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Towards Population-Based Funding for Health: Model Proposal

CONOR O'MALLEY, TIAGO MCCARTHY, ANDREW HANNIGAN & NIAMH BUCKLE.

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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 Department or the Minister for Health.

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Executive Summary

Background

- Population-Based Resource Allocation (PBRA) is a funding model for health planning that seeks to distribute available healthcare resources according to population need in order to promote efficiency and equity in both health outcomes and distribution of resources.
- The Irish healthcare system is undergoing substantial reform with a commitment to implement new Regional Health Areas (RHAs) with a PBRA funding model by 2024.
- RHAs will be regional divisions within the Health Service Executive (HSE) with the objective of aligning hospital and community care services, promoting innovation, integrated care, efficiency, clinical and corporate governance, and accountability.
- Implementation of a PBRA has been approved by Government included in the Sláintecare Action Plan 2021 - 2023 and as part of the Business Case on Regional Health Areas, subject to a further Government decision. Its introduction is also a recommendation of the OECD's 2022 Economic Survey of Ireland.
- Work is underway to develop an Implementation Plan for Government approval and this paper informs the decision on an appropriate PBRA model for inclusion. The integration of the PBRA model and reformed financial governance and reporting systems will be addressed through the Implementation Plan.
- This paper follows on from McCarthy et al., (2022) 'Towards Population-Based Funding for Health: Evidence Review & Regional Profiles' and Johnston et al., (2021), 'Moving beyond formulae: a review of international Population-Based Resource Allocation policy and implications for Ireland in an era of healthcare reform' - commissioned by the Department of Health (DoH), HSE, and Health Research Board (HRB).

Methods

- Informed by the findings of McCarthy et al., (2022) and Johnston et al., (2021) this paper proposes a preliminary PBRA model for implementation and provides indicative results. The model proposed is an illustrative one which is designed to inform ongoing discussions as to what the final model may look like.
- Model inputs include preliminary high-level results from Census 2022, HSE expenditure data, the Pobal HP Deprivation Index, as well as available age-cost data. Where data is lacking or further evidence is required, arbitrary weightings are used.
- These indicative/preliminary results show an estimate of the share of expenditure going to each RHA by programme level from 2016 - 2021 and the 'guide' shares resulting from the application of the model. Given current limitations in financial reporting, these results are a calculated estimate of expenditure by RHA.

Findings/Recommendations

- This paper recommends the use of a needs-adjusted capitation model to allocate funding to the new RHAs, subject to Government decision and in consultation with the Department of Public Expenditure and Reform.
- The model proposed adjusts RHA populations by an Age-Sex Index, a Deprivation Index, and a Rurality Index.

- It is recommended that only HSE Acute and Community expenditure be subject to the PBRA over the short to medium term. This excludes all expenditure that does not form part of a Hospital Group (HG) or Community Healthcare Organisations (CHO). This represents 50.1% of 2019 HSE operational expenditure and amounts to €8.14bn. It is recommended that the Nursing Home Support Scheme (NHSS or ‘Fair Deal’), the Primary Care Reimbursement Scheme (PCRS), and Disability Services not be included in the initial application of the PBRA.
- The results of the PBRA model applied in this paper point to indicative ‘guide’ PBRA expenditure shares being broadly similar to the current budget allocation by RHA. This is particularly true with regard to the large expenditure programmes of Acutes, Older Persons, Mental Health, and Primary Care.
- In line with international best practice, it is recommended that a permanent Advisory Group for the design and monitoring of the PBRA be established. It is recommended that this group is chaired by the DoH, and comprises members of the HSE, RHAs, DoH, Central Government, as well as academic experts in the area of health resource allocation models. This group should be supported by an appropriate secretariat. All the work of this advisory group should be made publicly available in the form of detailed reports on the formula/methodology and data used.
- The establishment of such a group will allow for refinement of the model as part of the ongoing Implementation Plan which includes the commitment to establish a shadow PBRA budget cycle in 2023 – a deliverable highlighted in the Sláintecare Action Plan 2022.
- Ireland’s ability to pursue a best-in-class PBRA model is constrained by data availability. The operation of the PBRA will benefit from forthcoming improvements in the data landscape such as the full roll out of a robust PPSN based Individual Health Identifier and the Integrated Financial Management System. This will allow for a greater analysis of the relationship between healthcare need, utilisation, expenditure, and variables such as deprivation and rurality.

Estimated allocation of funds subject to PBRA from 2016 – 2021 (€m)

	RHA A	RHA B	RHA C	RHA D	RHA E	RHA F
2016	1,688	1,525	1,271	1,003	573	1,263
2017	1,793	1,620	1,345	1,047	616	1,334
2018	1,888	1,709	1,429	1,110	649	1,406
2019	2,012	1,802	1,523	1,179	693	1,490
2020	2,159	1,906	1,620	1,256	760	1,564
2021	2,306	2,017	1,777	1,357	833	1,719

Estimated allocation of funds subject to PBRA, 2021 funding (€m)

	RHA A	RHA B	RHA C	RHA D	RHA E	RHA F
Acute	1,672	1,422	1,213	905	545	1,144
Primary	152	159	166	123	95	169
Social Inclusion	46	62	14	21	11	10
Palliative	19	33	9	14	13	16
Mental Health	211	170	194	139	76	187
Older Persons	206	171	181	155	93	193
Total	2,306	2,017	1,777	1,357	833	1,719

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1. Introduction

1.1 Policy Context

Set out in the Sláintecare reform programme is the commitment to implement Regional Health Areas (RHAs) in order to align acute, community, and social care services (Houses of the Oireachtas Committee on the Future of Healthcare, 2017). In April 2022, a Business Case that considered two different potential models of regionalisation that could meet the Sláintecare objectives was presented to Government. Government decided to proceed on the basis that RHAs be set up administratively within the Health Service Executive (HSE) structure as regional divisions. As shown in Figure 1, RHAs are geographically defined entities which largely align to county lines – with exceptions in the case of Dublin, Cavan, Tipperary, and Wicklow. It is possible to aggregate from Local Healthcare Organisations (LHOs) to RHAs. An Implementation Plan which will include the detailed design of the new RHA structures is now being developed and is due to be completed by 2023, with RHAs being fully operational from January 2024, subject to Government approval. A resource allocation model, also to be introduced in 2024, is a key part of the Implementation Plan under development.

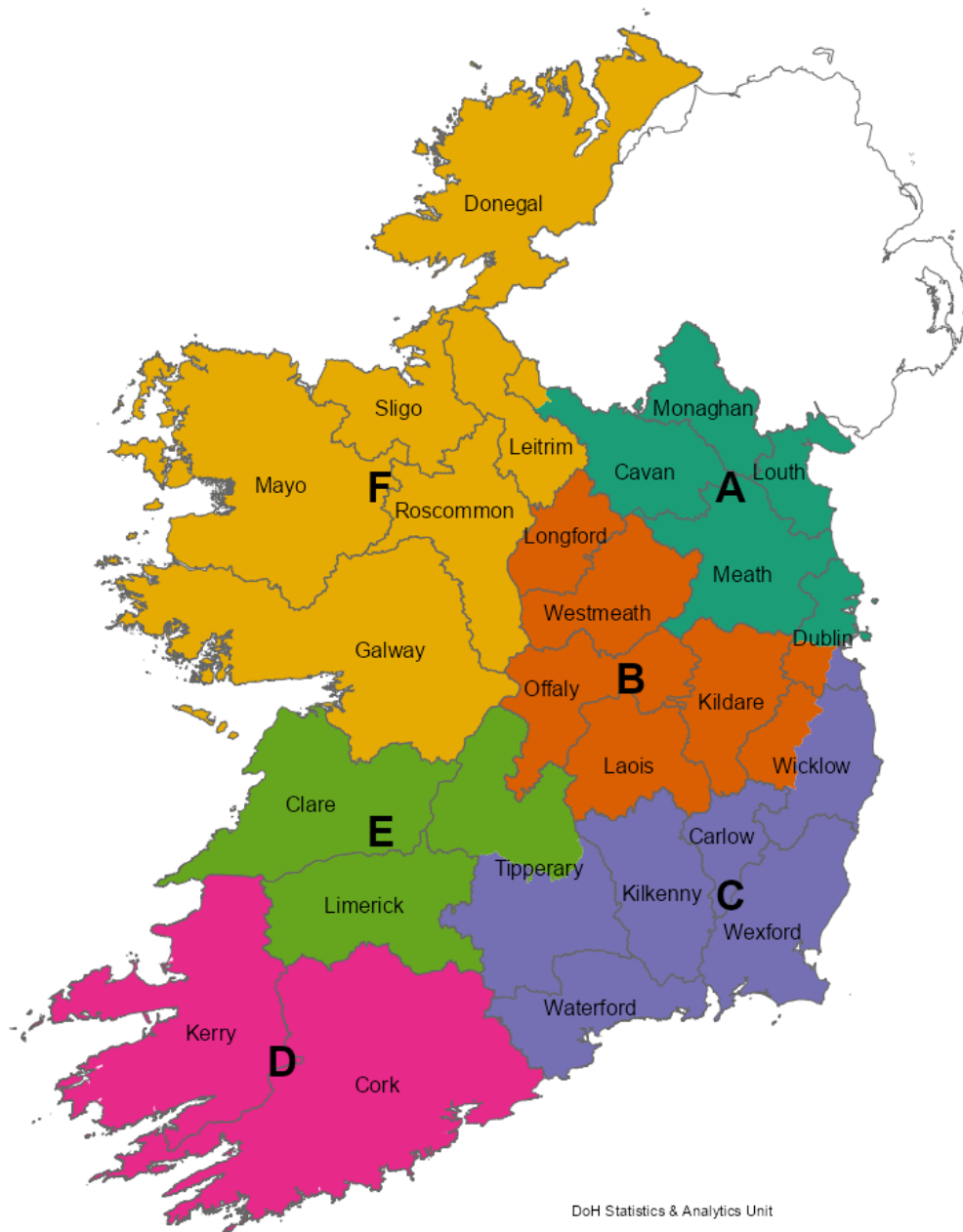
As highlighted in the ‘Business Case for the Implementation of Regional Health Areas’ (Department of Health, 2022), health and social care in Ireland is currently largely provided through seven Hospital Groups (HGs), and nine Community Healthcare Organisations (CHOs). These delivery systems are independent structures that operate separately and do not overlap in terms of management, geographies, budgets, or clinical governance. Restructuring health delivery structures along regional lines will help with the streamlining of multiple corporate and clinical governance lines, provide one budget per regional population, and allow for the delivery of a joined-up integrated care service with six regional management systems, as opposed to the sixteen that are currently in place across HGs and CHOs. The existence of one management structure per region, with their own budgets, would also help to deliver more accountable and transparent corporate governance and greater efficiency and innovation at the local level.

The Sláintecare report (2017) contained a commitment towards implementing Population-Based Resource Allocation (PBRA) as the means to allocate funding to the new RHAs:

‘A resource allocation model is required that allows for equity of access to health services across different geographic areas, taking into account population need, demographics, deprivation and other measures’ (Houses of the Oireachtas Committee on the Future of Healthcare, 2017: p. 21).

This method of funding allocation will enable RHAs to address the health and social care needs of their local populations. This holistic, person-centred approach is central to the RHA vision, which aims to facilitate timely access to integrated healthcare services for service users closer to home. Aligning hospital-based and community-based services and balancing national standards of care with local decision-making will ensure that populations receive quality services tailored to their local needs, improve their health and wellbeing, and enhance their experience of the health service.

Figure 1: Geographies of the Regional Health Areas



1.2 Rationale for PBRA

Any funding model for healthcare should be capable of achieving both efficiency and equity in the allocation of existing resources. An advantage of the PBRA model in delivering on these goals is the linking of expenditure to the healthcare ‘need’ of a population. This funding model promotes efficiency as there is an incentive for the recipient of the funds to reduce the activity as well as the cost of the activity provided (Rice and Smith, 1999). This funding model encourages allocative efficiency by incentivising provision of preventative services, health screening, and diagnostic screening with the argument that it is less expensive than providing treatment services, whilst incentivising care to be provided for in the least complex setting. PBRA also promotes integrated care,

a key feature of the Sláintecare reform programme, and a feature that presents opportunities to improve outcomes and efficiencies.

As argued by The King's Fund (2013, p. 5):

'the ability to look at overall expenditure for defined populations and user groups and to use budgets flexibly is one of the hallmarks of integrated care. This is important in enabling commissioners and integrated or multidisciplinary teams to allocate resources efficiently and ensure that needs are met in the most appropriate and cost-effective way.'

In an Irish context, the strength of a PBRA model needs to be assessed in the context of the current funding structure. Historically, decisions on what health and social care services are to be provided, and the allocation of those budgets are decided from proposals from hospital institutions, rather than being decided on a strategic analysis of a region's population need. Additionally, the current seven Hospital Groups (HGs) and nine Community Healthcare Organisations (CHOs) have delivery systems which do not overlap in terms of management, clinical oversight, or budget. Tackling duplication and fragmentation through the amalgamation of these services into six geographically contained areas should result in a less bureaucratic processes and help realise efficiencies.

1.3 Objective of Review

The purpose of this Spending Review is to further contribute to the evidence building required for the consideration of the most appropriate PBRA model to be implemented in 2024. This paper follows on from 'Towards Population-Based Funding for Health: Evidence Review & Regional Profiles' (McCarthy et al., 2022) published in September this year. That paper reviewed methodological literature on PBRA frameworks used internationally¹ with a view to informing the implementation of a PRBA model in an Irish context, with consideration given to methodology and data used. Informed by the findings of the literature review, potential Irish data sources were considered and statistical profiles of the new RHAs were presented with regard to relevant variables.

McCarthy et al., (2022) followed an earlier review carried out by Johnston et al., (2021), 'Moving beyond formulae: a review of international Population-Based Resource Allocation policy and implications for Ireland in an era of healthcare reform'. Commissioned by the Department of Health (DoH), HSE, and Health Research Board (HRB), the paper examined the objectives, impacts, and outcomes of PBRA models across six high-income countries with a view to informing strategic decision-making as Ireland progresses its universal healthcare reform agenda.

The model proposed in this Spending Review paper is not intended to be the final model or included in the Implementation Plan submitted to Government for approval. As a Spending Review, it is one of several inputs across Government departments to inform the evidence base needed to reach a decision as to what the model should look like and how it could operate. There are ongoing discussions across a variety of stakeholders, including the Sláintecare Finance Workstream, to decide what the official PBRA model proposed in the Implementation Plan should look like. It is envisioned that the fundamentals of the final model, e.g., inclusion of need variables, will be in line with the model in this Spending Review. However, more work is necessary, and efforts are ongoing to better understand and determine the weightings that should be applied for the deprivation and rurality variables. The weightings used in this paper are arbitrary numbers and chosen to illustrate how regional differences

¹ The selection of jurisdictions was based on three criteria: high-income countries, availability of documents in English, and similarities in health system funding models to Ireland. The selected jurisdictions are Alberta, Canada; England; New South Wales, Australia; New Zealand; Northern Ireland; and Scotland.

might be taken into account, but ultimately would be inappropriate for official use in the allocation resources.

The process of implementing a PBRA model is intended to be an iterative one, with the expectation that the model will evolve over time as both the quantity and quality of data improves. Section 9 of this paper focuses on the current data limitations, but also shows how ongoing work should help maximise the potential of a PBRA model in the near future.

1.4 Methods

Informed by the findings of Johnston et al., (2021), and McCarthy et al., (2022), this paper presents a preliminary PBRA model for implementation in an Irish context and provides indicative results. The model proposed is an illustrative one which is designed to inform ongoing discussions between the DoH and HSE as to what the final model may look like. Preliminary high-level data from Census 2022, HSE expenditure data, the Pobal HP Deprivation Index as well as available age-cost data² are used as model inputs. Indicative/preliminary results show the share of expenditure going to each RHA by programme level from 2016 - 2021 and the 'guide' shares resulting from the application of the model. The term 'guide' is used throughout the paper, as altering resources based on a PBRA model need to be carried out over the medium to long term. While budgets in the short term may be allocated based on historical expenditure shares between the RHA geographies, the PBRA 'guide' rates can be used to alter these shares over time, delivering a funding allocation that is more reflective of relative population need. Given current limitations in financial reporting, the expenditure data utilised in this paper are a calculated estimate of expenditure by RHA.

1.5 Findings/Recommendations

This paper recommends the use of a needs-adjusted capitation³ model to allocate funding to the new RHAs as part of the Sláintecare reform, subject to Government decision and in consultation with the Department of Public Expenditure and Reform. The proposed model adjusts RHA population shares⁴ by an Age-Sex Index, a Deprivation Index, and a Rurality Index. The results of the PBRA model applied in this paper point to 'guide' PBRA expenditure shares being broadly similar to the current budget allocation by RHA. This is particularly true for large expenditure programmes including Acutes, Older Persons, Mental Health, and Primary Care. It is recommended that only HSE Acute and Community expenditure be subject to the PBRA model over the short to medium term. This excludes all expenditure that does not form part of a Hospital Group (HG) or Community Healthcare Organisations (CHO). It is recommended that the Nursing Home Support Scheme (NHSS or 'Fair Deal'), the Primary Care Reimbursement Scheme (PCRS), and Disability Services not be subject to PBRA in the initial application.

In line with international best practice and as outlined in McCarthy et al. (2022), it is recommended that a permanent Advisory Group for the design and monitoring of the PBRA be established. It is recommended this group is chaired by the DoH and comprises members of the HSE, RHAs, DoH, and Central Government, as well as academic experts in the area of health resource allocation models. This composition would be similar to that of the advisory group in Scotland (TAGRA, 2012). This group should be supported by an appropriate secretariat. All the work of this advisory group should be made publicly available in the form of a detailed report on the formula/methodology and data used. The

² This publication includes results based on HIPPOCRATES, the ESRI healthcare projection model. Information on all HIPPOCRATES-related publications can be found at <https://www.esri.ie/research/health-and-quality-of-life/hippocrates-model>. Responsibility for the results and interpretation in this document rests with McCarthy et al., Department of Health and not with the ESRI.

³ Sometimes called 'weighted capitation'.

⁴ Allocating based just on population shares is the same as a pure capitation approach, with no adjustment/weighting.

formula should be reviewed annually and any recommended improvements, and adjustments made, should be published.

2. Proposed Model

Population-Based Resource Allocation (PBRA) is a funding model for health planning that seeks to distribute available healthcare resources according to population need to promote allocative efficiency and equity in both health outcomes and distribution of resources (Johnston et al., 2021; Penno et al., 2013; Rice & Smith, 2001). PBRA policies are considered vital in decentralisation processes by distributing healthcare resources in a manner which reflects variation in regional/local population profiles (Johnston et al., 2021).

In the first instance, PBRA is a means to distribute resources to the new RHAs to enable one budget per region to 'de-silo' acute and community budgets and management processes. However, further defining of the PBRA's objective is important. Johnston et. al, (2021) highlight the need to explicitly identify the stated objectives of the model at the outset of policy development to inform its design.

... "before any technical aspects of the model should be considered, clearly defining the objectives and rationale of the model is key. International evidence suggests that this is critical since the overarching goal will influence the type of model or approach required to achieve it" (p.18).

2.1 Objective

After considering examples of stated objectives internationally⁵, as well as the objectives of the RHA reform, the following objective is proposed:

*The objective of the PBRA is to **fairly distribute available funding** between RHAs according to the **relative needs** of their populations and the **relative cost** of providing health and social care services to meet those needs.*

Available funding is largely determined by prevailing economic conditions and forecasted Government revenue. Therefore, any decision with regard to increases in Government expenditure is taken considering its impact on fiscal sustainability. The Department of Finance annually establishes the upcoming budgetary parameters in its Summer Economic Statement and sets out sustainable increases in Government expenditure.⁶ This is taken as the initial input into the PBRA model and constitutes the *available funding* in the above proposed objective. What follows is a description of the proposed inputs into the model that are used to adjust allocations based on the 'relative need' of RHAs stated in the proposed objective. There is also an input that estimates the impact of difference in 'relative cost' in the proposed objective - in particular, unavoidable excess cost due to rurality.

2.2 Input Variables

2.2.1 Population Size

In order to fairly distribute available funding according to the relative need of the RHA populations, any PBRA model must account for the characteristics of a population that determine health and social care needs. Given this, PBRA models are 'designed primarily to be driven by population-based factors' (NSW Health, 2005). To account for differences between geographical areas, population size is the starting point for PBRA formulae (Radinmanesh et al., 2021). Across the six formulae investigated by

⁵ See Johnston et al., (2021) for a detailed consideration of objects of PBRA formula implemented in other jurisdictions.

⁶ For example, SES 2022 set out an increase of 6.5% in Core Government Expenditure. <https://www.gov.ie/en/press-release/a7fcd-government-sets-out-parameters-for-budget-2023/>

McCarthy et al., (2022) population size was the main and most consistent determinant included in each of the models. Therefore, the starting point in the proposed PBRA model is population size. Section 3 of this paper looks at RHA population shares using preliminary results from Census 2022.

2.2.2 Age-Sex Index

Some variation of Age-Sex cost weights are applied in each of the models previously analysed and the input is second only to population size in importance in PBRA models (Penno et al., 2013). The inclusion of Age-Sex cost weights reflects the fact that there exists significant variation in demand for healthcare across age-groups and by sex. For instance, women during childbearing years have generally a higher demand for healthcare resources than men of a similar age. Similarly, there is increased healthcare demand amongst older populations than younger, with a corresponding substantial increase in healthcare costs per capita. Section 3 analyses available Age-Sex cost profiles and proposes their use for the derivation of an Age-Sex Index. The Age-Sex Index is determined through the use of the observed relationship between age, sex, and expenditure per capita in acute public hospital expenditure (Keegan et al., 2020) and the estimated expenditure (authors' calculations) from utilisation rates by age and sex in Older Persons services (Walsh et al., 2021) and Palliative Care (May et al., 2020). In particular, the cost per capita for each five-year age band by sex is compared to the average national per capita cost, to derive relative age cost profiles. These relative age cost profiles by five-year age bands are then applied to the actual (or projected) population distribution in an RHA. The new Age-Sex adjusted population for each RHA is calculated as a share of the total Age-Sex adjusted population and then normalised to the total actual (or projected) population size. Dividing this normalised Age-Sex adjusted RHA population ($Age_Sex\ Adj\ Pop_{RHA_n} Norm$) by the actual (or projected) population ($Actual\ Pop_{RHA_n}$) gives the Age-Sex Index ($Age_SexIndex_{RHA_n}$) for that RHA as per equation 1 below.

$$(1) \text{Age_Sex Adj Pop}_{RHA_n} Norm \div Actual\ Pop_{RHA_n} = Age_SexIndex_{RHA_n}$$

Equation 1 - Age-Sex Index for RHAs

2.2.3 Deprivation Index

Various measures of socioeconomic status or deprivation are used in PBRA formula internationally (Penno et al., 2013; Radinmanesh et al., 2021). This is due to the established relationship between deprivation and health need (Duffy et al., 2022). New Zealand uses the New Zealand Index of Socioeconomic Deprivation by quintiles to adjust for socioeconomic factors in the funding formula (Ministry of Health, 2016). In Alberta, Canada, socioeconomic characteristics are accounted for by including two population groups that reflect low-income status; individuals under the age of 65 years receiving social assistance during the year; and individuals under the age of 65 years with subsidised healthcare premiums (Alberta Health and Wellness, 2007). In New South Wales, Australia, the socioeconomic status of the Area Health Services (AHS) is measured using the Index of Education and Occupation (EDOCC) developed by the Australian Bureau of Statistics Socio-Economic Indexes for Areas (SEIFA) Index (NSW Health, 2005).

In an Irish context a deprivation measure that incorporates the entire country and can be used for the purposes of this model is required. This paper utilises the Pobal HP Deprivation Index developed by Trutz Haase and Jonathan Pratschke. Based on the 'Small Area' statistics in the Census 2016, the HP Deprivation Index is used to show the level of overall affluence and deprivation by RHA. It uses three dimensions of affluence/disadvantage: Demographic Profile, Social Class Composition, and Labour

Market Situation.⁷ Section 3 derives an index using the HP Index to be applied to each RHA. The approach taken in this paper is to apply a cost weighting of 1 (same as no cost weighting) to those who are categorised as being ‘non disadvantaged’, 2 to those who are categorised as ‘disadvantaged’, 3 to those who are ‘very disadvantaged’ and a cost weighting of 4 to those categorised as ‘extremely disadvantaged’.

Like with the Age-Sex Index, these adjusted populations are normalised to the actual (or projected) population total ($Dep Adj Pop_{RHA_n} Norm$). This normalised adjusted rate is divided by the actual (or projected) RHA population ($Actual Pop_{RHA_n}$) to determine a Deprivation Index for each RHA ($DepIndex_{RHA_n}$) as per equation 2 below.

$$(2) Dep Adj Pop_{RHA_n} Norm \div Actual Pop_{RHA_n} = DepIndex_{RHA_n}$$

Equation 2 - Deprivation Index for RHAs

2.2.4 Rurality Index

Multiple PBRA formulae include a rurality or dispersion adjuster to account for the unavoidable excess costs associated with service delivery in rural areas (TAGRA, 2010; Johnston et al., 2021). However, there is no one standardised definition of rurality or accepted measurement of how rural an area is. The New South Wales model integrates the ARIA Index (Accessibility and Remoteness Index of Australia) into its Health Needs Index component. It is calculated via ‘scoring populated localities on the basis of road distance from centres of population greater than 5,000 persons to four categories of designated service centres’ (NSW Health, 2005), and weighted on a scale of zero to twelve. The New Zealand Population-Based Funding Formula (PBFF) model includes a Rural Adjuster which has seven different components to account for increased costs and diseconomies of scale incurred by different regions (Penno et al., 2013). Scotland includes an effort to account for ‘unavoidable excess costs of supply’ which specifically highlight the relative costs of providing services to different geographic areas’ (TAGRA, 2010).

One of the more prominent aspects of rurality that PBRA attempts to adjust for is the increased travel costs faced by service providers. Rural regions may spend disproportionately more on travel expenses such as petrol and maintenance of vehicles by virtue of the fact their clients are more dispersed across a district area. In addition to higher fuel consumption, employees working in rural areas may spend more time travelling, and consequently spend less time performing their caring role, than someone in a more densely populated area⁸. In the case of New South Wales, Kirigia (2009) notes that travel is one of the biggest barriers to accessing healthcare in rural regions and adds additional costs components in providing services to rural populations. New Zealand’s Rural Adjuster specifically recognises the greater travelling distances and time by health professionals in rural areas (Penno et al., 2012). In determining their ‘unavoidable excess costs’, Scotland factors in ‘travel-based community services’, such as the time it would take professionals to drive out to patients’ homes to provide care (TAGRA, 2012).

Analysis of expenditure related to travel and subsistence with regard to HSE community expenditure and comparing this measure to population density does not present clear results. Further work is required as part of the proposed advisory group’s deliberations as to the effect of rurality of excess costs on the delivery of care, particularly in the community. Furthermore, the potential lower

⁷ For detail on the construction of the HP Deprivation Index see Haase & Pratschke (2017)

<https://www.pobal.ie/app/uploads/2018/06/The-2016-Pobal-HP-Deprivation-Index-Introduction-07.pdf>

⁸ It should be noted that an urban location may indirectly increase costs, owing to the higher cost of living associated with urban areas which can lead to higher staff wages. A notable case of this is the High-Cost Allowance in the NHS England. It is less likely to be an issue in Ireland given wages are set at a national level.

productivity of those who spend a significant amount of time travelling to patients in the community could warrant increased staff to match the same rate of service in an urban setting. For the purposes of this model, data from Census 2016 on the rate of the population in a RHA that lives in a highly rural/remote area⁹ is given an arbitrary weighting of 2. The chosen figure is arbitrary in nature and is done so to illustrate the established impact of rurality on cost of care, rather than reflecting a specific relationship.

This is applied in the same way as the Deprivation Index, by adjusting the size of the RHAs population based on the cost weighting applied and estimated rate of people that the cost weight applies to.

$$(3) \text{ Rur Adj Pop}_{RHA_n} \text{ Norm} \div \text{Actual Pop}_{RHA_n} = \text{RurIndex}_{RHA_n}$$

Equation 3- Rurality Index for RHAs

2.2.5 Mortality/Morbidity

In some other jurisdictions, mortality and morbidity are used to adjust capitation models. For example, New South Wales uses a Health Needs Index which includes a Standardised Mortality Ratio¹⁰ for ages below 70. The use of mortality and morbidity measures would likely add to a PBRA model in an Irish context. However, this is caveated by the risk of double counting that may arise from including a mortality/morbidity index as well as a Deprivation Index, as mortality and morbidity are strongly correlated with deprivation. Therefore, it is recommended that the proposed advisory group considers the use of mortality/morbidity data of the RHAs as part of their deliberations.

2.2.6 Relevant HSE Expenditure

One of the main objectives of the implementation of RHAs is the unification of HG and CHO management structure and budgets. Therefore, this paper proposes that the PBRA model should initially only apply to HG and CHO expenditure. NHSS expenditure is not considered within the allocation for now, due to how this expenditure is allocated and agreements on prices reached¹¹. PCRS is also not included for similar reasons - that is, prices are the result of national agreements and not within the authority of the RHA¹². With regard to Acute expenditure, national specialist hospitals are omitted (e.g., Children's Health Ireland). Disability services are also excluded due to a small number of high-cost cases not enabling a population-based approach at this time.

The datasets constructed for the following analysis use the HSE Performance Review datasets published annually. These provide a breakdown of expenditure and income across acute hospitals and community healthcare programmes from 2016 - 2021. These reports publish such information at the individual hospital and the Local Health Organisation level. Whilst current Community Healthcare Organisation do not map seamlessly onto RHAs, their subcomponents - LHOs - do, enabling a figure for each RHA across the timespan to be calculated.

9 Rural areas (themselves defined as having an area type with a population less than 1,500 persons, as per Census 2016) are allocated to one of three sub-categories, based on their dependence on urban areas. Employment location is the defining variable. The allocation is based on a weighted percentage of resident employed adults of a rural Small Area who work in the three standard categories of urban area (for simplicity the methodology uses main, secondary, and minor urban area). The percentages working in each urban area were weighted through the use of multipliers. See <https://www.cso.ie/en/releasesandpublications/ep/p-urli/urbanandrurallifeinireland2019/introduction/>

10 A standardised mortality ratio (SMR) describes whether a specific population (e.g., patients in a certain area) are more, less, or equally as likely to die than a standard/ reference population (e.g., patients across the entire country).

11 In addition, prices are negotiated between an independent body, the NTPF, and the nursing homes.

12 It has been argued that PCRS already incorporates some of the principles of PBRA. General Practice capitation rates are negotiated based upon the age and sex of Medical Card holders, with fees and allowances.

2.3 Proposed PBRA Model

2.3.1 Formula

The 'guide shares' from the PBRA model are arrived at through equation 4 below, where $ProjPop_{RHA_n}$ is the projected population of an RHA:

$$(4) ProjPop_{RHA_n} \times Age_SexIndex_{RHA_n} \times DepIndex_{RHA_n} \times RurIndex_{RHA_n} = AdjPop_{RHA_n}$$

Equation 4- PBRA Model

$Adj Pop_{RHA_n}$ is then divided by the total adjusted population of the RHAs to get a 'guide share'. Section 4 shows the results of this application across the RHAs going back to 2016 and compares this to where expenditure was actually allocated by programme area and RHA.

2.3.2 Simplicity and Parsimony

Several countries highlight simplicity as a key goal in constructing their resource allocation formulae. For instance, the funding formula used in Alberta, Canada explicitly states that the model needs to be 'parsimonious', whilst the Scotland PBFF aims for 'practicality' in constructing its formula (Johnston et al., 2021). In New South Wales, the Resource Distribution Formulae (RDF) Advisory Committee recommended that the formula be 'comprehensible' and that the 'overall model should be understandable to those without a technical background' (NSW Health, 2005).

The goal of PBRA is to allocate resources in an efficient manner, but in order to succeed they need to ensure buy-in from different stakeholders (Kirigia, 2009). It has been argued that models which are straightforward are better positioned to achieve this trust and buy-in (Buck & Dixon, 2013). A simplified model should be easy to understand by policymakers, politicians, and other non-expert individuals; promote trust and confidence in the formula; and be better positioned to achieve buy-in to the wider idea of population-based health (Buck & Dixon, 2013; Kirigia, 2009).

The England 'fair shares' model is one of the more complex models and has been criticised for straying from the stated goals of 'simplicity' and 'parsimony' (Buck & Dixon, 2013; Johnston et al., 2021). Buck & Dixon (2013) argue that the addition of multiple variables 'significantly increases complexity, making the outputs more difficult to understand and for politicians and other decision makers to question the basis of the formula'. Buck & Dixon (2013) also contend that the supposed benefits of additional variables, e.g., greater precision, may not be as significant as assumed, with diminishing returns to accuracy once the key demographic variables are considered. Evidence from New South Wales demonstrates that a 'complex' model is 'poorly understood' by both policymakers and executives within the NSW health system, leading to mistrust of the Resource Distribution Formula (RDF) and questions over the extent to which it has been properly implemented (Kirigia, 2009). In New Zealand, a frequent criticism of the PBFF is a lack of transparency around the variables used and a view that the model is unfairly allocating resources between districts (Penno et al., 2013).

2.3.3 Further Model Development and Governance

Many of the countries that have adopted PBRA have set up advisory groups to help ensure that their models are updated with the latest data and are fine-tuned where issues arise. The PBRA model is intended to be iterative and will continually be updated based on the latest research.

Scotland

The NHS Scotland Resource Allocation Committee (NRAC) was established in 2005 to 'improve and refine' the Arbuthnott Formula (the precursor to the current NRAC Formula) (TAGRA, 2022a). One of the recommendations from the NRAC's Final Report was the need for an ongoing review to ensure

that the formula for allocating funds was properly monitored. In response to this recommendation, the Technical Advisory Group on Resource Allocation (TAGRA) was created with a responsibility for the construction, maintenance, and development of the NRAC formula (TAGRA, 2022b).

Membership of TAGRA comprises a mixture of health board members (mainly finance directors), academics/experts in the area, representatives from ISD (Information Services Division of NHS Scotland) and Analysts from the Health Department of the Scottish Government. The group are expected to meet three times a year and the work is ongoing with no set end date (TAGRA, 2022b).

Within TAGRA, there are two subgroups: The Remote and Rural subgroup and the Morbidity and Life Circumstances (MLC) subgroup. The Remote and Rural subgroup is responsible for work relating to out of hours services, estimating 'de minimis cost of services', and better understanding the factors within the unavoidable excess cost adjustment (TAGRA, 2022c). The MLC subgroup follows on from the recommendation that the morbidity and life circumstances components of the NRAC formula be refreshed and updated every three years (TAGRA, 2022d). The work on updating the MLC by TAGRA is done on a rolling basis. It has been responsible for two programmes – changes to the Acute MLC Indices and examining the Mental Health and Learning Difficulties Programme (TAGRA, 2022d).

New South Wales

The Resource Distribution Formula (RDF) Advisory Committee has a responsibility to 1) advise on ongoing refinement of the RDF, and 2) conduct research on factors influencing the RDF including a revised health needs index, treatment of patient severity, and health needs of special groups (NSW, 2005). The Committee is Chaired by the Director of Inter-Government & Funding Strategies Branch, and members have clinical, health administration, and academic background (NSW, 2005)

New Zealand

Within the Ministry of Health, New Zealand has a PBFF Technical Advisory Group (TAG) to review the model. The committee contains medical professionals, civil servants, economists, and District Health Boards (DHB) representatives. Their findings in the 2015 technical report were presented to the Ministry's Policy Advice Improvement Group. TAG commissioned Sapere, an independent research team, to review the rural and tertiary adjusters (Penno et al., 2012).

Ireland

With regard to the establishment of an Irish PBRA, it is recommended that a permanent advisory group be established to decide on the methodology used and to update the PBRA as required. It is recommended that this group be chaired by the Department of Health and its members comprise the HSE, RHAs, DoH, Central Government, as well as academic experts in the field. This advisory group would publish the initial formula and the methodology used as well as any subsequent updates to the formula. This advisory group should be supported by an appropriate secretariat to provide research and analytical support. Further work, including the Terms of Reference for the PBRA committee is currently ongoing.

As highlighted in McCarthy et al., (2022) the ability of Ireland to pursue a best practice approach is constrained by the lack of a fit for purpose unique health identifier and the inability to match utilisation and cost to other characteristics of people or groups (e.g., socioeconomic status). Work is currently underway on the Health Information Bill which will legislate for the use of a fit for purpose individual health identifier. This would enable more robust patient-level data and assist in the development of the PBRA. Therefore, in the future better data can inform the work of the advisory group as improvements are made to the PBRA over time.

3. PBRA Model Construction

3.1 Population Size

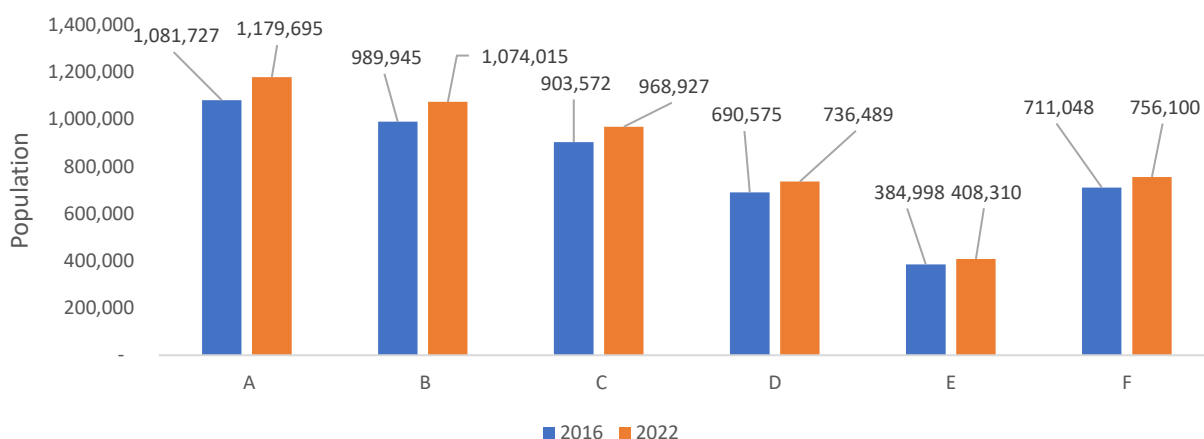
Preliminary results from Census 2022 show that the State’s population increased by 362,000 (+7.6%) since Census 2016, increasing from 4.76 million to 5.12 million. When looking at the preliminary change in population by RHA, it is evident that the greatest increase occurred in RHA A with an estimated additional 98,000 (+9.1%), rising from 1.08m to 1.18m. The estimated compound annual growth rate (CAGR) for the population in RHA A during the intercensal years is 1.5%. The smallest estimated increase in population was seen in RHA E with 23,000 (+6.1%) with an annual CAGR of 1.0%.

Table 1: Preliminary RHA Population in 2022 compared to 2016

RHA	A	B	C	D	E	F	Total
Census 2016	1,081,727	989,945	903,572	690,575	384,998	711,048	4,761,865
Census 2022	1,179,695	1,074,015	968,927	736,489	408,310	756,100	5,123,536
2016 - 2022 % Change	9.1%	8.5%	7.2%	6.6%	6.1%	6.3%	7.6%
CAGR	1.5%	1.4%	1.2%	1.1%	1.0%	1.0%	1.2%

Source: CSO Census 2016, preliminary results CSO Census 2022 and authors’ calculations.

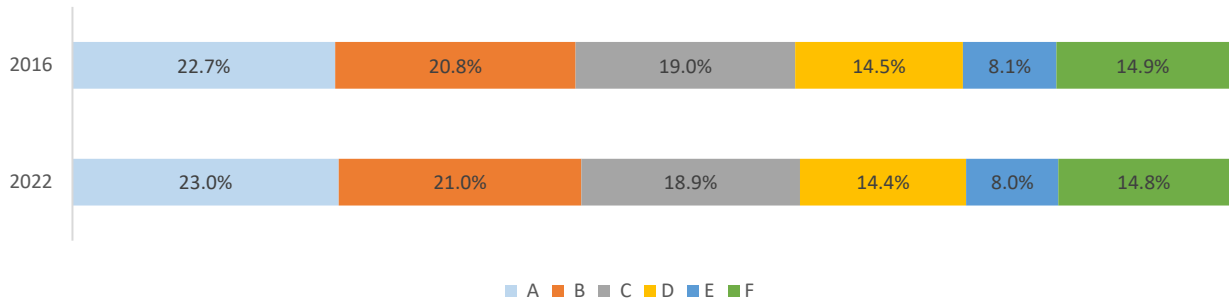
Figure 2: Preliminary RHA Population in 2022 compared to 2016



Source: CSO Census 2016, preliminary results CSO Census 2022 and authors’ calculations.

When looking at the change in the share of each RHA population, marginal changes are observed during the intercensal period. RHA A made up 23.0% of the population in 2022, compared with 22.7% in 2016 a 0.3 percentage point (pp) increase. RHA B’s share of population also increased at a rate of 0.2pp (20.8% to 21%). RHAs C, D, E, F all saw a reduction in the shares of the total population of -0.1pp.

Figure 3: RHA % of the Total Population 2022 vs 2016.



Source: CSO Census 2016, preliminary results CSO Census 2022 and authors' calculations.

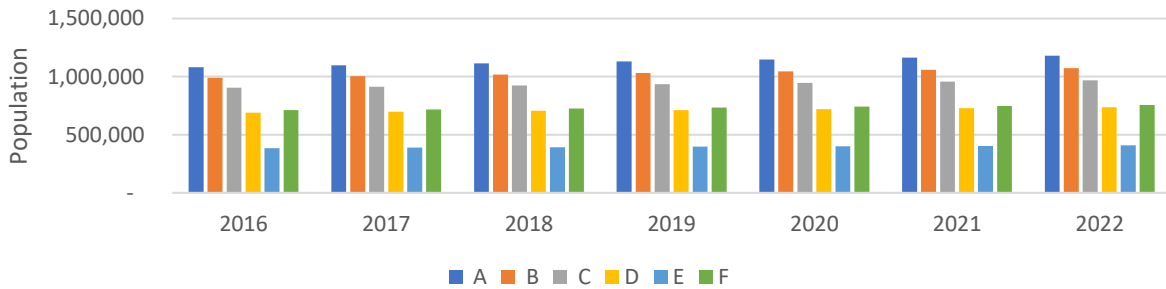
In order to estimate RHA populations for the intercensal period for the purposes of this paper, the intercensal CAGR is applied annually to each RHA. The results are shown in Table 2 and Figure 4¹³.

Table 2: RHA Estimated Population 2016 - 2022

RHA	A	B	C	D	E	F	Total
2016	1,081,727	989,945	903,572	690,575	384,998	711,048	4,761,865
2017	1,097,471	1,003,485	914,150	698,024	388,789	718,366	4,820,284
2018	1,113,444	1,017,210	924,852	705,552	392,617	725,759	4,879,435
2019	1,129,649	1,031,124	935,679	713,163	396,483	733,228	4,939,325
2020	1,146,091	1,045,227	946,633	720,855	400,387	740,774	4,999,966
2021	1,162,772	1,059,523	957,715	728,630	404,329	748,398	5,061,367
2022	1,179,695	1,074,015	968,927	736,489	408,310	756,100	5,123,536

Source: CSO Census 2016, preliminary results CSO Census 2022 and authors' calculations.

Figure 4: RHA Estimated Population 2016 - 2022



Source: CSO Census 2016, preliminary results CSO Census 2022 and authors' calculations.

3.2 Age-Sex Index

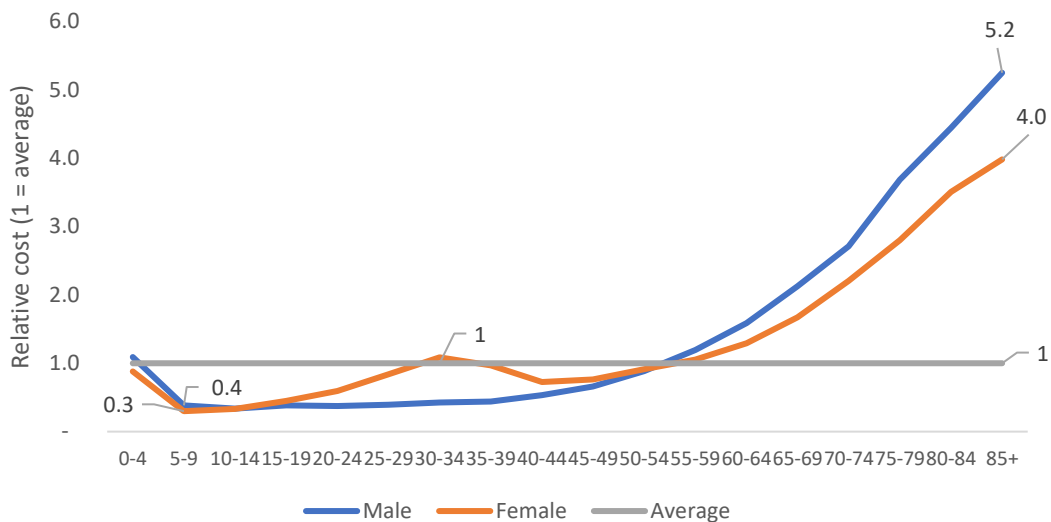
3.2.1 Acute

Figure 5 shows that Ireland follows the well-established relationship between per capita hospital expenditure and age and sex. Key features such as a higher relative cost at birth, for females during

¹³ For this paper we require an estimate of the age distribution of each RHA in 5-year age band and gender for each year of the intercensal period. For the purposes of this exercise, it is assumed the 2016 age distribution holds for 2022 and each intercensal year.

maternity years, and increasing costs substantially for both sexes from middle age onwards, with males costing more per capita than females, are all evident. Figure 5 expresses these per capita profiles relative to overall per capita expenditure for 2018¹⁴. This can be read as 1 = gross acute hospital expenditure per capita in Ireland. Per capita expenditure for males and females by five-year age band are divided by this average to get a relative cost. For example, on average, males aged 85+, cost 5.2 times the average person in Ireland, while females aged 85+ years cost four times the average person. Males aged 5-9 years cost 0.3 times the average person, while females aged 5-9 years cost 0.4 times the average person.

Figure 5: Gross Acute Hospital Relative Expenditure Cost Profiles by Age and Sex



Source: Hippocrates Query Interface 2022 and authors' calculations

These Age-Sex charts can be used to derive an age-adjusted RHA population. This is shown in Table 3 for the years 2016 and 2021, with the adjusted population by RHA 'normalised' to the actual total population.¹⁵ As described in Section 2: Proposed Model, the adjusted population is divided by the actual population for each RHA to get an Age-Sex Index for that RHA for a given year. The results of this are shown in Table 4. As expected RHAs F and C have the highest Age-Sex indices at 105.5% and 103.5% respectively. This is reflective of the fact that these RHAs have the oldest populations as highlighted in McCarthy et al., (2022).

¹⁴ Results based on HIPPOCRATES, the ESRI healthcare projection model. Information on all HIPPOCRATES-related publications can be found at <https://www.esri.ie/research/health-and-quality-of-life/hippocrates-model>. Responsibility for the results and interpretation in this document rests with O'Malley et al. in the Department of Health and not with the ESRI.

¹⁵ This means that the share of an age adjusted RHA population out of the total age adjusted population is applied to the actual population.

Table 3: Actual Population and Age-Sex Adjusted Population 2016 and 2021, Acute Care

RHA	2016 Actual	2016 Age-Sex Adjusted Normalised	2021 Actual	2021 Age-Sex Adjusted Normalised
A	1,081,727	1,037,231	1,162,772	1,115,267
B	989,945	938,270	1,059,523	1,004,742
C	903,572	935,170	957,715	991,242
D	690,575	706,908	728,630	746,107
E	384,998	394,324	404,329	414,300
F	711,048	749,958	748,398	789,713
Total	4,761,865	4,761,865	5,061,367	5,061,367

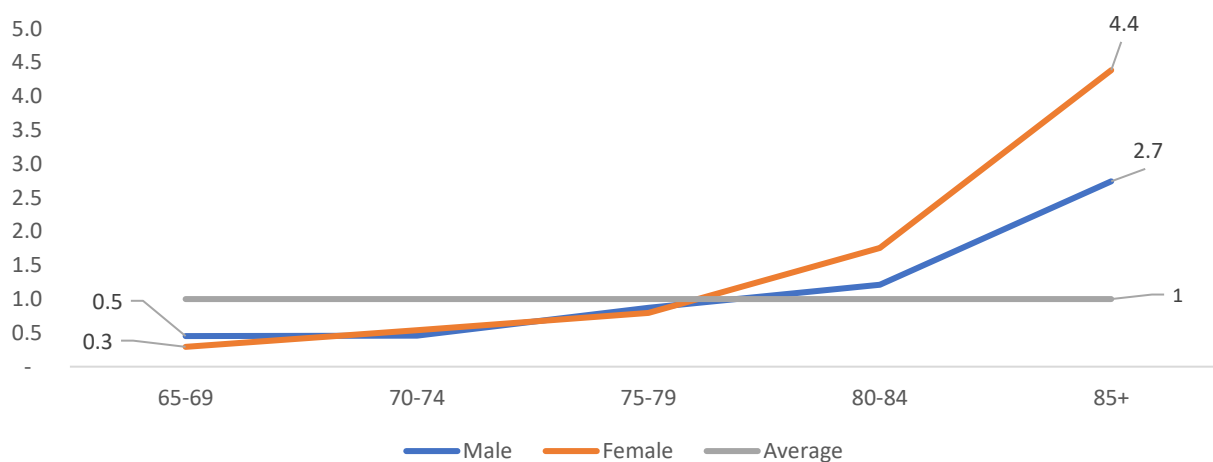
Table 4: 2016 and 2021 Acute Care Age-Sex Index

RHA	2016 Age-Sex Index	2021 Age- Sex Index
A	95.9%	95.9%
B	94.8%	94.8%
C	103.5%	103.5%
D	102.4%	102.4%
E	102.4%	102.5%
F	105.5%	105.5%

3.2.2 Older Persons

The described process for obtaining the acute Age-Sex Index is repeated with regard to Older Persons Services (i.e., Home Care). However, the per capita expenditure here only relates to the national population aged 65+ years. Likewise, relative cost profiles by 5-year age band and sex only relate to 65+ years. Figure 6 shows the Age-Sex profiles, whilst Table 5 and 6 shows the adjusted population and Older Persons Index respectively. Once again, RHA F and C have the largest Age-Sex Indices at 102.4% and 102.2%, respectively. This is expected because they have the oldest populations, as highlighted in McCarthy et. al (2022).

Figure 6: Gross Older Persons Relative Expenditure Cost Profiles by Age and Sex



Source: ESRI Hippocrates Query Interface 2022 and authors' calculations

Table 5: Actual Population and Age-Sex Adjusted Populations 2016 and 2021, Older Persons

RHA	2016 Actual	2016 Population Adjusted Normalised	2021 Actual	2021 Population Adjusted Normalised
A	127,448	128,106	136,991	137,603
B	112,889	108,194	120,847	115,741
C	132,619	135,633	140,524	143,618
D	98,877	98,386	103,811	103,735
E	55,935	54,742	58,749	57,456
F	109,799	112,507	115,580	118,349
Total	637,567	637,567	676,502	676,502

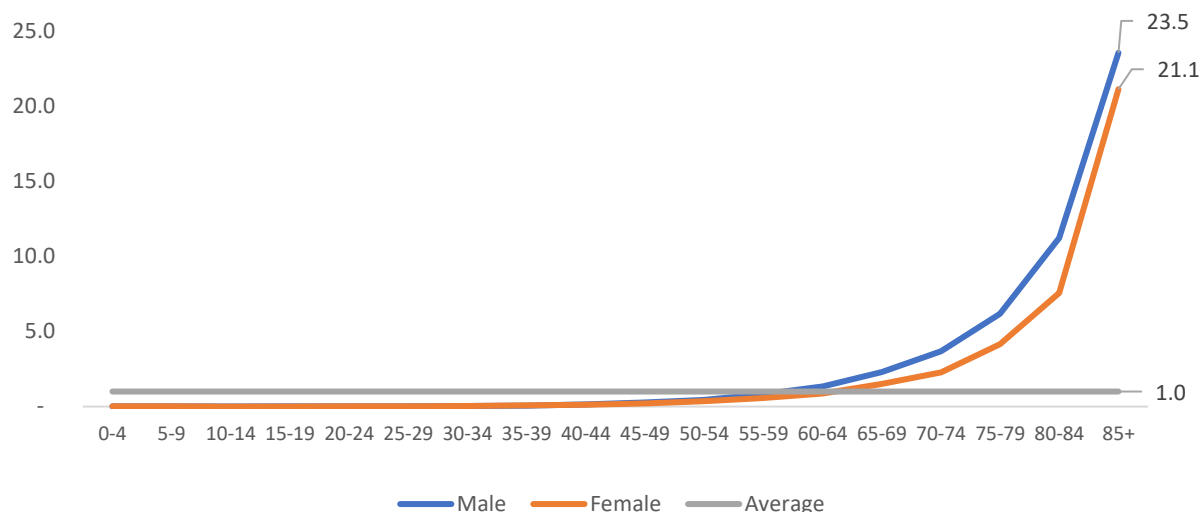
Table 6: 2016 and 2021 Older Persons Age-Sex Index

RHA	2016 Age-Sex Index	2021 Age-Sex Index
A	100.5%	100.4%
B	95.8%	95.8%
C	102.3%	102.2%
D	99.5%	99.9%
E	97.9%	97.8%
F	102.5%	102.4%

3.2.3 Palliative Care

With regard to palliative care, the Age-Sex expenditure distribution is assumed to mirror the Age-Sex distribution of deaths with palliative care needs in 2019 as estimated by May et al., (2020)¹⁶. This is then used to estimate per capita expenditure by 5-year age band and sex, and relative cost profiles are derived using the same approach for acutes and Older Persons previously and shown in Figure 7. The Age-Sex Indices are again derived in the same manner and shown in Table 8.

Figure 7: Gross Palliative Care Relative Expenditure Cost Profiles by Age and Sex



Source: Estimated using modelled deaths with a Palliative Care need in May et al., (2020)¹⁷

Table 7: Actual Population and Age-Sex Adjusted Population 2016 and 2021, Palliative Care

RHA	2016 Actual	2016 Population Adjusted Normalised	2021 Actual	2021 Population Adjusted Normalised
A	1,081,727	962,331	1,162,772	1,035,369
B	989,945	833,265	1,059,523	892,847
C	903,572	997,979	957,715	1,058,468
D	690,575	730,139	720,630	771,100
E	384,998	407,935	404,329	428,864
F	711,048	830,216	748,398	874,750
Total	4,761,865	4,761,865	5,061,367	5,061,367

¹⁶ As mentioned previously, it is important to consider the inclusion of morbidity and mortality given the relationship between utilisation and proximity to death. Whilst the use of mortality and morbidity measures would likely add to a PBRA model in the Irish context, the risk of double counting that may arise from including a mortality/morbidity index as well as a Deprivation Index, means it the issue be investigated by the proposed advisory group.

¹⁷ Application of this data to estimate per capita expenditure here is the responsibility of McCarthy et al. Department of Health and not with May et al., (2020)

Table 8: 2016 and 2021 Palliative Care Age - Sex Index

RHA	2016 Age-Sex Index	2021 Age-Sex Index
A	89.0%	88.9%
B	84.2%	84.1%
C	110.4%	110.4%
D	105.7%	106.8%
E	106.0%	105.9%
F	116.8%	116.7%

3.3 Deprivation Index

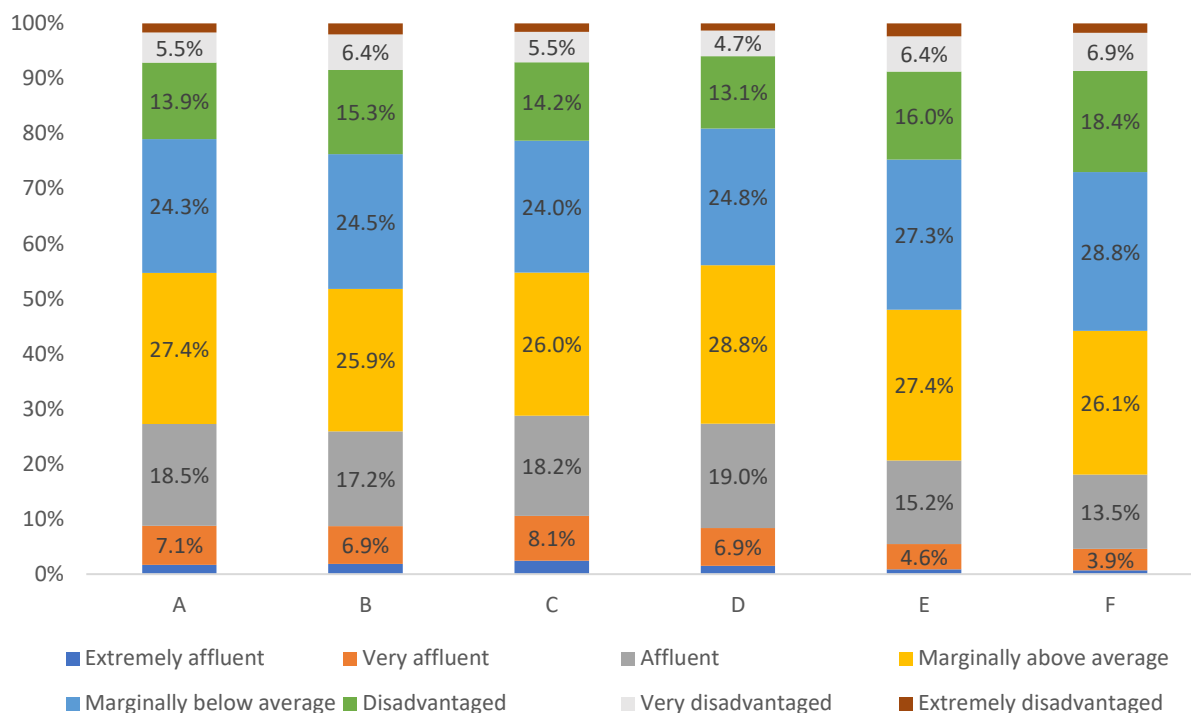
With regard to socioeconomic data from the Census, the lack of income data as well as measures of deprivation and consistent poverty is a significant drawback. While this data is collected at the survey level annually through the Survey on Income and Living Conditions (SILC), it is not currently possible to analyse by RHA geography. The Pobal HP Deprivation Index is presented in this paper as a proxy for Deprivation across the RHAs. It uses three dimensions of affluence/disadvantage: Demographic Profile, Social Class Composition, and Labour Market Situation¹⁸, and uses Census data on 10 key indicators including the proportion of skilled professionals, education levels, employment levels, and single-parent households found in an area to estimate the likely rate of deprivation. The Pobal HP Deprivation Index was developed by Trutz Haase and Jonathan Pratschke and funded by Pobal. Based on the ‘Small Area’ statistics in the 2016 Census, the HP Deprivation Index shows the level of overall affluence and deprivation. Table 9 and Figure 8 shows the HP Deprivation Index by RHA using Census 2016.

Table 9: HP Index 2016 by RHA

	A	B	C	D	E	F
Extremely affluent	1.7%	1.9%	2.5%	1.5%	0.8%	0.7%
Very affluent	7.1%	6.9%	8.1%	6.9%	4.6%	3.9%
Affluent	18.5%	17.2%	18.2%	19.0%	15.2%	13.5%
Marginally above average	27.4%	25.9%	26.0%	28.8%	27.4%	26.1%
Marginally below average	24.3%	24.5%	24.0%	24.8%	27.3%	28.8%
Disadvantaged	13.9%	15.3%	14.2%	13.1%	16.0%	18.4%
Very disadvantaged	5.5%	6.4%	5.5%	4.7%	6.4%	6.9%
Extremely disadvantaged	1.7%	2.0%	1.6%	1.3%	2.3%	1.7%

¹⁸ For detail on the construction of the HP Deprivation Index see Haase & Pratschke (2017) <https://www.pobal.ie/app/uploads/2018/06/The-2016-Pobal-HP-Deprivation-Index-Introduction-07.pdf>

Figure 8: HP Index 2016 by RHA



The approach taken in this paper is to apply a cost weighting of 1 (same as no cost weighting) to those who are categorised as being non disadvantaged, 2 to those who are categorised as ‘disadvantaged’, 3 to those who are ‘very disadvantaged’ and a cost weighting of 4 to those categorised as ‘extremely disadvantaged’.

Like with the Age-Sex Index, these adjusted populations are normalised to the actual (or projected) population. Table 10 gives the actual and deprivation adjusted population by RHA for 2016 and 2021. Table 11 creates a Deprivation Index by RHA by dividing the deprivation adjusted population by the actual population.

Table 10: Actual Population and Deprivation Adjusted Populations 2016 and 2021

RHA	2016 Actual	2016 Population Adjusted Normalised	2021 Actual	2021 Population Adjusted Normalised
A	1,028,727	1,064,927	1,162,772	1,144,722
B	989,945	1,007,436	1,059,523	1,078,300
C	903,572	890,508	957,715	943,917
D	690,575	661,620	728,630	698,115
E	384,998	396,647	404,329	416,584
F	711,048	740,727	748,398	779,767
Total	4,761,865	4,761,865	5,061,367	5,061,367

Table 11: 2016 and 2021 Deprivation Index

RHA	2016 Deprivation Index	2021 Deprivation Index
A	98.4%	98.5%
B	101.8%	101.8%
C	98.6 %	98.6%
D	95.8 %	95.8%
E	103.0%	103.0%
F	104.2%	104.2%

3.4 Rurality Index

Rurality is often factored into PBRA models, with funding being provided to cover ‘unavoidable excess costs’ of providing services in remote areas. Figure 9 shows the percentage of the population in each RHA that live in a ‘highly rural/remote area’, as classified by the Census. Overall, rurality is one of the most apparent characteristics in which the RHAs diverge, and this is seen in Figure 9 below with RHA B having the lowest rate of those living in a highly remote/rural area at 2.7%, increasing to 27.3% in RHA F.

As previously mentioned, further work is required as part of the proposed advisory groups deliberations as to the effect of rurality on excess costs to the delivery of care, particularly in the community. For the purposes of this model, data from Census 2016 on the rate of the population in a RHA that lives in a highly rural/remote area is given an arbitrary weighting of 2. This is applied in the same way as the Deprivation Index, by adjusting the size of the RHAs population based on the rate of people that the cost weight applies to. As seen in Table 13, RHA F has the largest index at 117%, reflecting the high degree of rurality in that region.

Figure 9: % of Each RHA population that live in a ‘Highly Rural/Remote’ Area

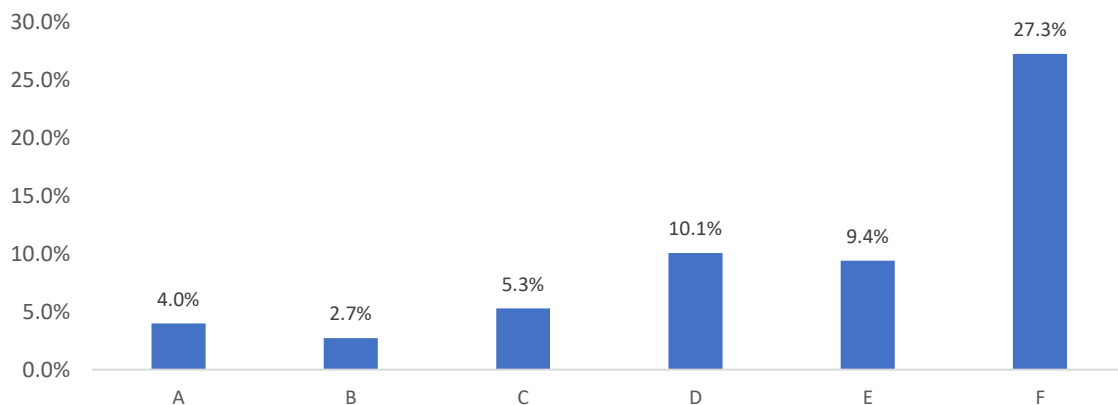


Table 12: Actual Population and Rurality Adjusted Populations 2016 and 2021

RHA	2016 Actual	2016 Population Adjusted Normalised	2021 Actual	2021 Population Adjusted Normalised
A	1,081,727	1,034,263	1,162,772	1,112,244
B	989,945	934,879	1,059,523	1,001,029
C	903,572	874,599	957,715	927,416
D	690,575	698,873	728,630	737,711
E	384,998	387,241	404,329	406,865
F	711,048	832,010	748,398	876,102
Total	4,761,865	4,761,865	5,061,367	5,061,367

Table 13: 2016 and 2021 Rurality Index

RHA	2016 Rurality Index	2021 Rurality Index
A	95.6%	95.7%
B	94.4%	94.5%
C	96.8%	96.8%
D	101.2%	101.2%
E	100.6%	100.6%
F	117.0%	117.1%

3.5 Relevant HSE Expenditure

As set out in the ‘Business Case for the Implementation of Regional Health Areas’ (Department of Health, 2022)¹⁹ health and social care in Ireland is currently largely provided through seven Hospital Groups (HGs), and nine Community Healthcare Organisations (CHOs). Therefore, the unification of HG and CHOs in terms of management structure and budgets is the prime objective of the RHA reform and brings the requirement for a PBRA. With regard to Acute expenditure, the national specialist services of Children’s Health Ireland (CHI) are excluded. An RHA budget should not be influenced by the location of a CHI, which will continue to be funded at the national level given the nature of the service. This is also the reason for exclusion of the National Acute services and National Ambulance service.

With regard to CHO expenditure, NHSS is excluded from the PBRA model in this proposal as expenditure data does not appear to be available at the regional level and the majority of nursing homes in the scheme are private, with prices negotiated with the National Treatment Purchase Fund (NTPF). PCRS is excluded for similar reasons. Furthermore, disability services are also excluded. This is due to a small number of high-cost cases not enabling a population-based approach at this time. Other

¹⁹ <https://assets.gov.ie/220582/178975ac-74de-40ee-8131-37db61c64612.pdf>

expenditure categories are excluded due to either being a national service (e.g., National Cancer Control Programme) or not having an immediate relationship with the PBRA approach (e.g., Pensions). Taken together and using 2019 (pre Covid-19) net expenditure, 50.1% of HSE operational expenditure is proposed to be subject to the PBRA.

Table 14: Expenditure Currently included in Proposed Approach

Proposed Included	2019 Expenditure €000s
Hospital Groups	
RCSI Hospital Group	839,049
Dublin-Midlands Hospital Group	994,500
Ireland East Hospital Group	1,099,507
South-South West Hospital Group	931,132
Saolta University Health Care Group	876,419
University of Limerick Hospital Group	370,301
Community	
Primary Care	886,051
Social Inclusion	161,149
Palliative Care	87,577
Mental Health Division	986,833
Older Persons Services	889,246
CHO HQs & Community Services - Total	20,621
Total	8,142,385

Table 15: Expenditure Currently not included in Proposed Approach

Proposed Not Included 2019	2019 Expenditure €000s
Acutes	
Children's Health Ireland	347,771
Acute Regional and National Services	8,136
National Ambulance Service	171,204
Community	
Nursing Home Support Scheme	986,202
Disability Services	1,992,614
Other	
Primary Care Reimbursement Service	2,798,048
Pensions	515,186
State Claims Agency	393,012
Demand Led Local Schemes	269,357
Treatment Abroad and Cross Border Healthcare	33,799
EHIC (European Health Insurance Card)	12,530
Clinical Design & Innovation	7,510
Office of Nursing & Midwifery Services	30,976
Quality Assurance & Verification	5,156
Quality Improvement Division	9,562
National Doctors Training & Planning	26,628
National Cancer Control Programme	5,525
National Screening Service	77,760
Health & Wellbeing Division	111,131
Environmental Health	47,719
Emergency Management	1,946
Support Services	254,287
Total	8,106,057

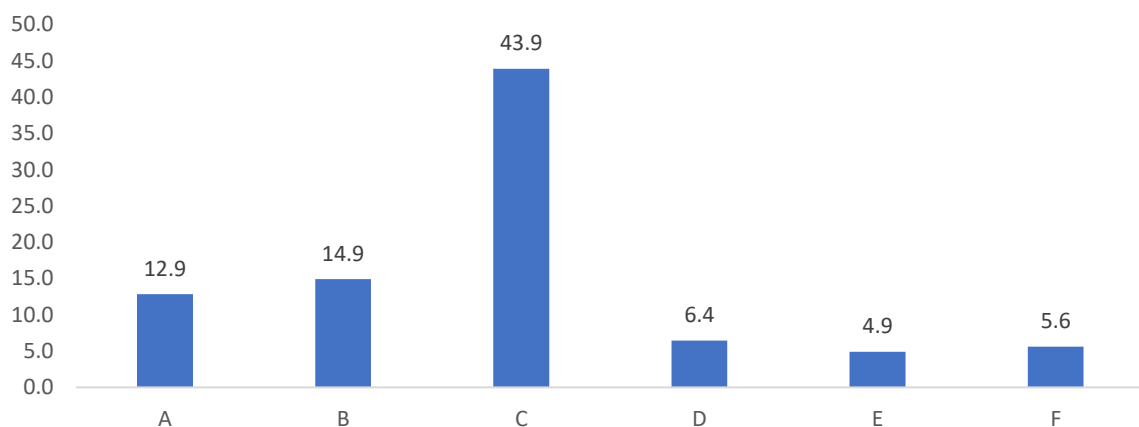
3.6 Cross-Regional Use of Services

An issue with regard to the successful implementation of a PBRA model is how to address cross-regional patient flows. This is particularly relevant to Acute hospital operations. As can be seen in Figure 10, the proportion of discharges from outside the RHA of residence is highest in C at 44%. RHA B stands at 15% followed by RHA A at 13%. RHA D, E, and F are relatively low at 6% or below.²⁰

RHA C is an immediate outlier with close to 44% of attendances coming from outside that RHA. The five hospitals with the highest number of external attendances are all located within RHA C. This feature is likely driven by the number of specialist care facilities operating in RHA C. For instance, the Royal Victoria Eye and Ear Hospital is a national referral centre for both eye and ear, and nose and throat disorders. Similarly, St. Luke's Hospital in Rathgar specialises in providing care for cancer patients. The National Maternity Hospital and St. Vincent's University Hospital also offer specialised services, and are therefore likely to attract patients from outside RHA C.

Looking at the international evidence, a few potential solutions present themselves. One possibility is to 'top slice' for the predicted activity and have RHAs reimbursed from a central level for this activity; or alternatively, RHAs could reimburse each other for discharges from another RHA. Both approaches would require an improvement to patient level data, and reform is underway to deliver this through the new Health Information Bill. The new Health Information Bill will support and direct the flow of information through the health system and provide a robust legislative basis to allow for the collection of specified health data to enhance patient care through a Summary Care Record.

Figure 10: % of Total Discharges from Patients Outside an RHA



Source: Hospital In-Patient Enquiry, 2021

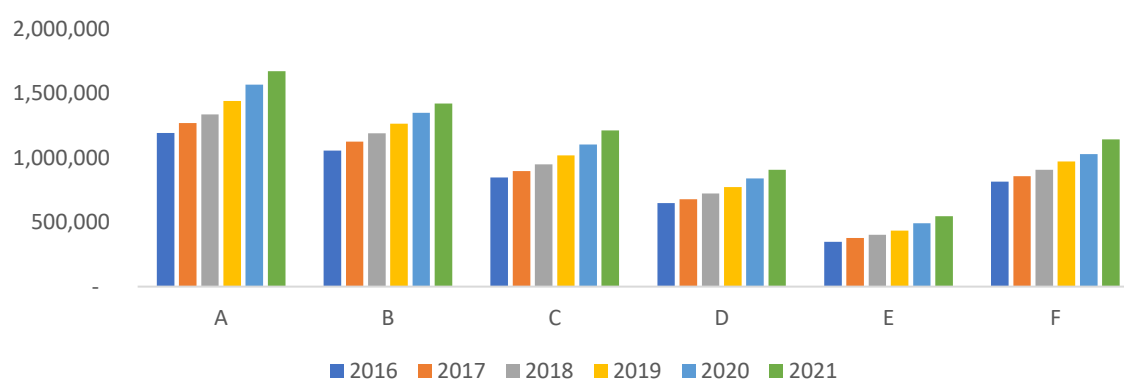
²⁰ These figures are calculated by colleagues in the Statistics Unit of the Department of Health.

4. PBRA Model Results

4.1 Acute Hospital Expenditure

Figure 11 shows gross Acute hospital expenditure from 2016 to 2021 by RHA. RHA A has the biggest expenditure in 2016 and in 2021, with €1.2bn and €1.7bn respectively, averaging an annual increase of 7.0%. RHA E has the lowest expenditure in 2016 and 2021, with €349m and €545m respectively, averaging an annual increase of 9.4%. Total gross Acute hospital expenditure in 2016 was €4.9bn rising to €6.9bn in 2021. This reflects an increase of 40.6%, with an average increase of 7.1% per year.

Figure 11: Gross Acute Hospital Expenditure by RHA 2016 - 2022 (€000s)

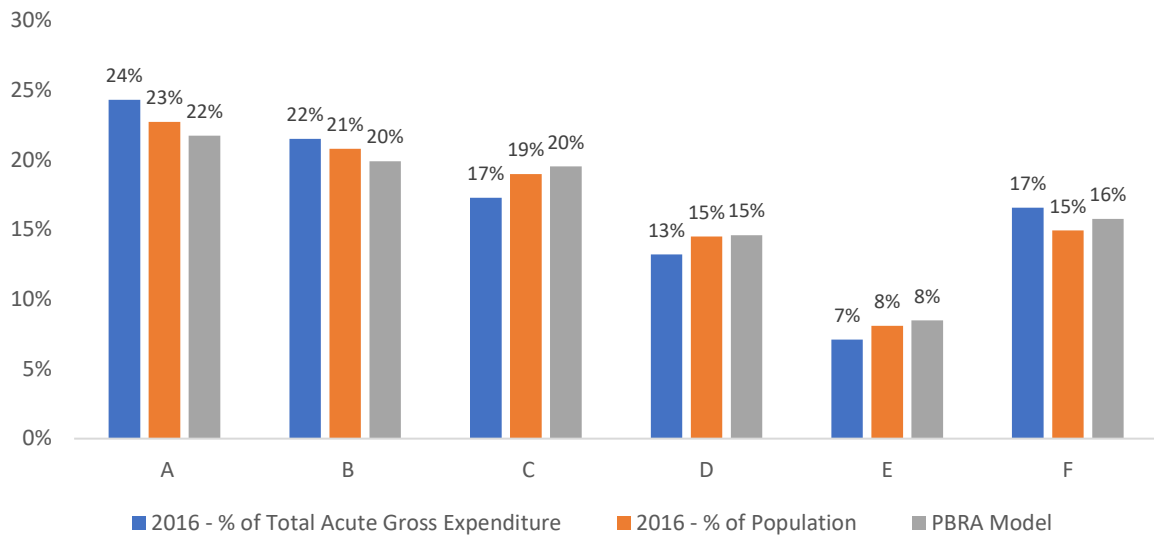


Source: HSE Performance Management Reports, authors' calculations

In a pure capitation model, the share of the total population a region has would determine the share of total expenditure allocated to that region. However, in a needs-adjusted capitation model, the capitation shares are adjusted to reflect the higher relative needs of some health care users over others. Therefore, throughout this section, the share of expenditure allocated to an RHA is compared to its population share which is then juxtaposed to the shares given from the PBRA model. This is to compare the results of needs adjusted capitation to pure capitation. Furthermore, this is done for 2016 and 2021 in order to compare the first and last year analysed.

Figure 12 shows that in 2016, RHA A had the largest share of total acute expenditure at 24%, followed closely by RHA B at 22%, while RHA E had the lowest at 7%. These shares are in line with distribution of the population, with RHA A having the largest share of the population at 23% followed by RHA B at 21%. RHA E also has the smallest share of the population at 8%. When we adjust the population by the Age-Sex Index and the Deprivation Index, we see changes within a percentage point (pp) across the RHAs.

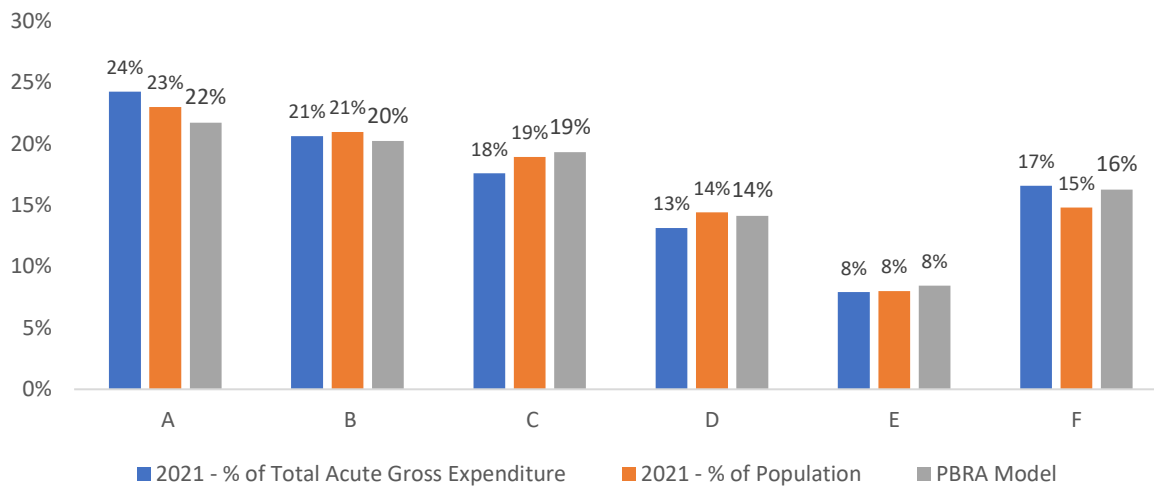
Figure 12: Gross Acute Hospital Expenditure by RHA as a % of Total and RHA Population as a % of Total Population 2016 and PBRA model



Source: HSE Performance Management Reports, authors' calculations

In 2021, we see small differences from 2016, all within one percentage point. This would indicate a degree of stability in terms of allocations, notably also during the Covid-19 Pandemic.

Figure 13: Gross Acute Hospital Expenditure by RHA as a % of Total and RHA Population as a % of Total Population 2021 and PBRA model



Source: HSE Performance Management Reports, authors' calculations

4.2 Community healthcare services

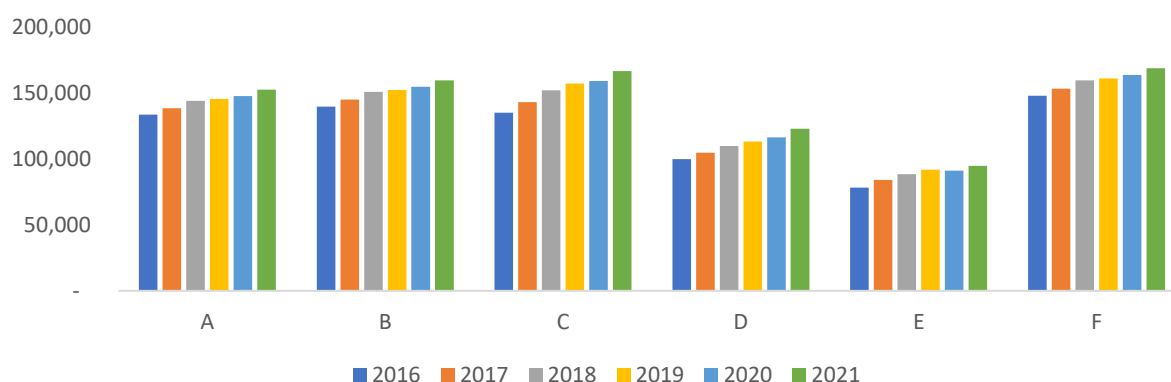
Community healthcare services refer to the broad range of services that are provided outside of the Acute hospital system and include primary care, social care, and mental health. These services are delivered to people in local communities through the HSE and its funded agencies.²¹ The Primary Care Division encompasses expenditure on Primary Care, Social Inclusion, and Palliative Care while Mental Health is its own division. The Social Care division comprises Older Person Services and Disability Services.

4.2.1 Primary Care Division

4.2.1.1 Primary Care

Figure 14 shows an estimate of gross Primary Care expenditure from 2016 to 2021. It does not include expenditure that has not been attributed to a Community Healthcare Organisation (CHO) or its substructure the Local Health Organisation.²² Total expenditure across the CHOs totalled €733.1m in 2016, increasing to €863.7m in 2021, an increase of 17.8%. This relates to an average annual increase of 3.3%. RHA F had the largest expenditure in 2016 with €147.7m and also in 2021 with €168.6m, an average annual increase of 2.7%. RHA E has the smallest expenditure at €78.1m in 2016, increasing to €94.5m in 2021, an average annual of 3.9%.

Figure 14: Gross Primary Care Expenditure by RHA 2016 - 2021 (€000s)



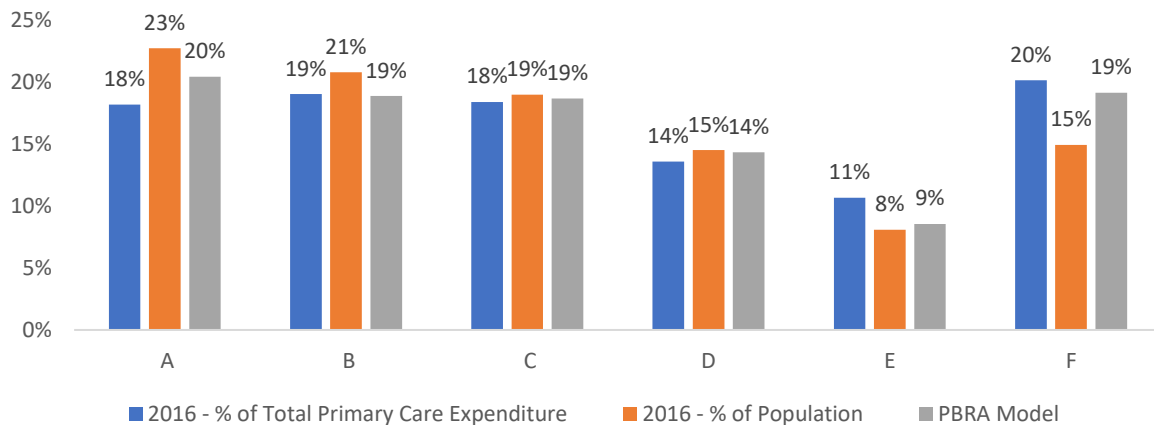
Source: HSE Performance Management Reports, authors' calculations

Figure 15 shows that in 2016, RHA F had the largest share of gross primary care expenditure at 20%, followed closely by RHA B at 19%, while RHA E had the lowest at 11%. These shares are less in line with the distribution of the population as was seen with Acutes. While RHA F has 20% of expenditure, it has 15% of the population. However, when we adjust the population by the Age-Sex Index as well as the Deprivation and Rurality Index, we arrive at an adjusted population share of 19%. With regard to RHA E we see that it has 11% of total expenditure, 8% of total population, and when adjusted for needs it remains at 9%. 2021 sees marginal changes, all within the 1pp. Again, this indicates stability regarding allocation.

²¹ https://www.citizensinformation.ie/en/health/health_system/health_boards.html#labc41

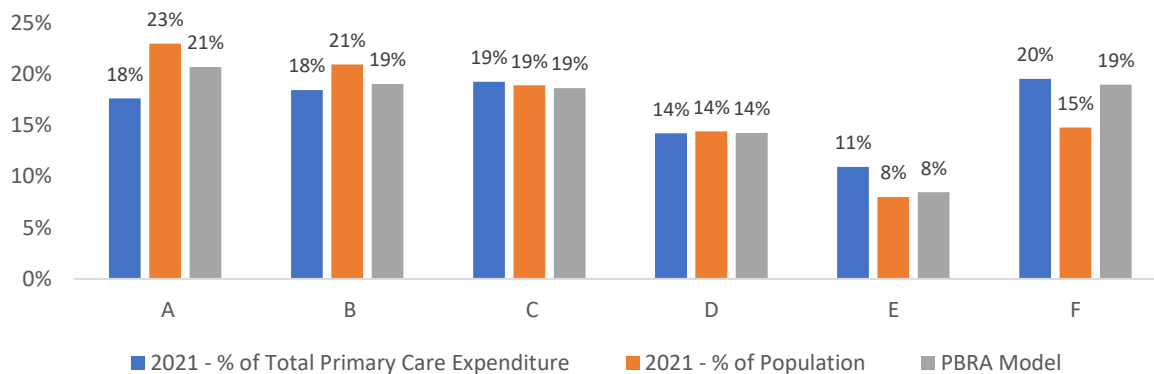
²² For example, expenditure coded as 'national services' or 'Regional Services' that have not been assigned to an RHA.

Figure 15: Gross Primary Care Expenditure by RHA as a % of Total CHO Primary Care Expenditure and RHA Population as a % of Total Population 2016 and PBRA model



Source: HSE Performance Management Reports, CSO Census 2016, and authors' calculations

Figure 16: Gross Primary Care Expenditure by RHA as a % of Total CHO Primary Care Expenditure and RHA Population as a % of Total Population 2021 and PBRA model



Source: HSE Performance Management Reports, CSO Census 2022 - preliminary results and authors' calculations

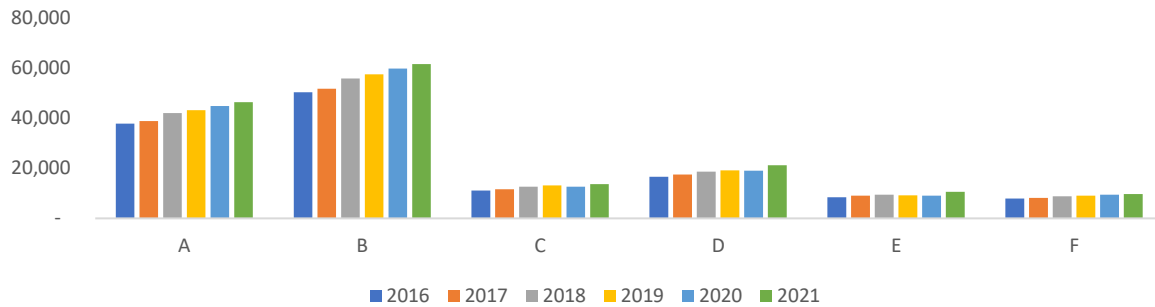
4.2.1.2 Social Inclusion

Social Inclusion plays a key role in supporting equity of access to services and provides targeted interventions to improve the health outcomes of minority groups which encompass Irish Travellers, Roma, and other members of diverse ethnic and cultural groups, such as asylum seekers, refugees and migrants, lesbian, gay, bisexual, and transgender service users. Members of these groups characteristically present with a complex range of health and social care needs which require multi-agency and multi-faceted interventions. The Health Service promotes and leads on integrated approaches on different levels across statutory and voluntary sectors.²³ Furthermore, Social Inclusion expenditure funds addiction services.

²³ <https://www.hse.ie/eng/about/who/primarycare/>

Total expenditure across the CHOs totalled €132.03m in 2016 and rose to €162.8m in 2021, an increase of 23.3%. This relates to an average annual increase of 4.3% across the period. RHA B saw the largest expenditure in 2016 with €50.2m and also in 2021 with €61.5m, an average annual increase of 4.1%. RHA F had the smallest expenditure at €7.9m in 2016, increasing to €9.7m in 2021, an average annual of 4.1%.

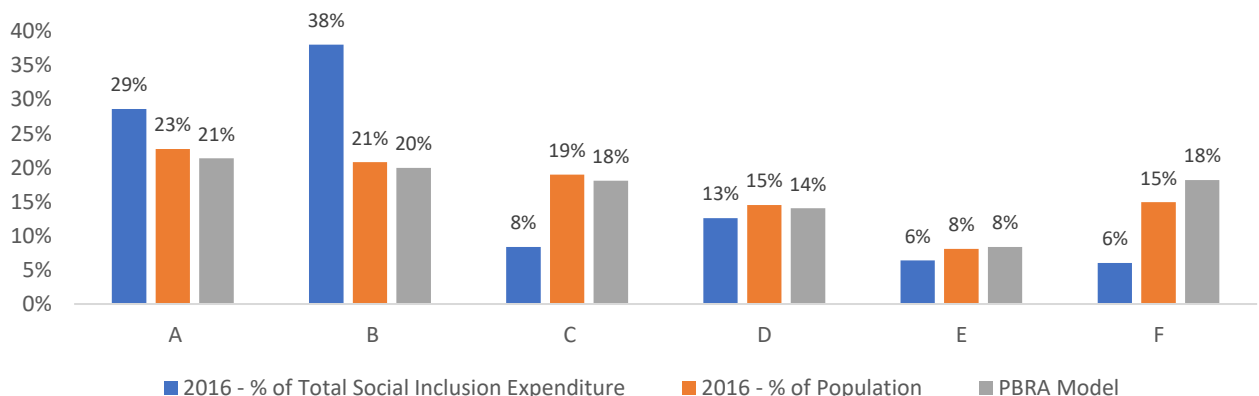
Figure 17: Gross Social Inclusion Expenditure by RHA 2016 - 2021 (€000s)



Source: HSE Performance Management Reports

Figure 18 shows that in 2016, RHA B had the largest share of social inclusion expenditure at 38%, followed by RHA A at 29%, while RHA E and F had the lowest, both at 6%. These shares are significantly less in line with the distribution of the population as was seen with Acutes and Primary Care. While RHA B has 38% of expenditure, it has 21% of the population and 20% of the needs adjusted population shares (without using an Age-Sex Index due to a lack of data). RHA A has 23% of the population which becomes 21% when needs adjusted as compared to the 29% share of expenditure. It is important to highlight the likely role of population density and highly concentrated areas of disadvantage within an RHA, which would have a significant impact on social inclusion expenditure far and beyond what can be picked up and modelled with deprivation rates at the RHA level. Further work is required by the proposed advisory group to try and adequately measure the impact of highly concentrated areas of disadvantage with regard to fairly dividing the social inclusion budget.

Figure 18: Gross Social Inclusion Expenditure by RHA as a % of Total CHO Social Inclusion Expenditure and RHA Population as a % of Total – 2016



Source: HSE Performance Management Reports, CSO Census 2016, and authors' calculations

Figure 19: Gross Social Inclusion Expenditure by RHA as a % of Total CHO Social Inclusion Expenditure and RHA Population as a % of Total – 2021



Source: HSE Performance Management Reports, CSO Census 2022 - preliminary results and authors' calculations

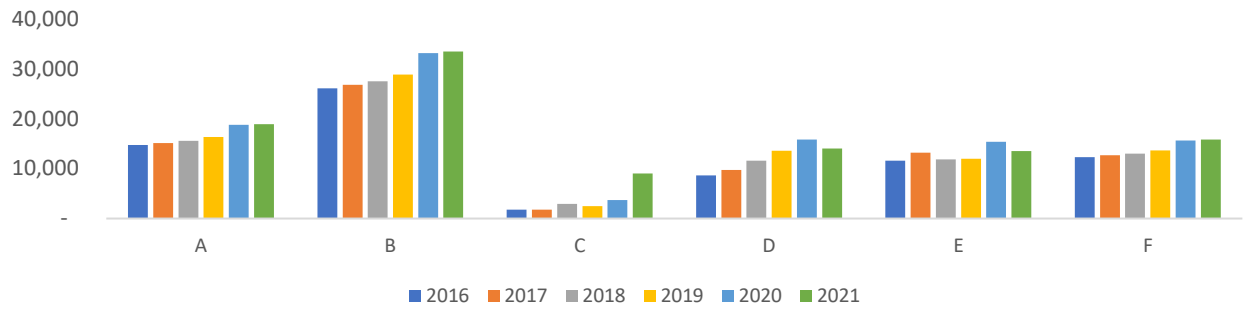
4.2.1.3 Palliative Care

Palliative care²⁴ is provided to people with life-limiting conditions and their families. It is a sensitive and holistic service, delivered across all care settings. The services are designed to maximise the quality of life for people living with life-limiting conditions and those important to them.

CHO expenditure on specialist palliative care totalled €75.3m in 2016 and rose to €104.7m in 2021 an increase of 39.2% or an annual average increase of 7.0%. The RHA with the largest expenditure is RHA B, increasing from €26.1m in 2016 to €33.45m in 2021, an annual average of 5.2%. The RHA with the lowest expenditure is RHA C, with €8.7m in 2016 going to €9m in 2021, an annual average increase of 48.7%. Figure 21 shows that in 2016, RHA B had the largest share of palliative care expenditure at 35%, followed closely by RHA A at 20%, while RHA C had the lowest at 2%. The most notable divergence between expenditure shares and population shares is with RHAs B and C. While RHA B has 35% of expenditure it has 18% of the population and 17% of the adjusted population. At the same time, RHA C has 2% of expenditure and 21% of the population, with 20% of the adjusted population. However, care is needed when assessing the figures for palliative care for 2020 and 2021. Palliative care centres were opened in RHA C in 2020, but they fall under the control of Our Lady's Hospice, which is headquartered in RHA B. It may be the case that funding has been allocated to RHA B which would have been used to deliver palliative care services in RHA C. Additionally, it is important to note that RHA B and C both comprise all of Co. Dublin south of the river Liffey. Therefore, it is possible that palliative care services available in RHA B are being used by people who live in RHA C, and this may explain the large difference between expenditure and population with regards to RHAs B and C. In 2021, we see a notable change in the share of expenditure going to RHA C, from 2% in 2016 to 9%. Further work is required to ascertain potential justified differences in allocation with regard to palliative care expenditure.

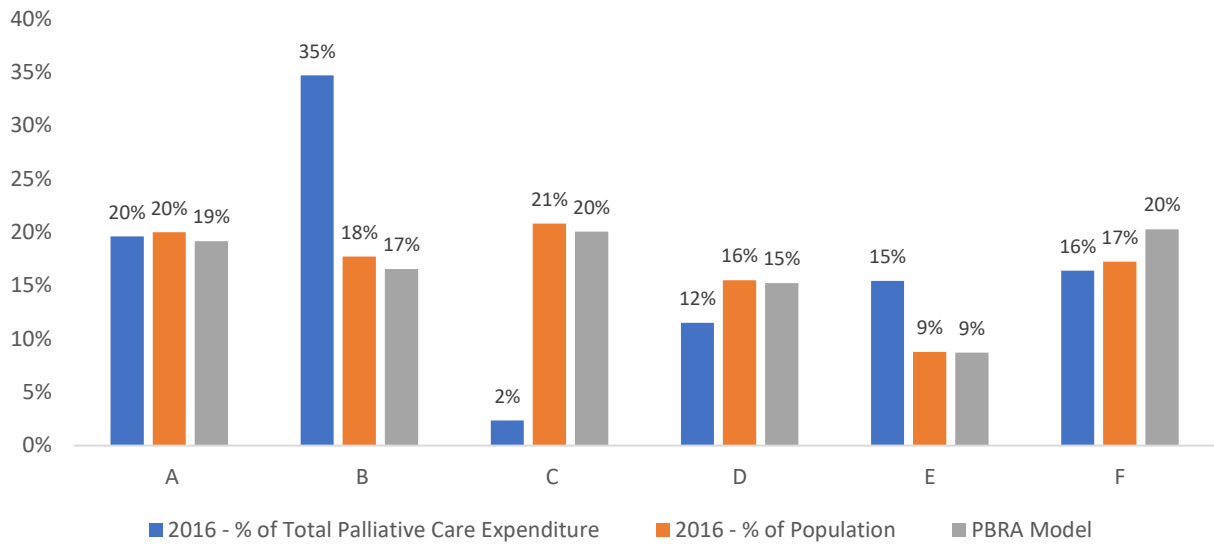
²⁴ <https://www.hse.ie/eng/services/list/1/lho/northdublin/palliative-services/>

Figure 20: Gross Palliative Care Expenditure by RHA 2016 - 2021 (€000s)



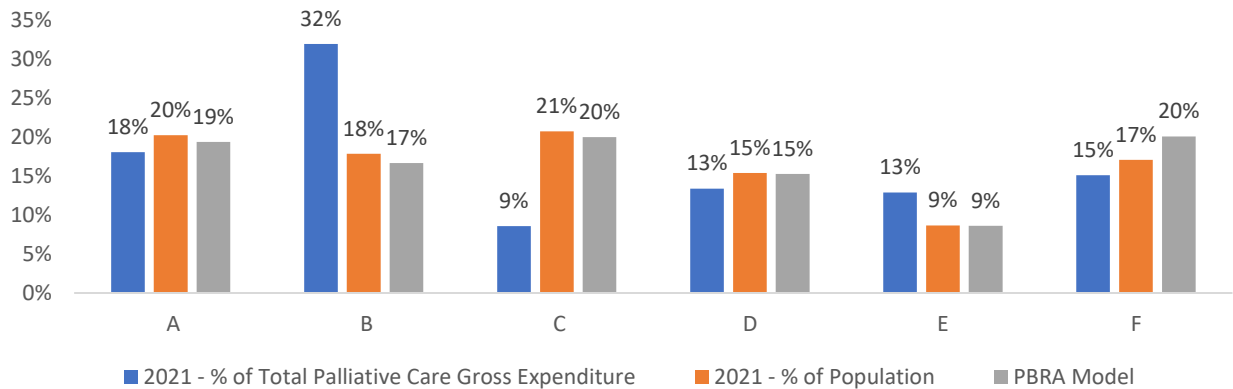
Source: HSE Performance Management Reports

Figure 21: Gross Palliative Care Expenditure by RHA as a % of Total CHO Palliative Care Expenditure and RHA Population as a % of Total – 2016



Source: HSE Performance Management Reports, CSO Census 2016, and authors' calculations

Figure 22: Gross Palliative Care Expenditure by RHA as a % of Total CHO Palliative Care Expenditure and RHA Population as a % of Total - 2021

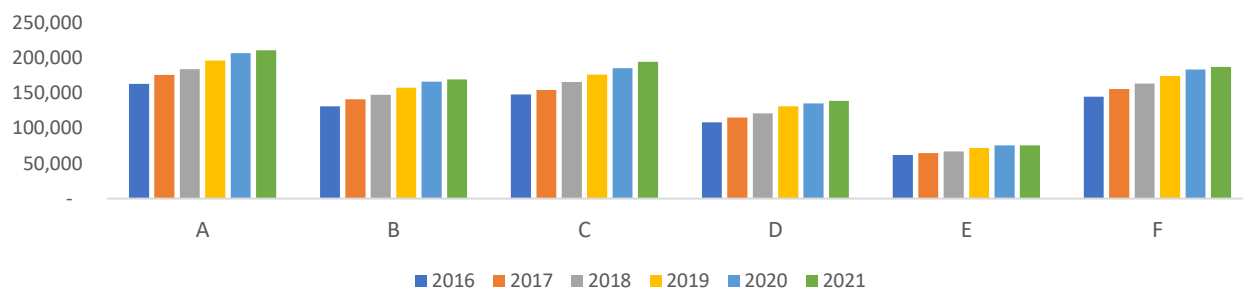


Source: HSE Performance Management Reports, CSO Census 2022 - preliminary results and authors' calculations

4.3 Mental Health

Total CHO expenditure for Mental Health services was €757.9m in 2016 and rose to €977.1m in 2021, an increase of 28.9% or an annual average increase of 5.2%. RHA A had the largest expenditure in 2016 at €163.3m and 2021 at €211.1m an average annual increase of 5.2%. RHA E has the smallest expenditure with €62m, increasing to €75.9m in 2021.

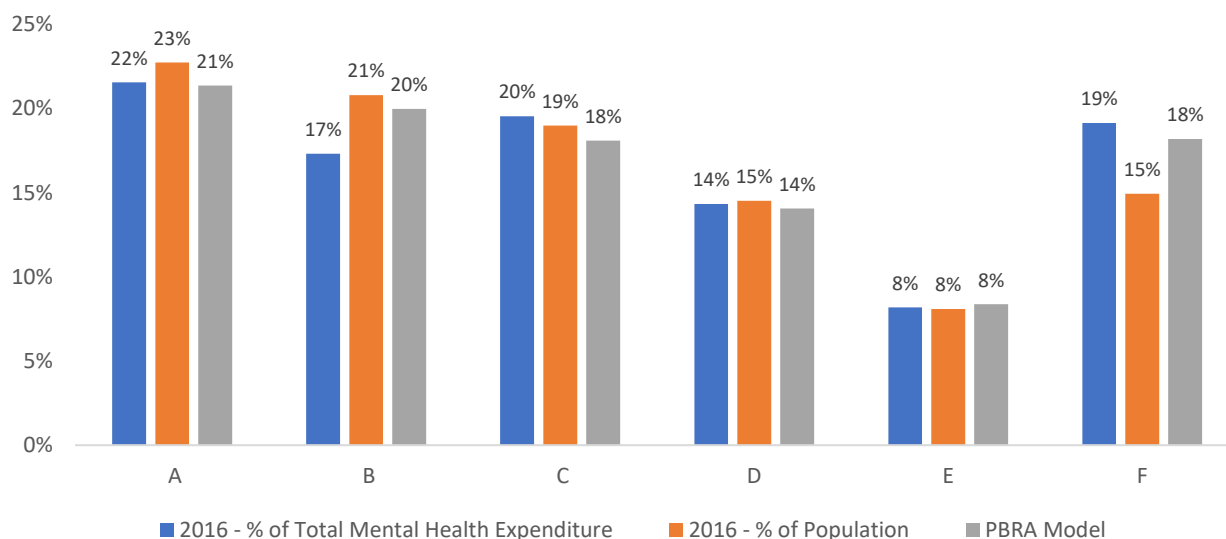
Figure 23: Mental Health Expenditure by RHA 2016 - 2021 (€000s)



Source: HSE Performance Management Reports

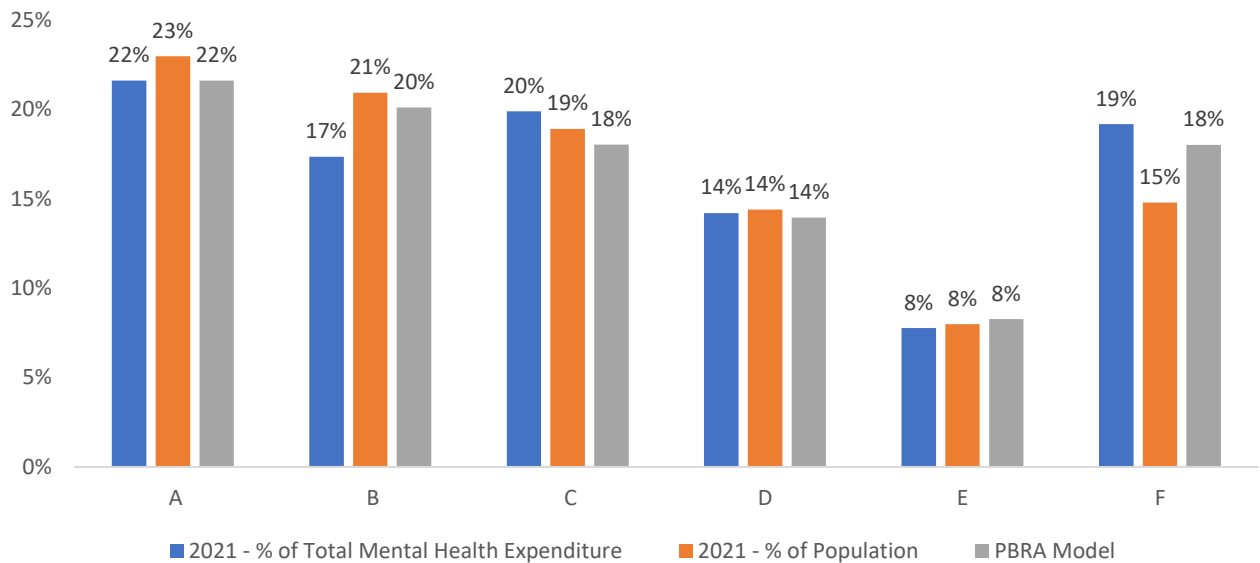
Figure 24 shows that in 2016, RHA A had the largest share of mental health expenditure at 22%, followed closely by RHA C at 20%, and RHA F at 19%. RHA E had the lowest rate of expenditure at 8%. When comparing expenditure shares to population shares and adjusted population shares (no Age-Sex Index is used to adjust populations for Mental Health because of the lack of evidence as to the age cost relationship), we see that expenditure shares are broadly in line with adjusted population shares. In 2021, we see the shares are the same as 2016, with some minor changes within 1pp.

Figure 24: Gross Mental Health Expenditure by RHA as a % of Total CHO Mental Health Expenditure and RHA Population as a % of Total – 2016



Source: HSE Performance Management Reports, CSO Census 2016, and authors' calculations.

Figure 25: Gross Mental Health Expenditure by RHA as a % of Total CHO Mental Health Expenditure and RHA Population as a % of Total – 2021



Source: HSE Performance Management Reports, CSO Census 2022 - preliminary results and authors' calculations.

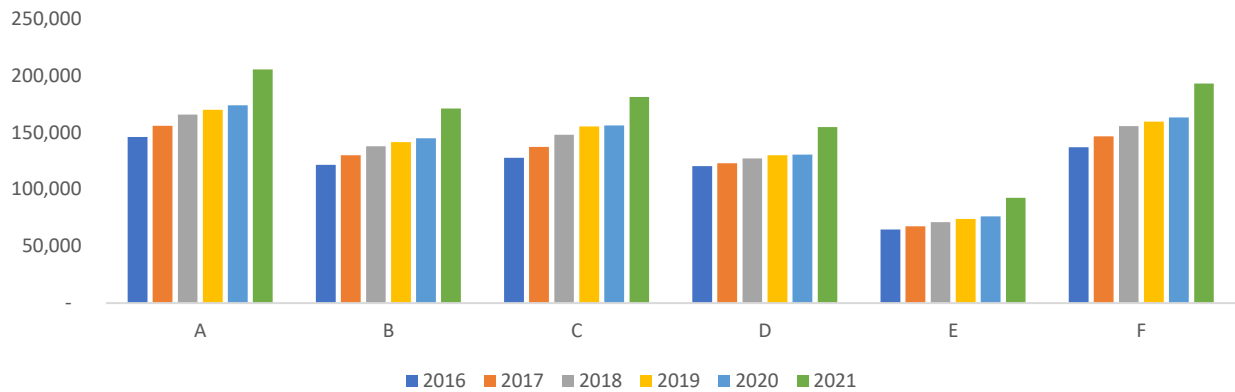
4.4 Social Care Division

4.4.1 Older Persons Services: Home Care

The Social Care Division was established to support ongoing service requirements of Older Persons and People with Disabilities. It is a fundamental step in moving forward with the design and implementation of models of care across both these care groups to support and maintain people to live at home or in their own community and to promote their independence and lifestyle choice as far as possible.²⁵ The HSE Home Support Service (formerly called the Home Help Service or Home Care Package Scheme) aims to support older people to remain in their own homes for as long as possible and to support informal carers. CHO expenditure on Older Persons Services totalled €717.7m in 2016 and rose to €998.7m in 2021 an increase of 39.2% or an annual average of 7.0%. The RHA with the largest expenditure on Older Person Services in 2016 was RHA A with €146m and again in 2021 with €205.6m, an average annual increase of 7.2%. The RHA with the smallest expenditure in 2016 was RHA E with €64.7m in 2016 and 92.6m in 2021, an average annual increase of 7.6%.

²⁵ <https://www.hse.ie/eng/about/who/socialcare/>

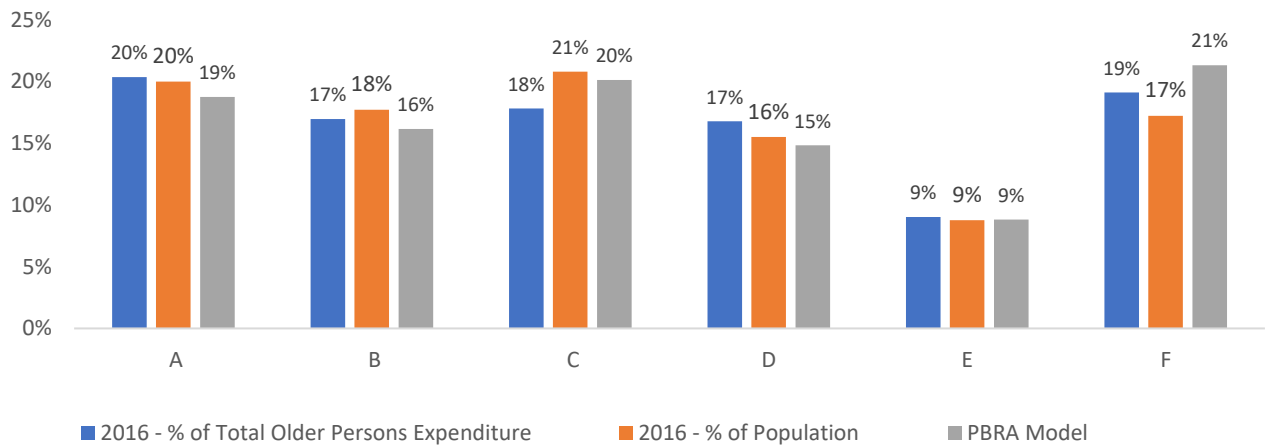
Figure 26: Gross Older Persons Expenditure by RHA 2016 - 2021 (€000s)



Source: HSE Performance Management Reports

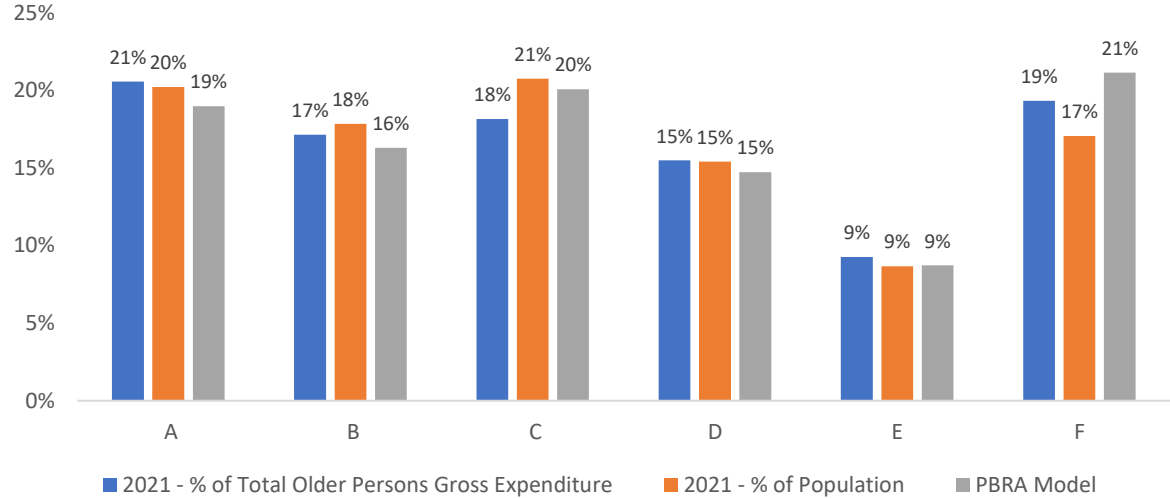
Figure 27 shows that in 2016, RHA A had the largest share of older persons expenditure at 20%, followed closely by RHA F at 19%. RHA E had the lowest rate of expenditure at 9%. When comparing expenditure shares to population shares and adjusted population shares (using the older persons 65+ years Age-Sex indices) we see that expenditure shares are broadly in line with adjusted population shares, with RHA C and F with estimated 2pp adjusted population shares greater than expenditure. In 2021, we see the shares are the same as 2016, with some small changes within 2pp. In 2021, we see similar relative shares to 2016. Again, RHA F shows the largest shares of total Older Persons Services expenditure to population at 19% vs 17%, while again RHAC shows the lowest relative shares at 18% vs 21%.

Figure 27: Gross Older Persons Expenditure by RHA as a % of Total CHO Older Persons Expenditure and RHA Population as a % of Total – 2016



Source: HSE Performance Management Reports, CSO Census 2016, CSO Census 2022 - preliminary results and authors' calculations.

Figure 28: Gross Older Persons Expenditure by RHA as a % of Total CHO Older Persons Expenditure and RHA Population as a % of total – 2021



Source: HSE Performance Management Reports, CSO Census 2016, CSO Census 2022 - preliminary results and authors' calculations.

5. Challenges of a PBRA Model

Policy tradeoffs are a necessary consideration when moving towards a new model for funding healthcare services. This section outlines some potential policy tradeoffs and challenges of introducing a PBRA, before outlining how they can be responded to within the Irish context over the coming years.

Potential disruptive transition: A common concern regarding reform is the potential of a ‘big bang’ where regions’ funding is radically changed. This could have an impact on delivery of care and services and ongoing commitments to health. The Business Case for RHAs specifically highlights the need for minimal disruption to existing services. However, the ‘guide’ figures show that there is little change from the current funding levels. This means that to a large extent, existing funding is going where it ‘needs’ to go. Some international case studies suggest that in the short to medium term there should be a decision not to curtail funding for ‘overfunded’ regions, but rather they would receive relatively smaller increases than those regions which are deemed to be ‘underfunded’. The guide shares’ role can inform the transition over the medium/longer term.

Inclusion of new developments: The extent to which new developments ought to and can be integrated into a PBRA model requires greater analysis. Work is ongoing to determine the most appropriate manner in which to address new developments.

Politically acceptable: The Sláintecare report contained a commitment towards implementing PBRA as the means to allocate funding to the proposed RHAs: ‘A resource allocation model is required that allows for equity of access to health services across different geographic areas, taking into account population need, demographics, deprivation and other measures’. Further to this, the Sláintecare Implementation Strategy and Action Plan 2021-2023 set out the development of a PBRA funding model. As demonstrated within the paper, there will not be significant deviations from current allocations, minimising any disruption caused to the delivery of care to patients.

Soft budget constraint: It is necessary to guard against a situation where stakeholders would be in a position to amend the formula or lobby for additional resources which goes beyond the ‘guide’ shares. It is important to note that the PBRA model mitigates against soft budgeting constraints by committing to a transparent and open process, with data, methodology, and changes to the formulae completed through established channels and ensuring that such material is publicly available and accessible.

Overruns impacting quality of services: If an RHA experiences an overrun in one ‘care group’, there is a concern that another ‘care group’ may be underfunded to ‘plug that gap’. For example, will RHAs syphon off resources from social inclusion to ‘plug the gap’ in acutes? The ‘guide’ shares that will be arrived at by the PBRA model offer suggestions as to how RHAs should go about allocating their resources. The issue of ring-fencing is still being discussed by involved stakeholders. The letter of determination will continue to set out priorities. RHAs in turn will submit a regional service plan setting out how they will deliver on the specified priorities. The HSE Centre will have significant monitoring and performance management powers.

Impact on efficiency: There is a strong theoretical basis for the creation of efficiencies within RHAs through PBRA. A post-ante evaluation of the functioning of PBRA once it has been implemented for a number of years should investigate whether efficiencies or savings were found.

Lack of popular support: With the implementation of PBRA there is the fear that the model will be misunderstood by the public, who may interpret changes as leading to less funding being apportioned to their areas. The PBRA model seeks to distribute available healthcare resources according to population need to promote allocative efficiency and equity in both health outcomes and distribution

of resources. As demonstrated within the paper, there will not be significant deviations in current funding allocations minimising any interference with the delivery of care to patients. If successfully implemented, the PBRA model should have broad support. One issue noted in the case of New Zealand was a lack of transparency and openness surrounding the model may have contributed to its unpopularity. The Irish PBRA should make every effort to be comprehensible, transparent, and equitable. Publishing the work of the expert advisory group and effectively communicating the role of the model should assist in ensuring public buy-in.

Data constraints: A lack of data is an issue that persists across the Department of Health and the lack of data availability and transparency has been highlighted by a recent OECD report (OECD, 2022). Data collection is an ongoing process, and the most up-to-date sources will be used when available. For instance, this paper uses projected figures to estimate 2022 RHA populations. Upon publication of the Small Area Populations by the CSO in 2023, those figures will be updated. The PBRA model will continually evolve as new data becomes available. The lack of data should highlight the need for the implementation of a robust unique health identifier. This follows international best practice but would also allow us to better monitor utilisation from people outside a specified RHA. Work on developing a unique health identifier is currently underway in the Department of Health.

This spending review and previous work in McCarthy et al. (2022) has identified data constraints that impact Ireland’s ability to pursue a best-in-class PBRA model. Over the coming years, the following data requirements are necessary to fully support and utilise PBRA.

Table 16: Data requirements for full implementation of PBRA

Data:	Rationale/status:
RHA population profiles	The Census of Population 2022 figures at the RHA level presented in this paper are preliminary. Full results of RHA population will not be available until the publication of Small Area Population Statistics by the CSO in Q3/Q4 2023. In addition, the ESRI’s in-house regional population projection model will provide RHA-level population projections.
Age-Cost Utilisation Curves	Work is ongoing at the ESRI to extend the Hippocrates model to provide public acute hospital projections at a regional level. The regional projections will be developed along three dimensions: public acute hospital demand, expenditure, and bed capacity. An assumption made throughout the paper is that the age-cost profiles are consistent across regions. The regionalisation of the ESRI’s Hippocrates model will test this assumption, but also provide a more granular understanding of differences in acute healthcare needs across areas.
Integrated Financial Management System (IFMS)	IFMS is a national finance and procurement system for the entire health system. It has been developed under the HSE Finance Reform Programme – a significant transformation programme for the health sector in terms of scale and complexity. The financial reform programme is well advanced with much work done across the HSE at a tactical level to align existing processes and upgrade legacy regional financial systems where this is possible. IFMS will provide better reporting, management, governance, compliance and transparency, and a better overall financial control environment, commensurate with the scale and complexity of the HSE and the funding provided for health services in Ireland. IFMS will also provide a single standardised financial and procurement system to voluntary organisations will, for the first time, provide quality standardised financial

	<p>and procurement information across both statutory and voluntary services.</p> <p>A detailed design for configuration of the SAP systems underpinning IFMS was completed in 2021. The transition to the new Integrated Financial Management System across the HSE is ongoing and is currently in the 'Build and Test' phase before implementation beginning in 2023, which is the beginning of a phased rollout of over a 4-year period. The deployment plan will ensure that sites that manage the majority of expenditure will be deployed first, followed by smaller sites in year 4.</p> <p>The introduction of IFMS should enable clearer reporting of expenditure across RHAs and by programmes, which will in turn make it easier to plan and operate the PBRA model.</p>
Individual Health Identifier/PPSN	<p>The current ability of Ireland to pursue a best practice approach to PBRA is constrained by the lack of a fit for purpose unique health identifier. The inability to track individual level expenditure means there is an inability to match utilisation and cost to other characteristics of people or groups (socioeconomic status). The Government approved the Principles and Policies of a Health Information Bill in April of this year. It is now expected that the General Scheme will be brought to Government in 2023. Approval of the General Scheme will see the Bill being formally drafted by Parliamentary Counsel in the AGO. Given the size and complexity of the Bill, it is likely that it will not be drafted until the end of 2023. It will then have to go to the Oireachtas for consideration and approval. The date of enactment is therefore likely to be sometime towards the end of the first half of 2024.</p> <p>Once implemented, it is envisioned that a PPSN will act as a single health identifier that will follow the patient throughout their life and across the various sectors.</p>
Deprivation Index	<p>The latest Pobal HP Deprivation Index dates back to 2016. An updated index would be naturally advantageous in utilising the most up to date information available. There are plans in the second half of 2023 to begin work on updating the Pobal HP Deprivation Index.</p>
Rurality Index	<p>To reach a better estimate of the impact of living in a rural area on healthcare needs, work is needed to examine the role that travel distances and time impacts on cost of care across regions.</p>

6. Conclusion

The Irish healthcare system is undergoing substantial reform with a commitment to implement new RHAs and a PBRA funding model by 2024. PBRA is a funding model for health planning that seeks to distribute available healthcare resources according to population need to promote efficiency and equity in both health outcomes and distribution of resources. The purpose of this Spending Review is to further contribute to the evidence building required for the consideration of the most appropriate PBRA model to be implemented in 2024. This paper follows from McCarthy et al., (2022) and Johnston et al., (2021) and informed by the findings of these works, proposed a PBRA model for implementation and provides indicative results. This paper recommends the use of a needs adjusted capitation model to allocate funding to the new RHAs to be established as part of the Sláintecare reform. The model

proposed adjusts RHA population shares by an Age-Sex Index, Deprivation Index and Rurality Index. The results of the PBRA model applied in this paper, point to 'guide' PBRA expenditure shares being broadly similar to the current budget allocation by RHA with particular regard to the large expenditure programmes of Acutes, Older Persons, Mental Health, and Primary Care.

In line with international best practice, it is recommended that a permanent Advisory Group for the design and monitoring of the PBRA be established. It is recommended this group be chaired by the Department of Health, and comprise members of the HSE, RHAs, DoH, Central Government, as well as academic experts in the area of health resource allocation models. This group should be supported by an appropriate secretariat with all work made publicly available in the form of detailed reports on the formula/methodology and data used.

Work on the final PBRA model is still ongoing as part of the Implementation Plan to be submitted to Government for approval. This Spending Review is one of several inputs across Government departments to inform the evidence base needed to reach a decision as to what the model should look like and how it could operate. There are ongoing discussions across a variety of stakeholders, including the Sláintecare Finance Workstream. This spending review and previous work in McCarthy et al. (2022) has identified data constraints that impact Ireland's ability to pursue a best-in-class PBRA model. The operation of the PBRA will benefit from forthcoming improvements in the data landscape such as the full roll out of a robust PPSN based Individual Health Identifier and the Integrated Financial Management System. This will allow for a greater analysis of the relationship between healthcare need, utilisation, expenditure, and variables such as deprivation and rurality.

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To ensure accuracy and methodological rigour, the author engaged in the following quality assurance process.

- Internal/Departmental
 - Line management
 - Spending Review Steering group
 - Other divisions/sections

- External
 - Other Government Department
 - Quality Assurance Group (QAG)
 - External experts

