Race-ethnic and gender differences in representation within the English National Health Service: a quantitative analysis

Adrienne Milner1,2, Elizabeth Baker, Samir Jeraj, Jabeer Butt3


ABSTRACT

Objectives To evaluate race-ethnic and gender disparities in National Health Service (NHS) England employment in relation to positions, prestige and pay.

Design Retrospective cohort study using data from NHS Digital National Health Service Workforce Data Store.

Setting NHS trusts and clinical commissioning groups in England.

Participants 1,105,390 NHS Hospital and Community Health Service staff.

Results Chinese people (42.9%, 95% CI 41.7% to 44.1%) are the most likely to be employed as doctors, followed by Asians (32.0%), black people (26.8%, 95% CI 25.2% to 28.5%), and white people (18.4%). Women (44.1%, 95% CI 43.4% to 44.8%) are more likely to be employed in the highest paid positions than men (39.9%, 95% CI 39.2% to 40.6%). Black (6.8%, 95% CI 6.5% to 7.1%) and Chinese people (7.6%, 95% CI 7.1% to 8.1%) are less likely to be employed as doctors. However, where doctors are the most likely to be employed in the higher paid positions: (1) are women (46.0%, 95% CI 45.6% to 46.4%) more likely to be employed in the higher pay bands than men; (2) are ethnic minorities and women over-represented in employment; (3) are ethnic minorities and women under-represented in employment; (4) do race-ethnic differences vary by gender? and (5) does gender affect race-ethnic representation? We examined these outcomes using cross-sectional data from one time point, and further research is needed to examine how NHS initiatives, aimed at ensuring equality in hiring and promotion, influence outcomes over time.

Strengths and limitations of this study

This study examines both race-ethnic and gender differences in position, prestige and pay among NHS doctors, nurses and health visitors, and supports staff. It is the most comprehensive study to date of race-ethnic and gender disparities in NHS employment, and it has focused primarily on workers in the NHS in England. However, this study did not examine data from the English National Health Service: Primary Care Trusts and clinical commissioning groups. It does not evaluate race-ethnic and gender disparities in pay disparities in the NHS, but it has focused primarily on workers in the NHS in England and does not examine data from the English National Health Service: Primary Care Trusts and clinical commissioning groups. Further research is needed to examine how NHS initiatives, aimed at ensuring equality in hiring and promotion, influence outcomes over time.
### Table 1: Sample size for those in the highest band in the medical profession by race/ethnicity: women and men

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>64,967</td>
<td>49,424</td>
<td>15,543</td>
<td>106,033</td>
<td>67,338</td>
<td>38,695</td>
<td>20,270</td>
<td>13,209</td>
<td>7,061</td>
<td>50,61</td>
<td>62,334</td>
<td>41,575</td>
<td>20,77</td>
<td>909,886</td>
<td>723,692</td>
</tr>
<tr>
<td>Profession</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Doctor</td>
<td>4,252</td>
<td>1,860</td>
<td>2,392</td>
<td>30,361</td>
<td>11,742</td>
<td>18,559</td>
<td>3,265</td>
<td>1,512</td>
<td>1,753</td>
<td>2,674</td>
<td>1,316</td>
<td>1,358</td>
<td>1,358</td>
<td>61,593</td>
<td>30,209</td>
</tr>
<tr>
<td>Consultant</td>
<td>1,301</td>
<td>421</td>
<td>880</td>
<td>12,775</td>
<td>3,795</td>
<td>8,980</td>
<td>992</td>
<td>364</td>
<td>628</td>
<td>894</td>
<td>347</td>
<td>547</td>
<td>547</td>
<td>28,341</td>
<td>11,032</td>
</tr>
<tr>
<td>Grades 6 to 9</td>
<td>11,096</td>
<td>9,227</td>
<td>1,869</td>
<td>10,139</td>
<td>8,223</td>
<td>1,916</td>
<td>1,992</td>
<td>1,668</td>
<td>324</td>
<td>615</td>
<td>553</td>
<td>62</td>
<td>62</td>
<td>135,107</td>
<td>120,995</td>
</tr>
<tr>
<td>Support to doctors, nurses and midwives</td>
<td>18,156</td>
<td>14,166</td>
<td>3,990</td>
<td>18,754</td>
<td>13,842</td>
<td>4,912</td>
<td>4,279</td>
<td>3,500</td>
<td>779</td>
<td>513</td>
<td>433</td>
<td>80</td>
<td>224,295</td>
<td>197,311</td>
<td></td>
</tr>
<tr>
<td>Grades 5 to 9</td>
<td>825</td>
<td>646</td>
<td>179</td>
<td>953</td>
<td>672</td>
<td>281</td>
<td>238</td>
<td>180</td>
<td>58</td>
<td>63</td>
<td>41</td>
<td>22</td>
<td>22</td>
<td>10,457</td>
<td>8,681</td>
</tr>
</tbody>
</table>

**Methods**

Data and analyses: The data for this study came from the 2017 NHS Digital workforce statistics on NHS Hospital and Community Health service staff groups working in trusts and clinical commissioning groups in England (excluding primary care staff). We use 2017 rather than 2018 data primarily because the high proportion of Chinese doctors (22.9%) working in NHS England. Although Chinese people are by definition, Asian, data for this group are categorised separately because of the high proportion of Chinese doctors (22.9%) working in NHS England. Asian refers to those people who identify in the NHS England. Asian refers to those people who identify in the high proportion of Chinese doctors (22.9%) working in NHS England. Asian refers to those people who identify in the high proportion of Chinese doctors (22.9%) working in NHS England. Asian refers to those people who identify in the high proportion of Chinese doctors (22.9%) working in NHS England. Asian refers to those people who identify...
outside the Agenda for Change bands, because we could not determine their pay grade and thus prestige. For nurses and health visitors, this number was 2099 and for support staff, this number was 3217.

To make comparisons we calculated the proportion of individuals in a higher prestige occupation by race/ethnicity and then constructed 95% confidence intervals around these proportions using z-scores. Z-scores are used because the data are population level. For example, to calculate the proportion of doctors who are black ($\Pi_{\text{black doctor}}$), the SD ($\sigma_{\text{black doctor}}$) and the 95% CI, we used the following formulas:

$$\Pi_{\text{black doctor}} = \frac{n_{\text{black doctor}}}{n_{\text{black}}}$$

$$\sigma_{\text{black doctor}} = \sqrt{\frac{\Pi_{\text{black doctor}}(\Pi_{\text{black doctor}} - 1)}{N_{\text{black}}}}$$

$$95\% \ CI = \Pi_{\text{black doctor}} \pm 1.96(\sigma_{\text{black doctor}})$$

The proportion of black doctors is calculated as the number of black doctors divided by the number of black people working in the NHS. Prestige within jobs—that is the proportion of black people who are employed in the highest band among support to doctors, nurses and midwives—is calculated as the number of black people in the higher bands among those employed as support to doctors, nurses and midwives divided by the total number of black people who are employed in this way. For these analyses, we focus on examining the extent to which different race-ethnic groups are under- or over-represented in prestigious and higher paying jobs, net of the overall prevalence of that race-ethnic group in the NHS data. Thus, because white people comprise a majority in the NHS data, they will probably make up the majority of any job, regardless of pay band. In order to examine difference in prestige net of prevalence in the data, we focus on within-group differences in prestige. For ease of interpretation, percentages (ie, $\Pi \times 100$) rather than proportions are displayed in the tables and graphs.

### Table 2  Percentage and 95% confidence Intervals (CIs) for those in the highest band in the medical profession by race/ethnicity: women and men

<table>
<thead>
<tr>
<th>Profession</th>
<th>Black</th>
<th>95% CI</th>
<th>Asian</th>
<th>95% CI</th>
<th>Mixed race/ethnicity</th>
<th>95% CI</th>
<th>Chinese</th>
<th>95% CI</th>
<th>White</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doctor</td>
<td>6.5</td>
<td>6.4 to 6.7</td>
<td>28.6</td>
<td>28.3 to 28.8</td>
<td>17.9</td>
<td>17.3 to 18.4</td>
<td>42.9</td>
<td>41.7 to 44.1</td>
<td>6.8</td>
<td>6.7 to 6.8</td>
</tr>
<tr>
<td>Consultant</td>
<td>30.6</td>
<td>29.2 to 32.0</td>
<td>42.2</td>
<td>41.6 to 42.7</td>
<td>30.4</td>
<td>28.8 to 32.0</td>
<td>33.4</td>
<td>31.6 to 35.2</td>
<td>46.0</td>
<td>45.6 to 46.4</td>
</tr>
<tr>
<td>Nurses and health visitors</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grades 6 to 9</td>
<td>46.4</td>
<td>45.7 to 47.0</td>
<td>37.8</td>
<td>37.3 to 38.4</td>
<td>49.3</td>
<td>47.8 to 50.9</td>
<td>55.0</td>
<td>52.1 to 57.9</td>
<td>56.9</td>
<td>56.7 to 57.1</td>
</tr>
<tr>
<td>Support to doctors, nurses and midwives</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grades 5 to 9</td>
<td>4.5</td>
<td>4.2 to 4.8</td>
<td>5.1</td>
<td>4.8 to 5.4</td>
<td>5.6</td>
<td>4.9 to 6.2</td>
<td>12.3</td>
<td>9.4 to 15.1</td>
<td>4.7</td>
<td>4.6 to 4.7</td>
</tr>
</tbody>
</table>

### Figure 1  Percentage of those in the highest band in the medical profession by race/ethnicity: women and men.

Table 3  Percentage and 95% confidence Intervals (CIs) for those in the highest band in the medical profession by race/ethnicity: women

<table>
<thead>
<tr>
<th>Profession</th>
<th>Black</th>
<th>95% CI</th>
<th>Asian</th>
<th>95% CI</th>
<th>Mixed race/ethnicity</th>
<th>95% CI</th>
<th>Chinese</th>
<th>95% CI</th>
<th>White</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doctor</td>
<td>3.8</td>
<td>3.6 to 3.9</td>
<td>17.4</td>
<td>17.2 to 17.7</td>
<td>11.4</td>
<td>11.0 to 11.9</td>
<td>31.7</td>
<td>30.5 to 32.8</td>
<td>4.2</td>
<td>4.1 to 4.2</td>
</tr>
<tr>
<td>Consultant</td>
<td>22.6</td>
<td>20.7 to 24.5</td>
<td>32.3</td>
<td>31.8 to 32.8</td>
<td>24.1</td>
<td>22.6 to 25.5</td>
<td>26.4</td>
<td>24.7 to 28.0</td>
<td>36.5</td>
<td>36.1 to 36.9</td>
</tr>
<tr>
<td>Nurses and health visitors</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grades 6 to 9</td>
<td>45.0</td>
<td>44.3 to 45.7</td>
<td>36.5</td>
<td>35.9 to 37.0</td>
<td>47.8</td>
<td>46.3 to 49.4</td>
<td>54.1</td>
<td>51.1 to 57.0</td>
<td>56.5</td>
<td>56.3 to 56.7</td>
</tr>
<tr>
<td>Support to doctors, nurses and midwives</td>
<td>4.6</td>
<td>4.2 to 4.9</td>
<td>4.9</td>
<td>4.5 to 5.2</td>
<td>5.1</td>
<td>4.5 to 5.8</td>
<td>9.5</td>
<td>6.9 to 12.0</td>
<td>4.4</td>
<td>4.3 to 4.5</td>
</tr>
</tbody>
</table>

Patient and public involvement statement
Patients and the public were not involved in the design, conduct, reporting or dissemination of our research.

RESULTS
Race/ethnicity
Table 1 displays sample sizes for those in the highest band within the medical profession by race/ethnicity for women and men. Table 2 displays the percentages and 95% confidence intervals of higher job prestige by race/ethnicity. This information is displayed graphically in figure 1. Within the NHS, Chinese people, Asian people and people of mixed race/ethnicity are the most likely to be employed as doctors: 42.9% (95% CI 41.7% to 44.1%) of Chinese people, 28.6% (95% CI 28.3% to 28.8%) of Asians and 17.9% (95% CI 17.3% to 18.4%) of people of mixed race/ethnicity are employed as doctors compared with 6.5% (95% CI 6.4% to 6.7%) of black people and 6.8% (95% CI 6.7% to 6.8%) of white people. Indeed, Chinese people were exceptionally over-represented among doctors after accounting for their overall prevalence in the NHS data.

However, although Chinese people working in the NHS are more likely to be doctors, they are less likely to be in the highest paid positions, especially relative to white people. The percentage of Chinese doctors who are consultants is 33.4% (95% CI 31.6% to 35.2%) compared with a percentage of 46.0% (95% CI 45.6% to 46.4%) for white doctors. Indeed, white doctors comprise the highest percentage of consultants compared with doctors from the other race-ethnic groups. Within the NHS, black people are under-represented both among doctors as discussed above and among consultants, with only 30.6% (95% CI 29.2% to 32.0%) of black doctors being consultants. A similar pattern is found for NHS nurses and health visitors, where white people in this profession occupy the higher paid positions (grades 6 to 9). However, among the NHS support for doctors, nurses and midwives we find that Chinese people are the most likely to be in the higher paid positions (grades 5 to 9).
Table 3 displays the percentages and 95% confidence intervals of higher job prestige by race/ethnicity for women. This information is displayed graphically in figure 2. Additionally, table 4 displays the percentages and 95% confidence intervals of higher job prestige by race/ethnicity for men. This information is displayed graphically in figure 3. The pattern of job prestige by race/ethnicity for men and women is similar to the pattern found for the overall sample described above.

Gender
In general, within the NHS, men were nearly three and a half times more likely to be doctors than women: 22.4% (95% CI 22.2% to 22.6%) of the men in the data were employed as doctors compared with only 5.4% (95% CI 5.4, 5.5) of the women (calculations not shown). The greater likelihood for men to be doctors compared with women persisted throughout different race-ethnic groups. As shown in tables 3 and 4, gender differences were largest among white people for doctors. Within the NHS, white men were four times as likely to be employed as doctors compared with white women (16.9% (95% CI 16.7% to 17.0%) vs 4.2% (95% CI 4.1% to 4.2%)). Gender differences were smallest among Chinese people where Chinese men were twice as likely to be doctors compared with Chinese women (65.4% (95% CI 63.3% to 67.4%) vs 31.7% (95% CI 30.5% to 32.8%)). Men were also more likely to be consultants than women: 34.2% (95% CI 33.8% to 34.6%) of female doctors were consultants compared with 51.1% (95% CI 50.7, 51.5) of male doctors (calculations not shown). Within each race-ethnic group we found a similar pattern, with male doctors more likely to be consultants than female doctors. We found a similar pattern also for nurses and health visitors and for support for doctors, nurses and midwives, with men in the higher paid bands than women. This gender disparity persisted across race-ethnic groups.
DISCUSSION
Our analyses found important differences in who becomes doctors compared with other professions, and which doctors have a more prestigious position and are on a higher pay band. We found that although Chinese people working in the NHS are more likely to be employed as doctors than other race-ethnic groups, they are less likely to be in the most prestigious group of doctors—consultants. In contrast, while only a small proportion of white people employed by the NHS are doctors, they were the most likely to be employed as consultants. Black people working in the NHS were doubly disadvantaged, having a low prevalence among doctors and, within the doctor groups as consultants. Examination of gender differences in the NHS showed that men were more likely than women to be employed as doctors, and within doctors, as consultants. This was true for all the race-ethnic groups examined here. We found a similar relationship between race/ethnicity, gender and prestige among nurses and health visitors. However, among support staff for doctors, nurses and midwives, we found that Chinese people are more likely to occupy the higher prestige jobs.

Other studies have examined race-ethnic pay disparities in the NHS, but most of this research has focused on differences between consultants and non-consultants among doctors and has failed to examine gender and race-ethnic disparities.1–3 We examine disparities in the prevalence of doctors by race/ethnicity, and by prestige within doctors (consultants compared with non-consultants), nurses and health visitors (grades 1 to 5 compared with 6 to 9) and support for doctors, nurses and midwives (grades 1 to 4 compared with grades 5 to 9). Additionally, we examine gender differences within and across race-ethnic groups.

The results of our study indicate that the NHS continues to favour white candidates8 and male candidates for the most prestigious and best compensated positions, even when they are statistically less likely to be represented in the applicant pool, such as in the case of white consultants. This has a negative effect on race-ethnic minorities and women working in the NHS, and the lack of diversity in prestigious and decision-making NHS positions is likely to have adverse public health consequences. Thus, the NHS should seek to reduce bias in hiring and promotions through other measures, such as requiring those involved in the decision-making process to undertake training, ensuring that committees are diverse and that applications are blinded.

One limitation of our study is that we excluded those from our analyses whose race/ethnicity was not stated, unknown or outside the categories used in our analyses (Black, Asian, Chinese, mixed race/ethnicity or White). We also excluded those in the nurses and health visitor and support to doctors, nurses and midwives categories whose pay grade was not listed in the current Agenda for Change system (Agenda for Change does not apply to doctors). An additional limitation is that we used cross-sectional data from one time point. Research using multiple time points is needed to examine how potential NHS initiatives ensure equality in hiring and promotion decisions over time. For this to be feasible, the NHS must also use consistent race-ethnic categories to examine longitudinal differences. These longitudinal data may also provide insight into potential race/ethnic disparities and improvements over time in other areas of the NHS apart from prestige and pay, such as board membership, retention and pensions.

Twitter Samir Jeraj @sajeraj
Contributors AM, EB, SJ and JB were involved in the design of the study. AM and EB carried out the statistical analysis and wrote the first draft of the manuscript with the support of SJ and JB. All authors participated in further drafts and approved the final manuscript. The corresponding author confirms that all listed authors meet authorship criteria and that no others meeting the criteria have been omitted. AM is the guarantor.

Funding SJ and JB are supported by the Health and Wellbeing Alliance grant, funded by the Department of Health and Social Care. JB was supported by a grant from NHS England during conduct of the study. These funding sources had no role in the design or conduct of the study, the collection, management, analysis and interpretation of the data, or preparation, review or approval of the manuscript.

Competing interests AM, EB and SJ have no other relationships or activities that could appear to have influenced the submitted work. JB sits on the Workforce Race Equality Standard strategic advisory group. They oversee the implementation of a work programme to deal with racial inequality in the employment of staff in the NHS.

Patient consent for publication Not required.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement Data are available in a public, open access repository. Data are available upon reasonable request.

Open access This is an open access article distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited, appropriate credit is given, any changes made indicated, and the use is non-commercial. See: http://creativecommons.org/licenses/by-nc/4.0/.

ORCID iD
Adrienne Milner http://orcid.org/0000-0003-3209-6185

REFERENCES
1. Moberly T. Doctors from ethnic minority backgrounds earn less than white colleagues. BMJ 2018;363.