Primary care and population factors associated with NHS Health Check coverage: a national cross-sectional study

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ABSTRACT

Introduction  High and equitable coverage of systematic cardiovascular disease (CVD) prevention programmes, such as the NHS Health Check programme in England, is essential if they are to effectively reduce the population CVD burden.

Methods We conducted a cross-sectional study using data from 151 English primary care trusts (PCTs) on NHS Health Check coverage during 2011–12. We examined the associations between programme coverage and primary care and population factors, including patient demographics, primary care workforce and cardiovascular health need.

Results Median coverage of NHS Health Checks was 8.2%, with wide PCT-level variation (range ≈ 0–29.8%). Coverage was significantly higher in PCTs in the most deprived areas compared with the least deprived (P = 0.035), adjusting for covariates. Significant negative associations between coverage and a higher proportion of PCT population aged 40–74 years—the eligible Health Check age group, a larger total population size and higher practice staffing levels were found in the unadjusted analyses.

Conclusions NHS Health Check coverage during 2011–12 was lower than the government projection of 18% coverage. Coverage must be increased through concerted multi-disciplinary strategies, for the programme to improve cardiovascular health in England. Considerable variation in participation between PCTs warrants attention, with enhanced support for poor performers.

Keywords circulatory disease, population-based and preventative services, primary care, screening

Introduction

Cardiovascular disease (CVD) remains the leading cause of death and a key driver of health inequalities in England, despite impressive declines in mortality over the last 30 years.1,2 It also causes a huge economic burden to the National Health Service (NHS).3 This burden of CVD, combined with an increasing prevalence of some key risk factors, such as obesity and type 2 diabetes,1 and the availability of cost-effective prevention interventions,4 provided the rationale for implementation of a population-based CVD prevention programme in England, the NHS Health Check programme.5 The programme was introduced in 2009, with complete rollout scheduled for 2013.6

The NHS Health Check is a systematic CVD risk assessment and management programme. It aims to reduce the CVD burden and socio-economic, ethnic and gender inequalities in health.7 The programme is internationally among the first of its kind to be implemented on a national scale. Briefly, it involves the assessment of global CVD risk in all individuals aged 40–74 years without existing CVD, diabetes and other cardio-metabolic diseases. The programme aims to reduce CVD risk factors in all participants; identify individuals at high risk of CVD (≥20% risk of a CVD event in the next 10 years) for more intensive management and identify undiagnosed diseases.8,9 Health Checks will be offered to all eligible patients over a 5-year period, requiring a 20% coverage per
The NHS Health Check programme has been commissioned by Primary Care Trusts (PCTs) since April 2009, before changes to the English health-care system in April 2013 when commissioning of the programme was transferred to local authorities (LAs). Owing to the variation in the demographic characteristics between areas, hence potential variations in population need, the Department of Health has provided substantial autonomy to PCTs in the administration of the programme, as long as minimum standards are met.

When pursuing a high-risk approach to CVD prevention, like the NHS Health Check, high coverage of those eligible is vital to significantly reduce the disease burden across the whole population. When estimating the likely impact of the programme, the Department of Health used an assumption of 75% uptake to model the costs and benefits of the programme. Early local pilot studies, however, place uptake in the invited groups well below this estimate—ranging from 29 to 45%. Equal uptake is also important across patient groups—inequalities in this first contact with a prevention programme can worsen inequalities in health. Previous studies have suggested that patient-level differences impact on the uptake of CVD prevention. In addition to patient differences, coverage of screening programmes varies between primary care centres and commissioning organizations. Structural or organizational differences in both primary care centres and commissioning organizations may be important.

We aimed to assess the coverage of the NHS Health Check programme and whether these differ by patient socio-demographic characteristics, primary care provider characteristics, such as staffing and budget, and markers of need for CVD prevention.

**Methods**

**Data**

We collected data from the integrated performance measures monitoring website of the Department of Health. Data represented the number of people who were eligible for, offered and received a Health Check in one financial year (April 2011–March 2012). PCTs collect these data through their performance monitoring schemes (e.g. Local Enhanced Services) or contracts with Health Check providers. These performance data were collected by Strategic Health Authorities through the collation of mandatory PCT data returns. The Department of Health specified requirements for the collection of the data; therefore, PCTs are expected to provide data conforming to these. The data were available for all 151 PCTs in England.

**Outcome measures**

Coverage of the Health Check programme was our primary outcome measure. We estimated the coverage of the programme in each PCT as the number of individuals who received a Health Check divided by the number eligible (i.e. not the number offered, which would indicate uptake). Three PCTs reported no patients invited or receiving a Health Check; however, all PCTs were included when assessing coverage. Although uptake is an important measure, and may better reflect an individual’s contact with a screening programme, coverage is the better measure for assessing public health impact.

**Explanatory variables**

We obtained explanatory variables at a PCT level. We examined socio-demographic factors—deprivation, the proportion of the population from ethnic minority groups, proportion of the total population aged 40–74 years (those eligible for a Health Check) and total population size; service related factors—patient experience, coronary heart disease (CHD) care performance measures, annual PCT budget, number of practices, full-time equivalent (FTE) GP and other staff in each PCT; and variables related to cardiovascular prevention need—the estimated proportion of the population at high risk and estimated CVD prevalence (Box 1).

We used the Index of Multiple Deprivation score (IMD 2010) to measure socio-economic status, taking the median IMD score from across every lower super output area within a PCT. We obtained ethnicity data for each PCT from the Care Quality Commission. These data estimate ethnic makeup based on the proportions admitted to hospitals in an area’s resident population. The percentage of the PCT population made up of ethnic minority groups was calculated by combining percentages from south Asian, Black and Mixed ethnic backgrounds. We calculated the proportion of patients aged 40–74 years from the 2010 mid-year population estimates from the Office for National Statistics and total registered population from the 2010/11 General Practice Quality and Outcome Framework (QOF).

We included QOF performance data (2010/11). We used the total points gained for CHD secondary prevention as a measure of CHD care quality. We also included the total points gained from the patient satisfaction survey, as patient experience has been associated with the quality of care received. The total annual budget for 2010/11 was collected for each PCT from the Department of Health. We collected information on the total number of FTE GPs and other
practice staff (health-care assistants and practice nurses) for 2011. Staffing levels may impact on the quality of care, with Health Checks often conducted by healthcare assistants and nurses. We also collected information on the number of practices from the 2010/11 General Practice QOF.

The estimated prevalence of CVD and the proportion of high-risk individuals may be an important indicator of the population need for CVD prevention. We obtained the proportion of individuals estimated at high risk (≥20% risk of a cardiovascular event within next 10 years—using the QRISK2 score) in each PCT from previous modelling and estimated CVD prevalence from the Association of Public Health Observatories (December 2011) and Imperial College London.

### Data analysis

We summarized the characteristics of the outcome and explanatory variables in the study sample at a PCT level. We assessed the univariable correlations between Health Check coverage and explanatory variables at a PCT level using Spearman’s rank correlation coefficient; a non-parametric test, since variables were not normally distributed. For subsequent analysis, we generated categorical variables by splitting all explanatory variables into equal thirds. We measured median levels of Health Check coverage in each category for all explanatory variables, using Wilcoxon rank-sum test to assess differences.

We assessed associations between absolute levels of coverage and explanatory variables by multivariable linear regression models, adjusting for primary care and population level factors. We used a square-root transformation of Health Check coverage before analysis to create a normally distributed variable for linear regression; results presented were transformed back to their original form. We included all explanatory variables in the final models, not employing model selection. We examined co-linearity between explanatory variables using the variance inflation factor. Due to high co-linearity, we omitted annual PCT budget, number of staff other than GPs and number of practices into the final regression models. All analyses were conducted using Stata version 11.2 SE.
Results

A summary of coverage and explanatory variables is shown in Table 1. The median PCT level coverage of the Health Checks programme was 8.2% in 2011/12, ranging from 0 to 29.8%. There were wide variations in most explanatory variables at a PCT level, e.g. the percentage of the PCT population from ethnic minority groups ranged from 2.1 to 58.7%.

Association between health check coverage and primary care and population level factors

Table 2 presents univariable correlations between the Health Check coverage and explanatory variables. There was a significant positive correlation between deprivation and coverage (Spearman’s rank correlation coefficient (rho) = 0.35, P ≤ 0.001); hence, Health Check coverage was significantly higher in more deprived PCTs. A higher proportion of population aged 40–74 years (rho = −0.23, P ≤ 0.005), a larger population size (rho = −0.21, P = 0.011) and more FTE GPs (rho = −0.23 P = 0.005) and other practice staff (rho = −0.16, P = 0.048) were negatively associated with coverage.

Table 1  NHS Health Check coverage and PCT level predictor variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>SD</th>
<th>Min–Max</th>
<th>Median</th>
<th>IQR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coverage (%)</td>
<td>8.1</td>
<td>5.4</td>
<td>0–29.8</td>
<td>8.2</td>
<td>8.0</td>
</tr>
<tr>
<td>Population factors</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deprivation (IMD score)</td>
<td>23.6</td>
<td>8.4</td>
<td>8.8–45.3</td>
<td>23.3</td>
<td>12.9</td>
</tr>
<tr>
<td>Ethnic minority proportion (%)</td>
<td>12.1</td>
<td>10.8</td>
<td>2.1–58.7</td>
<td>7.9</td>
<td>14.2</td>
</tr>
<tr>
<td>Proportion of population in the 40–74 age range (%)</td>
<td>40.8</td>
<td>5.1</td>
<td>24.8–48.6</td>
<td>42.4</td>
<td>7.08</td>
</tr>
<tr>
<td>Population size</td>
<td>359 725</td>
<td>197 277</td>
<td>94 556–1 325 050</td>
<td>298 190</td>
<td>193 890</td>
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<tr>
<td>Primary care factors</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>QOF CHD</td>
<td>4707</td>
<td>2236</td>
<td>1022–12 658</td>
<td>4298</td>
<td>2819</td>
</tr>
<tr>
<td>Patient experience (total patient survey points)</td>
<td>1847</td>
<td>987.5</td>
<td>0–5543</td>
<td>1626</td>
<td>1229</td>
</tr>
<tr>
<td>Annual budget</td>
<td>578 548</td>
<td>295 969</td>
<td>177 109–1 848 102</td>
<td>513 963</td>
<td>292 631</td>
</tr>
<tr>
<td>Full-time equivalent GPs</td>
<td>207.7</td>
<td>122.8</td>
<td>56.0–717</td>
<td>168</td>
<td>109</td>
</tr>
<tr>
<td>Full-time equivalent other practice staff</td>
<td>485.5</td>
<td>286.4</td>
<td>132.3–1887</td>
<td>404.5</td>
<td>235.5</td>
</tr>
<tr>
<td>Number of practices</td>
<td>55.1</td>
<td>26.0</td>
<td>12–146</td>
<td>51.0</td>
<td>33.0</td>
</tr>
<tr>
<td>Cardiovascular prevention need factors</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Estimated high-risk proportion (QRISK) (%)</td>
<td>10.6</td>
<td>1.66</td>
<td>6.4–13.7</td>
<td>10.7</td>
<td>2.8</td>
</tr>
<tr>
<td>Estimated CVD prevalence (%)</td>
<td>11.6</td>
<td>1.49</td>
<td>7.9–15.2</td>
<td>11.8</td>
<td>2.0</td>
</tr>
</tbody>
</table>

Results

A summary of coverage and explanatory variables is shown in Table 1. The median PCT level coverage of the Health Checks programme was 8.2% in 2011/12, ranging from 0 to 29.8%. There were wide variations in most explanatory variables at a PCT level, e.g. the percentage of the PCT population from ethnic minority groups ranged from 2.1 to 58.7%.

Association between health check coverage and primary care and population level factors

Table 2 presents univariable correlations between the Health Check coverage and explanatory variables. There was a significant positive correlation between deprivation and coverage (Spearman’s rank correlation coefficient (rho) = 0.35, P ≤ 0.001); hence, Health Check coverage was significantly higher in more deprived PCTs. A higher proportion of population aged 40–74 years (rho = −0.23, P ≤ 0.005), a larger population size (rho = −0.21, P = 0.011) and more FTE GPs (rho = −0.23 P = 0.005) and other practice staff (rho = −0.16, P = 0.048) were negatively associated with coverage.

Median Health Check Coverage and the differences in coverage between grouped explanatory variables are shown in Table 3. PCTs in more deprived areas had higher coverage than less deprived PCTs (median coverage = 5.39% in least
deprived areas compared with 10.6% in most deprived areas, \(P < 0.001\). PCTs with a larger population size and more FTE GPs had significantly lower coverage (median coverage = 4.80% in PCTs with the largest population size compared with 9.46% in PCTs with the smallest population size, \(P = 0.008\)).

Table 4 presents the associations between Health Check coverage and primary care and population level factors when examined using multivariable linear regression models. Coverage was significantly higher in areas with greater deprivation \([\text{coefficient} = -0.51 (95\% \text{ confidence interval (CI)}: -1.88\text{–}0.00]) in the least deprived PCTs compared with those with the most, \(P = 0.035\)). Other explanatory variables, which were significant in our univariable analysis, did not remain significant in our adjusted analyses, although PCTs with a moderate proportion of individuals at high CVD risk were significantly more likely to have lower coverage than those with the lowest proportion.

**Discussion**

**Main findings of this study**

The NHS Health Check had lower median coverage of 8.2% in 2011/12 compared with the anticipated (18% coverage), with considerable variation (0–29.8%) between PCTs. Health Check coverage was significantly higher in PCTs in more deprived areas, compared with 10.6% in most deprived areas, \(P < 0.001\). PCTs with a larger population size and more FTE GPs had significantly lower coverage (median coverage = 4.80% in PCTs with the largest population size compared with 9.46% in PCTs with the smallest population size, \(P = 0.008\)).

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**What is already known on this topic?**

There are limited national studies evaluating the performance of the NHS Health Check. A small number of studies examine the performance of local programmes: Health Check uptake has been previously reported at lower than 50% in north-west London\(^{13,14}\) and Stoke-on-Trent.\(^{15}\) Direct comparisons with our finding are not possible, as we examined
Artac et al. reported that uptake was higher in patients living in deprived areas, which is consistent with our finding. Uptake was also higher in south Asian patients and in patients attending small practices, the latter being consistent with our univariable findings. Our findings differ from those in studies examining predictors of coverage of cervical screening, which have identified the proportion of a population eligible for screening, QOF performance, area level deprivation and proportion of ethnic minority groups as significant.

**What this study adds?**

This is the first study reporting the national Health Check coverage and assessing the association between primary care and population factors with programme coverage. We reported lower median national coverage than the Department of Health anticipated. The Health Check is a 5-year rolling programme, with 20% of the eligible population invited per year with uptake estimated to be 75%; the Department of Health expects PCTs to reach a coverage of 18% in 2011/12. Coverage reported here is well below this and indicates the programme will not meet targets of screening the eligible population over a 5-year period unless coverage improves in future years.

Lower coverage of the Health Check programme might be explained by a number of factors. The budget allocated for the Health Check varies between PCTs and is not ring fenced. PCTs may allocate the budget for other public health interventions and under-invest in Health Checks, resulting in low coverage. Another reason limiting the coverage of the programme could be the uncertainties when the programme was first implemented. The minimum standards for what constitutes an NHS Health Check were published 2 years after initial rollout. The absence of essential support and training to Health Check providers in PCTs, and the lack of consistent central risk management interventions may be other reasons for low Health Check coverage reported in our study. Finally changes to the NHS’s structure and future changes in the commissioning body of the programme (with LAs commissioning the programme from April 2013) may have begun to affect the programme in 2011/12.

Our findings also highlight marked variation in coverage between PCTs with many seemingly well behind in achieving the target of complete rollout by 2013. This may indicate considerable geographic inequality in programme delivery, which may partly reflect differing patient preferences to attend to a health check in different parts of the country.

In contrast to previous evidence, and indeed wider beliefs about preventive medicine, we have shown better Health Check coverage in more deprived areas. A number of public health initiatives have been introduced to reduce health inequalities, notably the prioritization of ‘Spearhead PCTs’ to...

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**Table 4** Association between Health Check coverage (%) and PCT level factors: multivariable analysis

<table>
<thead>
<tr>
<th>Predictor variable</th>
<th>Coverage</th>
<th>Coefficient</th>
<th>Confidence interval</th>
<th>P-value</th>
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<tbody>
<tr>
<td>Socio-demographic factors</td>
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<tr>
<td>Deprivation (IMD score)</td>
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<tr>
<td>1 (most deprived)</td>
<td></td>
<td>-0.06</td>
<td>-0.49</td>
<td>0.05</td>
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<tr>
<td>2 (least deprived)</td>
<td></td>
<td>-0.51</td>
<td>-1.88</td>
<td>0.00</td>
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<tr>
<td>Ethnicity minority proportion</td>
<td></td>
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<tr>
<td>1 (lowest)</td>
<td></td>
<td>0.15</td>
<td>-0.01</td>
<td>0.81</td>
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<tr>
<td>3 (highest)</td>
<td></td>
<td>0.08</td>
<td>-0.17</td>
<td>0.95</td>
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<tr>
<td>Proportion of population in 40–74 age range</td>
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<tr>
<td>1 (lowest)</td>
<td></td>
<td>-0.02</td>
<td>-0.58</td>
<td>0.22</td>
</tr>
<tr>
<td>3 (highest)</td>
<td></td>
<td>-0.03</td>
<td>-0.87</td>
<td>0.36</td>
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<tr>
<td>Population size</td>
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<tr>
<td>1 (lowest numbers)</td>
<td></td>
<td>0.12</td>
<td>-0.95</td>
<td>0.08</td>
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<tr>
<td>3 (highest numbers)</td>
<td></td>
<td>-0.57</td>
<td>-2.93</td>
<td>0.04</td>
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<tr>
<td>Service factors</td>
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<td>QOF CHD points</td>
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<tr>
<td>1 (lowest)</td>
<td></td>
<td>0.04</td>
<td>-0.34</td>
<td>1.01</td>
</tr>
<tr>
<td>3 (highest)</td>
<td></td>
<td>0.01</td>
<td>-0.72</td>
<td>1.08</td>
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<tr>
<td>Patient experience (total patient survey points)</td>
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<tr>
<td>1 (lowest satisfaction)</td>
<td></td>
<td>-0.04</td>
<td>-0.77</td>
<td>0.25</td>
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<tr>
<td>3 (highest satisfaction)</td>
<td></td>
<td>0.08</td>
<td>-0.36</td>
<td>1.33</td>
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<tr>
<td>FTE GPs</td>
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<tr>
<td>1 (lowest numbers)</td>
<td></td>
<td>0.10</td>
<td>-0.11</td>
<td>0.94</td>
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<tr>
<td>3 (highest numbers)</td>
<td></td>
<td>0.02</td>
<td>-0.62</td>
<td>1.16</td>
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<td>Cardiovascular prevention need</td>
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<tr>
<td>Estimated high-risk proportion (Qrisk)</td>
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<td></td>
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<tr>
<td>1 (lowest)</td>
<td></td>
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<td>0.00</td>
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<tr>
<td>3 (highest)</td>
<td></td>
<td>-0.04</td>
<td>-0.90</td>
<td>0.31</td>
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<tr>
<td>Estimated CVD prevalence</td>
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<td>1 (lowest)</td>
<td></td>
<td>0.30</td>
<td>-0.01</td>
<td>1.42</td>
</tr>
<tr>
<td>3 (highest)</td>
<td></td>
<td>0.10</td>
<td>-0.17</td>
<td>1.06</td>
</tr>
</tbody>
</table>

*aIndex of Multiple Deprivation 2010 (1 most deprived, 3 least deprived).*
receive funding for preventive health services. Our findings might suggest PCTs benefiting from these initiatives are successfully addressing the needs of deprived communities. Alternately deprived areas may see greater need for CVD prevention, and therefore more vigorously support the programme. The impact of the programme on different socioeconomic groups needs to be carefully monitored but early indications from this and other studies suggest concerns that the programme may widen health inequalities may not be realized, and it may in fact reduce them.

We showed univariate associations between lower coverage and areas with a higher proportion of population aged 40–74 years, larger population size and more primary care staff. Lower coverage in PCTs with a higher proportion of 40–74-year-old population might suggest PCTs with older populations do not prioritize the programme, possibly spending more on other resources for their ageing population. Associations between coverage and population size were, however, not significant in multivariable analysis—possibly confounded by staffing levels. It may nonetheless be valuable to promote the programme in larger PCTs, with older populations—both characteristics of areas outside of major cities.

There have been concerns over effectiveness and cost-effectiveness of the Health Check programme from its outset. Findings from a recent systematic review have again raised the question about whether the programme will improve health outcomes, although it showed there was a dearth of recent studies. Key to the programme being effective is a high level of participation, yet our findings indicate low coverage suggesting that the programme may have limited public health impact.

Improving the Health Check coverage towards the Department of Health targets will require a concerted and multi-disciplinary approach. Strong collaboration is needed between policy-makers, commissioners and health-care professionals, with the programme receiving a guaranteed budget from LAs after the commission transition in April 2013. On-going and timely monitoring of attendance to the Health Check is needed. It might also be important to employ qualitative approaches to explore patients’ and health-care workers’ experiences of the Health Check to derive lessons for improving performance of the programme. With the large spending commitment of the programme, combined with evidence of limited effectiveness, the programme costs might be better deployed to lower cost and more effective population approaches, including policies to promote smoking cessation, healthy eating and regular physical activity. Further research is, therefore, needed to evaluate the clinical and cost-effectiveness of the programme.

**Limitations of this study**
To our knowledge, this study is the first to assess coverage of the NHS Health Check programme nationally. Data were available for all PCTs, including those not currently running a Health Check programme. We used data returns from PCTs to examine the Health Check coverage, which may limit the accuracy of the findings. The data were collected at a national level from all 151 English PCTs, but the sample size may limit the precision of the findings. Potentially important covariates (e.g., number of staff other than GPs) were dropped from multivariate analysis because of mathematical reasons; however, we present their univariable associations.

Some PCTs administer the programme in settings other than general practices, for example pharmacies or community settings. Our study was not able to investigate the impact of setting on programme coverage. The study had a cross-sectional, ecological design and we, therefore, could not determine the direct cause–effect relationship between the coverage and explanatory PCT-level variables. We did not include data from previous years of the programme. This provided a single, clear study outcome measure; but we were unable to examine cumulative coverage. Examining data returns, however, from the first 2 years of the programme, showed no evidence of PCTs ‘front-loading’ rollout, i.e. carrying out the bulk of activity in the start of a 5-year cycle.

**Conclusions**
Coverage of the NHS Health Check was lower than predicted during 2011/12, 3 years into this national programme. Coverage was higher in areas with greater deprivation. Coverage needs to be increased for the potential health benefits of the programme to be realized. Greater investment in the programme may be required to increase coverage in future years. Policy-makers need to decide whether any additional resource might be better invested in more cost-effective population-wide strategies, such as accelerating reductions in salt consumption and elimination of trans fats.

**Authors’ contributions**
M.A. conducted and A.R.H.D. and C.M. supervised the statistical analysis. All authors helped to interpret the findings of the data analysis. M.A., A.R.H.D. and C.M. wrote the first draft of the paper. All authors reviewed the manuscript critically for important intellectual content.

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**References**

24. Hull SA, Rivas G, Bobby J. Hospital data may be more accurate than census data in estimating the ethnic composition of general practice populations. *Inform Prim Care* 2009;17:67–78.


