An audit of the selective neonatal BCG immunisation programme showed that only 51% of eligible infants received the vaccination. Infants of Indian subcontinental origin (ISC) were significantly more likely to have been vaccinated than non-ISC infants (ISC 70% vs non-ISC 29%). Greater awareness of the eligibility of non-ISC infants for BCG as well as simplification of the eligibility criteria are needed to help increase BCG vaccination rates.

Methods
In view of the low numbers of eligible infants in Shropshire, the birth of nearly a quarter of infants in midwifery-led units, the national shortage of BCG vaccine, as well as the rarity with which the junior medical staff administer intradermal injections, a BCG clinic was set up at a local hospital within an area of the highest concentration of eligible ethnic groups. Eligible infants were identified during the antenatal and postnatal period by the midwifery staff, and after parental consent, were referred to the BCG clinic where a trained nurse administered BCG immunisation by the multiple puncture percutaneous technique.

From the county’s Child Health System (CHS) database, a cohort of Shropshire resident infants born between 1 January 1999 and 31 December 2001 belonging to the eligible ethnic groups was identified using the ethnicity codes notified on the birth notification form. The ethnic origin of these infants was further verified using the information on the patient administration system.

The monthly returns of the maternity units were examined to ascertain the infants for whom BCG vaccination was requested by the perinatal staff. The CHS was queried to ascertain a cohort of infants who were notified to have received BCG vaccination between 1 January 1999 and 31 March 2002.

Data from the WHO’s global surveillance and monitoring project was used to define eligible infants. The \( \chi^2 \) test was used for comparison of proportions.

Results
During this three year period, 13 016 infants were born to Shropshire resident parents, of whom 86% were “white”, 5% were of known “other” ethnic groups, and ethnicity was not recorded in 9% of births. Five hundred and twenty eight infants were eligible for BCG vaccination in view of their ethnic origin. Infants from the Indian subcontinent (ISC) were the most common group (54%), followed by black African (13%), black Caribbean (9%), other black (2%), Chinese (5%), and other or mixed ethnicity (17%) infants.

Of these eligible infants, 51% were known to have received BCG vaccination. There were no significant differences in the annual rates of BCG vaccination during these three years. There were substantial differences in the rates of BCG vaccination between infants from different ethnic groups (table 1). Infants originating from the ISC were significantly more likely to have received BCG vaccination than those from non-ISC groups (ISC 70% versus non-ISC 29%; \( \chi^2 = 88.5, p < 0.0001 \)).

For 42% of eligible infants there was a record of BCG immunisation being requested from the maternity units in Shropshire. ISC infants were more likely to have been referred for BCG vaccination by perinatal staff than those from non-ISC groups (ISC 61% v non-ISC 20%; \( \chi^2 = 97.2, p < 0.0001 \)).

Discussion
This audit highlights continuing problems with selective neonatal BCG immunisation programme, with nearly half of the eligible infants not receiving the vaccination. It also shows that non-ISC infants are more likely to be missed by the current programme than the ISC infants. This was at least in part due to the failure of the perinatal staff to recognise the need for such vaccination among infants of black African and Caribbean origin, a group with a sharp increase in the incidence of TB in recent years. The list of countries with a high prevalence of TB remains long and complex, causing difficulties in recognition of at-risk infants. Recent objective estimates show that the prevalence of TB is in excess of 40/100 000 in all countries of Africa, the Russian federation, Eastern Europe, and Asia except Japan and South Korea, and it may be simpler to denote countries of origin for which BCG vaccination is not required. It is known that second and third generation ethnic immigrants may not understand the vulnerability of their infants to tuberculosis and this may result in withholding consent for BCG vaccination. Similarly, infants born of a mixed marriage may not be recognised as being eligible for selective neonatal BCG vaccination.

This audit could not determine reasons for non-vaccination of the infants identified and referred for BCG vaccination. This is likely to be due to a number of factors such as parental refusal, inability to attend the clinic, return to the country of origin for holidays, and lack of follow up of non-attendees.
In order to improve detection of eligible infants, we now plan to amend the pregnancy record to obtain more detailed information both about the ethnic origin as well as the country of origin, include a question about the eligibility for BCG vaccination at the time of booking, include an information leaflet about BCG vaccination in the pregnancy notes, as well as institute a system of notification to the general practitioners and health visitors of eligible infants who fail to attend for BCG vaccination.

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REFERENCES

Table 1  BCG vaccination status according to ethnicity

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Total no.</th>
<th>No. (%) referred by the maternity staff</th>
<th>No. (%) given BCG*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indian subcontinent</td>
<td>283</td>
<td>173 (61)</td>
<td>197 (70)</td>
</tr>
<tr>
<td>Black African</td>
<td>68</td>
<td>3 (4)</td>
<td>6 (9)</td>
</tr>
<tr>
<td>Black Caribbean</td>
<td>49</td>
<td>15 (31)</td>
<td>16 (33)</td>
</tr>
<tr>
<td>Black others</td>
<td>10</td>
<td>1 (10)</td>
<td>1 (10)</td>
</tr>
<tr>
<td>Chinese</td>
<td>29</td>
<td>10 (34)</td>
<td>14 (48)</td>
</tr>
<tr>
<td>Other ethnic groups/ mixed</td>
<td>89</td>
<td>21 (24)</td>
<td>33 (37)</td>
</tr>
<tr>
<td>All eligible ethnic infants</td>
<td>528</td>
<td>223 (42)</td>
<td>267 (51)</td>
</tr>
</tbody>
</table>

*Some infants missed by the maternity staff received BCG vaccination following subsequent referral by the primary care staff such as the general practitioners and health visitors.