

**SURVEILLANCE OF TUBERCULOSIS**  
**IN NORTHERN IRELAND**  
**2003**

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# Table of contents

<b>Summary</b>	<b>3</b>
<b>1. Introduction</b>	<b>4</b>
<b>2. Methods</b>	<b>6</b>
2.1. Sources of information	6
2.2. Definition	6
2.3. Data analysis	7
<b>3. Results</b>	<b>7</b>
3.1. Notifications	7
3.2. Tuberculosis cases	8
3.3. Pulmonary tuberculosis cases	10
3.4. Non-pulmonary tuberculosis cases	12
3.5. Anti-tuberculous treatment	14
3.6. Non tuberculosis cases	15
3.7. Surveillance of mycobacterial isolates susceptibility to anti-tuberculous drugs	16
<b>4. Discussion</b>	<b>17</b>
4.1. Enhanced Surveillance of Tuberculosis in England, Wales & Northern Ireland	17
4.2. Incidence of tuberculosis in Northern Ireland by age	19
4.3. Paediatric tuberculosis in Northern Ireland	21
4.4. Tuberculosis in Northern Ireland by place of birth	23
4.5. Tuberculosis in healthcare workers	24
4.6. Incidence of <i>M. bovis</i> infection in Northern Ireland	25
4.7. Summary of tuberculosis in Northern Ireland at present	25
<b>5. Outcome Surveillance</b>	<b>28</b>
<b>6. References</b>	<b>29</b>

## Summary

In 2003 as part of the enhanced surveillance of tuberculosis notification scheme, CDSC (NI) received 60 notifications of tuberculosis. One case was subsequently identified as infection with a mycobacterium other than tuberculosis complex (MOTT) and a further two cases were subsequently diagnosed as having a condition other than tuberculosis. Thirty-eight cases were culture confirmed as *M. tuberculosis* infection and a further two cases were culture confirmed as *M. bovis* infection. In addition to the culture confirmed cases; three cases were positive by histological examination of lymph nodes, lung tissue or joint tissue. The outstanding fourteen cases remain notified on the basis of clinical and other laboratory diagnosis, giving a total of fifty-seven notified cases of tuberculosis identified through this programme in 2003. The annual notification rate of tuberculosis was estimated at 3.3 cases per 100,000 population.

Thirty-six of the 57 notified cases had pulmonary disease and 21 had non-pulmonary disease. Of the 36 pulmonary tuberculosis cases: 15 were both sputum smear and culture positive and a further 9 (sputum or bronchoscopy sample) were culture positive only. Eight patients with pulmonary disease died. Tuberculosis was the cause of death in 4 cases and was cited as a contributing factor in 1 of the 4 remaining cases.

Sixteen of the 21 non-pulmonary tuberculosis cases were confirmed by culture (14 *M. tuberculosis* and 2 *M. bovis*). The sites of disease reported in these cases were: lymph nodes (5), pleura (2), genitourinary (5), meningeal (2), gastrointestinal (1), joint/bone (4) and other (2).

Outcome data has been provided for 52 of the 57 cases. Details of initial treatment were recorded for 41 cases, of which 40 received a combination of rifampicin, isoniazid and pyrazinamide (with or without ethambutol). Continuation therapy was recorded for 37 cases, all of which received a combination of rifampicin and isoniazid, with or without an additional drug.

Antimicrobial sensitivity testing results were available for all 38 *M. tuberculosis* isolates and 1 isolate was found resistant to both isoniazid and streptomycin. The 2 *M. bovis* isolates were also subjected to antimicrobial sensitivity testing and, as expected, each was found resistant to pyrazinamide.

## 1. Introduction

Clinicians in Northern Ireland, in line with those in the rest of the United Kingdom, are required to notify all cases of tuberculosis to the Director of Public Health of the Health and Social Services Board (HSSB) of residence. Enhanced surveillance of tuberculosis was established in Northern Ireland in 1992, with the introduction of two customised data collection forms.

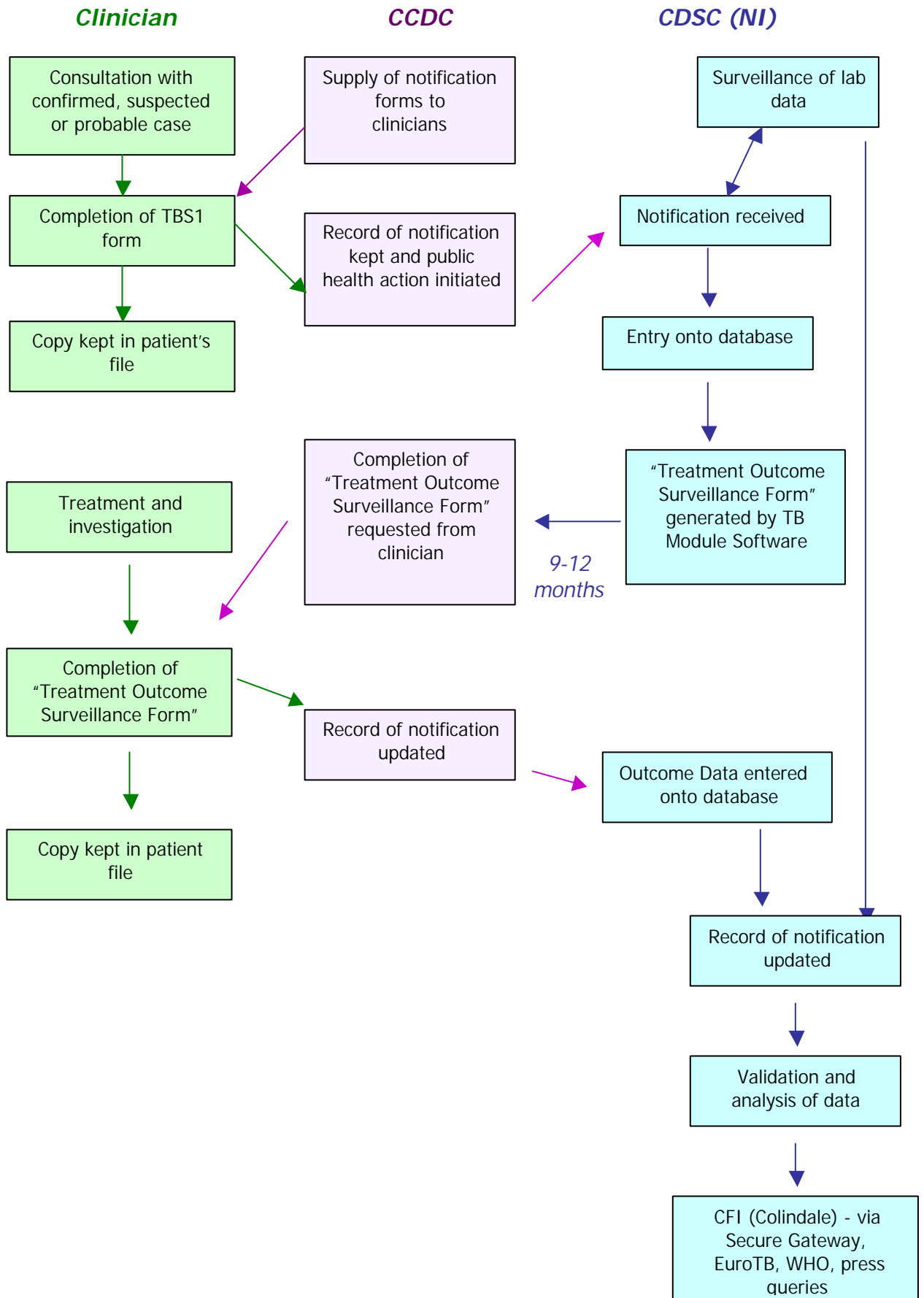
The notification form, TBS1, is used to collect clinical, demographic and microbiological information. The collection of outcome data, for all cases notified after 1 January 2001, was introduced in England and Wales at the beginning of 2002. In order to facilitate the export and central collation of data for England, Wales and Northern Ireland, outcome data is now collected across all three regions of the UK on a standardised 'Tuberculosis Treatment Outcome Surveillance Form'. This form, which replaces the TBS2 form, has been customised for local use and continues to collect details of drug treatment and outcome - together with any additional clinical and/or microbiological information not available at the time of initial notification.

Once a case has been notified and the TBS1 details entered onto a secure database at CDSC (NI), 'Tuberculosis Treatment Outcome Surveillance Forms', are generated automatically. These forms are then forwarded, approximately 9 months after initial notification, to the appropriate CCDC for completion by the patients' clinician.

All forms are subsequently forwarded to the Northern Ireland Communicable Disease Surveillance Centre CDSC (NI) where the information is entered onto a secure database, validated (using laboratory reports and anti-microbial resistance information), updated and analysed. The information is then used for inclusion in national and European and WHO reports, as well as for disease surveillance at a local level. A summary of the process is shown on the following page.

If *M. bovis* infection is identified in a notified patient, an additional questionnaire (available to download at <http://www.cdscni.org.uk/forms/>) is forwarded to the CCDC in the patient's Board of residence and, once completed, is returned to the Centre for Infections at Colindale. This questionnaire collects data on: case background information, travel history, unpasturised milk/milk product consumption and occupational details (including animal contact).

This report presents the epidemiological data for tuberculosis cases reported in Northern Ireland (NI) from 1<sup>st</sup> January 2003 to 31<sup>st</sup> December 2003. As the data collection process can only be completed 12 months after the initial notification, an annual epidemiological report does not normally become available until 18 months after the end of the reporting period.



## 2. Methods

### 2.1. Sources of information

The sources from which information used in the surveillance programme is taken include enhanced surveillance notification forms, the NI laboratory reporting system, information provided by the UK Mycobacterial Resistance Network (MYCOBNET) and death certifications.

All laboratories report a comprehensive list of clinically significant microbiological data to CDSC (NI), including isolates of *Mycobacterium* species. The Northern Ireland Mycobacterial Reference Laboratory, based at the Northern Ireland Public Health Laboratory at Belfast City Hospital, has also been participating in a national system for the surveillance of drug resistance in *Mycobacterium tuberculosis* complex organisms. This scheme, called MYCOBNET, provides information about drug resistant organisms in cases where the organism has been microbiologically confirmed.

### 2.2. Definitions

Case definitions are based on the recommendations developed by the working group of the World Health Organisation (WHO) and the European Region of the International Union Against Tuberculosis and Lung Disease (IUATLD).

**“culture confirmed” case** is defined as one in which the diagnosis has been confirmed by culture of *Mycobacterium tuberculosis*, *M. bovis* or *M. africanum*.

**“non culture confirmed” case\*** is based on a clinical diagnosis of tuberculosis, where the physician has the intention to treat with a full course of anti-tuberculous therapy. Such cases may have been clinically diagnosed and “confirmed” by methods other than culture, e.g., sputum smear or histology.

Both types of cases should be notified through this surveillance system. Any case which subsequently does not fulfil one of the above case definitions is marked as denotified but remains in the dataset. This would include those with diagnosis other than tuberculosis.

**\* For cases notified after August 2003, “Non culture confirmed case” is replaced by “Other than culture confirmed case”. In the absence of culture confirmation, such a case needs to meet the following criteria:**

“A clinician’s judgement that the patient’s clinical and/or radiological signs and/or symptoms are compatible with tuberculosis *and* a clinician’s decision to treat the patient with a full course of anti-tuberculosis treatment.”

**Multi-drug resistance (MDR)** is defined as resistance to at least isoniazid and rifampicin, with or without resistance to other drugs.

### 2.3. Data analysis

Data are entered onto and analysed using custom designed Microsoft Access-based software called HPA Regional Module for Enhanced TB Surveillance (2004; version 3.0 release 6). The 2003 mid-year population estimates (Registrar General Northern Ireland, NISRA) were used for calculating rates.

## 3. Results

### 3.1. Notifications

A total of 60 cases were notified through the surveillance scheme during 2003. Of these 60 notifications, one was laboratory confirmed as an infection with a mycobacterium other than tuberculosis (MOTT) and two further cases were subsequently diagnosed as having an illness other than tuberculosis. These three patients, diagnosed with another condition or an infection with MOTT, were de-notified but remained recorded in the dataset. They were excluded from the main analysis and analysed separately. This gave a total of 57 cases of tuberculosis notified during the course of 2003, of which 40 (70 %) were culture confirmed. Thirty-eight of the isolates were identified as *M. tuberculosis* and two as *M. bovis*. Seventeen cases were notified on the basis of clinical or non-culture diagnosis and response to anti-tuberculous therapy. Of these 17 cases; three were positive by histological examination of lymph nodes, lung tissue or joint tissue. Eleven of the remaining 14 cases were notified with pulmonary tuberculosis and two of these were close contacts of known culture positive pulmonary tuberculosis patients. Of these 11 patients; four responded well to anti-tuberculous therapy, three patients died shortly after treatment commenced and treatment details were not available for the remaining four patients.

Of the 57 tuberculosis cases, 36 (63 %) had pulmonary disease and 21 (37 %) had non-pulmonary disease. Follow-up information (either Treatment Outcome Form or death certificate) was provided for 52 (91 %) cases (Table 1).

**Table 1: Enhanced TB surveillance notification forms submitted in Northern Ireland, 2003**

	TBS1	Follow-up	TBS1/follow-up (%)
Total	57	52	91

### 3.2 Tuberculosis cases

The annual notification rate of tuberculosis for Northern Ireland in 2003, based on 57 notifications, was estimated at 3.3 cases per 100 000 population. Initial examination of this rate would suggest that the continued increase in the incidence of tuberculosis within Northern Ireland between 2000 (rate of 3.0 per 100 000 population) and 2002 (rate of 3.9 per 100 000 population) has now ceased. However, preliminary analysis of 2004 notification data indicates that, overall, the incidence of tuberculosis is continuing to rise (provisional rate of 4.9 per 100 000 population).

**Table 2: Tuberculosis cases, Northern Ireland 2003**

	Confirmed	Non-culture confirmed*	Total	Rate per 100 000
Total	40	17	57	3.3

\* A number of notified individuals, although never culture confirmed, were known contacts of others who already had culture confirmed tuberculosis. A further number of non-culture confirmed cases displayed clinical symptoms such as lung X-ray changes, heaf conversion or were diagnosed at post-mortem.

Of the 57 tuberculosis cases, 36 were male and 21 were female, giving a sex ratio M/F of 1.7 (a slight increase in the ratio of 1.5 recorded in both 2001 and 2002). The ages ranged from 1 to 89 years with a median, and also a mean, of 53 years. The age-sex distribution is shown in Table 3 and Figure 1. The highest proportion of cases for men was in the 65-74 age-group and, for women, was in the 75-84 age-group. Four children under the age of 15 years were notified with tuberculosis during 2004. All were of white ethnic group, all were born in the UK and three of the four were household contacts of known tuberculosis cases. Although infection was not culture confirmed in any of these children, they all exhibited clinical changes consistent with tuberculosis and were treated as cases – not as contacts.

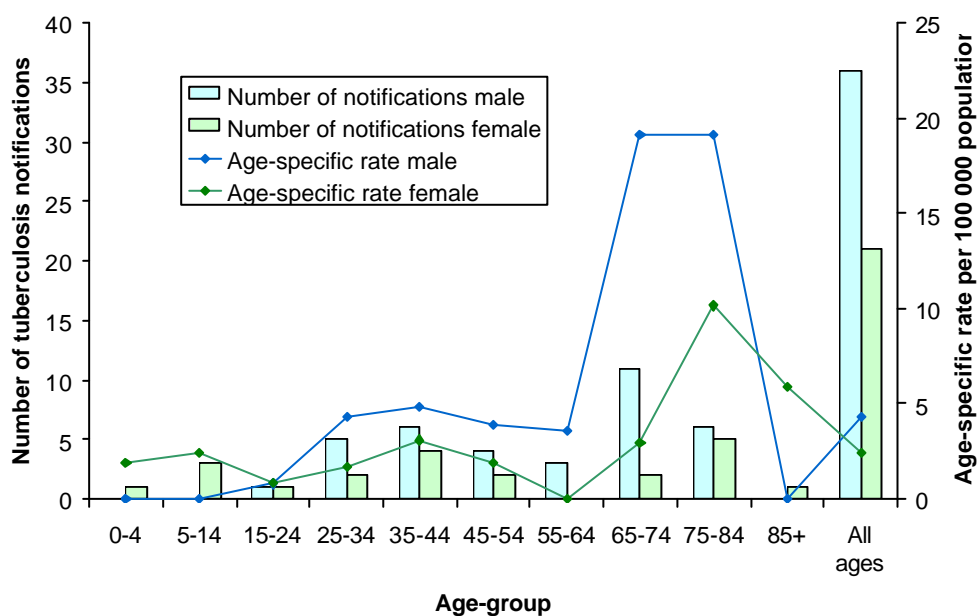
During 2003, the highest age-specific rate for male patients occurred in those aged 65-74 years and 75-84 years. For female patients, the highest age-specific rate occurred in those aged 75-84 years. Overall, the age-specific rate for men was higher than that for women, except in those under 15 years of age or over 85 years of age at the time of notification. (Table 3 and Figure 1).



**Table 3: Rates of notification of tuberculosis cases per 100 000 population in Northern Ireland by age and sex, 2003**

<i>Age-group</i>	<b>Male</b>	<b>Female</b>	<b>Total</b>
<b>0-4</b>	0.0	1.9	0.9
<b>5-14</b>	0.0	2.5	1.2
<b>15-24</b>	0.8	0.8	0.8
<b>25-34</b>	4.4	1.7	3.0
<b>35-44</b>	4.8	3.1	3.9
<b>45-54</b>	3.9	1.9	2.9
<b>55-64</b>	3.6	0.0	1.7
<b>65-74</b>	19.1	2.9	10.3
<b>75-84</b>	19.1	10.1	13.6
<b>85+</b>	0.0	5.9	4.2
<b>All ages</b>	<b>4.3</b>	<b>2.4</b>	<b>3.3</b>

**Figure 1: Notified cases of tuberculosis by age and sex, and age-specific rates per 100 000 population, Northern Ireland, 2003**



In 2003, the country of birth was recorded for all 57 notified cases. Forty-five (79 %) were born in the United Kingdom or Republic of Ireland, three were born in India, two were born in Portugal and one was born in each of the following countries: China, East Timor, Kenya, Philippines, Poland, Sierra Leone and Uganda. In the 10 years between 1992 (when enhanced surveillance of tuberculosis commenced in Northern Ireland) and 2002, an average of 90 % (range 83 % -100 %) of all notified individuals were known to have been born in the UK or Ireland. In 2003, this has decreased to below 80 % and provisional data for 2004 indicates a further decrease, to 68 %.

Information regarding any previous tuberculosis infection was recorded for 50 of the 57 cases notified during 2003. Five individuals were reported to have received their first diagnosis of tuberculosis between the 1930's and the 1960's – when all were children or young adults – but only one individual is recorded as having been treated with at least one month of chemotherapy at the time of original diagnosis. Detailed information on the year of initial diagnosis, or treatment received, was not available for the fifth case.

### **3.3. Pulmonary tuberculosis cases**

Of the 57 tuberculosis cases notified, 36 (63 %) were diagnosed with pulmonary tuberculosis. Twenty-four (67 %) of these 36 cases were confirmed by culture. On initial examination, the percentage of pulmonary tuberculosis cases confirmed by culture during 2003 appears to have decreased in comparison to previous years. Seventy-two percent of pulmonary tuberculosis cases were culture confirmed during 2002; the corresponding figures for 2001 and 2000 were 78 % and 79 % respectively. Provisional data for 2004 also indicates that 80 % of cases notified with pulmonary disease have already been culture confirmed. The apparent decrease in the percentage of culture confirmed pulmonary tuberculosis cases during 2003 might, in part, be due to culture not having been carried out in seven patients. The diagnoses in five of these seven individuals were based on clinical changes (three also had contact with a known tuberculosis case and one also had a positive histology result). The remaining two cases were diagnosed at post mortem.

Sixteen (44 %) of the 36 pulmonary tuberculosis cases during 2003 were found to be sputum smear positive at the time of notification and all but one were confirmed by culture. This represents an increase on the 2002 figure, when 19 out of 54 (35%) cases of pulmonary tuberculosis were found to be both sputum smear and culture positive. (Provisional data for 2004 indicates that 41 % of pulmonary tuberculosis cases were sputum smear positive at the time of notification and all have since been culture confirmed.) Ten pulmonary tuberculosis cases in 2003 were sputum smear negative at the time of notification but six were, subsequently, confirmed by culture. Sputum smear testing was not carried out in the remaining 10 pulmonary tuberculosis cases. However, bronchoscopy samples were obtained from four of these 10 patients; three samples were smear positive, the fourth was PCR positive and three of these four samples were, subsequently, culture confirmed. A lung biopsy smear was found positive in one further patient and histology was positive also.

Five patients notified with pulmonary tuberculosis during 2003 died within three months of treatment having commenced, one died shortly after treatment finished and two were diagnosed at post mortem. Tuberculosis was registered as the primary cause of death in four cases and as a contributing factor in one further case.

The annual notification rate for pulmonary tuberculosis in Northern Ireland during 2003 was 2.1 cases per 100 000 population (Table 4). This compares favourably to corresponding figure for 2002 (3.2 cases per 100 000 population). However, overall, the rate of pulmonary tuberculosis has been rising since 2000 – when it was 1.6 cases per 100 000 population. Provisional data for 2004 indicates that the rate of pulmonary tuberculosis will be in the region of 3.9 cases per 100 000 population.

**Table 4: Pulmonary tuberculosis notifications in Northern Ireland, 2003**

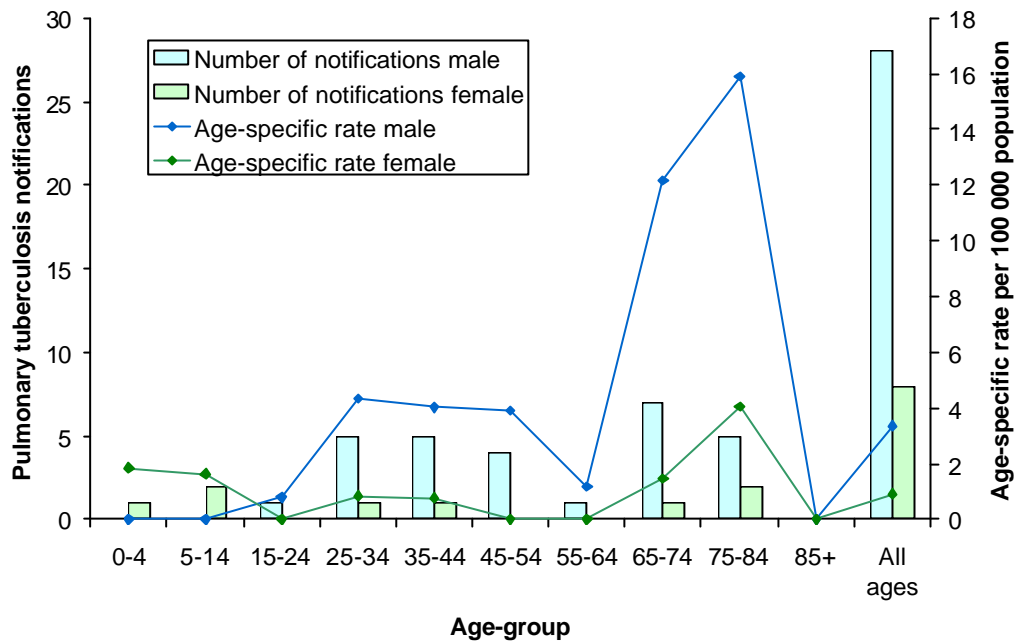
	Confirmed	Non-culture confirmed	Total	Rate per 100 000
Total	24	12	36	2.1

Of the 36 pulmonary tuberculosis cases notified during 2003, 28 were male and eight were female. The age of those affected ranged from 1 to 80 years with a both a median and a mean of 51 years (in contrast to a mean of 56 years in 2002, 58 years in 2001 and 61 years in 2000). The incidence of pulmonary tuberculosis was spread over a wide age range for both men and women. However, during 2003, more than half of all pulmonary cases occurred in those under 55 years of age. The age-sex distribution shows that the highest age-specific rate for pulmonary tuberculosis occurred in the 75-84 age-group for both men and women (Table 5 and Figure 2).

**Table 5: Rates of notification of pulmonary tuberculosis in Northern Ireland per 100 000 population by age and sex, 2003**

Age-Group	Male	Female	Total
0-4	0.0	1.9	0.9
5-14	0.0	1.6	0.8
15-24	0.8	0.0	0.4
25-34	4.4	0.8	2.6
35-44	4.0	0.8	2.4
45-54	3.9	0.0	1.9
55-64	1.2	0.0	0.6
65-74	12.2	1.5	6.4
75-84	15.9	4.1	8.7
85+	0.0	0.0	0.0
Total	3.4	0.9	2.1

**Figure 2: Notified cases of pulmonary tuberculosis by age and sex, and age-specific rates per 100 000 population, Northern Ireland, 2003**



### 3.4. Non-pulmonary tuberculosis cases

Twenty-one notifications of non-pulmonary tuberculosis were received during 2003. Sixteen of these cases (76 %) were culture confirmed: 14 with *M. tuberculosis* infection and two with *M. bovis* infection.

The sites of disease were:

- Lymph nodes: 5
- Pleura: 2
- Genitourinary: 5
- Meningeal: 2
- Gastrointestinal: 1
- Joint/bone: 4
- Other: 2

Four patients with non-pulmonary disease are known to have died. Tuberculosis contributed to the death of one individual. The cause of death in the other three cases was unrelated to tuberculosis.

The annual notification rate for non-pulmonary tuberculosis in 2003 was 1.2 cases per 100 000 population (Table 6). This has risen from the figure recorded in 2002 (rate of 0.8 per 100 000 population), but is more in keeping with that recorded in both 2001 and 2000 (rates of 1.1 and 1.4 per 100 000 population respectively).

**Table 6: Non-pulmonary tuberculosis notifications in Northern Ireland, 2003**

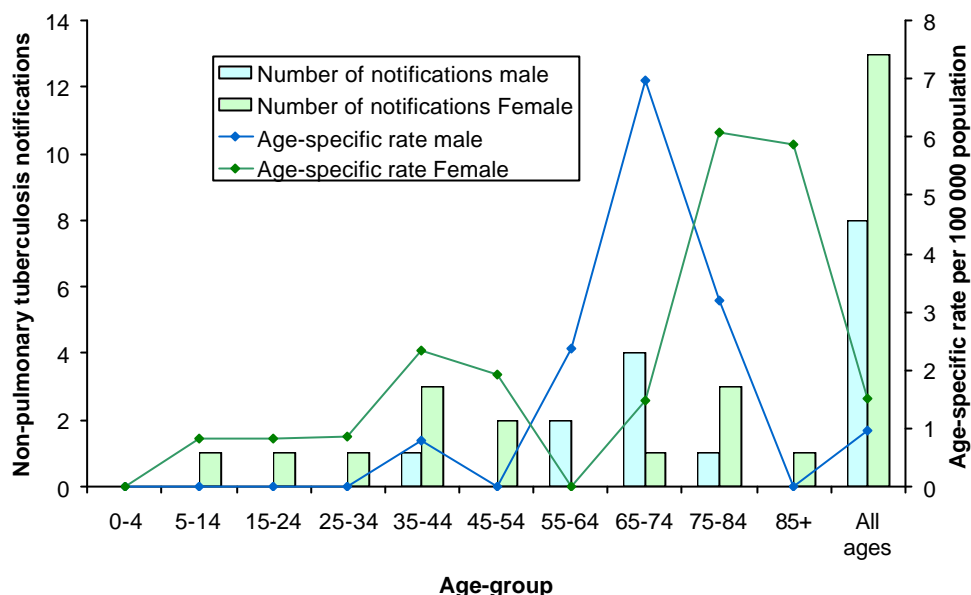
	Confirmed	Non-culture confirmed	Total	Rate per 100 000
<b>Total</b>	16	5	21	1.2

Of the 21 non-pulmonary tuberculosis cases notified during 2003, eight were male and 13 were female. The ages ranged from 11 years to 89 years with a median of 63 years and a mean of 57 years. In 2003, the highest proportion of cases overall was found in the 65-74 age-group. The highest age-specific rate occurred in men aged 65-74 years and in women aged 75-84 years. The highest age-specific rate overall also occurred in the 75-84 age-group (Table 7 and Figure 3).

**Table 7: Rates of notification of non-pulmonary tuberculosis in Northern Ireland per 100 000 population by age and sex, 2003**

Age-Group	Male	Female	Total
0-4	0.0	0.0	0.0
5-14	0.0	0.8	0.4
15-24	0.0	0.8	0.4
25-34	0.0	0.8	0.4
35-44	0.8	2.3	1.6
45-54	0.0	1.9	1.0
55-64	2.4	0.0	1.2
65-74	7.0	1.5	4.0
75-84	3.2	6.1	5.0
85+	0.0	5.9	4.2
<b>Total</b>	1.0	1.5	1.2

**Figure 3: Notified cases of non-pulmonary tuberculosis by age and sex, and age-specific rates per 100 000 population, Northern Ireland, 2003**



### 3.5. *Anti-tuberculous treatment*

#### Initial therapy

Initial therapy was recorded for 41 (72 %) of the 57 tuberculosis patients notified in 2003. As in previous years, the most commonly reported treatment regimen was a combination of rifampicin, isoniazid and pyrazinamide – with or without ethambutol (Table 8).

**Table 8: Initial therapies employed for the treatment of tuberculosis in Northern Ireland, 2003**

Initial Therapy *	Number of cases
Rifampicin/Isoniazid/Pyrazinamide/Ethambutol	25
Rifampicin/Isoniazid/Pyrazinamide	15
Rifampicin/Isoniazid/Ethambutol	1

\* No details of initial drug therapy were recorded for 16 individuals notified with tuberculosis during 2003. Of these: two were diagnosed at post mortem, eight died before their initial phase of therapy was complete and one patient left Northern Ireland before therapy could commence.

### Continuation therapy

In 2003, continuation therapy was recorded for 37 (65 %) tuberculosis cases. In all but two of these 37 cases, the treatment regimen was a combination of rifampicin and isoniazid (Table 9).

Adverse drug reactions were recorded in two cases during 2003 (5 % of cases for which initial therapy details were recorded). Rifampicin toxicity was reported in one case and pyrazinamide intolerance was reported in the second case.

**Table 9: Continuation therapies employed for the treatment of tuberculosis in Northern Ireland, 2003**

Continuation therapy *	Number of cases
Rifampicin/Isoniazid	35
Rifampicin/Isoniazid/Pyrazinamide	1
Rifampicin/Isoniazid/Ethambutol	1

\* No details of continuation drug therapy were recorded for four individuals notified with tuberculosis during 2003: one patient who completed the initial phase of drug therapy left Northern Ireland and was lost to follow-up, two patients were required to continue therapy for a further period of time and details of continuation therapy were not provided for the remaining patient.

### 3.6. Non-tuberculosis cases

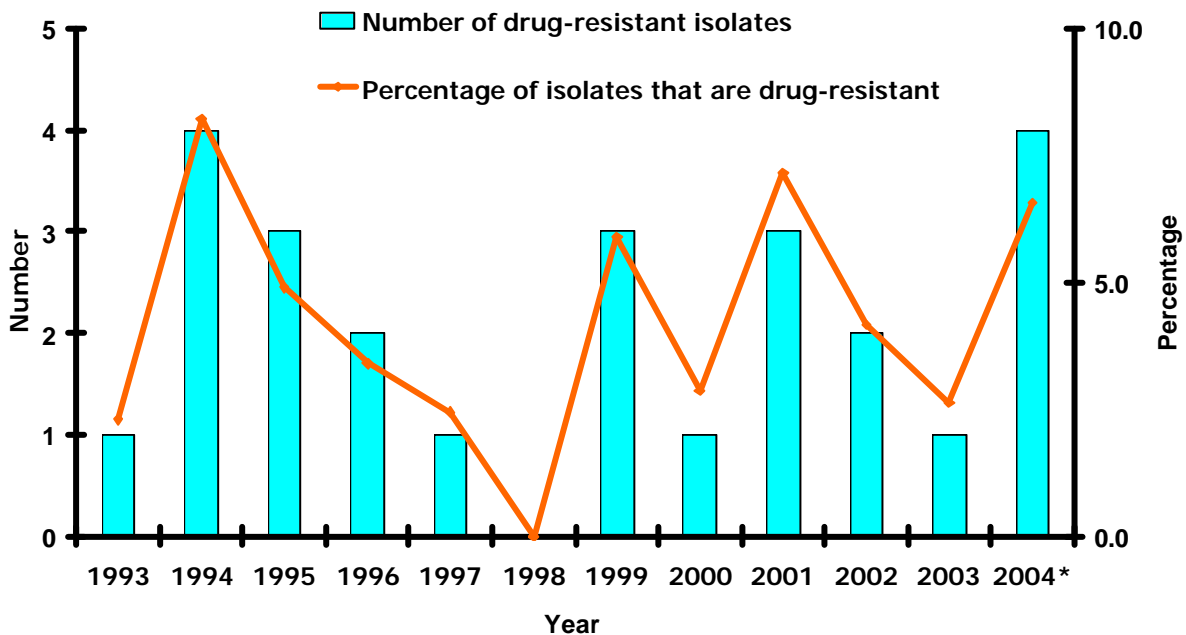
During 2003, one notified case of pulmonary tuberculosis was found, by culture, to be due to infection with *M. avium-intracellulare* and was therefore excluded from the main analysis. Two further cases, also suspected as having pulmonary tuberculosis, were denotified once other causes of illness had been established.

### 3.7. Surveillance of mycobacterial isolates susceptibility to anti-tuberculous drugs in 2003

In 2003, all 24 *M. tuberculosis* isolates from cases of pulmonary disease, together with 14 *M. tuberculosis* isolates and two *M. bovis* isolates from cases of non-pulmonary disease, were examined for susceptibility to anti-tuberculous drugs. One *M. tuberculosis* isolate (from a pulmonary case) was found resistant to both isoniazid and streptomycin. As expected, each of the *M. bovis* isolates was found resistant to pyrazinamide.

The level of *M. tuberculosis* drug resistance during 2003 is largely unchanged from that observed during each of the last few years (Figure 4). However, susceptibility testing has already been carried out on 61 out of the 62 *M. tuberculosis* isolates cultured from patients notified during 2004: one isolate was found resistant to isoniazid, two were found resistant to pyrazinamide and one was resistant to both isoniazid and rifampicin (i.e. multi-drug resistant). This is the first case of MDR-TB in Northern Ireland since 1995.

**Figure 4: Incidence of drug resistance in isolates of *M. tuberculosis* Northern Ireland, 1993-2004\***





## 4. Discussion

### 4.1. *Enhanced surveillance of tuberculosis in England, Wales and Northern Ireland*

Notification rates for tuberculosis in a number of Western European countries, including England and Wales, have been increasing since the late 1980's. In both 1998 and 1999, the Enhanced Surveillance of Tuberculosis notification rate for England and Wales was 11.0 per 100 000 population. In 2000, this figure rose to 12.1 per 100 000 population, in 2001 to 12.7 per 100 000 population and, by 2002, it had reached 13.0 per 100 000 population. The 2003 figures for England and Wales indicate that the rate may have decreased slightly once again, to 12.8 per 100 000 population<sup>1</sup>(Figure 5).

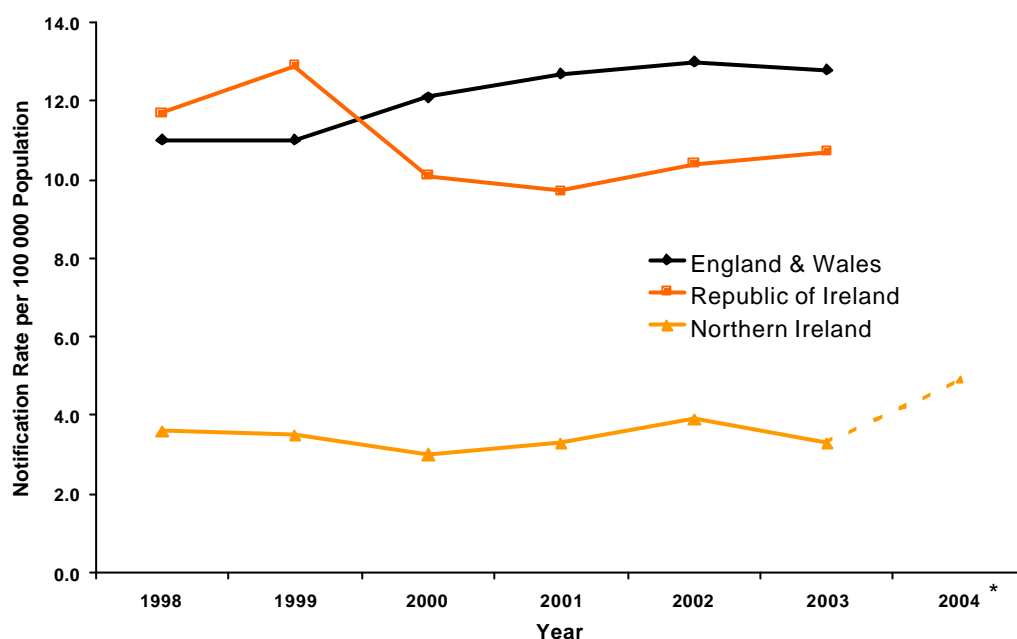
The notification rate in Northern Ireland still remains at approximately one third of that recorded for the UK as a whole. In 2003, the notification rate for Northern Ireland was 3.3 per 100 000 population and, for the UK overall (England, Wales & Northern Ireland), the corresponding rate was 12.5 per 100 000 population<sup>2</sup>.

This difference in rates between Northern Ireland and England and Wales continues to be due largely to the high numbers of notifications in the London Region. The 2003 rate for London was 41.3 per 100 000 population and this accounted for 45% of all cases reported across England, Wales & Northern Ireland<sup>2</sup>. In contrast, Northern Ireland accounted for less than 1 % of all cases notified through the Enhanced Surveillance scheme during 2003. This increasing number of cases reported in London is thought, at least in part, to be due to the implementation of a web-based reporting system in all TB clinics within the region during 2002<sup>3</sup>. The purpose of this system (the London TB Register) is to make clinical management of cases easier, to monitor treatment outcomes and to improve outcomes. TB is also concentrated in particular areas of London. Rates of tuberculosis notification in 2003 exceeded 40 cases per 100 000 population in 14 of the 33 Local Authorities and, in 2 Local Authorities, rates were in excess of 95 cases per 100 000 population<sup>4</sup>.

Notification rates in the Republic of Ireland, although markedly higher than those in Northern Ireland, have not changed substantially during the time that epidemiological data on tuberculosis have been collated by the Health Protection Surveillance Centre, Dublin (Figure 5). In 1999, the annual notification rate was 12.9 cases per 100 000 population. This rate decreased to 10.1 per 100 000 population in 2000 and to 9.7 per 100 000 population in 2001. Since then, the Republic of Ireland rate has been increasing again, albeit slowly: in 2002, the rate was 10.4 per 100 000 population and the provisional rate for 2003 is 10.7 per 100 000 population<sup>5</sup>.

**Figure 5: Rate of Tuberculosis per 100 000 population in England & Wales,**

## Republic of Ireland and Northern Ireland 1998- 2003\*



\* 2003 data for the Republic of Ireland <sup>5</sup> and 2004 data for Northern Ireland are provisional

Enhanced Surveillance of Tuberculosis commenced in Northern Ireland in 1992. Although the notification rate reached its lowest value during 2000, a reversal of this trend commenced in 2001 and continued during 2002 (Table 10). Examination of 2003 data suggests that, as in England and Wales, the rate may be falling once again. However, provisional analysis of 2004 Northern Ireland data indicates that the rate of notification is, overall, continuing to rise.

**Table 10: Number of tuberculosis notifications and rates per 100 000 population, Northern Ireland, 1992-2004\***

Year	Number of cases	Rate
1992	71	4.4
1993	77	4.7
1994	87	5.3
1995	84	5.1
1996	78	4.7
1997	70	4.2
1998	66	3.9
1999	57	3.4
2000	51	3.0
2001	55	3.3
2002	67	3.9
2003	57	3.3
2004 *	84	4.9

\* provisional data

#### **4.2. Incidence of tuberculosis in Northern Ireland by age**

For many years, tuberculosis in Northern Ireland has been a disease confined largely to older age groups. In 2000, 53% of tuberculosis notifications were in those aged 65+. However, since then, the proportion of those that are 65+ years of age at the time of notification has been falling. In 2002, the figure was 42% and provisional data for 2004 indicates that only 27 % of cases were aged 65+ at the time of notification. The proportion of tuberculosis cases aged 65+ has been very much lower in England & Wales than in Northern Ireland for a number of years. During both 2000 and 2001, only 19 % of all cases notified in England & Wales were in individuals aged 65+. By 2002, this figure had fallen to 17 % and, in 2003, only 15 % of all cases notified were aged 65+ <sup>1</sup>.

The highest proportion of cases in England & Wales continues to be found in the 15-44 age-group (53 % in 2001; rising to 57 % in 2002 and 61 % in 2003 <sup>1</sup>) and this is due, largely, to persons born outside the UK. In contrast, only 33 % of all cases notified in Northern Ireland during both 2003 and (provisionally) 2004 were aged 15-44 years. However, during 2003, 63 % of Northern Ireland cases aged 15-44 years were born outside the UK or Republic of Ireland and three-quarters of these were notified within 2 years entering the UK for the first time. Provisional data for 2004 also indicates that almost 68 % of Northern Ireland cases aged 15-44 years were born outside the UK or Republic of Ireland and, of these, two-thirds were notified within 2 years of their first entry to the UK.

Analysis of data collected over the past five years supports the observations outlined above and indicates that both the mean and median ages of those notified in Northern Ireland with tuberculosis are falling (Table 11a). Although the number and proportion of cases imported into Northern Ireland has increased steadily since 2000 (Table 11b), this does not account wholly for the overall decrease in age at the time of notification. Table 11c shows that, for those known to have been born in the UK or Ireland, the average age at the time of notification fell by 7 years between 2000 and 2003. Provisional data also indicates a further 7 years decrease in the average age at the time of notification between 2003 and 2004.

Table 11d shows a detailed breakdown of the age-specific rates of both pulmonary and non-pulmonary disease between 1999 and 2004 (provisionally) in four age bands, by place of birth. Almost all individuals (151/153) aged 65+ notified with tuberculosis between 1999 and 2004 were born in the UK or RoI. Although the proportion of total cases that this age-group represents has been falling year by year, both the number notified and the annual age-specific rate per 100 000 population has varied little during that time. Similarly, up until 2003, almost all (54/56) individuals aged 45-64 notified with tuberculosis were born in the UK or RoI and, overall, age-specific rates of both pulmonary and non-pulmonary tuberculosis varied little. However, provisional data indicates that, in this age-group between 2003 and 2004, there have been sharp increases in both the number of cases notified (up from 9 to 25) and the age-specific rate (up from 2.4 to 6.6 per 100 000 population). As Table 11d indicates, these increases are due, primarily, to a rise in pulmonary disease within the indigenous population.

Within the 15-44 age-group, the number of individuals notified with tuberculosis has been increasing steadily since 1999, with the pulmonary form of disease being responsible for much of this increase. In contrast to the 65+ and 45-64 age groups, the majority of pulmonary tuberculosis cases in those aged 15-44 are no longer occurring in the indigenous population – this is reflected by an increase in the overall age-specific rate of pulmonary tuberculosis for this age-group, but a much smaller increase in the age-specific rate amongst those born in the UK or RoI.

**Table 11a: Mean and median ages of all tuberculosis cases notified, Northern Ireland, 2000-2004**

Year	Total number of cases notified	All Countries of birth		
		Age range	Mean age	Median age
2000	51	2-99	61.0	68.0
2001	55	3-92	55.0	58.0
2002	67	2-94	53.8	56.0
2003	57	1-89	52.8	53.0
2004 (provisional)	84	<1-90	45.7	51.0

**Table 11b: Mean and median ages of tuberculosis cases known *not* to be born in UK or Ireland, Northern Ireland 2000-2004**

Year	Total number of cases notified	Known <i>not</i> to be born in UK/Ireland				
		Number of cases	Percentage of total cases	Age range	Mean age	Median age
2000	51	4	7.8%	32-43	39.0	41.0
2001	55	7	12.7%	27-85	41.7	34.0
2002	67	9	13.4%	24-49	37.6	38.0
2003	57	12	21.1%	21-44	34.1	35.0
2004 (provisional)	84	25	29.8%	19-73	34.1	28.0

**Table 11c: Mean and median ages of tuberculosis cases known to be born in UK or Ireland, Northern Ireland 2000-2004**

Year	Total number of cases notified	Known to be born in UK/Ireland				
		Number of cases	Percentage of total cases	Age range	Mean age	Median age
2000	51	43	84.3%	2-99	64.6	70.0
2001	55	36	65.5%	3-85	57.8	64.0
2002	67	58	86.6%	2-94	56.4	62.0
2003	57	45	78.9%	1-89	57.8	66.0
2004 (provisional)	84	58	69.0%	<1-90	51.2	56.0

#### **4.3. Paediatric Tuberculosis in Northern Ireland**

Although the actual numbers remain low, the increasing proportion of children in Northern Ireland notified with tuberculosis over the recent past is giving some cause for concern. In both 2001 and 2002, approximately 3 % of all cases notified were under 15 years of age. In 2003, the corresponding figure was 7 % and provisional data for 2004 indicates a further rise, to 9.5 %. It should be stated that these children have all been treated as cases in their own right i.e. not only given chemoprophylaxis because of known close contact with another tuberculosis case. In contrast, the proportion of cases in England & Wales under 15 years of age at the time of notification has remained relatively stable at between 5 % and 7 % during the period 2000-2003.

Table 11d indicates that, in children aged 14 years and under, all 23 cases of tuberculosis notified in Northern Ireland between 1999 and 2004 occurred within the indigenous population. Sixteen of these 23 children were notified with symptoms and/or chest X-ray changes consistent with pulmonary disease and, of these, a total of nine were known to have been part of family clusters or to have been a close contact of another infected adult. No information on possible sources of infection was stated on the notification or treatment outcome forms for the remaining seven children. Although the age-specific rate of tuberculosis in those aged 0-14 years remains low in comparison to the age-specific rate of infection within other age-groups, it has been increasing for both pulmonary and non-pulmonary disease in recent years – particularly between 2003 and 2004.

**Table 11d: Number and age-specific rates of tuberculosis by site of disease**

and by country of birth, Northern Ireland, 1999-2004 (provisional)

2004	All tuberculosis cases				Pulmonary tuberculosis				Non-pulmonary			
	Born all countries		Born UK/Rol		Born all countries		Born UK/Rol		Born all countries		Born UK/Rol	
AGE (yrs)	Number	Rate*	Number	Rate*	Number	Rate*	Number	Rate*	Number	Rate*	Number	Rate*
0-14	8	2.2	8	2.2	6	1.7	6	1.7	2	0.6	2	0.6
15-44	28	3.8	9	1.2	23	3.1	8	1.1	5	0.7	1	0.1
45-64	25	6.6	19	5.0	19	5.0	15	4.0	6	1.6	4	1.1
65+	23	10.0	22	9.6	18	7.8	17	7.4	5	2.2	5	2.2
<b>Total</b>	<b>84</b>	<b>4.9</b>	<b>58</b>	<b>3.4</b>	<b>66</b>	<b>3.9</b>	<b>46</b>	<b>2.7</b>	<b>18</b>	<b>1.1</b>	<b>12</b>	<b>0.7</b>
<b>2003</b>												
0-14	4	1.1	4	1.1	3	0.8	3	0.8	1	0.3	1	0.3
15-44	19	2.6	7	1.0	13	1.8	5	0.7	6	0.8	2	0.3
45-64	9	2.4	9	2.4	5	1.3	5	1.3	4	1.1	4	1.1
65+	25	10.9	25	10.9	15	6.5	15	6.5	10	4.3	10	4.3
<b>Total</b>	<b>57</b>	<b>3.3</b>	<b>45</b>	<b>2.6</b>	<b>36</b>	<b>2.1</b>	<b>28</b>	<b>1.6</b>	<b>21</b>	<b>1.2</b>	<b>17</b>	<b>1.0</b>
<b>2002</b>												
0-14	2	0.5	2	0.5	2	0.5	2	0.5	0	0.0	0	0.0
15-44	26	3.6	18	2.5	20	2.7	14	1.9	6	0.8	4	0.5
45-64	11	3.0	10	2.7	10	2.7	9	2.4	1	0.3	1	0.3
65+	28	12.3	28	12.3	22	9.7	22	9.7	6	2.6	6	2.6
<b>Total</b>	<b>67</b>	<b>3.9</b>	<b>58</b>	<b>3.4</b>	<b>54</b>	<b>3.2</b>	<b>47</b>	<b>2.8</b>	<b>13</b>	<b>0.8</b>	<b>11</b>	<b>0.6</b>
<b>2001</b>												
0-14	2	0.5	2	0.5	1	0.3	1	0.3	1	0.3	1	0.3
15-44	17	2.3	10	1.4	9	1.2	5	0.7	8	1.1	5	0.7
45-64	12	3.3	11	3.0	11	3.0	10	2.7	1	0.3	1	0.3
65+	24	10.7	23	10.3	15	6.7	14	6.3	9	4.0	9	4.0
<b>Total</b>	<b>55</b>	<b>3.3</b>	<b>46</b>	<b>2.7</b>	<b>36</b>	<b>2.1</b>	<b>30</b>	<b>1.8</b>	<b>19</b>	<b>1.1</b>	<b>16</b>	<b>0.9</b>
<b>2000</b>												
0-14	3	0.8	3	0.8	1	0.3	1	0.3	2	0.5	2	0.5
15-44	10	1.4	5	0.7	5	0.7	3	0.4	5	0.7	2	0.3
45-64	11	3.1	11	3.1	8	2.2	8	2.2	3	0.8	3	0.8
65+	27	12.2	27	12.2	14	6.3	14	6.3	13	5.9	13	5.9
<b>Total</b>	<b>51</b>	<b>3.0</b>	<b>46</b>	<b>2.7</b>	<b>28</b>	<b>1.7</b>	<b>26</b>	<b>1.5</b>	<b>23</b>	<b>1.4</b>	<b>20</b>	<b>1.2</b>
<b>1999</b>												
0-14	4	1.0	4	1.0	3	0.8	3	0.8	1	0.3	1	0.3
15-44	14	1.9	10	1.4	7	1.0	6	0.8	7	1.0	4	0.6
45-64	13	3.7	13	3.7	10	2.8	10	2.8	3	0.9	3	0.9
65+	26	11.8	26	11.8	20	9.1	20	9.1	6	2.7	6	2.7
<b>Total</b>	<b>57</b>	<b>3.4</b>	<b>53</b>	<b>3.2</b>	<b>40</b>	<b>2.4</b>	<b>39</b>	<b>2.3</b>	<b>17</b>	<b>1.0</b>	<b>14</b>	<b>0.8</b>

\* "rate" is defined as age-specific rate per 100 000 population

Following a review of scientific and epidemiological data by the Joint Committee on Vaccination and Immunisation (JCVI), changes to the existing BCG Vaccination Programme were announced during Summer 2005 <sup>6</sup>. It is known that BCG protects against serious childhood forms of tuberculosis (such as meningitis), but is not effective in preventing infectious forms of tuberculosis in adults. Under these changes, the current schools programme will cease and will be replaced by an improved programme targeting those most at risk of developing the disease. The groups now recommended to receive BCG are listed in the DHHSSPS letter of July 2005 <sup>6</sup>.

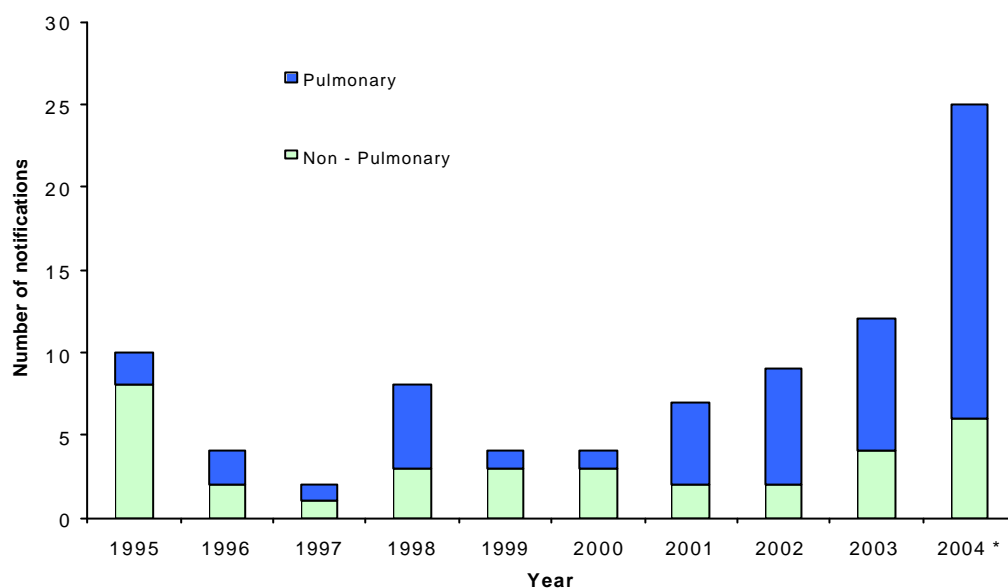
There were no cases of meningitis caused by *M. tuberculosis* infection in any age-group between 1999 and 2001 in Northern Ireland. Examination of the data for non-pulmonary disease in those aged 0-14 years shows that only one of the three children notified through Enhanced Surveillance of Tuberculosis between 2002 and 2004 had a diagnosis of meningitis. This child was not of secondary school age and, therefore, would not have received BCG under the Vaccination Programme which existed at that time.

#### **4.4. Tuberculosis in Northern Ireland by place of birth**

Overall, across England, Wales & Northern Ireland, the majority of cases and the highest rates of tuberculosis are found in people born outside the UK and within non-white ethnic groups. The Health Protection Agency 2002 Annual Report <sup>3</sup> indicates that the Black African ethnic group continues to have the highest rate of tuberculosis and that, between 2001 and 2002, the rate in this ethnic group increased from 210 per 100 000 population to 280 per 100 000 population. The corresponding 2002 rate in those of Pakistani, Indian or Bangladeshi origin was 127 cases per 100 000 population. By contrast, the 2002 rate of tuberculosis in persons of White ethnic origin was 4 cases per 100 000 population. In 1999, when Enhanced Surveillance of Tuberculosis commenced in England & Wales, 52 % of all individuals notified were known to have been born outside the UK. By 2002, this proportion had increased to 60 % and, by 2003, to 64 % <sup>1</sup>. Although the proportion of cases in Northern Ireland known to have been born outside the UK remains very much lower than in England & Wales, it has been increasing steadily since 2000 (Table 11b) and now represents almost one third of all cases notified.

For cases notified in England, Wales & Northern Ireland during 2002, where the patient was born abroad and the year of entry into the UK was known, 54 % developed disease within 5 years of arrival <sup>3</sup>. In Northern Ireland during 2003 (Table 11b), only 12 cases (21 % of all cases) occurred in individuals born abroad. However, eight of these 12 cases were notified with pulmonary disease and three of them were both sputum smear and culture positive for *M. tuberculosis* (Figure 6). The year of first entry into the Province was recorded for nine of the 12 cases born abroad. All but one developed disease within five years of entry to Northern Ireland and, of these, three developed disease during the same calendar year as their year of entry. Provisional data for 2004 indicates that 25 cases (30 % of all cases) occurred in individuals born abroad. Nineteen of these 25 cases were notified with pulmonary tuberculosis, of which nine were both sputum smear and culture positive at the time of notification. The year of first entry into Northern Ireland was recorded for 22 of the 25 cases known to have been born abroad. Sixteen developed disease within two years of entry to the Province and, of these, four developed disease during the same calendar year as their year of entry.

**Figure 6: Site of disease in notified tuberculosis cases born outside UK & Ireland, Northern Ireland, 1995-2004\***



\* provisional data

#### **4.5. Tuberculosis in Healthcare Workers**

In January 2003, the UK Department of Health published a draft consultation paper, seeking views on the implementation of a new health clearance policy for healthcare workers joining the NHS (England) <sup>7</sup>. The proposals in this publication followed recommendations (made by an expert group in 2001) to assess the potential health risks posed to patients from health care workers new to the NHS infected with serious communicable diseases such as HIV, hepatitis B, hepatitis C and tuberculosis. The Department of Health received a large number of responses to the consultation and these are being considered for incorporation into the final guidance, which will be published in 2005 (<http://www.doh.gov.uk>).

In 2002, a total of six healthcare workers were notified with tuberculosis in Northern Ireland; three with pulmonary disease and three with non-pulmonary disease. Two of the three pulmonary tuberculosis cases were found to be both sputum smear and culture positive and had arrived in the UK, from countries with a high incidence rate of tuberculosis, less than two years before the onset of illness. In 2003, a further two healthcare workers had culture confirmed pulmonary tuberculosis. Both entered the UK (from countries with a high incidence of disease <sup>8</sup>) less than two years prior to notification and one was found to be sputum smear positive at the time of notification. Provisional data for 2004 indicates no new cases of tuberculosis amongst healthcare workers.



#### 4.6. Incidence of *M. bovis* infection in Northern Ireland

There are, generally, only one or two human cases of *M. bovis* infection notified in Northern Ireland each year. As outlined on Page 4 of this Report, additional information is sought on any patient with culture confirmed *M. bovis* infection - in order to help identify potential source(s) of infection. In the past, the majority of these cases have been elderly patients with a reactivation of old disease. However, *M. bovis* infection can also occur in an individual for whom no risk factors (animal contact, consumption of unpasturised milk etc.) have been identified. Table 12 shows that, between 1999 and 2003, a total of seven culture confirmed human cases of *M. bovis* infection in Northern Ireland were notified through Enhanced Surveillance of Tuberculosis – with no cases in either 2000 or 2002.

**Table 12: Number of cases of *M. bovis* infection by site of disease and known risk factors, Northern Ireland, 1999-2003**

Year	Total <i>M. bovis</i> culture positive	Number Pulmonary (ages and risk factors identified)	Number Non-Pulmonary (ages and risk factors identified)
2003	2	0	2 > 50y - previous history of TB >80y - no risk factors identified
2002	0	n/a	n/a
2001	2	1 > 60y - no risk factors identified	1 > 50y - agricultural/animal worker
2000	0	n/a	n/a
1999	3	1 > 50y - previous history of TB	2 < 50y - family farm < 50y - family farm

#### 4.7. Summary of Tuberculosis in Northern Ireland at Present

The overall rate of notification of tuberculosis in Northern Ireland for 2003 was 3.3 per 100 000 population, an apparent fall from that recorded in 2002 (Table 10). Although the provisional notification rate for 2004 is 4.9 per 100 000 population, this still compares very favourably to rates seen in both England & Wales and in the Republic of Ireland. However, the overall England, Wales and Northern Ireland rate for 2003 (12.5 per 100 000 population) is still low in comparison with the rates recorded in many other EU countries <sup>9</sup>. Between 2001 and 2002, the overall WHO European Region tuberculosis notification rate increased from 45 per 100 000 population to 46

per 100 000 population with a clear (and increasing) gradient from West to East; the 2002 rate in the Enlarged European Union and West (32 countries) was 14.1 per 100 000 population (11.4 in 2001), in Central Europe (8 countries) it was 51.9 per 100 000 population (41.4 in 2001) and, in Eastern Europe (12 countries), it was 97.1 per 100 000 population (92.1 in 2001).

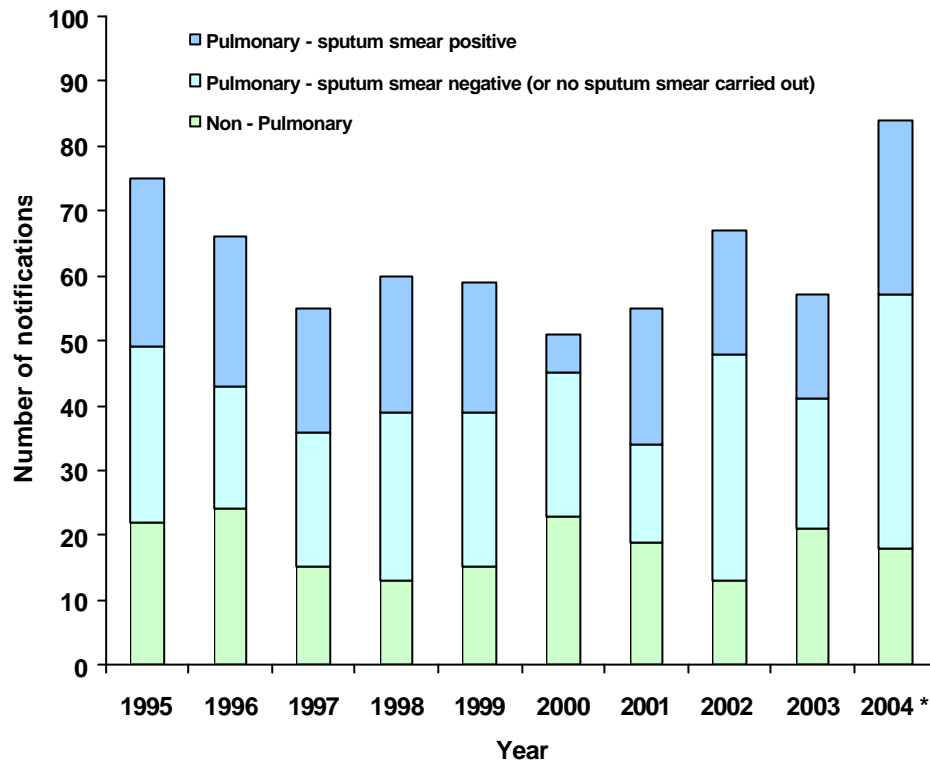
Tuberculosis is not considered a major communicable disease problem in Northern Ireland. However, continued changes in disease patterns and epidemiology in demographic groups observed elsewhere, particularly in England and Wales, indicate the need for vigilance and the importance of functional and informative surveillance strategies. Of some concern in Northern Ireland during recent years has been the increasing proportion of tuberculosis cases notified with pulmonary disease and the number of those cases that are both culture and sputum smear positive. In 2000, 55 % of all cases notified in Northern Ireland were for pulmonary disease. This figure increased to 65 % in 2001 and, in 2002, to 81 % (Figure 7) During 2003, the proportion of cases in Northern Ireland with pulmonary disease fell again, to 63%. However, this seems to have been a temporary decrease as, provisionally, 79 % of all cases notified during 2004 were for pulmonary disease.

In 2000, only 21 % of pulmonary tuberculosis cases notified in Northern Ireland were both culture positive and sputum smear positive and, by 2001, this figure had risen sharply, to 58 %. This trend appeared to be reversing in 2002, when only 35 % of pulmonary cases were found to be both sputum smear and culture positive. However, an additional 17 % of pulmonary tuberculosis cases notified during 2002 were not, for a variety of reasons, subjected to sputum smear testing.

In 2003, 16 out of 36 cases notified with pulmonary disease (44 %) were found to be both sputum smear and culture positive at the time of notification. Sputum smear testing was not carried out for 10 (28 %) of the 36 pulmonary cases notified during 2003. However, bronchoscopy or other respiratory samples were obtained from seven of these 10 cases; four of these samples were found to be smear positive and a further sample was found positive by PCR. The remaining three pulmonary cases notified during 2003 were treated on the basis of chest x-ray changes, other clinical symptoms and, for two of the three cases, household contact with another case of culture confirmed tuberculosis.

From 2001 to 2003, 25-30 % of sputum smear and culture positive pulmonary tuberculosis cases in Northern Ireland were under 40 years of age at the time of notification. Provisional analysis of data indicates that, during 2004, 40 % of sputum smear and culture positive cases were under 40 years of age and almost half were of White ethnic origin born in the UK.

**Figure 7: Classification of tuberculosis cases, Northern Ireland, 1995-2004**



\* provisional data

The incidence of drug resistant strains of *M. tuberculosis* in Northern Ireland continues to remain at very low levels. Only two multi-drug resistant isolates have been seen since 1992, when Enhanced Surveillance of Tuberculosis commenced in Northern Ireland; the first isolate was identified in 1995 and the second in 2004. One *M. tuberculosis* isolate was found resistant, to both isoniazid and streptomycin, during 2003 and, as expected, each of the two *M. bovis* isolates were found resistant to pyrazinamide. To date, provisional data for 2004 indicates four *M. tuberculosis* drug resistant isolates: one resistant to isoniazid, two resistant to pyrazinamide and one (MDR) resistant to both isoniazid and rifampicin. In the Republic of Ireland, the situation remains largely unchanged in comparison to previous years; ten drug resistant isolates were identified in 2002 and none were found to be MDR<sup>5</sup>. Provisional data for 2003 indicates eight cases of drug-resistant tuberculosis in the Republic of Ireland. One of these isolates has been identified as MDR; resistant to isoniazid, rifampicin, pyrazinamide, ethambutol and streptomycin<sup>5</sup>. Across the UK, the incidence of drug resistant TB and MDR-TB remains relatively stable: isoniazid resistance was found in 6.7 % of all isolates tested during 2001 and in 7.1 % of all isolates tested during 2002. Not unexpectedly, the proportion of isoniazid resistant cases is highest in those with a previous history of tuberculosis and/or in those born abroad<sup>3</sup>. It remains important to monitor closely any change in the pattern of drug resistance within Northern Ireland, particularly any increase in MDR isolates.

## 5. Outcome Surveillance

Outcome data collection on tuberculosis cases (using the TBS2 form) has been ongoing in Northern Ireland since enhanced surveillance commenced, in 1992. The collection of outcome data, for all cases notified after 1 January 2001, began in England and Wales at the beginning of 2002. In order to facilitate the export and central collation of data from each of the three regions, a standardised 'Tuberculosis Treatment Outcome Surveillance Form' was introduced. The first annual report on outcome surveillance was published by the Health Protection Agency in 2004<sup>10</sup>. Overall, outcome information was reported on 79 % of tuberculosis cases reported in the UK during 2001. In Northern Ireland, treatment outcome was reported for 96 % of case reported in 2001 (the highest in the UK). However, in both 2002 and 2003 the percentage completion of treatment outcome forms in Northern Ireland has fallen, to 91 %.

Outcome information was available for 52 of the 57 cases notified in Northern Ireland during 2003. Thirty-six of the 57 patients completed their full course of treatment. Two patients were diagnosed at post mortem and 10 patients died during treatment. All of those who died were over 50 years of age and two-thirds of those who died were over 70 years of age. This reflects the overall UK situation, where outcome is strongly associated with age and the proportion of treatment completion is lowest in those aged over 60 years<sup>10</sup>. During 2003, two patients left Northern Ireland - returning to their country of birth before, or shortly after, treatment commenced - and were lost to follow-up. In addition, two UK-born patients commenced treatment but, subsequently, had compliance problems. One of these patients finished their course of treatment towards the end of 2004 and the other was lost to follow-up. Details of drug treatment and/or other outcome information were not provided for the remaining five notified during 2003.

**CDSC (NI) would like to acknowledge the continued significant contribution made by CCDCs, microbiologists, chest physicians, consultant colleagues and their nursing and clerical staff to tuberculosis surveillance in Northern Ireland.**

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