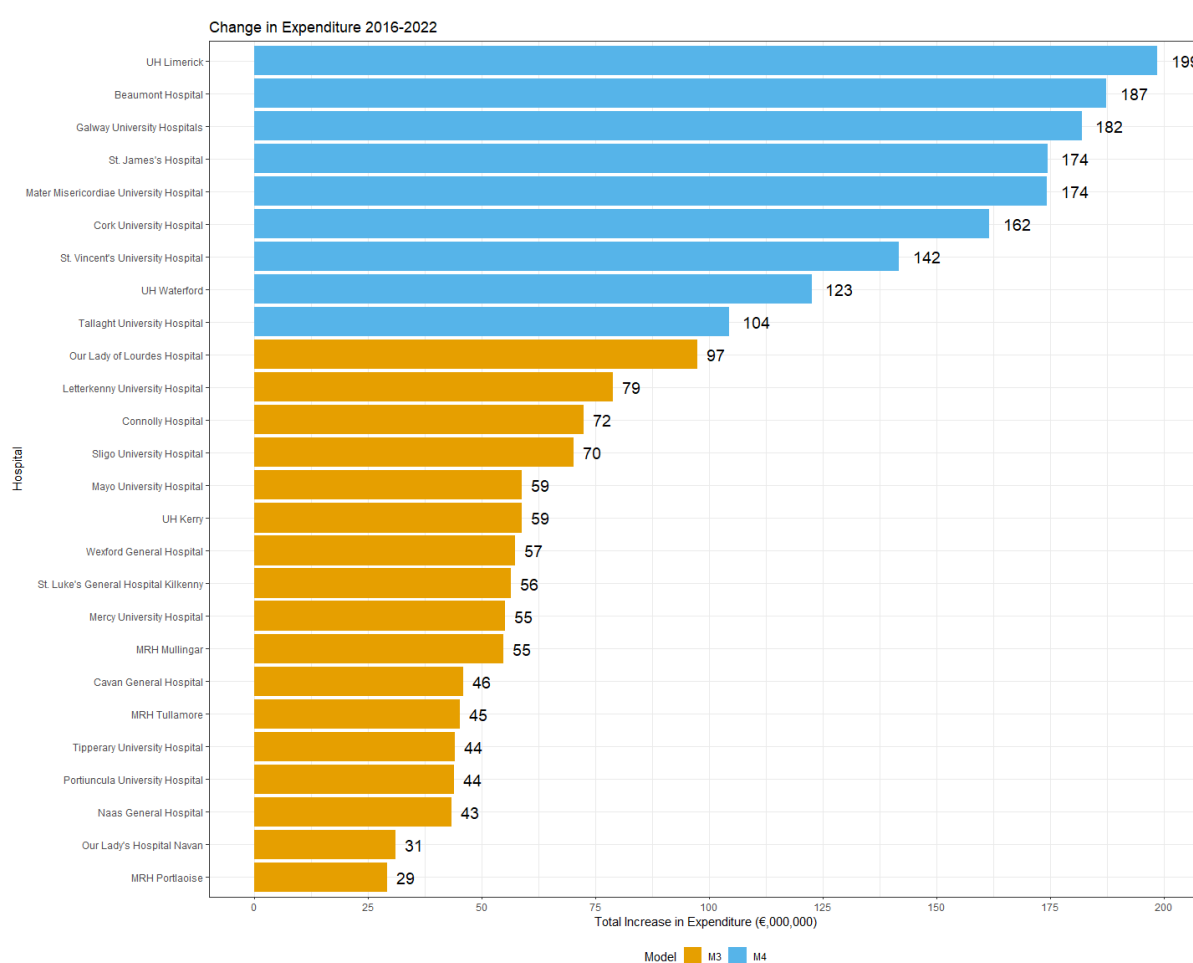
⁴⁷ As explained, Model 3 and 4 hospitals only are included, as these hospitals carry out the majority of overall acute care activity and are most appropriate for comparison due to similarity in services delivered.

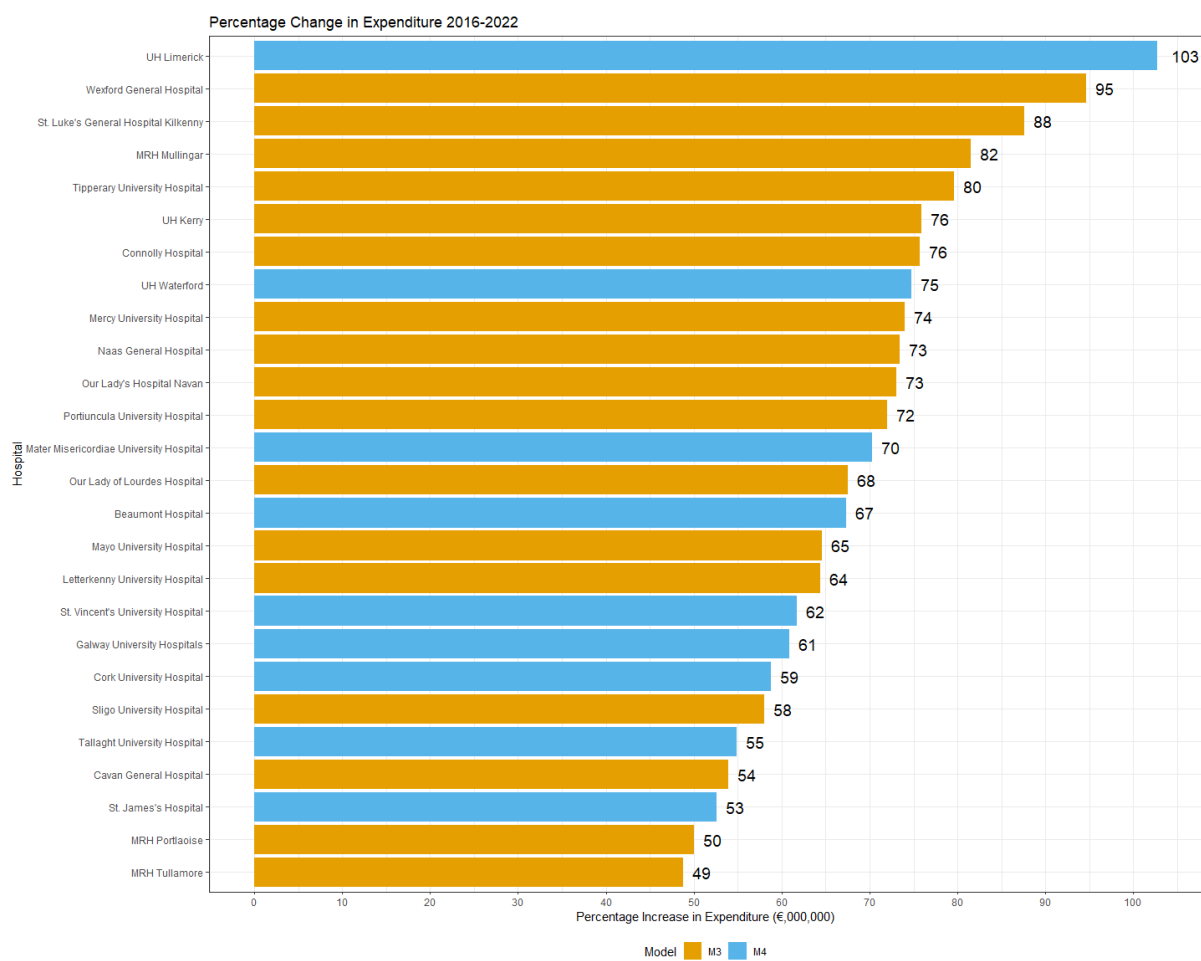
into account, this represents an increase of 83% (IFAC approach) in UHL between 2016 and 2022.

- Numerous other Model 4 hospitals have sizeable increases in total expenditure however, the percentage increase for these sites is less pronounced than many Model 3 sites.

Further analysis on the relationship between expenditure and activity is completed in Section 7. This helps to provide a clearer understanding of how these expenditure increases may have influenced activity in the acute care system.

Fig.5.2: Change in Nominal Expenditure Hospital Level 2016-2022 / Fig.5.3: Percentage Change in Hospital Expenditure 2016-2022





Source: Department of Health Financial Performance Unit based on HSE Reports, Author's Calculations

5.3 Inflation and its Impact on the Health Budget

The effect of healthcare inflation on the overall acute budget can be split into two distinct sub-categories, one which can be measured with a greater degree of certainty to the other.

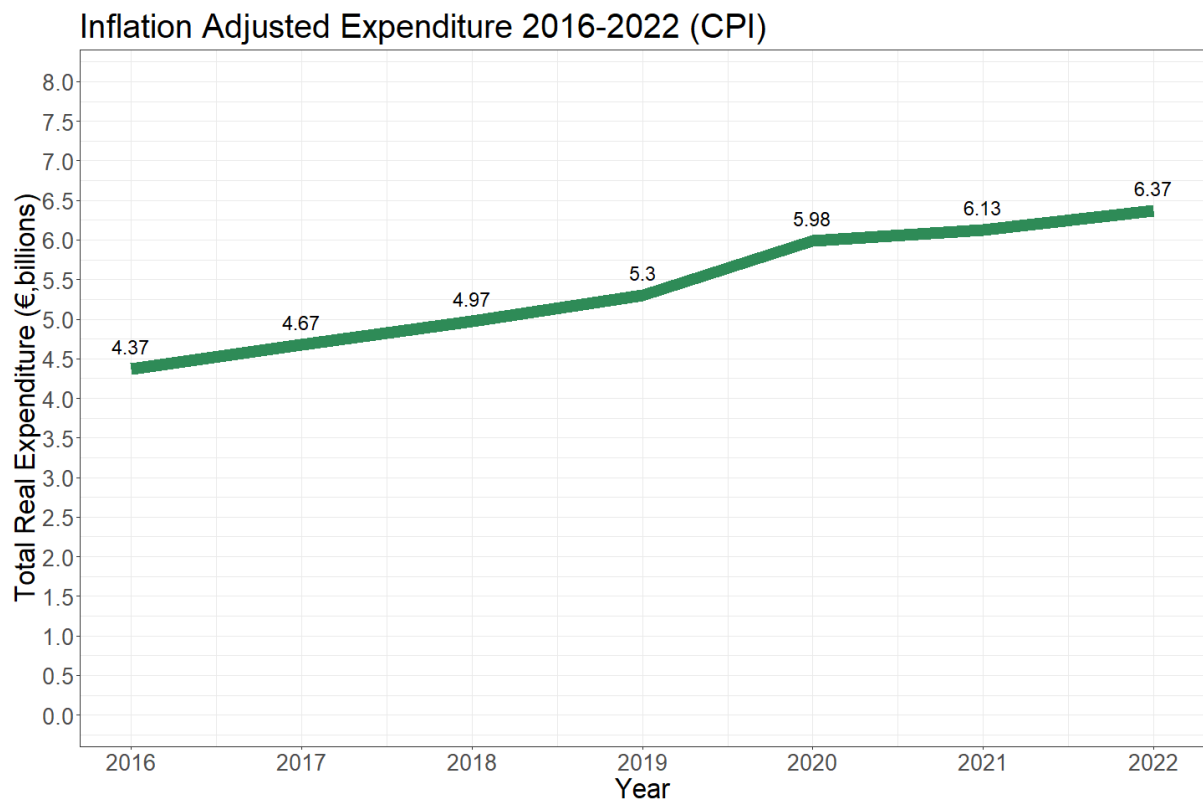
- I. Wage Inflation
- II. Non-Pay Inflation

Wage inflation can be linked to the direction of Public Sector pay negotiations. As alluded to in this report, the average salary in the Acute Sector has risen from €65,000 in 2016 to €78,000 in 2022. The growth in both headcount and the relative remuneration of the total workforce has resulted in the pay bill growing from €3.5bn to €5.4bn, an increase of 53%. The growth in wage inflation has been driven by both the pronounced growth in WTEs rising by 30% and changes in governmental pay policy. These changes include but are not necessarily limited to, the reversion of FEMPI alongside, changes in work practices, (reversal of Haddington Road Hours), the implementation of the Building Momentum pay agreement, and the new Consultants Contract. Each of these changes in pay policy has had a direct impact on the cost of healthcare workers, and therefore the cost of delivering patient care. The forthcoming public service pay deal⁴⁸ will further inflate the cost of delivering care, given the significant levels of pay inflation which will occur over the period 2024-2026, subject to ratification of this pay deal.

We discount acute hospital expenditures using Consumer Price Index inflation to provide an indication of the impact of aggregate inflation on the health budget. While public health sector inflation likely varies relative to this aggregated CPI measure, this is nonetheless a useful proxy to understand its impact in the context of the analysis presented. Figure 5.4 provides the graphical representation of how the health budget has increased adjusting for Inflation over our reference period, assuming a deflator of 15.7% (CPI adjusted). Over this period, paybill inflation has outstripped nominal inflation with an estimated rise of 20%. When applying this approach, real non-pay expenditure has increased from €1.74bn in 2016 to €2.33bn in 2022, an increase of €0.59 bn (+33%) in real terms. Therefore, the relative increases seen within non-pay expenditure remain pronounced and may therefore be linked to the delivery of higher cost care.

⁴⁸ <https://www.gov.ie/en/press-release/93217-minister-donohoe-welcomes-proposals-on-a-new-collective-pay-agreement-for-the-public-service/#:~:text=A%20general%20round%20increase%20in,greater%2C%20on%201%20January%202024.&text=%E2%80%A2,A%20general%20round%20increase%20in%20annualised%20basic%20salary%20for%20all,1%25%20on%201%20June%202024.>

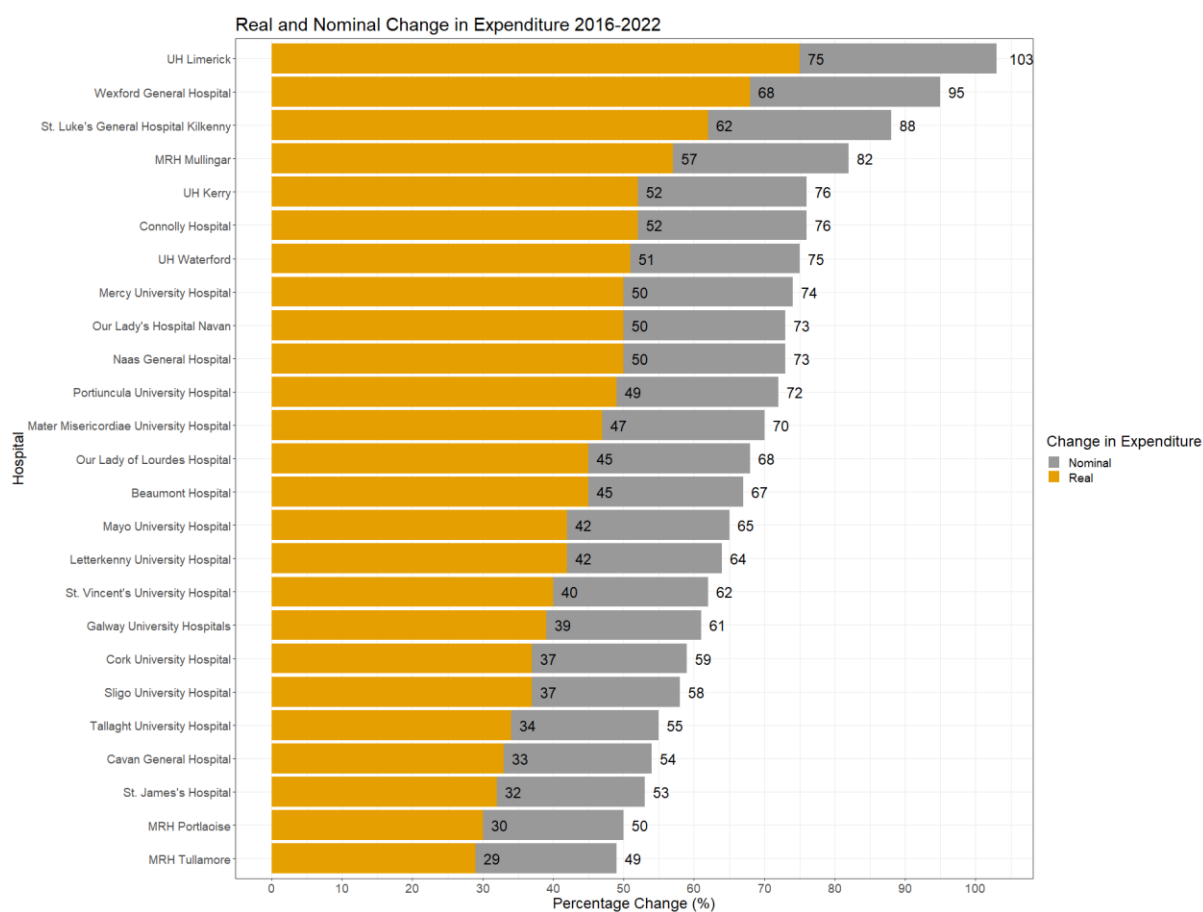
Figure.5.4: Growth in the Real Health Budget 2016-2022 (CPI)



Source: Authors Calculations using HSE Financial Run Rates and CSO CPI calculator

Figure.5.5 below allows a comparison of how real and nominal expenditure has changed across Model 3 and 4 hospitals at a hospital level. As inflation is applied proportionally to each hospital, the order of hospitals on expenditure rise remains the same, with UH Limerick experiencing the largest growth in both real (+75%) and nominal (+103%) terms. This analysis demonstrates the impact of inflation on hospital expenditures clearly highlighting the need for it to be fully taken into account in relation to its use as a hospital “input” for the purposes of productivity measurement.

Figure.5.5: Real and Nominal Expenditure Growth at a Hospital Level 2016-2022 (CPI):



Source: Authors Calculations using HSE Financial Run-rates and CSO CPI

6 Acute Hospital Workforce

This section presents graphics providing a high-level overview of the composition and change in workforce in the publicly funded acute hospital system between 2016 and 2022. Our motivation for including an analysis of acute hospital workforce in this report is twofold. Firstly, hospital workforce is a major component of overall hospital expenditure. As highlighted in Section 5, 66% of nominal acute hospital expenditure in 2022 (€5.4bn) was pay related. It is therefore important to note the composition of the workforce in publicly funded acute hospitals, and how this has changed as expenditure in hospitals has increased. Secondly, hospital workforce has a direct impact on hospital activity as patient procedures and patient care are delivered by the workforce within them. It is therefore also useful to note the distribution of workforce across hospitals and the change within for this reason; so that the change in workforce, especially clinical workforce can be noted and considered against the change in activity and expenditure.

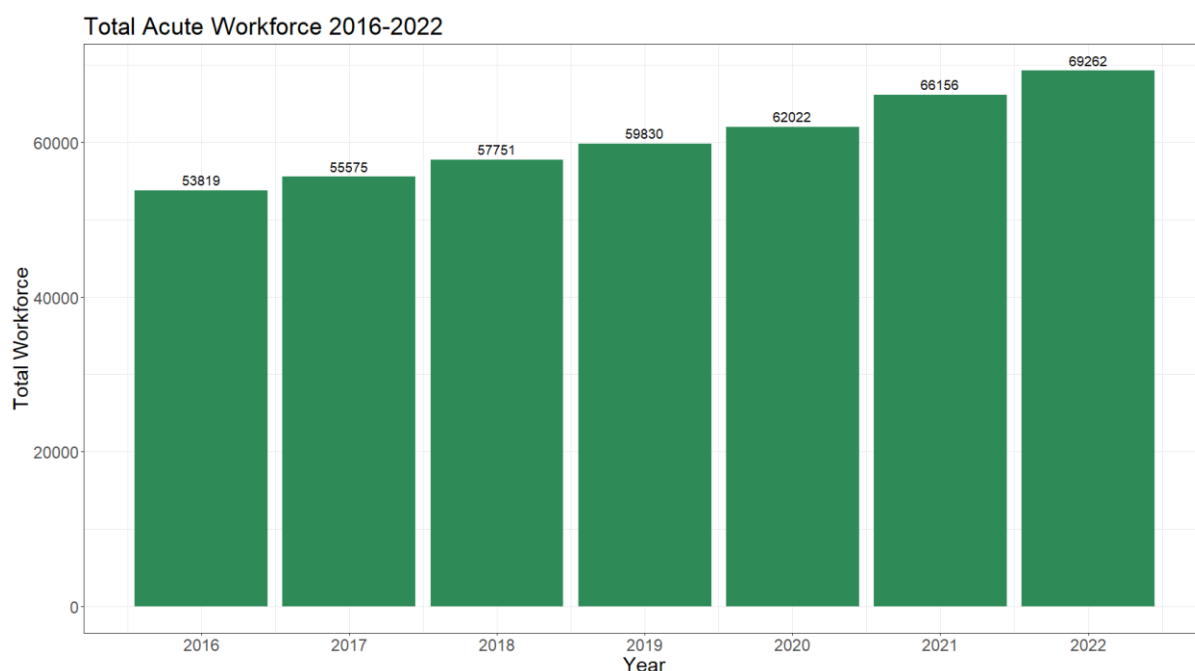
Since 2016, the total workforce within the Acute sector has increased rising from 53,819 in April 2016 to 69,262 in April 2022. In parallel to these staff increases reforms such as the reversal of Haddington Road Agreement hours, implementation of Safe Staffing Frameworks and pay reforms such as Building Momentum have impacted working conditions and working hours in the acute system. This section will illustrate the changes in the composition of the Acute Hospital workforce over this period.

6.1 National Workforce Trends and Composition

Figure 6.1 provides an overview of the total Wholetime Equivalents (WTEs) in the publicly funded acute hospital system over the period 2016-2022. The data was obtained from the HSE Staff Census. We observe the following in relation to the graphic:

- Wholetime Equivalents have increased annually, rising from 53,819 in 2016 to 69,262 in 2022.
- The growth in staff is most prominent since 2020, with the total headcount increasing by 11,521 in these 3 years versus 8,203 in the previous 4 years.

Fig.6.1: National WTEs 2016-2022



Source: HSE Staff Census, Author's Calculations

Table 6.1 provides an overview of the growth in workforce across various staff categories in the Acute Hospital sector. In total the workforce has increased by 26% over the period 2016-2022. We observe the following in relation to the change in the composition of workforce over this period:

- The Patient and Client Care category has experienced the greatest percentage increase over the period, rising from 4,597 WTEs in 2016 to 6,187 WTEs in 2022, a 35% increase.
- The Nursing and Midwifery category has experienced the largest nominal increase, rising from 20,902 to 26,496 over the period 2016-2022, an increase of 26%.
- Medical and Dental WTEs have increased by 34% rising from 7,331 to 9,882.
- Management and Administrative staff have risen by 30% from 8,238 to 10,720⁴⁹.
- Clinical Roles such as Health and Social Care Professionals, Medical and Dental, and Nursing and Midwifery roles have risen by 29% from 35,170 in 2016 to 45,340 in 2022.
- Non-Clinical Roles such as General Support and Management & Administrative roles have increased from 14,052 to 17,734, an increase of 26%.⁵⁰

⁴⁹ This only accounts for management and administrative staff working within Acute Hospital structures. Administrative staff may also be captured in the other workforce categories provided.

⁵⁰ Patient and Client care roles contain both clinical facing roles such as healthcare assistants and non-clinical facing roles such as hairdressers and barbers. Therefore, this category is not included within either group analysed in the preceding bullets.

- Overall, growth in clinical and administrative roles over the period examined has been roughly equal, relative to the initial proportion of the workforce they made up in 2016.

Table.6.1. Total WTEs by Staff Category:

Staff Category	2016	2022	Change	% Change 2016-2022
General Support	5812.62	7014.05	1201.43	21
Health & Social Care Professionals	6936.16	8963.84	2027.68	29
Management & Administrative	8238.3	10720.03	2481.73	30
Medical & Dental	7331.23	9882.62	2551.39	34
Nursing & Midwifery	20902.57	26494.46	5591.89	26
Patient & Client Care	<u>4597.86⁵¹</u>	6187.27	1589.41	35

Source: HSE Staff Census, Author's Calculations

6.2 Workforce Growth by Hospital

We can also examine the change in hospital workforce at a hospital level, building on the national-level picture presented above. Examination of the change in workforce at this level is useful both in understanding how changes in workforce over time vary by hospital group, and through examination of trends in workforce in combination with activity and expenditure growth in each hospital so as to better understand the relationships between these key performance indicators. To achieve this, we present the following:

- Growth in WTEs by Hospital 2016-2022

⁵¹ Staff can work various amounts of a contract and therefore WTEs are a measure of the total Units of Staff as a proportion of a full working contract.

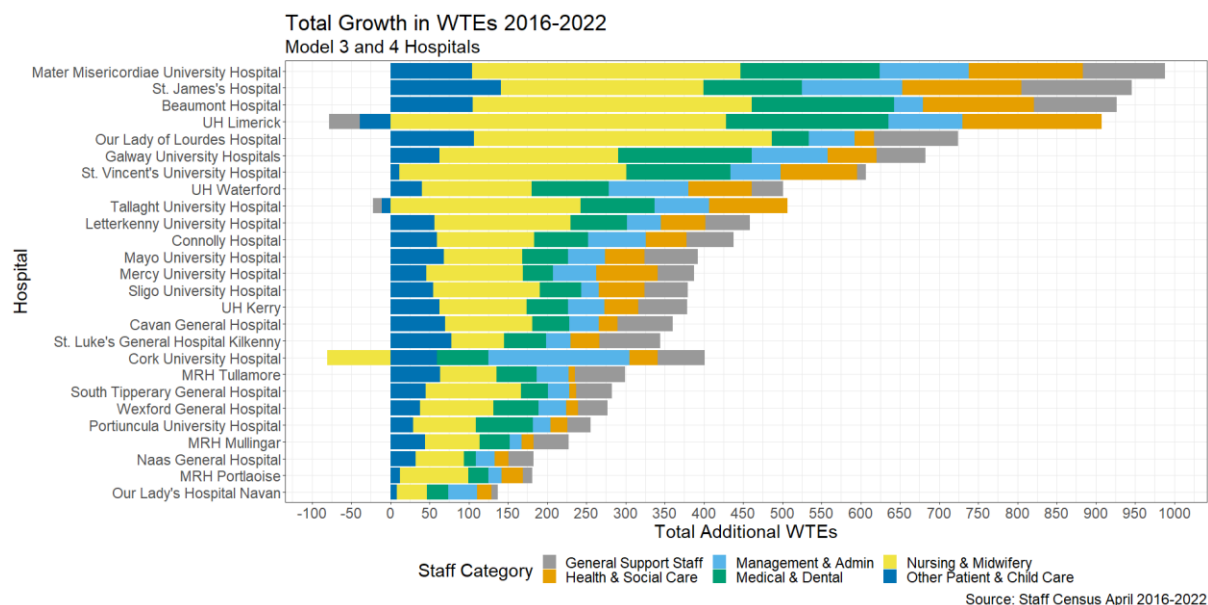
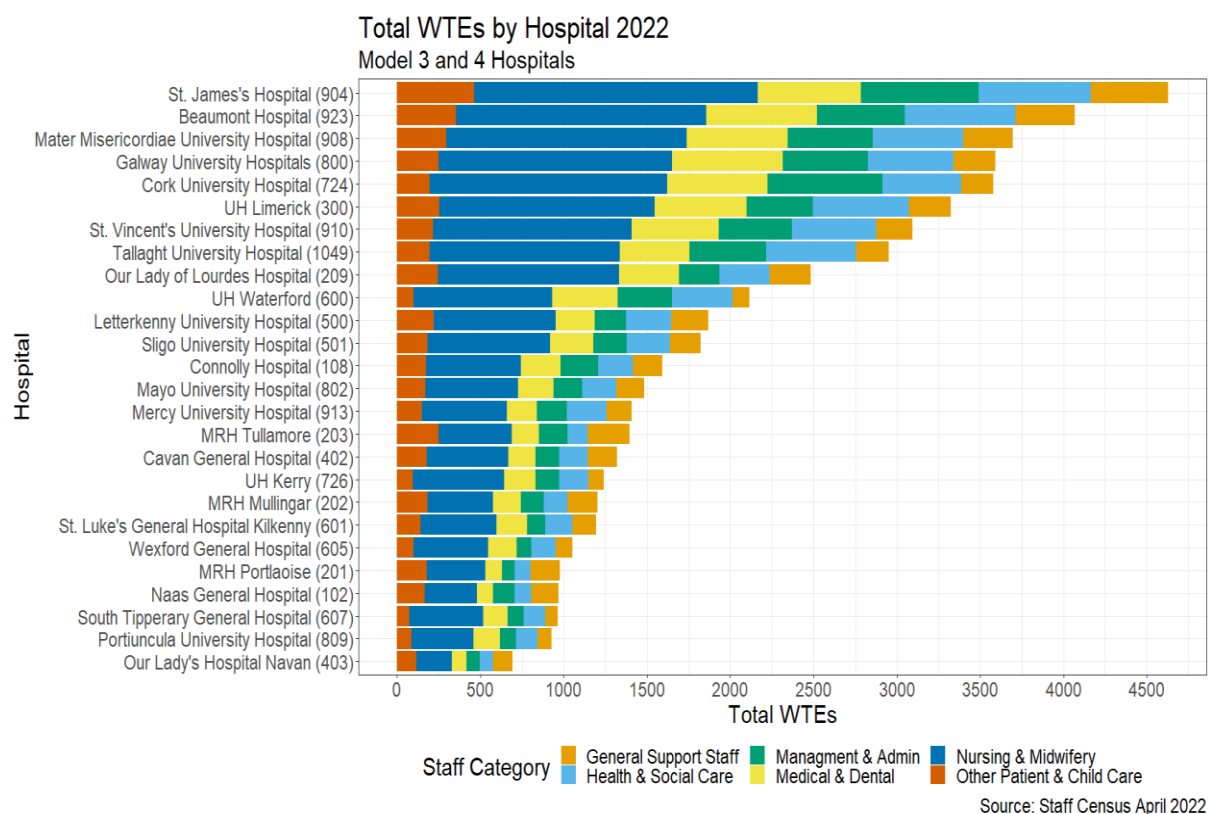
- Total Number of Staff by Category and Hospital 2016-2022

Over the following graphics the change in the workforce within Model 3 and Model 4 Hospitals is presented. The choice of focus on Model 3 and Model 4 Hospitals is to align with our other sections and ensure comparability across publicly funded hospitals, and as we observe elsewhere, the majority of hospital activity takes place in these facilities. In this case, the 26 hospitals we analyse account for 78% of all WTE growth in the Acute Hospital sector. We observe the following in relation to these graphics:

- The Mater experienced the largest increase in workforce over the period, rising from 2,706 WTEs to 3,695 WTEs, a 37% increase.
- The average increase in WTEs within the Model 4 and Model 3 hospitals is 461, with an average staffing increase of 31%.
- The hospitals which have experienced the largest increases in staff are the Model 4 sites, alongside the larger Model 3 sites such as Letterkenny and Our Lady of Lourdes.

As the colour coding within each graphic shows the relative increases across all Staff categories growth across groups and across sites varies. However, even accounting for these variations, the relative increase across all sites is observable.

Figure.6.4: Staff by Hospital 2022: (Model 3 / 4) / Staff by Hospital 2016: (Model 3 / 4)



Source: HSE Staff Census, Author's Calculations

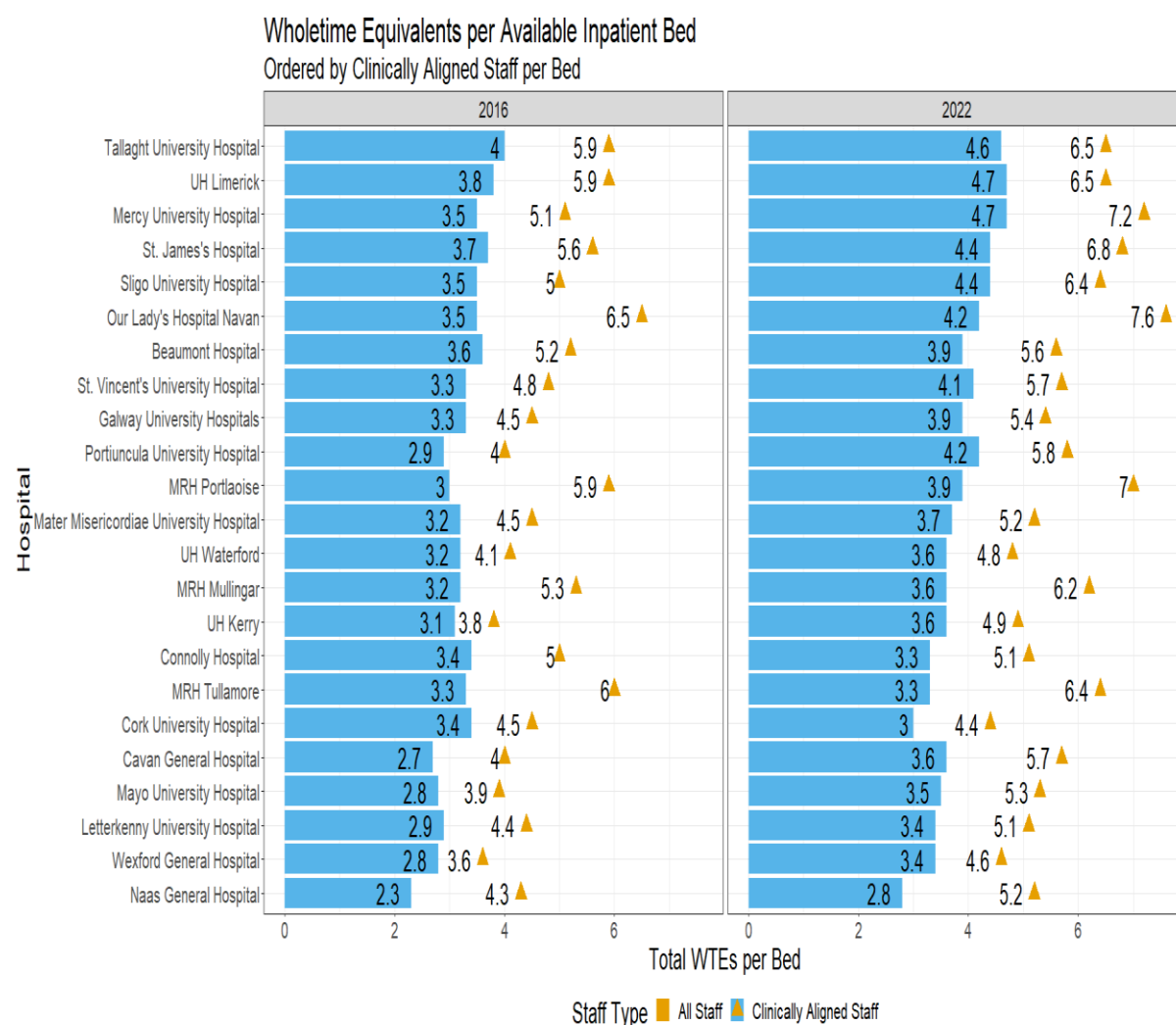
To further understand how workforce has changed, and the relative staffing levels per bed⁵², a calculation of the number of WTEs per bed at a site level is presented in Figure.6.5. Alongside this, a more clinically focused comparison is also included. We further include these total WTE and clinically aligned WTE figures for 2016 and 2022, allowing for an understanding of the development of this metric over time. Given, that patient acuity varies, it is sensible that WTE rates per bed would also vary depending on the type of services a hospital provides, with this being aligned to clinical best practice. Therefore, caution should be taken when interpreting cross-hospital variations in WTEs per bed. We observe the following in relation to this graphic:

- University Hospital Limerick and Mercy University Hospital Cork have the highest number of Clinically Aligned Staff per bed in 2022, at 4.7. This compares to 3.8 clinically aligned staff per bed in UHL, and 3.8 staff in Mercy University Hospital Cork in 2016.
- The relative number of clinically aligned workforce per bed has increased across all sites from an average of 3.23 in 2016 to 3.81 in 2022.
- There is a high level of variation in the relative number of clinically aligned to non-clinically aligned staff per bed in some hospitals, with this potentially being indicative of scale economy issues⁵³. This could be a potential area for investigation as a means to improve the productivity capacity of the acute care system in Ireland.

⁵² This calculation includes all forms of staff including administrative.

⁵³ Some roles such as Healthcare Assistant are currently grouped in the Staff Census into categories with Staff delivering non-clinical tasks.

Figure.6.5: Total WTEs and Clinically Aligned Staff per Bed, 2016 & 2022



Source: Author's Calculations using HSE Staff Census and Health Statistics Data⁵⁴

⁵⁴ The definition of Clinically Aligned Staff is the following staff categories in this instance: Medical & Dental, Nursing & Midwifery & Health & Social Care. The staff categories classified as not clinically aligned in this instance are Management & Admin, General Support Staff & Other Patient & Childcare.

7 Activity and Expenditure Changes 2016-2022

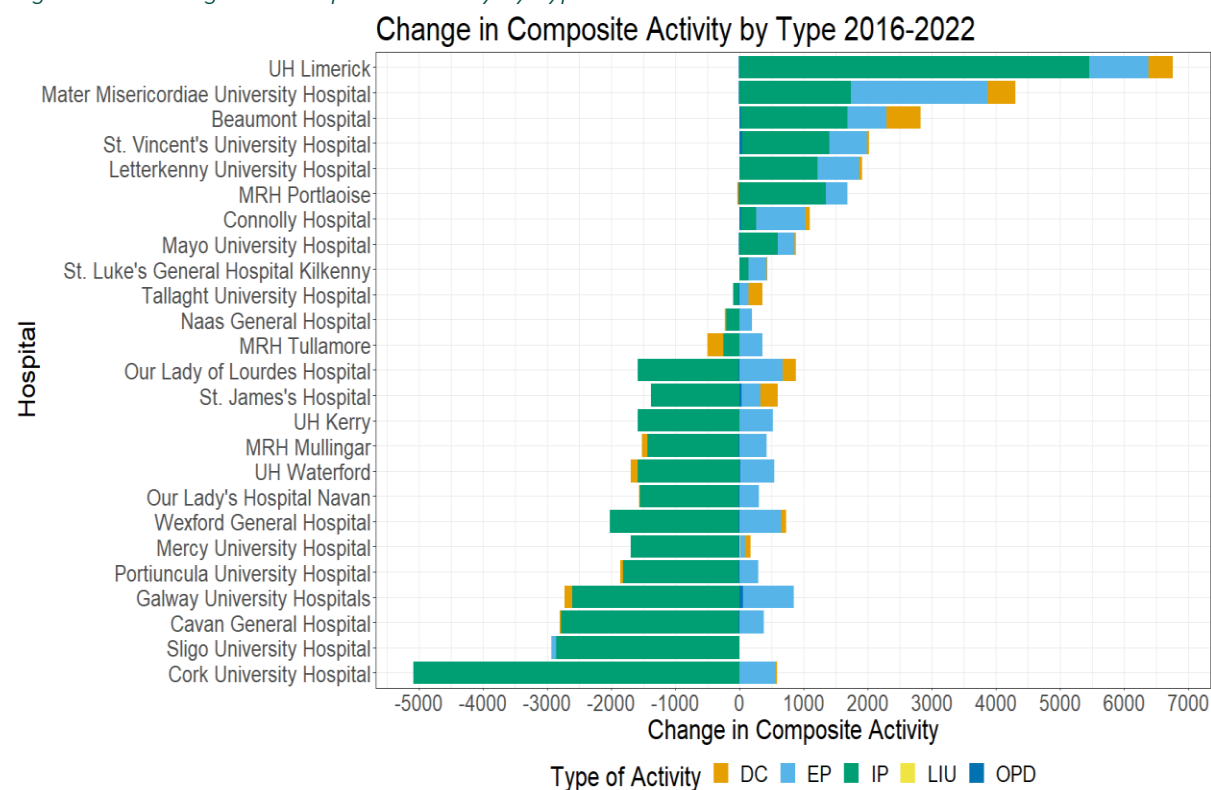
Sections 3, 5, and 6 present national and hospital-level activity, expenditure and workforce in the public acute hospital system between 2016 and 2022. While notable in their own right, these metrics are most usefully viewed in combination, with hospital expenditure and workforce able to be viewed as key inputs to expected hospital-level activity, a key output of acute care. This section combines these elements to develop an overarching picture which links developments in activity, expenditure, and workforce at a national, hospital group and hospital level.

In the following graphics different types of activity (Inpatient, day-case, outpatient, emergency department) delivered in publicly funded acute hospitals are combined into a 'Composite Activity' measure. This is achieved through reference to relative unit costs for each element of activity derived from the HSE HPO, with the methodology for its derivation discussed in Section 2. This allows the comparison of activity as a single value across all hospitals, with this able to then be further evaluated relative to developments in expenditure and workforce in each hospital examined.

Figure 7.1 provides an understanding and visualisation of the change in composite activity at a hospital level and how this influences the overall change seen across the reference period. As the graphic demonstrates, relative changes in Inpatient care delivered by hospital are the core driver of increases or decreases in composite activity, owing to inpatient activity's relatively high unit cost. It follows that policymakers need to also appreciate developments in activity beyond the composite metric presented, given that the weightings applied do not necessarily align with desired health-system performance in every case (for example, incentivisation of the provision of day-case over inpatient procedures). This has already been provided in section 3 but may be equally important to consider in this context given that, for example a hospital experiencing a large increase in ED presentations but a modest decline in inpatient discharges may appear to have negative activity according to the metric provided, which may run counter to prevailing hospital or national strategy⁵⁵. Nonetheless, the use of our composite activity metric has obvious advantages in terms of making comparison across multiple elements more tangible as shown in the rest of this section (e.g, Figure 7.2, Figure 7.3, Figure 7.4).

⁵⁵ for example Sláintecare would encourage the treatment of patients on a day-case rather than inpatient basis, which all else equal would result in a fall in composite activity relative to a situation where an equivalent patient is treated as an inpatient.

Figure.7.1: Changes in Composite Activity by Type 2016-2022

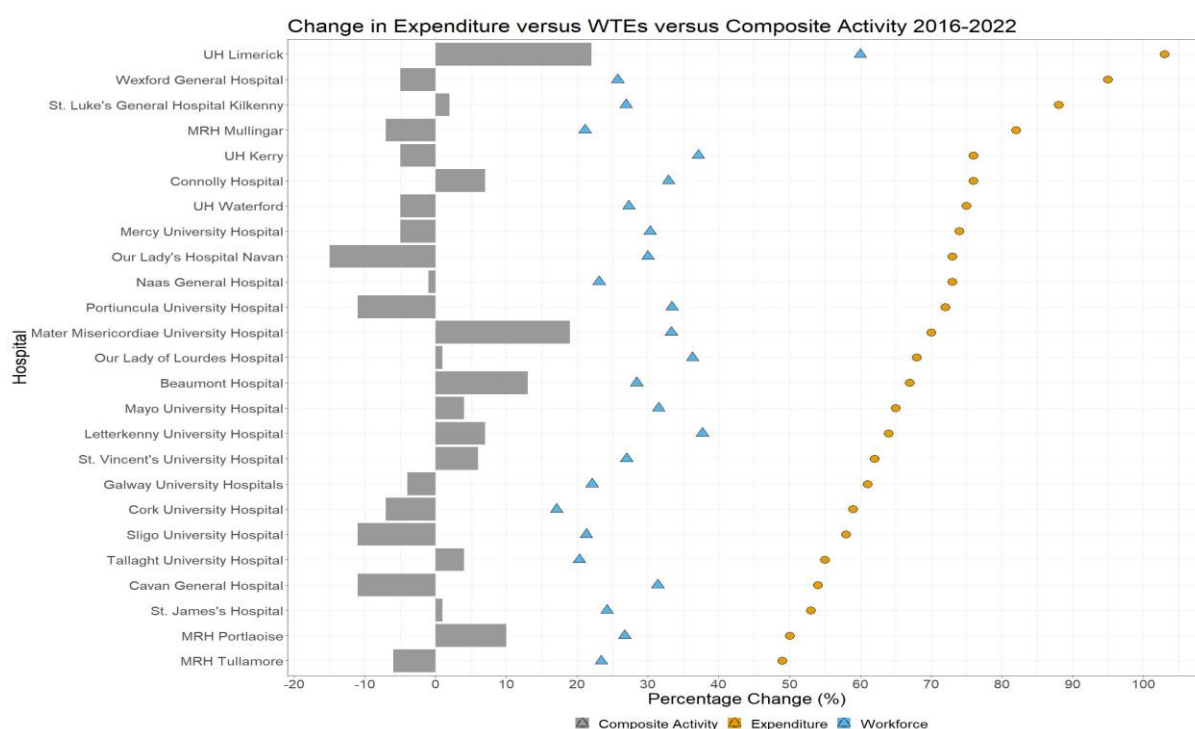


Source: HSE-BIU Data, Author's Calculations

Figure 7.2 presents the changes in (non-complexity adjusted) Composite Activity, Nominal Expenditure and Workforce at a hospital / site level, ordered by the relative change in nominal expenditure. We observe the following in relation to hospital-level activity:

- Composite Activity is highly variable, with several hospitals observing a decline in composite activity over the period examined.
- In general, composite activity lags behind workforce and expenditure growth at a hospital level.
- Workforce has increased across all sites, with increases of between 25-66%.

Figure.7.2: Overview of Changes in Activity, Expenditure and Workforce 2016-2022



Source: HSE-BIU Data, Author's Calculations

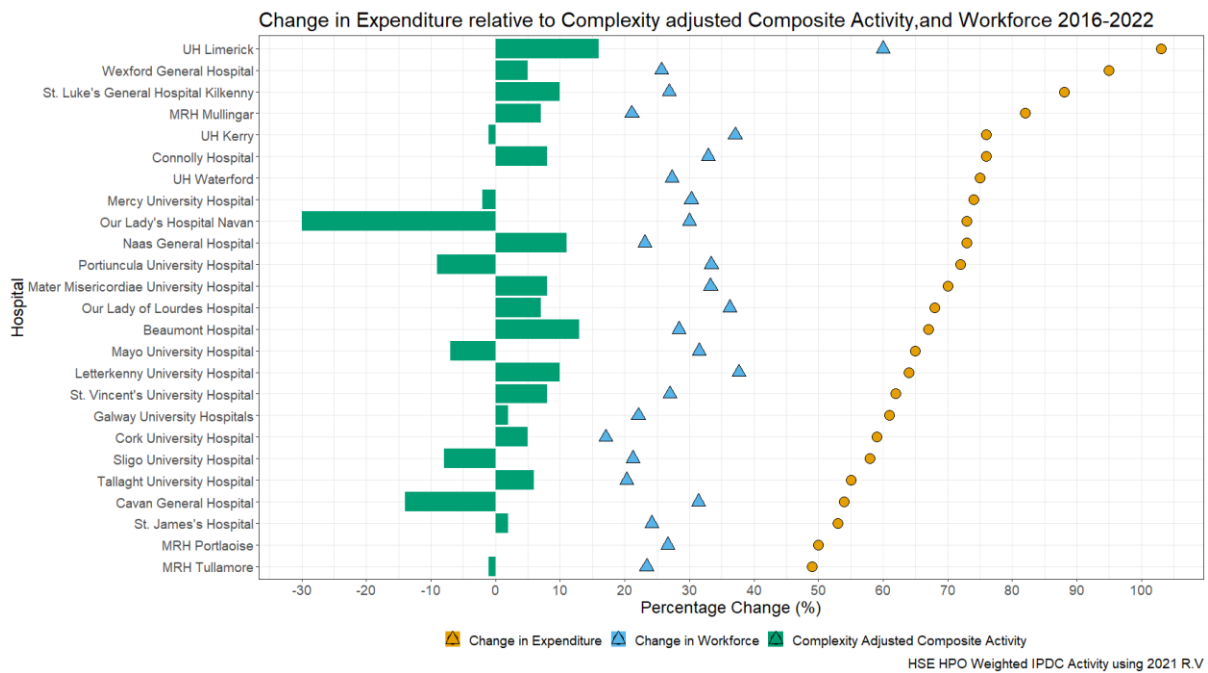
Figure.7.2 above provides a concise presentation of distinct components of the healthcare system, however both expenditure and activity could be viewed as “unadjusted” for complexity and inflation as nominal values for both are presented. As discussed throughout the paper however, the complexity of care delivered is intrinsically related to the cost intensity of a patient and therefore the potential activity a hospital can deliver. Therefore, further our understanding of the relationship between acute care inputs and outputs, Figure.7.3 presents the relative change in Composite Activity controlling for Inpatient and Ambulatory case mix in 2022 as presented in Figure 3.13 and 3.14 alongside an inflation adjusted expenditure amount as presented in Figure 5.5. We observe the following in relation to this graphic:

- In general, the impact of this complexity adjustment on activity is minor, likely owing to the moderate change in complexity adjusted activity over the period (a 3% increase in complexity adjusted inpatient presentations, and a 10% increase in complexity adjusted day-case presentations was shown in Section 3), and because the change in activity by hospital is being compared to itself over time, meaning that the relative impact of the complexity measurement is muted⁵⁶

⁵⁶ Given that the complexity of patients seen in a given hospital in 2022 is closely associated with the complexity of patients seen in 2016.

Given, the clear evidence, that complexity alone is not driving these pronounced expenditure increases, alongside the challenges with healthcare inflation. The need to develop a strong evidence base for both reducing inlier variance in delivering procedures and identifying processes which can be improved to bring cost savings and efficiencies.

Figure.7.3: Change in Expenditure relative to Complexity adjusted Composite Activity, Workforce, and Inpatient Complexity



Source: HSE-BIU Data, Author's Calculations

To further develop our understanding of Inputs and Outputs in publicly funded hospitals we use the following equation to relate expenditure to composite activity directly.

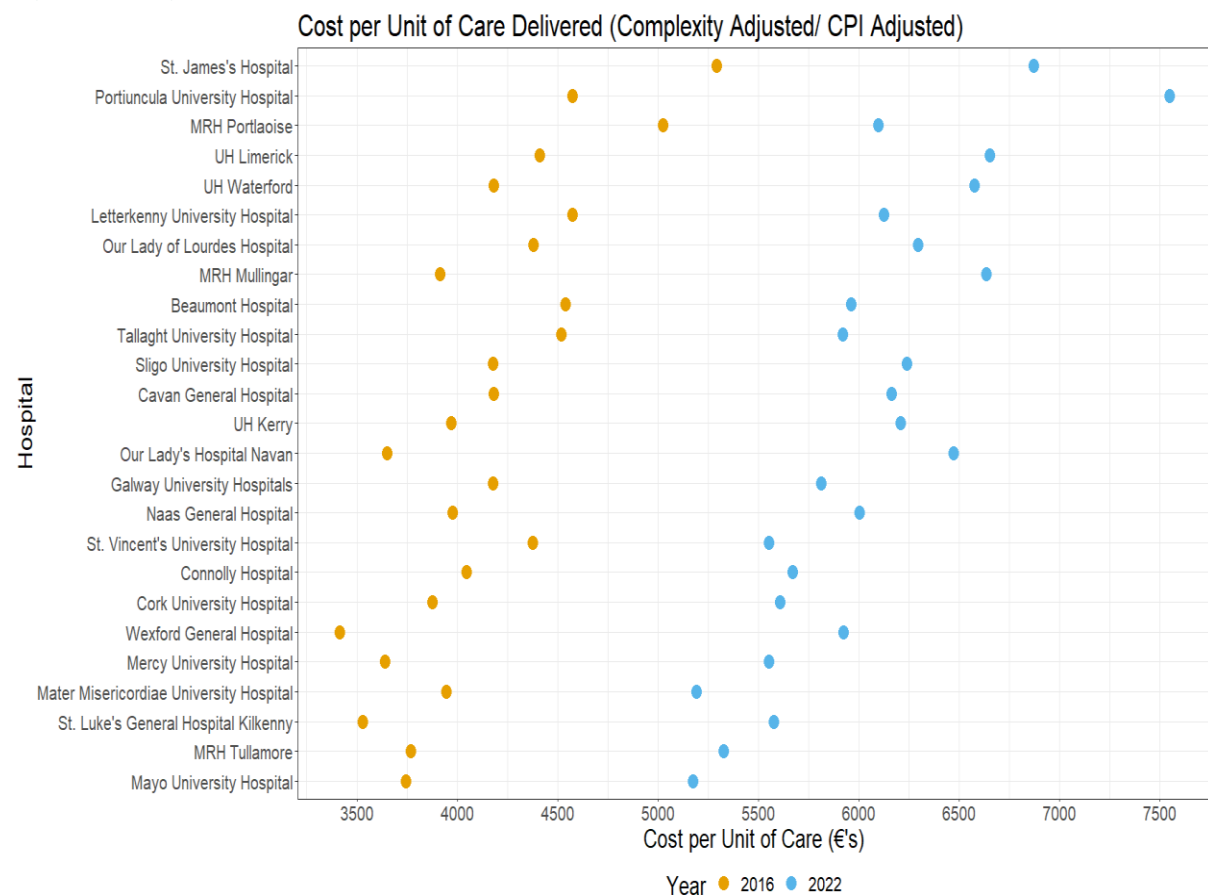
$$\alpha_i = \frac{\text{Real Expenditure}_i}{\text{Complexity Adjusted Composite Activity}^{57}_i}$$

In this equation Alpha is an index value which enables the comparison of how real expenditure (CPI adjusted) is changing over time relative to Complexity Adjusted Composite Activity growth. Figure.7.4 presents this index at a Hospital Level over the period 2016-2022, with both 2016 and 2022 highlighted. At a high-level this allows for a clear identification of which publicly funded hospitals are the most and least productive for a given level of expenditure input, however limitations are also evident when the graphic is interpreted. Most notably, the cost per unit of care delivered has strong

⁵⁷ Complexity adjustment applied only to inpatient and day case patients.

variation on a per-site basis. This is likely because the variation in the acuity of patients and complexity of care provided in each hospital is driving the cost per unit of activity to be higher in some sites, with some drivers of expenditure growth not adequately captured through a complexity adjustment. Comparison of performance in this lens is therefore most appropriate comparing a hospitals **own performance** in 2022 relative to its performance in 2016, or through consideration of a sub-sample of hospitals (e.g, comparison of relative differences between model 4 sites only). Through this comparison, it can be seen that the Cost per Unit of Composite Activity has increased across all sites by a significant amount, evening when comparing a hospitals own cost per unit in 2016 relative to the cost in 2022. While this approach has some merits, it will require further development to disentangle activity and non-activity generating components of hospital care to allow for appropriate comparison across or within hospitals over time.

Figure.7.4: Expenditure Index



Source: HSE-BIU Data, Author's Calculations

8 Policy Findings

Acute Hospital Expenditure

- Nominal Acute Hospital Expenditure over the period 2016-2022 has risen from €4.4 billion to €7.37 billion, an increase of ~€3bn (+68%).
- Real Acute Hospital Expenditure over the period 2016-2022 has risen from €4.4 billion to €6.37 billion controlling for Consumer Price Index inflation over the period of 15.7%, a growth of 45%. Nationally agreed public sector pay agreements have resulted in an increase in health expenditure above CPI over this same period.
- The annual nominal growth rate of expenditure increases has risen from 7.33% over the period 2016-2019 to 10% over the period 2020-2022, with expenditure provided for the COVID-19 response contributing to this increased rate of growth.
- The pay bill accounts for 65% of the total growth in expenditure over this period. This growth is inclusive of national pay awards, increments, overall increases in staff and changes in workforce composition including the prioritised recruitment of consultants over the period.

Capacity and Occupancy

- The number of beds in the Acute system has risen from 10,592 to 11,581 beds in 2022, an increase of 989 inpatient beds.
- Occupancy has decreased from 94.6% in 2016 to 92.3% in 2022. This may reflect a move towards a safer level of occupancy, with the literature identifying occupancy rates of 85% to be a safe level which leaves additional capacity for surge events. Occupancy was above this 85% range in 32 out of 48 sites in 2022.
- Length of Stay has increased, rising from a national average per patient of 5.7 days in 2016 to 6.4 days in 2022, with this rise partially attributable to the impact of COVID-19 on patient care needs.
- Population ageing has been shown to have a demonstrable impact on resource utilisation and capacity in the acute care system. Based on authors analysis of HIPE data this is also the case, with for example a 21-year-old emergency admission having an average length of stay of 2.84 days, versus an average length of stay of 11.9 days for an 85-year-old emergency admission. In addition, our analysis shows that persons aged over 65 currently make up 15% of the total population while consuming 58% of all Inpatient bed days.

Workforce

- Total Acute Workforce has increased from 53,819 in April 2016 to 69,262 in April 2022, growth of 29%.
- Nursing has experienced the largest nominal increase in workforce, rising from 20,902 to 26,494 WTE over the period.
- Out of a total of 15,443 hires over the period, 10,170 are medical, nursing and health & social care professionals (66% of total) while the remainder are in roles more closely related to administration.
- The relative number of clinically aligned workforce per inpatient bed has increased across all sites from an average of 3.23 in 2016 to 3.81 in 2022.

Activity:

- **Inpatient Discharges:** 623,000 inpatient discharges were delivered in 2022. This constitutes a 3.5% decrease in activity relative to 2016. Adjusting this for increased patient complexity results in a 3% growth in weighted inpatient discharges.
- **Day-Case Discharges:** 1.12 million day-case discharges were delivered in 2022. This constitutes a 6.3% increase in activity relative to 2016. Adjusting this for increased patient complexity results in a 10% growth in weighted day-case discharges.
- **Outpatient Attendances:** 3.4 million outpatient appointments were delivered in 2022. This constitutes a 2.7% increase in activity relative to 2016.
- **Emergency Presentations:** 1.66 million emergency presentations were seen in 2022. This constitutes a 20% increase in activity relative to 2016.
- **Composite Activity:** This paper presents a novel way of understanding the above activity in a single composite indicator at whole of site level. “Composite” activity (aggregate Inpatient, Day-Case, Outpatient and Emergency, weighted by unit costs for each area), adjusted for patient complexity, has increased by 3.8% over the period 2016 to 2022.
- Changes in activity at a site level are variable, with many sites experiencing reductions in nominal activity across one or more activity areas over the period.

- Non-complexity adjusted Inpatient Discharges over the period have decreased. However, the length which patients stay, and the number of bed days used has risen.

Productivity

- Our analysis shows the large divergence present in all sites between the expenditure and workforce provided, relative to the growth in either separate activity metrics or “composite” activity. In most cases, the divergence is significant, with the percentage growth in composite activity between 2016 and 2022 either negative, or two times behind workforce growth, and up to three times behind real expenditure growth over the same period.
- The Cost per Unit of composite activity has increased across all sites over the period 2016-2022. This provides further evidence that the cost of delivery of activity has risen over time within the publicly funded acute care system, although further analysis will be needed to fully understand the determinants of this change (including improvements to the health system that do not necessarily increase activity, such as improvements to patient and staff experience).

9 Policy Recommendations

I. **Improve Hospital Performance**

The analysis presented shows a clear variation in performance across sites both in expenditure management and in the delivery of activity. This highlights the need to examine productivity within publicly funded acute hospitals to see how activity levels can be improved. The report will also inform the productivity taskforce in setting KPIs in hospitals to establish a performance expectation for additional investment.

II. **Targeted Site Level Research**

There is large variation in the conversion of inputs, such as expenditure and workforce, into activity across hospitals. Site level analysis should be undertaken, including qualitative research to understand what differences exist between these sites, and how best to ensure that additional resources result in increased and improved hospital services.

III. **International Review of Performance**

The divergence in the conversion of hospital inputs to outputs appears to be a problem shared by other health systems. For example, a similar report on the UK NHS has demonstrated the emergence of a similar “productivity puzzle” within their acute hospital facilities. An extension of this research could therefore examine activity, workforce and expenditure trends in other healthcare systems, with the goal of informing Ireland’s response to the observed divergence reported here.

IV. **Improved Staff Reporting**

At present staff report at a cost centre basis, with limited information available as to what specific area they work in. To improve our understanding of where staff work the provision of an additional variable identifying what clinical area of the hospital staff work in would enable a better understanding of site level differences and therefore their contribution to activity.

V. **Improved Financial Reporting**

The implementation of the Integrated Financial Management System (IFMS) by the HSE will likely deliver a more granular level of financial reporting to the Department. This is imperative for the

development of more detailed analysis on cost drivers, enabling the identification of cost drivers and potential savings at a sub-expenditure line level.

VI. A focus on the Swift Implementation of OPD Clinical Coding and Emergency Presentation Clinical Coding

The provision of additional information on the reasons for OPD or Emergency Department presentations, alongside associated costs for each type of presentation will allow for a more detailed understanding of the relative characteristics of patients treated in each hospital, and the potential cost differences emerging from differences in patient acuity. This will aid service planning and will enable a more accurate understanding of the composition and complexity of care delivered by site in these settings, an important factor when considering cross-hospital performance rankings on the conversion of expenditure to activity.

VII. Revision of Key Performance Indicator Measures:

The paper emphasises the need to explore and improve publicly funded acute care productivity. As part of this approach, the Productivity Taskforce should consider how to structure a revised set of key performance indicators for the acute care system to better identify opportunities for, and drive performance improvement. This could utilise existing KPIs within the HSE Management Data Reports, alongside other analytics (such as the development of the HPVP system).

VIII. Activity Based Funding (ABF)

ABF is an internationally recognised system of healthcare funding which can assist in further understanding productivity at a site and procedure level. There is an opportunity to ensure that funding follows performance and that existing cost differentials in the provision of the same care are reduced or eliminated to the greatest extent possible.

IX. Further Research on Hospital Productivity

The analysis provided raises areas for further research in a number of contexts. research questions which may help us to understand and improve hospital productivity include:

- i.** Differences in capital infrastructure and diagnostics availability on hospital throughput.
- ii.** The admission of a high-number of emergency department patients on overall patient cost.
- iii.** The outsourcing and conversion of inpatient to day case care on average length of stay and hospital resource use.
- iv.** Differences in hospital IT infrastructure and its associated impact on patient throughput.
- v.** Changing staff experience, training and characteristics on patient and staff experience and hospital throughput.
- vi.** Analysis and comparison of hospital activity, expenditure and workforce developments at a model specific level (e.g, maternity, elective, etc) as well as comparing these developments across each HSE Health Region.

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