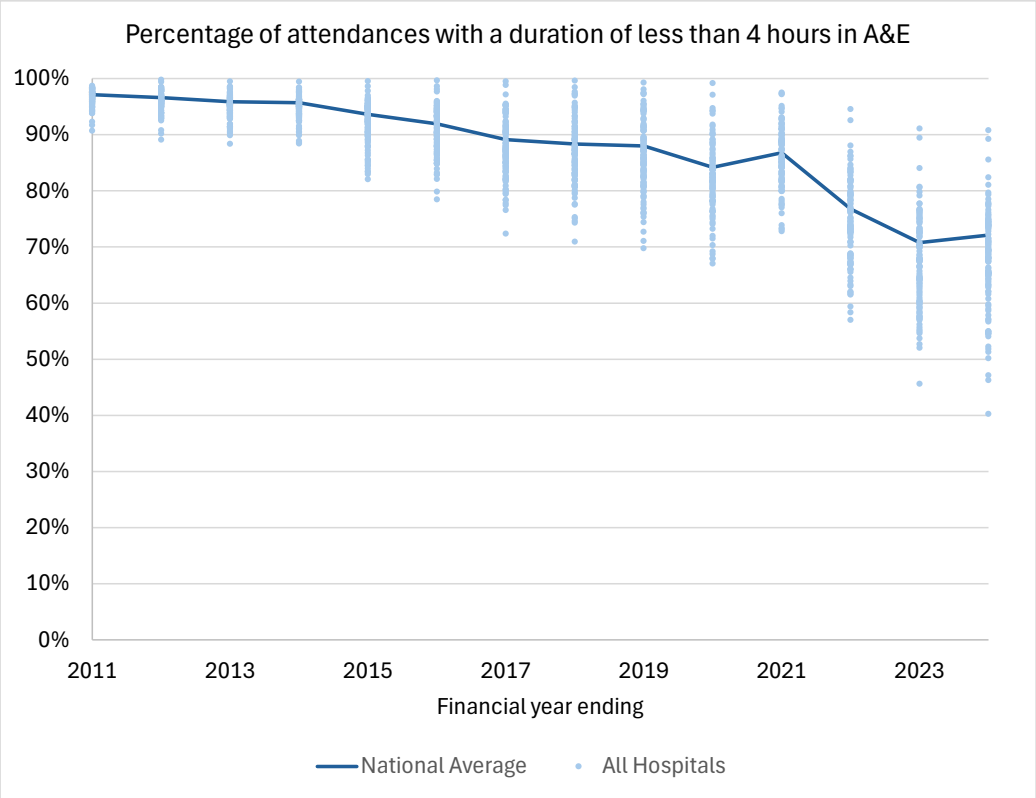
Analysis of the deterioration in A&E performance

(1) Performance by trust

Overview of performance

This chart shows the annual percentage of attendances with a duration of less than 4 hours in A&E across trusts in England, by financial year. Data is presented for the 14-year period from 2010/11 to 2023/24, inclusive. Each dot represents a different trust (where data is available) and the blue line shows the national mean average.

There are two striking observations. First, there is a consistent downward trend ('time trend') across all trusts. In fact, every single trust has experienced a reduction in A&E performance over time. Second, the variation in performance between trusts has grown significantly over time, i.e. the distribution of trust performance increasingly 'fans out'.



Source: NHS England (NHS Digital), Monthly Trust Situation Reports (MSitAE) data.
Notes: Excludes trusts with zero type 1 (major A&E) attendances. Excludes datapoints that were #N/A, blank or zero.

Statistical analysis

Approximately **two thirds** of the variation in performance of trusts over this 14-year period can be explained by a statistically significant linear downward trend over time, which is common across all trusts (i.e. the 'time trend').

The **remaining one third** of the variation in performance is unexplained by time. It may be attributable to differences between trusts which remain constant over the time period (known as 'fixed effects') or other drivers of performance that cause trust performance to diverge (fan out') over time.

The statistical methodology is discussed in Annex D.

Interpretation of the 'time trend'

The 'time trend' is a common statistical trend across all trusts. It implies the existence of a common set of factors that have had a material, negative impact on A&E performance across all trusts over time.[1]

Theoretically, the 'time trend' *could* be driven by common characteristics of NHS trusts themselves (such as NHS policies and processes), or by common external factors (such as changes in funding, or wider common trends in demand for healthcare services).

Analysis within the Lord Darzi report attributes declining NHS performance to several 'drivers of performance'. The two factors which are most relevant to changes since 2010 are (1) "*Austerity in funding and capital starvation*", and (2) "*The impact of the Covid-19 pandemic and its aftermath*". However, this note does not definitively attribute this time trend to specific variables or drivers.

Interpretation of the increase in variation between trusts

The variation between trusts is attributable to trust-specific factors.

Factors could include differentials in funding, capacity,[2] workforce, leadership, discharge capability and social care capacity. It could include trust-specific differentials that are consistent over time (such as geography and local population structures) and/or trust-specific differentials that change over time (such as service reconfiguration, or leadership changes).

[1] This analysis does not propose that time itself is a causal factor. Rather, the time trend is likely capturing the combined impact of set of common factors across the period.
[2] For example, analysis published in the BMJ's *Emergency Medicine Journal* (2020) found that differences in A&E waiting time performance across trusts are inversely correlated with trust bed occupancy.

NHS England has cited "*unwarranted variation in performance in the most challenged systems*" in its 2023 Delivery Plan for urgency and emergency services. Econometric analysis by Monitor in 2015 identified bed occupancy as a key driver of performance.

This statistical note does not definitively attribute this variation to specific drivers.

Implications

As the 'time trend' is statistically common across trusts, it implies that there is a set of nationwide, underpinning factors that (a) trusts collectively have low ability to control, and/or (b) trusts have some control over but have potentially failed to manage.

Given this common time trend accounts for roughly two thirds of variation over the period, trust-specific performance reviews (regarding past and current performance) should take into account the material influence of nationwide external factors.

Increasingly, there is variation in performance between trusts. Therefore, performance reviews should also consider trust performance in relation to appropriate current benchmarks.

These considerations are relevant in the context of ongoing government deliberations around hospital league tables and conditions around pay uplifts for senior leaders.

Further econometric analysis could help to reveal statistically significant drivers of A&E performance, and potentially wider areas of NHS performance.

Limitations

This decomposition of historic performance variation is context dependent. It is a backwards-looking assessment that applies to historic A&E data for the period 2010/11 – 2023/24 inclusive. These proportions could vary with other applications, such as other types of NHS activity, or over different time periods (including the future). The analysis in this note utilises the simplifying assumption of a linear time trend, which could be tested further.

This analysis does not definitively attribute the statistical results to specific variables or drivers. Attribution could be informed by a more granular analysis of drivers, including factors such as demographics, funding, leadership and social care capacity.

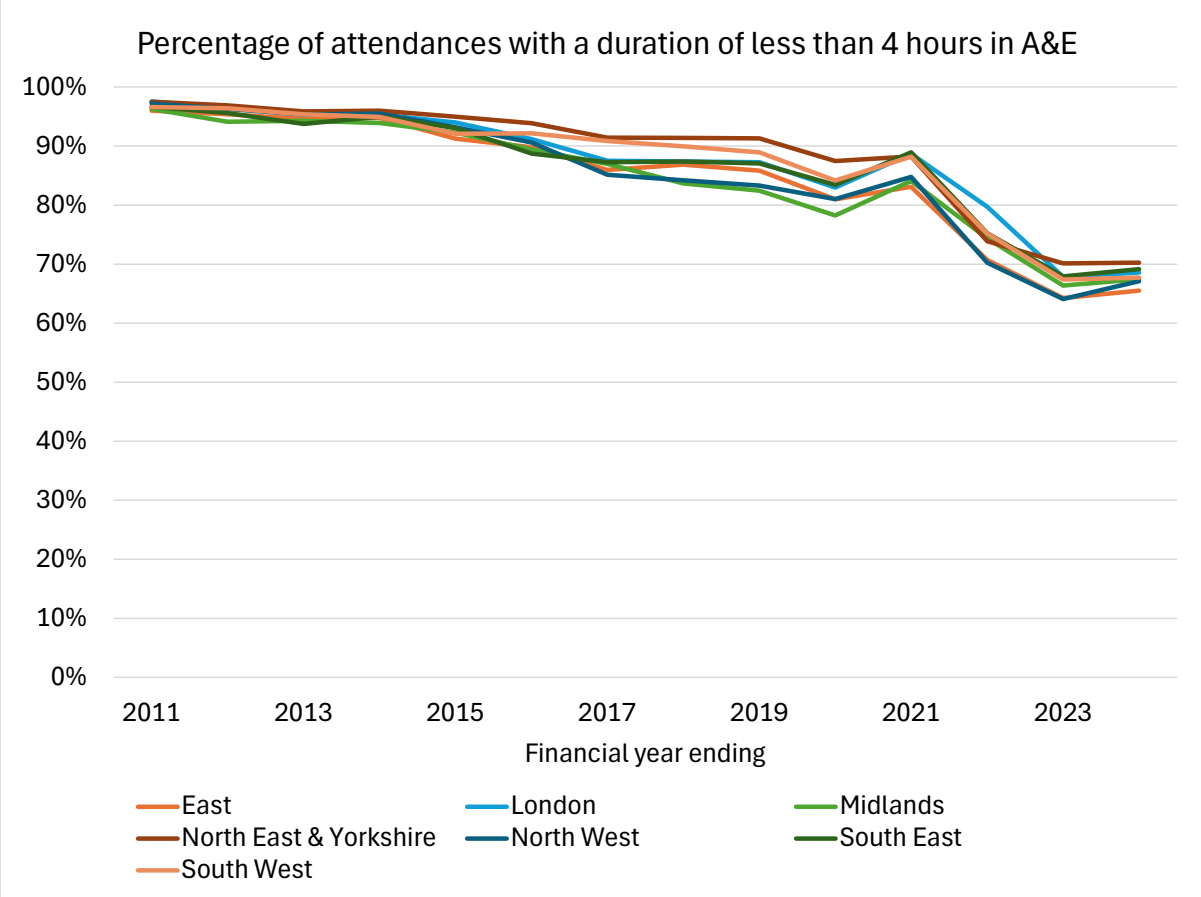
The performance metric under analysis is the percentage of A&E attendances with a duration of less than four hours. It is possible that different trusts could have significantly different *average* A&E wait times, despite having the same performance in relation to the 4-hour target.[3]

[3] For further investigation into this issue, see Eatock et al. (2017), "Performing or not performing: what's in a target?", Future healthcare Journey 4:3 pp.167-172.

(2) Performance by region

Overview of performance

The chart below presents (unweighted) mean average performance for each NHS region. The greatest variation between regions was in the late 2010s. However, since 2020, this variation has narrowed: In 2023/24, the range of (median) performance across all seven regions is five percentage points.



Source: NHS England (NHS Digital), Monthly Trust Situation Reports (MSitAE) data.

Notes: Excludes trusts with zero type 1 (major A&E) attendances. Excludes datapoints that were #N/A, blank or zero.

Statistical analysis

Regional fixed effects are statistically significant, both with and without a time trend, although average regional differences appear smaller than the variation between individual trusts. Overall, this suggests that regional differences exist, and that regional characteristics have influenced A&E performance beyond the observed time trend.

For example, a 2023 report by the National Audit Office stated that there is "*considerable variation in service performance and access, both between regions and between different providers*".

The strongest regional effect is from North East & Yorkshire. Since 2020, North East & Yorkshire's strong A&E performance has been substantially driven by two trusts – Sheffield Children's NHS Foundation Trust and Northumbria Healthcare NHS Foundation Trust. These trusts have the highest A&E performance in the country in 2023/24 (of 90.8% and 89.2%, respectively). However, pre-Covid-19, the region's average A&E performance was high (relative to the national average), even after excluding those two trusts.

The statistical methodology is discussed in Annex D.

Interpretation of regional differences

The statistical significance of regional effects implies that regional characteristics have materially influenced A&E performance over time.

This could be due to a range of factors, such as differentials in demand for NHS services (including due to demographic variation), differences in NHS capacity (including due to NHS funding allocations, hospital site capacity and staffing availability), the role of leadership, models of performance management, and/or variation in models of care. These potential factors could relate to differential pressures faced by different regions and/or differences in how pressures are being managed.

Some reports have analysed potential drivers of regional variation. A 2024 report by Sir Chris Ham highlighted the "*calibre of the leaders and staff involved in system leadership in the North East and Yorkshire*". A 2023 report by the think tank Reform found that A&E pressures are "*a system challenge*" that are driven by patient flow "*through hospital wards and back home efficiently*", concluding that "*investing in management is vital*". Econometric analysis by Monitor in 2015 also found evidence of regional variation.

However, this statistical note does not definitively attribute these regional effects to specific variables or drivers.

Implications

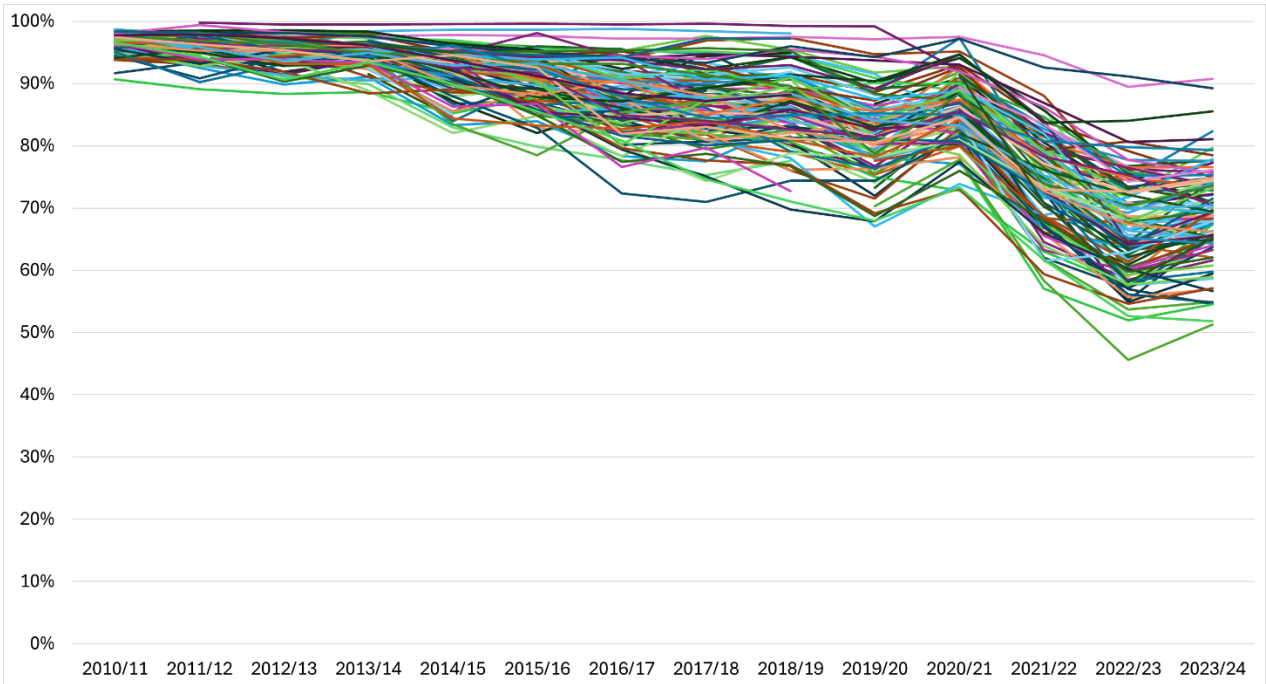
Further, detailed analysis of the variables underpinning regional differences would be required to determine the precise implications. Such investigations could have implications for trust performance management and ICB funding allocations. Given the government's intention to reduce regional and local variation – by taking "*the best of the NHS to the rest of the NHS*"[4] – detailed regional analysis could help to provide lessons learned for policymakers.

The trust-level limitations (above) apply to the regional-level analysis in this section.

[4] Wes Streeting speech at Labour Party Conference 2024

ANNEX A: Additional details for trust-level analysis

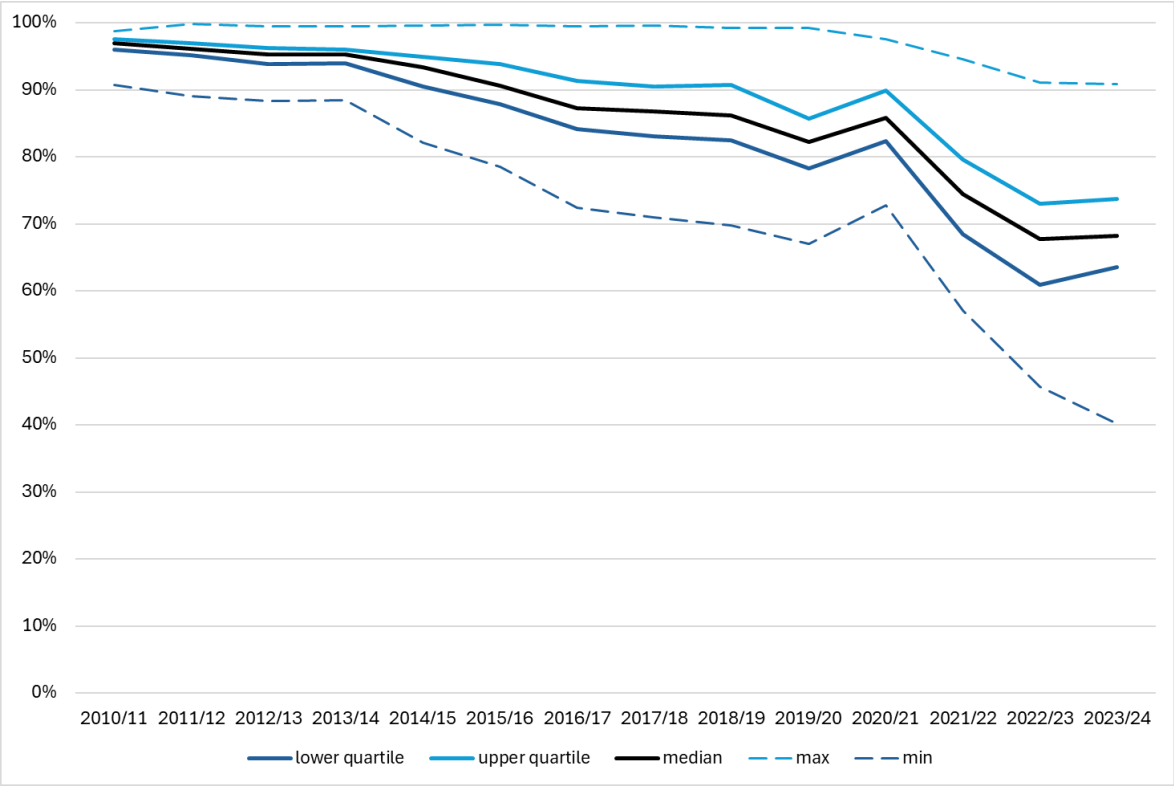
Percentage of A&E attendances with a duration of less than 4 hours: By trust



Source: NHS England (NHS Digital), Monthly Trust Situation Reports (MSitAE) data.

Note: Where the data is discontinuous, single data points are not shown above.

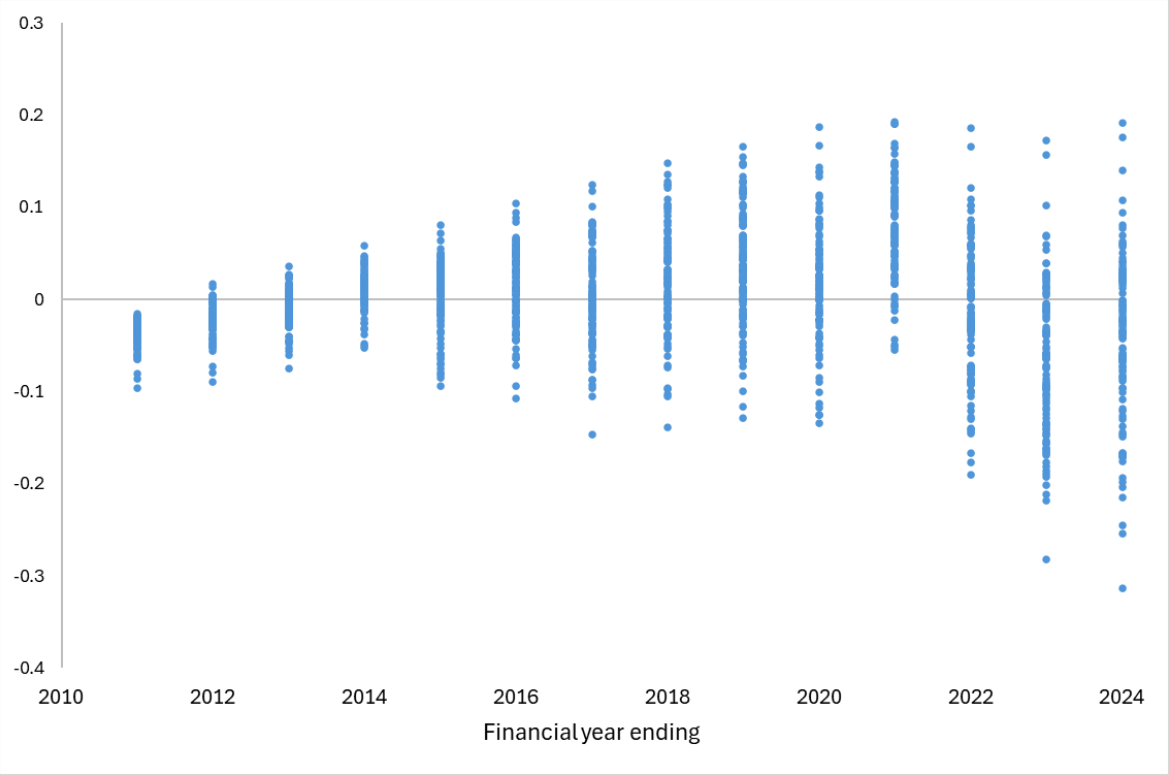
Percentage of A&E attendances with a duration of less than 4 hours: Summary statistics



Source: NHS England (NHS Digital), Monthly Trust Situation Reports (MSitAE) data.

ANNEX B: Statistical results for trust-level analysis

Percentage of A&E attendances with a duration of less than 4 hours: Residuals with respect to the linear time trend



Source: CEPA analysis

Regression results for the percentage of attendances with a duration of less than 4 hours in A&E

	Dependent variable:
	% attendance less than 4 hours
Time	-0.022***
	(0.0005)
Constant	1.025***
	(0.002)
Observations	1,568
R^2	0.665
Adjusted R^2	0.665
Residual Std. Error	0.063 (df = 1566)
F Statistic	3,106.871*** (df = 1; 1566)
Note: *p < 0.1**p < 0.05***p < 0.01	Standard errors are clustered by trust.

Source: CEPA analysis

ANNEX C: Statistical results for regional-level analysis

Models tested

- ***Null Model***: A&E performance modelled with only an intercept.
- ***Null Model with Time Trend***: A&E performance modelled with a time trend only.
- ***Regional Fixed Effects Model***: A&E performance modelled as a function of regional dummy variables.
- ***Regional + Time Model***: A&E performance modelled with both regional fixed effects and a time trend.

Statistical analysis: Regional effects without time trend

- Wald Test: ***Null Model*** vs. ***Regional Fixed Effects Model***
- F(6, 1561) = 2.2863, p = 0.0335
- Conclusion: Regional fixed effects are jointly significant at the 5% level when no time trend is included.

Statistical analysis: Regional effects with time trend

- The test analyses regional effects, controlling for the time trend.
- Wald Test: ***Null Model with Time Trend*** vs. ***Regional + Time Model***
- F(6, 1560) = 2.5907, p = 0.0168
- Conclusion: Regional fixed effects remain significant at the 5% level, even after accounting for time trends.

ANNEX D: Statistical methodology

Trust-level analysis

Each trust's A&E performance over time can be decomposed between (a) the average time trend across all trusts and (b) the difference between actual performance and this average time trend. Trust performance can be 'statistically explained' by the sum of these two factors.

Estimating the proportion attributable to each factor is statistically equivalent to running a linear regression with time on the x-axis and A&E performance on the y-axis. For each trust, a proportion of this deterioration in performance can be 'explained' by the linear best fit line through the data over time. The remaining variation of each trust's performance either side of the linear time trend is known as a 'residual'.

In Annex B, the R^2 statistic calculates trust performance variability explained by the linear time trend *as a proportion of* the total trust performance variability. Hypothetically, an R^2 value of 1 would indicate that the time trend perfectly explains the changes in trust performance over time. The results of the trust-level analysis derive an R^2 value of 0.665, which indicates that approximately two thirds of the historic variation is explained by the time trend.

Regional-level analysis

Average A&E performance by region can be calculated by grouping trusts into their respective regions. Performance for each region will – to a greater or lesser extent – differ from the national average. The regional-level statistical analysis tests whether the observed variation across regions is materially different to the national average.

Statistically, this is undertaken using a Wald Test (which is equivalent to an F-Test with standard errors that are clustered across individual trusts). In this case, the test calculates whether the 'explained' variation in trust A&E performance is significantly higher when regional effects are included within the predictive model, relative to when they are not. The test was undertaken both with and without a time trend, utilising a 5% level of significance.

Important notice

This document was prepared by CEPA LLP (trading as CEPA).

CEPA does not accept or assume any responsibility or liability in respect of the document to any readers of it (third parties), other than the recipient(s) named in the document. Should any third parties choose to rely on the document, then they do so at their own risk.

The information contained in this document has been compiled by CEPA and may include material from third parties which is believed to be reliable but has not been verified or audited by CEPA. No representation or warranty, express or implied, is given and no responsibility or liability is or will be accepted by or on behalf of CEPA or by any of its directors, members, employees, agents or any other person as to the accuracy, completeness or correctness of the material from third parties contained in this document and any such liability is expressly excluded.

The findings enclosed in this document may contain predictions based on current data and historical trends. Any such predictions are subject to inherent risks and uncertainties.

The opinions expressed in this document are valid only for the purpose stated herein and as of the date stated. No obligation is assumed to revise this document to reflect changes, events or conditions, which occur subsequent to the date hereof.

The content contained within this document is the copyright of CEPA. The recipient(s) or any third parties may not reproduce or pass on this document, directly or indirectly, to any other person in whole or in part, for any other purpose than stated herein, without our prior approval.

CEPA LLP

Queens House

55-56 Lincoln's Inn Fields

London WC2A 3LJ

T. **+44 (0)20 7269 0210**

E. **info@cepa.co.uk**

www.cepa.co.uk

cepa-ltd