

The Effect of Changing Demographics on Irish Health Expenditure – An Analysis of Different Approaches and Findings PBO Publication 45 of 2019 – Expenditure Analysis series

Key messages

- Population ageing is likely to add significant pressure to the healthcare system and lead to increases in healthcare expenditure in the coming years. However, the amount of additional public expenditure needed due to the changing demographics is unclear.
- Estimates produced using European Commission figures found that due to demographic change in Ireland, an **annual increase of 1.7%** in health expenditure will be needed in 2020 and 2021. One limitation of this method is that it does not use Irish specific cost data as data on healthcare cost per age group is not available for Ireland. Instead it uses an EU average which might not be reflective of Ireland's position. Efforts should be made to improve the availability of Irish specific data.
- Estimates produced by the Department of Public Expenditure and Reform find that due to demographic change in Ireland, an **annual increase of 0.9%** in health expenditure will be needed in 2020 and 2021. However, these estimates likely underestimate the total cost pressure as they only consider certain components of total health expenditure.
- Estimates produced by the Department of Health find that due to demographic change, an **annual increase of 1.8%** in health expenditure will be needed in 2020 and 2021. These estimates consider a large number of healthcare components, but are based on a large number of assumptions.
- Public health expenditure has been increasing annually with a 6.3% increase seen in 2018.¹ The findings from this paper highlight that approximately **27-31% of the increase can be attributed to demographic change**.
- **Non-demographic factors** are found to be the **main driver of increases** in Irish public health expenditure in recent years. Non-demographic drivers of expenditure include policy changes, price inflation for medical goods, increases in pay and changes in national income.

Introduction

Changes in public expenditure are driven by several factors which can be broken into two categories: demographic and non-demographic. **Demographic factors** refer to how the changing size and structure of the population impacts on public expenditure. For example, if a population grows, this leads to an increase in the amount of public services demanded. Older age groups need more public services than younger age groups, so an increase in the size of this age group will increase demand for public services and drive public expenditure upward. In addition, a decrease in the working age population will decrease revenue, resulting in further pressure on public resources. **Non-demographic factors** refer to all other drivers of public expenditure. This includes policy changes, changes to national income and price changes.

Cost pressures due to changing demographics is largely outside of the control of policy or decision makers. Understanding the amount of public expenditure increases driven by changing demographics is essential in **effectively planning public resources** and assessing decisions regarding budget allocations. Demographic cost pressures are also an important consideration when making decisions regarding the **future of public resources** and **implementing new policies**.

Demographic changes will add pressure to Irish public resources in the future.² Currently, Ireland has a young population and one of the highest birth rates in the EU. However, in the coming years it is expected that the **demography of the country will change substantially**. From 2019 to 2029, CSO projections show that the

1 Based on data published in [Health in Ireland Key Trends 2018](#).

2 For more detail see PBO Publication 1 of (2019) [Demographics and Voted Expenditure](#).

percentage of the population aged over 65 will increase from 14% to 18%, an increase of 250 thousand people aged over 65. The total population is also expected to continue to increase at an average of 0.9% per year for the next decade.

This paper will focus on just one cost area affected by these changing demographics, health expenditure. Analysis of estimations produced under different methods and assumptions by the EU Commission, the Department of Public Expenditure and Reform and the Department of Health, is conducted to explore the complex relationship between changing demographics and Irish public health expenditure.

How do changing demographics affect health expenditure?

On average, **people in older age groups consume more healthcare than younger adults**. Therefore, if the number of people in older age groups increases, it is expected that healthcare expenditure will increase also, as the amount of healthcare being demanded has increased.

However, it is unclear how much an ageing population impacts on healthcare expenditure. It might be the case that as people grow older and live for longer, the number of years spent in ill health increases, so the amount of healthcare demanded by the older age cohorts grows leading to an increase in expenditure. However, it might be the case that as people grow older and live longer, the number of years spent in ill health stay the same while the number of years in good health increases. This would have less of an effect on healthcare expenditure as the amount of healthcare consumed is less than in the previous scenario. A third theory assumes a combination of the previous two, where people live longer with some of these additional years spent in good health but some additional years in ill health. This would lead to an increase in expenditure greater than the first scenario but lower than the second. Due to these competing theories,³ the relationship between changing demographics and health expenditure is uncertain. However, to plan effectively for heightened pressure on public resources and to effectively scrutinise decisions regarding changes in health expenditure, **quantifying the cost pressure on health resources due to changing demographics is essential**.

The approaches analysed in this paper estimate the **'pure' demographic effect** on expenditure, meaning the estimated increase in expenditure if the demography of the country changed but everything else stayed the same. Importantly, this assumes that no policy change occurs, and that the cost of healthcare stays the same i.e. it is not affected by inflation, technological advancements or any other reason for a price change.

This paper will now explore and critically assess the approaches and estimates for the demographic effect on public health expenditure produced by the EU Commission, the Department of Public Expenditure and Reform (DPER) and the Department of Health (DHealth).

EU Commission Estimates

The EU Commission⁴ uses a **"top-down" approach** to estimate the effect of changing demographics on health expenditure across EU countries.⁵ This takes the **high-level**, aggregated data (i.e. per capita expenditure on healthcare) and estimate how the aggregate figure will change, without analysing the components of total expenditure.

The EU Commission sourced data on per capita healthcare cost by age group and sex for EU countries. Interestingly, the EU Commission found that the relative costs by age group were similar across EU countries, meaning that the proportion of total spending by age group is similar across countries. Applying these age group specific healthcare costs to the projected population in each age group over time results in an estimation of the cost pressures due to changing demographics.

3 These theories are called 'expansion of morbidity', 'compression of morbidity' and 'dynamic equilibrium' respectively.

4 Figures relating to age specific costs are sourced from the 2012 EU Commission report as these are the most recent figures that could be sourced. There have been two subsequent reports but it is unclear if more up to date figures have been collected since 2012. The method of projection has remained the same.

5 European Commission (2012) [The 2012 Ageing Report](#).

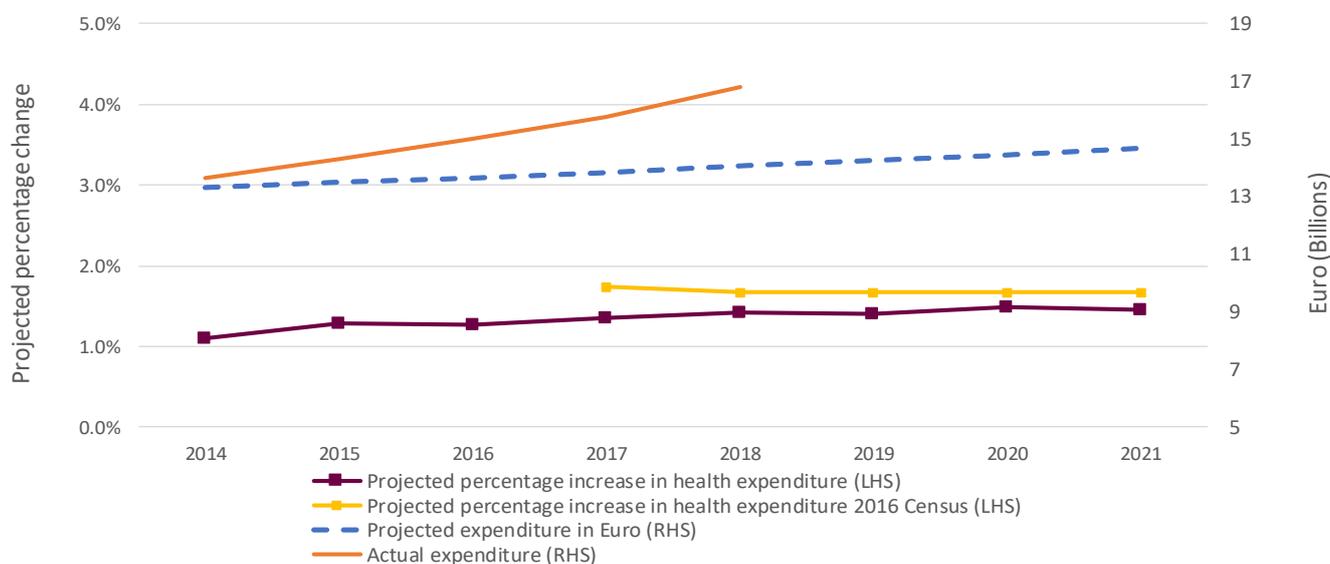
One significant limitation of this method when estimating Irish health expenditure, is that the **cost of healthcare broken down by age group is not available for Ireland** (this is also the case for Romania and Greece). Efforts should be made to improve the availability of this data in an Irish context. Due to the lack of Irish data, an estimate of cost by age group is calculated as an **average of EU 15 countries**. Age specific costs are measured relative to each other, i.e. the healthcare costs of a 75-year-old might be 1.5 times the healthcare cost of a 45-year-old. These relative costs are then applied to Irish population projections to estimate the percentage change in health expenditure due to changing demographics. It is unknown whether average EU relative costs per age group are an accurate reflection of the per capita costs of public healthcare in Ireland.

While there was significant convergence across EU countries for relative costs for age groups between 5 and 70 years old, there is more variation for relative costs of the youngest age group (0 to 5 years) and the oldest age groups (over 70 years), which may reflect different policies in place in different countries for these age groups. Any difference between the average EU costs for these age groups and the actual Irish cost will likely change the demographic cost estimate, as these are the age groups which have the largest impact on demographic cost pressure.

Applying the EU average of relative costs by age group to Irish population projections gives the estimated cost pressure due to a ‘pure’ demographic effect. The results when these estimates are applied to population projections based on the 2011 Census, is shown in figure 1.⁶ The results when estimates are applied to the 2016 Census, are also shown in figure 1. This results in a slight rise in the estimated percentage increase. The estimated total health expenditure when EU Commission estimates are applied and the actual public health expenditure⁷ for the years 2013 to 2017 is also displayed. This can be interpreted as how expenditure was expected to increase if only ‘pure’ demographic cost pressures existed.

This graph shows that healthcare expenditure has increased greater than the estimated ‘pure’ demographic effect. This is unsurprising as the assumptions of ‘no policy change’ and ‘no change in per capita costs’ are unlikely to hold in reality. Actual health expenditure has increased annually by an average of 4% between the years 2014 and 2017, compared to the estimated 1.3% due to demographics. This implies that on average during this period, two thirds of health expenditure growth was due to factors outside of demographics. Additional analysis is required to determine what non-demographic factors drove this expenditure increase.

Figure 1: Actual change vs “pure” demographic change in health expenditure - EU Commission Estimates



Source: PBO calculations on Department of Health estimates using data received from European Commission. Data also sourced from Revised Estimates for Public Services and CSO population projections.

6 Department of Health (2014) *Projected Demographic Effect on Health Service Costs in 2015*.

7 Data sourced from Revised Estimates for Public Services.

Department of Expenditure and Reform Estimates

In the 2016 publication *Budgetary Impact of Changing Demographics 2017-2027*,⁸ DPER outline their approach to estimating demographic cost pressure. They use a “**bottom-up**” approach to estimate healthcare expenditure by breaking total expenditure down into **smaller components** and estimating how expenditure for each component will change due to changing demographics. One benefit of this approach is that it allows for different components of health expenditure to be affected by demographic change in different ways. For example, some components (such as nursing home expenditure) will be significantly affected by an ageing population while other components (such as maternity care) will be affected to a lesser extent. This method allows these expenditure components to change to different degrees.

The estimates produced by DPER focus on **three components** of healthcare expenditure: Acute Services, Primary Care Reimbursement Services (PCRS), and the Nursing Home Support Scheme (NHSS) & Older Persons Services. They estimate that these services make up 80% of total health expenditure and therefore assume that they account for 80% of the total demographic cost pressure on health expenditure. It should be noted however, that within these three components, only a proportion of expenditure is analysed. Components such as expenditure on mental health, disability and ambulance services are not considered in these estimations because age specific cost data is not currently available. As such, these figures **underestimate the ‘pure’ demographic cost**.

Within the projections of **Acute Expenditure** (expenditure on hospitals), only services with per unit costs available are included in the estimates. This includes expenditure related to inpatients (patients admitted to hospital) and daycases (patients admitted to hospital but do not need to stay overnight). Other components of acute expenditure are not included in these estimates such as emergency department (ED) costs and outpatient costs (procedures where patients do not need to be admitted to hospital). It is estimated that DPER estimates **consider 71%** of total acute expenditure.⁹

To estimate the pressure on inpatient and daycase expenditure, DPER uses patient complexity data across procedures to obtain an average cost per age group.¹⁰ Complexity refers to how resource intensive (or costly) each patient’s care was. This data is collected within hospitals for each patient treated as an inpatient and daycase. For these estimations, the average complexity of patients for each age group is calculated. The average complexities by age group is converted to Euro values and multiplied by the projected number of people in each age group, for each year. This results in an estimation of the ‘pure’ demographic cost of acute care for future years.

The second aspect of healthcare analysed is the **Primary Care Reimbursement Service (PCRS)**. PCRS is a state body which is responsible for paying healthcare professionals, such as GPs and pharmacists, for services they provide to patients. This includes payments for services provided to medical card holders, GP card holders, reimbursement for certain pharmaceuticals and payment to other schemes.¹¹ To assess the effect of demographic change on PCRS expenditure, the average payment made by PCRS to each age group is obtained and multiplied by the estimated number in each age group over time.

The third aspect analysed is **NHSS and Other Services for Older People**. It should be noted that for these estimates, unlike the other components, DPER assumes that the cost per person will decrease over the period analysed. This assumption is based on policy knowledge that new entrants to the scheme will be required to contribute more for their care compared to those who previously entered, decreasing the amount of public expenditure needed for new entrants. Projections for numbers on the scheme is based on a model previously produced by DPER.¹²

8 Department of Public Expenditure and Reform (2016) [Budgetary Impact of Changing Demographics 2017-2027](#).

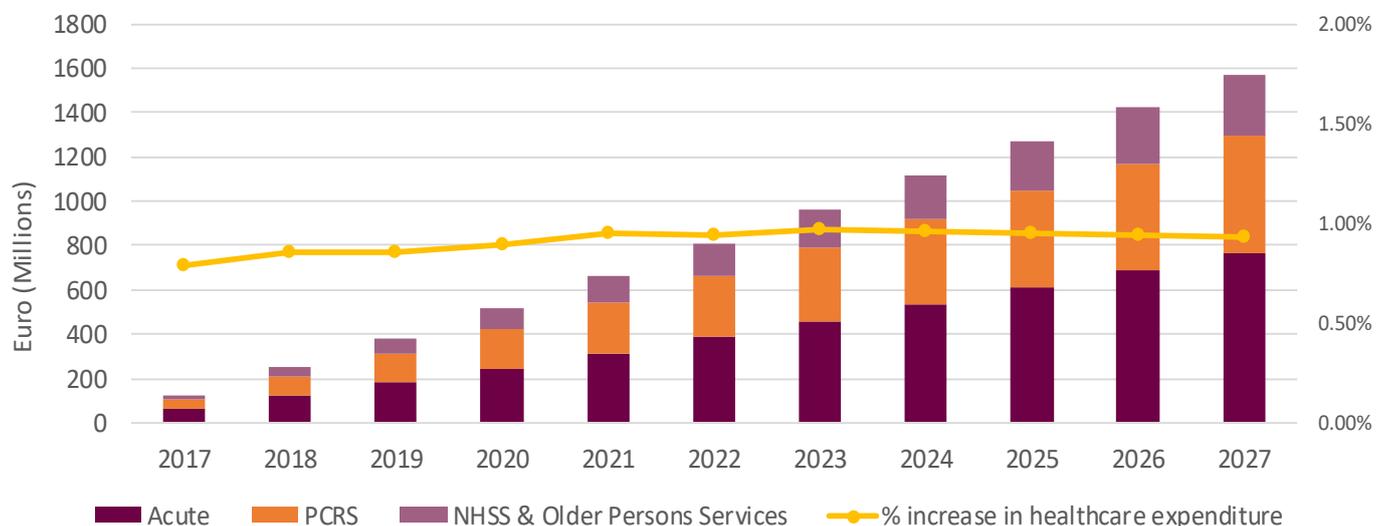
9 Department of Health (2014) [Projected Demographic Effect on Health Service Costs in 2015](#).

10 Age groups used: ‘0-14’, ‘15-44’, ‘45-64’, ‘65-74’, ‘75-84’, ‘85+’. Obtained by PBO from DPER.

11 Other schemes include the Drug Payment Scheme, the Long-Term Illness Scheme, Dental Treatment Services Scheme and Community Ophthalmic Scheme.

12 Department of Public Expenditure and Reform (2015) [Nursing Home Support Scheme](#).

Figure 2: Estimated Cumulative increase in health expenditure by component – DPER method



Source: PBO calculations on Department of Public Expenditure and Reform estimates.

Figure 2 shows the estimated increase in each of these three components following from DPER’s analysis. This analysis projected pure demographic pressure over a decade so figure 2 shows estimates from 2017 to 2027. On average, it’s estimated that due to demographic changes, an additional annual increase of 0.9% will be needed during this period. This estimate uses demographic projections from the 2016 Census and public health expenditure in 2016 from the Revised Estimates for Public Services.¹³ This results in a total cumulative increase of €9.1 billion over this decade. **This average annual percentage change is less than what was estimated using the top-down approach by the EU Commission.** This is likely at least partly due to the exclusion of certain health components in DPER estimates. It should also be noted that these estimates were produced using provisional Census 2016 figures, which are likely to differ slightly from the final published figures.

Department of Health Estimates

In the publication *Projected Demographic Effect on Health Service Costs in 2015*,¹⁴ DHealth outline their method to estimate the effect that changing demographics will have on health expenditure.¹⁵ The approach taken by DHealth is broadly the same as the approach taken by DPER (**bottom-up approach** which estimates age-related costs for different healthcare components and applies these costs to population estimates). However, the DHealth approach includes more components of health expenditure (based on alternative assumptions) and for this reason the estimates produced by DHealth capture more of the total ‘pure’ demographic cost pressures on health expenditure.

Expenditure is broken down into **components** including acute services, PCRS, mental health services, disability services, nursing home care, statutory pensions, health & wellbeing, ambulance and primary care. **These estimates include a larger proportion of expenditure compared to DPER estimates**, as all current healthcare components are included.

For some components, the same method as DPER was used to obtain age-related costs and apply these to projected demographic change. This is the case for inpatient and daycase procedures within acute services, and for approximately 75% of total PCRS costs.

13 Department of Health (2018) *Health in Ireland Key Trends 2018*.

14 Department of Health (2014) *Projected Demographic Effect on Health Service Costs in 2015*.

15 It should be noted that since this paper was published, the HSE have refined this method and have published new estimates in *Planning for Health 2017*. However, as a detailed description of the method has not been published, this paper describes the method published by DHealth in 2014.

Where the breakdown of age-related costs was not available, costs were estimated using **different assumptions**, based on utilisation rates and/or population growth rates. These estimates and assumptions are broken down by healthcare component and summarised in Table 1.

It should be noted that DHealth only published estimations of the change in expenditure between 2014 and 2015 needed to meet demographic change. To understand how estimates produced using this approach compare to the approaches used by DPER and the EU Commission, the PBO have used figures published in the 2014 DHealth document (including the population projections based on 2011 Census data) and the assumptions made to estimate the demographic effect on health expenditure up to 2021.¹⁶

Table 1. Summary of assumptions underlying Department of Health estimates

Healthcare Component	Estimated Average Annual Increase in € (Millions) 2015-2021	Projection Assumptions
Acute (inpatient and daycase)	54.5	Age-related cost multiplied by projected number in age group.
Acute other	15.5	Estimates a high estimate of 1.4% increase and a low estimate of 1% increase. PBO calculations have taken the midpoint.
PCRS GMS (age-related costs available)	36.3	Age-related cost multiplied by projected number in age group
PCRS non-GMS (age-related costs available)	6.5	Age-related cost multiplied by projected number in age group
PCRS Other	7.7	Assumes high estimate of a 2% increase and a low estimate of a 0.6% increase. PBO calculations have taken the midpoint.
Mental Health	6.2	Assumes growth in expenditure equal to expected growth in service utilisation
Disability	13.4	
Primary Care	5.6	Assumes growth in expenditure equal to expected population growth
Health and wellbeing	1.8	
Multicare Group	0.9	
National Services	1.5	
NHSS	36.5	Assumes growth in expenditure equal to expected growth in those over 65
Older People	22.8	
Ambulance	5	
Statutory Pensions	18.8	Assumes growth in expenditure equal to expected growth in those over 60
Total	232.4	

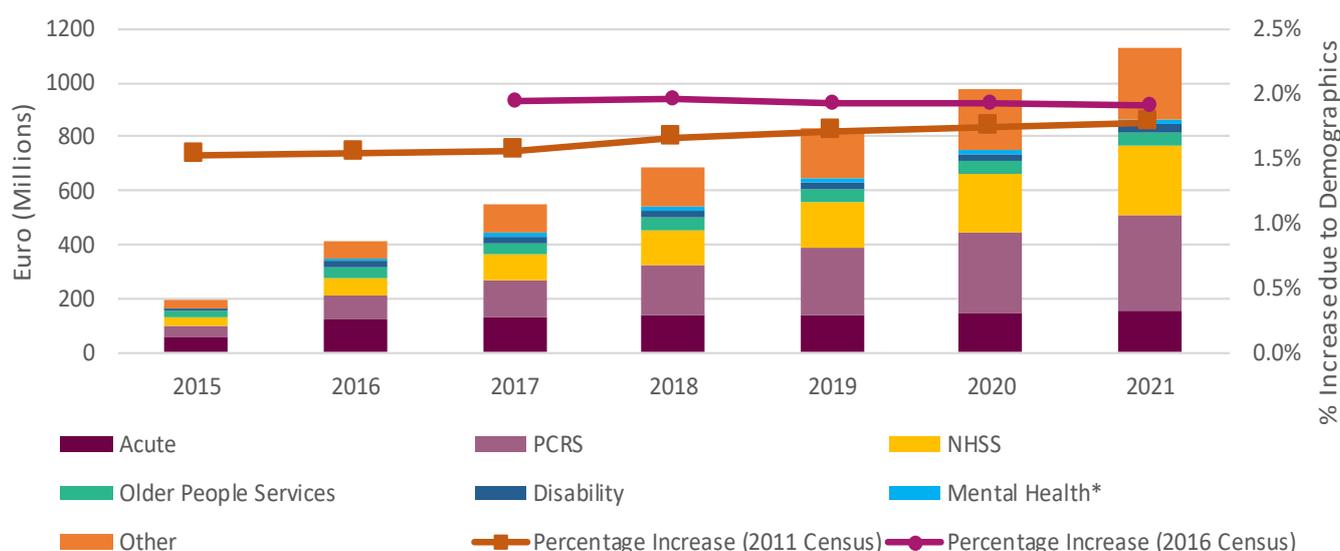
Source: PBO calculations using data and method from Department of Health

Note: Since 2014, some of these categories have been subsumed into other categories or have had titles changed.

¹⁶ In calculating this, the PBO took the midpoint of high and low estimates of growth where relevant.

Figure 3 shows the estimated increase in health expenditure due to ‘pure’ demographic change by healthcare component, for the years 2015 to 2021. The total demographic pressure is estimated to be €4.8 billion from 2015 to 2021. When analysed as a percentage of the Health Budget 2014,¹⁷ this equates to an **average annual increase of 1.7%**.¹⁸ Efforts have also been made to update these estimates using Census 2016 population projections, the results of which can also be seen in figure 3.¹⁹ These estimates suggest that there will be an **average 1.9% annual cost pressure** from 2017 to 2021 due to demographic change.

Figure 3: Estimated Cumulative increase in health expenditure by component – DHealth estimates



Source: PBO Calculations on DHealth figures, CSO Census data and data from Revised Estimates for Public Services.

* The figure for mental health in 2021 could not be estimated with DHealth figures. It is assumed that the annual increase in mental health in 2021 will be the same as in 2020.

These projections estimate a larger demographic cost pressure on health expenditure than either estimates from the EU Commission or from DPER. The increased pressure estimated by DHealth compared to DPER is likely due to the increased number of health components included in the DHealth method. The other main difference between these methods are the assumptions made on NHSS costs. On the basis of policy knowledge (the expectation that less expensive individuals will gradually replace the current more expensive individuals), DPER assumed that relative cost per person on NHSS will decrease in future, whereas DHealth assumed that relative cost per person will stay the same.

Implications for Health Expenditure

The different estimates of cost pressures analysed in this paper have different implications as to how much additional expenditure is needed to meet these demographic pressures.

Figure 4 shows the estimated annual increase in cost pressure due to demographic change using DPER’s method. It shows that an estimated average of €143 million is needed annually to meet demographic pressures. Figure 5 shows the annual increase using estimates produced by DHealth which finds that an estimated €239 million is needed annually to meet demographic pressures. The average annual difference between the two sets of estimations is €117 million.

17 Budget figures as stated in Projected Demographic Effect on Health Service Costs in 2015. These figures have been used as they form the base of these projections.

18 This average decreases to 1.6% when calculated as a percentage of public health expenditure 2014 published in the Revised Estimates for Public Services.

19 It should be noted that in estimating these figures, a number of components are still projected using utilisation rates based on 2011 Census data.

Figure 4. DPER Estimated Demographic Increase

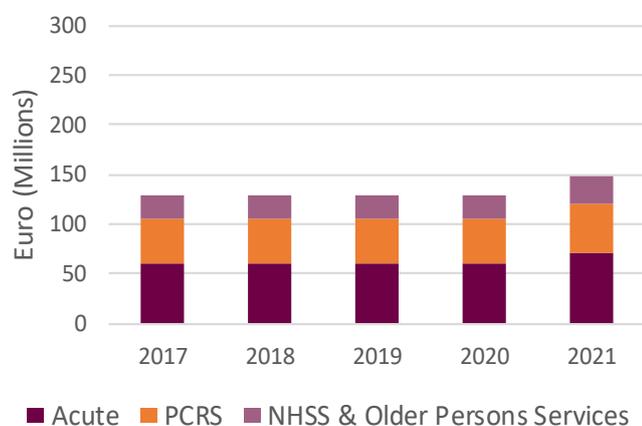
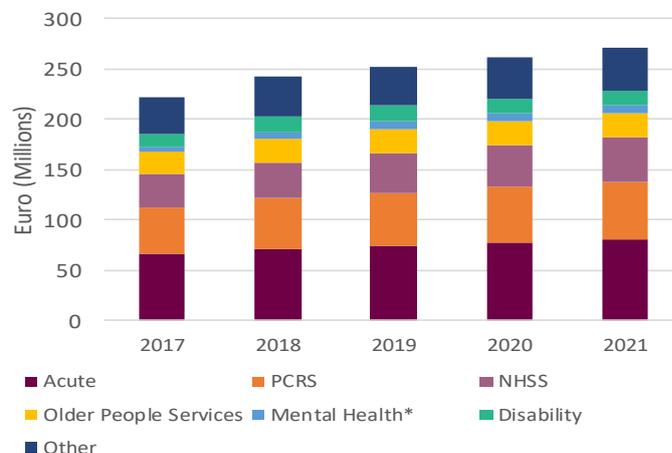


Figure 5. DHealth Estimated Demographic Increase



Source: PBO Calculations on DPER and DHealth figures.

* The figure for mental health in 2021 could not be estimated with DHealth figures. It is assumed that the annual increase in mental health in 2021 will be the same as in 2020.

Looking back, it is estimated that public health expenditure increased by 6.3% between 2017 and 2018.²⁰ Estimates produced by DPER suggest that 14% this increase was due to demographic factors. Taking DHealth estimates, 27% to 31% of this increase is due to demographic factors. The EU Commission also estimates that 27% of this increase is due to demographics pressures. It follows that, **regardless of estimate used, the majority of the increase was due to factors other than demographic change. This could be explained by changes to policies, increases in service provision or increases in the price of medical goods.**

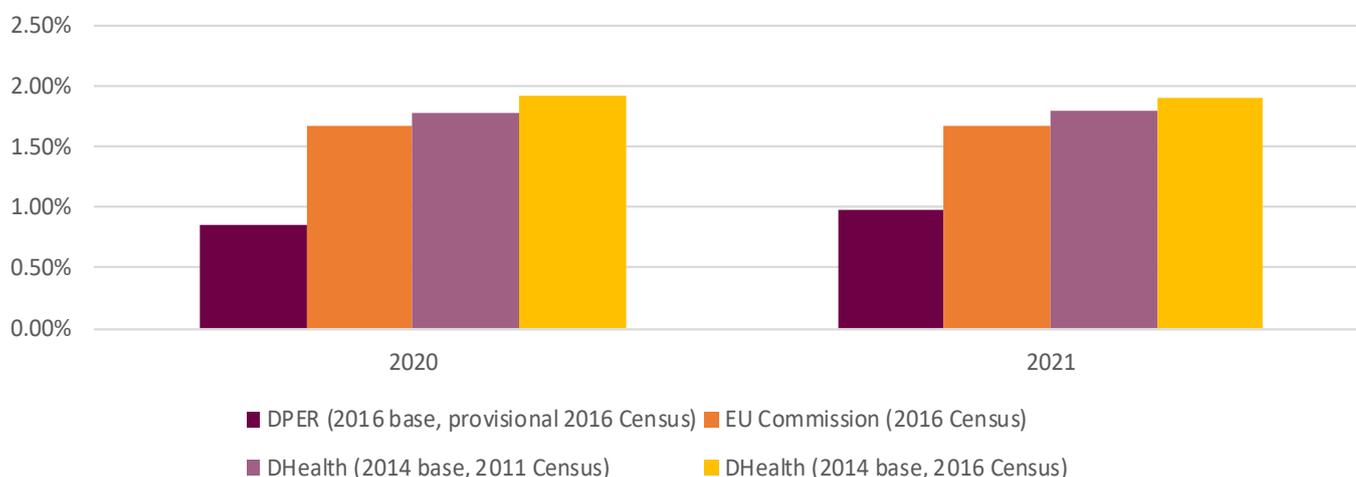
Table 2 shows a summary of the three approaches analysed in this paper and the estimates for demographic health expenditure costs produced by each approach. Figure 6 compares these estimates for the years 2020 and 2021. The approach taken by DPER produces the lowest estimates for the impact that changing demographics will have on health expenditure. The EU Commission and DHealth approaches produce similar estimates with DHealth producing the slightly higher estimate.

Table 2: Summary of Approaches and Estimations

Approach	Approach Taken	Components Included	Main Limitations	Average Annual increase from 2017-2019	Average Annual Increase from 2020-2021
EU Commission	Top-Down	Aggregated total expenditure	Not using Irish specific cost data	1.7%	1.7%
DPER	Bottom-Up	Portion of Acute and PCRS. NHSS & Older Persons Services	Underestimation, as not all health components are included	0.9%	0.9%
DHealth	Bottom-Up	Acute, PCRS and NHSS & Older Persons Services, Mental Health, Disability, Corporate social care, Primary Care, Health and Wellbeing, Older People, Ambulance Service, National Services, Statutory Pensions, Multicare Group, Corporate, 'Other'.	Based on several assumptions	1.7-1.9%	1.8-1.9%

20 Department of Health (2018) *Health in Ireland Key Trends 2018*.

Figure 6: Estimates of Cost Pressure as Percentage of Total Health Expenditure due to Demographic Change in 2020 and 2021



Source: PBO calculations using data from EU Commission, DPER and DHealth publications

It has been found that demographic factors have driven changes in health expenditure to a lesser extent than non-demographic factors in the past, regardless of which estimates are analysed. Taking the midpoint of the estimates from the EU Commission and DHealth, it is estimated that total health expenditure will experience an upward cost pressure of 1.8% annually in the years 2020 and 2021 due to ‘pure’ demographic factors.

If the average annual growth rate of total health expenditure persists at 4.6%, 39% of this increase will be explained by demographic factors. This means that non-demographic factors, such as policy changes or price changes, will drive the majority of the increase in health expenditure.

To effectively manage public resources, consideration needs to be given to these demographic drivers when considering policy changes which could drive health expenditure even further. Additional research is needed to determine the key non-demographic factors driving health expenditure in Ireland.

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