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Acute Hospital Waiting Lists and Times: International Comparison of Determinants of Inflows and Outflows

Waiting Lists Series: Report No. 1

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This paper has been prepared by IGEES staff in the Department of Health. The views presented in this paper do not represent the official views of the Minister for Health.

IGEES
Irish Government Economic and Evaluation Service

Contents

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Executive Summary

Overview

This paper examines the determinants of inflows to and outflows from waiting lists for elective care and examines how Ireland compares internationally on determinants of inflows and outflows. This is the first publication within a series of papers.

Key Findings

Determinants of Waiting List Inflows and Outflows

- Public health systems prioritise access to specialised healthcare based on need, and not on ability to pay, and because of capacity constraints waiting lists for elective care occur.
- Waiting lists for elective care increase when the number of patients referred for specialist consultation/treatment (*the inflow*) is greater than the number of patients assessed or treated and removed from the list (*the outflow*).
- The determinants of the *inflow* to a waiting list for elective care (i.e., demand for care) within any country are health status, medical technology, severity thresholds and user cost sharing.
- The determinants of the *outflow* from a waiting list for elective care (i.e., supply of care) within any health system are public capacity, private capacity, productivity, and provider payment mechanisms.
- It would be desirable to be able to compare the relative size of inflows onto and outflows from waiting list in Ireland to that of other countries. However, readily available collated data on inflows onto and outflows from hospital waiting lists for OECD countries is not available.

International Comparison of Determinants of Inflows and Outflows

- It is important to note that there are limitations to making international comparisons across countries due to data on health systems varying in definitions and/or data collection methods, and variation in the structure of health systems.
- A review of relevant inflow determinant indicators for 2019 suggests that Ireland **does not have high demand drivers to generate inflows** onto waiting lists relative to average EU/OECD countries. Notably, Ireland's population is relatively young and has a low share with chronic conditions. However, high annual rates of growth in the 65+ population suggests Ireland might have relatively high rates of growth in inflows.
- A review of relevant outflow determinant indicators for 2019 suggests that Ireland is **unlikely to have high outflows relative to population.** Ireland's stock of acute care beds per 1,000 (2.7) is in the 2nd lowest quintile[1], below the OECD average (3.5) and the EU22 average (3.6). Ireland's physicians working in hospitals per 1,000 (1.8) is in the 2nd lowest quintile, below the OECD average (2.1) and the EU22 average (2.2). Ireland has a mixed performance on gauges of productivity as proxied by hospital discharges per hospital doctor, the share of certain surgeries performed as day cases, and for avoidable hospital admissions.

- Understanding the likely impact of rates of change in the determinants of outflows (e.g., changes in capacity and / or productivity) is difficult due to limitations in the international data which hinder cross country comparison.

[1]This paper compares Ireland to all OECD countries. The data used in this paper relates to 2019 as this is the most recent year for which comparable data is available across a large number of OECD countries. Our analysis therefore does not capture any recent increases in capacity both in Ireland or in other OECD countries since then. A substantial number of acute care beds have been added in Ireland since the start of the pandemic, e.g., the number of available inpatient and day case acute care beds increased by 536 from end 2019 to end 2021.

Policy Implications

1. A review of relevant inflow and outflow determinant indicators for 2019 suggests that *relative to the population* Ireland does not have high demand drivers compared to EU/OECD averages (e.g., our population is relatively young and healthy) but neither does Ireland have high supply drivers (e.g., our measures of hospital beds and physicians per capita are not high). While Ireland's population overall is young and healthy, the rapid rate of growth and ageing of the population increases inflows into the system and how best to respond is a key consideration over the medium term. However, we do not know how inflows and outflows compare with other countries relative to the population nor how annual rates of change in inflows and outflows in Ireland compare with other countries.

   Therefore, there is a need for internationally comparable data on the rate of *inflows* onto and *outflows* from waiting lists for elective care both for waiting lists for treatment (e.g., inpatients, day case and GI scopes) and for specialist consultations (outpatients). The Department of Health should pursue **internationally comparable data on the rate of inflows onto and outflows from waiting lists** for elective care.

2. Capacity and productivity are identified as two core determinants of outflows, with Ireland not ranking above OECD mid-range performance. Increasing hospital activity, through **hospital capacity and productivity,** provides potential to increase outflows from waiting lists.

3. Given the importance of hospital activity to reduce waiting lists and wait times, there is a need to **evaluate the extent** to which annual waiting list plans deliver increased activity and the associated impact on reducing waiting lists and times. This will be subject to review under the multi-annual Waiting List Action Plan approach.

4. There is a need for an **increased focus on ways to improve productivity and efficiency** of the hospital sector in Ireland, particularly for areas with a substantial impact on elective care.

1. Introduction

1.1 Rationale and Review Questions

Waiting lists and times for specialist assessment and treatment in hospitals are an ongoing challenge for Ireland's health system and indeed for health systems in general. Even before COVID-19, waiting lists were shown to be a high- or medium-high priority issue in most OECD countries, as shown in responses to the OECD Waiting Times Policy Questionnaire (2019). The survey also indicated that much of the concern about waiting lists relates to elective treatments, followed by specialist consultations. The challenge of hospital waiting lists has increased because of the COVID-19 pandemic and its impact on healthcare systems, which led to a disruption in healthcare activity and a subsequent increase in the backlog of those waiting for care. Reducing waiting lists has been a Government priority for a number of years, is a central element of the Sláintecare Reform Programme and has witnessed increased policy focus (e.g., Waiting List Action Plan, expanded NTPF remit and funding).

This paper is part of a series examining the structural causes of and solutions to acute hospital waiting lists in Ireland. This report addresses the following questions:

1. What causes changes to waiting lists and times?
2. What determines waiting list inflows and outflows?
3. How does Ireland compare internationally on determinants of inflows and outflows?

1.2 Review Methods and Limitations

This is a mixed methods review, involving quantitative and qualitative analysis. Key inputs include a review of literature and data analysis.

Literature Review: As part of the second paper in this series, which examines interventions to reduce waiting lists, we undertook a literature review of papers reviewing interventions for reducing waiting lists or waiting times. A number of OECD papers were identified which discussed the determinants of hospital waiting lists and these reports form the basis for Chapter 2 of this paper.

Data Analysis: We undertook an analysis of data from the OECD (while acknowledging difficulties inherent in comparisons of international health systems). We examined selected core indicators relevant to determinants of inflows/outflows to waiting lists. Definitions of different measures used are provided in Appendix B. We ranked OECD countries' data for these indicators and used quintiles to assess how Ireland compared. A quintile represents any of five equal groups into which a population can be divided according to the distribution of values of a particular variable. For example, for a variable the first quintile represents the lowest 20% of the data (1% to 20%), while the fifth quintile represents the highest (81% to

100%). Quintiles can be a useful way to present where a country (in this case, Ireland) sits relative to other countries for which comparable data is available. The results of this are presented in Chapters 3 and 4. We also undertook correlation analysis between determinants and waiting times where data allowed this (see Appendix D for details).

A limitation of this paper is that internationally comparable data is not available for all determinants of inflows and outflows of the OECD's conceptual framework of waiting lists for elective treatment. For inflow determinants there is no comparable data available on how severity thresholds influence demand for hospital care and inflows onto hospital waiting lists across OECD countries. For outflow determinants there is no comparable data available on the extent of use of funding for extra activity nor payment mechanisms. It is also important to bear in mind that there are differences across health systems and the indicators used are proxy measures for the constructs of the conceptual framework. This paper compares all OECD countries with reported data. There are other ways of undertaking international comparisons, e.g., using criteria to identify a smaller set of comparator countries, and different approaches may yield different conclusions. International comparisons of determinants of waiting lists are based on data from 2019 as this is the most recent year for which comparable data is available across a large number of OECD countries. Our analysis therefore does not capture any recent increases in capacity both in Ireland or in other OECD countries since then.

1.3 Quality Assurance

In preparing this report, the authors followed the Irish Government Economic and Evaluation Service (IGEES) quality assurance process, seeking feedback on: the analysis format (structure), clarity (quality of writing), accuracy (reliability of data), robustness (methodological rigour), and consistency (between evidence and conclusions). An earlier draft of the report was circulated for review to the following:

- Internal/ Departmental
    - Research Services and Policy Unit (DoH)
    - Statistics and Analytics Unit (DoH)
    - Scheduled Care Performance Unit (DoH)
    - Waiting List Initiative (DoH)
    - Unscheduled Care Performance (DoH)
    - Health Vote (DPENDPDR)
- External
    - The National Treatment Purchase Fund (NTPF)
    - The HSE, specifically to the areas of Acute Strategy, of Acute Operations, and of Research and Evidence, and also to a health economist.
    - A research professor with expertise in hospital waiting lists.

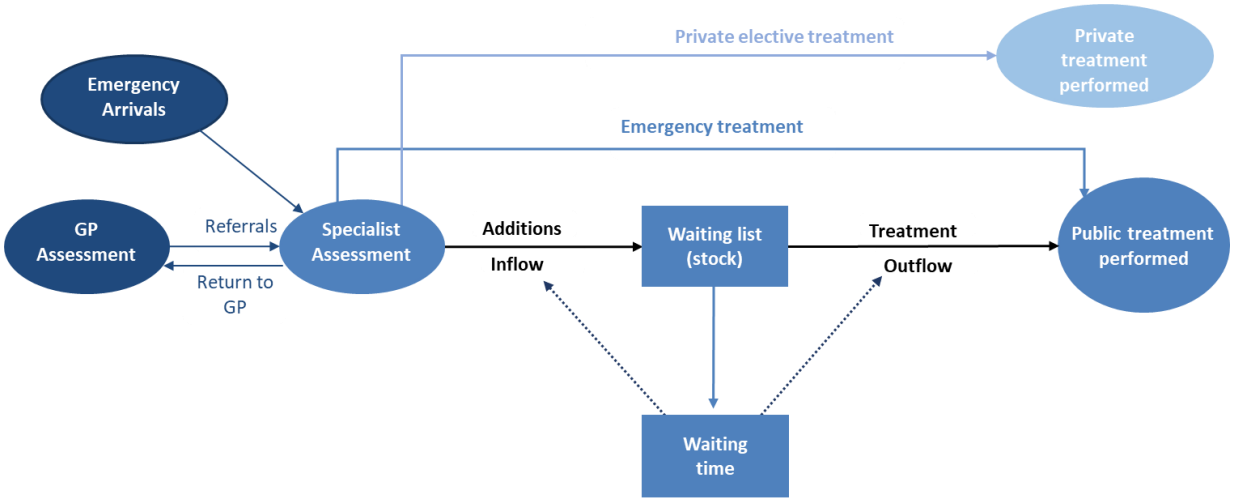
2. Determinants of Hospital Waiting Lists

2.1 Causes of Changes to Waiting Lists and Times

Waiting lists arise when the number of patients referred for consultation/treatment (the inflow) is greater than the speed at which patients are assessed or treated and removed from the list (the outflow) (OECD, 2013). See Figure 2.1. Waiting times are determined by the balance between "the *demand for* [as expressed by additions to the waiting lists] and the *supply of* health care services" (OECD, 2013, p. 20).

A **waiting lists increases** (decreases) when the inflow or number of patients referred for consultation/treatment is greater than (less than) the outflow or number of patients who are assessed or treated and thus removed from the list over a fixed period. It is important to note that **not all specialist care activity over a period is captured** by the change in the stock of a waiting list between the start and end of the period. This is because not all patients who receive specialist care are added to specialist care waiting lists. For example, after consultation and/or assessment, some patients are referred back to their GP if the specialist judges that specialist care is not required and some patients who do require treatment are given a date for treatment without being added to a waiting list (OECD, 2013).

Figure 2.1: Waiting List Inflows and Outflows for Elective Care[1]



Note: Dashed lines represent feedback effects of waiting time on inflow and outflow.

Source: Adapted from OECD (2003).

[1] Note: This framework is a broad conceptualisation of the pathway for elective care and does not necessarily reflect the idiosyncrasies of individual countries' health systems. In addition, it is important to note that ongoing waiting list validation can influence waiting list numbers overtime and is relevant to overall waiting list dynamics.

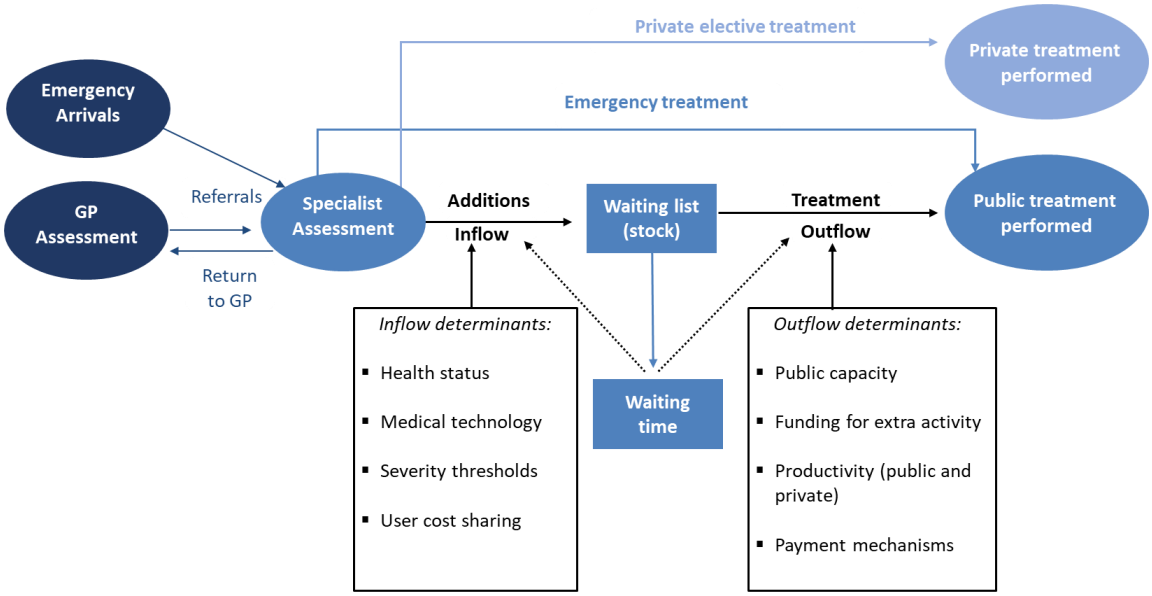
Once a patient has received specialist (outpatient) assessment, there are three routes they can take: (1) they may be deemed unsuitable for treatment/further consultation and be referred back to their GP, (2) they may be deemed suitable for treatment and added to the waiting list for treatment/surgery, or (3) they may be deemed not to require treatment/surgery at that point but remain on the outpatient waiting list for subsequent outpatient appointments for monitoring.

Waiting times change depending on both the size of waiting lists and characteristics of the hospital system/medical condition. In principle there could be a relatively long waiting list, but patients are seen quickly due to efficiency/capacity in system. Similarly, there could be a relatively small waiting list but waiting times are long due to lack of specialists with necessary expertise available and/or complexity of condition. Determinants of inflows and outflows are discussed next.

2.2 Determinants of Waiting List Inflows and Outflows

The OECD (2003, 2013) notes that the many factors that influence waiting lists and times can be divided into **inflow (demand or additions to the list), outflow (supply or volume), or feedback mechanisms**. As waiting times for elective treatments are generally the longest (OECD, 2020) we focus our explanation on elective acute hospital care (see Figure 2.2 and the subsequent discussion).

Figure 2.2: Conceptual framework of waiting lists for elective treatment



Note: Dashed lines represent feedback effects of waiting time on inflow and outflow.

Source: Adapted from OECD (2003)

The determinants of the inflow to a waiting list (demand for treatment) for elective surgery are health status, medical technology, severity thresholds and user cost sharing.

Health status. The health of the population and the impact of the ageing of the population influences demand for treatments.

Medical technology. The state of medical technology determines the range of conditions which are treatable and patients' expectations.

Severity thresholds. Doctors manage demand for specialist care. The medical severity thresholds used by general practitioners (GPs) for referring patients for specialist assessment or treatment (the 'gatekeeping' role), and by surgeons for adding them to a specialist waiting list, influences inflows.

User cost sharing. The extent of cost sharing by public patients (where patients are required to pay all or part of the costs of care), the proportion of the population with private health insurance, and the price of private surgery also influence demand for speciality care in the public sector and inflows onto waiting lists.

The **determinants of the outflow** from a waiting list (supply of treatment) for elective surgery are public capacity, private capacity, productivity, and provider payment mechanisms.

Public capacity. The capacity of public hospitals to treat patients is the key determinant of supply, and the higher the numbers of beds and physicians the lower are waiting times.

Private capacity. Capacity in private hospitals is also a determinant of outflows from waiting lists in a country.

Productivity. Productivity refers to how capacity is used to provide treatments and it is influenced by medical technology and also by structural factors such as the ways in which hospitals and healthcare professionals are paid.

Provider payment mechanisms. Outflows are also influenced by such as the ways in which hospitals and healthcare professionals are paid as this can influence productivity.

There are **feedback effects from waiting times to quantities demanded and supplied** in the public provision of elective surgery (see dotted arrows in Figure 2.2), just as there are feedback effects from prices to quantities demanded and supplied in private markets. The OECD notes that higher waiting time may reduce demand/inflow by encouraging patients to take out private health insurance or to purchase private surgery out-of-pocket, or by discouraging GPs from making referrals and by deterring surgeons from adding patients to

lists (OECD, 2013). On the other hand, longer waiting times may raise supply/outflows by encouraging hospital to increase productivity or public authorities to allocate more money to public hospitals.

The **OECD's overall observations on imbalances of waiting lists and time** include:

- Imbalances between inflows and outflows can be short-term, such as an increase in emergency patients requiring care, or long-term, such as issues with the management and administration of waiting lists (OECD, 2003; 2013).
- Overall, it appears that long waiting times are not a product of purely demand or supply issues, but instead are a combination of both.

3. Comparison of Determinants of WL Inflows

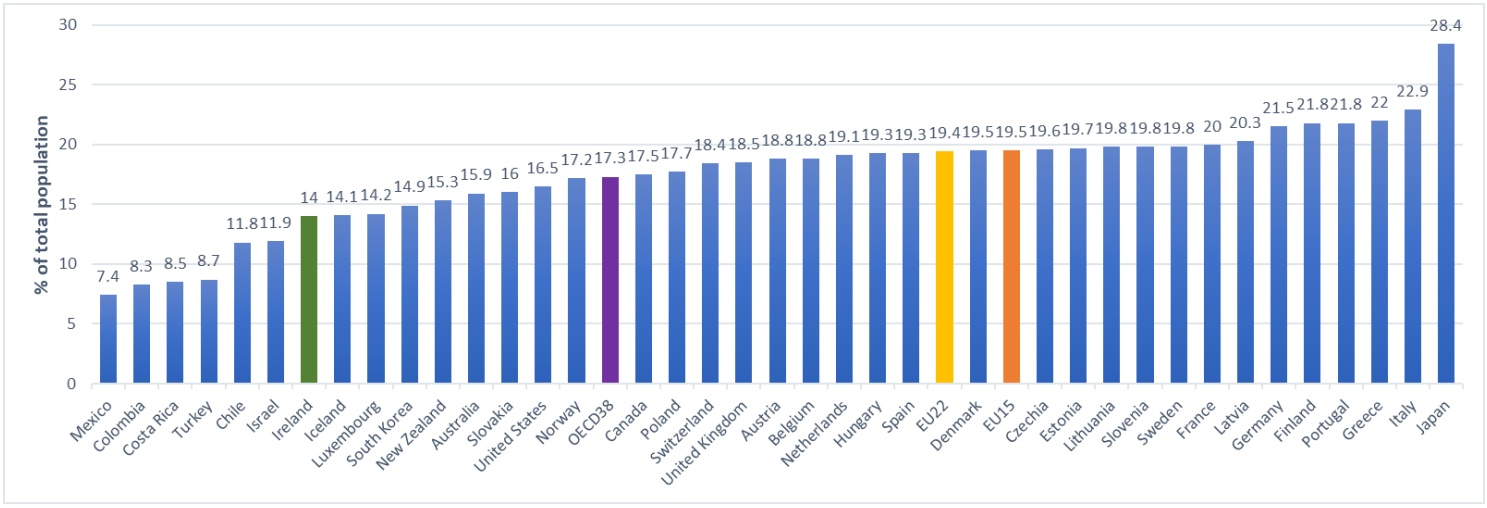
When making international comparisons, it is important to note that data for each country may vary in definition and/or methodology. See the Figure notes and Appendix for details.

3.1 Health Status

Chapter 2 noted that the health of the population and the impact of the ageing of the population influence demand for hospital treatments. In this section, we compare international data on three indicators, which could reflect differences in the health status of countries and potential inflows to hospital waiting lists: the share of the population aged 65 and over, the share of the population who judge themselves to be in poor health, and the prevalence of chronic health conditions[2].

Population aged 65+: Demand for healthcare tends to increase with age and the presence of an older population is associated with increased demands for elective surgeries and healthcare (OECD, 2013, 2021). Ireland has a comparatively young population, with the lowest proportion of population aged 65 and over in the EU and 7th lowest in the OECD (see Figure 3.1), placing Ireland in the bottom quintile (actually, near the lowest decile). In 2019, an estimated 14% of Ireland's population were aged 65+, compared to an EU22 average of 19.4% and an OECD38 average of 17.3%. For every 1,000 of the population, Ireland had 33-54 less people aged 65+ than OECD-EU countries.

Figure 3.1: Percentage of the population aged 65+ in 2019 in the OECD



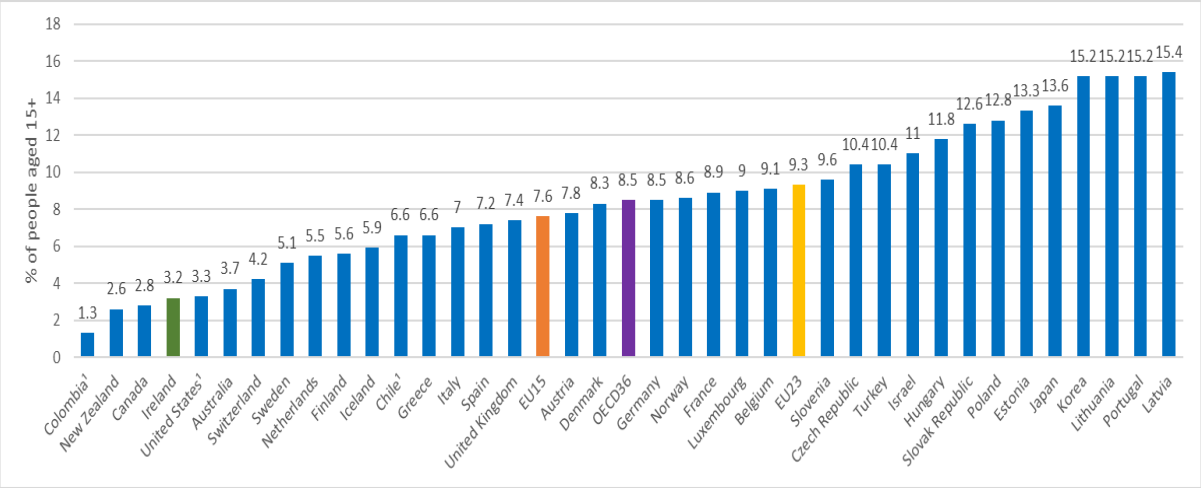
Source: OECD Health Statistics 2021

[2] It is useful to bear in mind that as populations' age, the share reporting poor health and the prevalence of chronic conditions rise.

Trend in Population aged 65+: The annual rate of growth in the population aged 65 plus in Ireland has exceeded the rate of overall population growth in Ireland. Ireland's growth in the 65 plus population has been among the highest in the OECD38. From 2009 to 2019 Ireland consistently ranked in the 4th or 5th quintile of OECD38 countries in terms of annual growth in population aged 65 plus (see Appendix C). Our annual rate of population growth in 2019 at 3.41% was 1.4 times the OECD38 mean of 2.43%.

Self-rated health[3]: Despite its subjective nature, self-rated health is shown to be a good predictor of future health care needs and mortality (Palladino et al., 2016). Ireland has a low share of adults considering themselves to be in poor health (rated as "bad" or "very bad"). In 2019, Ireland had the lowest share in the EU and 4th lowest in the OECD (see Figure 3.2), placing Ireland in the lowest decile. An estimated 3.2% of Ireland's adults compared to an EU23 average of 9.3% and an OECD36 average of 8.5% judged themselves to be in poor health. For every 1,000 adults, Ireland had 53-61 less adults who rated their health as poor compared EU/OECD countries.

Figure 3.2: Adults rating their own health as bad or very bad, 2019 (or nearest year)



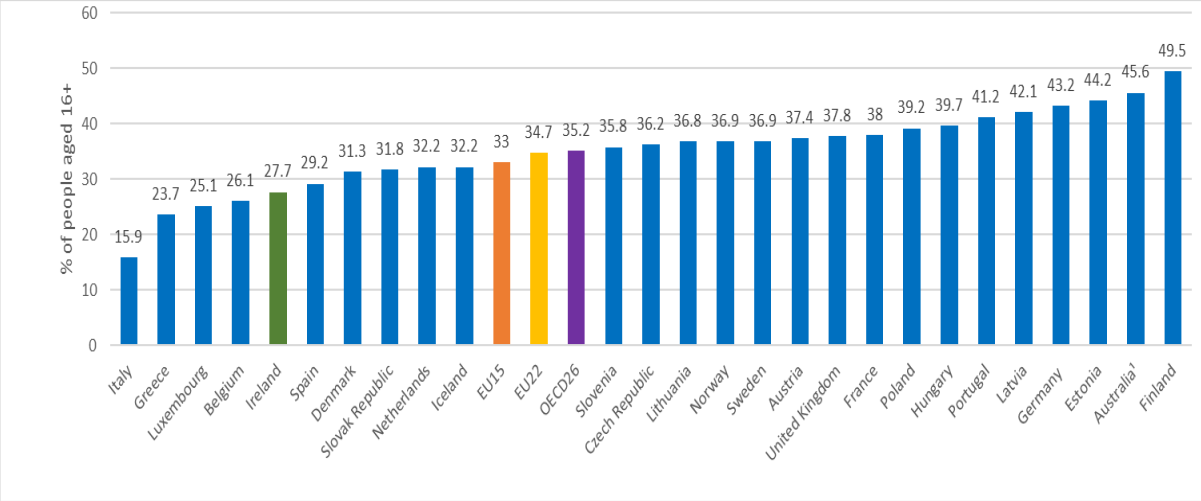
Source: OECD Health Statistics 2021. **Note:** 1. Results for these countries are not directly comparable with those for other countries, due to methodological differences in the survey questionnaire resulting in a bias towards a more positive self-assessment of health.

Chronic conditions: Chronic conditions, such as cancer, chronic respiratory problems and diabetes are not only the leading causes of death across OECD countries, but they also represent a major disability burden among the living (OECD, 2021). Ireland has a relatively

[3] The OECD (2021) lists three caveats to making cross-country comparisons of self-rated health: (1) self-rated health is subjective, (2) self-rated health generally worsens with age, so countries with an older population may have lower reported good health, and (3) how the data are collected (i.e., survey question and response options) differ across countries.

low proportion of people aged 16 and over who reported living with a longstanding illness or health problem. Ireland had the 5th lowest prevalence of these in the EU and OECD (see Figure 3.3), placing Ireland in the 2nd quintile (just above the bottom quintile). In 2019, an estimated 27.7% of people aged 16 and over in Ireland reported living with a chronic condition compared to an EU22 average of 34.7% and an OECD26 average of 35.2%. For every 1,000 people aged 16 and over, Ireland had 70-75 less people living with a chronic condition than EU/OECD averages.[4]

Figure 3.3: Longstanding illness or health problem, 2019 (nearest year)



Source: OECD Health Statistics 2021, EU-SILC. **Note:** 1. Data refers to people aged 18+ in 2017-18.

3.2 Medical Technology

Section 2.2 noted that the state of medical technology determines the range of conditions that are treatable and patients' expectations of what treatments should be available. The availability of medical technology, e.g., diagnostic equipment, may increase the rate at which diseases are detected and patients are subsequently added to waiting lists for treatment/surgery. On the other hand, a lack of available diagnostic equipment may also contribute to a higher demand for healthcare due to late detection of illness and conditions worsening. There is no overall measure of medical technology across OECD countries. However, there are measures of diagnostic technologies available and differences in the availability of these technologies could influence the extent to which the need for treatment is detected. Differences in methodology and data definitions when reporting medical technologies per country makes it difficult to make international comparisons (see Appendix B for details).

[4] Regarding chronic conditions, the OECD (2021) notes that (a) socio-economic disparities are large, 43% in the lowest income quintile compared to 26% in the highest quintile, and (b) this income gradient is largest in Latvia, the Czech Republic and Ireland, where people in the lowest income quintile are more than 2.5 times as likely to report having a chronic condition compared to people in the highest income quintile.

The OECD (2021) presents data on the availability and use (usage data is not available for Ireland) of three diagnostic imaging technologies: computed tomography (CT), magnetic resonance imaging (MRI) and positron emission tomography (PET). CT and MRI examinations both show images of internal organs and tissues, while PET scans show other information and problems at the cellular level. The OECD (2021) states that there is no international benchmark but that having too few equipment could create a barrier to access while having too much could lead to an overuse of costly procedures.

Ireland is below the EU and OECD averages for supply of CT scanners and MRI units (see Table 3.1). Ireland has 20.3 CT scanners per million of the population, which is approximately three less than the EU average, and six less than the OECD average. Ireland has 16 MRI units per million of the population roughly one less than EU and OECD averages. While Ireland is below the EU and OECD average (simple mean), we ranked above the median, ranking in the top 35-45% of countries for these availability indicators. As noted earlier, usage data of this equipment is not available for Ireland.

Table 3.1: Diagnostic imaging technologies, 2019 (or nearest year)

	Per million of the population				Rank		
	Ireland	**EU15**	**EU22**	**OECD37**	**EU15**	**EU22**	**OECD37**
CT scanners	20.3	24.4	23.6	25.9	8	13	21
MRI units	16	19.6	16.9	16.9	8	14	24
PET scanners	1.9	2.6	2.2	2	9	13	23

Source: OECD Health Statistics 2021 **Note:** The data in most countries cover equipment installed both in hospitals and the ambulatory sector, but coverage is more limited in some countries (e.g., covers hospitals only, covers equipment in public sector only). For more detail see Appendix B.

3.3 Severity Thresholds

Inflows onto waiting lists are influenced by the medical severity thresholds used by GPs for referral of patients for specialist assessment or treatment and thresholds used by surgeons for adding patients to a specialist waiting list. For this reason, a country with high severity thresholds might have lower waiting times compared to a country with lower severity thresholds (OECD, 2003). There is no comparable data available on how severity thresholds influence demand for hospital care and inflows onto hospital waiting lists across OECD countries.

3.4 User Cost Sharing

Section 2.2 notes that the extent of cost sharing by public patients (where patients are required to pay all or part of the costs of care) can influence demand for speciality care in the public sector and inflows onto waiting lists.

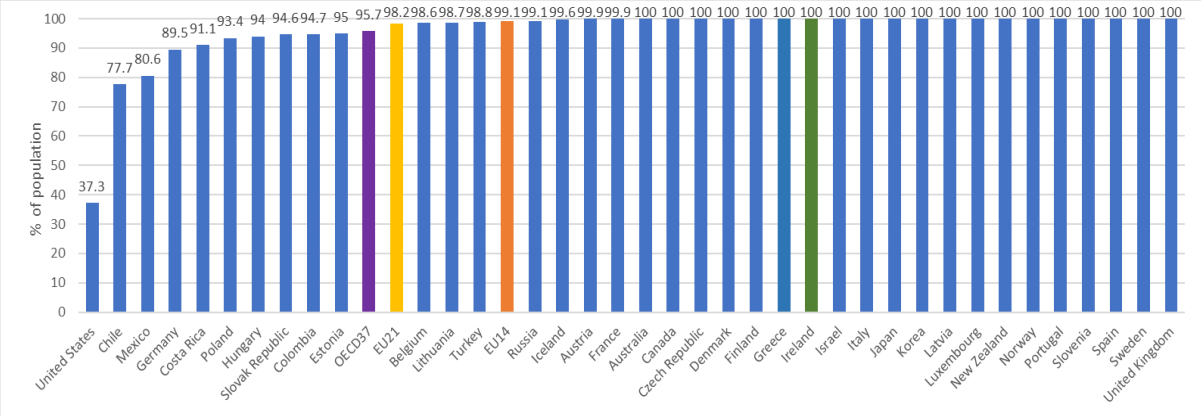
The OECD (2021) states that the share of a population covered for a core set of health services offers an initial assessment of access to care and financial protection. In 2019, Ireland was among 20 countries where 100% of the population was covered by public insurance for a core set of services[5] (see Figure 3.4 Panel a). This compares to an EU21 average of 98.2% and an OECD37 average of 95.7%. Additionally, 46.3% of Ireland's population had private health insurance in 2019[6].

The OECD (2021) states that over 75% of hospital care costs were covered by either government or compulsory schemes in 2019. The extent of coverage can vary between countries due to specific goods and services being provided, different cost-sharing arrangements, and certain services only being offered to a proportion of the population. In 2019, the government covered 72% of hospital care costs in Ireland, which was below both the EU22 average of 88% and the OECD32 average of 87% (see Figure 3.4 panel b). Ireland had the lowest and 5th lowest rates compared to EU and OECD countries, respectively. In relation to outpatient medical care costs, Ireland was similar to the EU and OECD averages and in the middle quintile (see Figure 3.4 panel c). In summary, Ireland has higher cost sharing for hospital care than many other countries, indicating that demand for specialty care should be lower, all else being equal.

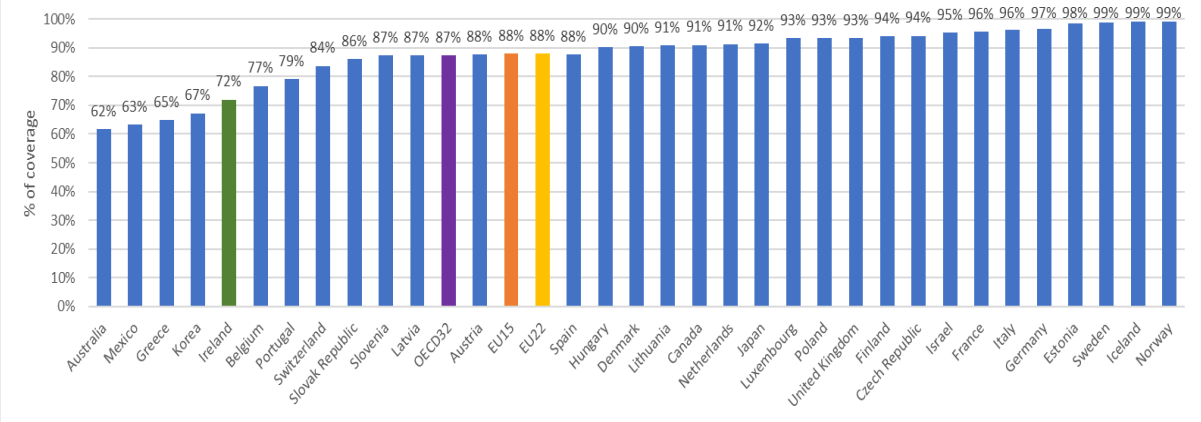
[5] These core set of services are country specific but usually includes consultations with doctors, tests and examinations, and hospital care. (OECD Health at a Glance, 2021).
[6] Derived from OECD Health at a Glance 2021 data.

Figure 3.4: Extent of coverage in 2019 (or nearest year)

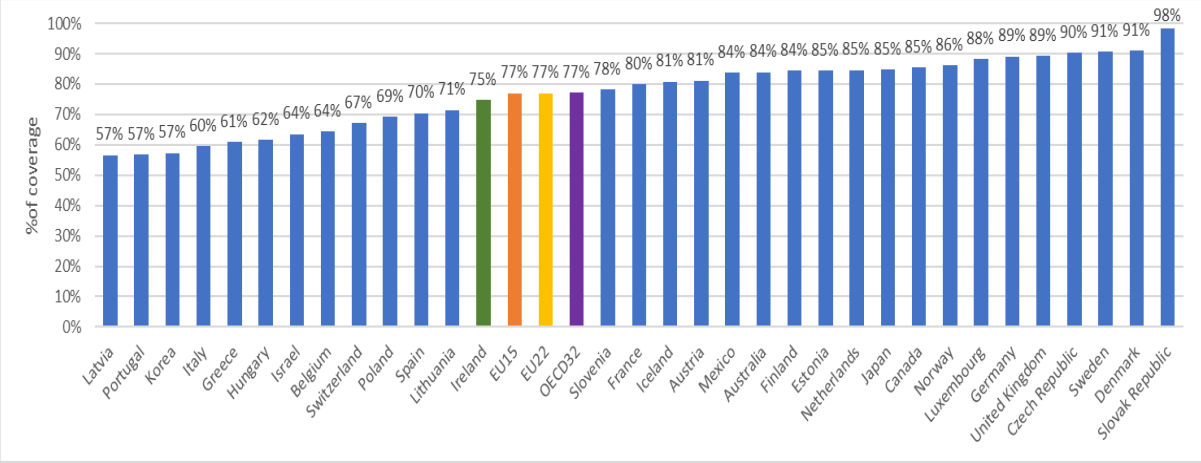
Panel a: Total public population coverage for a core set of services



Panel b: Extent of coverage for hospital care^



Panel c: Extent of coverage for outpatient medical care^



Source: OECD Health Statistics 2021. ^Refers to Government and compulsory insurance spending as proportion of total health spending for each type of care.

3.5 Chapter Summary

It would be desirable to be able to compare the relative size of inflows onto waiting list in Ireland to that of other countries. However, readily available collated data on inflows onto hospital waiting lists for OECD countries is not available. It is important to note when analysing the results of international comparisons that data on health systems can vary in definitions and/or methodology.

Nevertheless, a review of relevant inflow *determinant* indicators suggests that all else being equal Ireland does not have high demand drivers relative to its population to generate inflows onto waiting lists compared to average EU/OECD countries.

Indicators of health status suggest a relatively low potential demand for hospital care relative to the population compared to international averages as Ireland has a low share of the population aged 65+ and a low share reporting their health as poor (1st quintiles), and a low share with chronic conditions (2nd quintile).

The potential for higher rates of detection of need due to availability of medical technology seems unlikely. The extent of hospital and outpatient care user costs covered are unlikely to stimulate relatively higher inflows relative to the population.

Table 3.2: Comparison of Determinants of Inflows in 2019 (or nearest year)[1]

Inflow determinants: increase in shade intensity indicates higher quintile = relatively *higher potential* inflow

	Measure			Ireland compared to:	
Indicators:	**Irel.**	**EU**	**OECD**	**EU**	**OECD**
Health status					
% Pop 65+ (1)	14%	19.4%	17.3%	54 less per 1,000	33 less per 1,000
Self-rate health (bad/very bad) (1)	3.2%	9.3%	8.5%	61 less per 1,000	53 less per 1,000
Chronic conditions (2)	27.70%	34.7%	35.2%	70 less per 1,000	75 less per 1,000
Medical technology, per million people:					
CT scanners (3)	20.3	23.6	25.9	3.3 less	5.6 less
MRI units (4)	16	16.9	16.9	0.9 less	0.9 less
PET scanners (4)	1.9	2.2	2	0.3 less	0.1 less
User cost sharing, costs covered:					
Hospital care (1)	72%	88%	87%	18% less	17% less
Outpatient (3)	75%	77%	77%	3% less	3% less

Note: 1. (.) = quintile. Caveats associated with each indicator are discussed in relevant sections in Chapter 3, and in Appendix B. EU and OECD averages may be more sensitive to the inclusion/exclusion of different countries than quintiles. Reflects the situation in 2019.

Legend: 1st quintile 2nd quintile 3rd quintile 4th quintile 5th quintile

4. Comparison of Determinants of WL Outflows

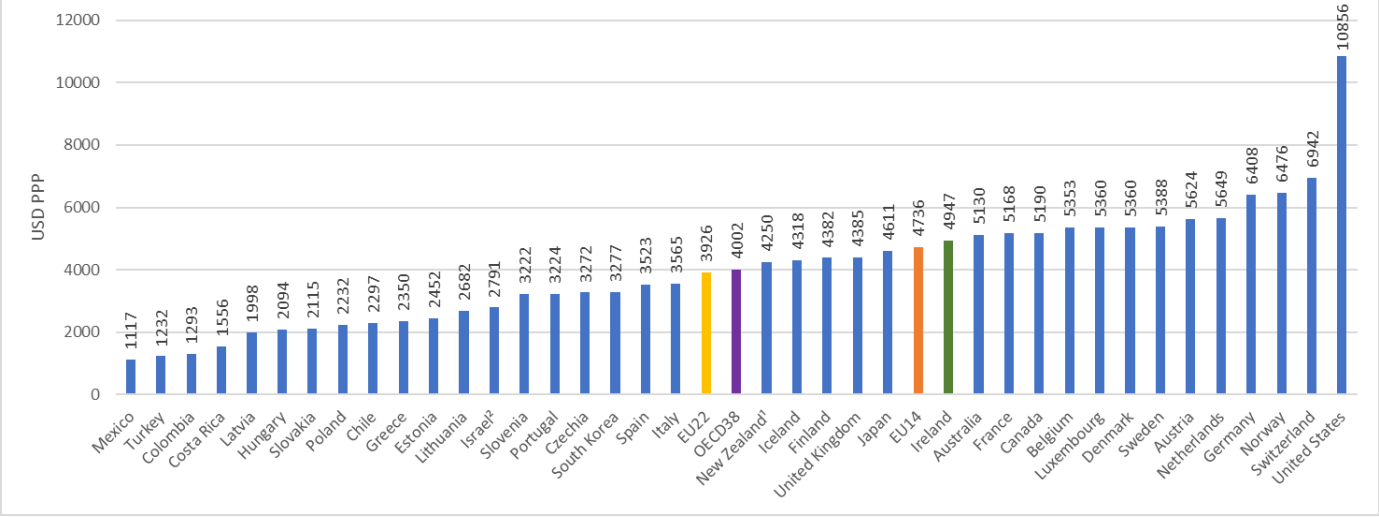
When making international comparisons, it is important to note that data for each country may vary in definition and/or methodology. See the Figure notes and Appendix for details.

4.1 Public Capacity

As discussed in Chapter 2, capacity of public hospitals to treat patients is a key determinant of supply. All else being equal, the higher the number of beds and physicians available to serve a population, the higher the supply and potentially the lower the waiting lists and wait times. This section examines three key indicators: health expenditure, doctors working in hospitals (given that doctors make the decisions for referral, treatment, and discharging of patients), and hospital beds (since inpatient procedures can only be carried out if beds are available). Appendix A also provides comparisons for nurses working in hospitals and all doctors licensed to practice.

Health Expenditure: Although health expenditure is not part of the OECD's conceptual framework of waiting lists for elective treatment, it is still useful to examine expenditure in Ireland relative to OECD countries. Ireland ranks above both EU and OECD averages on health expenditure per capita (see Figure 4.1). Ireland ranks in the top 40% within the EU27 and OECD, but just above average of the original EU15 countries.

Figure 4.1: Total health expenditure per capita, 2019



Source: derived from OECD Health Statistics 2022. **Note:** 1. OECD estimates. 2. Difference in methodology. Health expenditure above is calculated using the PPPs for Actual Individual Consumption. The implementation of the System of Health Accounts reporting standard in Ireland (where this data comes from) resulted in some services previously categorised as social care being reclassified to health care (where health care is the predominant activity).[7]

[7] For more information, see https://www.cso.ie/en/releasesandpublications/ep/p-sha/systemofhealthaccounts2019/.

It is important to note that the data assessed in relation to expenditure is from 2019. Since 2019, Government expenditure on health in Ireland has increased by €6bn or 33% in order to address the COVID-19 pandemic and other Government healthcare priorities, including waiting lists. While health expenditure may have also increased in other countries over the course of the pandemic, it is important to note that this increase is not reflected here.

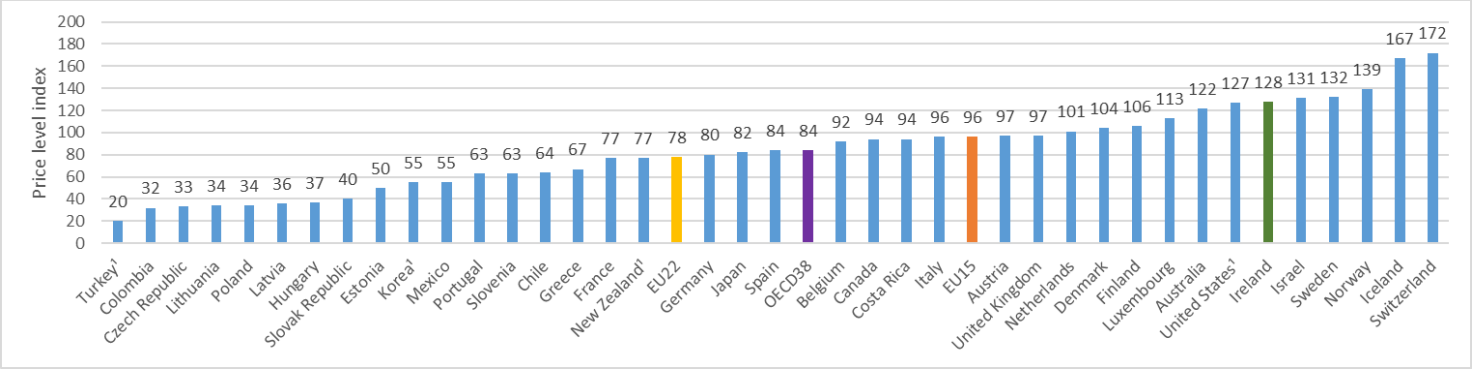
The OECD notes that the volume of care per capita is influenced by "the age and disease profile of a population; the organisation of service provision; use of prescribed pharmaceuticals; and issues with access leading to lower levels of care being used" (OECD, HAG, 2021, p. 192). The OECD does not provide a measure of volume of hospital care across countries. Nevertheless, it does provide a measure of prices in the hospital sector, and for the overall health sector it provides a measure of both prices and volume of care.

Examination of this data shows that Ireland has relatively high price levels for hospitals and for the health sector overall, and a lower relative measure of overall volumes of health care (which is measured using a representative basket of healthcare goods and services consumed by the population). For price levels in the overall health sector, Ireland has the 6th highest price levels at 28% above the OECD38 average - see Figure 4.2.

The relatively high price levels in hospitals suggests that Ireland may have a lower relative volume of care in hospitals, compared to countries with lower hospital price levels, which can "buy" more goods and services with the same level of expenditure. The OECD notes that "hospital prices tend to be higher in higher-income economies: the hospital sector is more labour intensive than the health sector as a whole (typically, 60-70% of hospital spending is staff costs)" (OECD, HAG, 2021, p. 192). More generally the OECD cite Barber, Lorenzoni and Ong (2019) who note that service prices in hospitals are heavily determined by national wage levels but may also be influenced by hospital financing mechanisms and funding arrangements, the structure of service provision, the market structure and competition among payers and among providers, and the way prices are set.

These findings point to two factors, (a) it is more appropriate to compare direct measures of capacity such as beds in and doctors working in hospitals and (b) Ireland's performance on productivity is particularly important given the high price levels in the healthcare sector (i.e., it is important to maximise activity within existing capacity/resources).

Figure 4.2: Price levels in the health care sector in 2017, OECD average = 100



Source: OECD Health at a Glance 2021. Note: OECD calculated price level index by using representative basket of goods and services for each country.

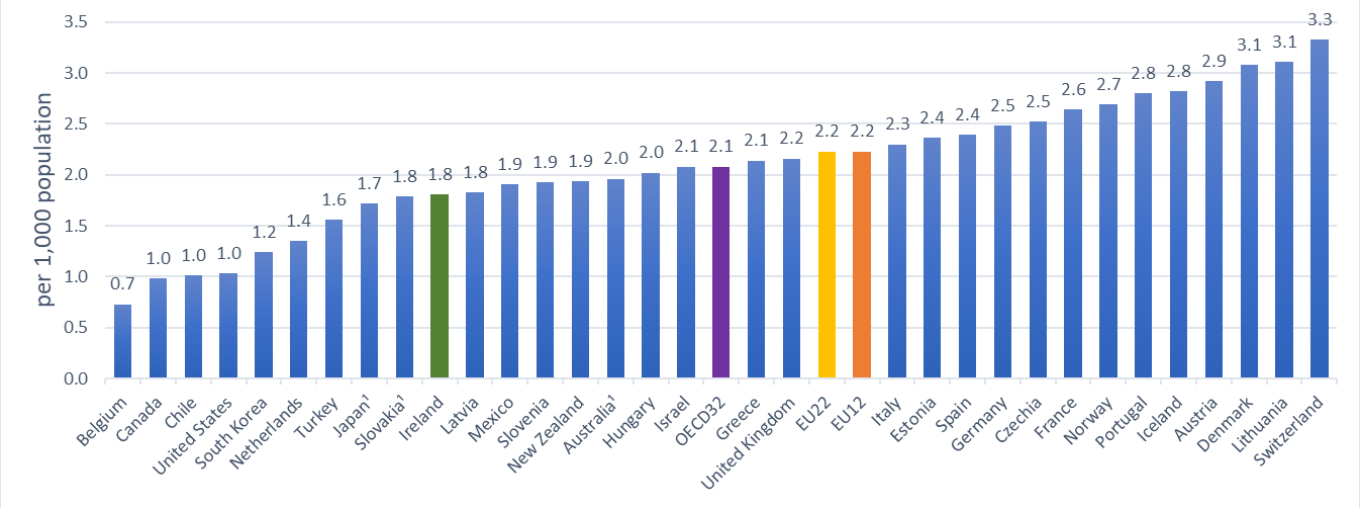
Doctors working in hospitals: When confined to doctors that are employed in hospitals, Ireland had the 4th and 10th lowest rate in the EU22 and OECD32, i.e., in the 2nd lowest quintile (see Figure 4.3). At 1.8 per 1,000 people compared to a 2.2 EU22 average and a 2.1 OECD32 average, Ireland had approximately 0.27 - 0.42 less hospital doctors per 1,000 population.[8]

There are other ways of undertaking international comparisons, e.g., using criteria to identify a smaller set of comparator countries. The Health Service Capacity Review 2018 identified six primary comparator countries on the basis of their similarities to Ireland: Australia, Denmark, Finland, Norway, New Zealand and Sweden[9]. Ireland ranked below four of these countries for doctors employed in hospitals per 1,000 population: New Zealand (1.9), Australia (2.0), Norway (2.7), and Denmark (3.1). Data was not available for Finland or Sweden from the OECD Health Statistics database for this indicator.

[8] Data is available for less countries on the FTE measure of physicians employed in hospitals, but Ireland still performs in the 2nd lowest quintile at 1.73 FTEs per 1,000 of the population compared to EU12 of 2.05 and OECD22 of 1.98 (0.32 less and 0.25 less FTEs per 1,000 of the population). When all practising doctors in the health system are included, Ireland ranked slightly higher but still below average, with the 8th lowest rate in the EU22 and 19th lowest in the OECD38 (3.3 per 1,000 population vs an EU22 average of 3.9 and OECD38 average of 3.6), see Appendix A.

[9]For more information, see: https://assets.gov.ie/10132/7c2a2299ca924852b3002e9700253bd9.pdf

Figure 4.3: Physicians employed (head counts) in hospitals, 2019 (or nearest year)



Source: OECD Health at a Glance 2021. **Note:** 1. Data refer to full-time equivalent (rather than head count), resulting in an underestimation.

Using the indicator of doctors employed in hospitals may mask differences in the share of generalist versus specialist doctors across countries. For elective care, there is a heavy reliance on specialists to either directly provide care or to supervise. Ireland had a relatively low share of specialist versus non-specialist doctors compared to the OECD average. Ireland had a 30% share of specialists compared to the OECD32 average of 65%.

While the OECD provides data on specialist medical practitioners, it is not necessarily restricted to those working in hospitals. While data comparability can be more constrained in this area, available data suggests that Ireland ranked fifth lowest in terms of specialist medical practitioners per 1,000 population in the OECD34, with 1.5 specialists per 1,000 population compared to 2.3 in the OECD34, 2.5 in the EU14, and 2.6 in the EU20.

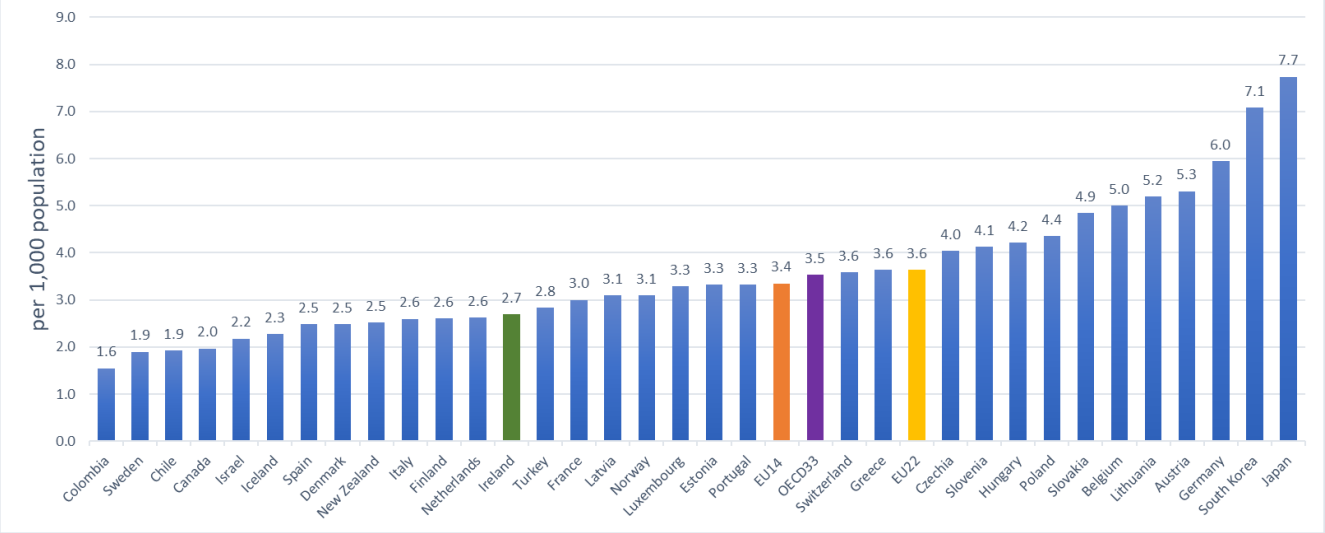
Hospital Beds: Ireland has a below average supply of acute care beds per 1,000 population compared to EU and OECD averages. Ireland has the 8th lowest supply in the EU22 and 13th lowest in the OECD33 (see Figure 4.4), placing Ireland in the 2nd quintile. In 2019, Ireland had an estimated 2.69 acute care beds per 1,000 people compared to an EU22 average of 3.64 and an OECD33 average of 3.54, so compared for every 1,000 people Ireland has approximately 1 less bed than the EU and OECD average[10].

[10] The data used in this paper relates to 2019 as this is the most recent year for which comparable data is available across a large number of OECD countries. Our analysis therefore does not capture any recent increases in capacity both in Ireland or in any other OECD countries since then. A substantial number of acute care beds have been added in Ireland since the start of the pandemic, e.g., the number of available inpatient and day case acute care beds increased by 536 from end 2019 to end 2021.

Ireland ranked above four of the comparator countries from the Health Service Capacity Review 2018 mentioned above: Sweden (1.9), Denmark (2.5), New Zealand (2.5), and Finland (2.6). It ranked below one of the comparator countries (Norway, 3.1), while data was not available for the sixth country (Australia) from the OECD Health Statistics database for this indicator.

Previous correlation analysis undertaken by the OECD (2013) and updated analysis undertaken for this paper show a significant negative correlation between acute care beds per 1,000 of the population and wait times (see Appendix D.2 for details).

Figure 4.4: Acute care beds, 2019 (or nearest year)



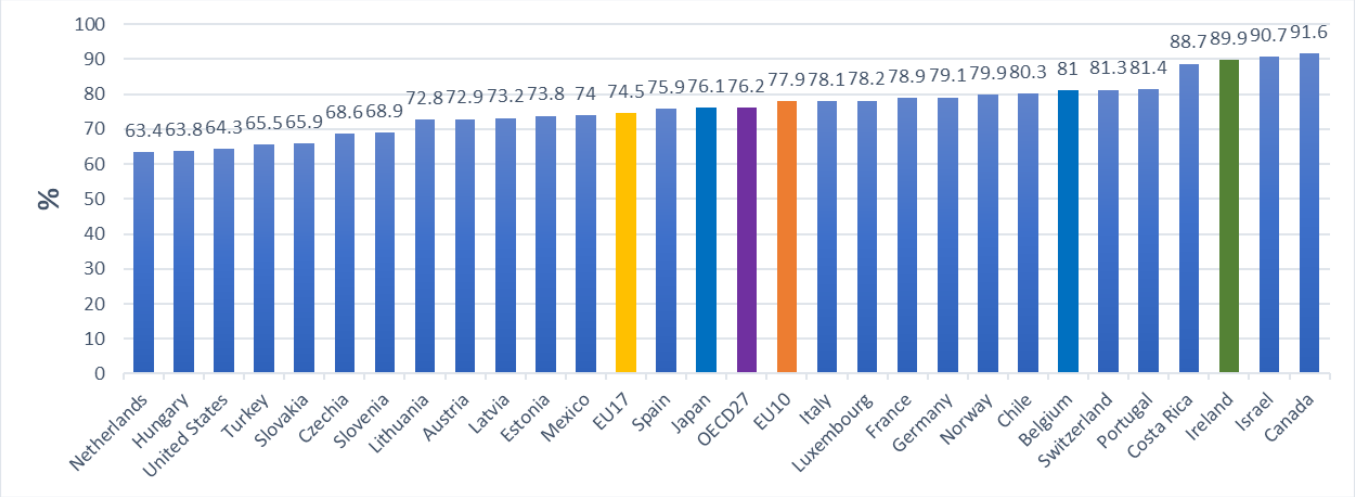
Source: OECD Health Statistics 2021

A comparatively lower level of bed supply relative to the population in Ireland may not necessarily equate to a lower level of supply relative to demand. As noted in Section 3.1, Ireland scores relatively lower in terms of possible need as reflected by health status indicators. Therefore, it is also useful to examine occupancy rate in hospitals as it has been recommended that the occupancy rate in hospitals do not exceed 85% to reduce the risk of bed shortages occurring (NICE, 2018, in OECD, 2021).[11] In 2019, Ireland had the 3rd highest occupancy rate out of 27 OECD countries, and was one of only four countries in this cohort with an occupancy rate above 85% (see Figure 4.5). Ireland is in the same quintile as: Portugal, Costa Rica, Israel and Canada. This is not a once off occurrence and the OECD has noted frequent instances of extremely high (e.g., 95%) occupancy rates in Irish hospitals (OECD, 2021).[12]

[11] In 2018, the National Institute for Health and Care Excellence (NICE) carried out a review to assess the appropriate level of hospital bed occupancy to facilitate optimal patient flow. It noted that according to the National Audit Office, occupancy levels greater than 85% can result in "regular bed shortages, periodic bed crises and increased numbers of health care-acquired infections" (NICE, 2018, p. 5).

[12] The drivers of occupancy rates are complex in nature and are not explored in this paper.

Figure 4.5: Occupancy rate of curative (acute) care beds, 2019 (or nearest year)



Source: OECD Health at a Glance 2021

4.2 Use of Extra Activity

Another determinant of outflows from a waiting list is the extent to which extra activity[13] occurs while maintaining baseline levels of capacity (i.e., increasing number of consultations or procedures with same level of staff/beds). The extent to which extra activity is used within a system could be measured by indicators such as (a) the use of extra activity in the public sector for example by providing appointment/treatments in the evenings/on weekends, (b) the use of extra activity in the private sector, and (iii) the use of extra activity abroad. It is not possible to compare Ireland on an international basis for this determinant as data on relevant indicators or comparisons in reviews of policies from the OECD are not available.

4.3 Productivity

Chapter 2 noted that productivity, which refers to how capacity is used to provide assessments and treatments, influences the level of outflows from hospital waiting lists. Productivity is closely related to the concept of efficiency, which looks at the optimal combination of resources in any one activity. Efficiency can be thought of as achieving the maximum output for a given level of inputs or minimising the quantity of inputs for a given level of output. Given the relatively high price levels for healthcare in Ireland (see Figure 4.2), performance on productivity is particularly important. In this section, we consider international data on two productivity indicators which measure the relationship between outputs and inputs (hospital inpatient discharges per hospital physician, and the total of high-volume procedures per hospital physician) and three indicators which can be used as gauges

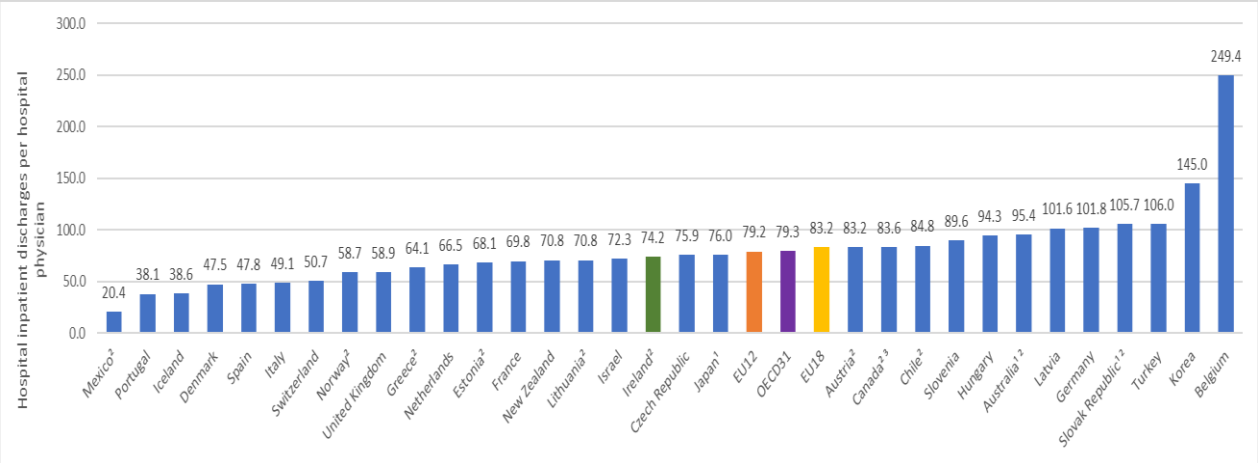
[13] Extra activity is a difficult determinant to define, as it can be challenging to separate 'extra activity' from 'regular activity'. It could also be argued that some of the extra activity performed should be carried out as regular activity.

of efficiency (cataract surgeries and tonsillectomies carried out as day cases, average length of inpatient hospital stay, and avoidable hospital admissions). Given complexity, this area would benefit from further detailed assessment which is beyond the scope of this paper.

Hospital inpatient discharges per hospital physician: Hospital discharges measure the number of patients who leave a hospital after staying at least one night. We derived a proxy for productivity by computing hospital inpatient discharges per hospital physician. This was computed by dividing hospital inpatient discharges per 1,000 of the population by hospital physicians per 1,000 of the population.

Ireland had the 8th lowest number of discharges per physician in the EU18 and 17th lowest in the OECD31, placing Ireland in the 3rd / middle quintile (see Figure 4.6). In 2019, there were 74.2 hospital inpatient discharges per hospital physician in Ireland compared to an EU18 average of 83.2 and an OECD31 average of 79.3[14]. For every 1,000 of the population, Ireland had 5.1-9 less hospital discharge per hospital physician than EU/OECD countries.

Figure 4.6 Hospital inpatient discharges per hospital physician, 2019 (or nearest year)



Source: OECD Health Statistics 2021

Note: 1. Physicians employed data refers to full-time equivalent (rather than head count). 2. Excludes discharges of healthy babies born in hospital. 3. Includes discharges for curative (acute) care only.

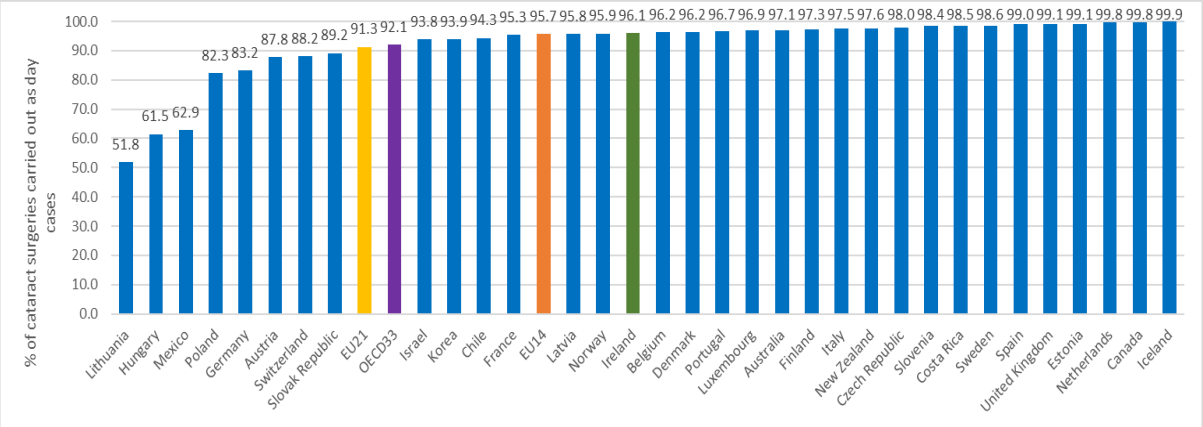
Cataract surgeries and tonsillectomies carried out as day cases: Advances in medical technologies in the past few decades have increased the number of surgical procedures that can be carried out on a same-day basis. The OECD (2021) notes that as day case surgery can

[14] It is important to note that the figures for Ireland could be underestimated due to the large private hospital sector, for which data is not included.

shorten the treatment episode, it can save important resources without any adverse effects on quality of care and frees up capacity within hospitals to focus on more complex cases or to reduce waiting lists. The OECD refers to cataract surgeries and tonsillectomies (the removal of tonsils – glands at the back of the throat – mainly performed on children) as good examples of high-volume surgeries that are now mainly carried out on a same-day basis in many OECD countries.

In 2019, Ireland had the 9th lowest share of cataract surgeries carried out as day cases in the EU21 and 15th lowest in the OECD33. This places Ireland in the 3rd or middle quintile (see Figure 4.7). An estimated 96.1% of Ireland's cataract surgeries were carried out as day cases compared to an EU21 average of 91.3% and an OECD33 average of 92.1%. Therefore, Ireland had 4-4.8 percentage points more cataract surgeries carried out as day cases compared EU-OECD countries.

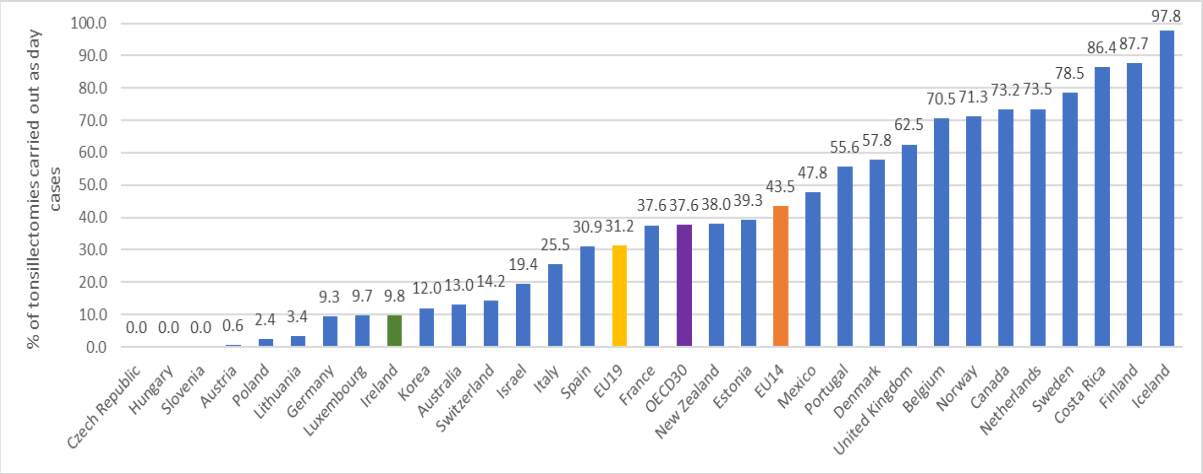
Figure 4.7: Cataract surgeries carried out as day cases, 2019 (or nearest year)



Source: OECD Health Statistics 2021. **Note:** Data for Ireland includes public hospitals (private hospitals introduced from 2020 onwards).

When comparing the share of tonsillectomies performed as day cases in 2019, Ireland had the 9th lowest in the EU and the OECD. This places Ireland in the 2nd quintile (see Figure 4.8). An estimated 9.8% of Ireland's tonsillectomies were carried out as day cases compared to an EU19 average of 31.2% and an OECD30 average of 37.6%. Therefore, Ireland had 21.4 to 27.8 percentage points less tonsillectomies carried out as day cases compared EU-OECD countries.

Figure 4.8: Tonsillectomies carried out as day cases, 2019 (or nearest year)



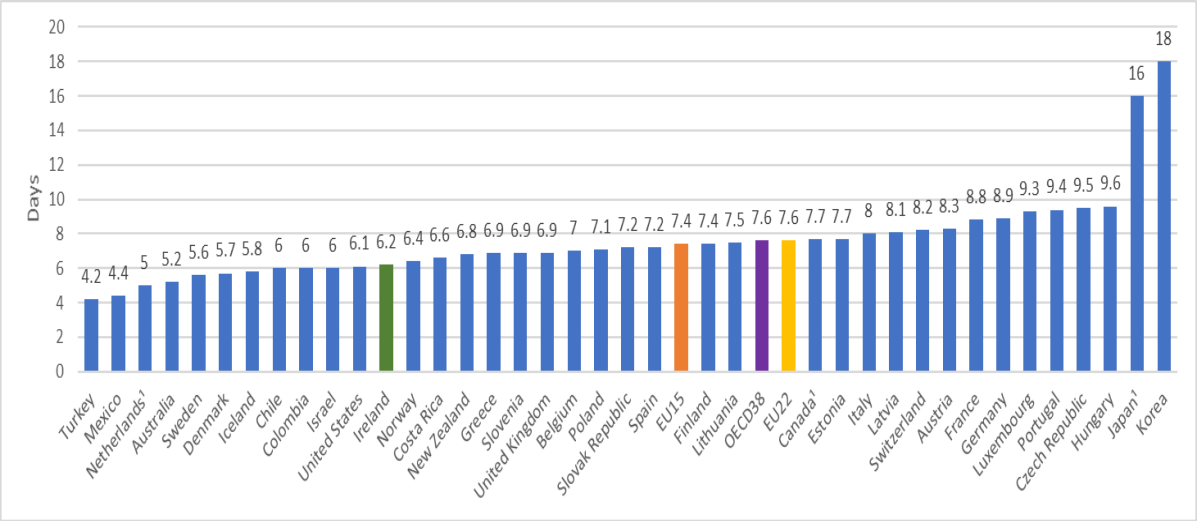
Source: OECD Health Statistics 2021. **Note:** Data for Ireland includes public hospitals only (private hospitals introduced from 2020 onwards).

Average length of stay: The OECD (2021) notes that average length of stay (LOS) in hospital can be used as an indicator of efficiency[15] in health service delivery, as all else being equal, a shorter stay reduces the cost per discharge and shifts care from inpatient to less expensive settings. Ireland had the 4th lowest average length of stay in the EU and 12th lowest in the OECD, placing Ireland in the 2nd quintile (see Figure 4.9). Unlike most indicators in this section, a lower (higher) rank for this indicator represents a better (poorer) performance. In 2019, the average length of stay in Ireland was 6.2 days compared to the EU22 and OECD38 averages of 7.6 days. Therefore, Ireland's average length of stay is 1.4 days shorter than EU-OECD countries.

The OECD (2021) also notes that while longer stays can be a sign of some patients waiting unnecessarily in hospital until rehabilitation or long-term care can be arranged, that some patients may be discharged too early as a longer stay may have improved their health outcomes or reduced the chances of readmission. One way to gauge the potential for the latter is to compare mortality or readmissions across OECD countries in the year after discharge from hospital. The OECD collects data on mortality or readmissions outcomes across OECD countries in the year after discharge following ischaemic stroke or congestive heart failure (CHF). However, data is not available for Ireland.

[15] Walsh et al. (2021) found that reductions in LOS in Ireland for emergency inpatient length of stay in Ireland between 2010 and 2015 were associated with reductions in bed supply. They note that use of length of stay as an efficiency measure should be understood in the contextual basis of other health system changes. This is because lower length of stay may be indicative of the lack of resources or available bed supply.

Figure 4.9: Average length of stay, 2019 (or nearest year)



Source: OECD Health Statistics 2021. **Note:** Data cover all inpatient cases (including not only curative/acute care cases) for most countries, with the exception of 1. where data refers to curative (acute) care or in acute care hospitals only, resulting in an underestimation.

Avoidable hospital admissions: The OECD (2021) presents data on hospital admission rates associated with asthma, chronic obstructive pulmonary disease (COPD) and congestive heart failure, which are all long-term conditions. Effective primary care has proven an effective treatment for these conditions. The OECD (2021) states that if a high-performing primary care system is provided, this can lead to an improved quality of life for people living with these conditions, which further reduces the level of hospital admissions associated with these three conditions. Unlike most indicators in this section, a higher ranking for these indicators represents a poorer performance.

Ireland is above the EU and OECD averages for asthma and COPD admissions but below the averages for congestive heart failure admissions (see Table 4.1)[16]. It may be the case that the rate of avoidable admissions is likely to be a function of both the prevalence of these conditions and the ability of the healthcare system to provide the necessary care, thus preventing avoidable admissions. Ireland had the 8th highest asthma prevalence in the OECD37, the 6th highest in the EU27, and the 5th highest in the EU15 in 2019[17]. However,

[16] It is important to note that the rate of avoidable admissions is likely to be a function of both the prevalence of these conditions and the ability of the healthcare system to provide the necessary care and thus prevent avoidable admissions. It should also be noted that the absence of universal primary and community care in Ireland may contribute to a higher rate of avoidable admissions.

[17] Data obtained from Our World in Data: https://ourworldindata.org/grapher/asthma-prevalenc

despite being above the EU and OECD averages for avoidable COPD admissions, Ireland had the lowest prevalence of COPD out of 12 EU countries in 2018/2019[18].

Table 4.1: Avoidable hospital admissions, 2019 (or nearest year)

	Average				Rank		
	Ireland	**EU14**	**EU20**	**OECD35**	**EU14**	**EU20**	**OECD35**
Asthma	42.4	32.97	37.6	37.5	12	15	25
COPD	335.5	185.97	163.4	170.7	14	20	34
	Ireland	**EU13**	**EU18**	**OECD33**	**EU13**	**EU18**	**OECD33**
Congestive heart failure	146.6	198.7	273.4	220	4	3	10

Source: OECD Health Statistics 2021 **Note:** 1. 3 year average used for Iceland and Luxembourg. 2. Break in time-series in 2016 for Belgium COPD data.

In 2019, Ireland had 146.6 congestive heart failure hospital admissions per 100,000 of the population aged 15+, which is lower than the EU18 average of 273.4 and the OECD33 average of 220, placing Ireland in the 2nd quintile (just outside the 1st). In contrast, Ireland had an average of 42.4 asthma hospital admissions per 100,000 of the population aged 15 or older, which is more than the EU20 average of 37.6 and the OECD35 average of 37.5, placing Ireland in the 4th quintile. Ireland had an average 335.5 COPD hospital admissions per 100,000 of the population, which is approximately twice the EU20 average of 163.4 and the OECD35 average of 170.7, placing Ireland in the 5th quintile.

4.4 Provider Payment Mechanisms

The level of treatment and hence outflows from waiting lists can be influenced by the way in which hospitals and specialists are paid. The OECD (2013) state that countries are increasingly using activity-based funding (ABF) and diagnosis-related groups (DRGs), in which hospitals are paid for additional patients treated. No comparable data is available to analyse the effect provider payment mechanisms have on outflows from waiting lists.

[18] Data obtained from WHO European Health Information Gateway: https://gateway.euro.who.int/en/indicators/hfa_403-2510-prevalence-of-chronic-obstructive-pulmonary-disease/

4.5 Chapter Summary

A review of relevant outflow determinant indicators suggests that, all else being equal, Ireland does not have high supply drivers to generate outflows from waiting lists relative to average EU/OECD countries.

Capacity and productivity are identified as two core determinants of outflows, with Ireland not ranking above OECD mid-range performance. Ireland has a somewhat low ratio of acute care beds per 1,000 population, and doctors employed in hospitals compared to EU and OECD averages (both in the 2nd quintile). There are other ways of undertaking international comparisons, e.g., using criteria to identify a smaller set of comparator countries. For the six comparator countries identified by the Health Service Capacity Review 2018, Ireland did not rank above any of these countries on both capacity measures. For acute care beds, Ireland ranked above four of the six countries (Sweden, Finland, Denmark, New Zealand), below one (Norway), and data was not available for the sixth country (Australia) from the OECD Health Statistics database. For doctors employed in hospitals, Ireland ranked below four of the countries for which data was available from the OECD (New Zealand, Australia, Norway, Denmark).

Ireland has a mixed performance on gauges of productivity, mid-range performance on productivity as proxied by hospital discharges per hospital doctor (3rd quintile), mixed performance for share of certain surgeries performed as day cases with a mid-rank for cataract surgeries (3rd quintile) but worse relative performance for tonsillectomies (2nd quintile, recall a lower quintile reflects a poorer relative performance), and above average performance for average length of stay (2nd quintile) and mixed performance for avoidable hospital discharges.

Table 4.2: Comparison of Determinants of Outflows in 2019 (or nearest year)

Outflow determinants: increase in shade intensity indicates higher quintile = relatively *higher* potential

	Measure			Ireland compared to:	
	Ireland	**EU**	**OECD**	**EU**	**OECD**
Public hospital capacity					
Physicians per 1,000 pop.(2)	1.8	2.2	2.1	0.4 less staff	0.3 less staff
Physicians(FTE) per 1,000(2)	1.73	2.05	1.98	0.32 less FTEs	0.25 less FTEs
Acute beds per 1,000 (2)	2.69	3.64	3.54	0.95 less beds	0.85 less beds
Productivity					
Inpatient discharges per hospital physician (3)	74.2	83.2	79.3	9 less discharges	5.1 less discharges
Cataract surg. as DC (3)	96.1	91.3	92.1	4.8 p.p. more	4 p.p. more
Tonsillectomies as DC (2)	9.8	31.2	37.6	21.4 p.p. less	27.8 p.p. less
Average length of stay*(2)	6.2	7.6	7.6	1.4 less days	1.4 less days
Avoidable hospital admissions per 100,000 pop. 15+					
Asthma* (4)	42.4	37.6	37.5	4.8 more	4.9 more
COPD* (5)	335.5	163.4	170.7	172.1 more	164.8 more
Congestive heart failure* (2)	146.6	273.4	220	126.8 less	73.4 less

Notes: * For most indicators, a higher quintile indicates a higher potential outflow, but for indicators marked * a higher quintile indicates a lower potential outflow. (.) = quintile. DC = day case. Caveats associated with each indicator are discussed in relevant sections in Chapter 3, and in Appendix B. EU and OECD averages may be more sensitive to the inclusion/exclusion of different countries than quintiles. Reflects the situation in 2019.

Legend: 1st quintile 2nd quintile 3rd quintile 4th quintile 5th quintile

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Appendix A International Comparison of Nurses and Doctors Licensed to Practice

Using a wider set of available data from the OECD, this section provides comparisons on another variable related to public capacity, nurses working in hospitals. This section also provides comparisons on a broader measure of doctors, doctors licensed to practise.

Nurses working in hospitals. There is a high ratio of nurses to doctors in Ireland (3.9 in 2019). Ireland ranks above the EU18 average number of hospital-based nurses and midwives (5.4 vs 5.1), and just below the OECD32 average of 5.5 (see Table A.1).[19]

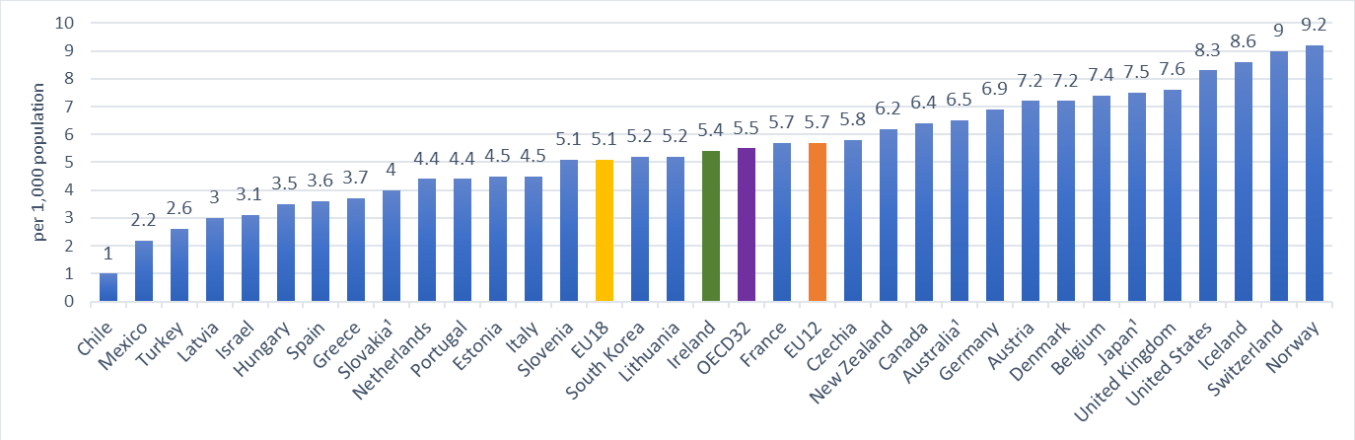
Table A.1: Ireland average & ranking for nurses & midwives compared to EU and OECD (2019 or nearest available year)

		Average			Ireland's Ranking*		
Measure	**Ireland**	**EU12**	**EU18****	**OECD32**	**EU12**	**EU18**	**OECD32**
Professional nurses and midwives employed in hospitals, density per 1,000 population	5.4	5.7	5.1	5.5	6	12	17

*Ranked in ascending order.
**Data are not available for all countries within the EU15, EU27, and OECD38. The number of countries with data available are indicated in the table.

Source: derived from OECD Health at a Glance 2021

Figure A.1: Professional nurses and midwives employed in hospital, 2019 (or nearest year)

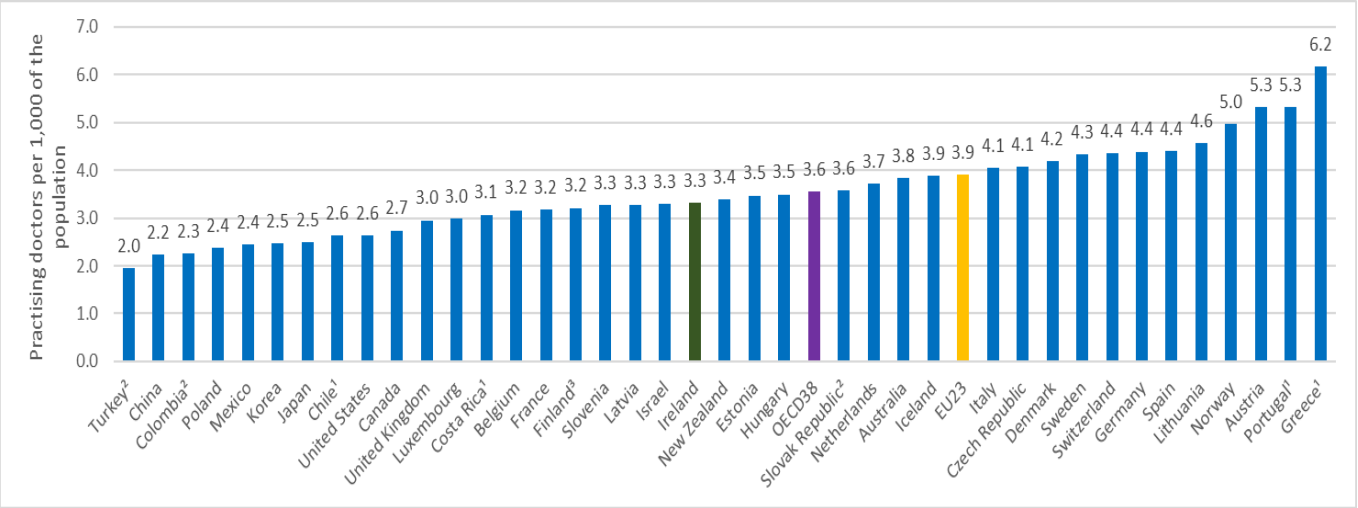


1. Data refer to full-time equivalent (rather than head count), resulting in an underestimation. **Source:** derived from OECD Health at a Glance 2021

[19] When all practising nurses in the health system are included, Ireland ranks even higher, with the 3rd and 6th highest rate in the EU and OECD respectively in 2019 (12.9 per 1,000 population vs an EU22 and OECD38 average of 8.8). However, figures for Ireland are overestimated as they include all professionally active nurses, including those in non-patient facing roles.

Doctors licensed to practice per 1,000 population: When analysing practising doctors per 1,000 of the population, Ireland had the 9th and 20th lowest rate in the EU23 and OECD38, i.e., in the 2nd lowest quintile (see Figure A.2). So, at 3.3 per 1,000 population compared to a 3.6 EU23 average and a 3.9 OECD38 average, Ireland had approximately 0.3 - 0.6 less doctors licensed to practise per 1,000 population.

Figure A.2: Doctors licensed to practice per 1,000 population, 2019 (or nearest year)



Source: OECD Health at a Glance 2021. **Note:** 1. Data refer to all doctors licensed to practice, resulting in a large over-estimation of the number of practising doctors (e.g., of around 30% in Portugal). 2. Data include not only doctors providing direct care to patients but also those working in the health sector as managers, educators, researchers, etc. (adding another 5-10% of doctors). 3. In Finland, the latest data refer to 2014 only.

Appendix B Definitions of Indicators and Comments on Comparability

Self-rated health: Self-rated health reflects an individual's overall perception of his or her health. Caution is required when making cross-country comparisons of self-rated health for three reasons. First, self-rated health is subjective, and responses may be systematically different across and within countries because of socio-cultural differences. Second, as self-rated health generally worsens with age, countries with a greater share of older people are likely to have fewer people reporting that they are in good health. Third, there are variations in the question and answer categories used in survey questions across countries. This difference in response categories may introduce a comparative bias to a more positive self-assessment of health in those countries that use an asymmetrical scale.

Chronic conditions: Chronic conditions can include cancer, chronic respiratory problems and diabetes. Data related to longstanding illnesses or health problems is based on the results of the European Union Statistics on Income and Living Conditions instrument (EU-SILC). The comparability of data on longstanding illnesses and health problems is limited by the fact that the indicator is derived from self-reported data, which can be affected by people's subjective assessment of their health and by social and cultural factors. As populations age, the prevalence of chronic conditions – including multimorbidity – rises.

Diagnostic technologies: The OECD (2021) presents data on the availability and uses (usage data is not available for Ireland) of three diagnostic imaging technologies: computed tomography (CT), magnetic resonance imaging (MRI) and positron emission tomography (PET). CT and MRI examinations (exams) both show images of internal organs and tissues, while PET scans show other information and problems at the cellular level. There is no general guideline or international benchmark regarding the ideal number of CT scanners, PET scanners or MRI units. Too few units may lead to access problems in terms of geographical proximity or waiting times, while too many may result in overuse of these costly diagnostic procedures, with little if any benefit for patients. The data in most countries cover CT scanners, MRI units and PET scanners installed both in hospitals and the ambulatory sector, but coverage is more limited in some countries. Costa Rica, Portugal, Sweden, Switzerland (for MRI units) and the United Kingdom report equipment available in hospitals only, while Hungary includes only devices installed outside hospitals. For Colombia, Costa Rica and the United Kingdom, the data only cover equipment in the public sector. For Australia and Hungary, the number of CT scanners, MRI units and PET scanners includes only those eligible for public reimbursement.

Hospital discharges: We derived a proxy for productivity by computing hospital discharges per hospital physician. Hospital discharges measure the number of patients who leave a hospital after staying at least one night. The data includes deaths in hospital following inpatient care. Same-day separations are excluded, with the exceptions of Chile, Japan and Norway, which include some same-day discharges. The data on physicians only includes physicians who were directly employed by a hospital (see below).

Total of high-volume procedures: We compared outputs to inputs by deriving a measure of high-volume procedures per 10,000 of the population per physician working in hospitals. This was computed by dividing the total of high-volume procedures per 100,000 of the population by hospital physicians per 1,000 of the population.

Data on the total number of high-volume procedures per 100,000 of the population was supplied by OECD.Stat on cataract surgeries, knee replacements, hip replacements, percutaneous transluminal coronary angioplasty (PTCA) surgeries, and coronary graft bypasses. Additionally, data was supplied on the total number of hysterectomies and prostatectomies carried out per 100,000 of the female/male population respectively.

Population coverage for a core set of services (total public coverage): The OECD (2021) states that the share of a population covered for a core set of health services whether through public programmes or primary private health insurance offers an initial assessment of access to care and financial protection, but this is only a partial measure of access and coverage. Population public coverage for health care is defined as the share of the population eligible for a core set of health care services through public programmes. The set of services is country-specific but usually includes consultations with doctors, tests and examinations, and hospital care. Public coverage includes both national health systems and social health insurance. On national health systems, most of the financing comes from general taxation, whereas in social health insurance systems, financing typically comes from a combination of payroll contributions and taxation. In both, financing is linked to ability to pay.

Extent of coverage for hospital care / outpatient medical care: Health care coverage is defined by the share of the population entitled to services, the range of services included in a benefit package and the proportion of costs covered by government schemes and compulsory insurance schemes. Coverage provided by voluntary health insurance and other voluntary schemes such as charities or employers is not considered. The core functions analysed here are defined based on definitions in the System of Health Accounts 2011 (OECD/Eurostat/WHO, 2017)[20]. Hospital care refers to inpatient curative and rehabilitative care (which is mainly provided in hospitals) and outpatient medical care refers to all outpatient curative and rehabilitative care excluding dental care. Comparing the shares of the costs covered for different types of services is a simplification. For example, a country with more restricted population coverage but a very generous benefit basket may display a lower share of coverage than a country where the entire population is entitled to services but with a more limited benefit basket.

Curative (acute) care beds per 1,000 population. The OECD defines curative (acute) care beds as those that are available for acute care. This includes both psychiatric and non-psychiatric beds in all hospitals, including general, mental health, and other specialised hospitals. Beds

[20] OECD/Eurostat/WHO (2017), A System of Health Accounts 2011: Revised edition, OECD Publishing, Paris, https://doi.org/ 10.1787/9789264270985-en.

allocated for other functions of care (e.g., rehabilitation, long-term care, and palliative care) are not included. It is important to note that data for some countries do not cover all hospitals (for example, data from Costa Rica and the UK include public hospitals only). Irish data includes beds in both public and private hospitals and excludes geriatric and rehabilitation beds in public acute hospitals. Private hospital bed data for 2019 is based on information given to the HSE as part of arrangements for hospital surge capacity during the COVID-19 pandemic (i.e., bed figures provided by the private sector in early 2020 were used as a proxy for private beds available in 2019).

Occupancy rate of curative (acute) care beds. The OECD calculates occupancy rate as "the number of hospital bed-days related to curative care divided by the number of available curative care beds (multiplied by 365)." (OECD HaAG 'Hospital Beds & Occupancy Rate', 2021).

Physicians employed in hospitals, density per 1,000 population. This includes physicians directly employed by a hospital. The data are reported in head counts. Irish data relate only to direct public health service employment in Acute Hospital Services (excluding Ambulance Services) and does not include overtime, agency workers or private hospitals.

Professional nurses and midwives employed in hospitals, density per 1,000 population. This includes professional nurses and midwives employed by a hospital. As above, the data are reported in head counts, and Irish data relate only to direct public health service employment in Acute Hospital Services and does not include overtime, agency workers or private hospitals.

Health expenditure per capita (USD PPP). "This includes spending by all types of financing arrangements (such as government-based programmes, social insurance and out-of-pocket spending) on medical services and goods, population health and prevention programmes, as well as administration of the health system" (OECD HaAG 'Health expenditure per capita', 2021). To compare spending levels between countries, per capita health expenditures are converted to a common currency (US dollars) and adjusted to take account of the differences in purchasing power of the national currencies.".

Cataract surgeries and tonsillectomies carried out as day cases: Advances in medical technologies in the past few decades have increased the number of surgical procedures that can be carried out on a same-day basis. The OECD (2021) refers to cataract surgeries and tonsillectomies as good examples of high-volume surgeries that are now mainly carried out on a same-day basis in many OECD countries. The OECD notes that data for several countries do not include outpatient cases in hospital or outside hospital (patients who are not formally admitted and discharged), leading to some underestimation for these countries. In Costa Rica, Ireland, Mexico, New Zealand and the United Kingdom, the data only include cataract surgeries carried out in public or publicly funded hospitals, excluding any procedures performed in private hospitals (in Ireland, it is estimated that approximately 15% of all hospital activity is undertaken in private hospitals). Data for Portugal relate only to public hospitals on the mainland. The OECD (2021) notes that tonsillectomies are one of the most frequent surgical procedures performed on children, and that large differences in the share

of ambulatory surgery may reflect variations in the perceived risks of postoperative complications, or simply clinical traditions of keeping children in hospital for at least one night after the operation.

Average length of stay: The average length of stay in hospital is an indicator of efficiency in health service delivery. The OECD (2021) notes that while longer stays can be a sign of some patients waiting unnecessarily in hospital until rehabilitation or long-term care can be arranged, that some patients may be discharged too early as a longer stay may have improved their health outcomes or reduced the chances of readmission. Average length of stay is generally measured by dividing the total number of days stayed by all inpatients (not including day cases) during a year by the number of admissions or discharges. Data cover all inpatient cases (including not only curative/acute care cases) for most countries, with the exceptions of Canada, Japan and the Netherlands, where data refer to average length of stay for curative/acute care or in acute care hospitals only (resulting in an underestimation). The exclusion of healthy babies born in hospitals from hospital discharge data in several countries (see the list above) results in a slight overestimation of the length of stay (for example, the inclusion of healthy newborns would reduce the average length of stay by 0.5 days in Canada).

Avoidable hospital admissions: The OECD (2021) presents data on hospital admission rates associated with asthma, chronic obstructive pulmonary disease (COPD) and congestive heart failure among people aged 15 years and over per 100 000 population. Rates are age- and sex-standardised to the 2010 OECD population aged 15 and over. Effective primary care has proven as an effective treatment for these conditions. Admissions resulting from a transfer from another hospital and where the patient dies during admission are excluded from the calculation, as these are considered unlikely to be avoidable. Disease prevalence, availability of hospital care and differences in coding practices among countries may affect the comparability of data.

Appendix C Comparison of Trends in Determinants of WL Inflows

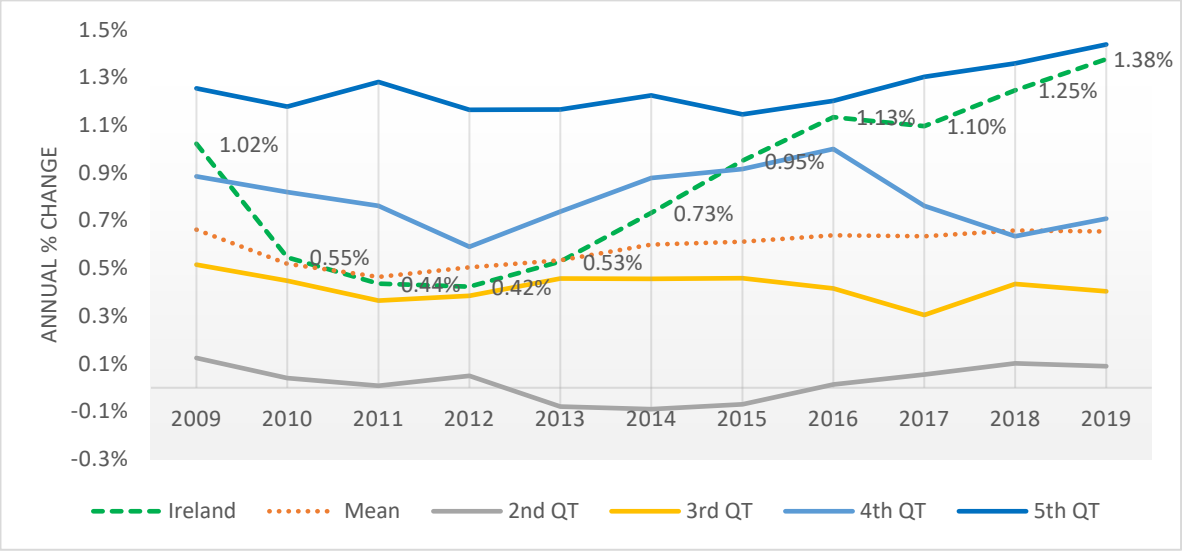
In Chapters 3 and 4, we applied the OECD's conceptual framework to compare determinants of waiting list inflows and outflows in Ireland to other OECD countries. This informed a view on the question: "Would we expect inflows onto waiting lists and outflows from waiting lists *relative to the population* to be high or low in Ireland compared to other countries?". In this section we consider the question: "Would we expect the *rate of change in* inflows or outflows to be high or low in Ireland relative to other countries based on trends in determinants of inflows and outflows?". We do this by examining trends internationally for a selection of the inflow determinants.

We focus on the trend in the total population and of the population aged 65 plus. If a country experiences relatively high rates of population growth and relatively high rates of growth in the older aged population (which has higher health needs) each year, then one would expect a relatively higher increase in demand for care and potentially higher rates of growth in inflows onto waiting lists. It would also have been desirable to examine changes in the absolute number of people across countries with long-standing illnesses or health problems. However, the absolute figures are not available for these from the OECD and it is not possible to reliably compute these from prevalence rates estimated in surveys given the challenges to this and the range of survey methods used. The data used in Chapter 3 for this indicator comes from difference sources. For European countries the OECD obtained the data from Eurostat but for non-European countries the OECD collated the data from individual country health surveys.

Understanding the likely impact of rates of change in the determinants of outflows (e.g., changes in capacity and / or productivity) is difficult due to limitations in the international data which hinder cross country comparison.

Trend in Total Population: Between 2010 to 2014 the rate of growth in Ireland's population was similar to the OECD mean and Ireland's annual population growth rates ranked in the 3rd quintile. However, from 2014 onwards Ireland experienced a more rapid rate of annual population growth than the OECD mean. From 2015 onwards, Ireland ranked in the 4th quintile (close to the 5th quintile from 2016 onwards) in terms of annual rate of population increase, see Figure C.1. Ireland's rate of population growth was particularly high in recent years, ranking 9th highest in 2018 and 2019 of 38 OECD countries. Our annual rate of population growth in 2019 at 1.38% was more than twice the OECD38 mean of 0.66%.

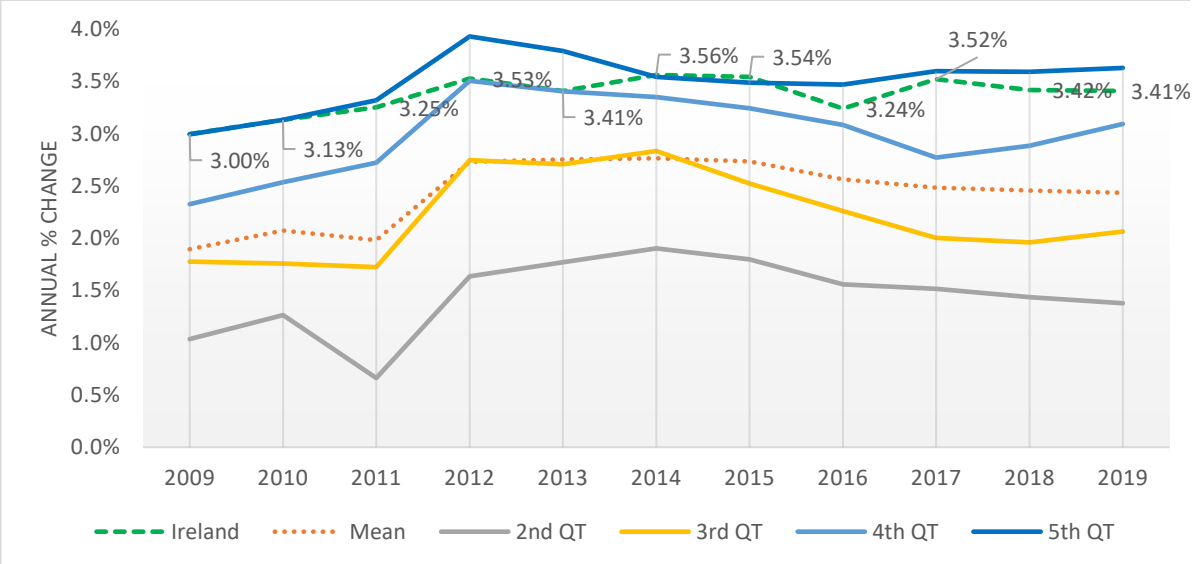
Figure C.1: Annual percentage change in population, 2009 to 2019



Source: OECD Health Statistics 2022. QT = quintile threshold, the value at which a quintile begins.

Trend in Population aged 65+: The annual rate of growth in the population aged 65 plus in Ireland has exceeded the rate of overall population growth in Ireland. Ireland's growth in the 65 plus population has been among the highest in the OECD38. From 2009 to 2019 Ireland consistently ranked in the 4th or 5th quintile of OECD38 countries in terms of annual growth in population aged 65 plus (see Figure C.2). Our annual rate of population growth in 2019 at 3.41% was 1.4 times the OECD38 mean of 2.43%.

Figure C.2: Annual percentage change in the population aged 65+, 2009 to 2019



Source: OECD Health Statistics 2022. QT = quintile threshold, the value at which a quintile begins.

We do not know how inflows onto and outflows from waiting lists in Ireland compare with other countries. Therefore, this Appendix posed the question "Would we expect the *rate of change in* inflows or outflows to be high or low in Ireland relative to other countries based on trends in determinants of inflows and outflows?". Proxy indicators for demand suggest a relatively rapid rate of increase in demand in Ireland over the period 2009 to 2019. Ireland experienced amongst the highest rates of growth across the OECD in its population aged 65 plus in each year since 2009 and in its overall population in each year since 2016. Therefore, all else being equal we would expect Ireland to have experienced a relatively high rate of growth in inflows.

Appendix D Relationship Between Determinants and Wait Times

D.1 Examining Associations between Determinants and Wait Times

Chapter 2 indicates how the size of waiting lists and the length of wait times are determined in part by the size of public capacity in a health system and the productivity of the public health system. In this Appendix we examine international data for evidence of correlations (i.e., the linear association, *not* causal relationship, between variables) for wait times and measures of capacity and productivity. Correlation was used to examine empirical evidence on the relationship between wait times and outflow determinants of capacity and productivity. Correlation is a statistical measure that is used to assess the linear association between two variables. It is important to remember that correlation is a measure of association or relationship between two variables, it is *not* a measure of causation (i.e., it measures whether two variables are related, not whether one causes another). A correlation coefficient ('r') of 1 indicates a perfect positive association between variables (i.e., as one variable increases, the other increases), a -1 indicates a perfect negative association (i.e., as one decreases, the other increases), and 0 indicates no association.

Once a correlation coefficient has been calculated, the first step is to test if it is statistically different to 0, i.e., 'statistically significant'. This occurs when the *p* value, or significance level, is less than .05. When this occurs, the null hypothesis can be rejected, and it can be interpreted that an association exists between the two variables. The following guidelines can be used to assess the size of the correlation (Cohen, 1988, pp. 79-81): small *r*=.10 to .29, medium *r*=.30 to .49, and large *r*=.50 to 1.0. Cases were excluded pairwise, so that only countries that had data available for both variables were included. Correlations were performed both including and excluding outliers (i.e., extreme values which were defined as values at least 1.5 times bigger or smaller than the interquartile range[21]). Caution is needed when interpreting the results. In particular, the data is limited because (a) it covers a small number of countries, and (b) the analysis of overall wait times relies on population survey estimate for wait times which is not as accurate as administrative data., proxy, services.

We also sought to include multiple regressions to test if the relationships between waiting times and capacity and productivity measures differed when controlling for share of population aged 65+ (which could indicate greater demand for healthcare). In addition to the data limitations outlined above, our data violates a number of the assumptions for regression models, e.g., our sample did not meet the recommended sample size of at least 50 (Green, 1991), and so we do not report regression results.

[21] The interquartile range is the difference between the value at Q3 and Q1, i.e., the median. Q3, or the upper quartile, is the value at which 75% of values fall below. Q1, or the lower quartile, is the value at which 25% of all values fall below.

D.2 Wait Times and Capacity

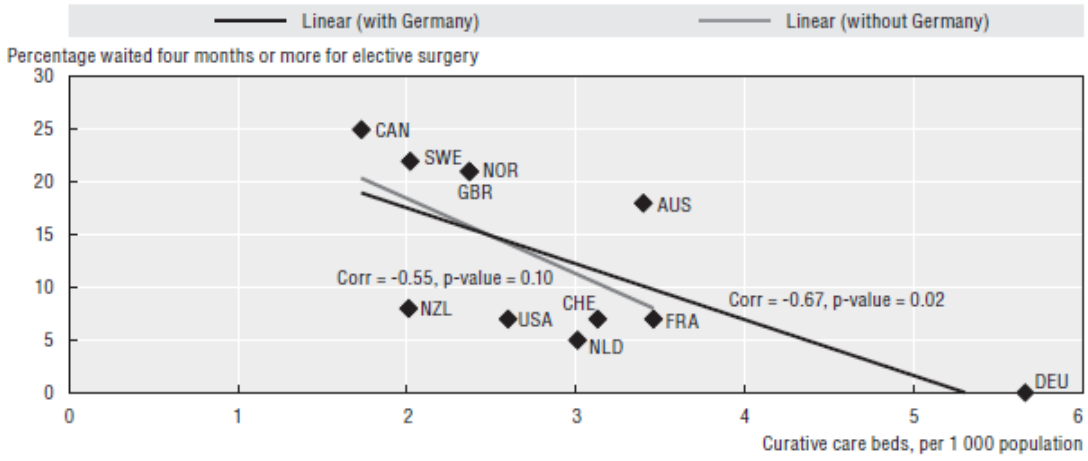
Overall Wait Times and Overall Capacity

OECD (2013) Analysis

An OECD policy review from 2013 examined the relationship between the proportion of patients waiting more than four months for elective surgery across 11 OECD countries and three measures of capacity, namely hospital beds, doctors, and overall health expenditure. The capacity measures were taken from the OECD Health Statistics database of administrative data. As the OECD's Health Statistics database does not provide an overall measure of wait times the analysis used wait time data from a 2010 Commonwealth Fund Survey (reported by Schoen et al., 2010) which collected waiting times through telephone interviews with a representative sample of adults from each country.[22] The sample does not include Ireland but it includes the following countries: Australia, Canada, France, Germany, Italy, the Netherlands, New Zealand, Norway, Sweden, the United Kingdom, and the United States.

OECD findings indicated a significant negative relationship between curative care beds per 1000 population and wait times (r= -.67, p = .02). The correlation was no longer significant at the 5% threshold when Germany (an outlier) was removed, although it did approach significance (r = -.55, p = .10), see Figure D.1. The remaining correlations produced non-significant results: public health expenditure and wait times (r = -.12, p = .72) and physicians and wait times (r = -.04, p = .90).

Figure D.1 Curative care beds per 1,000 pop. and % waiting 4 months + for elective surgery, 2010



Source: OECD (2013)

[22] The question was "After you were advised you needed surgery, how many days, weeks or months did you have to wait for the non-emergency or elective surgery?"

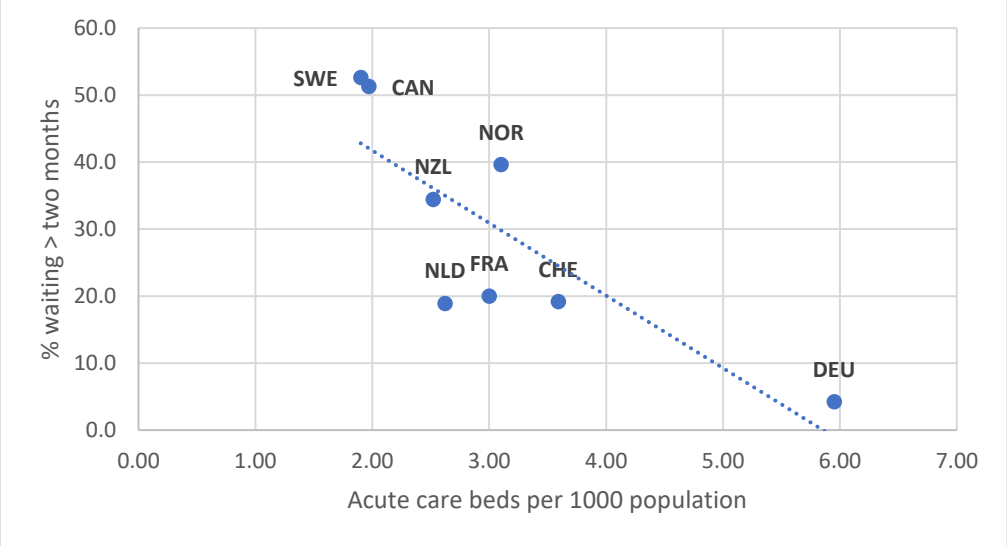
Analysis using Commonwealth Fund International Health Policy Survey (2020) data

We update the OECD analysis by using data from the most recent (2020) Commonwealth Fund survey and 2019[23] capacity data from the OECD Health Statistics database.

Similar to the OECD analysis, a significant negative association was obtained between acute care beds and the percentage of respondents waiting two months or more for elective surgery, $r(6) = -.81$, $p = .01$. However, unlike the OECD, this association remained significant even when the outlier Germany was excluded, $r(5) = -.76$, $p = .05$. As with the OECD analysis, the remaining correlations produced non-significant results: hospital doctors and wait times ($r(8) = -.27$, $p = .44$) and health expenditure and wait times ($r(9) = -.44$, $p = .17$).

The negative correlation between acute care beds and percentage waiting two months or more suggests that a greater supply of beds reduces waiting times. However, as noted above, caution is needed when interpreting the results due to the limited number of countries with data available and the use of population survey estimates (and not administrative data) for wait times.

Figure D.2 Acute care beds per 1000 population and % waiting > two months for elective surgery



Source: Wait times – Commonwealth Fund International Health Policy Survey (2020), Beds – OECD Health Statistics 2021

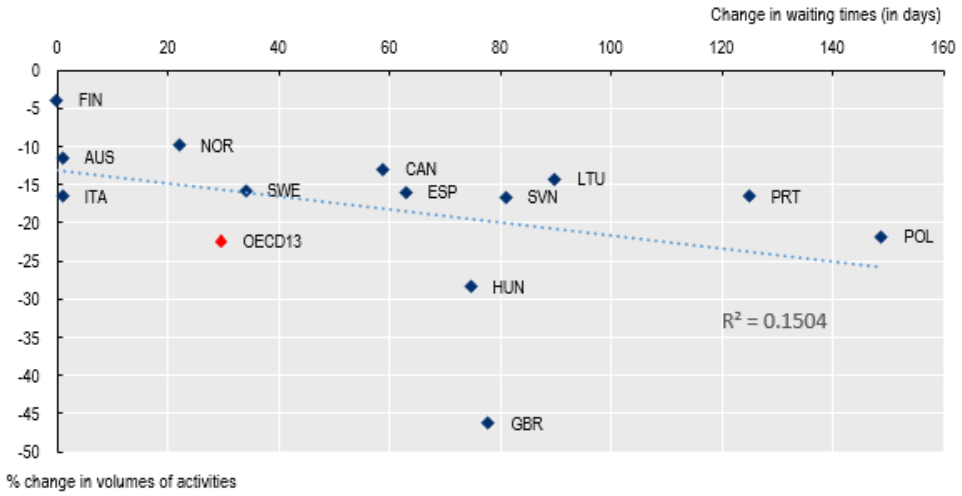
[23] We used data for 2019 as 2020 data from the OECD database was only available for a limited number of countries.

D.3 COVID-19 Wait Time Trends for Two Procedures and Activity

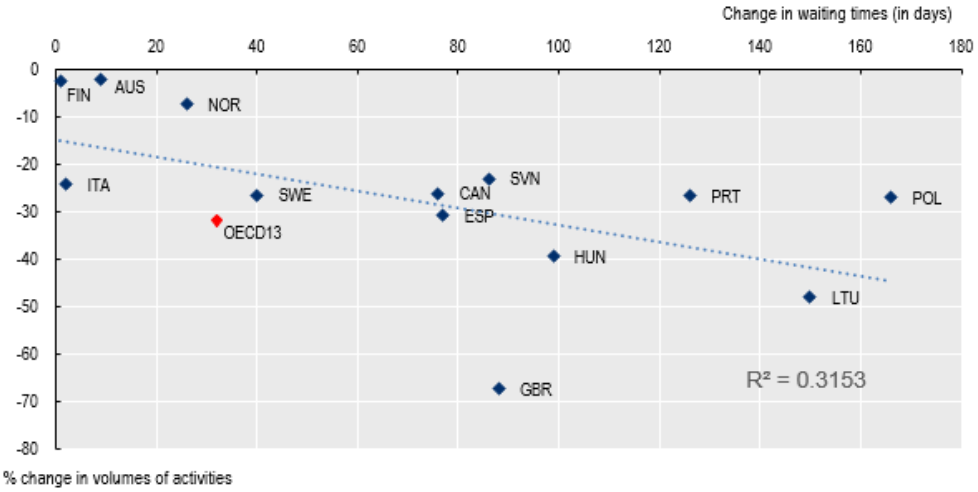
A forthcoming OECD report (Siciliani, Lafortune & Levy, forthcoming) examines the relationship between the 2019 to 2020 trend in wait times for hip or knee replacement and the 2019 to 2020 trend in the volume of hip or knee replacement surgeries. It found a smaller reduction in surgical activities was generally associated with a smaller increase in waiting times, see Figure D.3 (Ireland is not included).

Figure D.3: Wait time and activity trends for hip and knee replacement, 2019-2020

Panel a: Hip replacement



Panel b: Knee replacement



Source: Siciliani, Lafortune & Levy (forthcoming) based on OECD statistics

Note: The data for Australia, Canada, Finland, Italy, Lithuania, the Netherlands and Norway relate to the waiting times from specialist assessment to treatment (people who have received treatment), not those still on the waiting lists.