Impact of socio-economic circumstances on ethnic differences in lung function in children

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Background

• Ethnic minorities comprise 40% of the London population, which may have considerable impact on healthcare provision.
• Ethnic differences in lung function (LF) have been reported for over 150 years.
• Although several studies have investigated the extent to which socio-economic circumstances (SEC) may contribute to these differences, results are conflicting.
• The aim was to examine the impact of SEC on LF within a multi-ethnic population of children.

Methods

• As part of the Size and Lung function In Children (SLIC) study, school children (aged 5-11 years) of varied ethnicity were recruited from London primary schools.
• Children were categorised as: White (W=664), Black-African origin (Black: African=388; Caribbean=113; Black Other=42) or South Asian (Indian=318; Bangladeshi=48; Pakistani=39; Sri Lankan=47; S Asian Other=10). Those of “Other”/mixed ethnicities were excluded from this analysis.
• Anthropometry and spirometry (FEV1 and FVC) were performed in schools, with follow-up assessments 12 months later (Fig 1).
• Parents completed questionnaires including factors relating to SEC. SEC was measured at the individual level using Family Affluence Scale (FAS) and at the neighbourhood level using the English Indices of Multiple Deprivation (IMD).
• All children with parental consent were assessed. Data were excluded from those with current or chronic respiratory disease or significant congenital abnormalities.
• After adjusting for age and sex, height and weight were expressed as z-scores using the British 1990 reference1 based on White subjects.
• The magnitude of ethnic differences in LF, after adjusting for height, age and sex was examined by expressing results as z-scores based on the GLI-2012 “White” spirometry equations.2

• Spirometry was successfully assessed in 1669 children (46% boys) on 2365 test occasions (82% success).

Table 1: Group characteristics

<table>
<thead>
<tr>
<th></th>
<th>White</th>
<th>Black</th>
<th>S Asian</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>664</td>
<td>543</td>
<td>462</td>
</tr>
<tr>
<td>Boys (%)</td>
<td>49%</td>
<td>42%</td>
<td>48%</td>
</tr>
<tr>
<td>Born in UK (%)</td>
<td>87%</td>
<td>86%</td>
<td>79%</td>
</tr>
<tr>
<td>Age (y)</td>
<td>8.2 (1.6)</td>
<td>8.3 (1.6)</td>
<td>8.3 (1.7)</td>
</tr>
<tr>
<td>Weight (z score)1</td>
<td>0.4 (1.0)</td>
<td>1.0 (1.1)</td>
<td>0.0 (1.3)</td>
</tr>
<tr>
<td>Height (z score)1</td>
<td>0.3 (1.0)</td>
<td>1.0 (1.0)</td>
<td>0.1 (1.1)</td>
</tr>
<tr>
<td>Free school meals (%)</td>
<td>19%</td>
<td>53%</td>
<td>12%</td>
</tr>
<tr>
<td>Maternal routine/ manual occupations (%)</td>
<td>20%</td>
<td>39%</td>
<td>33%</td>
</tr>
<tr>
<td>Low FAS (score 1 of 5)</td>
<td>7%</td>
<td>14%</td>
<td>8%</td>
</tr>
<tr>
<td>IMD score: 5th quintile</td>
<td>28%</td>
<td>66%</td>
<td>22%</td>
</tr>
</tbody>
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Data shown are mean (SD) unless otherwise indicated.

• After adjustment for age and sex, children of Black-African origin were significantly heavier and taller compared to other groups while South Asians were significantly lighter (Table 1).

• More children of Black-African origin received free school meals, had mothers in routine/manual occupations, classified in the lowest category of the family affluence scale and lived in the most deprived areas of London.

Results

• Mean FEV1 z-score was significantly lower by 1.33 z-scores (15%) in children of Black-African origin and 0.89 z-scores (10%) in South-Asians compared to White children (Fig 2), with similar results for FVC and no differences in FEV1/FVC.

• After adjustment for SEC (IMD), FEV1 remained significantly lower in those of Black-African origin and South-Asian than White children (-1.08 and -0.84 z-scores respectively) (Fig 3).

• Neighbourhood deprivation appeared to explain more of the LF difference in Black-African than South Asian origin children (3% vs. 0.6% respectively).

Conclusions

• These results confirm ethnic differences in lung function.
• There is likely heterogeneity within these broad ethnic groupings and SEC only explained a relatively small proportion of the ethnic difference in lung function.

References:

2Guanjyer et al, Eur Respir J 2012