

Productivity in the context of healthcare

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Summary: Understanding productivity in the context of non-market services like healthcare can be challenging. Without a market price for inputs consumed and outputs produced, the challenge for policymakers and researchers is deciding which inputs and outputs should be measured, and how. Additionally, controlling for the outcomes of those using those health services, as well as accounting for more subjective and difficult-to-measure factors, such as user experience and stress among healthcare staff, is a key part of understanding productivity in a healthcare context. This InBrief examines some of the literature and research, both in an Irish and international context, in order to provide an introduction to this important policy discussion.

When economists and policymakers talk about productivity, what they are trying to capture is how much output is generated when accounting for inputs. What is left over after input costs are deducted is called “value added”, which is then divided up between workers and owners to pay wages and profits.

This value added, typically expressed per worker or per hour, usually increases as the size of the firm increases and is higher when some activity is less labour intensive.

The Office for National Statistics (ONS) defines productivity as follows:

“In simple terms, productivity is a measure of how much output is generated per unit of input. It is important because higher productivity is well understood to be linked to higher incomes and standards of living. However, differences in the way that output and inputs are defined lead to various approaches to measuring productivity, which can make comparisons between the approaches difficult.”

While labour productivity, expressed in value added per hour worked, is the most easily conceptualised way of understanding productivity, it is typically not deemed appropriate when looking at sectors such as healthcare, or education, or other sectors which are typically publicly-funded or “free at the point of use”.

The lack of a market price for the output means that value added is not calculable, and alternative measures of relating the changes in public sector inputs to their outputs are necessary to understand changes in the efficiency or otherwise of public services.

As stated in Castelli and Smith (2007)¹, the key methodological challenges centre around deciding which inputs and outputs should be measured and how, or specifically in their context:

“choosing the appropriate measures of NHS (National Health Service) activities; adjusting those measures for the quality of care; aggregating the measures into a single measure of output; identifying the associated inputs in the form of a single measure of costs; (and) tracking these measures consistently over time.”

It is important to understand how the various healthcare inputs, such as staff, beds, medicines, machines, and so on, are translated into the “value added” for the patient, namely improved health outcomes. This creates challenges as, not only is it difficult to decide which measure of health outcomes to use, data on these outcomes at the patient level is typically not available or regularly gathered. This creates barriers to systematically understanding the relationship between the inputs healthcare providers employ and the outcomes for the users of such services.

In healthcare, output is often weighted by some sort of cost-weighted index, where more expensive and more complex services are weighted more heavily in the data to reflect the increasing complexity of workload and how this might affect the translation of inputs into outputs².

As an example, a hospital might perform two different life-saving procedures, but one might require more nurses, bed days, or use of expensive equipment than the other. This increased “cost” of delivering the procedure is used as a means of capturing its complexity, and the hospital’s output is weighted accordingly to make sure greater numbers of these more complex procedures are accounted for when considering changes in any health service provider’s output.

This cost weighted index can then be augmented by adding in patient-level data on outcomes which would allow researchers to account fully for the costs and benefits in the inputs and outputs of the health service.

For example, in the previously quoted paper, an examination of outcomes for those receiving treatment of circulatory disease in the NHS shows that activity when measured using a cost-weighted index increased by 3.9 per cent per annum between 1998 and 2004.

¹ <https://www.health.org.uk/reports-and-analysis/reports/treatment-of-circulatory-disease-in-the-nhs>

² <https://www.ons.gov.uk/economy/economicoutputandproductivity/publicservicesproductivity/methodologies/methodologicaldevelopmentstopublicserviceproductivityhealthcare2021update>

However, when incorporating patient outcomes such as the in-hospital survival rate and 30-day mortality rate, this measure of productivity growth increases to 4.48%.

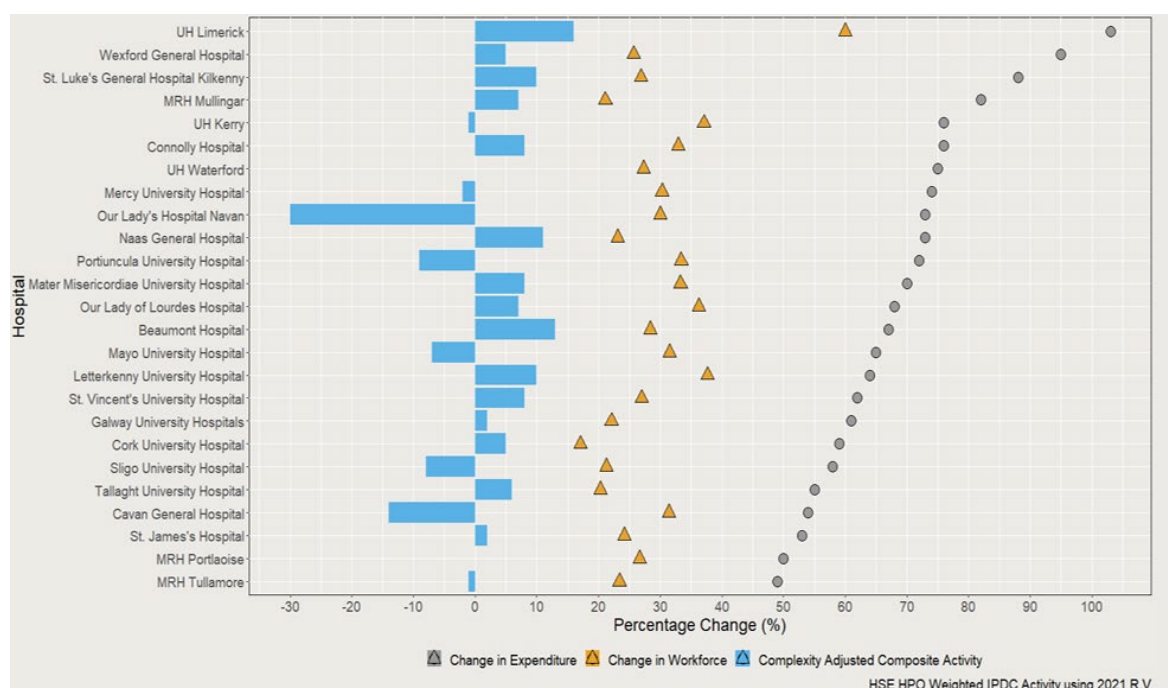
In the case of Ireland, attempts to understand productivity in these non-market services have been limited. A notable exception is a 2024 analytical paper from the Irish Government Economic and Evaluation Service, which examined trends in healthcare expenditure and output between 2016 and 2022³.

Taking rich data on the volume of various healthcare services delivered in acute hospitals, the authors developed a “composite activity” measure, which utilises aggregate Inpatient, Day-Case, Outpatient and Emergency outputs, weighted by unit costs for each area, and adjusted for patient complexity.

It is worth quoting this paper at length as it provides various rich sources of data that have not been brought together and analysed in this manner previously.

As we can see in Figure 1 below, expenditure and employment have increased at all of the acute hospitals between 2016 and 2022, yet activity measured using this weighted “complexity adjusted composite activity” metric has not increased in a similarly uniform fashion, and there appears to be no obvious relationship between inputs and outputs.

Figure 1 – Change in expenditure relative to Complexity Adjusted Composite Activity and Workforce, 2016 – 2022



Source: Department of Health, IGEES, 2024

³ <https://www.gov.ie/en/publication/36169-an-examination-of-trends-in-activity-expenditure-and-workforce-in-publicly-funded-acute-hospitals-in-ireland/>

There can be many reasons why this relationship between inputs and outputs varies across sites. The authors state that “further analysis will be needed to fully understand the determinants of this change (including improvements to the health system that do not necessarily increase activity, such as improvements to patient and staff experience)”.

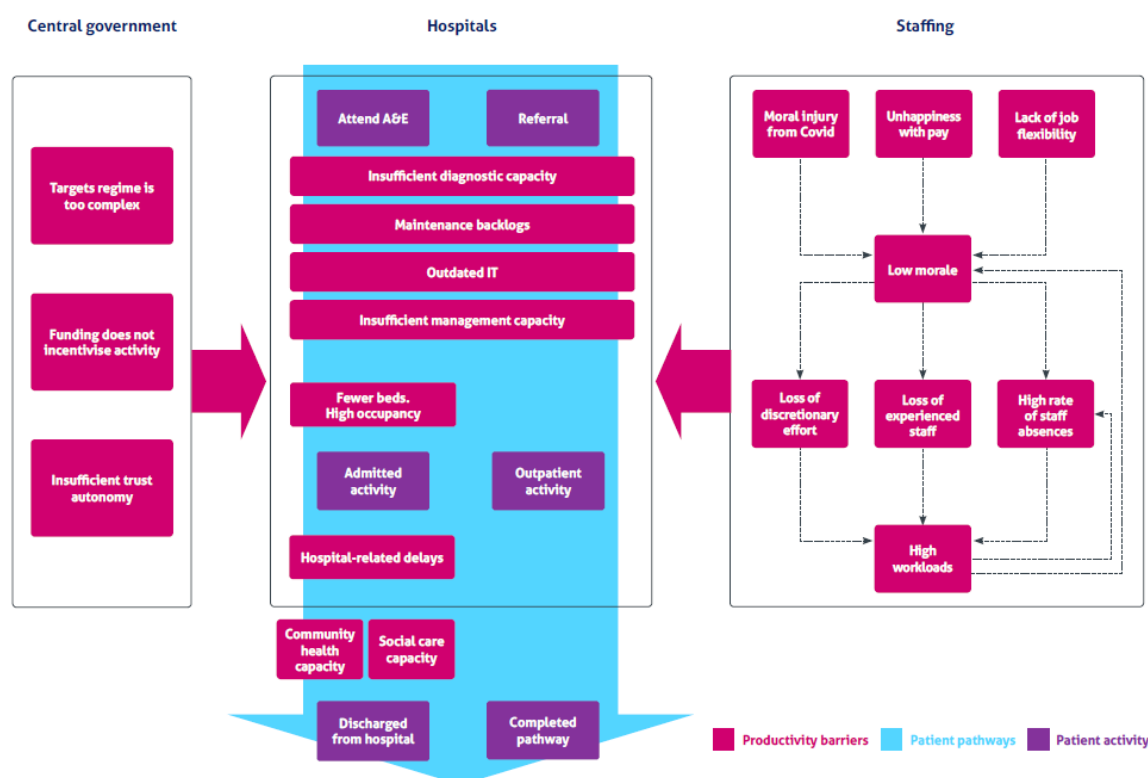
As an example, the average length of stay has increased over the period, which would manifest as a “fall” in productivity using this metric, but could lead to improved patient experience and outcomes.

Similarly, hospitals where conditions were poorer, or where staff were previously overworked or in unsafe conditions, may experience this increase in “inputs” (higher wages, appropriate staffing, new equipment) in a way which does not necessarily increase outputs (more treatment), but improves the hospital experience for both workers and service users alike.

These barriers to increased productivity have been discussed at length in the literature, with a recent report from the Institute for Government (Freedman and Wolf, 2023)⁴ looking at all of these inputs in the context of the NHS and how they may be affecting UK healthcare productivity. The flowchart below covers the most important inputs which feed into outputs and outcomes.

⁴ <https://www.instituteforgovernment.org.uk/publication/nhs-productivity>

Figure 2: Barriers to better hospital productivity



Source: Institute for Government, Public First and Health Foundation analysis.

Particular examples covered in the text include delayed discharges, stalled diagnostic testing due to outdated or insufficient equipment, low capital spending, less productive use of staff time, and a shift towards less experienced practitioners with significant gaps in key occupations that could be leading to capacity bottlenecks.

While some, all, or none of these issues may be the cause of an Irish productivity problem, with inputs and outputs not growing in tandem, it is important to understand and measure these various factors in order to better understand how the health system is (or isn't) working to ensure outcomes are achieved to their greatest potential with the inputs available to us.

Attempts to look at this problem more systematically in the Irish context include the establishment of a Productivity and Savings Taskforce in the Department of Health, and a corresponding Productivity Unit in the HSE⁵. Key to the work of both units is utilising data to better understand how various healthcare sites are performing, in areas such as “healthcare investment, workforce, activity and performance information”.⁶

⁵ <https://assets.gov.ie/307757/cb25dc6f-2378-40b8-bd89-ae542871e65f.pdf>

⁶ <https://www.gov.ie/en/collection/9a22b-productivity-and-savings-taskforce-and-medicines-taskforce/>

Attempts to modernise the collection and integration of health data in Ireland, such as the HSE's "Digital for Care 2030" initiative, would create the potential to understand the outcomes of the patient over a longer timeframe and how various health inputs interact with those outcomes⁷.

Conclusion: Understanding productivity in non-market services such as healthcare is challenging. Typically, productivity is assessed by looking at the value an output gets in the market and subtracting the cost of producing that output, to derive "value added".

In healthcare, the relationship between inputs and outputs is more difficult to measure as the value created from providing someone with healthcare services may not be easily measurable. A higher level of inputs, such as workers, equipment, or infrastructure, may also manifest in ways that improve the quality of care or the experience for service user without translating into a higher volume of outputs.

⁷ <https://about.hse.ie/our-work/digital-for-care-2030/>