The link between investing in health and economic growth

NHS Confederation Research

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NHS Confederation

Executive Summary

The recently announced "mini-budget" made clear the government has prioritised economic growth and committed to an immediate cut in national insurance, whilst underwriting energy costs. This fiscal environment, combined with inflation, will almost inevitably result in a pressure on all public spending and a re-examination on where spending is directed. Recent announcements indicate that public sector budgets – including the NHS – will not be "topped up" to prevent a real-terms fall in budget, against a backdrop of rising inflation. This comes at a time when the NHS is already under immense budgetary pressure and has been struggling in terms of day-to-day operational pressure (and associated funding requirements).

New analysis by CF, undertaken on behalf of NHS Confederation, finds that **growth in healthcare investment has a clear relationship with economic growth**. This analysis has been made possible by bringing together, for the first time, longitudinal data from multiple sources linked at the local level across all of England. This analysis shows that **for each £1 spent per head on the NHS, there is a corresponding return on investment of £4** – showing an economic benefit to investing in our national health service.

The main argument that health investment leads to economic growth is that **increasing spending on the NHS results in a healthier population with higher levels of workforce participation,** based on three findings:

1. Long term illness is linked to employment, median income and economic output (GVA) per person
2. Worryingly, long term sickness levels have risen steadily in the UK and have not returned to pre-covid levels, resulting in a cumulative total of 2.46 million working-aged adults off work due to long-term illness
3. Investing in the NHS has potential to support the population to improve health. The most direct link we have observed is that investing in primary care workforce shows links to reduced A&E attendances and non-elective admissions, both of which are signals of ill health and in turn influence workforce participation

In addition, the NHS itself has a **powerful role as an employer.** Half of NHS spending is on workforce and the NHS is the largest employer in England. The role of the NHS as an employer is especially important in more deprived areas.

This means that spending on the **NHS should be regarded as an investment not a cost.** Improving population health can drive higher levels of economic growth across the country.

SOURCES: Health Foundation analysis of workforce and vacancy data from NHS Digital and Health Education England. BMA analysis of NHS England Consultant-led Referral to Treatment Waiting Times statistics.
[1]ONS Labour Force Survey

CF investigated the direct relationship between NHS spend and GVA as well as what we hypothesise are the underlying relationships driving the trend

We explored in this work the relationship between increase in NHS spend with increase in gross value added (GVA) through two distinct analytical approaches.

We also explored a potential logical chain that could explain the relationship between the two end points, showing the linkages.

We also noted that alternative approaches have been used, including looking at the multiplier effect of NHS spend but concluded these were beyond the scope of this report.

- CF expect the strength and nature of these relationships varies between geographic regions due to differences in working-age population and deprivation
- We used data at local level*, which are counties; unitary authorities or districts in England, to account for regional variation
- The approach to this research was data-driven, and conclusions are based on current trends in both NHS and broader economic spend

* ITL3-level (internationally comparable regions) - See appendix

We have compiled a five-year longitudinal dataset at local level* to perform this analysis, bringing together this breadth of data for the first time

Population	Workforce	Health spending	Healthcare activity and outcomes	Economic activity
• Mid-year population estimates • Indices of Deprivation (2019)	• Employment rate • Economic inactivity • Full-time workers gross hourly pay • NHS workforce statistics • General Practice workforce (GPW) collection • National staff annual earnings estimates (March 2018)	• CCG allocations • National schedule of NHS costs (2021/22) • Weighted population needs (GP practice-level) • Weighted population need (CCG-level)	• Emergency Care Data Set (ECDS) • Admitted Patient Care (APC)	• Employment rate • Economic inactivity • Full-time workers gross hourly pay • Balance Gross value added (GVA) per head of population at current basic prices

* ITL3-level (internationally comparable regions) - See appendix

CF undertook analysis to understand the economic impact of investment in the NHS, with a particular focus on quantifying the effect of a £1 investment

Question	Data sources	Approach
What is the economic impact of £1 invested in the NHS?	• NHS funding allocations and assessment of need • GVA per head	• We modelled the relationship between NHS spend and GVA per head using two approaches: – Fixed effects regression to find the coefficient describing the relationship between NHS spend and GVA – Propensity score matching to evidence a causal relationship between increased spend and increase GVA
By which mechanisms can NHS spend impact economic activity?	• NHS funding allocations and assessment of need • GVA per head • Population statistics • Annual survey of hours and earnings • Index of Multiple Deprivation (IMD) • NHS workforce statistics • Hospital episode statistics (HES) • National schedule of NHS costs • National staff annual earnings estimates	• Correlation and regression analysis of relationships between metrics including: - Deprivation - NHS workforce - GPs per head - NHS contribution to GVA - A&E attendance and long-stay non-elective inpatient spells - Proportion of workers off for long-term sickness - Employment rate/median hourly pay

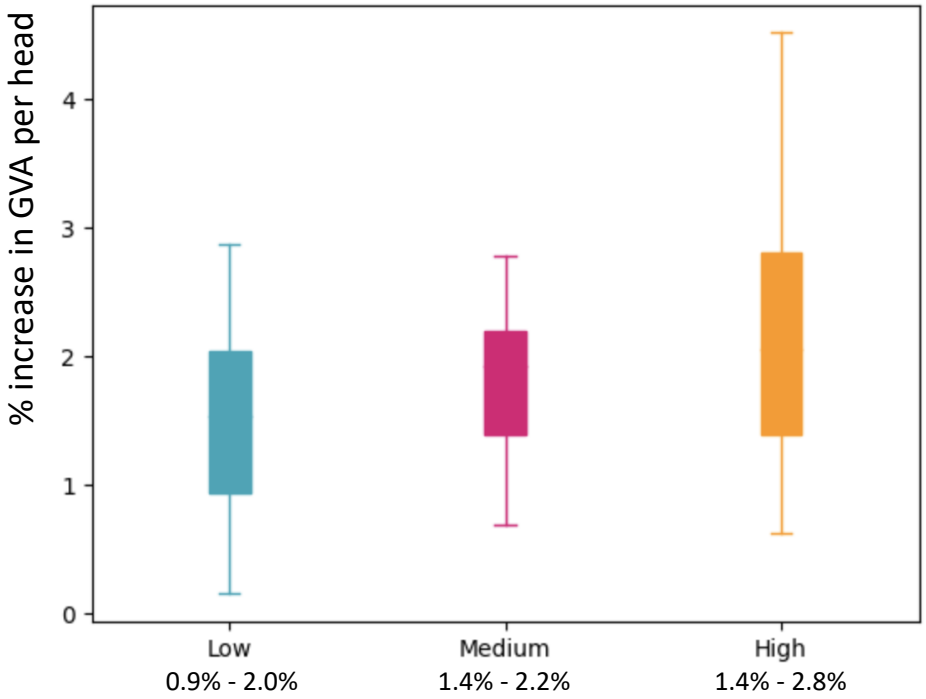
• We focus on NHS spend, which accounts for over 90% of total health spend

SOURCES: Spring Statement 2022

Every £1 invested in the NHS translates into an overall economic return of £4 in the local area.

Box plot of % increase in GVA per head from 2015 to 2019

% increase in NHS spend per head (needs weighted) quantile, % increase in GVA per head



Classification of % increase in NHS spend per head of weighted population

To quantify the impact of NHS spend per head relative to need on Gross Value Added (GVA) per head, we chose methods that would allow us to control for regional variations and temporal effects and would provide evidence for a causal relationship.

- We performed fixed effects regression, and found that a £1 increase in NHS spend is associated with a **£3.98 increase in GVA**
- To perform propensity score matching, we used the % increase in NHS spend per head between 2015/16 and 2019/20 to classify each ITL3 into three quantiles – low, medium and high
- For each quantile, we show the box plots for the % increase in GVA per head over the same period
- We expect GVA per head to increase over time, but we see that the % increase is generally higher for ITL3s with a larger increase in NHS spend
- By matching similar places and comparing the treatment effects, we found that on average **GVA increased by £4.12** for each additional £1 in NHS spend

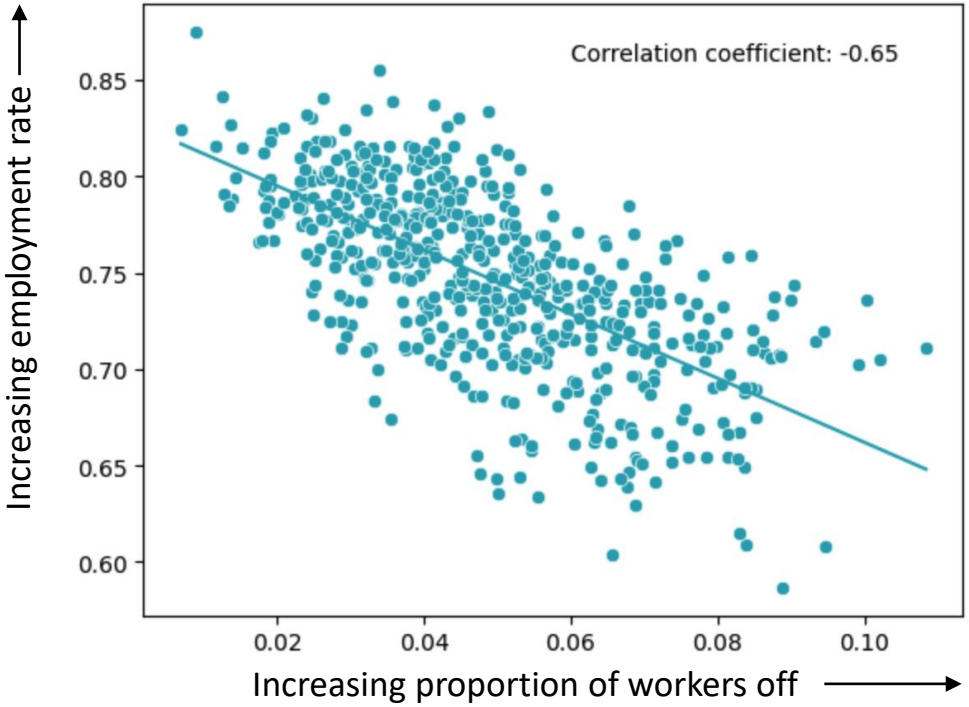
Two different methods of analysis have been used to demonstrate that increases in NHS spending per head are associated with increased economic output (GVA) per head.

TECHNICAL NOTE: Values shown for % increase in NHS spend are 25% and 75% quantiles
SOURCES: NHS England, CCG allocations; ONS, Gross value added (balanced) per head of population at current basic prices; GOV.UK, Indices of Deprivation; ONS, Mid-year population estimates

Long-term illness is linked to employment, median income and economic output (GVA) per person

Long-term sickness against employment across ITL3s

Proportion of workers off (long-term sickness), Employment rate



CF performed multivariate regression analysis to investigate the underlying associations that may contribute to the relationship.

Controlling for average Index of Multiple Deprivation (IMD) score, the percentage of the population aged 65+ and variation over time, we found that:

- A 1% decrease in the proportion of workers off due to long-term sickness (a proxy for general morbidity*) is associated with a **0.45% increase in employment** rate. This corresponds to an extra **~180,000** workers amongst the UK working population (~40.2 mill)
- A 1% increase in employment rate is associated with **a £292 increase in an area's GVA per head**
- A 1% decrease in the proportion of workers off due to long-term sickness is associated with **a £0.47 increase in median hourly pay**

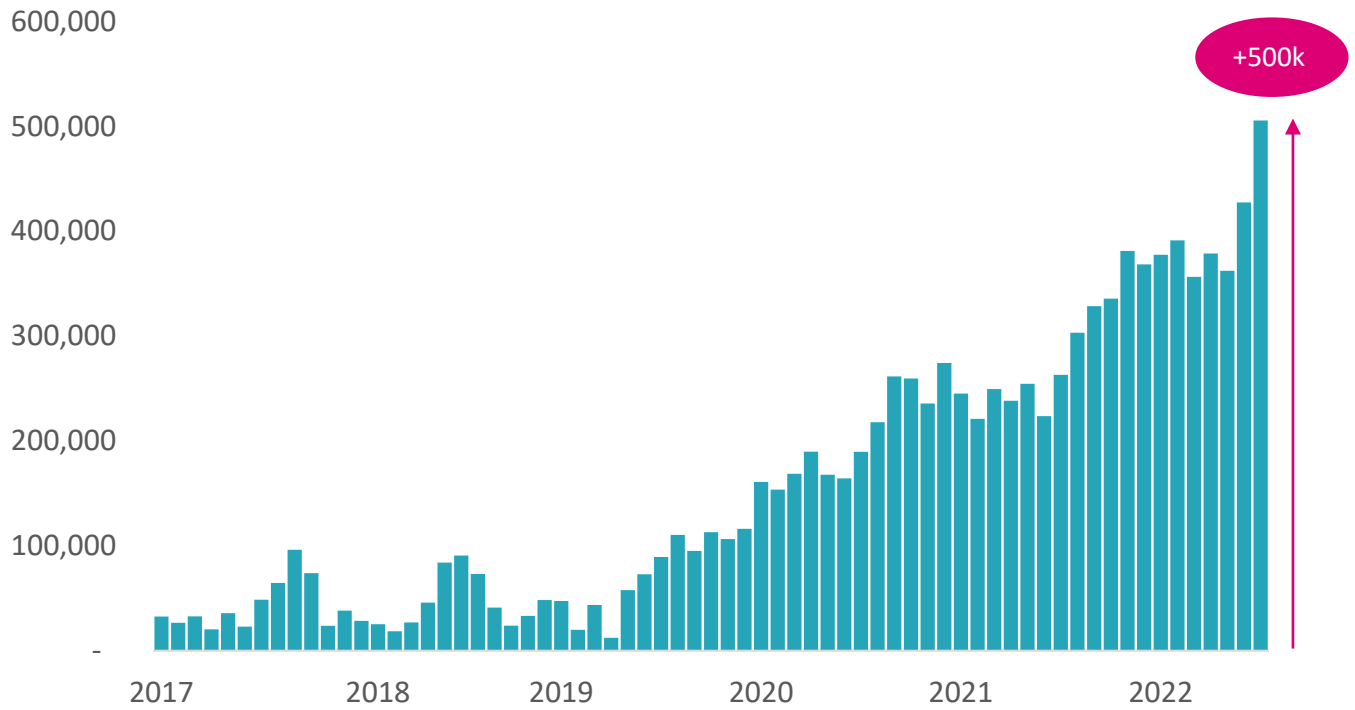
Reductions in the number of people who are off on long-term sickness not only brings more people into the workforce, but also has an overall beneficial impact on the productivity of that workforce. This analysis suggest that as a population gets healthier, the employment rate increases, but so too does the quality of the employment – with healthier workers able to pursue higher quality jobs.

SOURCES: NOMIS, Annual population survey (employment rate and economic inactivity 16-64); NOMIS, Annual survey of hours and earnings - workplace analysis (Full-time workers gross hourly pay); ONS, Mid-year population estimates
*Bambra and Norman (2006)

The number of people who have left the UK workforce due to long term sickness has steadily risen and not returned to pre-covid levels

Cumulative number of people who have left the UK workforce due to long-term sickness since 2017

(Ages 15 – 64, 2017 – 2022)



- There are now almost two and a half million people who have left the UK workforce due to long term illness – this is almost **500,000 more people than 2017**. Whilst this might be expected due to the onset of the pandemic, the trend began prior to its onset, with the upward climb in numbers starting in 2019[1].
- The same trend has **not been seen in other European and OECD countries**, where – despite initial increase in the number of people leaving the workforce – the numbers of those outside of the workforce is on a downward trend[2].

The link between an effective healthcare system and a high performing economy is not controversial. If people are not healthy, they will not be well enough to work. This is underscored by the fact that those who are not currently working are far more likely to report poor health than those who are still in work, and a fifth of adults aged 50 – 65 years old who have left work are currently on an NHS waiting list for medical treatment. In the UK, the large number of those with long-term sickness will be having an economic impact.

SOURCES: [1]ONS Labour Force Survey, [2] Financial Times: Chronic illness makes UK workforce the sickest in developed world

The potential impact of NHS spending is shown by the relationship between investing in primary care and reduced A&E attendance and inpatient spells

Secondary care service	Estimated impact due to an increase in 1 GP per 10,000 people relative to need
A&E attendances per 10,000 people	-98
Long-stay non-elective inpatient spells (2 days or more) per 10,000 people	-10

To illustrate the potential impact of investing in NHS workforce, CF analysed the relationship between increasing the number of GPs per head (relative to need) and use of secondary care services.

For every GP added to the workforce, there is a **decrease of 98 A&E attendances** locally, and a **decrease of 10 long-stay non-elective inpatient stays** (after controlling for average Index of Multiple Deprivation score and the percentage of the population aged 65+)

We note that the salary cost of employing an extra GP ranges between ~**£65,000** to ~**£98,000**. With an average A&E attendance cost of **£297**, average non-elective (long-stay) inpatient spells cost of **£4,842**, the above estimates would reduce costs by ~**£82,000** through the reduction of non-elective activity alone.

Whilst these direct cost reductions from secondary care are important to define, it is also important to acknowledge that there will be other wider benefits. Further research could also explore whether similar impacts could be observed from increases in other areas of health and care provision e.g., mental health resource and further. Can this work be used to understand the best places for investment?

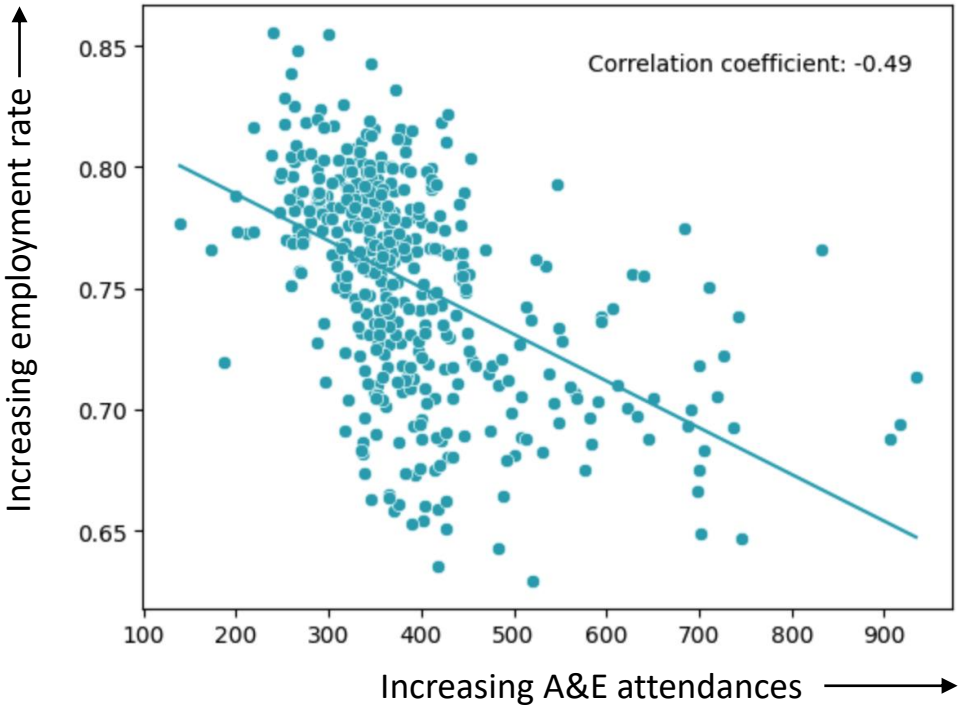
Analysis of workforce data suggests that for every GP added to the workforce, there is a decrease in the number of A&E attendances locally, and a decrease in the number of long-stay non-elective inpatient stays.

SOURCES: NHS Digital, General Practice Workforce Collection; Hospital Episode Statistics, Emergency Care Data Set; Hospital Episode Statistics, Admitted Patient Care; NHS England, National Schedule of NHS costs; NHS Health Careers, Pay for Doctors; ONS, Mid-year population estimates

Lower hospital activity levels are also associated with higher employment and pay

A&E attendances against employment across CCGs

A&E attendances per 1,000 population, Employment rate



In addition to the direct savings shown on the previous slide from reducing secondary care activity, CF also investigated if a reduction in secondary care activity is associated with increased economic activity.

Controlling for average Index of Multiple Deprivation (IMD) score, the percentage of the population aged 65+ and variation over time, we found that:

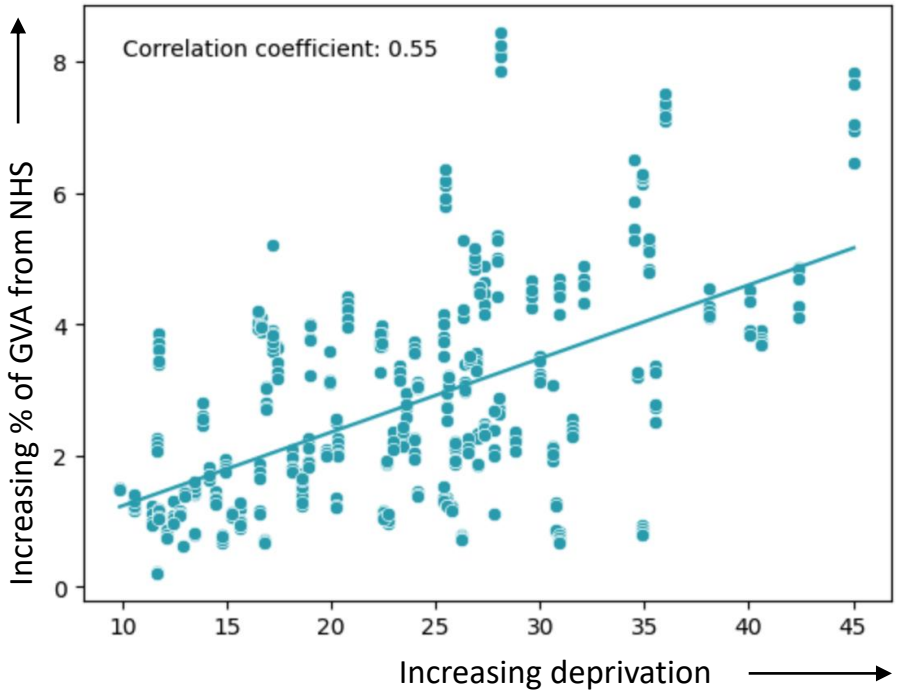
- A decrease of **100 A&E attendances per 1,000 population** per year is associated with a **0.5%** increase in employment rate
- A decrease of **10 long-stay non-elective inpatient spells per 1,000 population** is associated with a **£0.54 increase in median hourly pay**

SOURCES: NOMIS, Annual population survey (employment rate and economic inactivity 16-64); NOMIS, Annual survey of hours and earnings - workplace analysis (Full-time workers gross hourly pay); ONS, Mid-year population estimates

The role of the NHS as an employer impacts economic growth and GVA, particularly in more deprived areas

IMD against the contribution of NHS employment to GVA

IMD score, % of GVA accounted for by NHS salaries (acute, mental health and community only)



Beyond the impacts previously discussed, the NHS itself has a powerful role as an employer which is especially important in more deprived areas.

- **45-50% of NHS spend is on workforce**, with workforce numbers increasing with NHS spend
- We see there is a **correlation between the level of deprivation in an area and the contribution of NHS workforce expenses** for acute, mental health and community care to the total GVA
- In the least deprived areas the NHS constitutes just 1% of GVA but in **in the most deprived areas it accounts for at least 4 times that amount**.

With an overall workforce of around 1.2 million employees in England alone, the NHS is the largest employer in the UK. By its very nature, the distribution of the NHS is relatively decentralised. As a result, in many communities across the country, the NHS is a major employer. Whilst the NHS cannot single-handedly bring economic development to an area, it can generate economic activity. This is particularly true for areas with higher levels of deprivation.

TECHNICAL NOTES: To estimate the contribution of NHS workforce expenses, we multiplied the NHS workforce in acute, mental health and community organisations by the average NHS wage in NHS Trust and CCGs for March 2018 (£30,852)

SOURCES: NHS Digital, NHS Workforce Statistics; ONS, Gross value added (balanced) per head of population at current basic prices; GOV.UK, Indices of Deprivation; NHS Digital, National Staff Annual Earnings Estimates; ONS, Mid-year population estimates

There is more work to be done to understand whether all types of health spend have the same impact – or whether spend should be prioritised within specific areas

The core conclusion that increased spending in health increases GVA is significant and suggests that, at the current level of spending, real benefits can be seen in increasing NHS spend. Hence, spending on health may be thought of as an investment. We should note that this observation holds for behaviour close to the current state, and a vastly different amount or distribution of spend would require new analysis.

We have demonstrated that there is a link between increased NHS spend and NHS workforce and health outcomes, workforce participation and therefore GVA and economic growth.

There is good evidence both here and in other work to suggest that the ability of primary care to support interventions in population health management provide an opportunity to create higher returns on NHS spend investment, through the reduction of secondary care costs and the overall improvement of population health.

The policy implication of this is important in suggesting the need to prioritise primary care. With the current GP shortage, Integrated Care Systems are having to think creatively about how they can secure the workforce needed to deliver primary health care.

This also raises a question about whether other areas of health spending have similar impact in targeted areas, whether that be in sectors (e.g. Mental Health or Social Care) or in kinds of spending (e.g. capital spending or IT). Can we find similarly advantageous links to improving GVA by delivering more of these kinds of care?

We have not explored other linkages such as the multiplier effect of procurement or the return on investment in health research. Previous work has shown that NHS spend also contributes to GVA via these mechanisms, and support our thinking of spending on health as an investment.

Appendix

Overview of CF's modelling approach to quantify the impacts of £1 invested in the NHS

Two methods of modelling were used to determine the impact of NHS spend per head relative to need on GVA per head

Modelling method	Impact on GVA per head from a £1 increase in NHS spend per head relative to need
Fixed effects regression	£3.98
Propensity score matching	£4.12

By controlling for temporal effects, regression analysis can be performed to show the impact of NHS spend on GVA

- To perform fixed effects regression analysis between NHS spend per head and GVA per head, the following equation was used:

$$Y_{it} = \beta X_{it} + \alpha_i + u_{it}$$

- Y_{it} is the outcome variable, GVA per head, for a given ITL3 (i) and year (t)
- β is the coefficient for the regression variables (X_{it}), in this case spend per head relative to need and time in years
- α_i is the fixed effects associated with factors like IMD and u_{it} is the error term

Propensity score matching was performed to assess the reliability of the regression analysis output, with similar values reported

- Propensity score matching is a technique used to estimate the effect of a treatment or intervention, and is used for causal inference
- This question does not lend itself to understanding the effect of a treatment, as it is hard to define 'treated' and 'control' groups
- Using some proxies, we were able to show that increasing health spend does have a positive effect on GVA

SOURCES: NHS England, CCG allocations; ONS, Gross value added (balanced) per head of population at current basic prices; GOV.UK, Indices of Deprivation; ONS, Mid-year population estimates

Datasets (1/2)

Dataset	Source	Granularity used	Key assumptions / limitations
CCG allocations	NHS England	• Financial Year • Setting (Core Services, Primary Care, Specialised) • Allocation	• GP practice level weighted population was used to distribute CCG-level funding across ITL3s • GP practices were assigned to ITL3s based on geographical location
Weighted population needs (GP practice-level)	NHS England	• GP practice • Calendar year (2015 and 2018 only) • Total weighted population including SMR<75 adjustment	• Weighted populations are calculated every three years, and linear interpolation was used to calculated the weighted population for the intermediate years
Weighted population need (CCG-level)	NHS England	• CCG • Calendar year • Projected weighted population need	• 2015 weighted populations were projected to subsequent years using ONS population growth projections
Gross value added (balanced) per head of population at current basic prices	Office for National Statistics	• ITL • ITL Code • Calendar year • GVA per head	• Some ITL3s such as Westminster significantly diverged from the general values observed, all ITL3s with GVA above the 95th percentile were removed
Mid-year population estimates	Office for National Statistics	• Local authority (2020 geography) • CCG (2020 geography) • Population estimate	
Employment rate	NOMIS – Annual population survey	• Local authority (2021 geography) • Financial year • Age group (16-64) • People employed • Total people of working age	• Employment rate was projected from local authority to ITL3 using working age population weighted average
Economic inactivity	NOMIS – Annual population survey	• Local authority (2021 geography) • Financial year • Age group (16-64) • Reason for inactivity • Number of people not seeking work	• Used ONS population estimates of working age population to convert from raw value to rate

Datasets (2/2)

Dataset	Source	Granularity used	Key assumptions / limitations
Full-time workers gross hourly pay	NOMIS – Annual population survey	• Local authority (2021 geography) • Number of jobs included in analysis • Hourly pay per job (per decile)	• Gross hourly pay was projected from local authority to ITL3 using working age population weighted average
Indices of Deprivation (2019)	GOV.UK	• LSOA (2011 geography) • Index of Multiple Deprivation (IMD) score	• 2019 values assumed constant across all years • IMD scores were projected from local authority to ITL3 using population weighted average
NHS workforce statistics	NHS Digital	• Month • Organisation Code • Organisation Name • Setting • Staff group • FTE	• Average monthly FTE between April and March used to determine FTE for each financial year • Workforce provided for Trusts and not sites • Trusts were assigned to ITL3s based on geographical location • Analysis restricted to acute, mental health and community settings
General Practice workforce (GPW) collection	NHS Digital	• Practice Code • Practice Name • Total GP FTE	• Trusts were assigned to CCGs based on geographical location
Emergency Care Data Set (ECDS)	Hospital Episode Statistics	• CCG responsibility • Financial year • Attendances	
Admitted Patient Care (APC)	Hospital Episode Statistics	• CCG responsibility • Financial year • Admission method • Bed days	• Admission method used to break down spells into elective and non-elective • Bed days used to break down non-elective spells into short stay (< 2 days) and long stay (>= 2 days)
National schedule of NHS costs (2021/22)	NHS England	• Services • Average unit cost	• National average used for all areas
National staff annual earnings estimates (March 2018)	NHS Digital	• Staff group • Mean annual basic pay per FTE	• March 2018 national average used for all areas and years

Methodology (1/2)

Analysis	Data used	Methodology	Assumptions and limitations
Fixed effects regression of GVA per head as a function of NHS spend per head (needs weighted) over time	Dependent variable: • GVA per head Independent variables: • Overall NHS spend per head (needs weighted population) • Time in years	• Fixed effects regression is used to allow for differences between ITL3s • Demeaned values were used in OLS regression	• Linear regression does not describe a causal relationship – there is no guarantee that GVA increasing with spend occurs because increased spend causes increased GVA
Propensity score matching to find difference in GVA increase for similar ITL3s with either small or large NHS spend increase	Propensity score features: • Age composition of population • IMD Treatment comparison: • Overall increase in NHS spend per head • Overall increase in GVA per head	• We separate the ITL3s by % increase in spend per head over the 2015/16-2019/20 period into three groups – low, mid and high • We define the 'treated' group as the high increase ITL3s and the 'control' group as the low increase ITL3s • We use propensity score similarity to find pairs and compare the increase in GVA per head per pound increase in NHS spend	• There are no true treated and control groups, we used our heuristics to estimate proxy groups • The confidence intervals for this analysis were not sufficiently small for us to present this as a standalone result, but it does provide evidence of a positive causal relationship between variables
Calculation of contribution to GVA from NHS wages	• NHS workforce in acute, mental health and community settings • Average NHS wage • GVA • IMD	• We multiply the number of staff by the average wage and determine the % of GVA this comprises for each region • We calculate the correlation across ITL3s with IMD	• March 2018 average annual basic pay represents average wage of a staff member across all regions and time periods modelled • Accounts for direct contribution of wages to GVA only

Methodology (2/2)

Analysis	Data used	Assumptions and limitations
Linear regression analysis to predict A&E attendances from GPs per head	Dependent variable: • A&E attendances per 10,000 population Independent variable of interest: • GPs per 10,000 needs-weight population	• Assumes a linear relationship • We do not expect this analysis provides a comprehensive view of the factors impacting the dependent variables, we are interested in understanding the relationship between our independent variable of interest and the dependent variable • All p-values are below 0.05 • We also include as dependent variables: - IMD - Age composition of population - Time in years
Linear regression analysis to predict long-stay non-elective inpatient spells from GPs per head	Dependent variable: • Elective inpatient spells per 10,000 population Independent variable of interest: • GPs per 10,000 population weighted on need	
Linear regression analysis to predict employment rate from A&E attendances	Dependent variable: • Employment rate Independent variable of interest: • A&E attendances per 10,000 population	
Linear regression analysis to predict median hourly pay from long-stay non-elective inpatient spells	Dependent variable: • Employment rate Independent variable of interest: • Elective inpatient spells per 10,000 population	
Linear regression analysis to predict employment rate from workers off for long-term sickness	Dependent variable: • Employment rate Independent variable of interest: • Proportion of workers off from long-term sickness	
Linear regression analysis to predict median hourly pay from workers off for long-term sickness	Dependent variable: • Median hourly pay Independent variable of interest: • Proportion of workers off from long-term sickness	
Linear regression analysis to predict GVA per head from employment rate	Dependent variable: • GVA per head Independent variable of interest: • Employment rate	

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