Tuberculosis in England and Wales in 1993: results of a national survey

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Abstract

Background – A national survey of tuberculosis notifications in England and Wales was carried out in 1993 to determine the notification rate of tuberculosis and the trends in the occurrence of disease by ethnic group in comparison with the findings of similar surveys in 1978/79, 1983, and 1988. The prevalence of HIV infection in adults notified with tuberculosis in the survey period was also estimated.

Methods – Clinical, bacteriological, and sociodemographic information was obtained on all newly notified cases of tuberculosis in England and Wales during the six months from 2 January to 2 July 1993. The prevalence of HIV infection in 16–54 year old patients with tuberculosis notified throughout 1993 was assessed using “unlinked anonymous” testing supplemented by matching of the register of patients with tuberculosis with that of patients with AIDS reported to the PHLS AIDS centre. Annual notification rates were calculated using population estimates from the 1993 Labour Force Survey.

Results – A total of 2706 newly notified patients was eligible for inclusion in the survey of whom 2458 were previously untreated; the comparable figures for 1988 were 2408 and 2163. The number of patients of white ethnic origin decreased from 1142 (53%) in 1988 to 1088 (44%) in 1993 whereas those of patients of Indian, Pakistani, or Bangladeshi (Indian sub-continent (ISC)) ethnic origin increased from 843 (39%) in 1988 to 1014 (41%) and those of “other” (non-white, non-ISC) ethnic origins increased from 178 (8%) to 356 (14%). The largest increase was seen in the black African ethnic group from 37 in 1988 to 171 in 1993. Forty nine per cent of patients had been born abroad and the highest rates were seen in those who had recently arrived in this country. The overall annual notification rate for previously untreated tuberculosis increased between 1988 and 1993 whereas rates in the black African group have increased. An increased proportion of cases were found among people born abroad, particularly those recently arrived in this country. In previously untreated cases the level of drug resistance remains low and multi-drug resistance is rare. A small proportion of adults with tuberculosis were infected with HIV but there may be selective undernotification of tuberculosis in these patients.

Conclusions – The number of cases and annual notification rate for previously untreated tuberculosis increased between 1988 and 1993. Although the decline in rates in the white population has continued, the rate of decline has slowed. The high rates in the ISC ethnic group population have continued to decline since 1988 whereas rates in the black African group have increased. An increased proportion of cases were found among people born abroad, particularly those recently arrived in this country. In previously untreated cases the level of drug resistance remains low and multi-drug resistance is rare. A small proportion of adults with tuberculosis were infected with HIV but there may be selective undernotification of tuberculosis in these patients.

Keywords: tuberculosis, UK.

The steady decline in tuberculosis notifications in England and Wales which continued after the Second World War ceased in the mid-1980s and subsequently small increases over the previous year have been observed in 1988, 1989, 1991, 1992, and 1993. Several factors have been suggested as possible causes for the recent increases including the HIV epidemic, an ageing indigenous population, an increase in the number of recent immigrants from high prevalence countries, poverty, and an increase in the number of homeless persons. The information available from the routine notification system is insufficiently detailed to monitor the epidemiology of the disease, in particular the trends in different subgroups of the population.

Surveys of tuberculosis notifications were first undertaken in England and Wales in the 1960s to examine the occurrence of tuberculosis in greater detail following the recognition of the emerging problem of tuberculosis in immigrant groups. The most recent surveys were carried out by the Medical Research Council (MRC) in 1978–79, 1983, and 1988. The present survey was carried out in 1993 using similar methodology to previous
Tuberculosis in England and Wales in 1993

Table 1 Notifications of tuberculosis in six months

<table>
<thead>
<tr>
<th></th>
<th>1983</th>
<th>1988</th>
<th>1993</th>
</tr>
</thead>
<tbody>
<tr>
<td>Notifications to &quot;proper officers&quot;</td>
<td>3839</td>
<td>2748</td>
<td>3298</td>
</tr>
<tr>
<td>Duplicate notifications</td>
<td>107</td>
<td>71</td>
<td>141</td>
</tr>
</tbody>
</table>

Exclusions:

<table>
<thead>
<tr>
<th></th>
<th>1983</th>
<th>1988</th>
<th>1993</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients receiving chemoprophylaxis</td>
<td>207</td>
<td>105</td>
<td>199</td>
</tr>
<tr>
<td>Patients already notified</td>
<td>11</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Diagnosis changed by physician</td>
<td>104</td>
<td>51</td>
<td>65</td>
</tr>
<tr>
<td>Disease due to mycobacteria other than M tuberculosis</td>
<td>101</td>
<td>106</td>
<td>165</td>
</tr>
<tr>
<td>Other**</td>
<td>7</td>
<td>3</td>
<td>21</td>
</tr>
</tbody>
</table>

Total corrected notifications = 3839 + 107 = 3946

Total newly notiﬁed eligible patients = 3302 + 3002 = 6304

No. of notifications reported to the OPCS* = 3609 + 2669 = 6278

* Total corrected notifications.
** Includes patients not resident in the UK, patients with inactive disease notiﬁed after death, or patients with BCG abscess.

Figure 1 Tuberculosis notiﬁcations by ethnic group in the three surveys.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
<td>1983</td>
<td>1988</td>
<td>1993</td>
</tr>
<tr>
<td>Indian</td>
<td>1983</td>
<td>1988</td>
<td>1993</td>
</tr>
<tr>
<td>Pakistani and Bangladeshi</td>
<td>1983</td>
<td>1988</td>
<td>1993</td>
</tr>
<tr>
<td>Other</td>
<td>1983</td>
<td>1988</td>
<td>1993</td>
</tr>
</tbody>
</table>

Methods

The study methodology was similar to that described previously. Briefly, consultants in communicable disease control (CCDCs) provided copies of all notification forms for tuberculosis received during 1993. The notifying clinicians were asked to provide further demographic information on a clinical form for all patients notiﬁed during the ﬁrst six months and during the second six months of the survey period for patients aged less than 55 years only. The six regional tuberculosis centres and the Mycobacterium Reference Unit of the Public Health Laboratory Service (PHLS) provided results of species identiﬁcation and sensitivity tests on all ﬁrst isolates of Mycobacterium tuberculosis complex received in 1993. For patients on whom no clinical form was received, the survey team contacted the notifying clinicians or other staff directly.

In order to estimate the prevalence of HIV infection in adults notiﬁed in the survey, unlinked anonymous testing methodology was used. All patients aged 16–54 years notiﬁed throughout 1993 were eligible for inclusion. Clinicians were asked to provide limited demo-

graphic information on each patient (insufficient to permit identiﬁcation of the patient) on a special form which was attached to a ﬁlter paper card. Drops of blood or serum from the patient were placed on an attached ﬁlter paper card which was returned to the study centre by post for analysis. Specimens were examined by the PHLS Virus Reference Division for HIV-1 and HIV-2 infection. In addition the register of all patients reported in the survey was matched with the register of cases of AIDS and HIV infection reported to the PHLS AIDS Centre at the Communicable Disease Surveillance Centre.

Data on all cases notiﬁed with tuberculosis from 2 January to 2 July 1993 are reported here. To permit comparison with the results of previous notification surveys, patients who had previously been treated for tuberculosis have been excluded from the analyses but have been included in estimates of the annual notiﬁcation rates. Annual rates were estimated by multiplying the total number of notiﬁcations in the ﬁrst six months by a scaling factor (1.886) which is the ratio of all cases reported in 1993 to the Ofﬁce of Population Censuses and Surveys (OPCS) to those reported in the ﬁrst six months. Population estimates were obtained from the 1993 Labour Force Survey (commissioned tables). The trends in rates for the white ethnic group were examined for England only to enable comparison with rates published for previous surveys. The trends in age and sex speciﬁc rates for the white and Indian subcontinent population were also examined.

Data for the main survey were entered into an Oracle database and analysed using SPSS. Data for the HIV prevalence estimate were entered into and analysed with Epi-Info.

Results

After exclusions and removal of duplicates (table 1) 2706 notiﬁcations were eligible for inclusion in the survey but a further 248 previously treated patients were excluded from the analyses (unless otherwise stated). Clinical forms were received for 2296 (93%) of the 2458 previously untreated patients. Although the 1993 ﬁgure represented an increase of 13.6% in the 1988 total, there was a decline of 18.1% from the 1983 total.

ETHNIC GROUP

Both the number and proportion of white patients in England and Wales decreased from 1142 (53%) in 1988 to 1088 (44%) in 1993, whereas the number of patients of ISC ethnic origin increased from 843 (39%) to 1014 (41%). Cases of “other” ethnic origin nearly doubled from 178 (8.2%) in 1988 to 356 (14.5%) in 1993 (ﬁg 1). The largest increase in the “other” ethnic groups occurred among black Africans who accounted for 1.7% (37 cases) of all notiﬁcations in 1988 and 7.0% (171 cases) in 1993. In the black Caribbean group (classiﬁed as “West Indian” in previous surveys) the number of cases dropped from 70 in 1988 to 49 in 1993. Notifications increased
substantially in the remaining groups of “other” ethnic origin (mainly other Asian, Arab and mixed race) from 67 in 1988 to 135 in 1993.

Forty nine per cent of all previously untreated patients in the survey whose place of birth was known were born abroad compared with 45% in 1988. Among the 139 black African patients whose date of entry to the UK was known, 103 (74%) had first arrived in the United Kingdom during the previous five years whereas among the ISC group the proportion was 31%.

AGE AND SEX

The white patients were generally older than patients from the ISC and those of “other” ethnic origins: 588 (51%) of white patients were over 55 years compared with 24 (24%) of ISC and 38 (11%) of “other” ethnic origins (fig 2). While the proportion of white patients and those of “other” ethnic origins remained little changed from 1988, the proportion of ISC patients over 55 years had increased from 16%. A slightly higher proportion of white patients were male (60%) than those of ISC (48%) or “other” ethnic groups (52%).

ANNUAL NOTIFICATION RATES

The annual rate of newly notified previously untreated tuberculosis in England and Wales increased between 1988 and 1993 from 8.4 to 9.2 per 100 000 (table 2). The rate increased in England from 8.6 to 9.4 but decreased in Wales from 5.3 to 4.9. The rates declined in the white, Indian and black Caribbean ethnic groups and increased in all other groups. The highest rates were seen in the Indian, Pakistani

Table 2  Annual notification rates per 100 000 population in England and Wales by ethnic group (excluding those previously treated)

<table>
<thead>
<tr>
<th>Country &amp; Region</th>
<th>1983</th>
<th>1988</th>
<th>1993</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>England</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>1550</td>
<td>42 994</td>
<td>6.9</td>
</tr>
<tr>
<td>Indian</td>
<td>714</td>
<td>773</td>
<td>178.0</td>
</tr>
<tr>
<td>Pakistani or</td>
<td>374</td>
<td>422</td>
<td>169.0</td>
</tr>
<tr>
<td>Bangladeshi</td>
<td>117</td>
<td>6</td>
<td>0.0</td>
</tr>
<tr>
<td>Black Caribbean‡</td>
<td>78</td>
<td>494</td>
<td>30.0</td>
</tr>
<tr>
<td>Black African¶</td>
<td>0</td>
<td>634</td>
<td>47.0</td>
</tr>
<tr>
<td>Other</td>
<td>156</td>
<td>634</td>
<td>47.0</td>
</tr>
<tr>
<td>All</td>
<td>1704</td>
<td>50 042</td>
<td>12.2</td>
</tr>
<tr>
<td><strong>Wales</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All</td>
<td>2876</td>
<td>46 164</td>
<td>12.2</td>
</tr>
<tr>
<td>England &amp; Wales</td>
<td>3002</td>
<td>48 942</td>
<td>12.0</td>
</tr>
</tbody>
</table>

* Includes 847 000 in 1983, 296 000 in 1988 and 11 600 in 1993 whose ethnic origin was unclassified and were distributed among the other groups in proportion to reported figures for calculation of rates.

† For calculation of annual rates the numbers of cases in a year in each survey were estimated by multiplying the number of cases in the first six months with a scaling factor which was based on the proportion of cases reported to the OPCS in the first six months to the number reported in the whole year. The scaling factors used were: 1.9348 in 1988 and 1.886 in 1993.

‡ Number of cases in six months.


** Classified as West Indian in 1983 and 1988.

*** Includes two cases of unknown ethnic origin.
and Bangladeshi and black African ethnic groups and were 20–30 times those in the white population.

**White population**

An increase in rates with age was seen in England in 1993, particularly in men (fig 3). In several age groups the rates were higher in 1993 than in 1988, particularly in female subjects aged less than 15 years and males aged 15–24 years. The rates were higher in males than in females in all age groups except those age under 15 years; in the older age groups the rates were approximately twice as high in male subjects.

From 1953 until 1993, while notification rates have fallen in most age and sex groups, there has been a slowing in the rate of decline of the notification rate. The percentage annual declines in rates since 1978/79 (the first survey to use the current methodology) are shown in fig 4 for the 1983, 1988, and 1993 surveys. The considerable variation in the rate of decline between the different surveys in some of the age groups, in particular in young adults, is likely to be due, at least in part, to the relatively small numbers of notified cases in these groups in the later surveys. In all age groups the annual rate of decline was lower in 1993 than 1983. In some groups there appeared to be a marked increase in the rate of decline in 1988 followed by a similar reduction in 1993.

Between 1988 and 1993 the rates decreased in the Indian and Bangladeshi ethnic groups but increased in the Pakistani groups resulting in a small increase in the combined Pakistan/Bangladeshi rate but an overall decline in the ISC ethnic group. In all three ethnic groups the rates increased with age and were higher in those born abroad than those born in the UK (table 3). For individuals in the ISC ethnic group born abroad the rates were highest in those who had most recently arrived, as in previous surveys; in individuals arriving within the previous five years the rates were 10 times higher than for those who had first arrived more than 15 years previously. For children of ISC ethnic origin, both born in the UK and born abroad, the rates were, if anything, higher in 1993 than 1988.

Rates in the ISC ethnic group were directly standardised to the 1983 population to take into account the effect of age, country of birth, and year of first entry to the UK (table 3); the directly standardised rate declined more between 1983 and 1988 than between 1988 and 1993.

**Other ethnic groups**

Between 1983 and 1988 there was little change in the notification rate in the black Caribbean ethnic group but between 1988 and 1993 the rate and the number of cases decreased (table 2). In contrast there was a marked increase in both the number of cases and the notification rate in the black African ethnic group. As in the ISC ethnic group, the highest rates in the black African ethnic group were in those who had most recently arrived (the number of cases
Table 3 Annual notification rates in the population of Indian subcontinent ethnic origin in England by age, place of birth, and years since first entry to the UK (excluding those previously treated)

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Place of birth and years since first entry</th>
<th>1983</th>
<th>1988</th>
<th>1993</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Population estimate (1000s)</td>
<td>Rate per 100 000</td>
<td>Population estimate (1000s)</td>
<td>Rate per 100 000</td>
</tr>
<tr>
<td>&lt;15</td>
<td>UK</td>
<td>369</td>
<td>47</td>
<td>410</td>
</tr>
<tr>
<td></td>
<td>Abroad</td>
<td>77</td>
<td>64</td>
<td>55</td>
</tr>
<tr>
<td>&gt;15</td>
<td>UK</td>
<td>61</td>
<td>67</td>
<td>144</td>
</tr>
<tr>
<td></td>
<td>Abroad</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt;15 years</td>
<td>(31)</td>
<td>(23)</td>
<td>(127)</td>
</tr>
<tr>
<td></td>
<td>11–15 years</td>
<td>(194)</td>
<td>(213)</td>
<td>(84)</td>
</tr>
<tr>
<td></td>
<td>6–10 years</td>
<td>(105)</td>
<td>(242)</td>
<td>(69)</td>
</tr>
<tr>
<td></td>
<td>&lt;5 years</td>
<td>(72)</td>
<td>(702)</td>
<td>(70)</td>
</tr>
<tr>
<td>&gt;35</td>
<td>Abroad</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt;15 years</td>
<td>(286)</td>
<td>(126)</td>
<td>(247)</td>
</tr>
<tr>
<td></td>
<td>11–15 years</td>
<td>(258)</td>
<td>(200)</td>
<td>(59)</td>
</tr>
<tr>
<td></td>
<td>6–10 years</td>
<td>(52)</td>
<td>(316)</td>
<td>(22)</td>
</tr>
<tr>
<td></td>
<td>&lt;5 years</td>
<td>(22)</td>
<td>(773)</td>
<td>(18)</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>1220</td>
<td>175</td>
<td>1350</td>
</tr>
<tr>
<td></td>
<td>Directly standardised rate</td>
<td></td>
<td>175</td>
<td></td>
</tr>
</tbody>
</table>

*Standardised to the 1983 population estimates taking into account age, place of birth, and year of first entry into the UK.

Table 4 Site of disease by ethnic group in 1993

<table>
<thead>
<tr>
<th></th>
<th>White</th>
<th>ISC</th>
<th>Other</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Newly notified previously untreated patients</td>
<td>1088</td>
<td>1014</td>
<td>356</td>
<td>2458</td>
</tr>
<tr>
<td>Respiratory No. of patients*</td>
<td>834</td>
<td>612</td>
<td>253</td>
<td>1699</td>
</tr>
<tr>
<td>Type of lesion* (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pulmonary</td>
<td>778 (93)</td>
<td>484 (79)</td>
<td>219 (87)</td>
<td>1481 (87)</td>
</tr>
<tr>
<td>Pleural</td>
<td>59 (7.1)</td>
<td>70 (11)</td>
<td>24 (9.5)</td>
<td>153 (9.0)</td>
</tr>
<tr>
<td>Intrathoracic lymph nodes</td>
<td>6 (0.7)</td>
<td>52 (8.5)</td>
<td>13 (5.1)</td>
<td>71 (4.2)</td>
</tr>
<tr>
<td>Other</td>
<td>11 (1.3)</td>
<td>34 (5.6)</td>
<td>7 (2.8)</td>
<td>52 (3.1)</td>
</tr>
<tr>
<td>Non-respiratory No. of patients*</td>
<td>241</td>
<td>428</td>
<td>125</td>
<td>794</td>
</tr>
<tr>
<td>Type of lesion* (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lymph node</td>
<td>91 (38)</td>
<td>201 (47)</td>
<td>79 (63)</td>
<td>371 (47)</td>
</tr>
<tr>
<td>Bone and joint</td>
<td>35 (15)</td>
<td>60 (14)</td>
<td>10 (8.0)</td>
<td>105 (13)</td>
</tr>
<tr>
<td>Genitourinary tract</td>
<td>41 (17)</td>
<td>16 (3.7)</td>
<td>7 (5.6)</td>
<td>64 (8.1)</td>
</tr>
<tr>
<td>Abdomen</td>
<td>16 (6.6)</td>
<td>54 (12.6)</td>
<td>11 (8.8)</td>
<td>81 (10)</td>
</tr>
<tr>
<td>Central nervous system</td>
<td>9 (3.7)</td>
<td>19 (4.4)</td>
<td>2 (1.6)</td>
<td>30 (3.8)</td>
</tr>
<tr>
<td>Military</td>
<td>20 (8.3)</td>
<td>29 (6.8)</td>
<td>8 (6.4)</td>
<td>57 (7.2)</td>
</tr>
<tr>
<td>Abscess</td>
<td>8 (3.3)</td>
<td>21 (4.9)</td>
<td>7 (5.6)</td>
<td>36 (4.5)</td>
</tr>
<tr>
<td>Other</td>
<td>29 (12)</td>
<td>42 (9.8)</td>
<td>8 (6.4)</td>
<td>79 (9.9)</td>
</tr>
<tr>
<td>Site of disease not known</td>
<td>36</td>
<td>27</td>
<td>11</td>
<td>74</td>
</tr>
</tbody>
</table>

ISC = Indian subcontinent (India, Pakistan and Bangladesh).
* 23 white patients, 53 patients of ISC ethnic origin, and 33 of “other” ethnic origins had both respiratory and non-respiratory disease.
† Some patients had lesions at more than one site (percentages are of total respiratory and non-respiratory lesions respectively in each ethnic group).

in 1983 was too small to assess). The “other” ethnic groups, which included other Asian (such as Chinese, Vietnamese, Sri Lankan, Malaysian and Philippino), Arab and those of mixed ethnic origin, also showed an increase in both numbers of cases and notification rates.

Increase in population size

Between the 1988 and 1993 surveys the relative increases in the size of the populations of black Caribbean and white ethnic origin were small compared with the other ethnic groups. The largest increases in population were seen in the Bangladeshi and black African ethnic groups but, while the notification rate in the former group declined, it showed a marked increase in the latter.

SITE OF DISEASE

Respiratory tuberculosis alone, defined as pulmonary, pleural or mediastinal disease, was reported in 1590 (66.7%) of the 2384 patients in whom the site of the disease was reported (table 4). A further 109 (4.6%) patients had both respiratory and non-respiratory disease and 685 (28.7%) had non-respiratory disease alone. The proportion with non-respiratory disease increased slightly from 30.1% in 1988 to 33.3% in 1993.

There were considerable differences in the sites of disease by ethnic group: 811 (77%) of patients of white ethnic origin had respiratory disease alone compared with 559 (57%) of the patients of ISC ethnic origin and 220 (64%) of those of “other” ethnic origins; 218 (21%) of the patients of white ethnic origin had non-respiratory disease alone compared with 375 (38%) and 92 (27%) in the ISC and “other” ethnic groups, respectively. Lymphadenopathy was more common in patients of ISC ethnic origin occurring in 201 (20%) cases, whereas genitourinary disease was more common in the white ethnic origin group occurring in 41 (3.9%) cases.

BACTERIOLOGY

Of the 2458 previously untreated patients 1372 (56%) were reported to have had a positive
Tuberculosis in England and Wales in 1993

1065

white, ISC and “other” ethnic groups: 59%, increases have been reported from the United
than outside London (0.8%), and was higher the reduction in the annual rate of decline is
proportion positive was higher in men (2.5%) in most age and sex subgroups of the white
Specimens were received from 1059 (39%) of liable to be less reliable as they are based on a
other drugs. hence small numbers of cases the estimated
isoniazid alone and four (4%) to isoniazid and creased between 1988 and 1993. In ethnic
results available. Thirteen (13%) were resistant the number of cases and the noti®cation rate
12 (4.3%) of ISC origin, and seven (4.9%) in the older age groups. The decline in no-
tuberculosis, of whom 141 (57%) had positive and these were largely associated with recent
Two hundred and forty eight patients were white, ISC, black Caribbean, or black African
Previously treated patients
Two hundred and forty eight patients were reported to have been previously treated for
tuberculosis, of whom 141 (57%) had positive cultures and 101 (41%) had drug sensitivity
results available. Thirteen (13%) were resistant to one or more drugs including six (6%) to
isoniazid alone and four (4%) to isoniazid and rifampicin, two of whom were also resistant to
other drugs.

Drug Sensitivity
Previously untreated patients
Sensitivity test results were available for 882 isolates from previously untreated patients with
respiratory disease of which 44 (5.0%) were resistant to one or more drugs compared with
32 (3.6%) in 1988. In 1993, 27 (3.1%) were resistant to isoniazid alone, nine (1.0%) to
isoniazid in combination with one or more drugs, and one (0.1%) to rifampicin alone. The
equivalent figures in 1988 were 10 (1.2%), seven (0.8%), and one (0.1%), respectively. Resistance to isoniazid and rifampicin (with or without other drugs) was reported in three
patients in 1993 (0.3%) compared with one (0.1%) in 1988. Resistance to isoniazid alone
was reported in eight (1.7%) white subjects, 12 (4.3%) of ISC origin, and seven (4.9%)
patients from “other” ethnic groups, and resistance to isoniazid in combination with one
or more other drugs was reported in five (1.1%), two (0.7%), and two (1.4%), respectively.

Previously treated patients
Two hundred and forty eight patients were reported to have been previously treated for
tuberculosis, of whom 141 (57%) had positive cultures and 101 (41%) had drug sensitivity
results available. Thirteen (13%) were resistant to one or more drugs including six (6%) to
isoniazid alone and four (4%) to isoniazid and rifampicin, two of whom were also resistant to
other drugs.

Estimate of HIV Prevalence
Specimens were received from 1059 (39%) of the 2706 adults (aged 16–54 years) eligible for
inclusion in the HIV prevalence estimate. Twenty one (2.0%) were HIV positive. The proportion positive was higher in men (2.5%) than in women (1.3%), but was similar in both
sexes in the 16–34 year and 35–54 age groups. HIV prevalence was higher in London (4.3%)
than outside London (0.8%), and was higher in those of “other” ethnic origin (6.0%) and
lower in those of ISC ethnic origin (0.4%) than in those of white ethnic origin (1.6%).

Information provided by clinicians on the clinical forms, and from the register matching
exercise, identified a further 41 (2.5%) HIV positive patients among the 1647 eligible adults who had not been included in the unlinked anonymous HIV prevalence estimate. Thus, the overall estimate was that at least 62 (2.3%)
of the 2706 eligible adults were HIV positive.

Discussion
The 13.6% increase in the number of newly notified previously untreated cases between the
survey periods in 1988 and 1993 is consistent with the increase in notifications reported in
England and Wales from 1987 to 1993.1 Similar increases have been reported from the United
States and several European countries.13–1450% and 63%, respectively.
Notifications in England and Wales in 1994, however, declined by 5.6% from the 1993
figure,15 a similar decline to that seen in the USA in 1993 and 1994.16

The largest increase in notifications between the 1988 and 1993 surveys was in the Indian
subcontinent (ISC) ethnic group from 843 in 1988 to 1014 in 1993. This is likely to be due to
changes in the population size and structure as the overall rate in this ethnic group is con-
continued to decline, whether expressed as a crude rate or when standardised for age and year of
entry into this country. However, the rate of decline appears to be slower than that seen
between 1988 and 1993. The increase in noti®cations in the ISC ethnic group occurred mainly
in the Pakistani group, particularly among female subjects, and was associated with high rates among recent immigrants, especially in the older age groups. The decline in noti-
®cation rate in the Indian group may be due partly to a relatively smaller number of new
immigrants.

The largest relative increase in both the number and rate of notifications occurred in indi-
viduals of black African ethnic origin (from 37 noti®cations in 1988 to 171 in 1993 and
those of “other” ethnic origins – that is, not of white, ISC, black Caribbean, or black African
ethnic origin – from 71 in 1988 to 135 in 1993, and these were largely associated with recent
immigration to this country. By contrast, both the number of cases and the notification rate
in those of black Caribbean ethnic origin decreased between 1988 and 1993. In ethnic
groups with small populations in the UK and hence small numbers of cases the estimated
rates are likely to be subject to considerable variation due to chance. In addition, the es-
mates of the population denominators are liable to be less reliable as they are based on a
sampling survey.

Since 1953 a steady reduction in the rate of decline in notification rates has been apparent
in most age and sex subgroups of the white population and the results from 1993 are con-
sistent with a continuation of that trend. Using the 1978/79 survey as the starting point (®g 4),
the reduction in the annual rate of decline is apparent in most age groups and both sexes
between 1983 and 1993. However, the rate of decline appeared to increase markedly in some age and sex subgroups in 1988 followed by a large reduction in the decline in 1993. While the overall decline in the number and rate in the white group is reassuring, the small numbers in some age and sex groups make the changes difficult to interpret. Despite continuing the survey for the full 12 months in 1993 for cases up to 35 years of age, the confidence limits around estimates of the annual rate of decline in groups below this age remain wide. While the results may reflect true changes in the trends in the incidence rates, it is also possible that the annual rate of decline in these subgroups of the white population was over estimated in the 1988 survey for reasons which are not apparent.

To be comparable with the published estimates of notification rates in the white population from previous surveys the rates in the white population presented in figs 3 and 4 included those previously treated patients and re-notified and de-notified patients. However, a more appropriate comparison of the change between 1988 and 1993 excludes those inappropriately notified (such as those which were re-notified and those in whom the diagnosis was subsequently changed) while including those previously treated. On this basis, for male and female subjects combined, a 4.2% increase (95% confidence intervals CI −0.3 to 8.5) was seen in notifications in the 0–14 year group, a 4.3% increase (95% CI −0.8 to 9.2) in the 15–24 year group, and a 4.2% decrease (95% CI −5.0 to 2.4) in the 25–34 year group. These non-significant changes illustrate the difficulties in determining the trends in the age groups for which the impact of the schools’ BCG programme is relevant, despite extending the survey to a full year in these groups.

Only 56% of cases in the survey were confirmed by culture of the tubercle bacillus, and this proportion was higher in those with pulmonary disease (64%) than in those with non-pulmonary disease only (44%). These results are similar to those in 1988 suggesting that the increase in total notifications between the surveys is not due to an increase in diagnoses made on clinical grounds only. These proportions, however, may underestimate the true proportions somewhat as in 28% of cases (17% pulmonary, 35% non-pulmonary) a bacteriological result was not available either because a specimen had not been sent for bacteriological examination or because the result was not known. Nevertheless, a large proportion of cases are diagnosed and treated without bacteriological confirmation. Although the white population now contributes less than half of all notified cases of tuberculosis, it continues to contribute 55% of the infectious cases in the community (335 out of 614 pulmonary smear positive cases).

The prevalence of resistance to isoniazid in newly notified previously untreated patients in 1993 has increased since 1988 but the total numbers remain low. Initial resistance was more common in individuals of ISC or “other” ethnic origins as in previous surveys and in the USA. The numbers of previously untreated cases with multi-drug resistant isolates — that is, resistant to isoniazid and rifampicin with or without resistance to other drugs — also increased but the numbers involved (one isolate in 1988 and three isolates in 1993) are too small to identify a trend. Multi-drug resistance was proportionately higher in previously treated patients (4%) than in previously untreated patients (0.3%), but again the numbers are low. Isolated resistance to pyrazinamide or rifampicin also remains rare.

The participation rate in the HIV prevalence survey is disappointing but may be understandable; there are likely to be particular difficulties in conducting HIV testing in patients with tuberculosis, even using unlinked anonymous methodology, as most of the patients are not from recognised risk groups and the physicians looking after the patients are often not familiar with the unlinked anonymous methodology. The 61% of eligible cases who were not included were demographically similar to those who were included (data not presented) and the estimate of the HIV prevalence in this group (based on alternative sources of information) is also similar (2.5%), suggesting that the results from the survey may be reasonably representative of the prevalence in all notified cases of tuberculosis (although because of the methodology used, the latter estimate could not include individuals whose HIV infection status was not known). The higher prevalence of tuberculosis in “other” ethnic origins compared with the white population, the lower prevalence in those of ISC origin, and the higher prevalence in male subjects and in London was to be expected in the light of the well established distribution of AIDS cases in different groups of the population of England and Wales. As a result of the exercise to identify co-infected patients, a further 60 cases of tuberculosis were identified among patients reported with AIDS to the PHLS AIDS Centre in 1993 who were not included in the present survey and whose HIV infection status was unknown: 35 of these cases were re-notified and those in whom the diagnosis was subsequently changed; 25 of the remainder (13 isolated) were co-infected patients, a further 60 cases would be comparable with the published estimates of notification rates in the white population from previous surveys the rates in the white population presented in figs 3 and 4 included those previously treated patients and re-notified and de-notified patients. However, a more appropriate comparison of the change between 1988 and 1993 excludes those inappropriately notified (such as those which were re-notified and those in whom the diagnosis was subsequently changed) while including those previously treated. On this basis, for male and female subjects combined, a 4.2% increase (95% confidence intervals CI −0.3 to 8.5) was seen in notifications in the 0–14 year group, a 4.3% increase (95% CI −0.8 to 9.2) in the 15–24 year group, and a 4.2% decrease (95% CI −5.0 to 2.4) in the 25–34 year group. These non-significant changes illustrate the difficulties in determining the trends in the age groups for which the impact of the schools’ BCG programme is relevant, despite extending the survey to a full year in these groups.

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associated with an increase in the number of cases of non-tuberculosis mycobacterial lymph node infections in children and M avium intracellulare infections in patients with HIV infection. The continuing problems in the notification system have been reviewed by a subgroup of the Joint Tuberculosis Committee of the British Thoracic Society.11

Improved notification of tuberculosis cases following the appointment of CCDCs to all districts in England and Wales may have contributed to some of the apparent increases in cases in recent years. In addition, extra cases have certainly occurred as a result of the HIV epidemic but, although it is likely that this contribution is relatively small and concentrated in London, the extent of this excess may be underestimated due to failure to notify all such cases. Other factors linked with poverty, such as overcrowding, low income, malnutrition and homelessness, have been associated with increased levels of tuberculosis but this survey cannot throw any light on the contribution of these factors to the increase in tuberculosis in recent years.

In conclusion, the increase in the number of cases of tuberculosis in England and Wales between 1988 and 1993 has been largely associated with extra cases occurring in certain ethnic minority subgroups of the population, particularly in patients who have recently arrived in this country. Tuberculosis has continued to decline in the white population but the rate of decline has continued to slow. Changes since the previous survey in 1988 in tuberculosis rates in specific age/sex groups in the white population are difficult to interpret because of low numbers of cases and wide confidence intervals. Drug resistance in previously untreated cases remains low and multidrug resistance is rare. About 2.3% of adults with tuberculosis notified in the survey were HIV infected but the true prevalence of co-infection may be higher because of selective undernotification of tuberculosis in HIV infected patients. More detailed reports from the survey are being prepared on trends in the geographical distribution of disease, tuberculosis in children, and the overlap with the HIV epidemic.

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