Rialtas na hÉireann
Government of Ireland

Spending Review 2022

Health Capital Investment in Ireland

An Analysis of Built Healthcare Infrastructure

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September 2022

Paper Summary

- This paper provides an analysis of the physical infrastructure within the HSE Acute and Community care settings.
- The analysis presents an overview of the condition, quality, energy efficiency, maintenance requirements and functional suitability of the HSE Estate for both the Community and Acute Care settings.
- The analysis presented can be used to inform future healthcare investment on the basis of all the areas considered. While specific analysis will be needed in a given region and service area to identify and prioritise planned investment, the paper outlines an evidence base for reference that can be used in addition to findings from the previous paper "An Analysis of Healthcare Infrastructure Capacity".

Findings

- **Ageing Capital Stock** - The age of both Community and Acute Facilities varies significantly with a large proportion of both portfolios being built over 40 years ago. This likely has negative associated impacts on maintenance costs, patient safety and efficiency in healthcare service delivery.
- **Quality of Stock** - The overall quality of the Community care portfolio is good with over 90% of all sites receiving B or above scores across all 4 categories measured. The quality of the stock within the Acute setting is much more varied, with 43% of sites having a quality score below the recommended B rating.
- **Functionality of Stock –** 44% of the acute care portfolio is below the recommended rating for functionality based on an assessment provided by the HSE. This may indicate that staff and patient flow are being impacted by the use of unsuitable facilities. It may also indicate that technical compliance issues are present throughout the estate.
- **Maintenance** – HSE engaged Capita (a real estate and infrastructure consultancy firm) to provide estimated maintenance requirements and associated costs for the HSE Property Portfolio. These were calculated based on individual site visits and comparison to national and international standards. They estimate a recommended maintenance cost of €121m for community care settings, and €887m for acute care settings over the next five years. While these figures have not been subject to independent verification by paper authors, their potential scale and distribution by region and facility are nonetheless important for future investment considerations. For example, estimated maintenance requirements are higher on a per bed basis in smaller facilities over larger ones, indicating scale economy issues in this context.
- **Energy Efficiency -** Just 28% of the top 120 energy users in the HSE portfolio exceed a B3 Display Energy Certificate rating. While the full monetary cost of achieving retrofitting and net-zero energy needs continues to be developed it is likely that significant investment will be required to achieve carbon abatement targets in the health sector in line with Government objectives.

Recommendations

- **Investment Considerations -** The age, quality, functional suitability and other characteristics of the HSE Health portfolio identified in this paper should be taken into account to inform future healthcare investment in both community and acute care settings. While more detailed analysis will be required to inform need and priorities in a given service area region, these high-level considerations provide a baseline for any future healthcare investment planning.
- **Maintenance and Replacement -** Data provided by the HSE implies a high cost of recommended maintenance to be incurred over the next five years in the community and acute care settings. It may also be economical to consider replacement of some facilities over continued maintenance in light of the high cost of maintenance relative to the scale of some sites. Further research in each case is required to validate and prioritise required maintenance.
- **Data Reporting & Future Research -** As in the previous paper, the analysis presented highlights the value of the collection and use of data to inform investment priorities in Health. Specific to this analysis, the condition, age, functional suitability and required maintenance of healthcare facilities presented all have implications for future healthcare investment. Policymakers should therefore endeavor to ensure these characteristics are collected on a more regularized basis than at present. In addition, data and research gaps have been identified in areas including the relationship between healthcare stock age and efficiency, as well as the relationship between maintenance expenditure and healthcare outputs.

Contents

1 Introduction

This paper builds on the first three spending reviews produced as part of the Healthcare Capital Investment in Ireland series, published in December 2021 (Hennessy, et al., 2021). A key recommendation emerging from this analysis was the need for planned investment to better account for the long-term strategic priorities of the health system while incorporating the existing capital stock profile and population needs by care setting and region. This motivated the authorship and publication of the first Strategic Investment Framework for Health, due to for publication in late 2022.

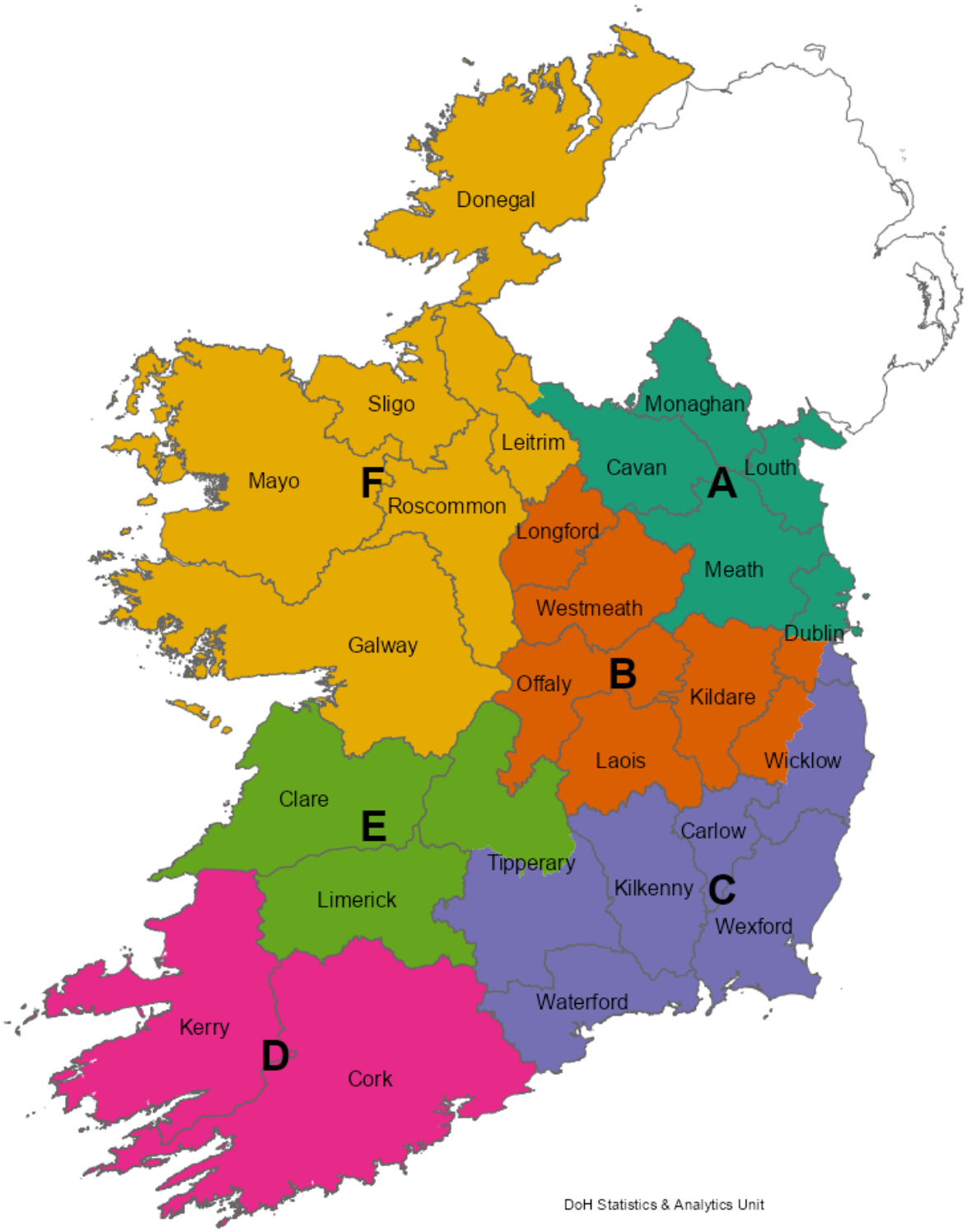
To facilitate the implementation of this framework, the authors of the original series have set out to produce two supplementary pieces of work, aiming to identify the composition of Ireland's Healthcare stock by region. The 4th paper of the series, "an analysis of Healthcare Capacity" presented healthcare capacity as it relates to throughput, such as acute and community beds, radiological equipment, and healthcare practitioners by region. The analysis presented in this paper is complimentary in nature, focusing on the age, area, suitability, quality, and the maintenance requirements of the health infrastructure portfolio. As in the previous paper, these findings are an important input for investment considerations, although more analysis is needed to account for differences in health needs, population structures and acuity of care by region. Nonetheless, the evidence presented in this paper provides a baseline from which future investment and prioritization decisions can be made under the Strategic Healthcare Investment Framework.

1.1 Regional Health Area Regions:

As in paper 4, Regional Health Areas (RHAs) are used as the primary categorization for comparison across regions. This is because RHAs and their associated characteristics will be used to directly inform healthcare funding considerations in the future, making them a natural focus point for our study.

There are six regional health areas (RHAs) in all with the geographies based on population data including how people currently access health services. The proposed geographies have good alignment to existing Community Healthcare Organisations & Hospital Groups, with some exceptions. Therefore, it requires some data to be re-aligned at an LHO level to enable alignment of older datasets to RHAs.

Fig.1.1: Map of Regional Health Areas (RHAs)



Source: Department of Health Statistics & Analytics Unit

The six RHAs will cover the following areas:

Area A: North Dublin, Meath, Louth, Cavan, and Monaghan.

Area B: Longford, Westmeath, Offaly, Laois, Kildare, and parts of Dublin and Wicklow.

Area C: Tipperary South, Waterford, Kilkenny, Carlow, Wexford, Wicklow, part of South Dublin.

Area D: Kerry and Cork.

Area E: Limerick, Tipperary and Clare.

Area F: Donegal, Sligo, Leitrim, Roscommon, Mayo, and Galway.

The six RHAs are further broken down into 96 Community Healthcare Networks (CHNs). CHNs deliver primary and community services to an average population of 50,000 people each[1].

1.2 Methodology/Limitations

The data used in this paper was provided from one distinct source, HSE Capital & Estates. The data provided by the HSE Capital & Estates team includes primary research undertaken by CAPITA, involving a survey of all community residential units and Acute Hospitals within their Estate. This survey was split into two distinct phases or lots. The first lot of this survey examined community nursing units and was undertaken between January 2016 - January 2019: obtaining the age, gross internal area, condition, and the maintenance requirements of these sites. This dataset is very detailed, identifying at a fixture and fitting level the remaining life years and associated cost of replacement for all 543 sites surveyed. The second lot concerning acute care facilities has been under development since 2017 and includes a larger array of measures of quality including a measure of condition, functional suitability (for example, relative to HBN and HTM[2] standards), utilization of space, and the quality of the rooms for their current purpose. There are some limitations to this data which include:

- The costs of maintenance and the costs of achieving regulatory compliance were estimated as part of this survey. Due to the delay in collection between the community and acute care lots, separate times are associated with each estimate. Cost estimates are as at 30/06/2015 for the Community residential units and 01/01/2019 for the Acute hospitals.
- The authors did not have access to the full model and methodology used to estimate these maintenance requirements by facility. As such, this analysis should not be taken as an endorsement of the specific quantum of required expenditure in each context that has been estimated by Capita.
- These costs do not include the costs of procurement and decanting[3] of current service.
- The measures of quality provided within this analysis were evaluated at a point in time and therefore the quality of stock may have changed in the intermittent period.

[1] https://healthservice.hse.ie/staff/news/hse-to-establish-six-regional-health-areas/
[2] See table of definitions below.
[3] This is when patients are moved to another block of beds or location during periods of upgrading or maintenance.

- The values for space utilization are at a point in time, however they do aim to consider usage trends over a preceding period of time.
- The onset of the Covid-19 pandemic has hindered the completion of the lot two survey with 38 sites currently surveyed and 9 sites outstanding. The outstanding sites account for 2,709 acute inpatient beds out of a total of ~15,000.
- The HSE Energy Bureau (subdivision of Capital and Estates) has provided a sample of the top energy consumers within the HSE Estate accounting for 120 sites.
- The costs of retrofitting sites which do not meet the energy efficiency requirements may be interlinked with maintenance requirements of some sites given that the replacement of equipment or fixtures may result in increased energy performance.

2 Capital Stock of Community Care facilities

Community care facilities provide both inpatient care and day services. The HSE portfolio includes 2,085 buildings across 543 sites. A significant amount of the current National Development Plan (NDP) Health allocation is devoted to the replacement and refurbishment of the HSE residential estate to meet Health Information and Quality Authority (HIQA) requirements[4]. Out of a total allocation of €5.7bn up to 2025, approximately €1bn is to be invested across 90 sites to achieve compliance.

A quantitative analysis of the HSE owned non-acute residential facilities has been completed within this section using data from the Lot 1 survey completed by CAPITA supported by the HSE Capital and Estates Team. This has included the evaluation of the quality, age, and internal area of buildings across the community care portfolio. The facets which were evaluated can be used to help inform future investment requirements, ensuring investment is prioritized relative to competing criteria including patient safety and clinical need. This research will enable the implementation of a Strategic Health Investment Framework (SHIF) within the Department of Health. This work has been completed alongside the development of the HSE Capital and Estate strategy and will help shape future health capital investment strategies going forward for both organisations.

The initial wave of data collected by the HSE focused on the condition, age, maintenance cost, and some measures of quality and the internal area. Additional work is currently underway as part of the Capital and Estate strategy to re-evaluate these sites, enabling a more in-depth analysis in future within the community care setting.

2.1 Average Year of Construction and Size of Community Facilities

The age of healthcare infrastructure is an important consideration for a variety of issues including patient safety, functional suitability, technical compliance with modern health standards and arising future maintenance and refurbishment costs. The older a building is, the more likely a negative outcome across these areas. For example, maintenance expenditures are likely to be higher on old buildings than new, due to the use of building components and fixtures passed their useful lifespan. Age can also be indicative of the energy efficiency of a building, with older buildings being built to different regulations and with less insulation than more modern buildings (Office for National Statistics, 2022). Age can also limit the refurbishment of a building to a modern standard, with

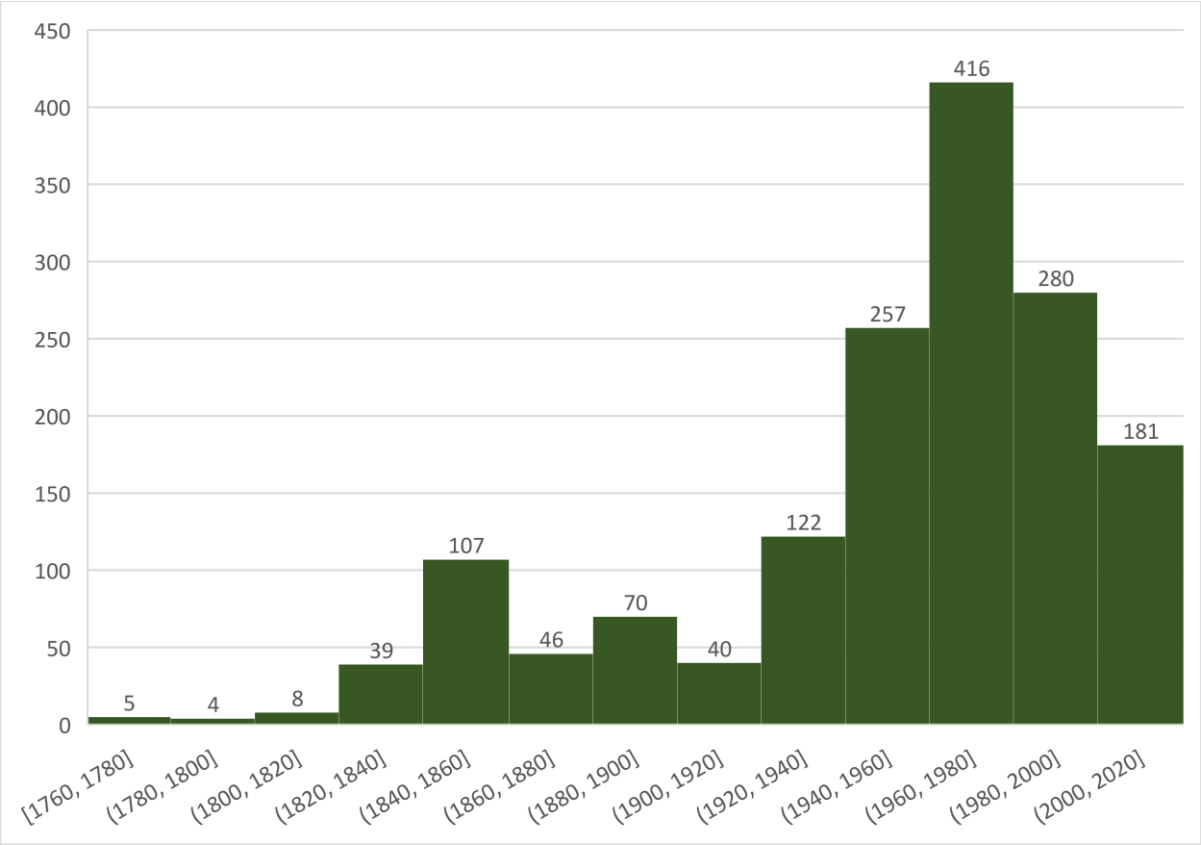
[4] Approximately €1billion is to be invested across 90 sites to achieve HIQA compliance

Bakowski (2017) noting that the modernization of older hospital buildings must be approached with a tailored rather than standardized plan, given the idiosyncrasies present in each structure.

Taking this into account, an analysis of both age and internal area by age was undertaken. In Fig 2.1.1, a left skewed distribution is observed with a mean construction year of 1953 and a median construction year of 1970, with 5 sites being constructed pre-1780. In addition to this, a further 12 buildings were constructed pre-1820, which would imply that 17 buildings currently in operation are over 200 years old, with a further 319 buildings being over 100 years old. The age of these buildings may present additional challenges in both maintenance costs, net zero targets and their adaptability to provide care as technology advances.

The maintenance of buildings can be costly. Equally, the maintenance of inefficient stock could result in an inefficient allocation of resources. The use of older capital stock may also result in decreases in suitability and functionality. Examples of where suitability issues may arise include the use of shared rooms, which present additional challenges for infection control and other considerations such as patient privacy. Equally, the cost of modernisation may be considerably greater in some instances depending on the original methods of construction. In the estate there are 56 properties which were built before 1840 and are still used to provide care.

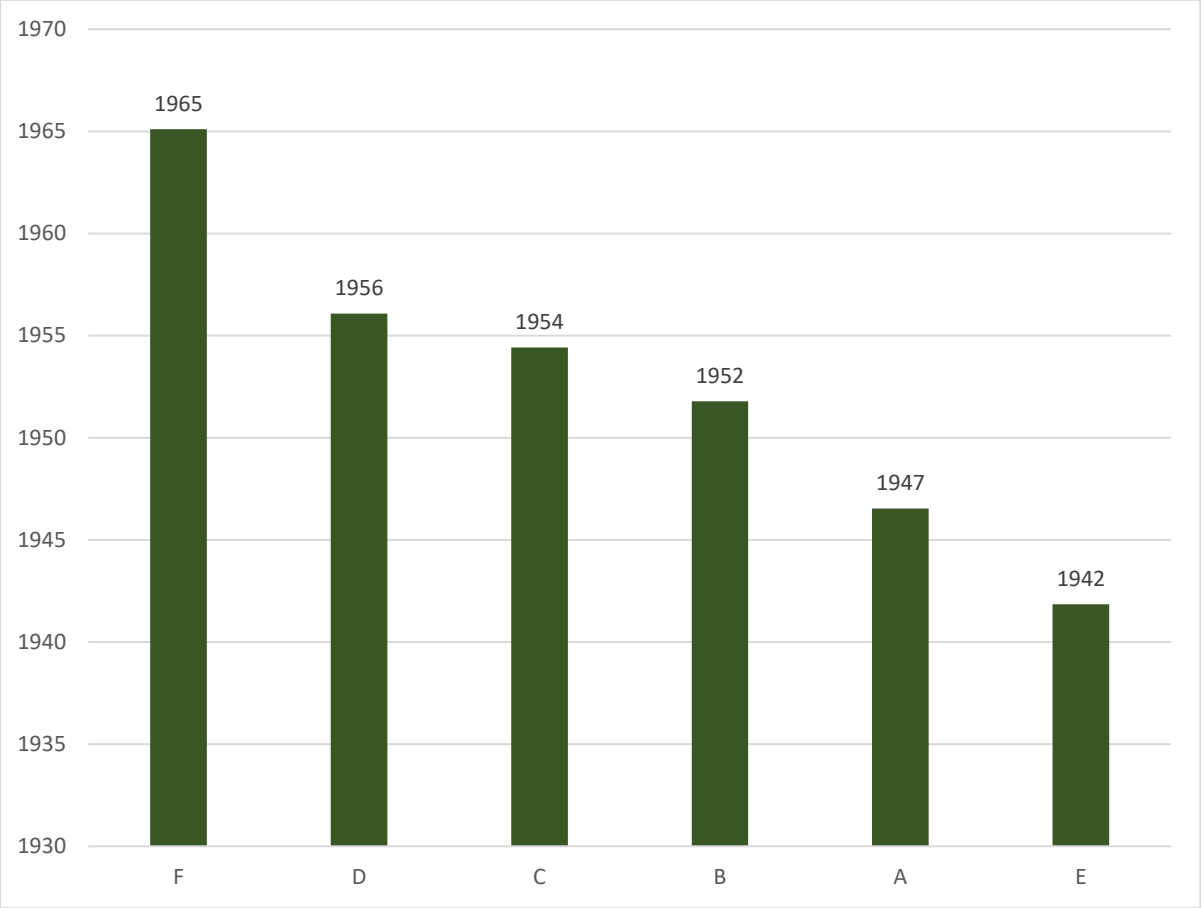
Fig.2.1.1: Distribution of HSE Community care buildings by Year of construction



Source: HSE Capital & Estates, 2022

Examining the average year of construction of stock by RHA is also informative. Variations in the average year of construction of stock by RHA can be observed, with RHA F having an average construction year of 1965 whereas RHA E has the oldest average year of construction at 1942. The age of construction can influence the required level of maintenance for a given property and its suitability in use for the delivery of healthcare services. While not definitive, the difference in age of stock by region may indicate suitability and functionality concerns are more present in some RHAs than others. In later sections of this analysis, the condition of community residential stock is examined on a per site basis to identify areas in need of potential improvement.

Fig.2.1.2: Average year of construction of HSE Residential Facilities by RHA



Source: HSE Capital & Estates,2022

Understanding both the age and the total internal area of a building can provide further insights into the challenges which may arise in the maintenance and refurbishment of buildings across the estate. As observed in Table 2.1.3, 57% of all internal area within the portfolio is contained within buildings built pre-1950, with 43% built pre–1920. This raises potential concerns given that a proportion of all services are provided in buildings which may have passed their economic reference lifespan of 30 years and functional lifespans relative to PSC designation (Public Spending Code, 2021). Only 20% of all buildings by gross internal area within the portfolio meanwhile have been built within the last 42 years. While the age of stock is not a definitive indicator of the need for replacement it does point to many potential issues which may exist in the portfolio of assets by region. Further analysis in each case at a more granular level in each case is required to fully determine potential replacement and refurbishment needs arising from this information.

Table.2.1.3: Total Internal Area by Age of HSE Community care estate

Year of Construction	Gross Internal Area	% Total Gross Internal Area
1760-1920	634,279	43%
1920-1950	207,245	14%
1950-1980	341,866	23%
1980-2000	116,378	8%
2000-2022	176,714	12%

Source: HSE Capital & Estates,2022

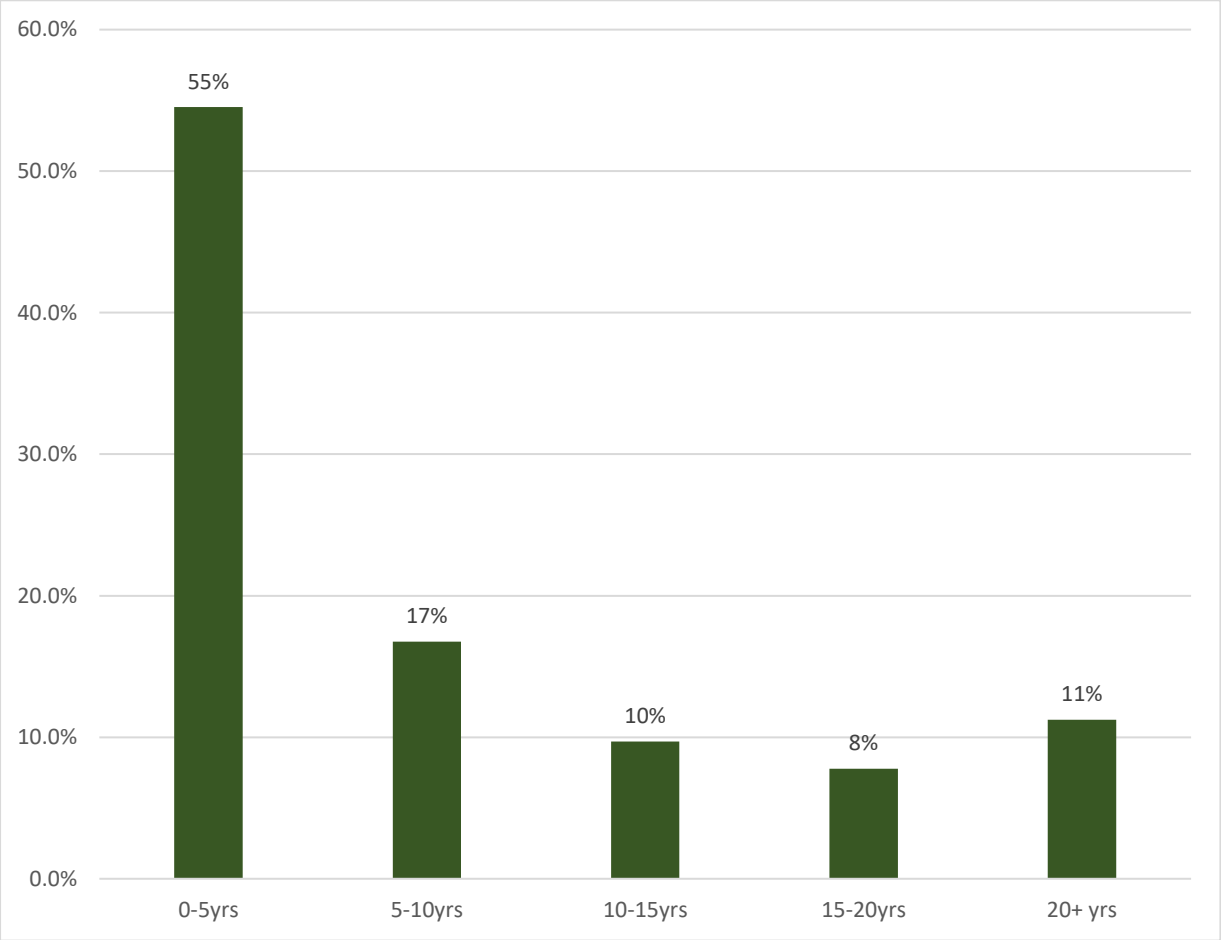
2.2 Capita Estimated Community Care Maintenance Costs

The costs associated with annual maintenance and the replacement of stock will vary based on the composition of a given RHA. RHAs which have more sites of a larger area, and of an older age, may potentially have greater maintenance and replacement costs. The level of maintenance which a building receives has a significant impact on its lifespan, as highlighted by Akomolafe (2020). In this context, Capita estimated remaining years of life and associated maintenance figures are worthy of examination. **Although these figures have not been subject to independent evaluation by authors**[5], their quantum and distribution across RHAs is worthy of consideration in relation to planned investment. Across the Capita provided dataset, an analysis of over 160,000 items across all sites was completed with the number of remaining life years of each item recorded. This includes minor components such as doors, floors and all forms of fittings and fixtures. 55% of all items have a recommended replacement requirement within the next 5 years. According to Capita estimates, this would equate to €121m of expenditure to facilitate full replacement of all of these assets. The

[5] As noted elsewhere, the authors did not have access to the full model and methodology used to estimate these maintenance requirements by facility. As such, this analysis should not be taken as an endorsement of the specific quantum of required expenditure in each context that has been estimated by Capita.

remaining risks are mainly within the following 15-year period, when a further 34% of items will require replacement.

Fig.2.2.1: Replacement Risks of fittings and fixtures by remaining life years

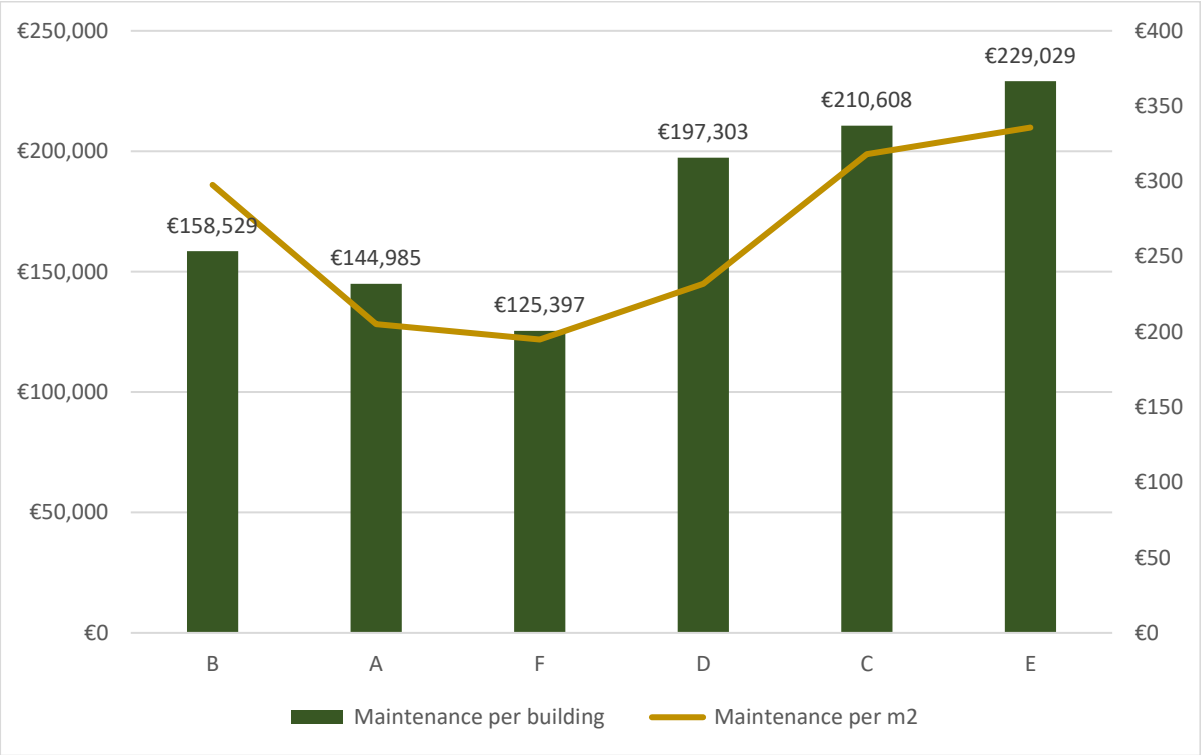


Source: HSE Capital & Estates, 2022

The relationship between total maintenance per building and maintenance per m^2, can also be examined, with this provided in Fig 2.2.2. In general, regions with greater levels of maintenance per building costs also tend to have greater levels of maintenance per m^2. When compared to the average age of stock a clear trend appears, with RHA E having both the highest minor capital requirements and the oldest stock within the portfolio. It must also be noted that both RHA A and RHA B have a lower estimated required maintenance per m^2 than other RHAs with relatively newer stock. The slight differences in age between RHA C and D, and the potential differences in past maintenance expenditure within each of these regions may also be influencing the estimated level of maintenance required in these regions. The level of maintenance required in future can be dependent on the levels

of preventative maintenance completed in the past[6]. While maintenance costs estimated will need to be verified and prioritized for value across the estate, they nonetheless provide a good preliminary indication of the range of costs that may emerge in this context. As this aspect of the survey took place in 2016 many of the fixtures for replacement identified may already have passed their useful lifespan, although additional analysis will be needed to verify this.

Fig.2.2.2: Maintenance costs per Building and per m² by RHA



Source: HSE Capital & Estates, 2022

2.3 Measures of Building Condition

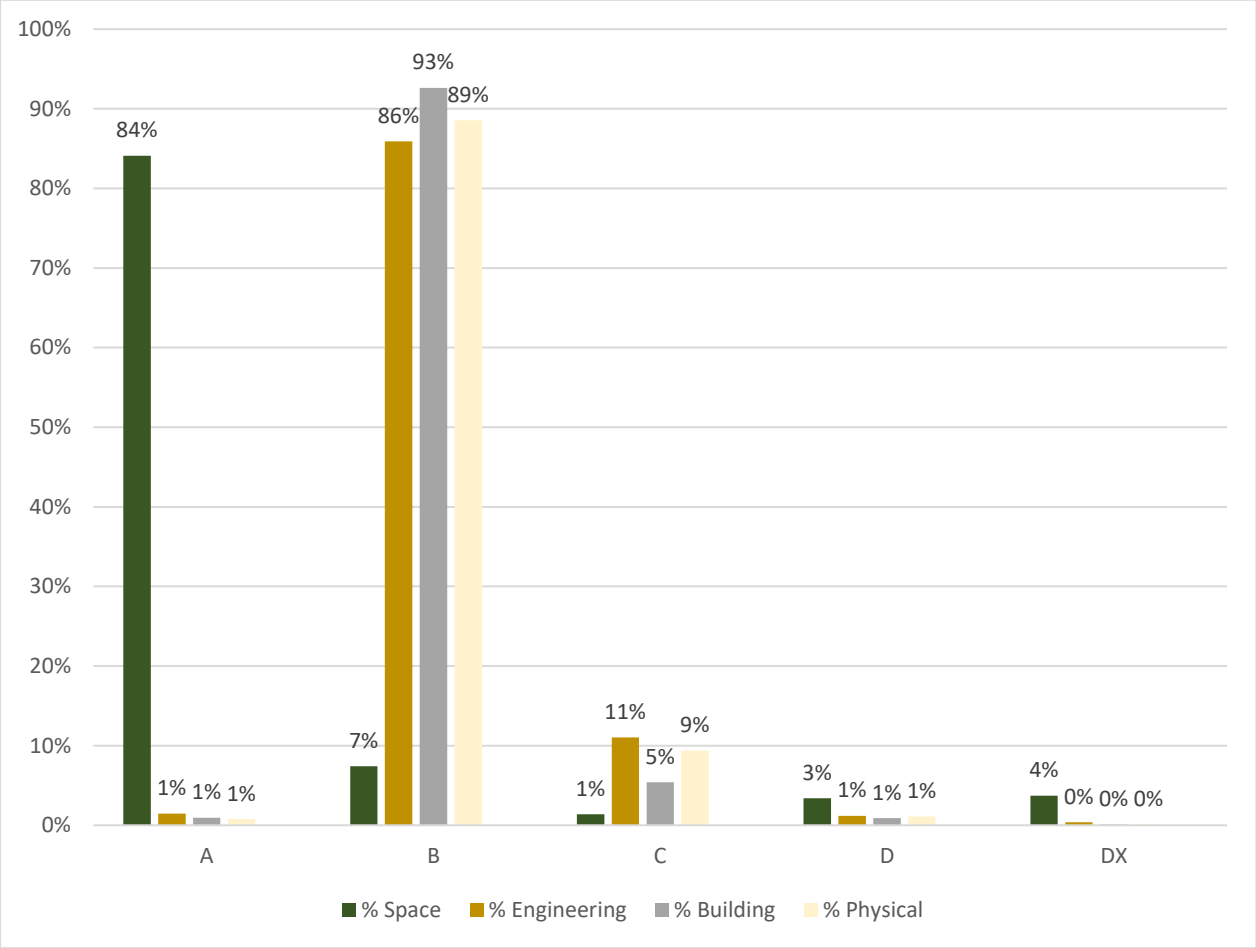
The HSE Capital & Estates database also includes an evaluation of the condition of each community residential unit under 4 measures of condition: space utilization, engineering, building condition, and physical condition. These measures were evaluated using an ordinal qualitative scale, where a score of A is excellent, B is reasonable, C is below standard, D is non-compliant, and DX is non-compliant, with no ability to become compliant. It must be noted that this survey doesn't evaluate the regulatory compliance of each site. The vast majority of sites (84%) received a score of A for space, with only 8% of all stock receiving a score of C or below. This trend continues for the other 3 measures of quality

[6] https://www.facilitiesnet.com/maintenanceoperations/tip/The-Real-Cost-of-Deferred-Maintenance--38366

with 87% of sites receiving a B or above for engineering systems quality, 94% of all buildings scoring a B or above for building condition and a further 90% of buildings receiving a score of B or above for physical condition. Overall, the condition of stock appears to be good relative to its age at the time of survey[7]. However, 10% of the portfolio has physical risks which leave it below standard, 12% have engineering risks, and 6% have building risks. Moving forward the remediation of these risks along with the provision of preventative maintenance to maximize the useful life of stock is imperative to ensuring value for money within the system. The HSE Capital & Estates is currently developing a strategy[8] intended to identify and rectify these issues. It should also be noted that changing health standards will in some cases require a re-evaluation of the stock relative to condition, with some facilities likely to receive a lower condition rating if assessed on the basis of regulatory compliance. This has been indicated by HIQA compliance data, with 25% of community residential sites surveyed being non-compliant on premises regulation.

[7] The Community residential stock was not measured relative to regulatory compliance, it was simply evaluated on building condition metrics.
[8] HSE Property and Asset Management Strategy

Fig.2.3.1: Measures of Building Quality



Source: HSE Capital & Estates, 2022

3 Acute Hospitals Capital Stock

There are 47 Acute and Elective Hospitals in Ireland, reporting 930,000-day case discharges and care to 569,000 inpatients in 2020 (Healthcare Pricing Office, 2021). Acute Hospitals vary in capacity, size and scale with the largest hospitals having over 707 inpatient beds and some of the smallest providing care to 20 inpatients.

In this section, an analysis of the physical infrastructure in which acute activity is provided is completed. The analysis focuses on the age, size, and the quality of the capital stock in the acute sector. The age and size of a site can provide insight into both the scale of the site, and the future needs for its replacement. These metrics can be informative, however, the most valuable metrics which provide a clear understanding of stock are the four measures of quality: functional suitability, building quality, and mechanical and electrical system quality. These provide a clear understanding of

the current state of stock, and how much investment may be required to achieve compliance with international best practice.

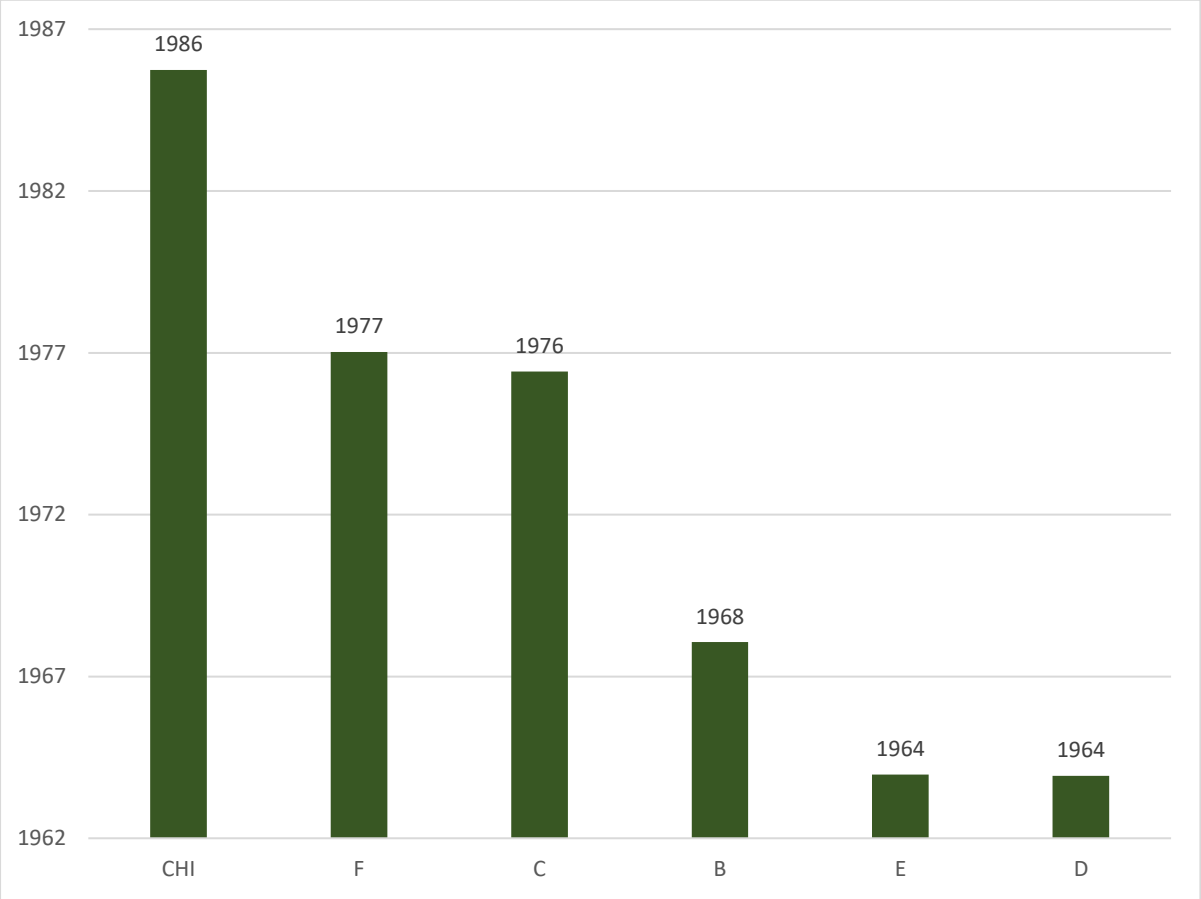
3.1 Year of Construction of Capital Stock by RHA

As with community residential units discussed above, the age of Acute Hospitals may provide a measure of the potential needs for replacement, the potential additional costs for maintenance, and the loss of productivity through poor functional design. Due to a significant number of sites still requiring to be surveyed by the HSE, RHA A has been removed from this analysis. Across the remaining five RHAs, and the CHI hospital group[9],variations in age can be seen. The buildings within the CHI group have an average build year of 1986[10], with this being the newest of all areas. This raises questions around the strategic alignment of past investment decisions with the state of stock, given the large amount of ongoing and planned investment in maternity and pediatric care presently occurring. Across the five RHAs analyzed, the average age varies markedly with RHA F having an average build year of 1977, whereas RHAs E and D have an average build year of 1964.

[9] CHI is a national service providing care to patients from across the state and therefore is separate to the RHA structure

[10] The average build year is calculated based on the cumulative average construction year of all buildings within a site including temporary buildings.

Fig.3.1.1: Average Year of Construction by RHA

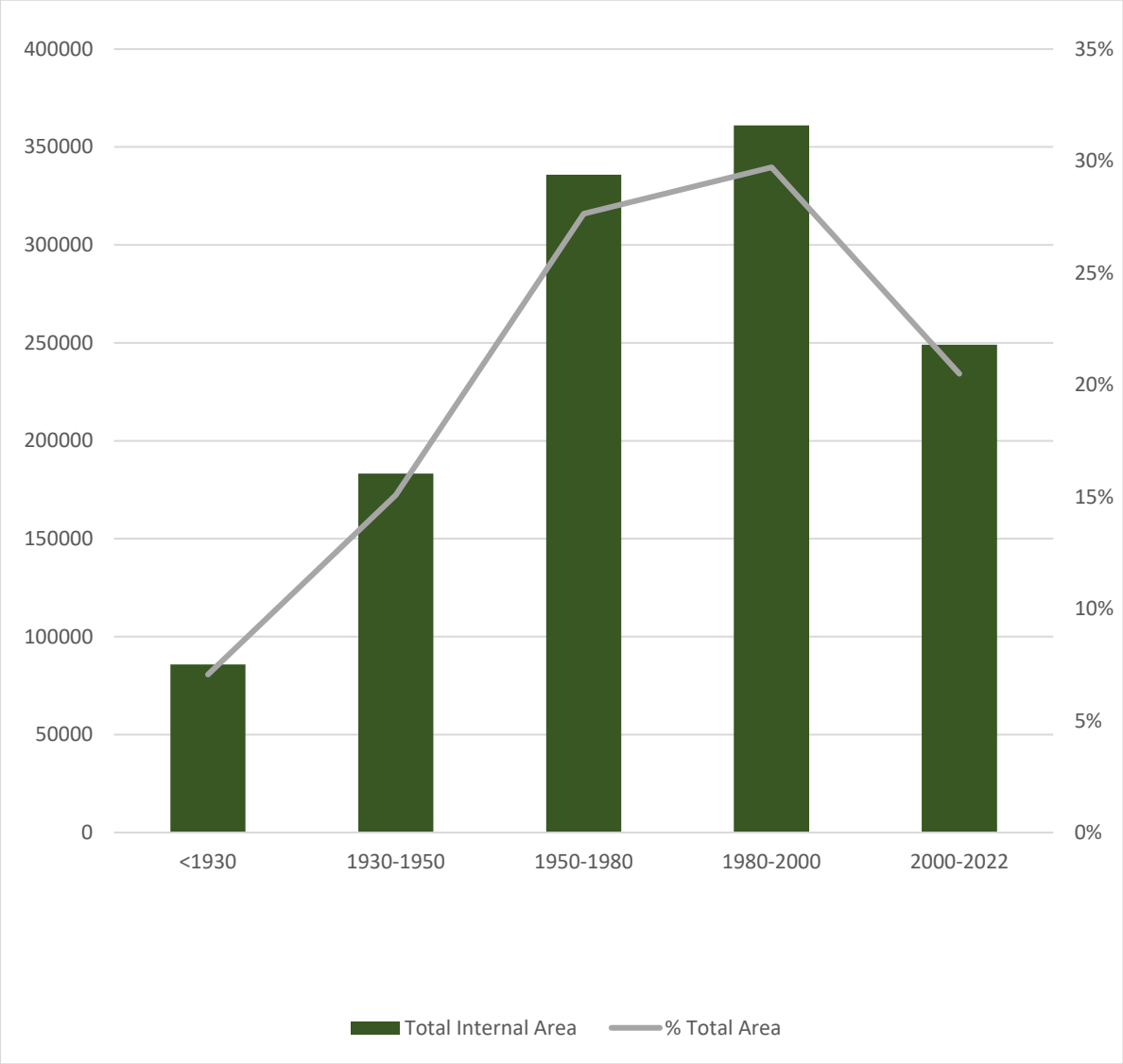


Source: HSE Capital & Estates, 2022

3.2 Internal Area and Age

In Fig 3.2.1, it can be observed that unlike in the community setting, where 57% of all stock was built pre-1950, only 22% of all Acute stock was built within this period. The age associated risks are therefore not as present in this instance with 50% of all stock built since 1980 and 78% of stock since 1950. Evidently, age-related risks may not necessarily be related to the condition of the portfolio as in the case of community care where the vast majority of stock received positive scores for building condition. That said, the intensity of care provided within the acute sector is significantly higher than in the community and this can result in the deterioration of equipment and fittings at a faster rate given the higher level of use (Shohet, 2002). Considering the higher requirements of acute care infrastructure, older properties may also be less able to meet service demands efficiently. This may motivate the limitation of these properties to less intensive services where identified, such as rehabilitation or outpatient procedures (Rechel, et al., 2009).

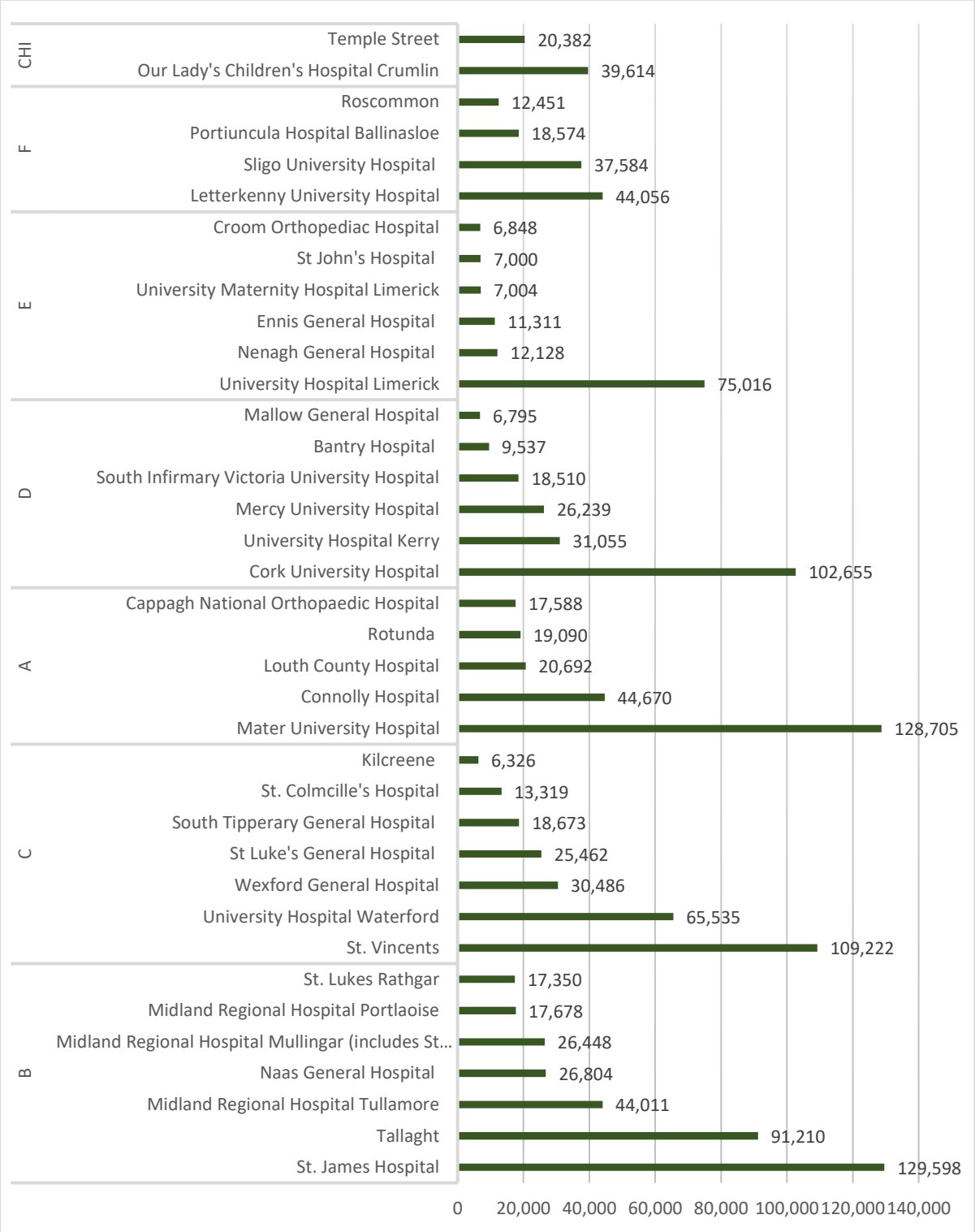
Fig.3.2.1: Total Internal Area by Year of Construction and % Total Area by Year of Construction



Source: HSE Capital & Estates, 2022

The average internal area of all sites was estimated and recorded centrally although in some instances the estimate has yet to be verified as the site has yet to be surveyed locally. The variation in gross internal area of buildings across sites is noticeable. Sites with lower gross internal areas may in some instances be more fragmented and consist of a larger number of buildings with a smaller size. In some instances, the inverse could also be the case, with some sites being one large building. The average internal area across both RHAs and individual sites varies significantly with the smallest sites having an average internal area of 4186m^2 and the largest sites having an average internal area of 148,000m^2. The fragmentation of a site may lead to complexities around the replacement and maintenance of a site. This can arise when central components of a hospital decay and require replacement earlier than peripherals which are attached to the original façade (Rechel, et al., 2009).

Fig.3.2.2: Average Gross Internal Area by Site and RHA (m^2)



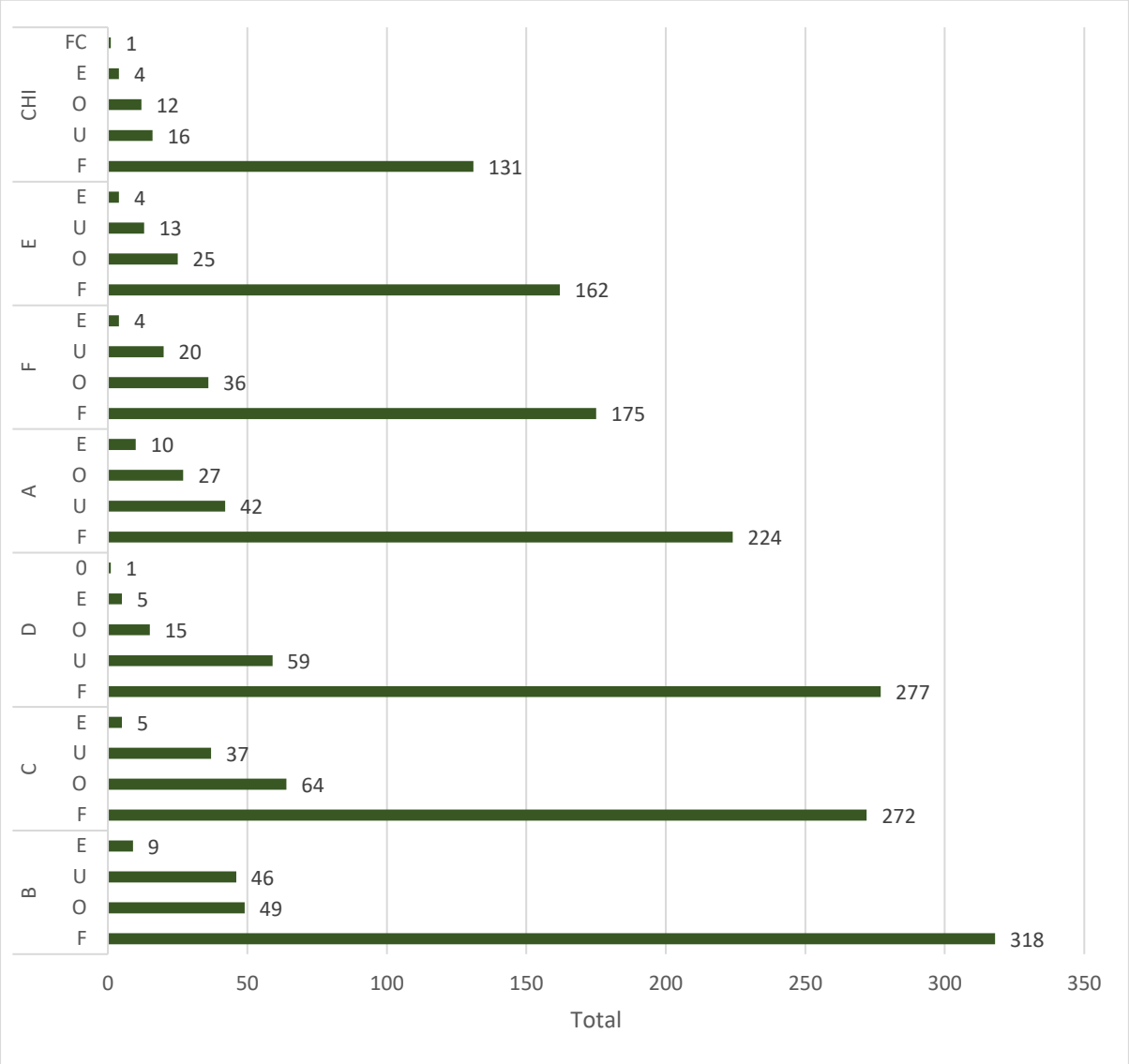
Source: HSE Capital & Estates, 2022

3.3 Utilization of Space

The utilization of space can also affect the performance of a hospital; when the utilization of space is not optimized, the utility of the asset is not maximized. Given that physical assets have significant costs to both build and maintain maximizing the utilization of space ensures a higher return on investment than otherwise. The utilization of space can be varied and was recorded using four distinct qualitative categories: Empty, Under-used, Fully Used, and Overcrowded (see Appendix for further explanation). These criteria had sub-criteria to factor in the current use, use over time, and regulatory guidance. Out of all units surveyed, 328 (17%) were reported as being Overcrowded, with a further 37 (2%) being Empty, and 164 (8%) being underutilised. Overall, the vast majority of facilities 1428 (73%) have a score of Fully Used, which implies they are operating at their recommended level of use.

This analysis presents two core observations. Firstly, 328 (17%) areas may require additional space to reduce their occupancy score from overcrowded to fully utilised. This is also reflected in the acute occupancy statistics presented at a hospital level in the previous paper. Secondly, there is a further 201 areas which have the capacity to provide further services / a greater level of service. The overcrowding issues can be further broken down into categories and strategies implemented on a site-by-site basis to mitigate the occurrence of these events. Areas experiencing overcrowding may have higher patient safety incidents and reduced staff productivity (Mishra, 2001).

Fig.3.3.1: Utilization of Space by RHA



Source: HSE Capital & Estates,2022

3.4 Measures of Quality

Electrical and Mechanical systems are essential parts of any building. In the case of Health Infrastructure the demands on these systems and the implications of system failure can be clinically significant. The replacement of this ageing equipment is essential to mitigate the risks of electrical systems failure and the associated clinical risk that this poses.

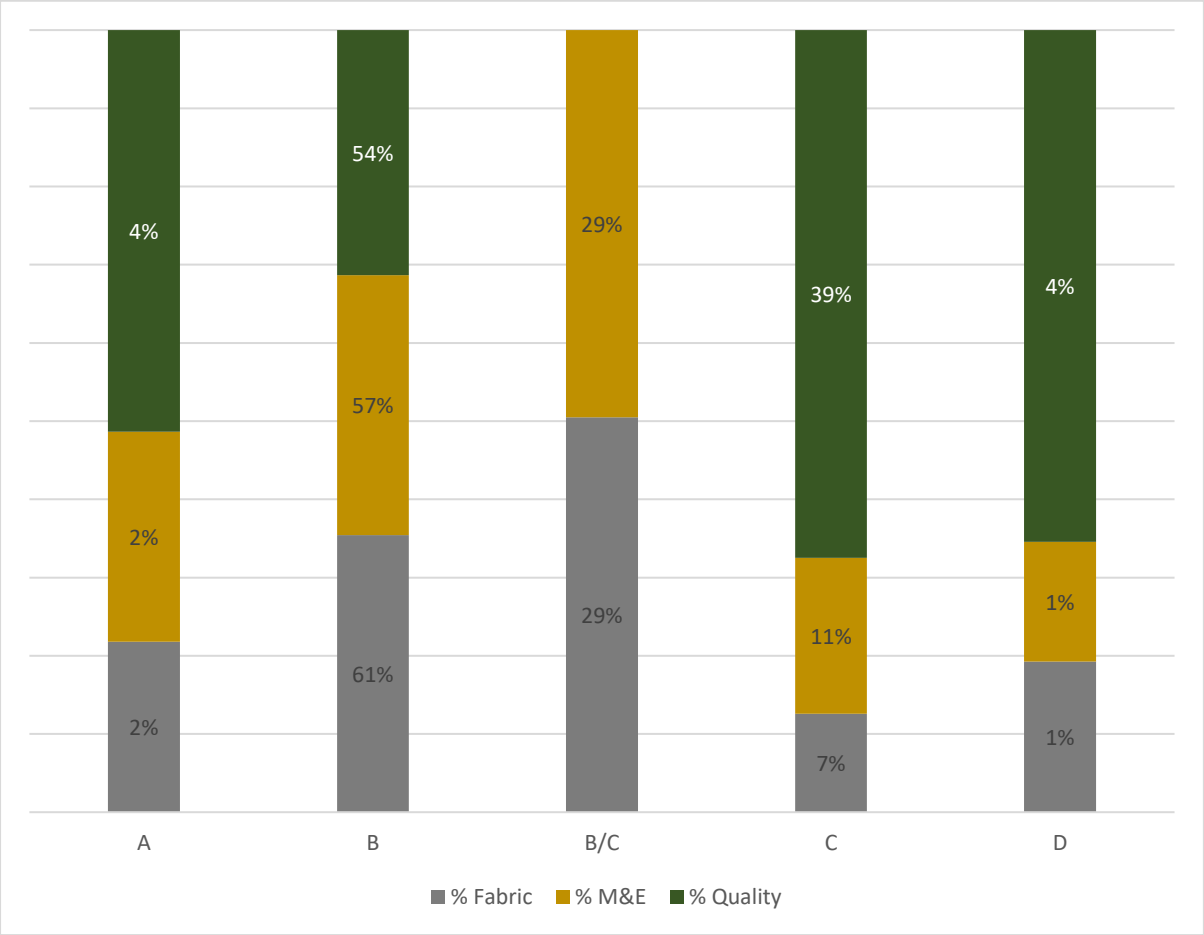
Mechanical systems include ventilation systems, heating systems, and other equipment. The role which mechanical systems play is equally important, and the failure of mechanical equipment can have adverse effects for both patients and staff such as no air conditioning or heating. The

maintenance and replacement of mechanical systems can also be considered from the perspective of lowering carbon emissions from sites. The replacement of older systems with more efficient ones can reduce the risks of failure, the costs of maintenance, and potentially the energy consumption of the system.

The fabric of a building is a broad term which includes the cladding, structural materials, and the internal fixtures and fittings. This broad measure of quality evaluates both the interior and exterior of the building providing a broad understanding of the quality of each building. Given that this measure is so broad, buildings with a D rating could still be regarded as having a structurally reasonable condition overall while requiring considerable internal refurbishment. Therefore, the interpretation of this analysis is solely at a high level to understand the incidence of fabric quality risks by RHA. This analysis may identify RHAs which have a greater level of risks which can then be further explored at a site or RHA level to understand the extent of remediatory investment required.

The quality of a building is a broader measure which includes both of the above facets along with other considerations including patient privacy, confidentially, and ease of use for staff. These considerations provide a wider understanding of the ability of these facilities to deliver compliance with healthcare regulations in their current configurations. In Fig 3.4.1, ratings on each measure are displayed. The most pronounced risks are within overall quality of the estate, with 43% of sites having a quality score of below the recommended standard score of B. The challenge of remediation of these sites to the recommended standard is potentially significant. The vast majority of sites have low levels of Fabric and M&E risks, with only 8% and 12% of sites having below standard scores in these areas. The relationship between the scores for M&E, Fabric, and Quality reflects the differences between building quality and its ability to provide an appropriate level of care, reflecting modern practices and guidelines. This along with the analysis below which reflects on the functional suitability of sites, enables a true understanding of the standard of stock, and the immediate risks which exist within the portfolio.

Fig.3.4.1: % of each measure within each category

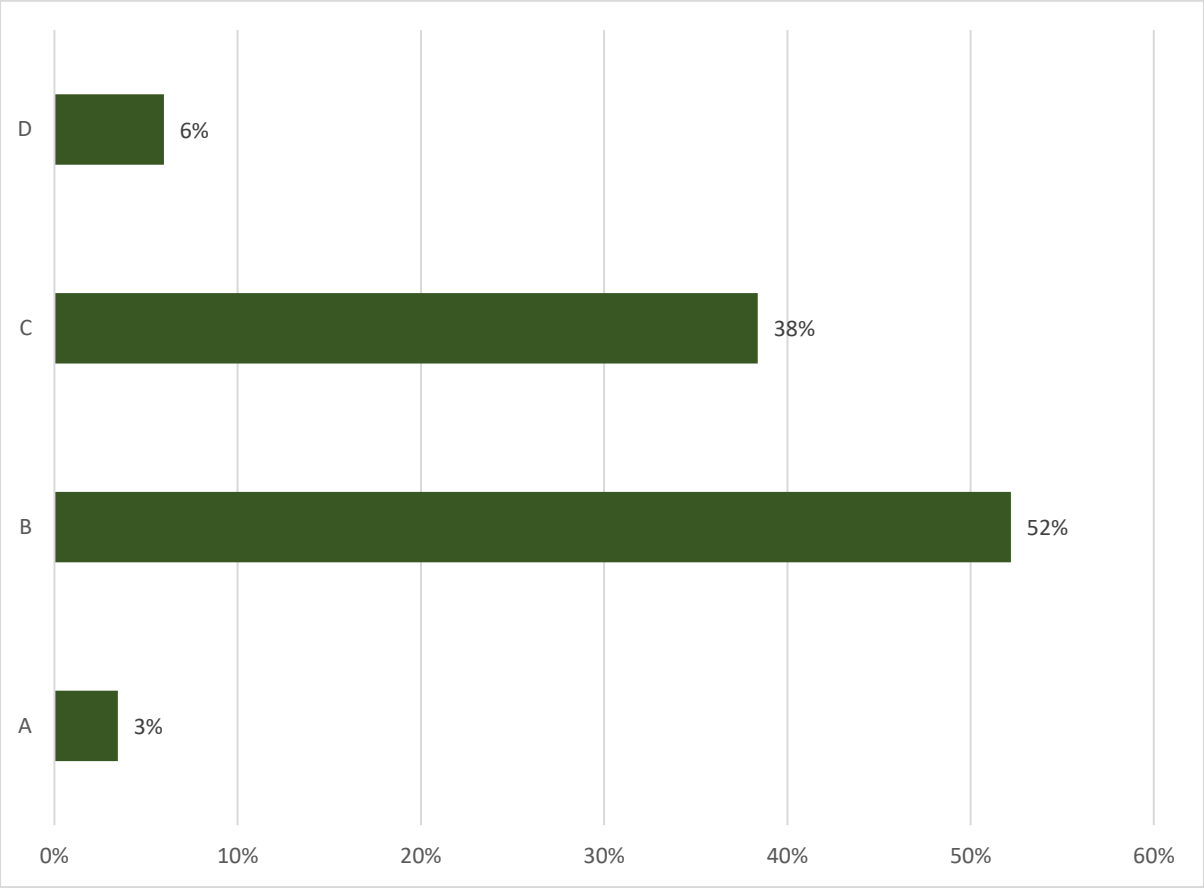


Source: HSE Capital & Estates,2022

3.5 Functional Suitability

The suitability of a room for providing its stated role can be varied and this may be relative to the ever-evolving methods in which care is delivered and the introduction of additional technology since the facility was constructed. In each of the RHAs it can be seen that the majority of buildings receive a score of B or C for functional suitability. As identified throughout this analysis, some hospitals are still to be surveyed and, therefore, the functional suitability ratings of some RHAs may change as this information is collected. In instances were a score of C or D is present, solutions should be identified to remediate these issues. This may be through replacement, refurbishment, or the reconfiguration of services within a given site to maximize the functional suitability of the current stock.

Fig.3.5.1: Total Functional Suitability of the Estate[11]



Source: HSE Capital & Estates,2022

[11] The functional suitability is measured on a room specific basis and is not adjusted for gross internal area.

3.6 Capita Estimated Acute Care Maintenance Requirements

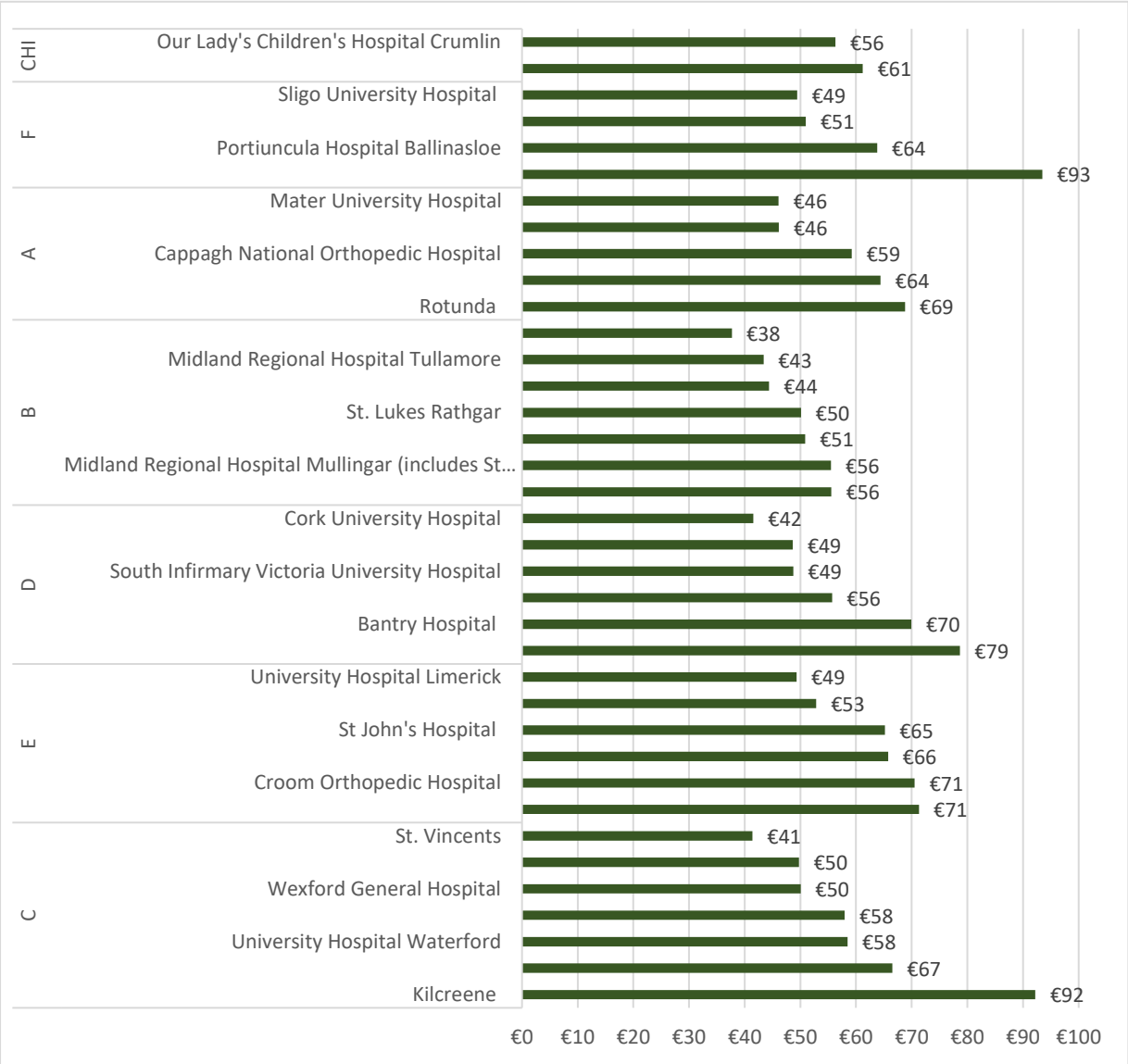
Maintenance is the combination of all technical, administrative and management actions that maintain or return an entity so as to be able to perform its requested function[12]. The cost of maintaining and operating a building over its lifetime can be five times its initial construction cost over a 30-year time horizon (Circular Economy, 2021) with maintenance costs beyond this horizon likely to increase as the building continues to age. High maintenance costs are directly related to the use of older stock, which requires more thorough and complex maintenance than newer builds (Shohet, 2002). The intensity of care delivered across these sites is a core determinant of the maintenance requirements, with an outpatient's department for example requiring a lower level of maintenance expenditure than an operating theatre given the lower levels of compliance requirements in outpatient settings (Rechel, et al., 2009). In general, "hot" areas of a hospital used for clinical treatment have shorter lifespans than facilities used for administrative or other tasks.

The following analysis of maintenance evaluates information and costings estimated by Capita for the HSE Capital and Estates Team to understand the maintenance and compliance requirements across surveyed sites. The maintenance schedule was developed by Capita based on industry experience, the HSE Property Appraisal Manual, SFG20 and Irish State Claims guidance documents. **Authors did not have full access to the model and methodology used to estimate maintenance costs per site, and as such this analysis is not an endorsement of the specific quantum of required expenditure estimated by Capita.** Instead, the focuses of our analysis is on maintenance costs relative to site size, capacity and region.

In this context, one can firstly see in figure 3.6.1 that the level of planned preventative maintenance varies across hospitals, with Roscommon requiring €92 p/m^2 annually over the next five years according to provided estimates. Tallaght University Hospital has the lowest estimated maintenance requirement with €37 p/m^2 annually over the time horizon. In instances where stock has poor performance on all measures of quality, compliance, and high associated costs of maintenance, the replacement or a deep refurbishment of the site could be considered as part of an options analysis.

[12] UNI EN 13306: 2003 standard

Fig.3.6.1: Planned Preventative Maintenance per metre squared per annum

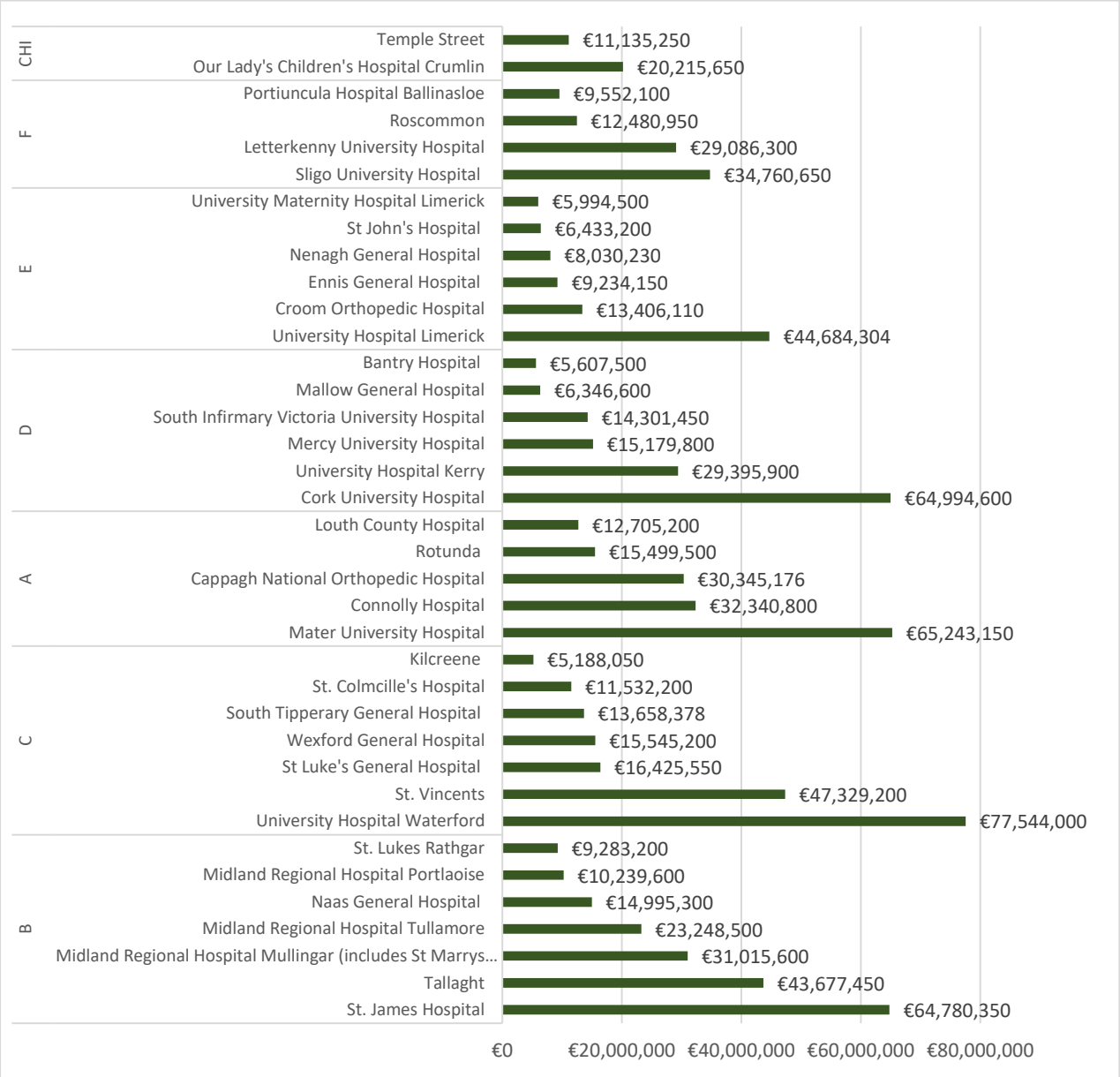


Source: HSE Capital & Estates Capital Survey,2022

Total Capita estimated maintenance costs by RHA & Hospital are provided in figure 3.6.2[13]. In a large number of sites the estimated total maintenance cost is high, with fourteen, or 37% of hosptials surveyed having maintenance requirements above €20m. University Hospital Waterford has the highest estimated maintenance cost of €77m, while Kilcreene has the lowest estimated maintenance cost of €5m. This indicates the likely spread of required investment in this context by hospital and region.

[13] these estimates do not include the cost of decanting, renting, or the procurement of the skills required to meet technical compliance.

Fig.3.6.2: Total Compliance and 5-year maintenance costs by RHA & Hospital



Source: HSE Capital & Estates,2022

Estimated maintenance costs can also be compared by RHA as in table 3.6.3. One can see that estimated maintenance costs varies by RHA, with RHA B (€199m) having over double the estimated maintenance requirement of RHA E (€87m). Maintenance requirements per person in a given RHA can also be examined to indicate where critical remediatory infrastructure investment is likely to be most needed. In this context, one can see that RHA E, C and B have a maintenance cost above €200 per person, compared to €126 per person in RHA F.

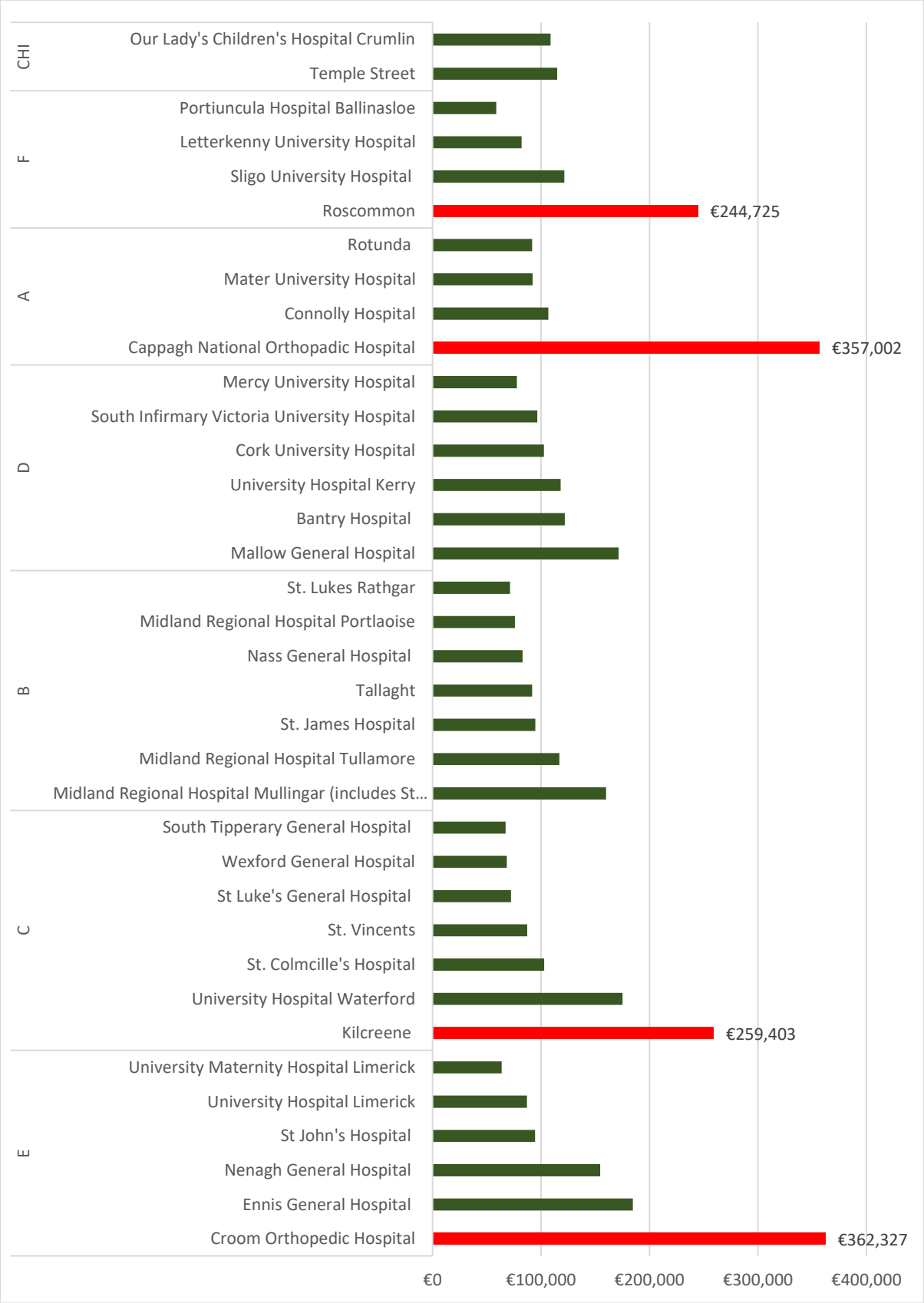
Table.3.6.3: Acute care Capita estimated maintenance costs by RHA

RHA	Total Capita Estimated Maintenance Cost	Population	Maintenance Cost per RHA Population
E	€ 87,782,494	384,998	€ 228.01
C	€ 187,222,578	903,572	€ 207.20
B	€ 199,651,000	989,945	€ 201.68
D	€ 135,825,850	690,575	€ 196.69
A	€ 156,133,826	1,081,727	€ 144.34
F	€ 89,873,700	711,048	€ 126.40
CHI	€ 31,350,900	1,190,502	€ 26.33
Total	**€ 887,840,348**	**5,952,367**	**€ 149.16**[14]

In Fig 3.6.4, total compliance and five-year maintenance costs are compared to the number of acute inpatient beds within each facility based on data from AcuteBIU. This provides a more generalized understanding of the levels of investment required relative to the scale of a given facility. The largest cost per bed is Croom Orthopedic Hospital based on this approach, requiring a total investment of €362,237 per bed to meet both compliance and maintenance requirements over the next five years. It follows that the viability of some facilities may need to be considered in light of their high maintenance and compliance costs relative to other acute facilities. The replacement of some of these facilities may be a more cost-effective intervention given their small scale. In all instances where a cost of over €200,000 per bed is required, the hospitals have an inpatient capacity of less than 80 patients and are Model 2 or Elective Hospitals. This may highlight scale economy issues with smaller hospital facilities in the context of compliance and maintenance. Further analysis at a site-specific level, coupled with considerations around factors including strategic alignment, physical condition and patient safety should be used to inform investment considerations in the context of the refurbishment or replacement of sites.

[14] Number is average rather than total.

Fig.3.6.4: Estimated Maintenance Cost per Bed by Facility & RHA

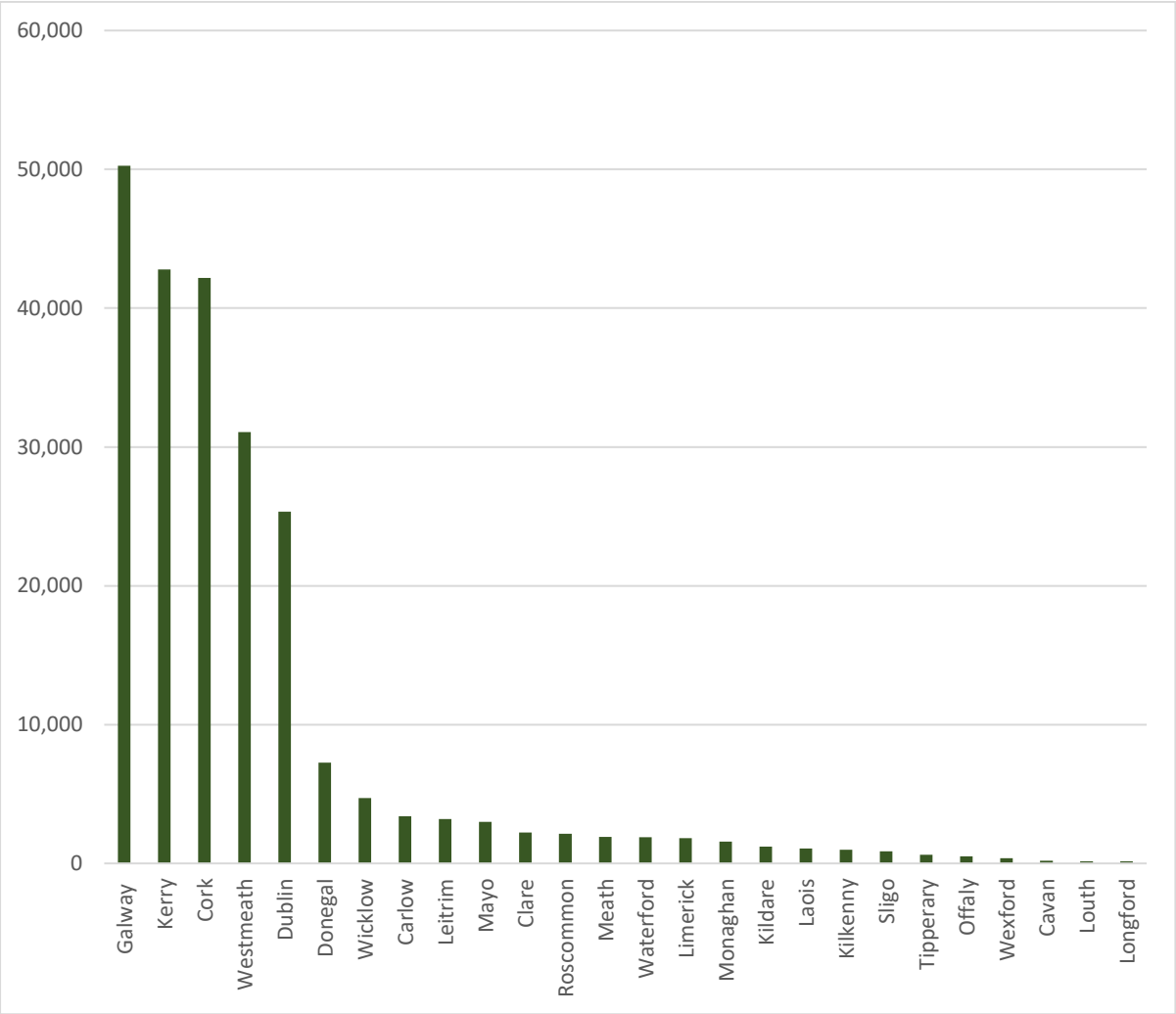


Source: HSE Capital & Estates,2022

4 Vacant Properties in the HSE Estate

The HSE manages a large portfolio of buildings. Some HSE buildings have been vacated, with these sites being categorized by their potential use (retained for future use, disposal, vacant). The size and quantity of these buildings varies across the state, with Galway having 50,000m^2 of vacant buildings, Cork with 42,000m^2 and Dublin with 25,000m^2. With constraints on land within these areas, the utilisation of these sites for other purposes where suitable may alleviate issues around housing and other societal issues. The HSE is currently engaging with the LDA on the potential disposal of such assets. This potential transfer of assets aligns with the S6.13.1 of HSE Fixed Accounting regulations (Health Service Executive, 2016).

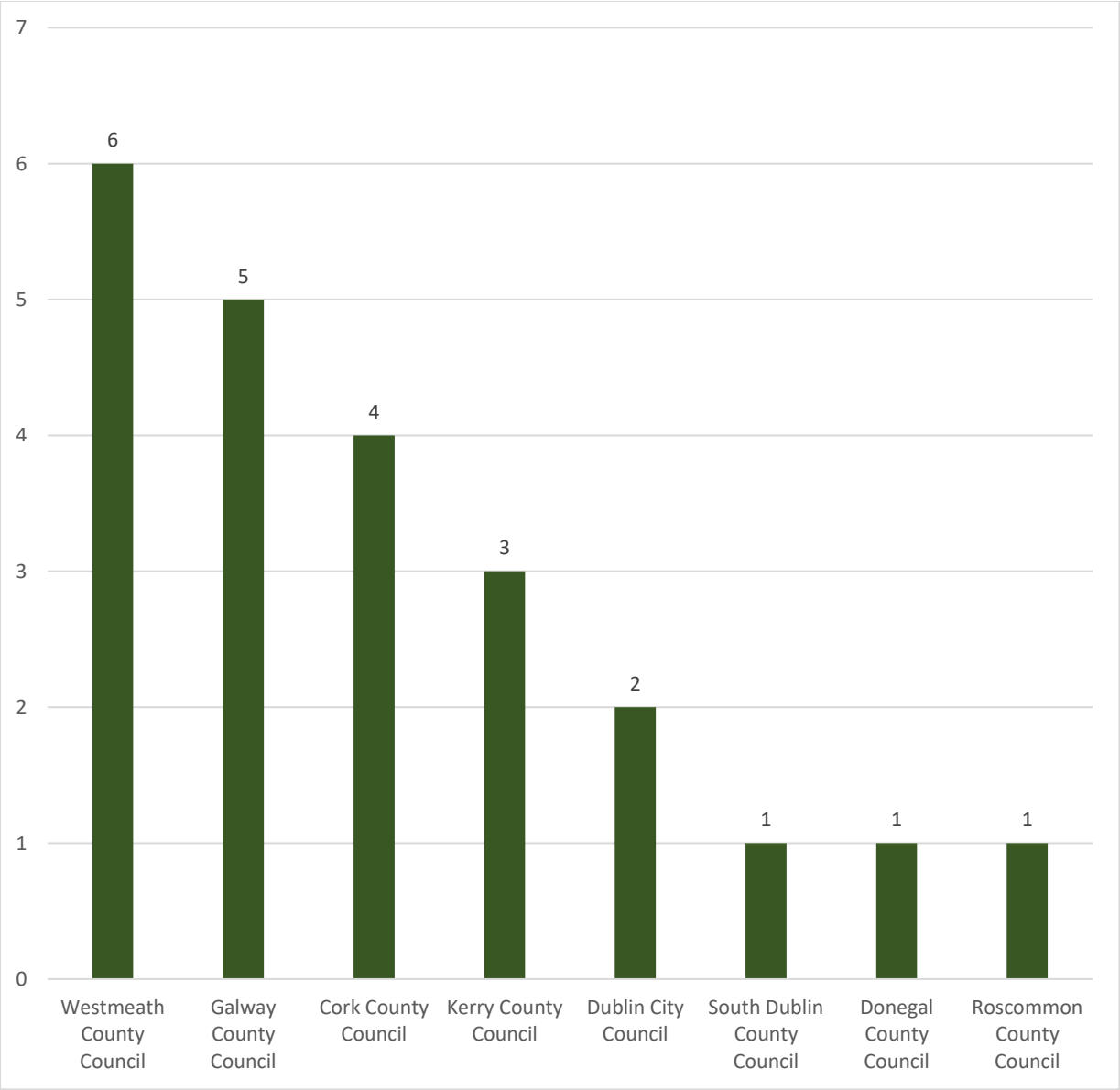
Fig.4.1.1: Total Internal Area of Vacant Buildings by County (m^2)



Source: HSE Capital & Estates,2021

The size of a building evidently is a core factor in its adaptability for alternative uses, therefore, buildings with a gross internal area of 1500m^2 were selected on the basis that they had the greatest potential for adaption. On this basis within Fig 4.1.2, it can be observed that there are 23 vacant buildings held by the HSE that are above this size. In some instances, these buildings may be co-located within sites which still provide medical care and, therefore, it may be inappropriate to divest these sites. In instances where these sites are not collocated, and no further uses can be identified, the divesting of these sites should be considered.

Fig.4.1.2: Number of Vacant Buildings with an Internal Area greater than 1500m^2 per County Council



Source: HSE Capital & Estates, 2021

5 Analysis of Energy Efficiency within the HSE Capital & Estates

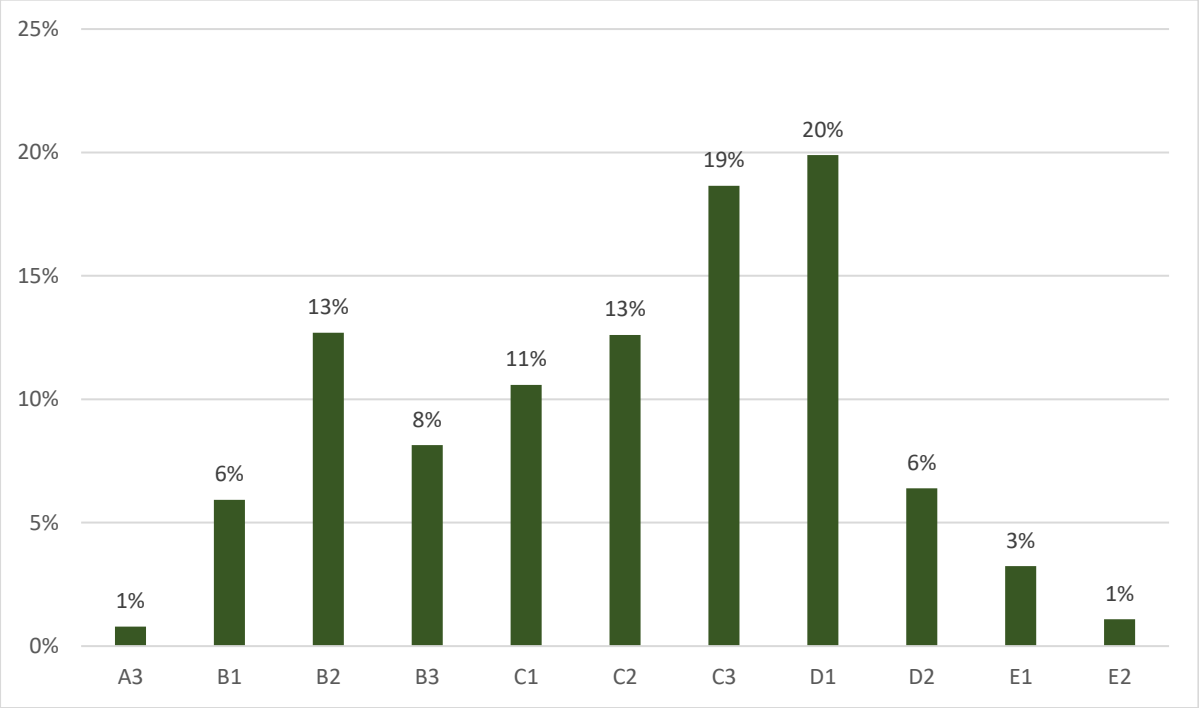
Energy Efficiency has become a highly discussed topic due to the rising costs of energy in Ireland and the ongoing climate crisis. The HSE Energy Bureau has collected information on the top 120 sites within its portfolio for energy consumption. As stated above, the HSE has significantly more sites than the 120 which are accounted for within this portfolio and therefore this analysis only provides a snapshot of the largest consumers within the portfolio. The Climate Action Plan 2021 (as revised) requires an emissions (energy related greenhouse gas emissions) abatement reduction target of 51% for public sector buildings by 2030. This target will be measured and assessed against baseline emissions which will be the average energy related CO2 emissions from the years 2016-18. The Climate Action Plan does include a requirement to achieve a B2 BER rating; however, this requirement is limited to "residential dwellings" and appears to be limited to 500,000 units.

To achieve their own climate action objectives, the HSE have developed the "HSE Infrastructure Decarbonisation Roadmap". This roadmap sets out how the HSE intend to achieve the energy efficiency carbon abatement targets as specified in the Climate Action Plan, 2021. The HSE recognise that significant funding will be required to fund the works that are outlined in this Roadmap. To assess specific need in this context, the HSE have initiated a Pilot Pathfinder Programme engaging Design Teams and Technical Advisors Team to assess the performance of 10 representative facilities to identify the cost and potential technical solutions required on a site by site basis. The objective of the Pilot Programme is to develop an approach for these 10 representative sites, and to use these KPIs to develop a national approach for the HSE based on the HSE Top Energy Users dataset.

The HSE are also working to develop a methodology for the assessment of Energy Performance by facility across the health sector in collaboration with the SEAI. In the interim, the HSE has estimated a Display Energy Certificate Rating[15] for the top 120 energy users within the HSE portfolio, which accounts for 1.7 million m^2 of gross internal area. These ratings are displayed in Figure 5.11.

[15] This differs from a BER rating, as a BER rating includes regulated energy utilisation only (light, heat, power), while a Display Energy Certificate includes all energy expenditures including unregulated energy (e.g, IT, medical equipment).

Fig.5.1.1: Breakdown of DEC Ratings as % Total Gross Internal Area (m^2)



Source: HSE Capital & Estates Energy Bureau,2021

One can see Display Energy Certificate Scores vary greatly across the estate, with 72% of the estate below a B3 score. While this dataset does not include the full portfolio of HSE buildings, it likely provides a good indication of the scores for the portfolio as a whole. Based on this information, it is likely that significant investment will be required to achieve carbon abatement targets in line with Government objectives. Furthermore, the HSE has also noted that buildings of A and B scores may also require some retrofitting to achieve 2050 net-zero targets. Efforts are continuing in this context to develop a definitive monetary estimate for retrofitting and energy needs.

6 Findings

1. **Ageing Capital Stock**

   The age of both Community and Acute Facilities varies with 70% of the Community estate and 50% of the Acute care estate being built over 40 years ago. While the age of the healthcare portfolio should not itself determine planned investment, its association with maintenance costs, patient safety and efficiency in service delivery emphasizes that it is an important consideration.

2. **Quality of Stock**

   The overall quality of the Community care portfolio is good with over 90% of all sites receiving B or above scores across all 4 categories measured. The quality of the stock within the Acute setting is much more varied, with 43% of sites having a quality score below the recommended B rating.

3. **Functionality of Stock**

   44% of the acute care portfolio is below the recommended rating for functionality based on an assessment provided by the HSE. This may indicate that staff and patient flow are being impacted by the use of unsuitable facilities. It may also indicate that technical compliance issues are present throughout the estate.

4. **Maintenance**

   Capita provided estimates for required maintenance expenditure in the acute and community care settings have been examined in this paper. While these figures have not been subject to independent verification by paper authors, their quantum and distribution by region and facility are nonetheless important for future investment considerations. Capita estimates indicate a high level of required maintenance in the acute care sector in particular, with RHA E, C and B having higher maintenance requirements relative to population than other regions. Estimated maintenance requirements are also higher on a per bed basis in smaller facilities over larger ones, indicating scale economy issues in this context.

5. **Energy Efficiency**

   Just 28% of the top 120 energy users in the HSE portfolio exceed a B3 Display Energy Certificate rating. While the full monetary cost of achieving retrofitting and net-zero energy needs continues to be developed it is likely that significant investment will be required to achieve carbon abatement targets in the health sector in line with Government objectives.

7 Recommendations

1. Investment Considerations

The age, quality, functional suitability and other characteristics of the HSE Health portfolio identified in this paper should be taken into account to inform future healthcare investment in both community and acute care settings. While more detailed analysis will be required to inform need and priorities in a given service area region, these high-level considerations provide a baseline for any future healthcare investment planning.

2. Maintenance and Replacement

Data provided by the HSE implies a high cost of recommended maintenance to be incurred over the next five years in the community and acute care settings. While further analysis will be needed to validate required maintenance in each region relative to planned maintenance, replacement, and new capacity in each service area region, the identified costs imply a high cost in the short term for the renewal of the existing stock. In addition, it may be economical to consider replacement of facilities over continued maintenance, given the high maintenance cost relative to scale of some sites.

3. Data Reporting & Future Research

As in the previous paper, the analysis presented highlights the value of the collection and use of data to inform investment priorities in Health. Specific to this analysis, the condition, age, functional suitability and required maintenance of healthcare facilities presented all have implications for future healthcare investment. Policymakers should therefore endeavor to ensure these characteristics are collected on a more regularized basis than at present. In addition, data and research gaps have been identified in the context of healthcare infrastructure characteristics and their impact on performance. Further research could focus on how the age or condition of a given healthcare building impacts the efficiency of healthcare service delivery. Research could also focus on the interaction between maintenance expenditures and healthcare outputs or outcomes.

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9 Appendix

9.1 Capita Survey Methodology

The methodology employed by Capita and the HSE in relation to the collection of the data reported is outlined below:

Capita were appointed to undertake the surveys following a competitive tender for both Lot 1 and subsequently Lot 2. Both Lot 1 and Lot 2 are a large scale commission in terms of logistics, volume and complexity. Lot 1 focused on the Non-Acute Residential Units (Older People, Mental Health Services, Disability Services, Day units) nationally across 543 sites and Lot 2 included the survey of all 45 Acute hospitals including 14 Voluntary across all 9 regions.

Lot 1 surveys were undertaken in 2016 / 2017. Lot 2 was awarded in 2018 and commenced in 2019. The survey commission work was suspended due to the global pandemic and COVID 19 and the programme has been delayed.

Capita are delivering the scope of service set out in the HSE Appraisal manuals. The proposed approach adopts a model for measuring risk in relation to sub-standard assets so that investment can be prioritised. Once the risks associated with sub-standard assets have been assessed, high and significant risk elements can be addressed as a priority as part of the estate investment planning process (for both Capital and Maintenance).

The surveys are a combination of on-site visual inspection of Elements and Sub-Elements and a desktop review of available data, reports etc.

Lot 1 Scope - Non-Acute Residential Units (Older People, Mental Health Services, Disability Services, Day units)

The scope of service for Lot 1 focused on the **Facet 1 Physical condition** of the estate and included the assessment of the following:

- The appraisal of the Physical Condition of the Estate's Buildings (Fabric), Mechanical Systems, Electrical Systems and External Grounds.
- The survey is carried out on a block-by-block basis.
- The physical condition of the Estate is assessed on the basis of the 20 building and engineering Elements and Sub-Elements set out in the property appraisal manual.
- Each element and sub element will be graded. This will then be aggregated to an overall block grading for each block on the site.

- Any sub element or element that falls below condition B within the next 5 years are risk assessed and costed as backlog maintenance. All associated remedial works will include photographic evidence.
- Backlog maintenance costs are calculated using an approved schedule of rates.

Lot 2 Scope – Acute

In Lot 2 the scope was widened for the Acute estate to consider other facets in addition to **Facet 1 physical condition**. Lot 2 also includes the assessment of following facets:

Facet 2: Technical Compliance

A detailed compliance check of all aspects of technical compliance will be carried out as they apply to the building/ property. (Not workplace activities). The Irish State Claims Agency guidance documents, Health Technical Memoranda (HTMs) and Healthcare Building Notes (HBNs) are used as guidance to assist the HSE in complying with its legal obligations.

These are considered in addition to the relevant statutory instrument / standards relating to a particular element / sub element or block. For example, Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations S.I. 386 of 2006 and S.I. 589 2010.

- The compliance checks are a combination of a desktop review of existing documentation (loaded to share file) and onsite checks.
- The standard ranking protocol does not apply to this Facet as this is not deemed appropriate for statutory items which are either compliant or non-compliant, therefore risk assessment is used to assess individual items.

Facet 3: Space Utilisation

Assessment of space utilisation is an assessment at a single point in time which reflects the following:-

- How intensely is the space being used at the time of visit.
- How might this be different across the day/week? E.g., OPD clinic time of day or booked clinics across the week.
- How does the space available compare to national guidance (bed space, room size etc).
- Relevant HBN, HTM standards are considered

Facet 4 Functional Suitability,

Relates to not only the visual inspection of the department but also collects information from dialog with staff working within the area relating to:-

- Internal space relationships e.g., physical space and observation of patients.
- Support facilities e.g., adequate storage, waiting area, toilets, and bathrooms for the number of patients and provision for disabled people.
- Location is the space well sited and located close interdependent departments (e.g., A&E and Xray), access to other areas by lifts /stairs etc. and relationship to hospital entrance, car parking and public transport.
- Relevant HBN, HTM standards are considered

Facet 5 Quality

The assessment of quality is based on 3 elements:-

- **Amenity**, cross references with functional suitability for a number of areas but also identifies any issues with privacy and dignity, confidentiality and appropriate facilities for children.
- **Comfort engineering** relates to lighting, heating, ventilation, noise levels/ acoustic privacy etc.
- **Design** looks at the therapeutic environment including first impressions, colour, flooring and overall design of the area
- Relevant HBN, HTM standards are considered

PPM – Planned Preventive Maintenance Schedule

Capita developed a PPM maintenance schedule based on a combination of industry experience, the requirements detailed within the HSE Property Appraisal Manual, SFG20 (industry standard for building maintenance specifications), the Irish State Claims Agency guidance documents and relevant statutory requirements.

Capita's PPM schedule was then presented and reviewed by representatives of the estates teams from various regions in HSE's office in Tullamore and we received feedback on rates which vary from Hospital to Hospital.

The costings were built up by Capita's cost consultant and engineering team. The schedule may contain activities which currently are not been undertaken such as a fixed painting life cycles, however allowances have been made for budgeting purposes.

9.2 Data

All data arising from the conditional assessments is intended to be imported into the existing HSE property database Estate Manager. The property Data Base is managed by the HSE Corporate Property Office with input from local property managers. The software system was developed, provided and

supported by a third party. In addition to the data import for Lot 2 Capita are also providing summary reports in Word for each site.