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UTILISATION OF PUBLIC ACUTE HOSPITAL SERVICES IN IRELAND – BASELINE ANALYSIS FOR THE HIPPOCRATES MODEL

AOIFE BRICK AND CONOR KEEGAN

ESRI ECONOMIC & SOCIAL RESEARCH INSTITUTE

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ABOUT THE AUTHORS

Aoife Brick and Conor Keegan are Research Officers at the ESRI and Adjunct Assistant Professors at Trinity College Dublin.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABBREVIATIONS

AMAU	Acute Medical Assessment Unit
ASAU	Acute Surgical Assessment Unit
ED	Emergency Department
HIPE	Hospital In-Patient Enquiry Scheme
HPO	Healthcare Pricing Office
HSE	Health Service Executive
LOS	Length of stay
NTPF	National Treatment Purchase Fund
OPD	Outpatient Department
PET	Patient Experience Time
SYOA	Single year of age

EXECUTIVE SUMMARY

The Hippocrates Model provides estimates and projections of public and private healthcare demand for a range of Irish health and social care services and has been extended to project capacity and expenditure for public hospital care. The first report from the Hippocrates Model, published in 2017, presented a baseline for projection based on data from 2015. This report updates that baseline analysis using 2018 data. Using a range of administrative data sources, the report provides age and sex utilisation profiles for public acute hospital services. It covers emergency department and outpatient department attendances, and day-patient and in-patient discharges.

1 INTRODUCTION

The first report from the Hippocrates Model published in 2017 provides baseline estimates and projections of public and private healthcare demand for a range of Irish health and social care services for 2015–2030 (Wren et al., 2017). The model continues to be extended to include additional service areas, for example mental health and disability services (Brick et al., 2020a; b), and to project capacity (Keegan et al., 2018) and public acute hospital expenditure (Keegan et al., 2020).

The Hippocrates Model employs a macro-simulation (cell-based) approach to project demand for and expenditure on health and social care services. A macro-simulation approach was deemed most appropriate as it offers more flexibility than standard macro-level modelling, yet is still feasible despite the considerable data constraints faced in the Irish system. In these models, individuals are grouped into cells according to age and sex, and expenditure is estimated by multiplying the number of individuals in a cell by the unit (or average) cost (Wren et al., 2017).

Where possible, the model disaggregates demand and expenditure estimates for each healthcare service by single year of age (SYOA) and sex (Wren et al., 2017) and aims to include both public and private activity and cost wherever possible. The first step in the modelling is to estimate utilisation and demand in the base year. In the next step, healthcare demand will be projected based on projected assumptions in relation to population growth and healthy ageing. Expenditure is projected by applying assumptions in relation to projected cost of care delivery to projected demand (Figure 1).

FIGURE 1 Hippocrates Model

Source: Author representation of the Hippocrates model.

The specific aim of this report is to generate baseline utilisation profiles for public acute hospitals for 2018 that that form the basis for projections of public acute

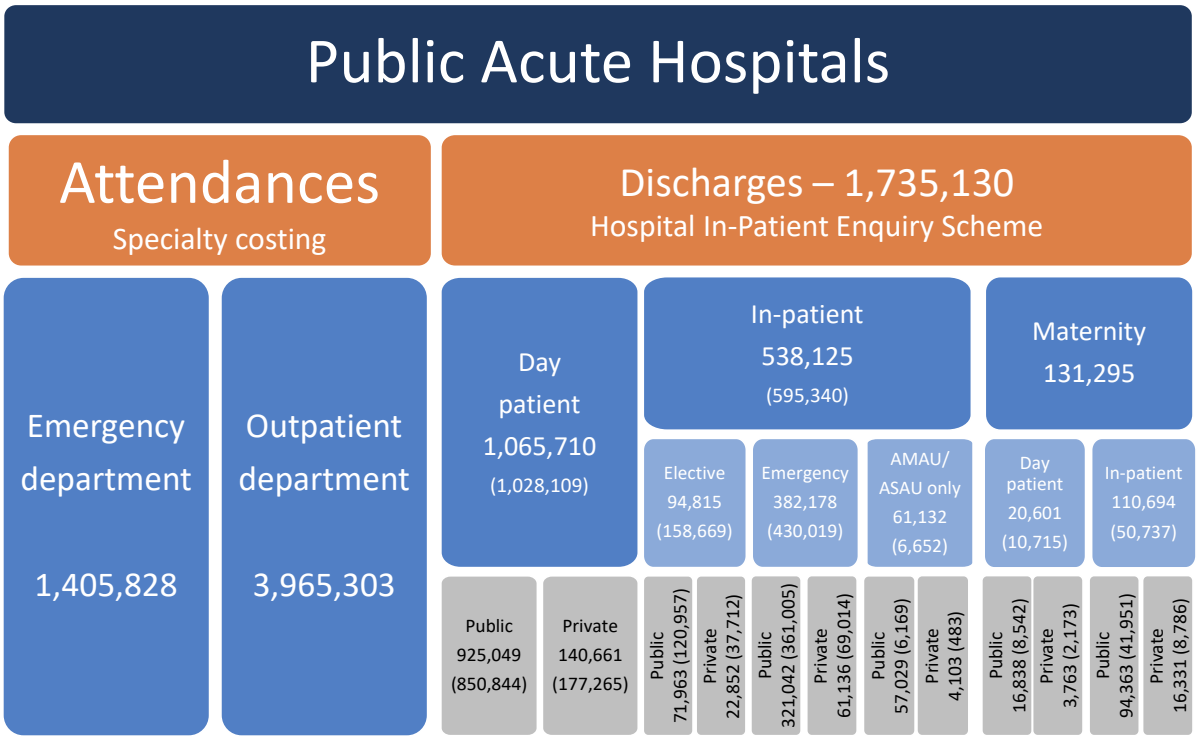
hospital expenditure reported in Keegan et al. (2020). These profiles will facilitate updated demand projections and, for the first time, the expenditure phase of the model. The services examined include emergency department (ED) and outpatient department (OPD) attendances, and day-patient and in-patient discharges in public hospitals.

Section 2 describes the data and methods used to establish a baseline for projection for the above-listed services. Section 3 gives an overview of trends in service utilisation between 2015 and 2018. Sections 4 and 5 present detailed findings on service utilisation for the above-listed services in public acute hospitals. Section 6 summarises.

2 DATA AND METHODS

The following section outlines the data sources and methods used to generate utilisation profiles for public acute hospital attendances and discharges. In some cases, multiple data sources are required to generate a comprehensive profile. Data that align most closely with expenditure data – that is, the Healthcare Pricing Office (HPO) specialty costing returns and the Hospital In-Patient Enquiry (HIPE) scheme – are the preferred sources. Figure 2 provides a summary of baseline utilisation for 2018.

FIGURE 2 Attendances and discharges (unweighted and complexity-weighted), 2018



Note: Complexity-weighted discharges in parentheses.
Source: HIPE, 2018.

2.1 Attendances

2.1.1 Emergency Department

Data

The number of ED attendances[1] reported to the HPO specialty costing returns is the main source of data on ED attendances.[2] As this dataset does not provide any detail on the profile of patients who attended, we supplement these with data from the Patient Experience Time (PET) dataset managed by the HSE Business Intelligence Unit (BIU). This contains patient-level data on 28 of the 30 public acute hospital EDs in 2018. As all public hospitals with EDs report to the HPO, the total number of attendances is higher and more inclusive than the PET. In 2018, PET covered 92 per cent (1,288,257) of the attendances returned to the specialty costing data (1,405,828).[3]

Methods

The SYOA and sex profile of ED attendances in 2018 is generated using the PET data. This profile is then applied to the total number of attendances reported to HPO specialty costing returns. Utilisation is presented as total attendances and attendances per 1,000 population in 2018.

2.1.2 Outpatient Department

Data

The number of OPD attendances reported as part of the specialty costing returns is the main source of data for the OPD analysis.[4] These data are supplemented with waiting-list data from the National Treatment Purchase Fund (NTPF), HIPE, and OPD attendances in the NHS England (NHS Digital, 2019).

Methods

The total number of OPD attendances reported to the HPO specialty costing returns provides the total number of first and return attendances to public OPDs in 2018. While these data have detail on the OPD speciality attended, there is no information on the age or sex of the person attending. To estimate an age-sex

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1 An attendance in this report is a single visit to an emergency or outpatient department.

2 This is a different data source to that used in the first Hippocrates report (Wren et al., 2017). The specialty costing data data are more comprehensive; including 5.8 per cent more attendances for 2018 than the BIU ED attendance data used in the previous report.

3 In Wren et al. (2017), 60,000 attendances in PET were categorised as 'did not wait' and were excluded from the age and sex distribution analysis as it was understood they had left before any treatment. It is now known that these attendances may have had some treatment and they have therefore been included for 2018 (77,000 attendances).

4 This is a different data source to that used in the first Hippocrates report (Wren et al., 2017). In 2018, there were 630,000 more attendances reported in the specialty costing data than in the BIU data used in the previous report. It should be noted that, although the number of attendances is higher, specialty costing returns do not cover all OPD activity. Attendances in hospitals outside of the HPO specialty costing programme are not included. These are small hospitals which we estimate account for <4% of total OPD attendances.

profile for OPD attendances, the data are first split into maternity-related attendances[5] and other attendances.

For non-maternity attendances, we apply the age-sex profile for first-time attendances in the NTPF waiting list data to the number of non-maternity first-time attendances in the specialty costing data.[6] This assumes that the age profile of those waiting for a first appointment is a reasonable proxy for the age profile of those attending OPD for the first time. For repeat attendances, we use the ratio of first-time attendances to return attendances by age and sex from NHS non-maternity OPD data (NHS Digital, 2019) and apply it to the first-time attendances profile derived from the NTPF data. The resulting proportions in each age group are applied to the total number of return attendances reported in the specialty costing data. To estimate an age profile for maternity attendances, the age profile of public maternity discharges (day and in-patient combined) from HIPE is applied to the total number of maternity OPD attendances.[7] Utilisation is presented as SYOA and sex-specific total attendances and attendance rates per 1,000 population in 2018.[8]

5 Includes midwifery, obstetrics, maternity ultrasound, and assisted reproductive technology clinics.

6 See Appendix 1.

7 NHS data show that there is very little variation in the number of repeat attendances across age categories, so no adjustment is made for this.

8 Rates are calculated using ESRI population estimates for 2018.

2.2 Discharges

Public acute hospital discharges refer to patients admitted for treatment or investigation as day or in-patients and subsequently discharged. There are several categories of patients, which are outlined below.

- A **day patient** is admitted (or readmitted) to hospital for treatment on an elective (rather than an emergency) basis and is discharged alive, as scheduled, on the same day. Deliveries are not included.
- An **in-patient** is admitted (or readmitted) to hospital for treatment or investigation on an elective or emergency basis. Sameday in-patients are admitted as in-patients and discharged on the same day, while overnight in-patients stay at least one night in hospital.
  - **Elective:** The patient's condition permits adequate time to schedule the availability of suitable services. An elective admission may be delayed without substantial risk to the health of the individual.
  - **Emergency:** The patient requires immediate care and treatment as a result of a severe, life-threatening or potentially disabling condition. Generally, the patient is admitted through the Emergency Department.

HPO (2018), pg 4; HPO (2019a), pg 8

2.2.1 Data

The HIPE scheme, managed by the Healthcare Pricing Office (HPO), is an information system which records administrative and clinical data on deaths in and discharges from public acute hospitals in Ireland.[9] The following analysis uses data on discharges between 1 January 2018 and 31 December 2018. Variables from HIPE used to establish the Hippocrates Model projection baseline are age, sex, patient type (day, in-patient), admission type (elective, emergency, incl. acute medical/ surgical assessment unit [AMAU/ASAU] only,[10] and maternity[11]), public/private status,[12] length of stay (LOS) in days (sameday in-patient LOS equals to 0.5 days).

9 See Appendix 2 for a list of the hospitals included in the analysis. Two long-term care hospitals are excluded from the analysis.

10 Discharges from the 'AMAU/ASAU only' are recorded as emergency in-patients in HIPE. They are admitted as an emergency to the AMAU/ASAU and are discharged from there; 92 per cent have an LOS of 0.5 days.

11 'Admitted in relation to their obstetrical experience (from conception to six weeks post-delivery).' HPO (2019a), pg 64.

12 'Public/private status refers to whether the patient saw the consultant on a public or private basis. It does not relate to the type of bed occupied nor is it an indicator of private health insurance.' HPO (2019a), pg 13.

In addition, the HPO also provide a weighted unit for each discharge (Healthcare Pricing Office, 2015).[13] A weighted unit is a complexity-weighted measure of utilisation. For example, at the hospital level, two hospitals A and B may each treat 100 patients, but, if the sum of the weighted units in hospital A is greater than that of hospital B, this indicates that patients in hospital A are overall more complex than those in hospital B (see Appendix 3).

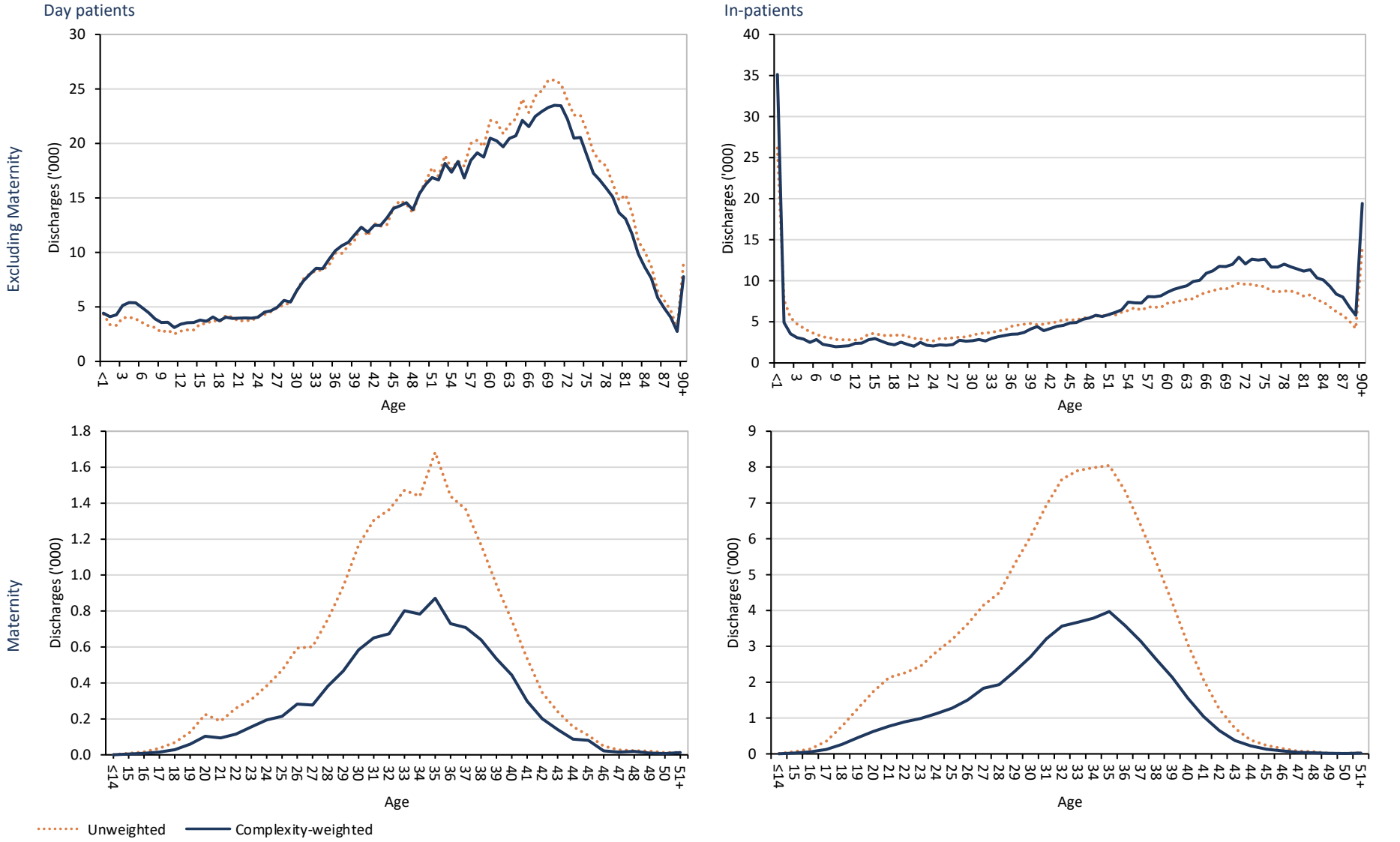
Figure 3 illustrates how complexity-weighted discharges compare to unweighted discharges for day, in-patients and maternity patients across the age distribution.[14] For day patients (excl. maternity) there is higher relative complexity in younger ages (18 years and under) compared to older ages (50+ years) while the opposite is the case for in-patients (excl. maternity). For in-patients, younger discharges are relatively less complex. Maternity day and in-patient discharges are relatively less complex than non-maternity discharges.

Using a complexity-weighted measure of utilisation allows for alignment with the methods in the expenditure phase of the Hippocrates Model in which age- and sex-specific utilisation (complexity-weighted) is multiplied by a unit cost (base cost).

13 For a detailed explanation on how the weighted unit is calculated by the HPO, see 'Introduction to the Price Setting Process for Admitted Patients' (Healthcare Pricing Office, 2015).

14 See Appendix 4 for unadjusted and complexity-weighted discharges across all patient types, admission types and public/private status.

FIGURE 3 Age-specific unweighted and complexity-weighted day patient, in-patient and maternity discharges, 2018



Source: HIPE, 2018.

2.2.2 Methods

The measures of activity presented are *complexity-weighted discharges* and *complexity-weighted discharge rates per 1,000 population* in 2018.[15]

Given the unique profile of maternity discharges – that is, they are admitted in relation to their obstetrical experience, have a narrow age range, a narrow range of diagnoses and procedures, and lower mean complexity – they are considered separately throughout the report. Maternity discharges are separated into day and in-patient discharges; no distinction is made in HIPE between elective and emergency maternity in-patients.

3 TRENDS 2015–2018

The following section examines the change in utilisation across service areas over the four-year period between the original Hippocrates base year of 2015 and the new base year of 2018. The percentage change in both actual volumes of attendances/discharges and the attendance/discharge rates are presented (Figure 4). Attendance/discharge rates provide a comparison of the growth in attendances/discharges reported to HPO with that of the population over the period, while growth in attendance/discharge volumes reflects population growth also.

In 2018, 1,405,828 attendances at public acute hospital EDs were reported to the HPO.[16] This was an increase of 92,000 (7.0%) on 2015, representing average annual growth of 2.3 per cent. The number of OPD attendances increased by 220,605 (5.9%) to 3,965,303 in 2018, representing average annual average annual growth of 1.9 per cent. Attendances per 1,000 population also increased between 2015 and 2018 for both ED (3.4% or 1.1% average annual growth) and OPD (2.3% or 0.8% average annual growth). This implies that over the period the growth in service utilisation has outpaced population growth.

A total of 1,735,130 discharges were reported to HIPE in 2018; 73,140 more than in 2015. This represents a 4.4 per cent increase over the period and a 1.4 per cent average annual growth rate. Growth in the discharge rate per 1,000 population was far lower, at 0.9 per cent over the period and 0.3 per cent in terms of average annual growth. Again, the growth in the discharge rate demonstrates that the growth in discharges outpaced population growth. Figure 4 shows that growth rates in the number of discharges and discharge rates vary by patient and admission type.

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15 Rates are presented as a centred moving average across three years of age to smooth the presentation. Moving average rates are not calculated for maternity discharges or for any discharges aged <1, 1, 2, 3, 4, and 90 years and older.

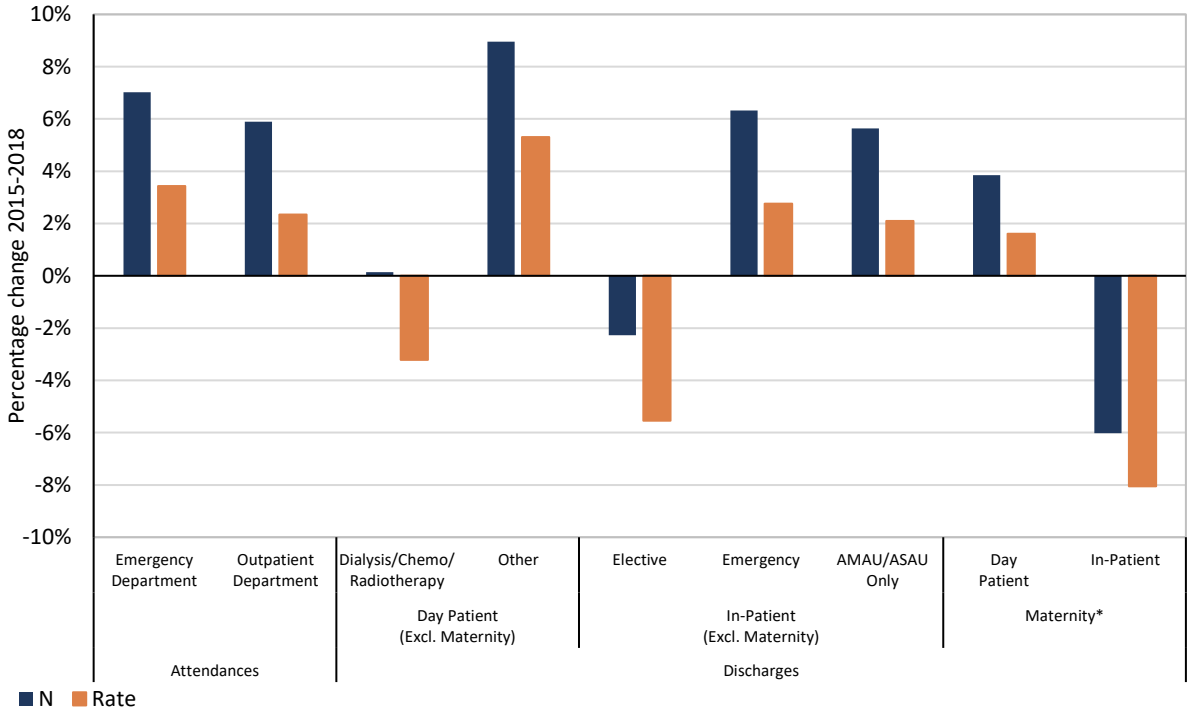
16 See also Appendix 5.

The number of dialysis, chemotherapy, and radiotherapy day-patient discharges remained stable between 2015 and 2018 but there was a 3.2 per cent decrease in the discharge rate for this group.[17] The average annual growth in discharges for these day patients was also just 0.1 per cent per annum between 2015 and 2018. For other day patient discharges, there was a 9.0 per cent increase in the number of discharges between 2015 and 2018 (2.9% average annual growth) compared to a 5.3 per cent increase in the discharge rate per 1,000 population.

For both emergency in-patients and AMAU/ASAU patients, there were increases in the number of discharges (6.3% and 5.6% respectively) and the discharge rate (2.8% and 2.1% respectively) over the period. There was average annual growth of approximately 2 per cent for each admission type. In contrast, there was a decrease in the number and rate of elective in-patient discharges over the period (-2.3% and -5.5% respectively).

For maternity discharges, there was an increase in the number of discharges and the discharge rate for day patients but decreases in both the number and rate of in-patient discharges (-6.0% and -8.1% respectively). This decrease in in-patient maternity discharges is reflected in a year-on-year decrease in the number of births in Ireland since 2016 (Central Statistics Office, 2019).

FIGURE 4 Attendances and discharges – unweighted utilisation and utilisation rates per 1,000 population, 2015–2018



Source: HIPE, 2015 and 2018.

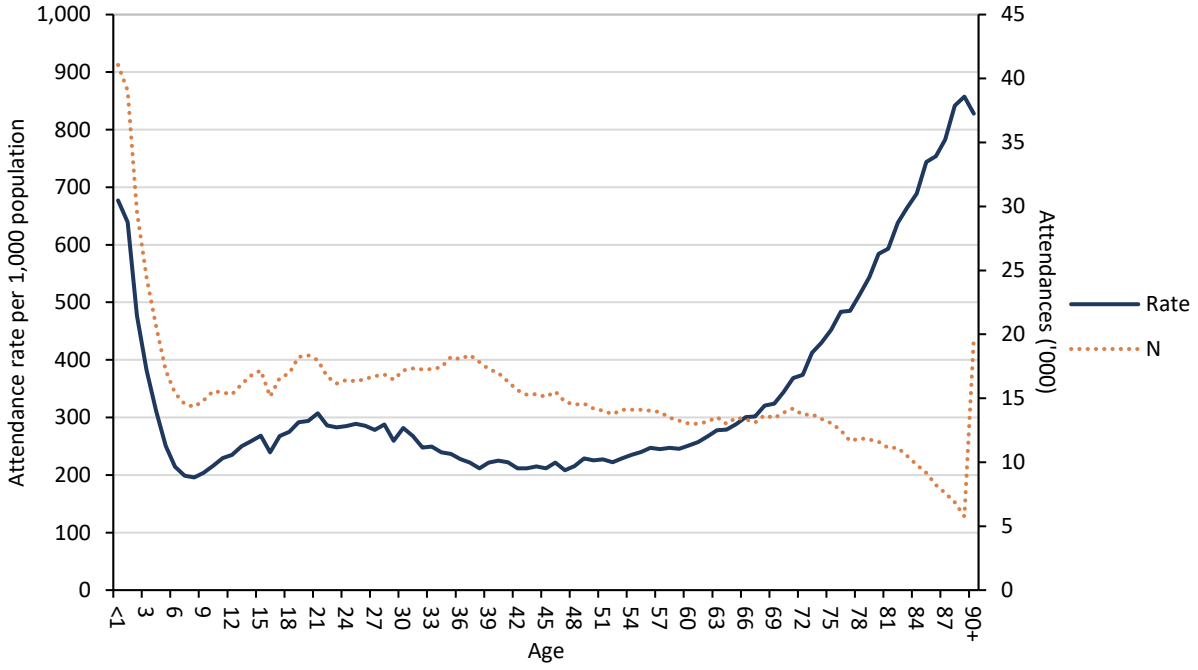
[17] See also Appendix 5.

4 ATTENDANCES

4.1 Emergency Department

In 2018 there were 1,405,828 ED attendances in public acute hospitals in Ireland. Figure 5 presents the age-specific number of attendances and the attendance rate per 1,000 population. The number of attendances generally decreases with age, being highest among very young children. There are also relatively high attendance rates among young children, particularly those aged less than one year. Rates remain relatively stable up to the age of 60 years, at which point substantial increases in rates are observed. The highest attendance rates are associated with those in the oldest age cohorts (85 years and older), at more than 800 per 1,000 population.

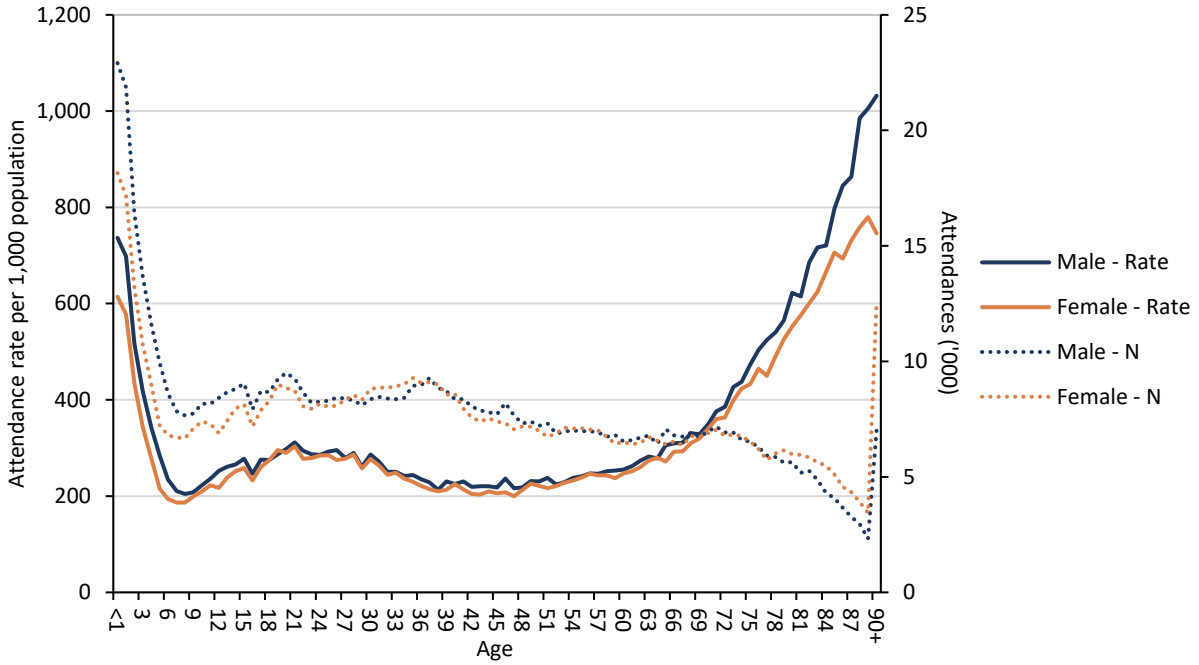
FIGURE 5 ED – age-specific attendances and attendance rates per 1,000 population, 2018



Source: HPO Specialty Costing, 2018; HSE Patient Experience Time, 2018; ESRI population data, 2018.

In Figure 6, age-specific ED attendance data are disaggregated by sex, showing similar patterns for males and females. In 2018, 50.9 per cent of attendances were male. Higher numbers of males attend the ED in the younger age cohorts while the pattern is reversed in the oldest age cohorts. Males attend the ED at higher rates than females across the age distribution, with particularly greater differentials in the younger (25 years and younger) and older (75 years and older) age cohorts.

FIGURE 6 ED – age- and sex-specific attendances and attendance rates per 1,000 population, 2018



Source: HPO Specialty Costing, 2018; HSE Patient Experience Time, 2018; ESRI population data, 2018.

4.2 Outpatient Department

There were 3,965,303 attendances at public acute hospital OPDs in 2018; 3,425,423 excluding maternity attendances. Using the methods described in section 2.1.2, estimated age-specific attendances and attendance rates (excl. maternity) are illustrated in Figure 7. The number of attendances is highest between 35 and 74 years, remaining relatively stable across these age categories. The number of attendances is lowest for the oldest age cohorts. The attendance rate per 1,000 population generally increases with age, peaking at 75–79 years and decreasing thereafter.

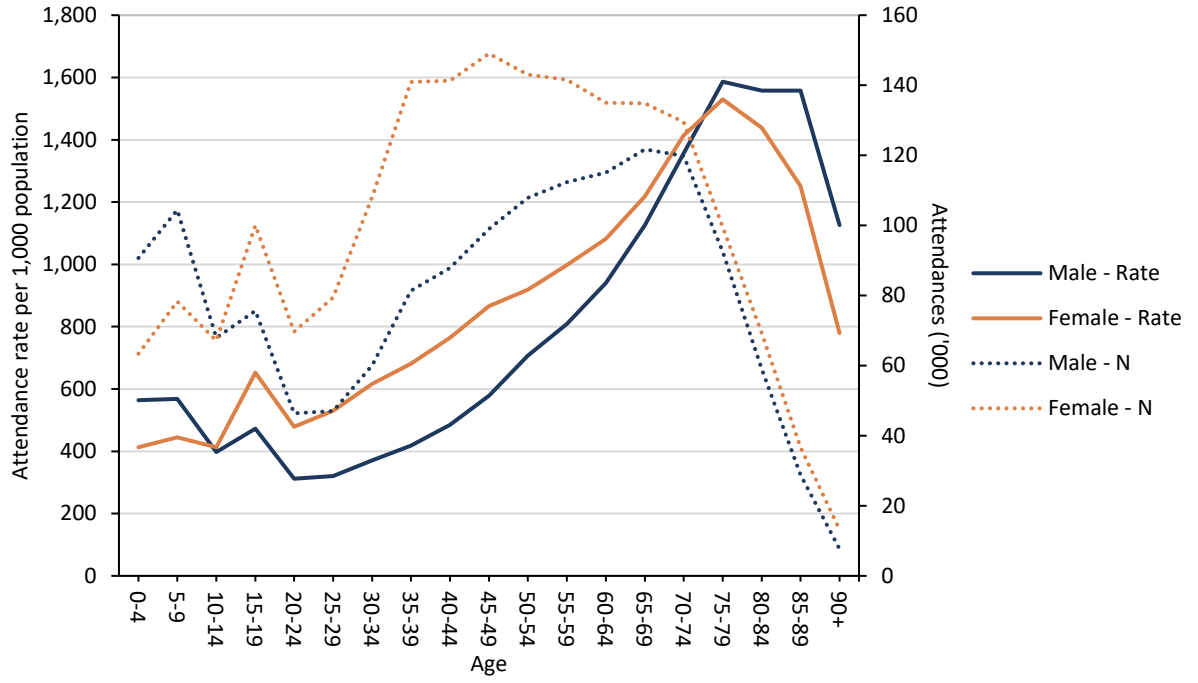
FIGURE 7 OPD (excl. maternity) – age-specific attendances and attendance rates per 1,000 population, 2018

Source: HPO Specialty Costing, 2018; National Treatment Purchase Fund, 2018; NHS 2018-2019, ESRI population data, 2018.

In Figure 8 the age- and sex-specific estimates of the number and rate of OPD attendances (excl. maternity) are presented.[18] The number and rate of attendances for females is higher than that for males for almost the entire age distribution.[19] This demonstrates that, even when maternity attendances are removed, females use OPD services more than males. The exception to this is at the youngest and oldest ages where the male attendance rate is higher than the female rate.

18 See Section 2.1.2 for estimation methodology.
19 See Appendix 1 for further discussion of the male/female age distribution.

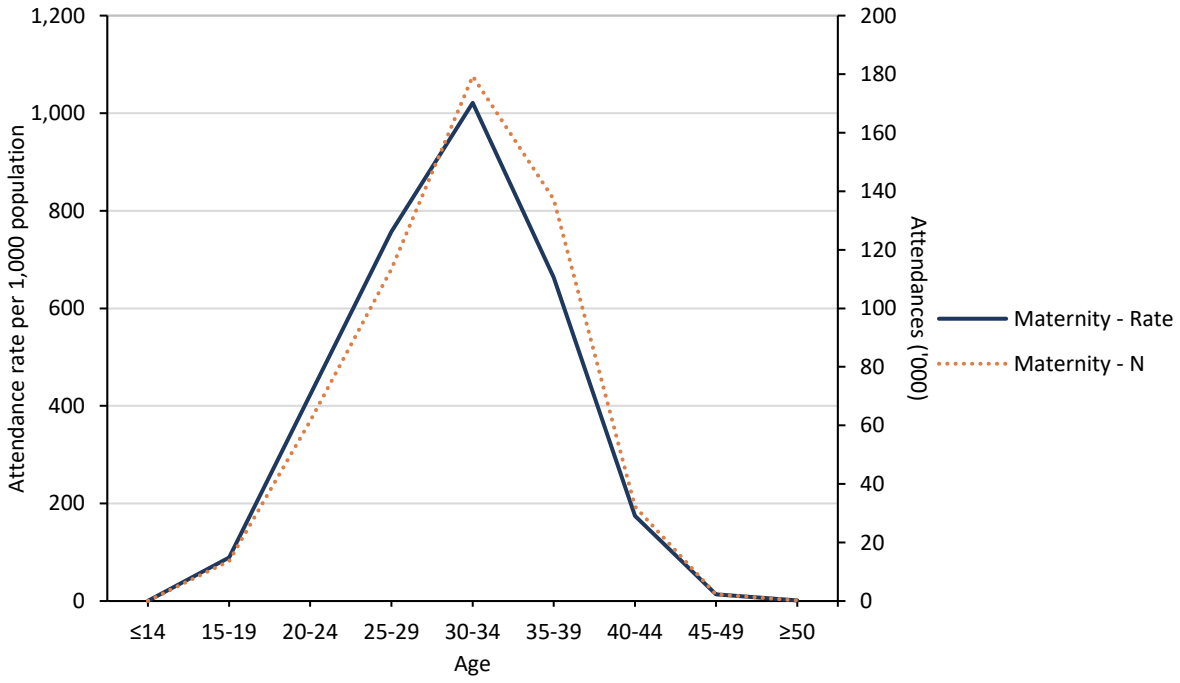
FIGURE 8 OPD (excl. maternity) – age- and sex-specific attendances and attendance rates per 1,000 population, 2018



Source: HPO Specialty Costing, 2018; HIPE 2018; NHS 2018-2019, ESRI population data, 2018.

There were approximately 540,000 maternity-related attendances at public hospital OPD clinics in 2018 (Figure 9). Maternity OPD attendances and the attendance rate follow a similar pattern. The number and rate of attendances increase with age until 30–34 years at which point they begin to decrease.

FIGURE 9 OPD (maternity) – age-specific attendances and attendance rates per 1,000 female population, 2018



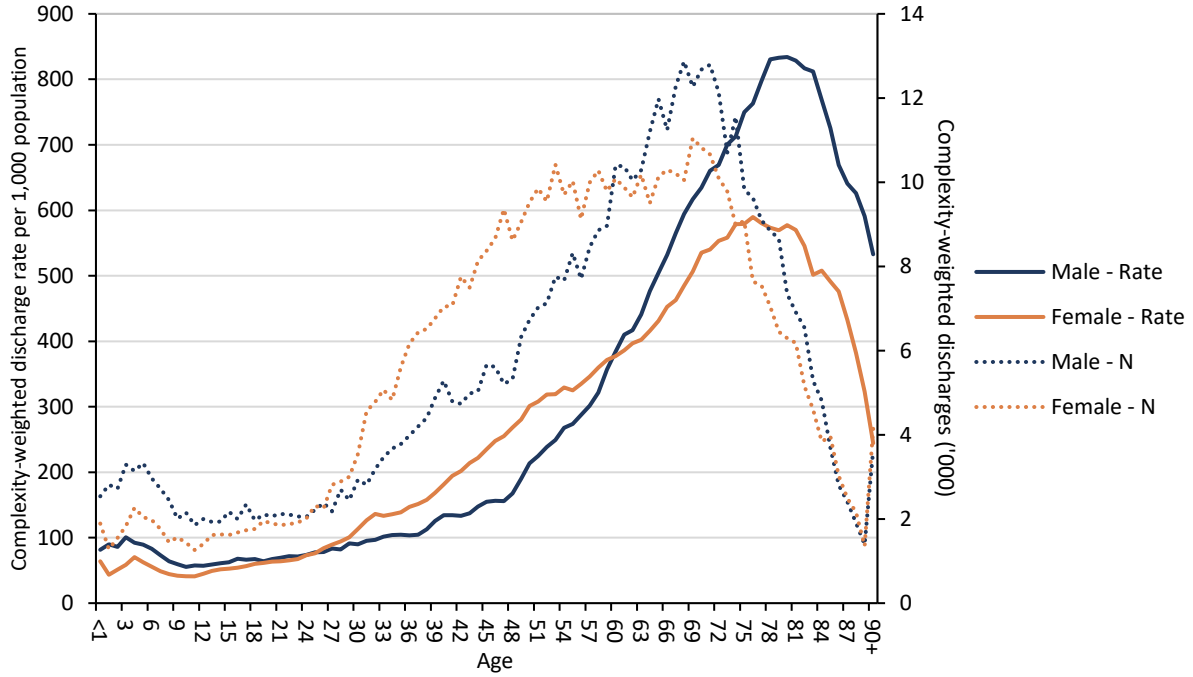
Source: HPO Specialty Costing, 2018; ESRI population data, 2018.

5 DISCHARGES

5.1 Day Patients

In 2018, 1,028,109 complexity-weighted day-patient (excl. maternity) discharges were recorded in public acute hospitals in Ireland. Figure 10 presents age- and sex-specific complexity-weighted discharges and discharge rates per 1,000 population. Volumes of discharges are higher for males than females (excl. maternity) in the youngest (under 25 years) and oldest (60 years and older) age cohorts. Volumes of discharges peaked at 68 years for males and 69 years for females. The complexity-weighted discharge rates per 1,000 population followed a similar pattern, being higher for males than females in the youngest and oldest age cohorts. Rates peaked at 76 and 80 years for females and males respectively but are substantially higher for males (834.1 discharges per 1,000 population) than females (589.7 discharges per 1,000 population).

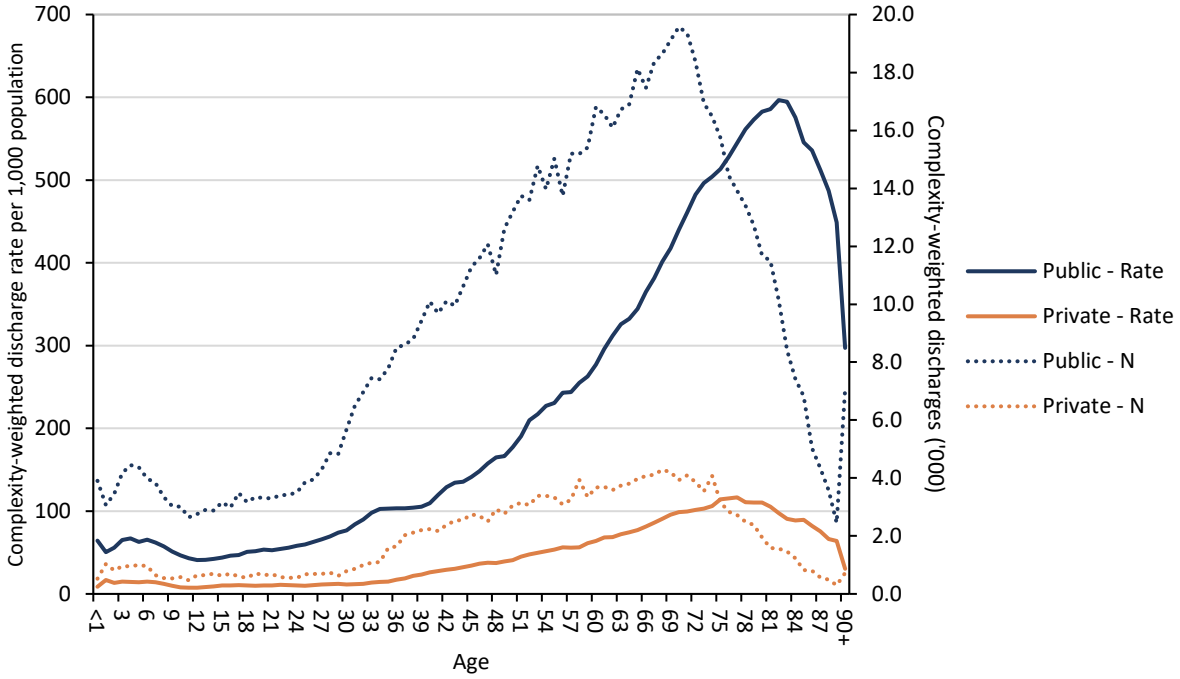
FIGURE 10 Day patient (excl. maternity) – age- and sex-specific complexity-weighted discharges and discharge rates per 1,000 population, 2018



Source: HIPE, 2018; ESRI population data, 2018.

Of the 1,028,109 complexity-weighted day-patient discharges (excl. maternity) recorded in public acute hospitals in Ireland in 2018, 82.8 per cent were public and 17.2 per cent were private. Rates peaked at 82 and 77 years for public and private discharges respectively (Figure 11) and are substantially higher for public (596.6 discharges per 1,000 population) than private (116.4 discharges per 1,000 population).

FIGURE 11 Day patients (excl. maternity) – age-specific complexity-weighted discharges and discharge rates per 1,000 population by public/private status, 2018



Source: HIPE, 2018; ESRI population data, 2018.

5.2 In-Patients

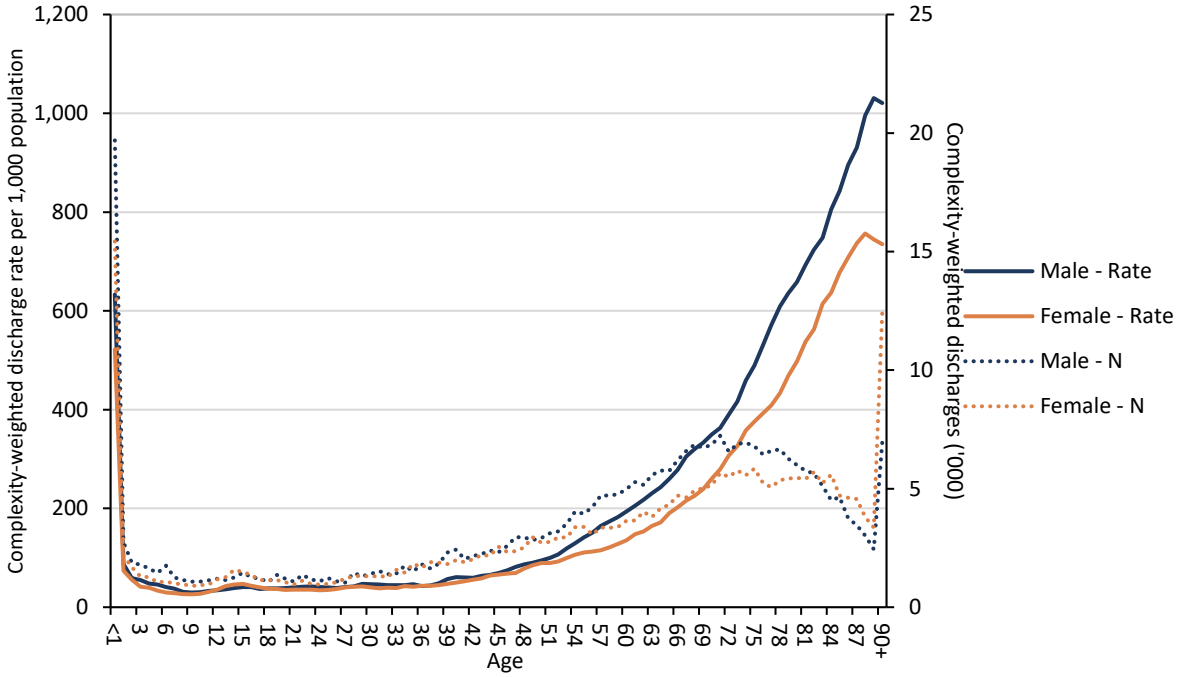
In 2018, 595,340 complexity-weighted in-patients (excl. maternity) were discharged from public acute hospitals. Figure 12 presents age- and sex-specific complexity-weighted discharges and discharge rates per 1,000 population. There was a high volume of discharges for children aged less than one year, at which point volumes peak for both males and females. Volumes remain relatively stable up to 25 years old at which point they begin to increase gradually with age until approximately 70 years old, at which point they begin to decrease with age. Volumes of discharges for males and females are similar until approximately 40 years old at which point the number of male discharges is greater at almost all ages until the age of 80, when volumes of female discharges surpass those of males.

The complexity-weighted discharge rate per 1,000 population is high for those <1 year old[20] (633.2 per 1,000 population for males; 522.2 per 1,000 population for females) and is similar for males and females until approximately 50 years old. For those 50 years and older, the rate increases each year and is higher for males than females for all ages. The rates peak at 89 years for both males (1,030.8 per 1,000 population) and females (744.4 per 1,000 population). This is also the point at which there is the greatest divergence between male and female rates, possibly

[20] A large proportion of discharges aged <1 year in 2018 are in the admission type 'newborn' in HIPE (51.2% of total in-patients). These are patients aged 0–27 days who are categorised as in-patients following delivery due to conditions such as being preterm, respiratory issues, neonatal jaundice, or observation for infection. It should be noted that well newborn babies are not coded in Ireland and so do not appear as discharges in HIPE (Irish Coding Standard 1607).

associated with higher rates of residential long-term care use by females at older ages (Wren et al., 2017).

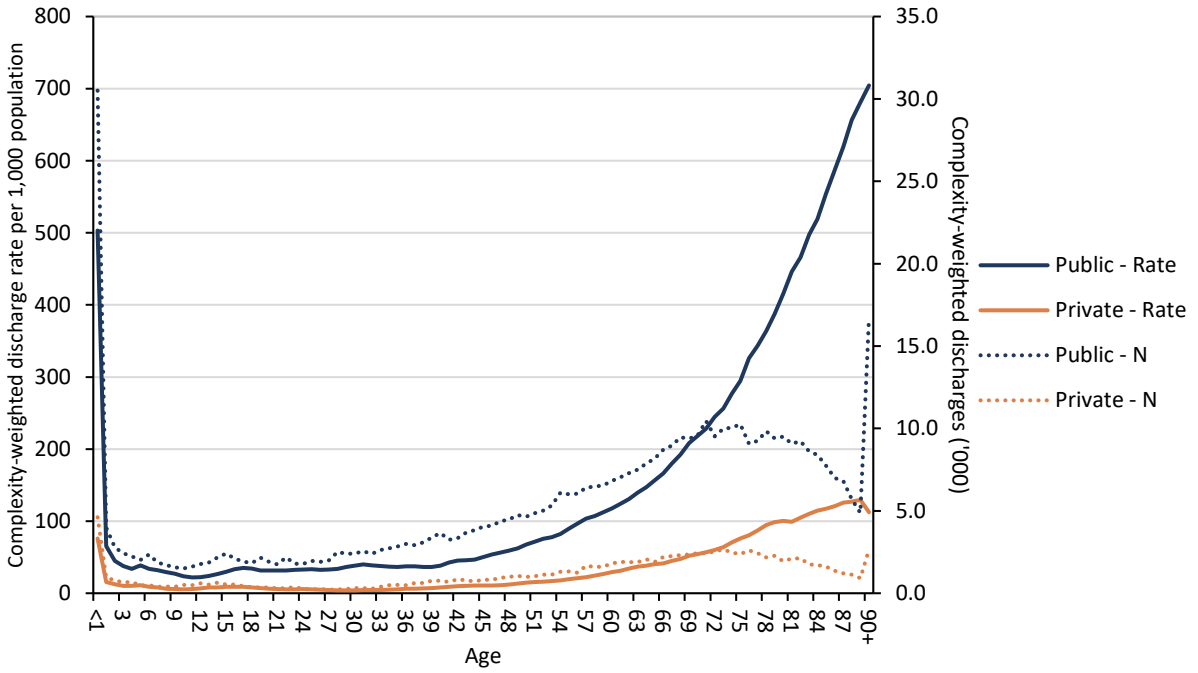
FIGURE 12 In-patients (excl. maternity) – age- and sex-specific complexity-weighted discharge rates per 1,000 population, 2018



Source: HIPE, 2018; ESRI population data, 2018.

Of the 595,340 complexity-weighted in-patient discharges (excl. maternity) recorded in public acute hospitals in Ireland in 2018, 82.0 per cent were public and 18.0 per cent were private (Figure 13). The number of complexity-weighted discharges peaked for both public and private discharges at less than one year old, while discharge rates peaked at oldest ages for both. The rate of increase in the discharge rate per 1,000 population from 50 years onwards is far greater for public than private discharges.

FIGURE 13 In-patients (excl. maternity) – age-specific complexity-weighted discharges and discharge rates per 1,000 population by public/private status, 2018



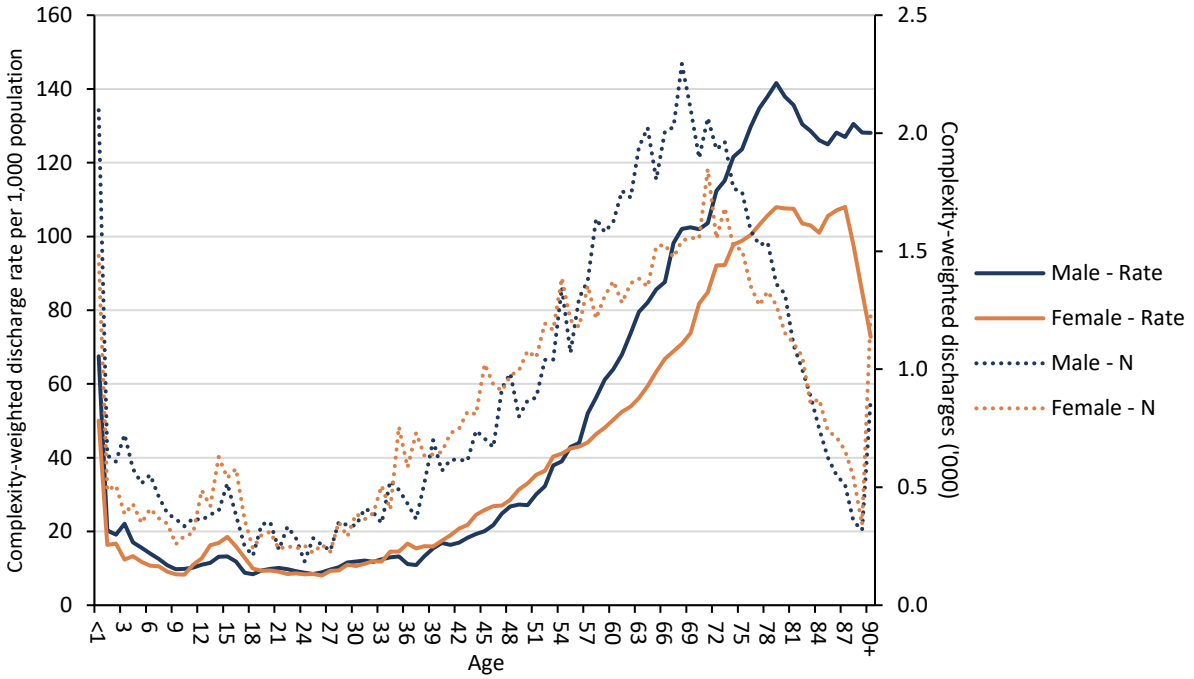
Source: HIPE, 2018; ESRI population data, 2018.

5.2.1 Elective

Of the 595,340 complexity-weighted in-patient discharges (excl. maternity), 26.7 per cent were elective. Figure 14 shows that the volume of elective in-patient discharges peaked for males at 68 years and for females at 71 years. The volume of discharges is higher for males than females in the younger (<12 years) and older (60–80 years) age cohorts. There were a higher number of complexity-weighted discharges attributed to females than males for those 80 years and older.

The complexity-weighted elective in-patient discharge rate per 1,000 population peaked for males at 79 years (141.6 per 1,000 population) and for females at 87 years (108.0 per 1,000 population). The discharge rate is similar for males and females until approximately 60 years old, beyond which the male rate is substantially higher than that for females at all ages.

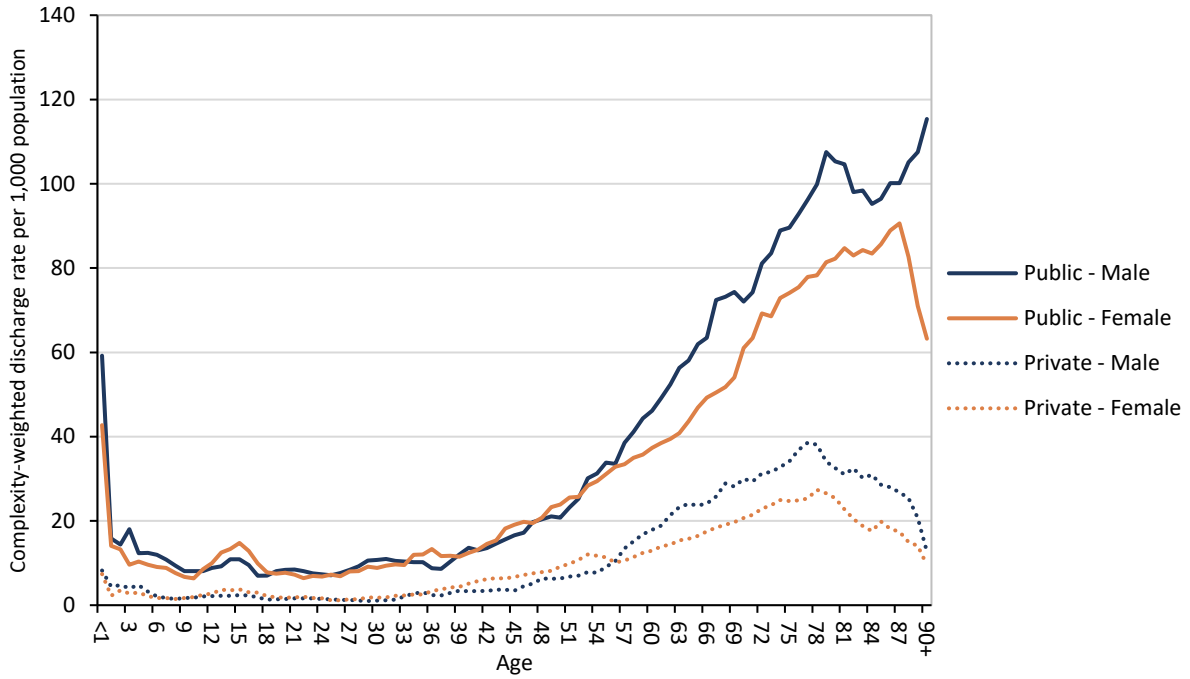
FIGURE 14 Elective in-patients (excl. maternity) – age- and sex-specific complexity-weighted discharges and discharge rates per 1,000 population, 2018



Source: HIPE, 2018; ESRI population data, 2018.

Of the 158,669 complexity-weighted elective in-patient discharges, 23.8 per cent were private. Figure 15 disaggregates the age- and sex-specific elective in-patient complexity-weighted discharge rate per 1,000 population by public/private status. It shows that the patterns are similar for public and private discharges at most ages, except for the oldest and youngest ages. The rate peaked at younger ages for private discharges compared to public; at 77 years for private male discharges (38.6 per 1,000 population) compared to 90+ years for public (115.4 per 1,000 population) and at 78 years for private male discharges (27.4 per 1,000 population) compared to 87 years for public (90.6 per 1,000 population).

FIGURE 15 Elective in-patients (excl. maternity) – age- and sex-specific complexity-weighted discharge rates per 1,000 population by public/private status, 2018



Source: HIPE, 2018; ESRI population data, 2018.

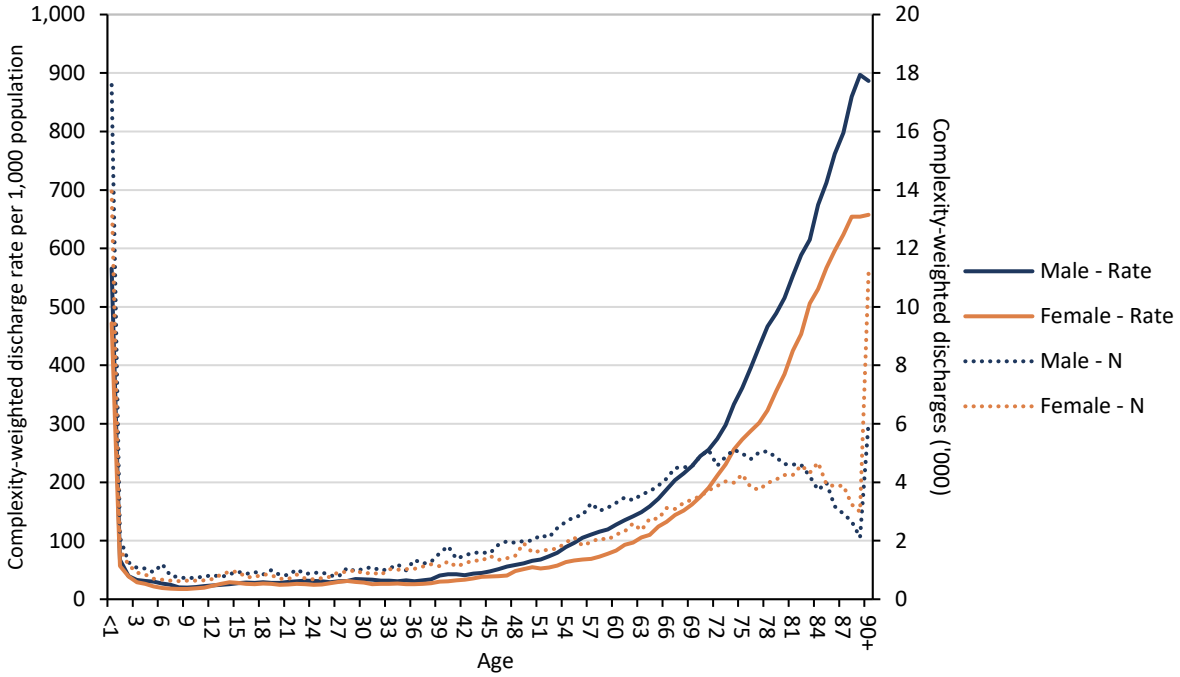
5.2.2 Emergency

In 2018, emergency in-patient discharges accounted for 72.2 per cent of total complexity-weighted in-patient discharges. Figure 16 shows that the volume of emergency discharges for both males and females peaked at less than one year old with a second albeit lower peak at approximately 70 years.[21] The volume of male discharges is higher than that of females across almost the entire age distribution, but the differential begins to increase around the age of 30 years. The differential between males and females is greatest between 55 and 70 years old.

The complexity-weighted emergency in-patient discharge rate per 1,000 population peaked for males (896.9 per 1,000 population) and females (657.5 per 1,000 population) at 90+ years with a second lower peak at less than one year old. The discharge rate is similar for males and females until approximately 50 years old, beyond which the male rate is substantially higher than that for females at all ages.

[21] The complexity-weighted number of discharges and the discharge rate per 1,000 population is high for those aged <1 year. A large proportion of discharges aged <1 year in 2018 are in the admission type 'newborn' in HIPE (54.3% of emergency in-patients).

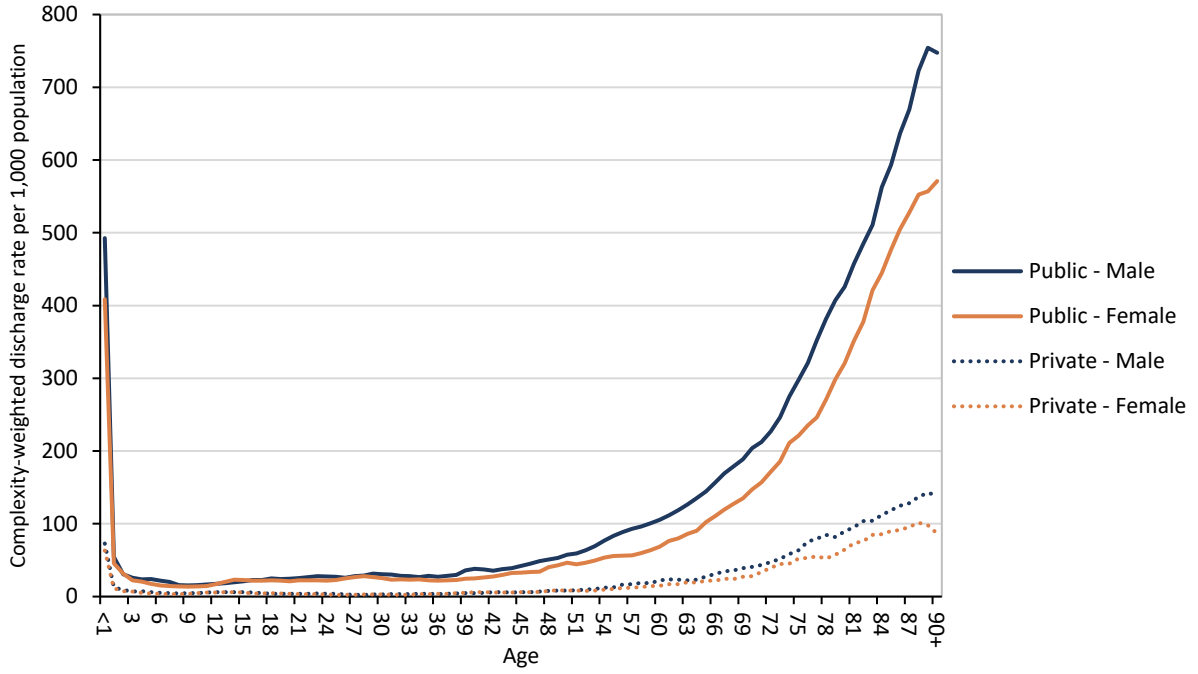
FIGURE 16 Emergency in-patients (excl. maternity) – age- and sex-specific complexity-weighted discharges and discharge rates per 1,000 population, 2018



Source: HIPE, 2018; ESRI population data, 2018.

Just 16 per cent of 430,019 complexity-weighted emergency in-patient discharges were private. Figure 17 disaggregates the age- and sex-specific emergency in-patient complexity-weighted discharge rate per 1,000 population by public/private status. Given the low proportion of private discharges, the distribution of public discharges is almost the same as that for total emergency discharges. For private patients, up to the age of 50, with the exception of those under the age of two, the emergency in-patient rate was very low, at under six per 1,000 population for most ages.

FIGURE 17 Emergency in-patients (excl. maternity) – age- and sex-specific complexity-weighted discharge rates per 1,000 population by public/private status, 2018



Source: HIPE, 2018; ESRI population data, 2018.

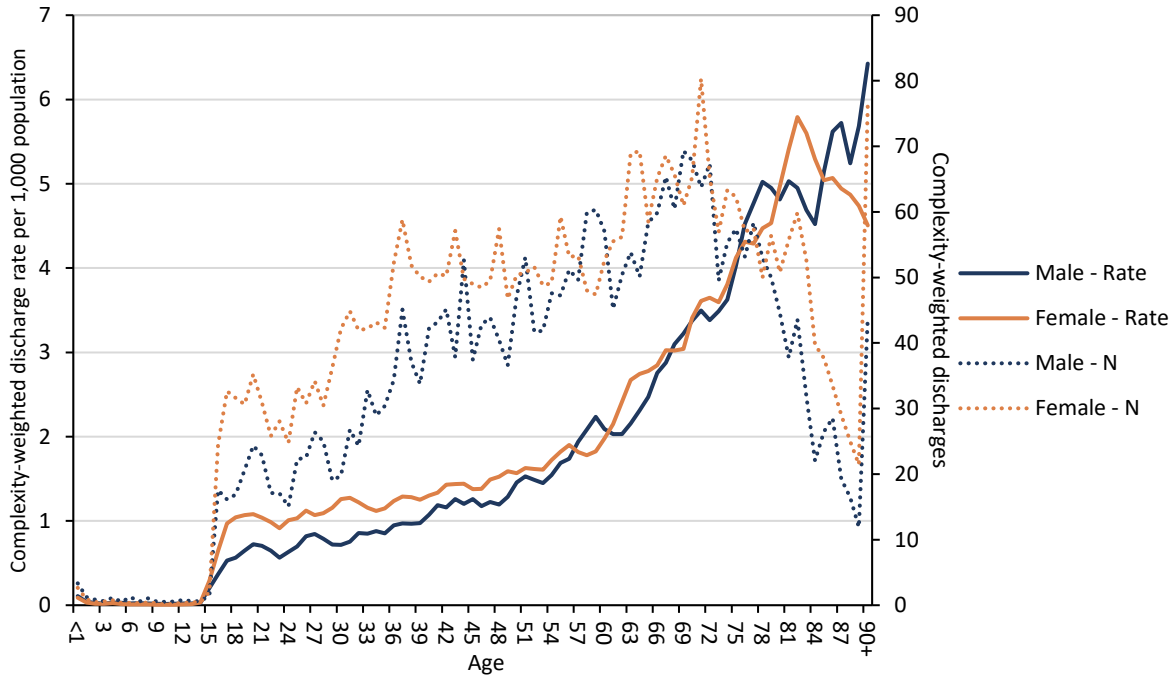
Acute medical/surgical assessment units only

In 2018, AMAU/ASAU-only in-patient discharges accounted for 1.1 per cent of total complexity-weighted in-patient discharges; almost 93 per cent of these were public.[22,23] Children less than 16 years old are usually not permitted to attend AMAU/ASAU, which explains the low rates for these ages in Figure 18. Both the volume of discharges and the discharge rates per 1,000 population increased with age, and there were higher numbers of females than males across almost all ages. Rates peaked at 82 years for females (5.8 per 1,000 population) and 90+ years for males (6.4 per 1,000 population).

22 Patients who attend the AMAU/ASAU and are subsequently admitted to the hospital as in-patients are included with the emergency in-patient discharges in section 5.2.2.

23 See Appendix 6 for comparison of unweighted and complexity-weighted AMAU/ASAU discharges.

FIGURE 18 AMAU/ASAU only – age- and sex-specific complexity-weighted discharges and discharge rates per 1,000 population, 2018



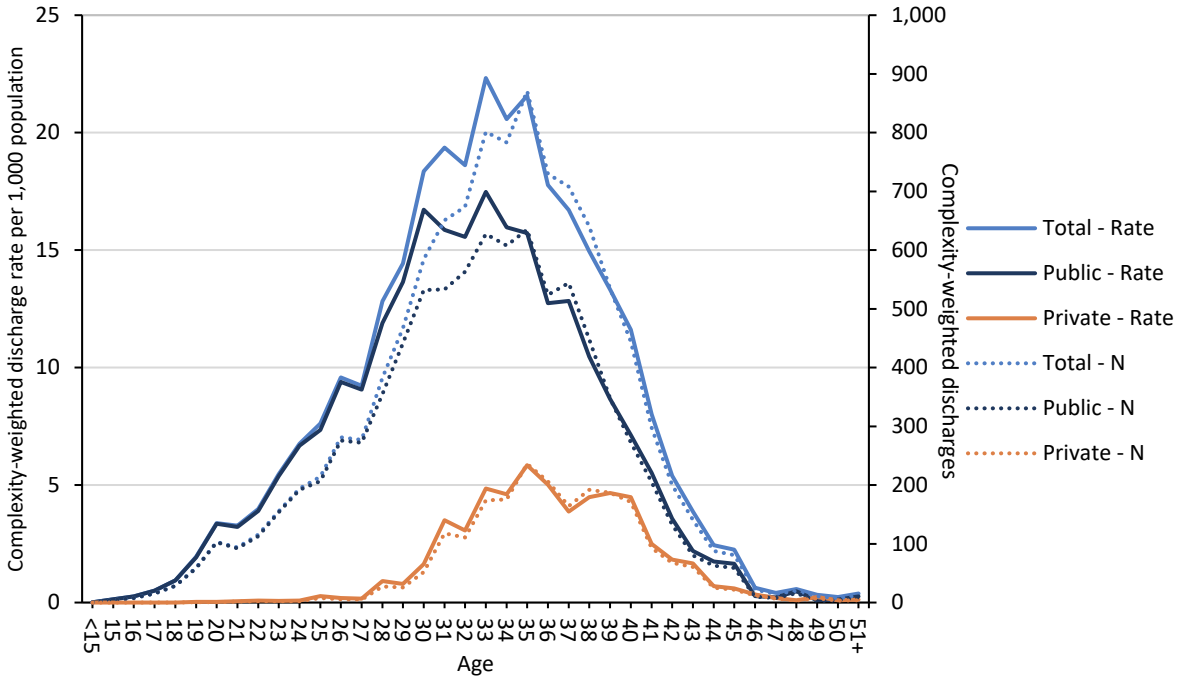
Source: HIPE, 2018; ESRI population data, 2018.

5.3 Maternity

5.3.1 Day patients

Figure 19 presents age-specific complexity-weighted maternity day-patient discharges and discharge rates per 1,000 population, disaggregated by public/private status. In 2018 there were 10,715 complexity-weighted day patient discharges, of which 79.7 per cent were public. Maternity day-patient volumes increase with age, peaking at 35 years for both public and private discharges. The rate per 1,000 population, however, peaks at 33 years for public (17.5 per 1,000 population) and overall day patients (22.3 per 1,000 population) and at 35 years for private maternity day patients (5.8 per 1,000 population). There were few private complexity-weighted maternity day patients aged 25 years or younger.

FIGURE 19 Maternity day patients – age-specific complexity-weighted discharges and discharge rates per 1,000 population by public/private status, 2018

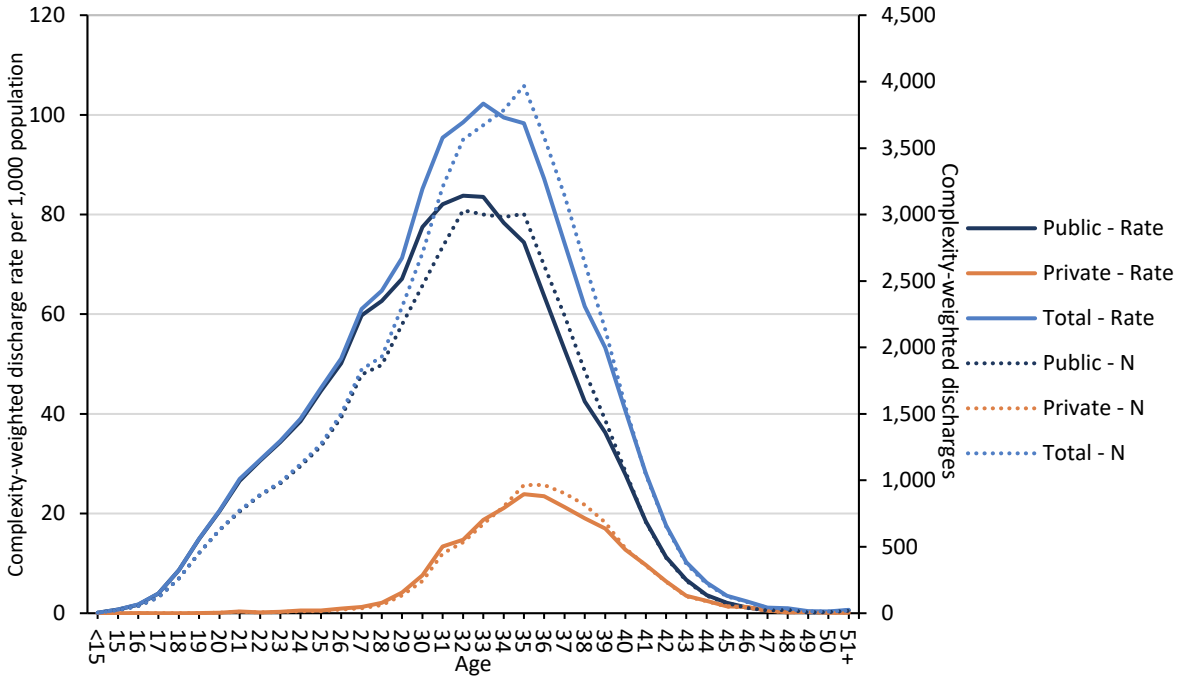


Note: Maternity discharge rates are calculated from the female population aged 14–51 years
Source: HIPE, 2018; ESRI population data, 2018.

5.3.2 In-patients

In 2018 there were 50,738 complexity-weighted maternity in-patient discharges from public acute hospitals, of which 82.7 per cent were public. Maternity in-patient discharges capture delivery and non-delivery episodes of care. Figure 20 presents age-specific complexity-weighted maternity in-patient discharges and discharge rates per 1,000 population, disaggregated by public/private status. The volume of public discharges peaked at 32 years compared to 36 years for private discharges. The public complexity-weighted discharge rate per 1,000 population also peaked at 32 years (83.8 per 1,000 population), compared to 35 years for private discharges (23.9 per 1,000 population). The overall in-patient discharge rate peaked at 33 years (102.3 per 1,000 population).

FIGURE 20 Maternity in-patients– age-specific complexity-weighted discharges and discharge rates per 1,000 population by public/private status, 2018



Note: Maternity discharge rates are calculated from the female population aged 14–51 years.
Source: HIPE, 2018; ESRI population data, 2018.

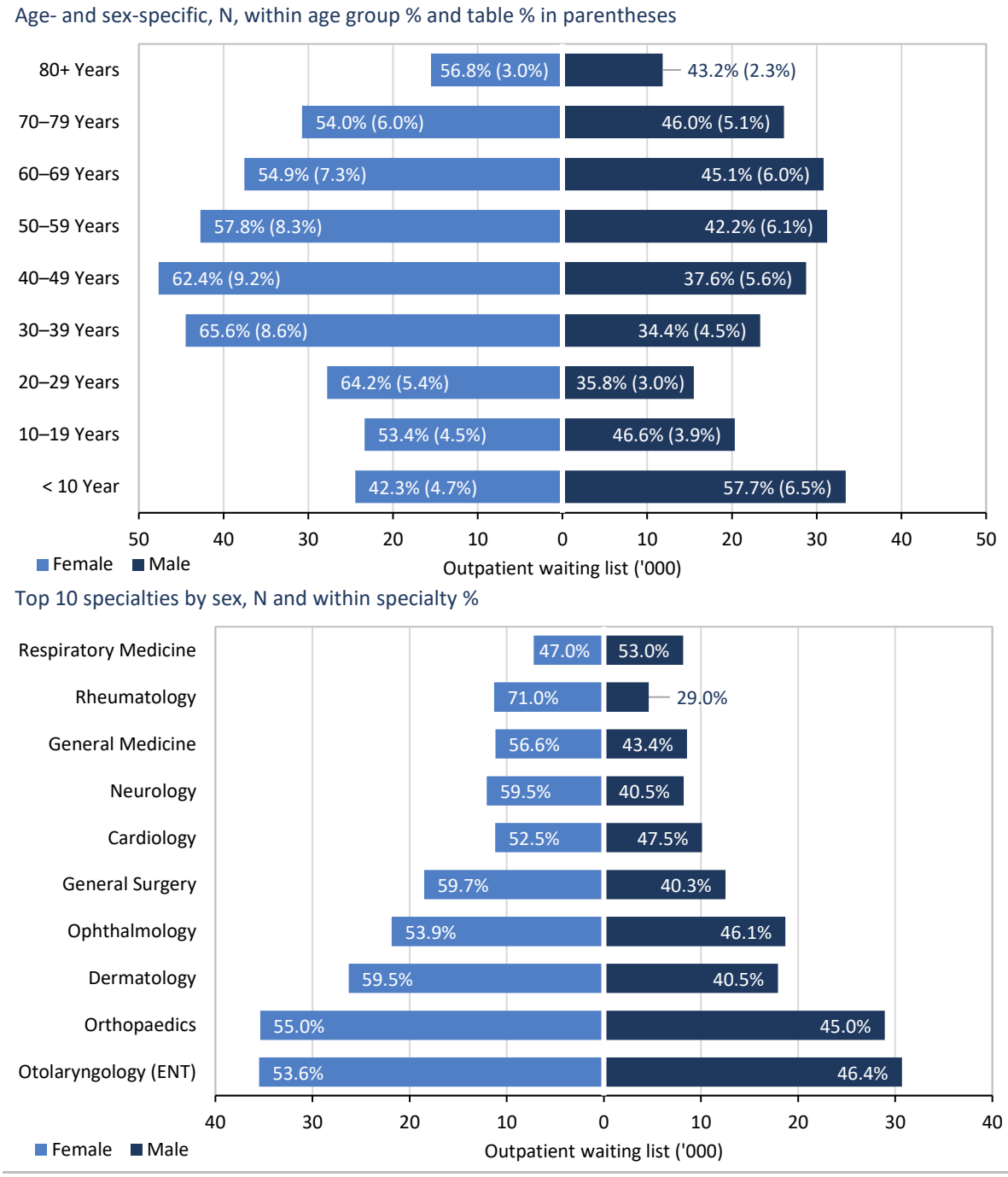
6 SUMMARY

This report has presented the baseline utilisation profiles for a range of services provided in public acute hospitals. These profiles provide the foundation for demand and expenditure projections to 2035, generated from the ESRI's Hippocrates Model in Keegan et al. (2020). The services include public acute hospital ED and OPD attendances, day-patient and in-patient discharges.

APPENDIX 1: NTPF OUTPATIENT AGE, SEX, AND SPECIALTY PROFILE, DECEMBER 2018

Figure A1.1 shows the age- and sex-specific distribution of public patients waiting for a first-time OPD appointment on the NTPF waiting-list at the end of December 2018. The age distribution used for non-maternity OPD is based on this distribution. In all but the youngest and oldest age groups, there were more females than males waiting for an appointment. Taking the top 10 specialities (excluding gynaecology and urology) in terms of numbers waiting for appointments, females outnumber males in 8. For example, of those waiting for a general surgery appointment, 60 per cent are female.

FIGURE A1.1 NTPF: OPD waiting-list profile, end December 2018



Source: NTPF, December 2018.

APPENDIX 2: HIPE HOSPITALS INCLUDED IN HIPPOCRATES, 2018

Hospital Name	County	Hospital Type
Ireland East Hospital Group		
St. Columcille's Hospital*	Dublin	Non-voluntary
Mater Misericordiae University Hospital*	Dublin	Voluntary
St. Vincent's University Hospital*	Dublin	Voluntary
Cappagh National Orthopaedic Hospital*	Dublin	Voluntary
St. Michael's Hospital, Dun Laoghaire	Dublin	Voluntary
Royal Victoria Eye and Ear Hospital, Dublin*	Dublin	Voluntary
National Maternity Hospital, Holles St, Dublin*	Dublin	Voluntary
St. Luke's General Hospital, Kilkenny*	Kilkenny	Non-voluntary
Wexford General Hospital*	Wexford	Non-voluntary
Midland Regional Hospital, Mullingar*	Westmeath	Non-voluntary
Our Lady's Hospital, Navan*	Meath	Non-voluntary
RCSI Hospital Group		
Connolly Hospital, Blanchardstown*	Dublin	Non-voluntary
Beaumont Hospital, Dublin*	Dublin	Voluntary
Rotunda Hospital, Dublin*	Dublin	Voluntary
St. Joseph's Hospital, Raheny	Dublin	Voluntary
Our Lady of Lourdes Hospital, Drogheda*	Louth	Non-voluntary
Cavan General Hospital*	Cavan	Non-voluntary
Louth County Hospital, Dundalk*	Louth	Non-voluntary
Monaghan Hospital	Monaghan	Non-voluntary
Dublin Midlands Hospital Group		
Naas General Hospital*	Kildare	Non-voluntary
St. Luke's Hospital, Rathgar	Dublin	Non-voluntary
St. James's Hospital, Dublin*	Dublin	Voluntary
Coombe Women & Infants University Hospital*	Dublin	Voluntary
Tallaght University Hospital*	Dublin	Voluntary
Midland Regional Hospital, Tullamore*	Offaly	Non-voluntary
Midland Regional Hospital, Portlaoise*	Laois	Non-voluntary
South/South West Hospital Group		
University Hospital Waterford*	Waterford	Non-voluntary
Kilcreene Orthopaedic Hospital	Kilkenny	Non-voluntary
South Tipperary General Hospital, Clonmel*	Tipperary	Non-voluntary
Bantry General Hospital	Cork	Non-voluntary
Mercy University Hospital, Cork*	Cork	Voluntary
South Infirmary Victoria University Hospital*	Cork	Voluntary
Mallow General Hospital*	Cork	Non-voluntary
Cork University Hospital (incl. maternity)*	Cork	Non-voluntary
University Hospital Kerry*	Kerry	Non-voluntary
University of Limerick Hospital Group		
University Maternity Hospital Limerick	Limerick	Non-voluntary
University Hospital Limerick*	Limerick	Non-voluntary
Croom Orthopaedic Hospital, Limerick*	Limerick	Non-voluntary
St. John's Hospital, Limerick*	Limerick	Voluntary
UL Hospitals, Ennis Hospital	Clare	Non-voluntary
UL Hospitals, Nenagh Hospital	Tipperary	Non-voluntary
Saolta Hospital Group		
Roscommon County Hospital	Roscommon	Non-voluntary
Portiuncula Hospital, Ballinasloe*	Galway	Non-voluntary
Galway University Hospitals*	Galway	Non-voluntary
Mayo University Hospital*	Mayo	Non-voluntary
Letterkenny University Hospital*	Donegal	Non-voluntary
Sligo University Hospital*	Sligo	Non-voluntary
Children's Hospital Group		
Our Lady's Children's Hospital, Crumlin*	Dublin	Voluntary
Temple Street Children's University Hospital*	Dublin	Voluntary
Tallaght University Hospital*^	Dublin	Voluntary
No hospital group		
National Rehabilitation Hospital (NRH), Dun Laoghaire	Dublin	Voluntary
Incorporated Orthopaedic Hospital, Clontarf	Dublin	Voluntary

Note: 51 hospitals included in Hippocrates.
*Participate in the HPO activity-based funding process and complete specialty costing returns.
^Tallaght University Hospital adult and paediatric report as one hospital.

Source: HIPE, 2019.

APPENDIX 3: COMPLEXITY-WEIGHTED DISCHARGES

Throughout the report, the measures of day and in-patient utilisation reported are complexity-weighted discharges and discharge rates. The following section outlines what is meant by complexity-weighted. This is not an exhaustive explanation as this can be found elsewhere.[24]

Complexity of hospital discharges is first understood through assignment to **Diagnosis-Related Group**s (DRGs). **DRGs** are a way to classify hospital activity to allow for meaningful comparisons of the number and type of patients treated to the resources used. In Ireland in 2018, there were 807 possible DRGs into which a discharge might be allocated.

For each hospital discharge, a relative complexity score, known as a **relative value** (RV), can be assigned. This is defined as the average cost per discharge for that assigned DRG expressed as a proportion of the average cost per discharge across all DRGs. For example, in 2019 the HPO reported that a relatively low complexity in-patient DRG, tonsillectomy, adenoidectomy (D11Z), has an inlier RV of 0.6 compared with an inlier RV of 28 for heart transplant (A05Z) (Healthcare Pricing Office, 2019b).

In its simplest form, a **weighted unit** is calculated as the RV for a DRG multiplied by the number of discharges[25]. As a weighted unit takes account of the number of discharges and complexity (through the RV), it provides a complexity-weighted measure of activity. It therefore represents a more refined measure of resource use compared to unadjusted discharges or bed days used.

Complexity-weighted discharges = number of discharges x relative complexity

These complexity-weighted units can then be aggregated by patient or hospital-level characteristics to provide insights into variation in resource use. To calculate total expenditure, we multiply complexity-weighted discharges by the base cost as provided by the HPO.

In this analysis we focus on how variation in resource use for selected patient types differs by age and sex as this is key for understanding the impact of projected changes to population structure on projections of public acute hospital expenditure.

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24 See *Introduction to the Price Setting Process for Admitted Patients* (Healthcare Pricing Office, 2015).

25 There are additional complexities related to outlier cases. See *Introduction to the Price Setting Process for Admitted Patients* (Healthcare Pricing Office, 2015).

APPENDIX 4: HIPE UNWEIGHTED AND COMPLEXITY-WEIGHTED DISCHARGES, 2018

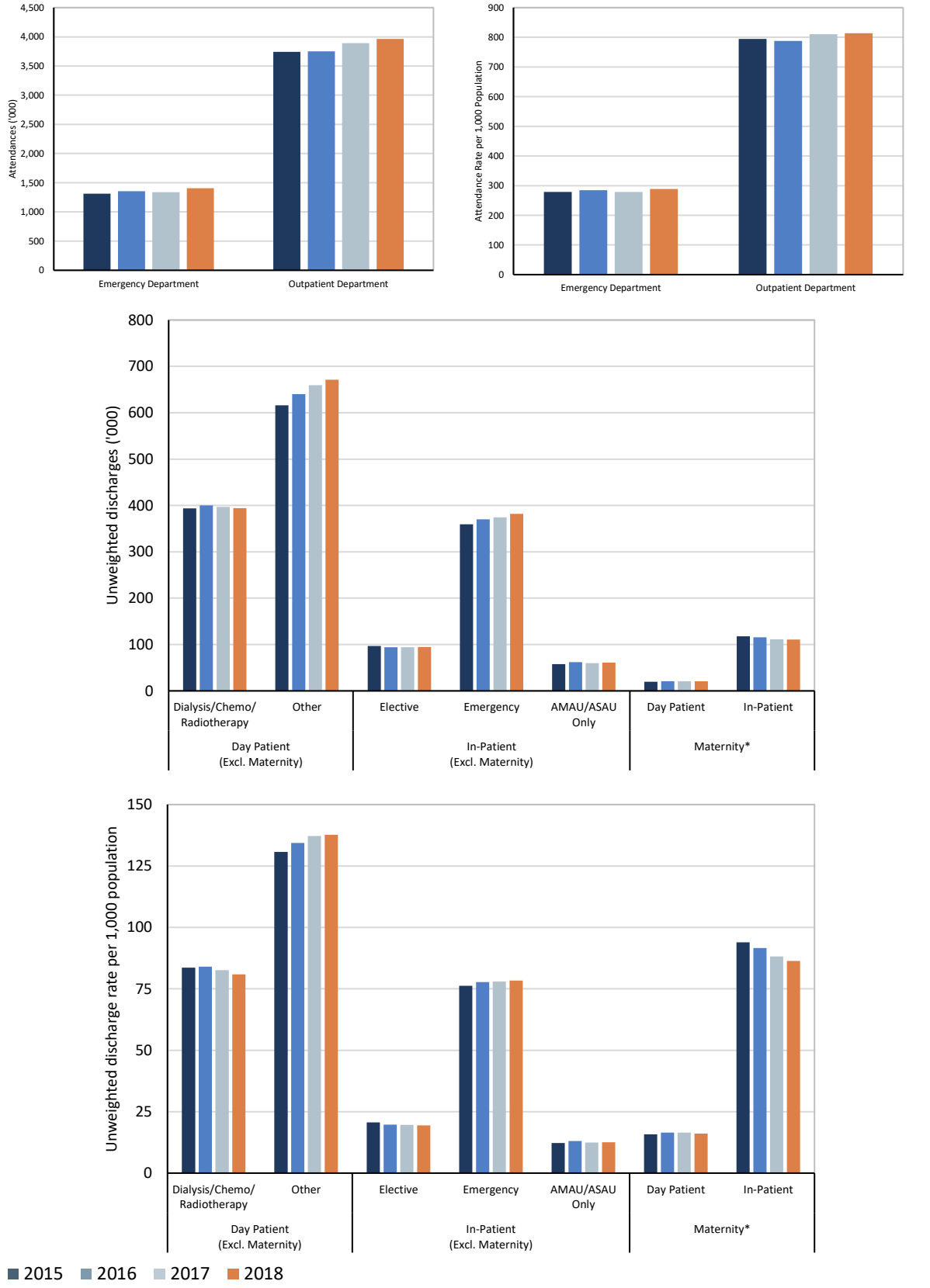
TABLE A4.1 Discharges: unweighted and complexity-weighted discharges by patient type, 2018

	Number of discharges	
	Unweighted	Complexity-weighted
Day patients	**1,065,710**	**1,028,109**
Public	925,049	850,844
Private	140,661	177,265
Dialysis/chemotherapy/radiotherapy	394,397	325,367
Other	671,313	702,742
In-patients	**538,125**	**595,340**
Elective	94,815	158,669
Public	71,963	120,957
Private	22,852	37,712
Emergency	382,178	430,019
Public	321,042	361,005
Private	61,136	69,014
AMAU/ASAU	61,132	6,652
Public	57,029	6,169
Private	4,103	483
Maternity	**131,295**	**-**
Day	20,601	10,715
Public	16,838	8,542
Private	3,763	2,173
In-patient	110,694	50,738
Delivery	59,608	41,507
Public	48,702	33,745
Private	10,906	7,762
Non-delivery	51,086	9,231
Public	45,661	8,207
Private	5,425	1,024
Total	**1,735,130**	**-**

Source: HIPE, 2018.

APPENDIX 5: TRENDS IN UTILISATION, 2015–2018

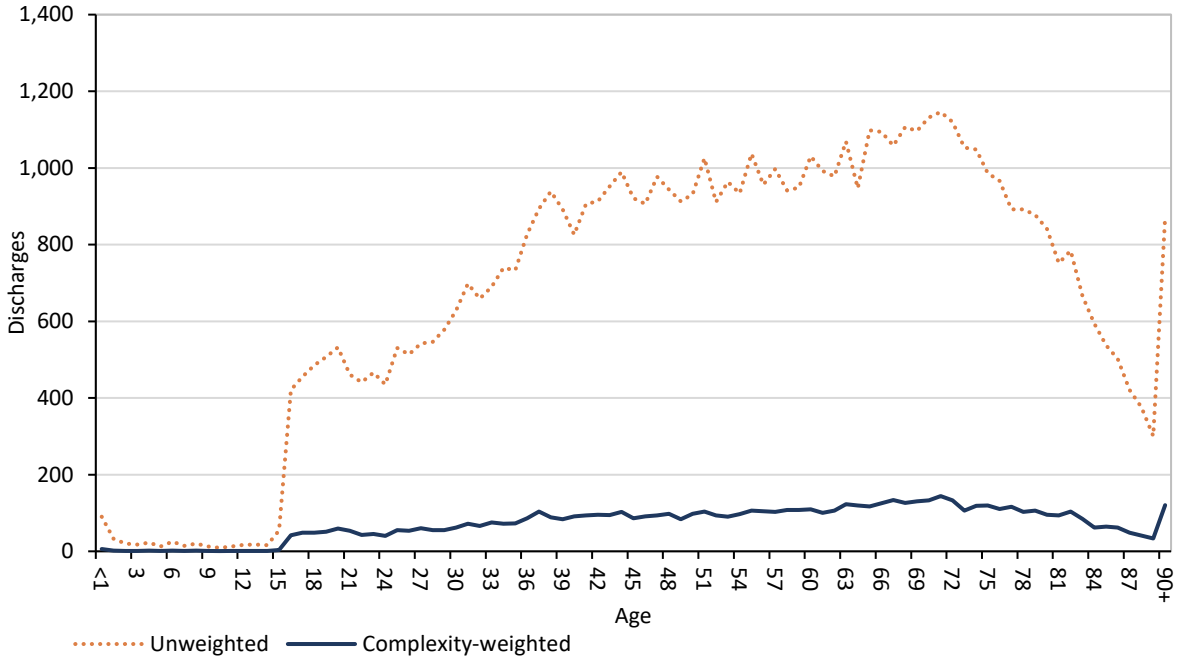
FIGURE A5.1 Unweighted attendances/discharges and attendance/discharge rates per 1,000 population, 2015–2018



Note: * The maternity discharge rates are calculated from the female population aged 14–51 years.
Sources: HPO Specialty Costing, 2018; HSE Patient Experience Time, 2018; HIPE, 2018; ESRI population data, 2015–2018.

APPENDIX 6: UNWEIGHTED AND COMPLEXITY-WEIGHTED AMAU/ASAU IN-PATIENT DISCHARGES, 2018

FIGURE A6.1 Age-specific unweighted and complexity-weighted AMAU/ASAU in-patient discharges, 2018



Source: HIPE, 2018; ESRI population data, 2018.

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Whitaker Square,
Sir John Rogerson's Quay,
Dublin 2
Telephone **+353 1 863 2000**
Email **admin@esri.ie**
Web **www.esri.ie**
Twitter **@ESRIDublin**

ESRI ECONOMIC & SOCIAL RESEARCH INSTITUTE