Defining the size of the health innovation prize

Prepared for the Health Innovation Network

June 2025

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Health Innovation Network Statement on Frontier Economic Report: Defining the Size of the Health Innovation Prize (1/3)

Unlocking £278 Billion Through Health Innovation

We are proud to present the findings of a new report, Defining the Size of the Health Innovation Prize, commissioned by the Health Innovation Network and delivered by Frontier Economics that identifies strategic investment in health innovation could unlock £278 billion in economic value for the UK.

As the health innovation adoption experts, we know that health innovation is not just about better care, improving health outcomes and better supporting the NHS workforce. It is a driver of productivity, economic growth, and international investment. As detailed in this new report, the economic evidence is now clear. Innovation in health is a catalyst for national prosperity.

This report outlines three major economic productivity opportunities that investment in health innovation could support us to deliver, including:

- £113 billion from targeting innovation towards four major health conditions associated with loss of economic productivity- cardiovascular disease, mental health, musculoskeletal disorders, and respiratory illness.
- £8.55 billion in productivity gains for the NHS through reducing health-related staff absences, addressing 233 million hours lost to ill health annually.
- £32 billion in potential Foreign Direct Investment (FDI) through a stronger innovation offer that attracts global businesses to the UK.

The report shows evidence of projects that demonstrate how innovation could help to address this productivity gap. For example:

- Proactive cholesterol management could deliver £242mn in the first year of treatment, and £1.13bn if treatment continues.
- Stroke AI imaging could create £26mn in deferred mortality savings and £434mn created from more individuals achieving functional independence, as a result of speedier access to the right treatment following a stroke.

Health Innovation Network Statement on Frontier Economic Report: Defining the Size of the Health Innovation Prize (2/3)

Unlocking £278 Billion Through Health Innovation

Focussing innovation efforts on maximum value areas – including tackling cardiovascular disease, obesity, respiratory, mental health as the key drivers of economic inactivity – will support the Government's missions to kickstart economic growth and building an NHS fit for the future, delivering:

- Population health improvement
- Boosted workforce productivity
- Reduced NHS pressures
- Economic impact and growth

Accelerating innovation requires coordinated action at national and local level. Supporting place-based health innovation and leveraging the capabilities of local economies to find, test and develop approaches to implementing innovation at scale, is central to realising the opportunity presented.

As a Network, we agree critical components of the place-based health innovation offer include:

- Accelerated digital transformation and harnessing data - generating real-world population level insights, moving care from analogue to digital, and optimising AI, remote monitoring and digital health solutions that make care more efficient and effective, equitable and personalised.
- Strategic industry partnerships to supercharge UK life sciences sector investment - aligned to tackling critical health and productivity challenges, deploying industry-led innovation at scale through real world studies, clinical trials and place-based deployment projects.
- Deployment of proven innovation to bolster primary and secondary prevention - including evidence-based solutions in diagnostics, treatment, medicines and management of chronic conditions.
- Increased system sustainability and workforce productivity through innovation to improve efficiency, effectiveness and support people back to work.

Health Innovation Network Statement on Frontier Economic Report: Defining the Size of the Health Innovation Prize (3/3)

Unlocking £278 Billion Through Health Innovation

Each of our 15 health innovation networks across England, who collaborate as the Health Innovation Network, is embedded in its local ecosystem, driving health innovation at place-level through our connections with the NHS, industry, academia and communities. Over the past decade, we've also demonstrated how our collaboration as a Network can spread proven innovations across the country, at pace and scale.

We help the NHS solve real problems by finding the right innovations, testing them and implementing them at scale – delivering local changes to services and pathways that have a national impact on the health and wealth of our country, and are well positioned to support the country to realise the health and economic opportunity of health innovation, articulated in the report.

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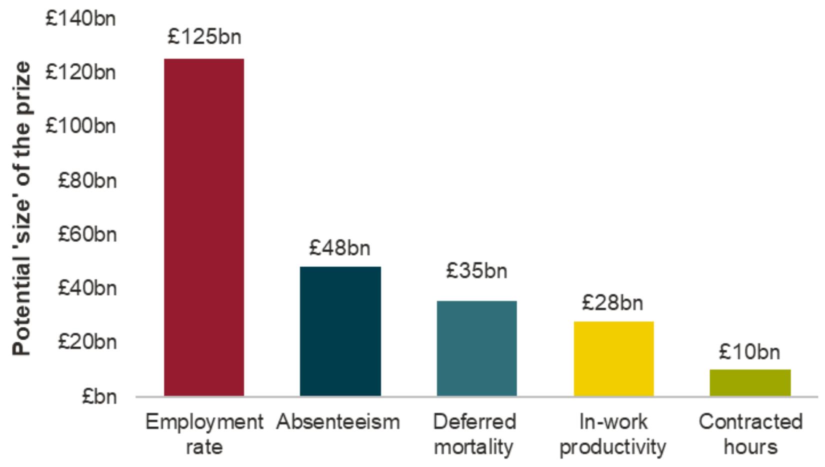
Innovation in healthcare can support economic growth and improve healthcare services

- Innovation in healthcare will help to deliver on two of the most important Government missions: **kickstarting economic growth** and **building an NHS fit for the future**.
- This report provides a new perspective: **the potential for innovation in healthcare to help address the economic impacts of ill-health**. It documents the cost of ill-health and the role health innovation is, and can, play in helping to reduce those costs.
- Innovation in healthcare can **increase the productivity of individuals with work-limiting health conditions** and **prevent the development of work-limiting health conditions**, leading to economic growth. These productivity benefits are for all individuals in the population, including the NHS workforce.
- Economic growth will also be supported by a health sector that can help **unlock investment.** The report provides **estimates of new foreign direct investment.** There would also be domestic business growth – estimating such growth is beyond the scope of this work.
- The potential to unlock value in the form of new higher GDP, including increased productivity from those with work-limiting health conditions, greater inward investment, and improved NHS performance is represented in the figures to the right.

£246bn

UK productivity growth from reducing ill-health – equal to about **9.6% of GDP**



Including a direct **NHS workforce impact** of **233 million hours** of additional NHS care, worth £8.55bn, equal to about **5.5% of NHS budget***

+

£32bn

Additional foreign direct investment in life sciences – equal to about **1.4% of GDP**

Up to **£10 bn** additional R&D

Up to **£22 bn** additional GVA

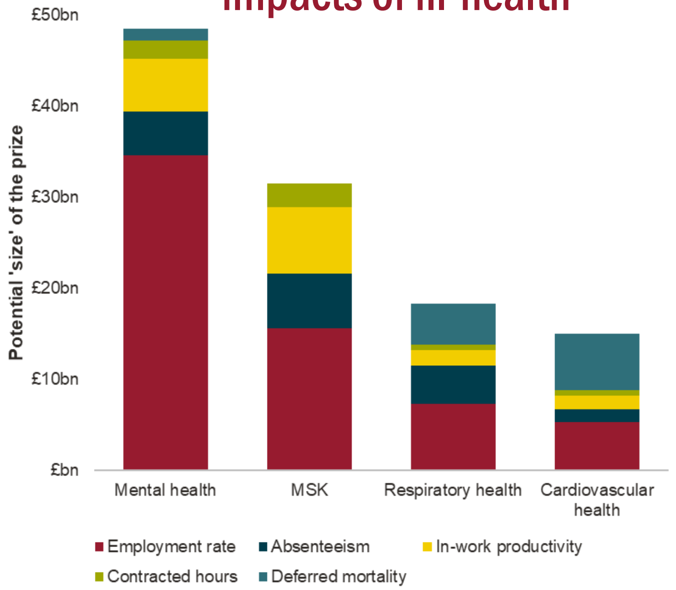
Up to **150,000** additional jobs

** Using an NHS budget of £155.1 billion in 2022/23 (Kings Fund)[1]*

Innovation is already delivering improvements – and has the potential to provide much greater support to future economic growth, as well as personal wellbeing.

- Recent innovations demonstrate the possibility to return people to work faster and allow them to be more productive in work. Realising the full benefit of reducing ill-health will depend on more than new innovation alone but even if innovation achieves a proportion of the total potential value (such as supporting a quarter of those off work with ill-health back to work) it would deliver significant additional economic value.
- Some of that value is already being realised by recent, known innovations. They range from innovations to support musculoskeletal conditions to those linked to preventing cancer, detecting asthma and improving blood pressure. New innovations can generate further value.
- This value is in addition to the very important impact of improvements in personal wellbeing which can be monetised but have deep impacts on family, loved-ones and carers.

Tackling four health conditions would help realise much of the economic impacts of ill-health



Health innovation will deliver significant economic benefits even if it helps to tackle 10-25% of ill-health

Getting 1 million people (about 25% of those off work due to ill-health) into work would be worth around **£48 billion to the UK economy in GVA.**

Reducing long-term absences by 20% would be worth nearly **£10 billion in GVA**.

Avoiding 20,000 preventable cancer deaths (about 15% of total) each year would contribute approximately **£5 billion in GVA**.

Avoiding in-work productivity loss for 1.4 million people would be worth **£10 billion in GVA**.

Known innovations are already delivering benefits

	Productivity benefit:
Targeted return-to-work interventions in MSK	£1.21bn
Proactive care for cholesterol and high blood pressure	£2.33bn
Detection of asthma through FeNO testing	£274mn
Use of technology to prevent cancer	£856mn

New innovations in healthcare are central to drive the ‘three shifts’ in NHS reform

- Innovation can help support – and be supported by – the shift from hospital to community, treatment to prevention and better use of technology.
- Much innovation is often considered to sit in goal to "better use of technology". In reality, innovation is needed to support all three shifts and they, in turn, can spur further innovation through, for example, the increased productivity supported by the innovation and increased NHS efficiency.
- The virtuous circle created by the interaction of the three shifts with innovation is underpinned by the specific new innovations.
- Innovation can also enable step-changes in treatment: in the products we use (e.g. AI and personalised medicine for cancer), the processes we employ (e.g. community health programmes for CVD) and the skills we deploy (e.g. how we treat strokes).
- The outcomes (higher productivity in the NHS and the wider economy, greater foreign direct investment, growth, improved quality of life) are the “prize” of innovation. Innovation and new technology alone is unlikely to be the complete answer but is a crucial component. Innovation in healthcare can help to spur a change in the ability of people to work and seek work.

Three shifts	Hospital to community	Treatment to prevention	Better use of technology
Innovation examples	▪ Telemedicine and Remote Monitoring ▪ Personalized Medicine ▪ AI and Automation ▪ Home Healthcare Technologies	▪ Predictive analytics ▪ Vaccination technologies ▪ Health education and awareness ▪ Genomic research	▪ Wearable devices ▪ 3D printing ▪ Diagnostic imaging

The health innovation networks can act as catalysts to realise the prize

- The focus of this work has been on understanding the nature of the prize. The estimates are based on HM Treasury and related best practice analytical guidance. The estimates – and methodologies and inputs – have been benchmarked against related analysis undertaken by the Office for National Statistics (ONS), Office for Budget Responsibility (OBR) and the Health Foundation amongst others. The prize is waiting.

- The next step is how the health innovation networks (HINs) can best take their expertise and experience to help catalyse innovations and start to claim some of this prize. That is likely to involve:
  - Diagnosing what areas of innovation are most likely to address the barriers to achieving the productivity and related improvements documented here
  - Understanding the market failures and wider market and firm characteristics (including where current support is working or needs to change) that call for HIN and related support
  - Developing a plan to address those failures with a clear link to the subsequent benefits (the prize), a way of monitoring progress and adjusting approaches as needed

- This is likely to require some engagement with stakeholders and could be done in parallel with finalising the 10 Year Plan and the associated implementation measures that will be needed once the Plan is published.

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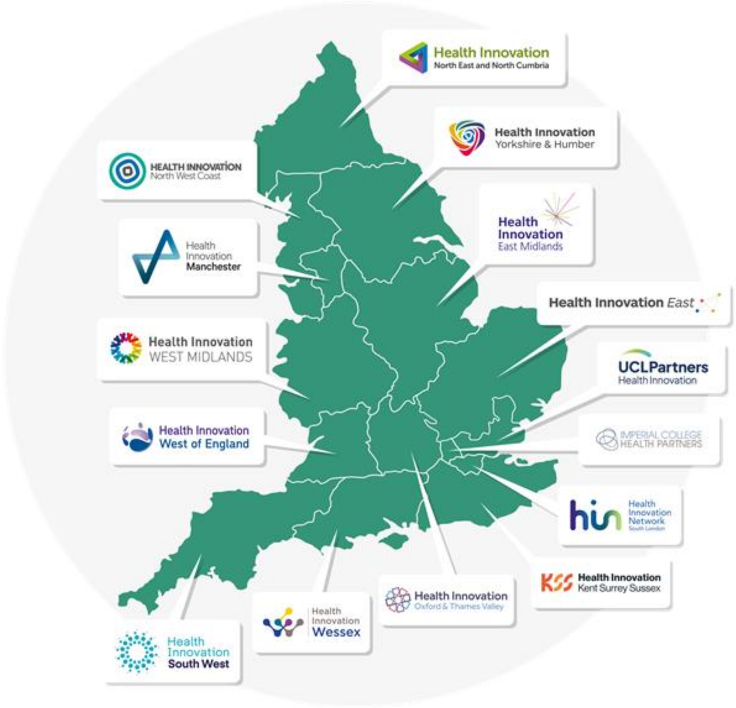
The health innovation networks are responsible for implementing innovation across England's health and social care system

The **health innovation networks (HINs)** are key organisations responsible for **implementing innovative practices in the health and social care system in England**. There are 15 HINs that are geographically organised. Since 2018, the HINs have, through implementing innovations, benefited over 4.9mn patients, released 340,000 hours of healthcare staff capacity, and generated almost £3.1bn for the UK economy.[2]



Source: NHS England

The HINs have two core objectives:

1. To generate a rich pipeline of demonstrably useful, evidence-based innovations; and
2. To support the adoption and spread of proven evidence-based innovations across England.

HEALTH INNOVATION NETWORKS

Find high-potential innovations in areas of unmet need	Test and prepare high-promise innovation for real world adoption	Implement proven innovations at scale
▪ More than 3,100 innovations in the national pipeline	▪ More than 2,800 companies have been supported ▪ More than £3.1bn investment has been leveraged	▪ More than 4.9mn people have benefited ▪ Estimated £536m costs avoided in long term care in NHS through Patient Safety commission

Objectives

- Improve the health of the UK
- Save the health and care system time and money
- Drive economic growth

Source: Adapted from Health Innovation Network Impact Report 2023-24

The benefits that health innovation can bring to the UK

Project aim → **Quantify the economic cost of ill-health and the value that HINs could help to realise by addressing ill-health through innovation in healthcare provision**

The benefits from health innovation are broad and cover individual benefits, health and social system benefits and wider society benefits. This project focuses on a broad set of benefits from health innovation, specifically:

- **Improved productivity:** health innovation results in **improved health outcomes**, which in turn will reduce the number of work-limiting health conditions, improving the **productivity** of the workforce.
- **Inward investment:** a life science strategy that encourages the adoption of innovation will increase the attractiveness of investing in the UK, which in turn will lead to an increase in employment opportunities.
- **Benefits to the NHS:** health innovations can create efficiencies in delivering care, which results in reductions in waiting lists and cost savings for the NHS and the UK.
- **Improved quality of life:** improved health outcomes from health innovations will lead to improvements in quality of life for patients and family and carers.

Increasing innovation is likely to also result in wider benefits, such as the growth of UK businesses and other sources of the innovation. Those benefits are already documented by the HINs and beyond the scope of this work.

The analysis in this report uses best practice guidance (e.g. HM Treasury Green Book) and quality assurance to provide reliable, comparable estimates.

BENEFITS FROM HEALTH INNOVATION

INDIVIDUAL	▪ Improved **quality of care** received ▪ Improved **health outcomes** ▪ Improved **quality of life** ▪ Reduced impact on **family and carers**
HEALTH AND SOCIAL CARE	▪ **Efficiencies** in the delivery of health and social care ▪ Reduction in **waiting lists** ▪ **Improved patient safety**

WIDER SOCIETY	▪ Improved **societal health**
	▪ Improvements in **health inequalities**
	▪ Improved **productivity**
	    ▪ Reduction in work-limiting health conditions
	    ▪ Decreased need for
	▪ Thriving **life science sector**
	    ▪ Increased inward investment
	    ▪ Development of new business and employment opportunities

We have developed a bespoke approach for estimating the different benefits from health innovation – the remit of HINs differs across each area

1. PRODUCTIVITY

Our productivity analysis combines **two complementary methods** for estimating the productivity impacts of health innovation on productivity.

A. **Top down analysis:** Estimates the **total impact of ill-health** on the UK economy

B. **Bottom-up analysis:** Illustrates how innovation in health can result in realised productivity benefits through **examples of known innovation.**

2. INWARD INVESTMENT

Our analysis of inward investment assesses the broader **economic impacts of increased FDI** driven by innovation in health and life sciences. This includes:

- A brief **evidence review** on the relationship between government policy, health innovation and FDI growth.
- A **trend analysis** of historical trends in FDI across Europe and the potential drivers of FDI.
- **Scenario modelling** on **FDI growth** and estimated impact on **employment, GVA, and R&D spillovers** for the years 2030 and 2035.

3. NHS BENEFITS

- Our analysis of **NHS benefits** considers case studies in **respiratory health** highlighting potential efficiencies
- These efficiency improvements are quantified in terms of in cost savings to the NHS.
- These case studies draw on the analysis conducted for the productivity analysis.

4. QUALITY OF LIFE

- Our analysis of **quality of life** considers case studies in respiratory health highlighting potential efficiencies
- These improvements are quantified in terms of QALYs and valued according to HMT Green Book Guidance.
- These case studies draw on the analysis conducted for our productivity analysis.

Contents

Our productivity analysis combines estimates of the overall impact of ill-health on productivity with examples of productivity gains from the network's programmes

Analysis aims

Our productivity analysis combined two types of analysis:

Productivity		
	A **Top-down estimates**	Estimates the total impact of ill-health on the UK economy
	B **Proof of concept examples**	Illustrate how innovation in health can result in realised productivity benefits through examples of innovation

High-level approach

The **top-down estimates** uses publicly available data on reasons for mortality, economic inactivity, reduced hours worked, absenteeism and health pay gaps to estimate the overall productivity lost due to ill-health in the population. The analysis is *UK wide*.

The **bottom-up ("proof of concept") analysis** combines two types of analysis. Firstly, we present illustrative scenarios that show the potential magnitude of health innovation on productivity. Secondly, we focus on existing innovations that have had an evidenced and quantifiable impact on health outcomes and develops productivity estimates based on rolling out the program across *England*.*

Scenario analysis on potential future innovations

- We assess the potential productivity impact of innovations focusing on return-to-work interventions for MSK conditions.
- We suggest the potential magnitude of productivity impacts that could occur from innovation in medical technologies, specifically in cardiovascular and cancer.

Existing innovation examples

- For cardiovascular health, we develop estimates for **proactive care for treatment for cholesterol and blood pressure**[3] in reducing the number of CVD events and thereby increasing productivity through deferred mortality.** We also develop estimates for **Stroke AI imaging** that uses AI technology to speed up access to specialist stroke care.[4] Stroke AI imaging care improves stroke outcomes, decreasing mortality and increasing the number of individuals who achieve functional independence following stroke, thereby improving employment outcomes.
- For respiratory health, we develop estimates on the adoption of **FeNO testing in primary care,** leading to faster and more efficient diagnosis of asthma[5], and **biologic therapies for patients with severe asthma**, which has led to an increase in prescriptions of asthma biologics.[6] Both of these innovations are expected to increase the number of individuals who achieve asthma control, decreasing absenteeism and increasing in-work productivity.

Results

Our top-down estimates illustrate the significant productivity benefits of investing in measures that improve population health. The total impact of ill-health on the economy from productivity impacts is **£246bn (9.62% of GDP).** The productivity benefits predominately come from increased employment rates – both reducing inactivity due to health conditions and reducing unemployment to levels equal to those without work-limiting conditions. Our bottom-up estimates show how innovations have led to productivity benefits, **illustrating how health innovation can be used as a mechanism to unlock productivity benefits for the UK economy**.

The following slide presents a summary of our bottom-up estimates. The rest of this section outlines the methods and results from our productivity analysis.

**It is important to note that the results from the bottom-up analysis will not add up to the total size of the prize estimates from the top-down analysis. Rather, the estimates are illustrative case studies of the mechanisms by which health innovation can impact productivity.*

*** Deferred mortality productivity benefits refer to the productivity gained from working age years gained. We do not consider the costs of deferred mortality e.g. future healthcare costs due to an individual living longer.*

Our analysis of specific innovations shows how they can be used to unlock productivity benefits, as demonstrated by innovations in cardiovascular and respiratory health

		Innovation	Description	Health measures	Productivity impact*	Total impact*
Future potential innovations		**Return-to-work interventions for MSK**	Evidence suggests the potential impact of return-to-work interventions in MSK that are used quickly after an individual leaves work and used with complementary approaches. We have developed illustrative scenarios to understand the potential productivity impacts of these interventions.	▪ Improvements in pain levels	▪ Reduction in sick days (4.7mn avoided)	**£1.21bn**
Future potential innovations		**Improvements in medical technology targeting prevention**	Evidence suggests the role of medical technology in preventing illnesses such as cancer and cardiovascular health. We have developed illustrative scenarios to understand the potential magnitude of impact.	▪ Prevention of cancer ▪ Prevention of cardiovascular health disease	▪ Cancer - deferred mortality (£876mn) ▪ Cardiovascular - deferred mortality (£624mn)	**£1.5bn**
Current innovation examples	Cardiovascular health	**Proactive care – cholesterol management**	Patient search and stratification tools and prioritisation pathways to help the primary care workforce prioritise high-risk patients, and resources and training to support the practices in delivering structured support for education, self-management and behaviour change for individuals. The tools are specific to a range of long-term conditions, including cardiovascular-related conditions. Our analysis focuses specifically on cholesterol and blood pressure optimisation.	▪ Reduction in CVD events	▪ Deferred mortality (£381mn) ▪ Employment impacts avoided (£750mn)	**£1.13bn**
Current innovation examples	Cardiovascular health	**Proactive care – blood pressure optimisation**		▪ Reduction in CVD events	▪ Deferred mortality (£403mn) ▪ Employment impacts avoided (£793mn)	**£1.20bn**
Current innovation examples	Cardiovascular health	**Stroke AI imaging to speed up access to specialist stroke care**	AI images to accelerate diagnosis and helps stroke clinicians make swift decisions relating to transfer and treatment. This includes speedier access to mechanical clot removal following a stroke, which can reduce mortality and disability. The adoption of stroke AI imaging was achieved in 2025 in all English acute stroke services. The productivity impact calculated is based on evidence from early stages of rollout.	▪ Decreased mortality following stroke ▪ Increased functional independence following stroke	▪ Deferred mortality (£26mn) ▪ Increased functional independence after stroke (£434mn)	**£459mn**
Current innovation examples	Respiratory health	**FeNO testing**	FeNO testing rolled out nationally in primary care, contributing to a faster and more effective asthma diagnosis when used alongside a detailed clinical history and other tests.	▪ Increased asthma detection ▪ Increased asthma control	▪ Reduced absenteeism (£22mn) ▪ Improved in-work productivity (£127mn)	**£149mn**
Current innovation examples	Respiratory health	**Increased uptake of biologic medicines**	Implemented pathway change designed to increase the uptake of biologic medicines. Biologic medicines can transform patients' lives by reducing the long-term side effects of other treatments, such as steroids	▪ Increased number of individuals on biologics ▪ Increased asthma control	▪ Reduced absenteeism (£3m) ▪ Improved in-work productivity (£17mn)	**£20mn**

** This is based on a national roll-out of each innovation. Where we have multiple estimates, we have reported the central scenario. For the proactive care estimates we included estimates for continued treatment. That is, include the productivity benefits for individuals who are detected with sub-optimal treatment and treated for the next 5 years. The proactive care estimates represent the total potential impact, including impacts from realised early stages of implementation and future potential impacts from continued implementation. They represent the impact if all individuals with unoptimised care received optimised care.*

Our top-down analysis estimates the total potential productivity impact from reducing ill-health in the UK

Analysis aims

Our top-down analysis focuses on answering the following questions:

- **What is the total impact of ill-health on UK productivity?**
- **What is the total impact of ill-health for the NHS workforce?**

The estimates are based on calculating the total impact of removing ill-health in the UK. The analysis uses publicly available data on reasons for mortality, economic inactivity, reduced hours worked, absenteeism and health pay gaps to estimate the overall productivity lost due to ill-health in the population. The analysis is UK-wide.

The top-down analysis includes estimates for the following productivity areas.

1. Deferred mortality

ONS data on avoidable mortality is used to estimate the total years of working life lost for individuals aged between 16 and 64 and the resulting value of productivity to be gained.[7] We use Health Foundation evidence to calculate the number of working years of life gained that will be spent working (i.e. we factor in unemployment rates for reasons outside of health conditions).[8]

2. Increases in the employment rate

ONS data on economic inactivity is combined with ONS data on unemployment due to work-limiting health conditions to estimate the total potential increase in the number of employees from eliminating ill-health.[9,10]

3. Increases in contracted hours

DWP data on average hours worked for individuals with long-term health conditions is used to estimate the increase in contracted hours, i.e. from part-time to full-time employment, associated with eliminating work-limiting health conditions.[11,12]

4. Reduced absenteeism

ONS data on sickness absences is used to calculate the productivity loss associated with absenteeism. It is important to note that this includes all reasons for sick days, including minor illnesses.[13]

5. Improved productivity when at work

Evidence from the Health Foundation suggests that individuals with a work-limiting health condition earn 15% less on average per hour compared to an individual without a work-limiting health condition.[14] This represents the ‘health pay gap’. We use the ‘health pay gap’ as a proxy to value expected differences in per-hour productivity of individuals with and without work-limiting health conditions.

Wider approach

Our estimates are based on using a **gross value added (GVA) productivity approach**. ONS data suggests that in 2023, each hour of work in the UK corresponds to £39.34 of GVA (£40.65 in 2024).[15] This means that we value an hour of employment at £40.65 in our estimates.

In addition to calculating the total impact of ill-health on the UK economy and for the NHS workforce, we also calculate **condition-specific estimates** for mental health, musculoskeletal, respiratory, and cardiovascular health. The annex provides more detail on this calculation.

It is important to note that there are wider productivity impacts that are not included in our analysis. For example, we do not include productivity gains from reduced informal care. A wider analysis could also include Exchequer impacts (such as increased tax revenues and National Insurance) and reduced benefit payments, as included in ONS analysis. [16]

Our estimates show that there is a potential £246bn of productivity to be gained from reducing ill-health in the UK

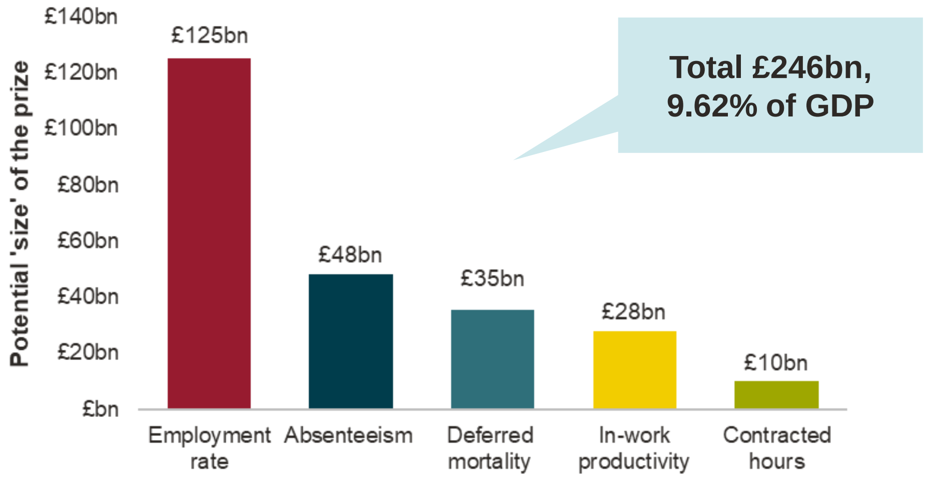
Results – annual impact in 2025

The total productivity impact of reducing ill-health on the UK economy is up to **£246bn (9.62% of GDP).** The productivity benefits predominately come from increased employment rates – both reducing inactivity due to health conditions and reducing unemployment to levels equal to those without work-limiting conditions.

These results value productivity based on a GVA-added per-hour worked approach, consistent with the approach of the Office for Life Sciences.

This estimate is based on the productivity impact of immediately improving health today. In practice, there are trends that might make this productivity estimate higher in the future. For example, there are some conditions that are becoming more prominent.

Total productivity impact of ill-health on the UK economy



There is an increasing proportion of the population who are obese, a key risk factor for many health conditions such as cardiovascular disease and cancer. There are increasing trends in high anxiety prevalence and mental health conditions.[17] There are also trends that might make this estimate lower. For example, some conditions may be prevented due to wider health policies.

It is important to note that our absenteeism estimates also include minor illnesses, such as coughs and colds. This corresponds to approximately £8.23bn.

We have included additional detail on interpreting the results of this analysis in the annex.

Benchmarking our estimates

We have conducted a review of comparable estimates to provide quality assurance on the estimates we have developed.

- ONS estimate the value of absenteeism to be between £38 billion - £56 billion and economic inactivity to be between £127 billion - £188 billion. [18]
- 2.5 million people inactive due to ill-health.[19] This can be valued at approximately £141bn at GVA per hour worked of £40.65 per day with 7.5 hours worked a day, 5 days a week with 37 weeks worked in a year.
- 3.7 million employed with work-limiting conditions (Health Foundation 2023). This can be valued at approximately £31.3bn at a productivity loss of 15% using health pay gap estimates.[20]
- Inactivity and reduction in hours associated with £8.9bn reduction in tax receipts.[21]
- A one percent increase in the number of people in work aged 50 – 64 could increase GDP by around £5.7 billion per year and have a positive impact on income tax and NICs liabilities of around £800 million per year. [22]

Our estimates show that there is a potential £8.55bn of NHS workforce productivity to be gained from reducing ill-health in the UK

Results – annual impact in 2025

The total productivity impact of reducing ill-health of the **NHS workforce is £8.55bn**. This figure is for the NHS Secondary care and Community care workforce in England specifically. In terms of hours worked, this corresponds to **233 million hours, which is equivalent to about 6% of total NHS hours worked**.

The productivity benefits primarily come from decreased absenteeism. Our absenteeism value includes illnesses such as colds, coughs, and the flu. We estimate that £0.59bn of absenteeism in our NHS workforce estimates is due to colds, coughs, and the flu.

There are further productivity gains for reducing ill-health outside secondary and community care. For example, if we scale the above result to reflect the **primary care** workforce, this suggests an **additional 21 million hours** to be gained with a monetary value of **£20.61 million**.

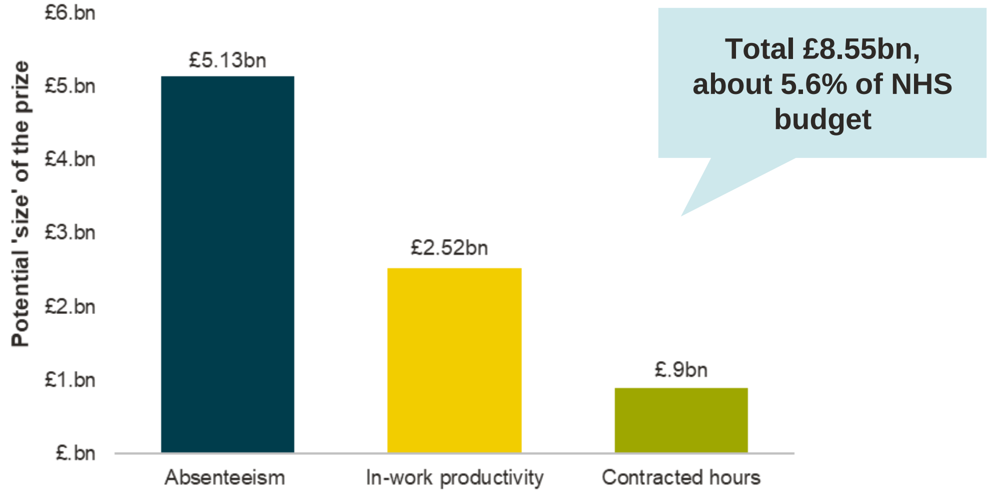
Data used to develop our NHS estimates

Where possible, we have used **NHS-specific data** to calculate our productivity estimates.

- We have used a GVA per hour worked that is specific to health and social care (£30.46 in 2024£s). [23]
- We have used NHS data on sick days to calculate the productivity lost from absenteeism. [24]
- We have used data on the number of public sector workers with work-limiting health conditions and scaled to the NHS workforce to calculate the productivity impacts of reduced working hours due to health conditions (i.e. our contracted hours estimate) and in-work productivity estimates. [25]

- Due to data availability, we do not include the impact of deferred mortality in our NHS workforce estimates. However, by scaling our UK-wide estimates on deferred mortality to the NHS workforce size in England, we suggest that the productivity impact from deferred mortality is expected to be £1.77bn.

Productivity impact of ill-health for NHS Secondary Care and Community Care workforce



233 million hours

NHS workforce time that could be gained by reducing ill-health, equivalent to 6% of hours worked

** Using an NHS budget of £155.1 billion in 2022/23 (Kings Fund)* [26]

The additional NHS workforce productivity will translate to a material number of appointments

Approach

We develop **illustrative scenarios to explore the number of potential additional appointments** that could result from the productivity improvements from reducing ill-health. These scenarios are developed for (1) secondary and community care and (2) primary care.

(1) Secondary and community care

Our estimates suggest that there are 233 million hours to be gained for the NHS secondary care and community care workforce by reducing ill-health. We develop illustrative scenarios by combining this estimate with the following:

- **NHS workforce data:** NHS data suggests that 54% of the secondary care and community care workforce provides clinical care. [27] This implies that there are 125 million *clinical* hours to be gained in secondary and community care.
- **Assumptions on workforce time required per appointment:** We assume that each clinical FTE spends 50% of their time providing appointments, that 1.5 clinical staff are required per appointment and each appointment is 30 minutes long.

(2) Primary care

Our analysis suggests that there are an additional 21 million hours to be gained for the primary care workforce by reducing ill health. We combine this with:

- **NHS workforce data:** NHS data indicates that 37% of the workforce is clinical. [28] This implies that there are 21 million *clinical* hours to be gained in primary care.
- **Evidence on the length of a GP appointment:** our scenarios assume each primary care appointment is 15 minutes long.[29]
- **Assumptions on workforce time required per appointment:** We assume that clinical primary care staff spend 50% of their time in appointments and 1 member of clinical staff is required per appointment.

Results

84 million secondary care and community care appointments

Additional appointments from reducing ill-health in the NHS secondary care and community care workforce

15 million primary care appointments

Additional appointments from reducing ill-health in the NHS primary care workforce

It is important to note that there are many factors that will influence whether these appointments are realised, including the following:

- What areas of clinical expertise will be gained from reducing ill-health? How do these areas compare to where there are significant waiting lists?
- What is the geographic distribution of where the additional hours will be gained? Where in the UK are waiting list most significant?

As population health is worsening, we expect the productivity impact from reducing ill-health to be increasing over-time

Trends in work-limiting health conditions

Our total values for the productivity impact of ill-health are based on current population health levels. There is evidence to suggest that the impact of poor health on productivity is increasing.

- Since Covid-19, there are 470,000 more people out of the workforce on ill-health grounds. [30]
- In 10 years to 2023, individuals with work-limiting health conditions increased from 15.3% to 19.3% (Health Foundation 2023).[31]

This means that under a 'do-nothing' scenario (i.e., there are no additional changes to policies that impact population health trends), population health is worsening. This will increase the size of the productivity impact of reducing ill-health on the UK economy.

Analysis

We estimate projections for the productivity impact of reducing ill-health on the UK economy.

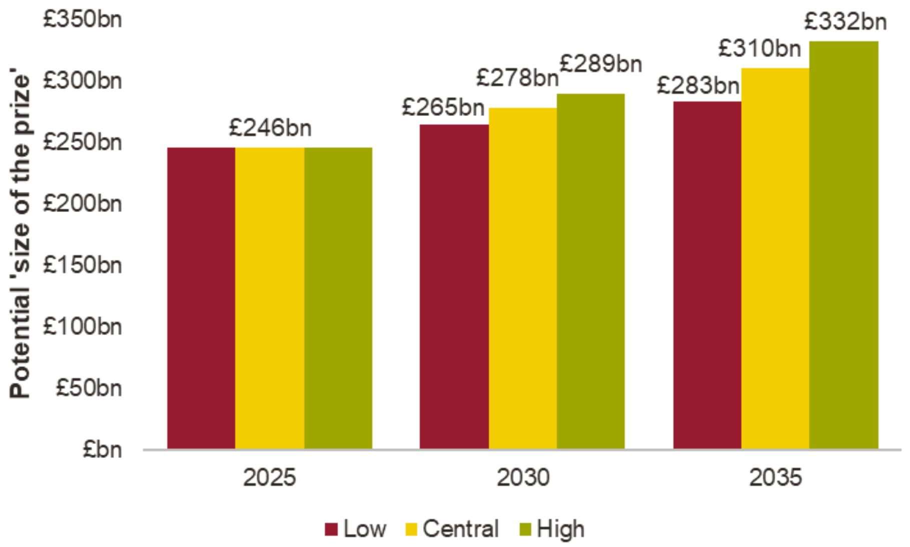
- Our central scenario uses the Health Foundation evidence cited above and involves the productivity impact of work-limiting conditions increasing by 26% between 2025 to 2035. This is our 'do-nothing' scenario.
- We also calculate 'low' and 'high' scenarios. These scenarios model the impact of ill-health on UK productivity assuming that the number of work-limiting health conditions grows at a smaller rate or higher rate than historical trends. We assume the productivity impact increases by 15% (low) and 35% (high) between 2025 and 2035.

Our analysis presents UK-wide real undiscounted values.

Results

Scenario		2035	Total 2025 to 2035
Low	Smaller growth in comparison to historical trends	£283bn	£2,900bn
Central	Work-limiting health conditions continue to grow at current rates	£310bn	£3,050bn
High	High growth in comparison to historical trends	£332bn	£3,200bn

Projections on the productivity impact of ill-health on the UK economy



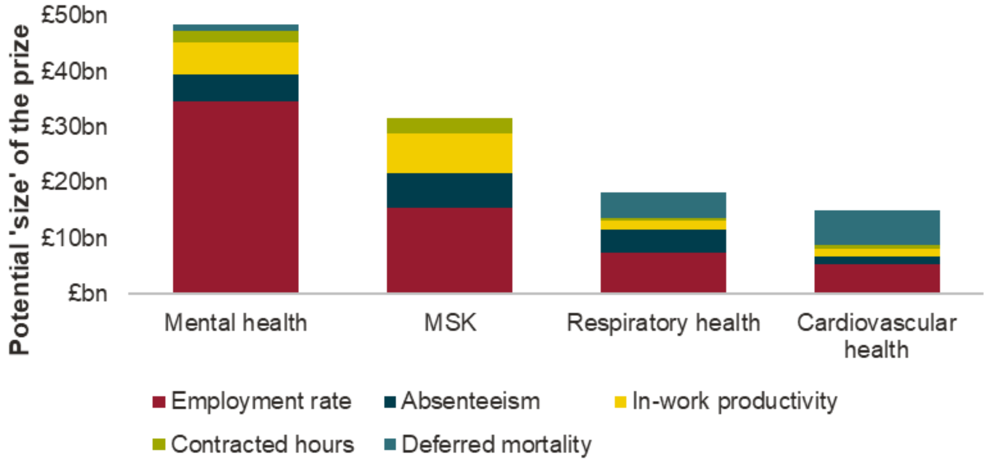
Mental health, MSK, respiratory and cardiovascular health areas have high potential productivity gains

We have estimated the potential productivity gains from improvements in health for **specific health areas**: mental health, musculoskeletal (MSK), respiratory, and cardiovascular health. For each of these health areas productivity gains are at least £15bn, with mental health having the highest potential productivity to be gained from reducing ill-health (£49bn).*

Analysis by the Tony Blair Institute suggests that a 20% reduction in the incidence of six major disease categories (those included on this slide as well as cancer and diabetes) could raise GDP by 0.74% within 5 years and 0.98% within 10 years.[31]

As part of the **bottom-up analysis**, we develop specific productivity impacts from innovations in respiratory and cardiovascular health to illustrate how innovation in health can result in realised benefits.

Productivity impact of ill-health on the UK economy by key healthcare areas



Mental health

- Mental health conditions are becoming more common in the working-age population, rising from 8-10% to 13-15% prevalence since the mid 2010s. Mental health related deaths among this group have also risen.[32]
- Long-term productivity impacts may result from missed education for young people with mental health conditions.[33]
- The rise in work-limiting conditions is driven by increases in mental health conditions.[34]

MSK

- The percentage of people in England reporting an MSK condition has been roughly constant since 2018 (when data collection began).[35]

Respiratory

- Hospital admissions from respiratory disease rose steadily in the 2010s – primarily due to rises in admissions for pneumonia.[36]
- On the other hand, the mortality rate from respiratory disease for under 75s fell from 2001 to 2023 – but the impact from Covid is yet to be seen in the data.[37,38]

Cardiovascular

- Whilst there have been falls in heart-related diseases for those over 60, there has not been improvements in heart health for younger age groups.[39]

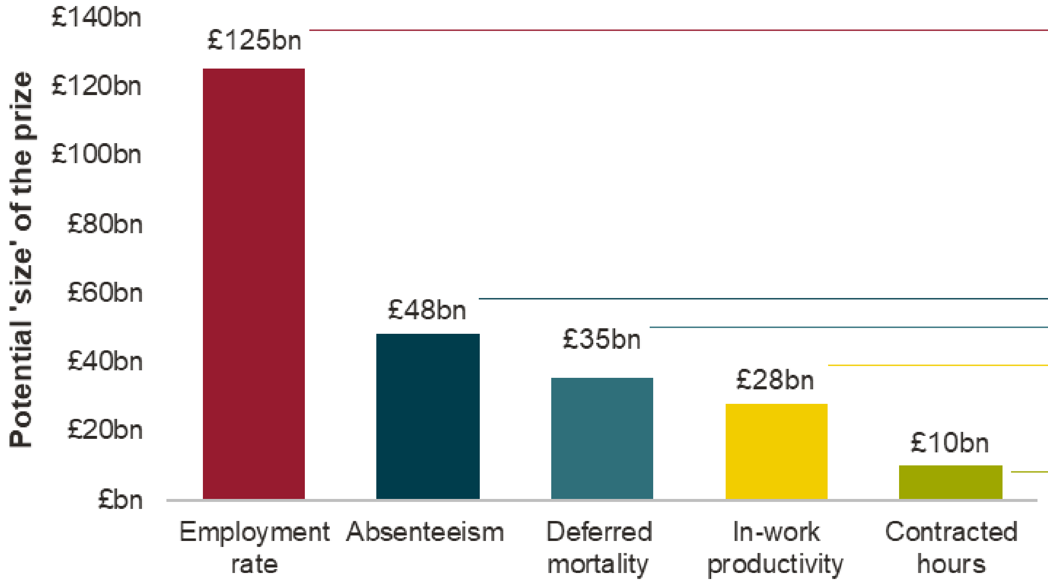
The exact conditions that are included within each of these health areas are included in the annex.

What scale of intervention would be required to access these potential productivity gains?

Opportunity from innovation

Breaking down the 'size of the prize' into the source of potential productivity gains helps to illustrate the scale of intervention which may be required. This slide shows, for each category of productivity gains, the potential scale which would be necessary.

On the following slides, we consider examples of innovations, including current NHS examples that are already evidenced within local areas and future innovations, both of which could be part of a broad package of interventions.



Current UK unemployment rate for individuals with work-limiting health conditions is 8%. Current UK economic inactivity rate for individuals with work-limiting health conditions is 48%. This equates to 4.2 million people who are currently not working.

Getting 1 million people into work would be worth around **£48 billion to the UK economy in Gross Value Added**.

Absences from work account for 185.6 million days lost per year, including absences for minor illness (44.3 million) and all other absences (141.3 million).

Reducing long-term absences by 20% would be worth nearly **£10 billion in GVA**.

Each year, 132,000 people die prematurely due to preventable diseases.

Avoiding 20,000 of these deaths each year would contribute approximately **£5 billion to the economy in Gross Value Added**.

Evidence suggests that ill-health leads to a 15% reduction in productivity, and this affects 3.9 million people each year.

Avoiding this productivity loss for 1.4 million people each year would be worth **£10 billion in GVA**.

Currently, people with work-limiting conditions work on average 4-hours less than individuals without work-limiting conditions.

If 10% of these people could be enabled to work full-time, this would contribute approximately **£1 billion to the economy in Gross Value Added**.

Our "proof of concept" analysis provides illustrative examples of how health innovation has led to productivity benefits

The **proof of concept analysis** combines two types of analysis. Firstly, we present illustrative scenarios that show the potential magnitude of health innovation on productivity. Secondly, we focus on existing innovations that have had an evidenced and quantifiable impact on health outcomes.*

Scenario analysis of potential future innovations

Our scenario analysis is designed to show the **potential opportunity for health innovation**. First, we assess the potential productivity impact of innovations focusing on **return-to-work interventions** for MSK conditions. Secondly, we suggest the potential magnitude of productivity impacts that could occur from **innovation in medical technologies**, specifically in cardiovascular and cancer.

Analysis of existing innovations

We have identified examples of health innovations that have had an evidenced and quantifiable impact on health outcomes. These examples are for cardiovascular health and respiratory health.

For **cardiovascular health**, we have modelled the potential impact of proactive care in cholesterol and high blood pressure (aims to increase the number of individuals on optimal treatment) and the Stroke AI imaging (improving access to treatment for stroke patients).[40,41]

For **respiratory health**, we have focused on FeNO testing in asthma diagnosis and management which has led to an increase in the number of new asthma diagnoses and biologic therapies for patients with severe asthma, which has led to an increase in the number of individuals with controlled asthma.[42]

For each of these innovation examples, we estimate the **impact that the innovation could have if rolled out nationally**. This involves estimating the population in England that we would expect to access the innovation and what that implies for the expected changes to health outcomes.** We then estimate the productivity benefits from the changes in health outcomes.

All our estimates represent the **present value of productivity benefits for individuals diagnosed/treated in 2025**. In practice, an individual treated with a particular innovation today is expected to have productivity benefits in the future. Where relevant, we have discounted all future benefits using HMT Green Book guidance (i.e. we apply a discount rate of 3.5%).[43]

As we are estimating the impact of health innovation on productivity specifically, we estimate the proportion of individuals that are expected to benefit from the innovation that is part of the working-age population (i.e. aged between 16 and 64) and in employment using Health Foundation evidence.[44]

We present estimates using a **GVA per hour worked approach.** This is consistent with our top-down estimates.

In practice, we expect there are other ways innovation leads to increased productivity that are not included in our analysis. For example, we expect improvements in quality of life due to better treatment to lead to additional productivity improvements.[45] We also expect improvements to health outcomes to result in less time in caring roles, and, for some individuals, this will result in additional hours spent working. Therefore, our estimates present illustrative examples of the impact health innovation can have on productivity.

** It is important to note that the results from the bottom-up analysis will not add up to the total size of the prize estimates from the top-down analysis. Rather, the estimates are illustrative case studies of the mechanisms by which health innovation can impact productivity.*
*** The respiratory health projects have already been rolled out nationally and so we do not conduct any scaling for these innovation examples.*

Innovative approaches targeting return-to-work have been shown to be effective

Importance of return-to-work interventions

Once out of the workforce, individuals with work-limiting health problems are almost three times less likely to return-to-work within a year than those without health issues. The likelihood of returning to work decreases the longer that someone remains out of the labour market. [46]

There is currently a significant focus within government and the health service on advancing health-focused interventions to support individuals out of work due to ill health to return-to-work. Innovation and collaboration across organisations is required to provide tailored assistance, addressing challenges like mental health conditions and managing chronic illnesses.

Evidence on return-to-work interventions

Evidence suggests return-to-work (RTW) interventions can be effective. This evidence based has focused on musculoskeletal and mental health problems. Interventions are most effective when:

- They are used early i.e. as soon as possible after an individual has left work.[47]
- They use multiple complementary approaches to support individuals. *"There was strong evidence that duration away from work from both MSK or pain-related conditions and MH conditions were significantly reduced by multi-domain interventions encompassing at least two of the three domains (health-focused, service coordination, and work modification interventions)".*[48]

These interventions can have a direct impact on absenteeism. For example, a comprehensive Cochrane Review of RTW interventions found:

> *"Workplace interventions reduced the number of sick days taken by 12 months' follow-up by a mean 33.33 days compared with usual care."* [49]

Based on these average impacts, we have illustrated below the potential benefits from achieving this level of impact across a much larger population

Similar interventions may also have an impact on individuals' ability to work more contracted hours, and their in-work productivity, although these potential impacts have not been explored in the clinical and academic literature.

2 million working-age individuals have MSK conditions [4]

500,000 individuals in employment have work-related MSK conditions [5]

→ If RTW interventions were appropriate for **100,000** of those currently working

→ This could avoid **4.7 million sick days**

→ **£1.21 billion** total productivity gained

Innovative technologies have reduced premature mortality

Importance of targeting premature mortality

Our analysis suggests that premature mortality among working age individuals is a significant driver of lost productivity, in addition to the human cost of these avoidable deaths.

Leading causes of premature mortality include cardiovascular disease and cancer. According to the Health Profile for England (2018), *"Falling mortality rates from heart disease were the biggest cause of increases in life expectancy between 2001 and 2016 in England"*.[50]

Role of health innovation in deferring mortality

Health innovation can lead to prevention or improved treatment for these conditions, leading to reductions in premature mortality. Recent innovations include use of digital health solutions, and other smart technologies such as wearable devices, AI and remote monitoring.[51,52,53]

The long-term impact of these new innovations has not yet been tested in the literature.

However, studies of past innovation suggest that the impacts can be significant. A 2025 study considered the number of cancer deaths avoided over 45 years due to improvements in prevention, screening and treatment. They found that improvements in treatment had the smallest impact, while "*prevention and screening accounted for 8 of every 10 averted deaths*".[54]

Considering the role of innovative technology more widely, a 2003 study investigated deaths from UK road traffic incidents over 20 years. Deaths declined over this period for a number of reasons, including improvements in car safety and road design. However, **one third of the reduction in premature deaths was due to improvements in medical technology**, such as use of imaging technology, microsurgery and transplantation techniques. The study concluded: "*Results suggest that the medical technology improvements seem to be more important than the changes in medical care*."[55]

We have illustrated below the potential benefits from a modest reduction in premature deaths due to cancer and cardiovascular disease, as a result of health innovation.

221,000 years of working life lost due to cancer → If health innovation could reduce these deaths by 10% → **£876 million** total productivity gained

157,000 years of working life lost due to cardiovascular disease → If health innovation could reduce these deaths by 10% → **£624 million** total productivity gained

The estimates presented above have been derived using the top-down productivity approach

Our cardiovascular health estimates have focused on innovations across detection and treatment

CVD, such as heart disease and stroke, is a leading cause of death in the UK, responsible for a **quarter of all mortalities each year**. [56] Our top-down estimates show that there is a potential of **£15bn productivity to be gained from improving cardiovascular health**. High blood pressure and cholesterol are leading factors for CVD, but are highly modifiable, and with effective treatment, the risk of CVD can be substantially lowered. [57]

There has been a wide range of innovations in cardiovascular health aimed at improving detection, treatment and secondary prevention of diseases. For example, through the **Atrial Fibrillation (AF) Programme**, almost 12,000 AF-related strokes were avoided. [58] The **Lipid Management and Familial Hypercholesterolaemia Programme** is estimated to have prevented approximately 9,500 CVD events.[59] There are current examples of innovations moving towards adopted a **multimorbidity approach** that enables health innovation networks and their partners to deliver CVD focused initiates that are aligned to their ICBs needs. This includes initiatives that adopt a population health management approach to addressing **CVD prevention and management** (such as CVDAction[53]), addressing **health inequalities**, ensuring **equitable access** to evidence-based / NICE-approved treatments (such as Stroke AI imaging[60] and proactive care for blood pressure and cholesterol[61]) and sharing learning to ensure timely adoption and spread of identified and evidence-based innovations.

As part of this workstream, we have estimated the productivity impact of proactive care for cholesterol and blood pressure and Stroke AI imaging for individuals with stroke. More detail of these innovations is provided in the table below.

Our results are consistent with work by the Tony Blair Institute that shows that readily available treatments could increase annual GDP by 0.08% in 2030 (£2.2 billion). [62]

Innovation	Description	Health measures	Productivity impact
Proactive care	Proactive care consists of patient search and stratification tools and prioritisation pathways to help the primary care workforce prioritise high risk patients, and resources and trainings to support the practices in delivering structured support for education, self-management and behaviour change for individuals. The tools are specific to a range of long-term conditions, including cardiovascular-related conditions. Our analysis focuses specifically on (A) cholesterol level optimisation and (B) blood pressure optimisation. The estimates represent the total potential impact of proactive care, including impacts from realised early stages of implementation combined with future impacts from continued implementation. This means the estimates represent the impact if all individuals with estimated unoptimised care received optimised care.	▪ Decreased CVD events ▪ Decreased mortality from CVD events	▪ Deferred mortality ▪ Employment impact avoided
Stroke AI imaging	Stroke AI imaging uses AI images to accelerate diagnosis and helps stroke clinicians make swift decisions relating to transfer and treatment. This includes access to MT, a life-changing treatment, which can reduce disability and prevent or limit long-term care needs in patients with the most severe strokes caused by a blockage in a large blood vessel in the brain. This innovation is rolled out across all England acute stroke services as of 2025. Our modelling is based on evaluation evidence from the early stages of roll-out.	▪ Increase in MT use ▪ Decrease in mortality and increased functional independence following stroke	▪ Deferred mortality ▪ Employment impact avoided

We estimate a total productivity benefit of £1.06bn from a national roll-out of proactive care for cholesterol level optimisation

Modelling approach

- The estimates developed represent the potential benefits from full rollout of the proactive care frameworks for cholesterol. They represent the **impact if all individuals with unoptimised care received optimised care.**
- Evidence from the UCLPartners Cholesterol Size of the Prize modelling shows how, in one Integrated Care System (ICS), 87% of individuals with CVD were either not on a statin (21%), on a sub-optimal statin (59%) or not at target despite maximal statin (7%).[63] We use this to estimate the number of individuals with unoptimised treatment in England.
- Literature provides evidence on the number of individuals needed to treat in order to avoid a CVD event.[64] We estimate that an England-wide roll-out would avoid approximately **2,500 CVD events annually** for working-aged individuals treated in 2025 (or 12,300 across five years if these individuals continue optimal treatment).
- It is important to note that this approach differs from the UCLPartners Cholesterol Size of the Prize modelling by calculating **annual figures** for the number of CVD events avoided that are **specific to individuals who we expect to be employed.** We also calculate productivity impacts for continued treatment (over five years). In contrast, the UCLPartners Size of the Prize modelling calculates the number of CVD events avoided for **five years only** and for the whole population in England.
- We estimate the mortality prevented from CVD events among the working-age population. Literature suggests that the **30-day mortality risk following a CVD event (i.e. stroke or heart failure) is around 18.75%.**[65] We then calculate the productivity impact of deferred mortality.
- Evidence from the Stroke Association and the European Society of Cardiology shows that individuals who experience a CVD event may leave employment or start to work part-time.[66,67] We estimate the employment impacts avoided due to the reduction in CVD events. Employment benefits will occur beyond the year that a stroke was avoided, i.e. future years of working life are gained through the avoided CVD event.
- More detail on the approach and assumptions is available in the annex.

Results – Present value of productivity benefits for individuals with treatment optimised in 2025

- For individuals who optimise their treatment in 2025, we expect the productivity benefits to be **£82mn from deferred mortality**, and **£160mn from employment impacts avoided (total £242mn).** This productivity impact is for CVD events avoided in the first year of optimised treatment only.
- **We also estimate the productivity benefit from continued treatment.** We assume that once an individual starts optimal treatment, this treatment is continued across five years, leading to additional CVD events avoided. We estimate **£381mn productivity from deferred mortality** and **£750mn from employment impacts** avoided (**total £1.13bn)**.

	First year of optimised treatment	Continued treatment
CVD events avoided	2,500	12,300
Deferred mortality	£82mn	£381mn
Employment impacts avoided	£160mn	£750mn
Total	**£242mn**	**£1.13bn**

Please note, these roll-out estimates are indicative and assume that the results achieved to-date could be replicated nationally.

We estimate a total productivity benefit of £1.12bn from a national roll-out of proactive care for blood pressure optimisation

Modelling approach

- The estimates developed represent the potential benefits from full rollout of the proactive care for blood pressure optimisation. Early implementation evidence shows how proactive care has increased the number of individuals on optimal treatment for high blood pressure.[68]
- Evidence from the UCLPartners Hypertension Size of the Prize modelling suggests that 33.2% of individuals with hypertension do not have blood pressure treated to target.[69] We combine estimates from the UCLPartners modelling with data on the number of working-aged individuals with hypertension to suggest that there are **522,000 working-aged individuals in England who are not treated to target** and would be identified by proactive care. [70,71]
- Evidence suggests that the number of individuals needed to treat with anti-hypertensive medication to avoid one heart attack is 100, and 67 individuals need to be treated to avoid one stroke.[72] From this, we estimate that we expect **2,600 CVD events are avoided annually** for working-aged individuals treated in 2025 (or 13,000 across five years) from a nationwide roll-out of the blood pressure optimisation.
- Similar to our modelling for the UCLPartners Cholesterol Framework (see previous slide), we calculate **annual figures** for the number of CVD events avoided that are **specific to individuals who we expect to be employed**. We also calculate productivity impacts for continued treatment (over five-years). In contrast, the Size of the Prize modelling calculates the number of CVD events avoided for **five years only** and for the whole population in England.
- We combine our estimates on CVD events avoided with evidence on mortality rates following CVD events and the impact of CVD events on employment (see previous slide).
- More detail on the approach and assumptions is available in the annex.

Results – Present value of productivity benefits for individuals with treatment optimised in 2025

- For individuals who optimise their treatment in 2025, we expect the productivity benefits to be **£86mn from deferred mortality**, and **£154mn from employment impacts avoided (total £240mn).** This productivity impact is for CVD events avoided in the first year of optimised treatment only.
- **We also estimate the productivity benefit from continued treatment.** We assume that once an individual starts optimal treatment, this treatment is continued across five years, leading to additional CVD events avoided. We estimate **£402mn productivity from deferred mortality** and **£720mn from employment impacts** avoided (**total £1.12bn**).

	First year of optimised treatment	Continued treatment
CVD events avoided	2,600	13,000
Deferred mortality	£86mn	£403mn
Employment impacts avoided	£170mn	£793mn
Total	**£256mn**	**£1.20bn**

Please note, these roll-out estimates are indicative and assume that the results achieved to-date could be replicated nationally.

We estimate a total productivity benefit of £459mn from a national rollout of Stroke AI imaging

Modelling approach

- Stroke AI imaging aims to increase the number of stroke patients who are treated with MT. This innovation is rolled out nationally. The adoption of stroke AI imaging was achieved in all English acute stroke services in 2025. Evidence from the early rollout of Stroke AI imaging finds that 4.21% of stroke patients in the rollout sites are treated with MT, in comparison to a national average of 2.9%.[73] We estimate a **1.31% increase in MT** across England from Stroke AI imaging.
- Stroke AI imaging is expected to **reduce mortality and disability for those who receive the treatment following stroke**. We estimate the number of individuals with deferred mortality and the increase in the number of individuals who achieve functional independence due to Stroke AI imaging in England. Literature suggests a **17% reduction in 3-month mortality of patients who are treated with MT** [74] and for approximately every three individuals treated with MT, one additional individual achieves functional independence in comparison to usual care. [75]
- We calculate the productivity impact of MT by estimating **mortality avoided** and the increase in the number of individuals who achieve **functional independence** for individuals who we expect to be employed. We use evidence from the Stroke Association on employment impacts of stroke to estimate the number of individuals with deferred mortality or who achieve functional who we expect to return-to-work. [76]
- We expect that the employment benefits to occur not just in the year that a stroke was avoided i.e. future years of working life are gained due to MT.
- More details on the approach and assumptions are available in the annex.

Results - Present value of productivity benefits for individuals treated with MT in 2025

- We estimate that **5,500 additional working age stroke patients are expected to received MT** per year**.** This is expected to lead to approximately 200 mortality avoided and 1,600 additional individuals achieving functional independence per year.
- We estimate productivity benefits of **£26mn from deferred mortality** and **£434mn from functional independence**. The figures indicate the net present values of productivity impacts from a individuals treated by Stroke AI imaging in one year.
- These results are derived using the GVA productivity approach as used in the top-down analysis. Results using average wages are provided in the Annex.

5,500 additional stroke patients expected to receive MT

	Productivity impact	
	Deferred mortality	**Functional independence**
Full-time employment	£22mn	£373mn
Part-time employment	£4mn	£60mn
Total	**£26mn**	**£434mn**

£459mn total productivity gained

Please note, these estimates assume that the results achieved in early rollout areas can be achieved nationally.

Similarly to cardiovascular health, our respiratory health estimates have focused on innovations across detection and treatment

Respiratory illness affects one out of every five people and ranks as the **third biggest cause of death in England**, after cardiovascular disease and cancer. [77] Our top-down estimates show that there is a potential of **£18bn productivity to be gained from improving respiratory health**. It is expected that this productivity improved will be from disadvantaged groups. Incidence and mortality rates are worse in deprived areas and for disadvantaged groups. From 2017 to 2019 in England, early mortality from respiratory disease was 2.9 times higher in the most deprived areas compared to the highest socioeconomic areas. [78]

There are examples of health innovations that aim to improve detection and access to effective treatments. These include the following:

- Improving the implementation of COPD and asthma discharge care bundles, which help improve disease control and reduce hospital readmissions.[79]
- The use of FeNO (fractional exhaled nitric oxide) testing in primary care to enable faster and more effective asthma diagnoses.[80]
- Targeted approach to identifying patients with respiratory conditions at risk of poor health outcomes due to fuel poverty. [81]
- Improved access to asthma biologics. [82]

As part of this workstream, we have estimated the productivity impact of two England-wide innovations: better access to **FeNO testing in primary care** and **improving access to innovative asthma biologics**.

Innovation	Description	Health measures	Productivity impact
FeNO testing in asthma diagnosis and management	FeNO testing is a simple, non-invasive test to measure the amount of nitric oxide in an exhaled breath – a biomarker for airway inflammation. FeNO testing can improve patient care by contributing to a faster and more effective asthma diagnosis when used alongside a detailed clinical history and other tests. It can also be used to monitor patient response to asthma treatments. More than 1,200 FeNO devices were rolled out into use in primary care in England with an estimated 53% of primary care networks having access to FeNO.	▪ Increased asthma diagnosis ▪ Estimated impact on asthma control	▪ Reduced absenteeism ▪ Improved in-work productivity
Increased uptake of biologic medicines	Asthma biologics are an innovative group of medicines for the treatment of severe asthma. Asthma biologics work in a targeted way by disrupting pathways causing airway inflammation, helping to manage symptoms and reduce exacerbations. These therapies can transform patients' lives by reducing the long-term side effects of other treatments, such as steroids, and reduce the number of life-threatening asthma attacks. As part of the Rapid Uptake Products programme this innovation has been rolled out nationally across England.	▪ Increased number of individuals with severe asthma on biologics ▪ Estimated impact on asthma control	▪ Reduced absenteeism ▪ Improved in-work productivity

We estimate between £100mn and £204mn of productivity benefits from improved diagnostics due to FeNO testing

Modelling approach

- The FeNO testing in asthma diagnosis and management innovation has led to faster and more efficient diagnosis. Between April 2021 to March 2023 **1,200+ FeNO devices have been rolled out into use in primary care** in England. This has led to an estimated **58,000 new asthmatic diagnoses through enhanced asthma testing.**[84] The correct diagnosis of asthmatics then allows individuals to access treatment, which in turn is expected to help manage asthma symptoms.
- We assume that each year due to FeNO testing, an **additional 29,000 individuals are diagnosed with asthma** in England. Based on an assumption that these patients are spread uniformly through the age population and Health Foundation data on employment rates, we estimate that approximately 8,700 of these are in employment.[85]
- We expect that a diagnosis of asthma reduces the likelihood an individual has uncontrolled asthma. Evidence suggests that at least **50% of undiagnosed cases of asthma are controlled**,[86] compared to between **60% and 70% in the diagnosed population.** [87,88]
- Given the uncertainty around the impact on asthma control, we develop scenarios to calculate a potential range of impacts based on the literature. In our scenarios, we assume that 10% (low), 15% (central) and 20% (high) of those diagnosed due to HIN technology move from uncontrolled to controlled asthma because of diagnosis enabling individuals to access treatment.
- Evidence suggests that those with uncontrolled asthma have **more absenteeism and lower productivity** when in-work, compared to those with controlled asthma.[89] We calculate the value of the relative fall in absenteeism and improvement in in-work productivity for the scenario-based assumptions around the number of people moving
- We calculate that an individual diagnosed with asthma has, on average, 24 years of working life remaining. We expect that this is the upper bound for the time horizon of the productivity benefit. In practice, factors such as treatment adherence and the potential for non-linear benefits over time will impact productivity benefits. We, therefore, adopt a more conservative benefit period of 10 years, consistent with HM Treasury's Green Book guidance. [90]

Results - Present value of productivity benefits for individuals detected in 2025

- We estimate a productivity benefits of **between £100mn and £204mn, with a central estimate of £149mn** This represents a present value benefit for individuals who are diagnosed with asthma as a result of FeNO testing. This benefit is predominately from improved in-work productivity benefits.

29,000 additional diagnosis per year due to FeNO testing

Productivity impact	Low	Central	High
Reduced absenteeism	£15mn	£22mn	£30mn
Improved in-work productivity	£85mn	£127mn	£174mn
Total	**£100mn**	**£149mn**	**£204mn**

Between £100mn and £204mn total productivity gained due to FeNO testing

** These estimates are indicatives, and assume the results achieved to-date could be replicated year-on-year.*

We estimate between £8mn and £40mn productivity benefits from improved treatment via biologics

Modelling approach

- Innovation has led to a redesign of the patient care pathway for severe asthma to speed up **access to asthma biologics**, including initiation and ongoing monitoring. This innovation has led to an additional 4,960 patients starting treatment with life-changing biologics between April 2021 and March 2023. [91]
- We assume that each year **2,300 additional patients with severe asthma** are moved onto biologics in England. Based on an assumption that these patients are spread uniformly through the age population and Health Foundation data on employment rates, we calculate that approximately 700 of these individuals are in employment. [92]
- Evidence suggests biologics, as compared to other treatments, **reduce the risk of asthma exacerbations by between 11% and 47%.**[93] We use as a proxy for change in asthma control to inform scenario analysis around the percentage of those on asthma biologics who move from uncontrolled to controlled asthma as a result of biologics: 10% (low), 25% (central) and 50% (high).
- Evidence suggests that those with uncontrolled asthma have **more absenteeism and lower productivity** when in work, compared to those with controlled asthma. [94] We, therefore, calculate the value of the relative **fall in absenteeism** and **improvement in in-work productivity** for the scenario-based assumptions around the number of people moving from uncontrolled to controlled asthma.
- We calculate that an individual diagnosed with asthma has, on average, 24 years of working life remaining. We expect that this is the upper bound for the time horizon of the productivity benefit. In practice, factors such as treatment adherence and the potential for non-linear benefits over time will impact productivity benefits. We, therefore, adopt a more conservative benefit period of 10 years, consistent with HM Treasury's Green Book guidance.

Results - Present value of productivity benefits for individuals starting treatment in 2025

- We estimate a **productivity benefits of between £8mn and £40mn, with a central estimate of £20mn.** This represents a present value benefit for individuals who move onto biologics each year as a result of the AAC Rapid Uptake Products programme. This benefit is predominately from improved in-work productivity benefits.

2,300 additional diagnosis per year due to FeNO testing

Productivity impact	Low	Central	High
Reduced absenteeism	£1mn	£3mn	£6mn
Improved in-work productivity	£7mn	£17mn	£34mn
Total	**£8mn**	**£20mn**	**£40mn**

Between £8mn and £40mn total productivity gained due to biologics

** These estimates are indicatives, and assume the results achieved to-date could be replicated year-on-year.*

Contents

Our investment analysis demonstrates the importance of attracting FDI, and the value it can bring to the UK economy

Analysis aims

Our inward investment workstream combines three types of analysis.

Inward investment

A	Evidence review	Illustrate the importance of health innovation to attracting FDI
B	Trend analysis	Analysis of historical trends in FDI across Europe and explores potential drivers of FDI.
C	Scenario analysis	FDI growth scenarios to assess the wider economic benefits of encouraging investment, including employment, GVA, and R&D

Evidence review

We have reviewed publicly available evidence on health innovation and how it influences FDI. The evidence shows that Health innovation attracts FDI by improving population health, fostering investment, and strengthening the life sciences sector. It drives economic benefits such as job creation and increased investment. Strong governance and regulatory frameworks further support FDI inflows.

Trend analysis

We have used the **OLS competitive indicators** to assess the potential drivers in FDI. FDI is an investment from a foreign investor into an enterprise in a different country.

The OLS dataset includes data on various drivers of health innovation that can be used to understand the trends in FDI in life sciences. These includes figures on **historical values of FDI** in comparative countries and key drivers of FDI, including measures relating to health innovation.

The FDI data used is based on fDi Markets data for "life sciences", which includes projects in pharmaceuticals, biotechnology, medical devices as well as some projects in adjacent sectors such as healthcare, software and IT, business services and various other industries where fDi Markets has tagged these projects as life sciences.[96]

Our analysis of historical trends finds the following.

- **Europe's life sciences investment leaders:** Across Europe, France and Germany have emerged as the key leaders in attracting FDI in the life sciences sector.
- **Factors driving investment in life sciences:** Investment in the life sciences sector is influenced by multiple interrelated factors. Key indicators related to health innovation analysed include:
  - Government budget allocation for health R&D
  - UK business gross expenditure on health R&D
  - Medical science publication
  - Life science degrees
  - Number of people employed in pharmaceuticals
- **Comparison of the UK to Germany and France:** We compare the UK's performance to Germany and France's performance across the above health innovation indicators. Results show that the UK's workforce is reducing at a relatively higher rate, while research output has declined. Meanwhile, stagnant R&D spending contrasts with Germany's continued investment growth.

Our FDI scenarios show how encouraging FDI has the potential to deliver £32bn in economic benefits

Scenario analysis

We have modelled the following **three scenarios in FDI** growth for the UK.

- **Low** (10% annual increase): Conservative growth assumption.
- **Medium** (31% annual increase): Based on the average UK FDI trends
- **High** (38–45% annual increase): Based on the FDI trends in Germany and France

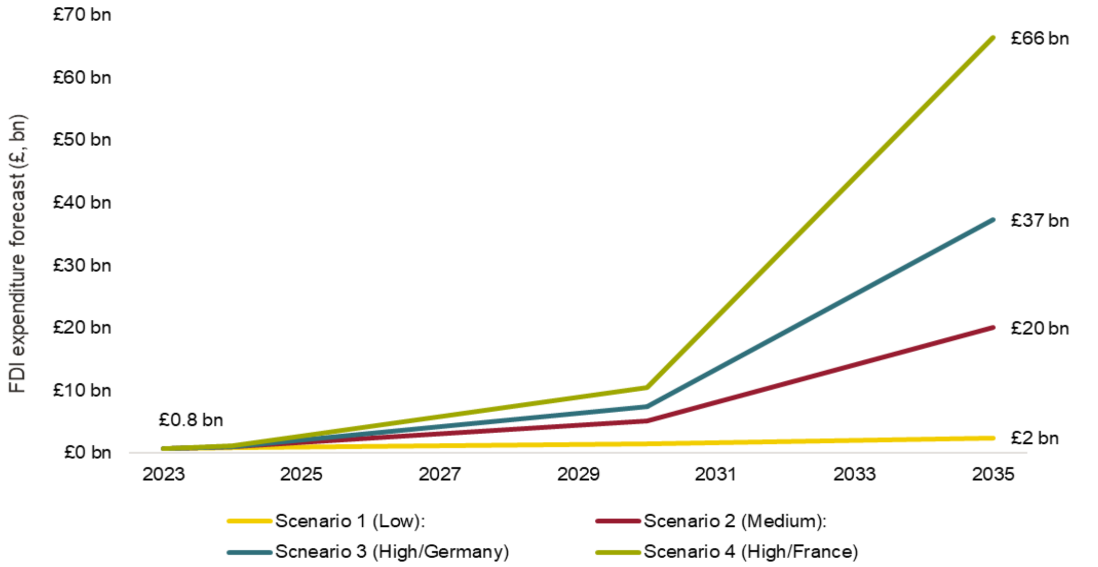
We have modelled the impact of increased **FDI on employment, GVA and R&D**. We have developed these estimates based on the following:

- **R&D Spillovers:** We assume a 1:1 relationship between FDI and R&D investment, applying a 15% rate of private return, based on estimates of spillover effect to biomedical and health research in the UK.[97]
- **Employment:** We estimate that an increase of £1mn in FDI leads to ~2.5 new jobs in life sciences (Based on DBT[98] & OLS data).
- **GVA:** For each new full-time job in life science, an additional £54k is added to GVA (Based on ONS data). [99]

Our scenarios illustrate the potential impact of increased FDI growth to the UK economy. In 2040, FDI growth under the high scenario is estimated to:

- Generate **158k jobs** (3x the medium scenario).
- Generate **GVA of £22bn** (~1.5x the medium scenario).
- Deliver **£32bn in total economic benefits, i.e. GVA & R&D spills (~2x the medium scenario)**

Low, Medium and High scenario estimates of UK FDI



Total yearly UK economy contribution in **2035** from FDI

	2023 (actual)*	Low	Medium	High (DE)	High (FR)
R&D spillovers	0.1 bn	£0.4 bn	£3 bn	£5.6 bn	£10 bn
Employment (# new jobs)	4,123	8,128	49,629	90,091	158,687
GVA	£13.7 bn	£14bn	£16.1 bn	£18.3bn	£22bn
Total	**£13.8 bn**	**£14.4bn**	**£19.1bn**	**£24bn**	**£32bn**

**The 2023 values represent the latest available data:*

- *Employment based on DBT (new jobs from FDI projects in life sciences)*
- *GVA based on OLS (Gross GVA from pharmaceutical manufacturing)*
- *R&D returns are calculated as 15% of actual FDI expenditure in 2023*

Wider government policy and the health innovation environment has a role in attracting FDI

The evidence we have reviewed can be grouped into two broad categories, focused on the role of health innovation and wider government policies in attracting FDI inflows.

1. Role of health innovation in attracting FDI

The evidence found shows that health innovation plays a role in attracting FDI:

- Aslan et al (2016) show that good population health, measured by average life expectancy, also enhances a country's attractiveness to FDI.[100] Among a sample of low- and middle-income countries, a **one-year higher life expectancy results in a 9 percent increase in gross FDI inflows**. Our productivity analysis demonstrates that innovation enhances health outcomes, and evidence indicates that better health outcomes drive increased FDI. This establishes a link between innovation and FDI growth.
- Ekosgen (2024) show strong economic arguments for improving health care innovation eco-systems in Scotland, including direct impacts (R&D spend, GVA, jobs), indirect impacts (e.g. efficiency savings) and social impacts (improved health).[101] For instance, report estimates that aligning with OECD healthcare innovation spending could create 3,000 new jobs and £537mn additional turnover. Investment in health innovation interventions such as the Clinical Entrepreneur Programme can lead to 8-9 new business start-ups and £17mn new investment.
- Biomed allowance (2023), provides a set of key indicators and policy considerations for fostering a robust life science ecosystem and attracting investment.[91] Indicators are grouped into four categories, including 1) **Political, Social & Economic Environment** 2) **Industrial Investment Context** 3) **Life Science Innovation** – Measured by life science publications, workforce size, clinical trials, R&D investments, and degrees in life sciences and 4) **Healthcare Investment Environment.**
- Kuemmerle (1999) examines factors driving FDI in R&D labs by 32 multinational firms in pharmaceuticals and electronics.[102] It is an econometric study of 136 lab investments and finds that **market size and a country's scientific strength determine whether FDI in R&D is carried out**.

2. Wider government policies affecting FDI inflows

Evidence from the literature shows that governance structures is also an important factor:

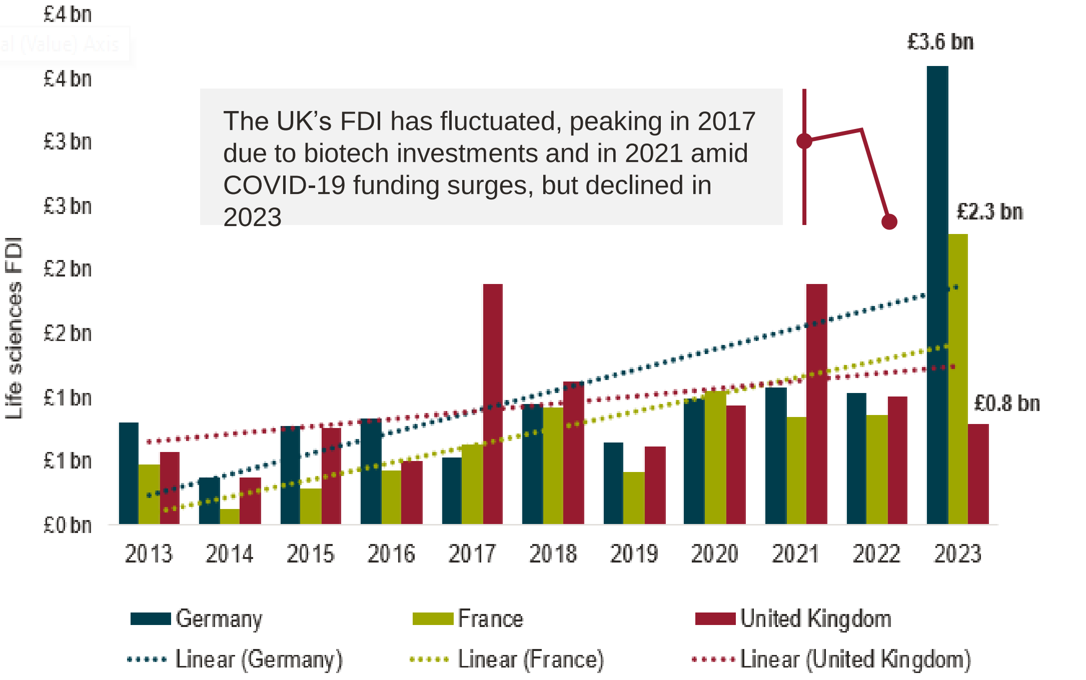
- Rao et al (2024), using panel data consisting of 49 countries over 14 years, show that a positive relationship between FDI and domestic innovation depends on the **recipient country's capacity to absorb knowledge and the quality of its governance**. [103]
- HM Government (2021) outlines the **role of the government and regulation** in creating an environment for the life science sector to grow. [104]
- The UK Board of Trade (2022) examines the trade and investment position of the life science sector and how its growth could be supported. [105] The paper states that the **government plays a crucial role in transforming market opportunities** into inward investment by actively attracting investments in R&D, manufacturing, and commercial operations.

The UK's FDI growth has not kept up with comparable countries, likely due to policy differences, labour market factors and research trends

While starting at similar levels in 2023, the **UK's FDI growth trend has not kept pace with Germany and France**, both of which saw sharp increases in 2023. This decline suggests that external factors, such as policy changes, regulatory challenges, and labour markets, may be impacting the UK's ability to attract investment. We explore potential factors influencing the differences in FDI trends, with a focus on innovation-related drivers.

We find that the UK's workforce is shrinking at a faster rate, while its research output has also declined. Additionally, R&D spending in the UK has remained stagnant, in contrast to Germany's consistent investment growth.

FDI historical trends in Germany, France and the UK



- **Declining R&D investment:** The UK government has reduced its budget allocation for health R&D, while Germany has steadily increased its spending since 2018. Analysis shows that the UK Government's budget for health R&D as a percentage of GDP dropped from 0.15% in 2020 to 0.13% in 2023. However, OECD data shows an increase in indirect government support through R&D tax incentives (2010-2021). This primarily incentivises private sector investment.
- **Decreasing Research Output:** The UK historically had a higher share of global medical science publications, However, there has been a gradual decline in recent years, bringing the UK closer to Germany and France.
- **Shrinking Skilled Workforce:** There has been a decline in UK life science degree completions, reducing to 8.72% in 2022 compared to 13.40% in 2019. Germany and France have exhibited a more stable trend, maintaining their graduate numbers.
- **Pharmaceutical Employment Trends:** Germany maintains a higher number of pharmaceutical employees, whereas the UK and France have lower but relatively stable employment figures.

Broader evidence also indicates a potential downturn in the UK's life sciences sector. According to the ABPI, the **UK's rebate rates* are substantially higher than comparable mechanisms in other countries**—12% in Germany, for instance—potentially discouraging investment.[106] Additionally, a Savills report highlights a sharp **decline in science investment volumes in Oxford and Cambridge**, which fell by 90% and 84%, respectively, compared to the two-year average in 2023. [107]

** Rebates refer to payments that pharmaceutical companies make to the UK government, calculated as a percentage of their net sales revenues from branded medicines supplied to the National Health Service (NHS)*

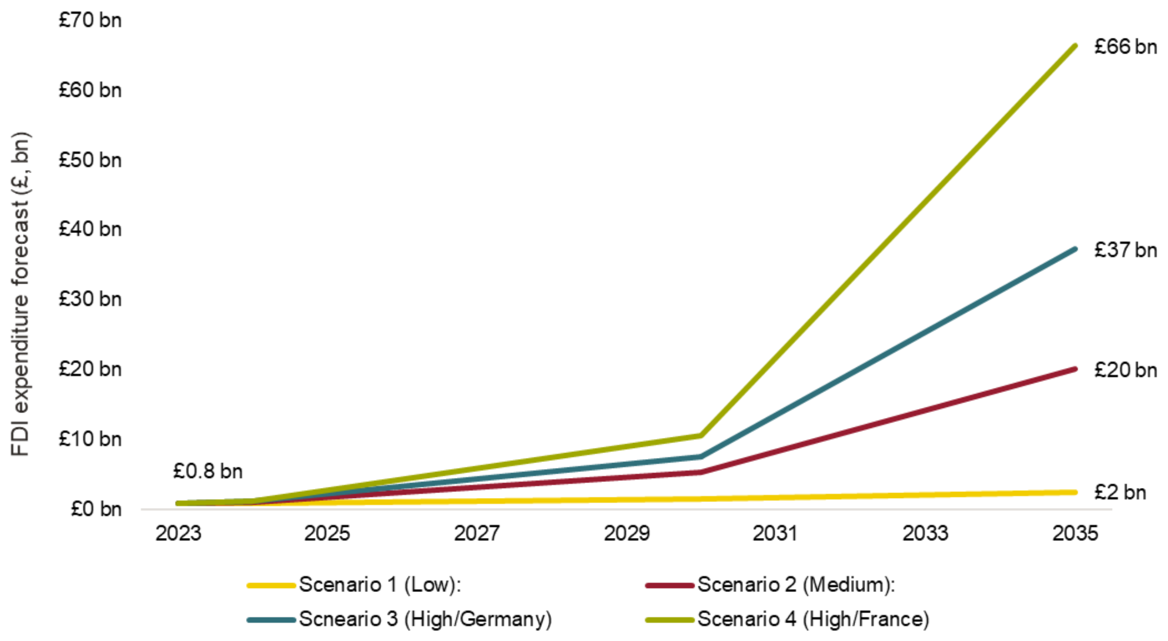
We have modelled future UK FDI trends using low, medium, and high scenarios based on OLS data

In 2023, the UK's Foreign Direct Investment (FDI) stood at £0.8 billion. To assess potential future growth, we have modelled three scenarios based on historical trends and international benchmarks. These scenarios reflect varying levels of investment expansion, providing a framework for understanding potential economic impacts.

- **Low Growth Scenario (10% Increase):** Represents a conservative outlook, assuming a modest **10% increase in FDI**. Reflects limited policy interventions or external economic changes.
- **Medium Growth Scenario (31% Increase):** Aligns with the **year-on-year average UK FDI growth rate**, based on OLS data from 2013-2023. Assumes a continuation of recent investment trends with stable economic conditions
- **High Growth Scenarios**
  - **Germany Benchmark (38% Increase):** Based on Germany's average FDI growth rate (2013-2023), representing a higher but achievable trajectory.
  - **France Benchmark (45% Increase):** Reflects France's average FDI growth rate (2013-2023), indicating an optimistic but historically grounded scenario.

It is important to note that FDI data is highly volatile and therefore averages shown must be reviewed with caution.

Low, Medium and High scenario estimates of UK FDI



We assessed the wider economic impacts of these scenarios on employment numbers, GVA and R&D.

Under a high-growth FDI scenario, the life sciences sector could generate up to 159,000 additional jobs in 2035

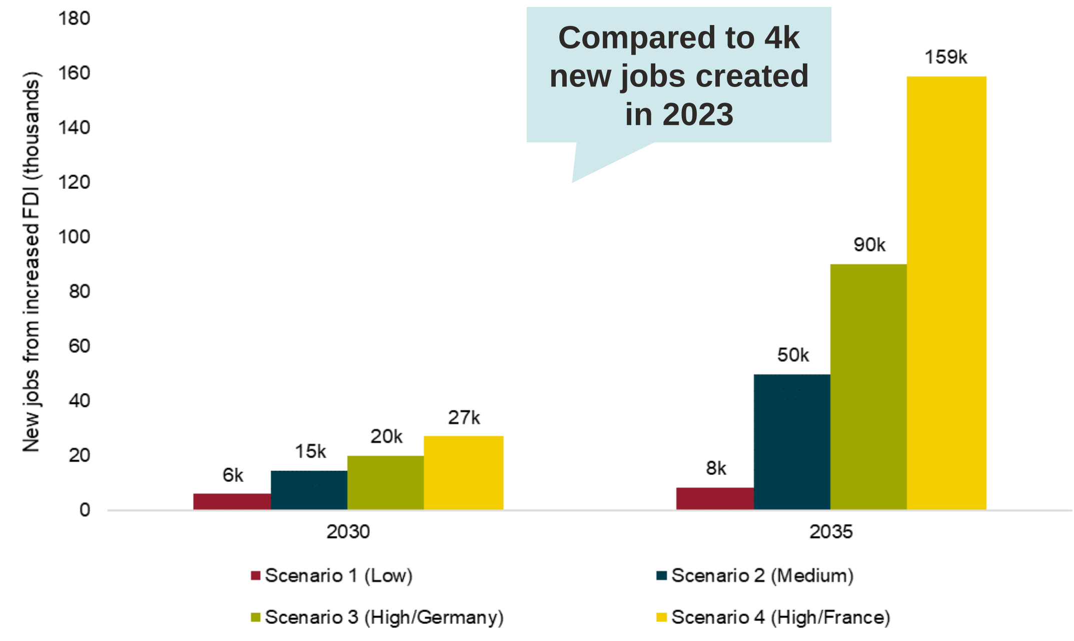
Modelling approach

- We estimate that a **£1mn** increase in FDI leads **to ~2.3 new** jobs in the life sciences sector. This is based on the **average of two estimates:**
  1) **Estimate 1**: **£1mn increase leads to ~2 new jobs in life sciences**.
     - Methodology: We used DBT inward investment data, which provides the number of new jobs created per FDI project.[108]
     - We applied OLS data, which estimates FDI capital investment and projects per year, showing that, on average (2021–2023), a £24mn increase in FDI leads to one new project. This estimate is specific to the life science sector.
  2) **Estimate 2: "*On average a £1 million FDI project into Great Britain leads net increase in employment of around 2.9 jobs*"[109]**
     - **Source:** DIT report (2021) Understanding FDI and its impact on the UK.This evidence is broad and not specific to the life science sector.
- The two estimates are similar, which validates our approach. We take an average of the two estimates, i.e. approximately **2.3 jobs are created per £1mn FDI**. This provides a pragmatic midpoint, balancing Life Sciences-specific data with broader cross-sector evidence.
- Using this estimate, we apply it to DBT data on new jobs created and safeguarded by FDI projects in life sciences. According to the most recent data (2022–2023), **4,123 new jobs** were created or safeguarded in the sector through FDI projects.

Results

- In 2030, job creation from increased FDI ranges from **6k** (low scenario) to **27k** (high scenario – France benchmark) of additional jobs.
- By 2035, under high-growth assumptions, job creation expands significantly.
- The difference between "High" scenarios based on Germany and France highlights the varying potential impact of different FDI growth trajectories**.**

New jobs created from an increase in FDI



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Under a high-growth FDI scenario, the life sciences sector could generate up to £22bn in GVA in 2035

Modelling approach

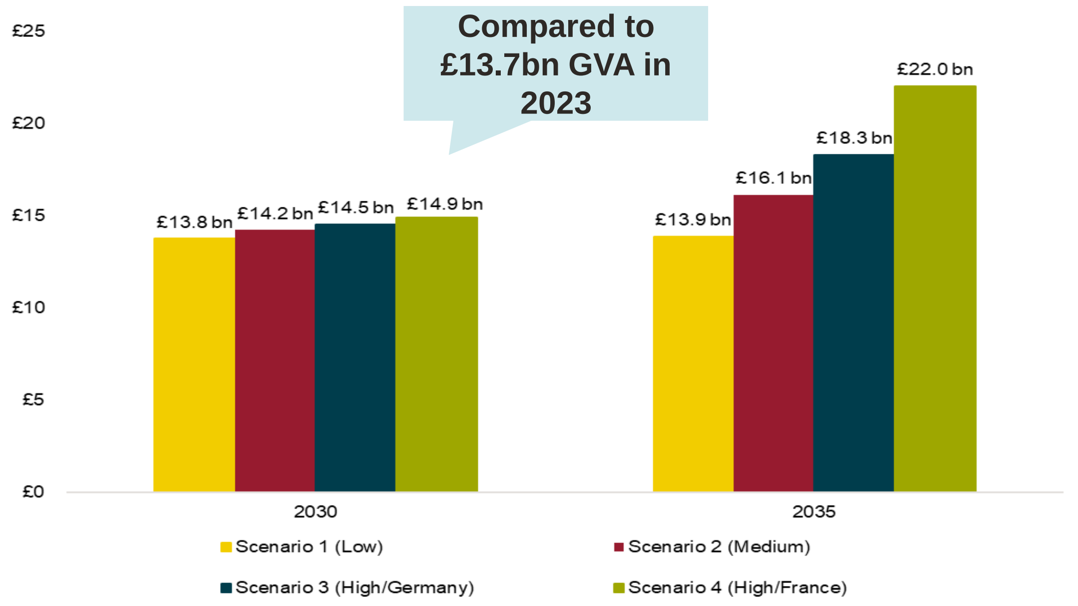
- Our estimates of GVA benefits are based on **£54,149** GVA per year per full time employee from full time employment.
- The estimate is based on whole economy GVA per hour provided by the ONS and adjusted for inflation (£40.65), in line with our productivity workstream.
- We have applied the £54k to the estimates number of new jobs created through an increase in FDI.

Results

- In 2030, GVA from a FDI increase remains **relatively similar** at £14 billion across all scenarios. However, by 2035, the range of estimates increases, with values between **£18 billion and £22 billion for the high scenarios*.**
- The High scenarios associated with France FDI growth rates result in 1.5 more GVA compared to the medium scenario based on the UK FDI average growth.

The OECD also provides GVA per hour worked for the manufacture of chemicals, chemical products, and basic pharmaceutical products (£108 per hour, adjusted for inflation). This is significantly higher than the whole economy GVA. By calculating the difference (£64 per hour), we can approximately estimate the additionality of GVA attributable to new jobs in life sciences. Using this approach, the high scenarios for Germany and France project GVA increases to £21.4 billion and £27.6 billion, respectively, by 2035. These figures represent a 17% (Germany) and 25% (France) increase in comparison to estimates that rely solely on whole economy GVA per hour.

GVA per year for the various FDI scenarios



A report by ABPI/PWC estimates that the average GVA per employee for life science is £104,000, over twice the UK average.[110] Our estimates therefore reflect a more conservative approach.

A high growth FDI scenario translates to £32bn benefits in terms of GVA and spillovers in R&D

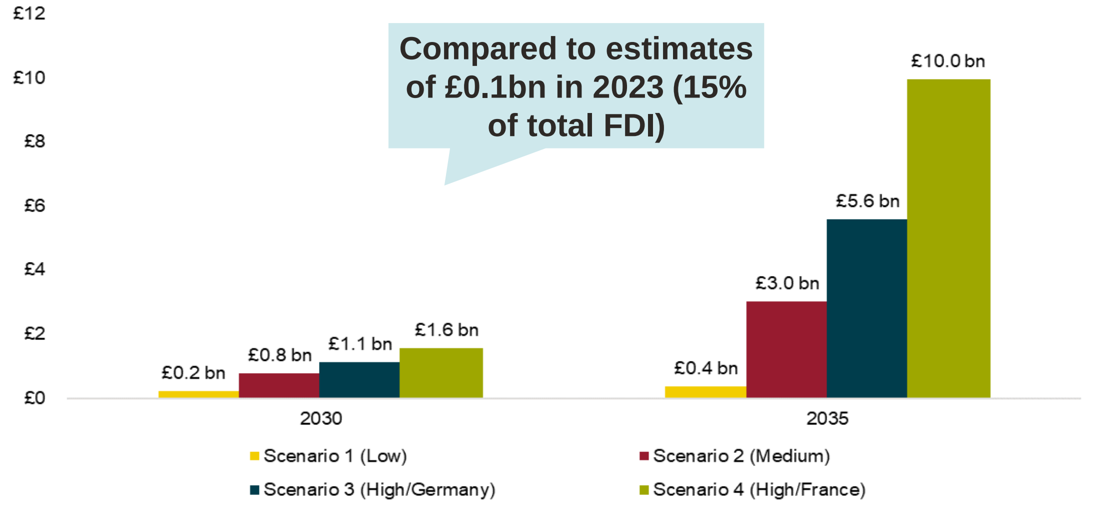
Modelling approach

- We have assumed the following assumptions:
- **Assumption 1:** A **direct 1:1 relationship between FDI increases and R&D investment.** Since the specific allocation of additional FDI is uncertain, we have adopted a scenario where the entire amount is dedicated to R&D.
- **Assumption 2:** For the returns on R&D, we base our estimates on findings from a BMC Medicine report, which identifies a spillover effect with a real annual rate of return (in terms of economic impact) of 15–18% for public biomedical and health research in the UK. To maintain a conservative estimate, we have applied the **15% return rate in our analysis**.

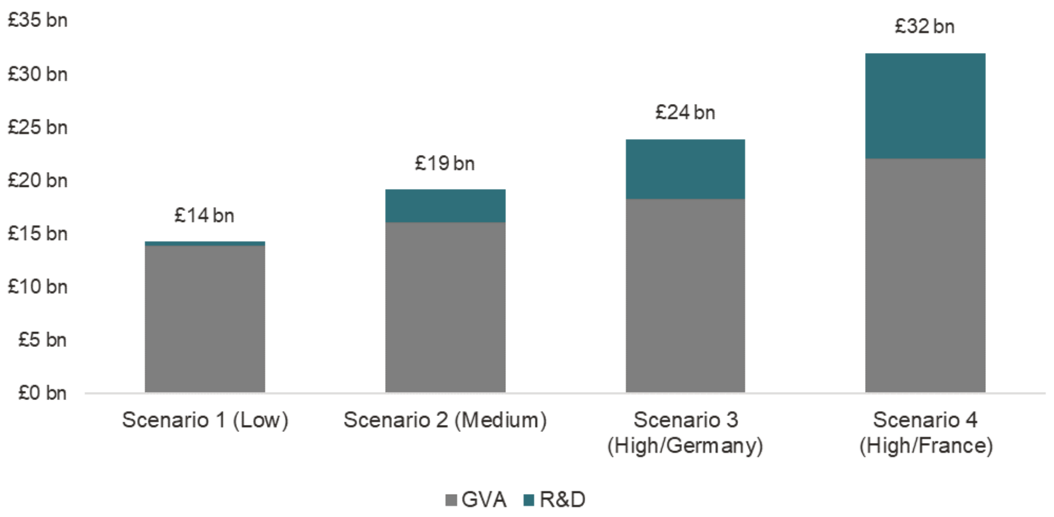
Results

- Adding the benefits of GVA and R&D leads to economic benefits of £32bn in the High/France scenario (~2x the medium scenario), and £24bn in the High/Germany scenario
- The findings suggest that adopting a more aggressive FDI approach (as seen in France) could yield significantly higher R&D spillovers

R&D spillovers a result of FDI increase



R&D and GVA impacts a result of FDI increase in 2035



Contents

Health innovation also had wider benefits: to the NHS itself and to individuals through improved quality of life

Analysis aims

Our wider impacts analysis combined two types of analysis:

Wider impacts		
A	NHS efficiency	Estimates the total impact of ill-health on the UK economy
B	Quality of life	Illustrate how innovation in health can result in realised quality of life benefits through examples of innovation

Background

According to the 2025/26 priorities and operational planning guidance[111] the NHS is set to exceed the £7 billion in efficiencies achieved in 2023/24, driven by innovation, reform, continuous improvement, and investments in technology, data, and capacity, alongside improved workforce retention.

There is clear evidence linking health innovation to both improved efficiencies and quality of life improvements. Examples of this are provided below.

- Research suggests that **AI plays a role** in increasing **accuracy of care, reducing costs, and saving workforce time.**[112] Evidence supports the application of AI in medical imaging, including radiology, pathology and cardiology, highlighting its role in speeding up the interception of complex images and improving early detection of disease, leading to better outcomes.[113]
- **Predictive analysis** is being used to forecast patient demand, helping to optimise resources and improve patient safety and outcomes.[114]
- Digital tools can be effective in mental health treatment.[115] They have the potential to improve access to care, reduce waiting lists, thereby improving quality of life.

Our analysis provided illustrative examples of how health innovation can lead to increased NHS efficiency and quality of life.

High-level approach

Our analysis focuses on respiratory-related innovations presented in the bottom-up analysis: FeNO testing in asthma diagnosis and biologic therapies for patients with severe asthma, which has led to an increase in the number of individuals with controlled asthma. In line with our previous analysis, we estimate low, central and high scenarios for patient pathways.

- **NHS efficiency costs** are evaluated considering the cost savings from (i) management of asthma for improved diagnostics (ii) primary care (iii) pharmacological treatment and (iv) hospital admissions.
- **Quality of life:** The value of quality-of-life improvements is estimated by multiplying the health related quality of life (HRQoL) associated with better asthma control by the number of patients benefiting from each intervention. This result is then multiplied by £70,000, (HM Treasury Green Book). In the case of improved diagnostics, QALY gains are also estimated for avoided premature deaths from mild asthma.

Results

We estimate potential for the two innovations to deliver annual NHS savings of £1.5 to £3.7 million, driven by improvements to diagnostics, primary care, pharmacological treatment, and reductions in hospital admissions. This would amount to an NPV of £14.3 -£34.5 million. Combined, they could generate QALY gains of £0.6-£1.6 billion in present value.

We estimate that these two respiratory innovations could deliver £14.3 million to £34.5 million in present value NHS efficiency benefits

This analysis focuses on specific innovations in respiratory health. Targeted interventions in asthma treatment are expected to reduce misdiagnosis, reduce the burden on primary care, decrease reliance on pharmacological treatments, and lower hospital admission costs.

Our estimates are based on the annual number of additional diagnoses in line with the bottom-up analysis, with 2,345 patients with severe asthma transitioning to biologics and 29,000 new diagnoses attributed to FeNO testing each year in England. We assume low, central and high scenarios for patient pathways for each of the interventions.

It is important to note our modelling is not a cost-benefit analysis of the innovations. Rather, the modelling illustrates the potential efficiency benefits and opportunities.

Modelling approach

For improved diagnosis of asthma through FeNO testing, cost savings for asthma management are estimated to range between £341 and £553 per patient. An average per-patient saving of £462 is derived as the midpoint of this range (inflation-adjusted). [116]

For biologics, the modelling approach considers savings to the NHS for (i) primary care and pharmacological treatment and (ii) reduced hospital admissions for patients.

- **Primary care & Pharmacological treatment:** We use estimates of total NHS costs for primary care and pharmacological treatment for three asthma patient categories: controlled (non-severe), uncontrolled (non-severe), and severe.[117] Using patient population data from the study, we calculated the average per-patient cost for each asthma category, adjusted for inflation. We estimate the cost savings with an increase in the number of individuals with controlled asthma. The savings are calculated as the difference in per-patient costs between: (i) controlled vs severe and (ii) uncontrolled vs severe patients. The estimated final saving figures for pharmacological treatment and primary care are the average of (i) and (ii).
- **Hospital admissions:** Cost savings from reduced hospital admissions are estimated using a mid-range cost of £1,516 to £2,473 per patient per night for asthma-related hospital stays.[118] After adjusting for inflation, the estimated cost per night is £2,200. The median hospital stay for asthma patients is two nights, and 4% of patients with severe asthma require hospital admission. [119]

Results - *Present value of efficiency benefits for individuals detected/treated in 2025*

Improved diagnostics are projected to yield the most significant savings, and together the interventions could lead to £3.7 million in cost savings per year in the high scenario, representing 0.5% of potential efficiency gain targets for the NHS. The NPV of total costs over 10 years equates to £14.3, £23 and £34.5 million in the low, central and high scenarios.

NHS cost savings	Low	Central	High
FeNO testing	**£1.3mn**	**£2.0mn**	**£2.7mn**
Biologics	**£191k**	**£477k**	**£954k**
- Primary care / Pharmacological treatment	£149k	£373k	£745k
- Hospital admission	£42k	£104k	£209k
Efficiency benefits in the first year of detection/treatment	**£1.5mn**	**£2.5mn**	**£3.7mn**
Efficiency benefits assuming continued treatment (NPV)	**£14.3mn**	**£23.2mn**	**£34.5mn**

Additionally, the total estimated NHS savings from avoiding false positive asthma diagnoses through FeNO testing in the UK could reach approximately **£28 million** (inflation-adjusted) per year [112]

We estimate that these two respiratory innovations could deliver £1 billion quality of life benefits

Modelling approach

QALYs gained from improved asthma control

The modelling approach estimates the quality of life improvements resulting from better asthma control, quantified using literature reporting the average reduction in quality of life due to poor asthma control for both men and women.[120]

To determine the value of these improvements, the quality of life estimates are multiplied by the number of patients benefiting from each innovation. We value a QALY at £70,000, in line with HM Treasury Green Book guidance. As in our productivity analysis, we estimate that the individuals will have this benefit for 10-years.

QALYs gained from deferred asthma-related mortality

We estimate the QALYs gained from deferred asthma-related mortality. This analysis primarily focuses on improved diagnostics, as mortality reductions from biologics are expected to be minimal—given that only a small percentage of severe asthma cases requiring secondary care result in death.[121]

The National Review of Asthma Deaths reports that 30% of asthma deaths occur in individuals diagnosed with mild asthma.[122] Evidence suggests that these individuals have been misdiagnosed with mild asthma and likely had uncontrolled, undertreated asthma. We estimate the number of deaths caused by mild asthma. According to NHS data, the total annual asthma-related mortality is 2,630 deaths per year in England[123]. From this, we estimate that 789 people die from mild asthma annually in England.

To model the potential reduction in mortality due to more accurate diagnosis and better maintenance care enabled by FeNO testing, we consider three scenarios: a 5% reduction (39 fewer deaths per year), 10% reduction (79 fewer deaths), and 15% reduction (118 fewer deaths).

The model estimates that each asthma-related death results in 18 years of life lost, based on NHS data. This is based on NHS data on years of life lost and the number of asthma-related deaths.[124,125] The total monetary value of life years saved is calculated by multiplying the number of patients avoiding mortality by the HRQoL coefficient for asthma (0.731), multiplied by £70,000.

Results - *Present value of benefits for individuals detected/treated in 2025*

We estimate that in total, the two innovations could lead to QALY gains of £370 - £840 million per year from improved asthma control and gains of £252mn - £757mn for quality of life improvements from deferred mortality (FeNO testing only). Using the central estimates, this suggests **a total of £1.09 billion from quality of life improvements in present value** due to the two asthma innovations.

QALY from improved asthma control	Low	Central	High
FeNO testing	£342mn	£514mn	£702 mn
Biologics	£28 mn	£69mn	£138 mn
Total QALY (NPV)	**£370 mn**	**£583mn**	**£840 mn**

QALY – deferred mortality (FeNO testing)	Low	Central	High
Asthma deaths avoided	39	79	118
Total years of life lost	727	1,455	2,182
Total QALY (NPV)	**£252mn**	**£504mn**	**£757mn**

Contents

This initial work suggests how to support the development of a new innovation strategy focused on adding economic value to England, and the wider UK

Our analysis was completed in a short period from January 2025 to March 2025. We have outlined below examples of how the analysis could be extended in the future.

Extensions to the top-down productivity analysis:

- **Regional impacts.** The productivity analysis is conducted from a UK perspective (recognising that the HINs and NHS are focused on England but much of the data is UK-wide). We expect that both the mechanisms underlying the potential productivity impacts and the productivity impacts themselves to be unequally distributed in the UK. For example, there are regional differences in the incidence of cardiovascular disease and cancer. [126,127]There are also material differences in avoidable mortality across the UK.[128]A regional analysis would help to understand the causes and potential mechanisms result in lost productivity. The analysis could adjust for different in demographic an socioeconomic factors as well as the prevalence of health conditions. This analysis could help inform different priorities across the HINs. This analysis could include an understanding of the different population health of regions and regional labour market factors.
- **Further understanding of the impact on specific health conditions**. Our analysis focuses on understanding the productivity impact of reducing ill-health on the UK economy broadly. We have included some condition-specific estimates for MSK, mental health, respiratory health and cardiovascular health. Further work could look to understand the condition specific estimates in more detail. For example, the estimates for mental health could be split into different mental health conditions to understand where innovations could be targeted.
- **Overtime impact.** Our analysis includes scenarios on how the expected size of the prize would evolve if population health trends continue. In reality, there is evidence to suggest that the impact of some health conditions on UK productivity is increasing (e.g. for mental health), others are staying constant (e.g. MSK), and others are potentially decreasing (e.g. for respiratory). [128,129,130]A more detailed analysis could include an understanding of condition specific health trends, helping understand the health conditions associated with the largest potential productivity gains both today and in the future.

Extensions to the inward investment analysis:

- **Business growth.** Our analysis focuses on the impacts of increased foreign direct investment in the life science sector. Further analysis could focus on the impact of the partnerships fostered by the HINs and the consequent business growth and economic impacts, such as gross value added, employment impacts, wider spillovers and local economic impacts.

Extensions to the bottom-up productivity analysis and wider impacts (NHS efficiency and quality-of-life) analysis:

- **A wider set of examples.** Our analysis has focused on a smaller subset of examples of innovation. A wider set of analyses could be conducted that included innovations in healthcare areas beyond cardiovascular and respiratory health. For example, in MSK or cancer. These examples could be used to demonstrate the potential impact of health innovation on UK productivity, NHS efficiency and quality of life. The aim of these examples would be to further illustrate the magnitude of impact of health innovation on the UK economy.

Each of these more detailed analyses, building on the work in this report, could help shape the future strategic focus for innovation: which conditions, geographies and populations to target and how.

Contents

Annex: Productivity – top-down estimates

Interpreting the analysis

Categorising the productivity impacts

There are **multiple ways that the total size of the prize can be broken into the individual productivity impacts modelled** (e.g. deferred mortality, employment rate, in-work productivity etc.). Our approach allocates the benefits such that if an individual experiences a given benefit (e.g. because their mortality is deferred) their health condition is removed completely (and so they are able to work for the standard wage and for standard hours, rather than at the lower levels which are averages for those with health conditions). Some of the benefits in the 'Deferred mortality' and 'Increase in employment rate' categories could be apportioned to the 'Hours worked' and 'Productivity' categories.

To avoid double counting between the two categories that apply to those currently employed ('Hours worked' and 'Productivity), the benefits for reduced hours are calculated at the lower rate of pay, i.e., assuming lower levels of productivity. The extra productivity for these hours is accounted for in the 'In work productivity' benefit. **This does not affect the total size of the prize.**

Deferred mortality is based on a 'steady state' world

Estimates of deferred mortality are based on a 'steady state' world. We have calculated the years of working life lost from avoidable deaths occurring in 2022. This figure is a proxy for the actual loss of working years in 2022: deaths in 2022 will affect the working age population for the next 50+ years whilst the working age population in 2022 is affected by deaths over the last 50 years.

More sophisticated inter-generational modelling would be needed to calculate a more accurate picture of the 2022 working age population. However, data suggests that avoidable mortality is falling and so this figure is likely an underestimate of the total years of working life lost in 2022.

Assumptions for calculating condition-specific estimates of mortality

Condition-specific estimates of deferred mortality are calculated by assigning years of life lost for the working age population (16-64) to conditions using data on the causes of avoidable mortality for individuals aged up to 75 from Eurostat. This approach does not capture that the causes of avoidable mortality differ across age groups. Certain conditions, such as COPD and heart attacks, will be over-represented in our years of life analysis since they predominately affect older individuals who will have fewer (or no) years of working life left. Other conditions, such as mental health, will be underrepresented.

In particular, we expect **our estimates of deferred mortality from respiratory conditions overstates the value** because of the prevalence of deaths from COPD and pneumonia in the those aged 65+. **Other conditions (in particular mental health) may be understated**. Further, no mortality can be assigned to MSK based on the data.

Estimates are based on an instantaneous policy change

The analysis presents the current levels of ill-health and **the annual impact of eliminating that ill-health at one go**. This is a simplification but it is unclear whether a more sophisticated approach would result in higher or lower benefits – more work would be needed to do so. It is not intended to guide specific healthcare decisions but instead to offer an estimate of the benefit "at play" for innovations to aim to realise.

Annex: Productivity – top-down estimates

Mapping of conditions included in each health area

The table below sets out the mapping of health conditions as reported in the raw data to the four groups of conditions used in our top-down productivity estimates.

Group	ONS work-limiting conditions	ONS reasons for absence	Eurostat causes of avoidable mortality
MSK	Problems or disabilities connected with arms or hands; Problems or disabilities connected with legs or feet; Problems or disabilities connected with back or neck	Musculoskeletal problems (defined as ‘back pain, neck and upper limb problems and other musculoskeletal problems.)	No conditions assigned
Respiratory conditions	Chest or breathing problems, asthma, bronchitis	Respiratory conditions	Upper respiratory infections; Lung diseases due to external agents; Pneumonia, not elsewhere classified or organism unspecified; Pneumonia due to streptococcus pneumonia or haemophilus influenzae; Other acute lower respiratory infections; Chronic obstructive pulmonary disorder; Asthma and bronchiectasis; Abscess of lung and mediastinum, pyothorax
Cardiovascular conditions	Heart, blood pressure or blood circulation problems	Heart, blood pressure, circulation problems	Hypertensive diseases; Ischaemic heart diseases
Mental health	Depression, bad nerves or anxiety; Mental illness or suffer from phobias, panics or other nervous disorders	Mental health conditions (stress, depression, anxiety and serious mental health problems.)	Intentional self-poisoning by drugs; Intentional self-harm (not relating to alcohol and drugs)

Annex: Productivity – bottom-up estimates

Key assumptions

National roll-out

Our estimates are based on understanding the impact of the innovation under a national roll-out.

- For proactive care, this involves estimation the number of individuals with CVD (for cholesterol) and the number of individuals with uncontrolled hypertension (for blood pressure).
- For Stroke AI imaging, we use evidence on the number of individuals who has a stroke each year.
- The FeNO and improved access to biologic programmes have already been rolled-out nationally. We therefore use the annualised figures from the programme on the number of additional individuals with asthma detected and the number of individuals who start on biologics.

Focus on employed individuals in the working-age population with work-limiting conditions

As we are estimating the impact of health innovation on England productivity specifically, we estimate the proportion of individuals that are expected to benefit from the innovation as working-age (i.e. aged between 16 and 64), in employment, and with work-limiting conditions using evidence from the Health Foundation[119].

In 2023, 3,863,000 (A) individuals with a work-limiting health condition were employed and 334,000 (B) individuals were unemployed.

- An additional 3,905,000 (C) individuals with a work-limiting health condition were economically inactive.
- This suggests 47.7% of individuals with a work-limiting health condition to be employed i.e. (A) / ((A) + (B) + (C)).

Present value of benefits

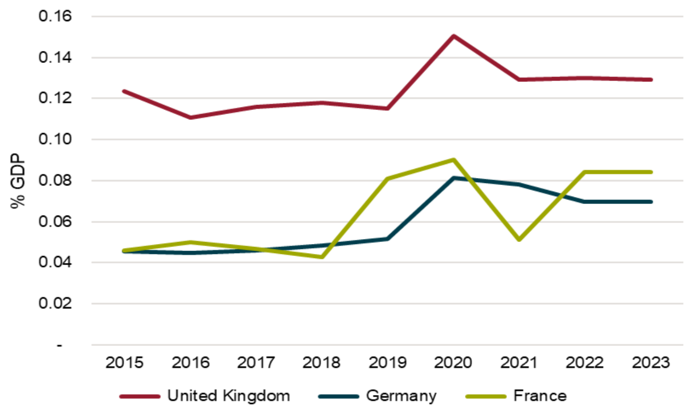
All our estimates represent the **present value of productivity benefits for individuals diagnosed/treated in 2025**. In practice, an individual treated with a particular innovation today is expected to have productivity benefits in the future. Where relevant, we have discounted all future benefits using HMT Green Book guidance (i.e. we apply a discount rate of 3.5%).

- For proactive care, we estimate that for each mortality avoided, 8 years of additional working life are gained, based on the number of deaths across different age bands from CVD events between 2020 and 2022 reported by the ONS[120], For each individual who avoids having to leave employment or become part-time due to the CVD event avoided, we estimate 11 years of additional working life are gained, based on the number of CVD conditions across age bands in 2021 reported by the ONS[121].
- Similarly, for Stroke AI imaging, for each mortality avoided we estimate 8 years of working life are gained. For each additional individual who achieves functional independence, we estimate an additional 11 years of working life at ‘functional independence’.
- For each FeNo detection and for improved access to biologics, we estimate that the benefit will occur for an individuals’ remaining working life. We assume that asthma diagnoses are evenly distributed across age-groups. From this we calculate that an individual will benefit for 10 years. This is the medium impact of working life left for an individual in the population.

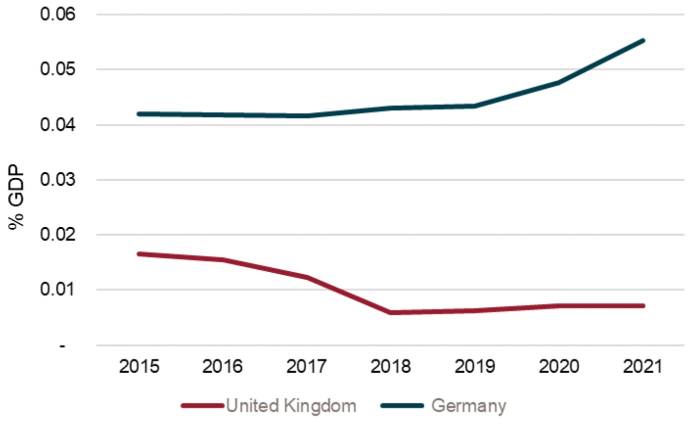
Annex: Inward Investment Life science skills and employment

Trends in innovation indicators

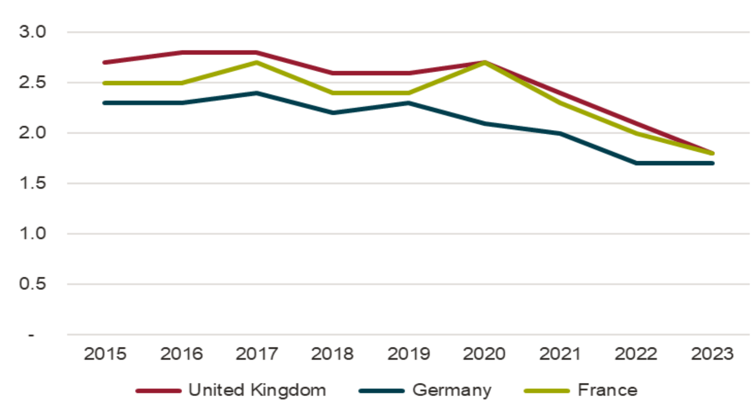
Government budget allocation for health R&D (% GDP)



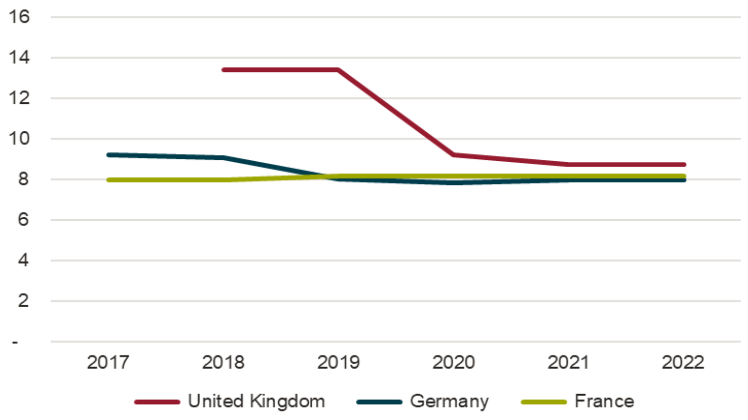
UK gross expenditure on health R&D (% GDP)



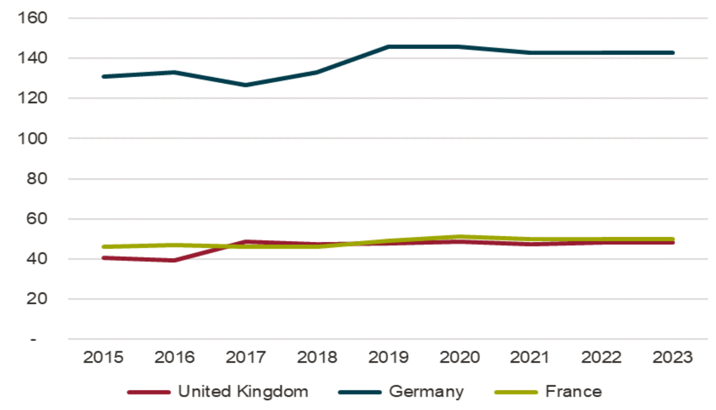
Medical science publications (%)



Life sciences degrees (%)



Number of people employed in pharmaceuticals (thousands)



Notes: Medical science publications represents the percentage of each country's medical sciences publications which are amongst the most highly cited (top 1%) globally. Life sciences degrees represents percentage of graduates from tertiary education graduating from Natural Sciences, Mathematics and Statistics programmes (%) in the UK, and count of life science apprenticeships started in England. Employment numbers represent number of people employed in manufacture of basic pharmaceuticals and pharmaceutical products.

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