Socio-economic status, ethnicity and diabetes management: an analysis of time trends using the health survey for England

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ABSTRACT

Background The National Health Service (NHS) has invested substantially in recent years to reduce variations in health care for chronic conditions such as diabetes. We examined trends in the management of diabetes in England between socio-economic and ethnic groups from 1998 to 2004.

Methods Secondary analyses of Health Survey for England data comparing achievement of national treatment target for blood glucose, blood pressure and cholesterol and use of medications in survey respondents with diabetes.

Results The proportion of respondents with diabetes achieving national treatment targets increased significantly between 1998 and 2004. There was a significantly lower increase in blood pressure control in the black group [13.9% (95% confidence interval (CI) 13.0–14.8%)] but higher increase in south Asian and white Irish groups when compared to the white British group [15.7% (95% CI 15.4–16.0%)]. Manual workers experienced lower improvements in blood pressure control [15.3% (95% CI 14.9–15.7%) versus 16.7% (95% CI 16.2–17.2%)] but higher improvements in cholesterol control [10.3% (95% CI 9.7–10.9%) versus 7.4% (95% CI 6.8–8.0%)] when compared to non-manual workers.

Conclusion There were considerable improvements in the management of diabetes in England during a period of sustained investment in health care quality but these were not distributed uniformly across ethnic and socio-economic groups.

Keywords diabetes management, ethnicity, Health Survey for England, socio-economic status, time trends

Background

Diabetes is an escalating global epidemic with considerable variations in health outcomes between ethnic and socio-economic groups.¹,² Ethnic minority groups within developed countries, such as England and the United States (US) generally have a higher prevalence of diabetes and higher mortality rates than the general population.³,⁴ Diabetes-related morbidity and mortality are inversely related to income and socio-economic status, with higher complication rates found in manual, compared with non-manual occupational groups.⁵,⁶ These inequalities may partly be explained by variable access to high quality diabetes care.⁷,⁸

Improving the quality of chronic disease management is a key component of health policy in many countries.⁹,¹⁰ The National Health Service (NHS) in England has invested substantially in recent years to improve standards and reduce variations in health care for individuals with chronic conditions such as diabetes.¹¹,¹² A key driver for these initiatives has been the belief that improved secondary prevention will reduce complication rates, demand for hospital services and thus overall healthcare spending.⁹,¹³

For diabetes, this investment includes the National Service Framework in 2001,¹⁴ National Institute for Clinical Excellence (NICE) guidelines in 2002¹⁵ and the new general practitioner contract that introduced pay for performance for primary care physicians in 2004.¹⁶ The Diabetes National Service Framework sets out a comprehensive national strategy for the prevention and management of diabetes, including a key target to improve the quality of disease registers.
in primary care. The new general practitioner contract sets out national standards for the management of a range of chronic diseases and general practitioners receive financial incentives for providing high quality care.

There has been little assessment of the impact of these quality initiatives on known variations in access to health care and health outcomes, which is a key requirement of all new government policies in the UK.\textsuperscript{17} Statistics from the first 2 years of the general practitioner contract suggest that most practices reached many of the higher Quality and Outcome Framework (QOF) targets for diabetes.\textsuperscript{18} However, these data are aggregated to practice level and do not permit examination of variations in care by age, gender, ethnicity or income. Moreover, no historical data are available to enable comparisons with performance before the implementation of the new contract.

The Health Survey for England is an annual survey of people living in private households and a primary mechanism for monitoring population health in England. The survey is conducted by the National Centre for Social Surveys and Research and University College London on behalf of the Department of Health. The 1998, 1999, 2003 and 2004 surveys examined cardiovascular disease and behavioural risk factors such as drinking, smoking and eating habits; within this, the 1999 and 2004 surveys focused on the main ethnic minority communities in England. We undertook a secondary analysis of data from these four surveys to examine trends in diabetes management within ethnic and socio-economic groups.

**Methods**

**Sampling and data collection**

Methods for the Health Survey for England are described in detail elsewhere.\textsuperscript{19} In brief, interviewers obtained household, socio-economic and personal details, information on health and illness and health service use from respondents. A trained nurse took anthropometric measurements including height and weight and asked respondents about prescribed medications at a follow-up visit soon after the interview according to survey protocols. Blood pressure, HbA1c and total cholesterol were measured in respondents aged 16 years and older. No HbA1c measurements were undertaken in 1998.

The 1998 and 2003 surveys were conducted with a representative sample of the general population, whilst the 1999 and 2004 surveys focused on ethnic minority communities involving a three-stage sampling process; a general population sample (approximately half the size of that in the previous year), an ‘ethnic boost’ sample involving stratified multistage probability sampling and a follow up survey of 569 Chinese households who took part in a Health Education Authority survey in 1998.

We selected respondents aged 40 years and above from the 1998, 1999, 2003 and 2004 surveys who answered yes to the question: ‘Were you told by a doctor that you had diabetes?’. Interviews with adults in the general population sample in 1999 and 2004 did not include cardiovascular disease module questions. We used white British respondents to the 1998 and 2003 surveys with diabetes as a comparison group.

**Study variables**

We examined control of HbA1c, blood pressure and cholesterol against national treatment targets (HbA1c $\leq 7.0\%$, BP $\leq 140/80$ mm Hg and total cholesterol $\leq 5.0$ m mol/L) and use of medications as they applied to our population in each of the 4 years. Independent study variables included social class, household income and ethnicity. We collapsed ethnicity into four categories (white British, black, south Asian, white Irish) and social class into two categories (manual, non-manual) for the analyses due to small numbers. White Irish people were considered as a separate ethnic group as they have been shown to experience significantly higher all-cause mortality than the national average in England and Wales.\textsuperscript{20} Respondents were grouped into approximate income quartiles, with those in quartile 1 having the lowest incomes and those in quartile 4 having the highest incomes.

**Data analysis**

For each indicator, we describe percentage achievement and change in achievement within each ethnic, social class and income group standardized by age and gender, with 95\% CI. All analyses were weighted to the general population in England, where indicated. We performed statistical analyses using Stata 9.1 (Texas, USA: Stata Corporation).

**Results**

The number of respondents with diabetes aged 40 years and over in 1998, 1999, 2003 and 2004 surveys were 401, 357, 557 and 372 respectively.

**Use of medications**

Uses of oral hypoglycaemic agents (OHAs), insulin, lipid-lowering and antihypertensive medications have all increased significantly since 1998. The extent of these increases differed between ethnic groups. Increases in the use of...
lipid-lowering and antihypertensive medications were significantly higher and insulin significantly lower in the south Asian and Irish groups when compared to the white British. Increases in prescribing of antihypertensive medications were significantly lower in the black group. South Asian and Black respondents were significantly more likely to be taking OHAs than white British respondents in both years (Table 1).

Increases in the use of lipid-lowering medications and insulin were significantly higher and antihypertensive medications significantly lower in the manual when compared to the non-manual occupational group (Table 2). Increases in the use of insulin were significantly higher and the use of antihypertensive medications and OHAs significantly lower in the lowest income group when compared to the highest income group (Table 3).

### Table 1 Ethnicity and use of medications

<table>
<thead>
<tr>
<th></th>
<th>Lipid-lowering</th>
<th>Antihypertensives</th>
<th>OHAs</th>
<th>Insulin</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1999</td>
<td>2004</td>
<td>Change</td>
<td>95% CI</td>
</tr>
<tr>
<td>White British</td>
<td>14.1</td>
<td>44.1</td>
<td>30.0</td>
<td>29.6–30.4</td>
</tr>
<tr>
<td>South Asian</td>
<td>13.1</td>
<td>51.6</td>
<td>38.5</td>
<td>37.9–39.1</td>
</tr>
<tr>
<td>Black</td>
<td>6.7</td>
<td>37.7</td>
<td>31.0</td>
<td>29.9–32.1</td>
</tr>
<tr>
<td>White Irish</td>
<td>14.4</td>
<td>44.1</td>
<td>30.7</td>
<td>39.3–41.9</td>
</tr>
<tr>
<td>All groups</td>
<td>13.2</td>
<td>45.4</td>
<td>32.2</td>
<td>31.9–32.5</td>
</tr>
</tbody>
</table>

**Note:**<sup>a</sup>Significantly different to the reference group after adjusting for age and gender.

### Table 2 Social class and use of medications

<table>
<thead>
<tr>
<th></th>
<th>Lipid-lowering</th>
<th>Antihypertensives</th>
<th>OHAs</th>
<th>Insulin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-manual</td>
<td>11.8</td>
<td>40.1</td>
<td>28.3</td>
<td>27.7–28.9</td>
</tr>
<tr>
<td>Manual</td>
<td>14.1</td>
<td>46.1</td>
<td>32.0</td>
<td>31.5–32.5</td>
</tr>
<tr>
<td>Total</td>
<td>13.0</td>
<td>43.4</td>
<td>30.4</td>
<td>30.0–30.8</td>
</tr>
</tbody>
</table>

**Note:**<sup>a</sup>OHAs, oral hypoglycaemic agents.

### Table 3 Income (quartiles) and use of medications

<table>
<thead>
<tr>
<th></th>
<th>Lipid-lowering</th>
<th>Antihypertensives</th>
<th>OHAs</th>
<th>Insulin</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>16.2</td>
<td>45.1</td>
<td>28.9</td>
<td>27.9–29.9</td>
</tr>
<tr>
<td>2</td>
<td>12.4</td>
<td>45.1</td>
<td>32.7</td>
<td>31.7–33.7</td>
</tr>
<tr>
<td>3</td>
<td>9.9</td>
<td>42.1</td>
<td>32.2</td>
<td>31.4–33.0</td>
</tr>
<tr>
<td>4</td>
<td>13.1</td>
<td>40.6</td>
<td>27.5</td>
<td>26.6–28.4</td>
</tr>
<tr>
<td>Total</td>
<td>12.0</td>
<td>42.9</td>
<td>30.9</td>
<td>30.3–31.5</td>
</tr>
</tbody>
</table>

**Note:**<sup>1</sup>¼ lowest income, <sup>4</sup>¼ highest income.

**Note:**<sup>a</sup>OHAs, oral hypoglycaemic agents.
Intermediate clinical outcomes

The proportion of respondents with diabetes meeting national treatment targets for blood glucose, blood pressure and total cholesterol increased significantly between 1998 and 2004. The extent of these increases differed between ethnic groups. Improvements in cholesterol control were significantly greater in the black and Irish groups and significantly lower in the south Asian group when compared to white British (Table 4).

Improvements in blood pressure control were significantly lower and improvements in cholesterol control significantly greater in the manual occupation group compared to non-manual group (Table 5). Respondents in the lowest income group had a significantly lower improvement in cholesterol control but a significantly higher improvement in blood pressure control when compared to those in the highest income group (Table 6).

### Table 4 Ethnicity and intermediate clinical outcomes

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Cholesterol ≤5 m mol/L</th>
<th>BP ≤140/80 mm Hg</th>
<th>HbA1c ≤7.0%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1999 2004 Change 95% CI</td>
<td>1999 2004 Change 95% CI</td>
<td>1999 2004 Change 95% CI</td>
</tr>
<tr>
<td>White British</td>
<td>28.3 36.4 8.1 7.6–8.6</td>
<td>32.7 48.4 15.7 15.4–16.0</td>
<td>— 47.5 — —</td>
</tr>
<tr>
<td>South Asian</td>
<td>37.9 40.6 2.7 1.9–3.5</td>
<td>30.6 49.2 18.6 18.0–19.2</td>
<td>26.5 55.4 28.9 28.3–29.5</td>
</tr>
<tr>
<td>Black</td>
<td>40.1 65.1 25.0 23.9–26.1</td>
<td>23.8 37.7 13.9 13.0–14.8</td>
<td>15.5 41.9 26.4 25.3–27.5</td>
</tr>
<tr>
<td>White Irish</td>
<td>42.7 68.2 25.5 23.8–27.2</td>
<td>30.3 55.1 24.8 23.5–26.1</td>
<td>28.4 39.3 10.9 9.6–12.2</td>
</tr>
<tr>
<td>All groups</td>
<td>32.8 41.4 8.6 8.3–8.9</td>
<td>31.4 48.2 16.8 16.5–17.1</td>
<td>24.4 48.0 23.6 23.2–24.0</td>
</tr>
</tbody>
</table>

### Table 5 Social class and intermediate clinical outcomes

<table>
<thead>
<tr>
<th>Social class</th>
<th>Cholesterol ≤5 m mol/L</th>
<th>BP ≤140/80 mm Hg</th>
<th>HbA1c ≤7.0%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-manual</td>
<td>29.0 36.4 7.4 6.8–8.0</td>
<td>30.3 47.0 16.7 16.2–17.2</td>
<td>— 53.5 — —</td>
</tr>
<tr>
<td>Manual</td>
<td>28.5 38.8 10.3 9.7–10.9</td>
<td>31.6 46.9 15.3 14.9–15.7</td>
<td>— 45.7 — —</td>
</tr>
<tr>
<td>Total</td>
<td>28.8 37.4 8.6 8.2–9.0</td>
<td>31.0 47.0 16.0 15.7–16.3</td>
<td>— 49.3 — —</td>
</tr>
</tbody>
</table>

### Table 6 Income (quartiles) and intermediate clinical outcomes

<table>
<thead>
<tr>
<th>Income quartile</th>
<th>Cholesterol ≤5 m mol/L</th>
<th>BP ≤140/80 mm Hg</th>
<th>HbA1c ≤7.0%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1998 2003 Change 95% CI</td>
<td>1998 2003 Change 95% CI</td>
<td>1998 2003 Change 95% CI</td>
</tr>
<tr>
<td>1</td>
<td>30.5 39.5 9.0 8.2–9.8</td>
<td>26.0 48.7 22.7 21.7–23.7</td>
<td>— 54.8 — —</td>
</tr>
<tr>
<td>2</td>
<td>22.7 39.2 16.5 15.7–17.3</td>
<td>29.7 47.4 17.7 16.7–18.7</td>
<td>— 39.2 — —</td>
</tr>
<tr>
<td>3</td>
<td>27.7 35.0 7.3 6.7–7.9</td>
<td>30.2 47.0 16.8 16.1–17.5</td>
<td>— 46.0 — —</td>
</tr>
<tr>
<td>4</td>
<td>25.0 47.3 22.3 21.6–23.0</td>
<td>35.3 49.3 14.0 13.1–14.9</td>
<td>— 45.2 — —</td>
</tr>
<tr>
<td>Total</td>
<td>26.9 40.1 13.2 12.9–13.5</td>
<td>30.5 47.9 17.4 17.0–17.8</td>
<td>— 46.9 — —</td>
</tr>
</tbody>
</table>

1 = lowest income, 4 = highest income.
Discussion

Main findings of the study
There has been considerable improvement in the management of diabetes in England during a period of sustained investment in health care quality. Despite this improvement, fewer than half of individuals with diabetes met national treatment targets for blood pressure, blood glucose and cholesterol in 2004. Moreover, improvements in the quality of diabetes care have not been uniform across ethnic and socio-economic groups. For example, there was a significantly lower increase in blood pressure control in the black group but higher increase in south Asian and white Irish groups when compared to the white British group.

What is already known on this topic
Our findings are consistent with previous UK and international studies, which have found improvements in process of care, prescribing of medications and intermediate clinical outcomes in diabetes. These improvements probably reflect the considerable investment in chronic disease management programmes in these countries over the past decade. However, available evidence from the United States and England indicate that whilst these improvements may have been accompanied by an attenuation of variations in processes of care, variations in clinical outcomes within diabetes populations frequently persist. For example, findings from the National Health and Nutrition Examination Survey (NHANES) suggest that poorer glycaemic control evident in black and Mexican American participants relative to whites in the 1988–94 survey had not been attenuated in 1999–2002, despite publication of national clinical guidance and other quality initiatives in the interim period. A separate study using data from NHANES and the Behavioural Risk Factor Surveillance System found persistently lower recording of process measures and worse intermediate outcomes between 1988 and 2002 in persons with lower educational attainment. In north-west England, McElduff and colleagues identified higher Hba1c levels amongst south Asians compared to Europeans attending primary and secondary care settings from 1995 to 2001.

Implications for practice
The NHS in England offers universal coverage with no charges for consultations with primary care physicians or specialists. Furthermore, patients with diabetes are exempt from prescription co-payments and do not pay towards the cost of any of their prescribed medications. Hence, there are no financial barriers to access to care for people with diabetes. Despite this, variations in diabetes care remain, suggesting that universal access to health care by itself will not address health inequalities. We did though find considerable improvements in the quality of diabetes care suggesting that national quality initiatives can achieve significant improvements in quality of care in a health system, offering universal coverage.

Limitations of this study
The Health Survey for England is a national, population-based survey and a primary mechanism for monitoring population health in England. Comparing outcomes across time using cross-sectional surveys may introduce bias, given that there may be systematic differences in the participants sampled in the different survey years. We combined Indians, Pakistanis and Bangladeshis into a single ethnic category of ‘south Asians’ and black African and Caribbeans as ‘blacks’, due to insufficient numbers. This may have masked differences in diabetes management and outcomes in what are known to be culturally and epidemiologically heterogeneous groups. Some of the comparisons made may not have reached statistical significance due to the small size of our sample. We were unable to adjust for certain patient factors, such as duration of diabetes and the presence or severity of complications, which may have been confounders in the relationship between our independent variables and diabetes management.

Our data predate the implementation of a new General Practitioner contract in England, a major pay for performance initiative, introduced in April 2004. Our findings suggest that considerable improvements in the management of chronic diseases such as diabetes are possible with national quality improvement initiatives but without the potential benefits of pay for performance. Preliminary findings suggest that pay for performance incentives in the new contract have not addressed ethnic group variations in prescribing or intermediate clinical outcomes in diabetes. However, these findings need to be confirmed with further prospective longitudinal studies with longer term follow up.

What this study adds
There has been considerable improvement in the management of diabetes in England since 1998. However, our findings suggest that existing quality improvement initiatives in England may have had a differential impact across socio-economic and ethnic groups. Improved monitoring of the impact of universally applied quality initiatives, such as the National Service Frameworks and General Practitioner contract, is essential to determine their impact on variations in...
chronic disease management and health inequalities. Ethical approval is not required for this study.

**Contributors**

C.M., S.S. and A.M. conceived the study. A.N. and C.M. performed the statistical analyses. All authors contributed to the data interpretation. C.M. wrote the first draft of the manuscript and all authors contributed to the revision and approved the final version. C.M. is the guarantor for the study.

**Conflict of interest**

AM is Associate Director (Primary Care) for the English Diabetes Research Network.

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**References**


