

**SURVEILLANCE OF TUBERCULOSIS**  
**IN NORTHERN IRELAND**  
**IN 1999**

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## Summary

In 1999 as part of the enhanced surveillance of tuberculosis notification scheme, the Communicable Disease Surveillance Centre (CDSC NI) received 87 notifications of tuberculosis. Twenty-six were subsequently identified as having infections with mycobacteria other than tuberculosis complex (MOTTs), two were subsequently diagnosed as other conditions and two were based on information taken from death certificates or post mortem findings. Forty-one and four cases were culture confirmed as *M. tuberculosis* and *M. bovis* respectively. Five cases were positive either by histological examination of sputum samples or by molecular amplification test. The remaining seven cases remain notified on the basis of clinical and other laboratory diagnosis, giving a total of 59 notified cases of tuberculosis identified through this programme in 1999. The annual notification rate of tuberculosis was estimated at 3.5 cases per 100,000 population.

Of the 59 cases, 44 had pulmonary disease and 15 had non-pulmonary disease. Eight patients with pulmonary disease died and tuberculosis was implicated as a cause of death in 5 cases. Out of the 44 cases of pulmonary tuberculosis, 34 were confirmed by culture and 20 were sputum smear positive cases.

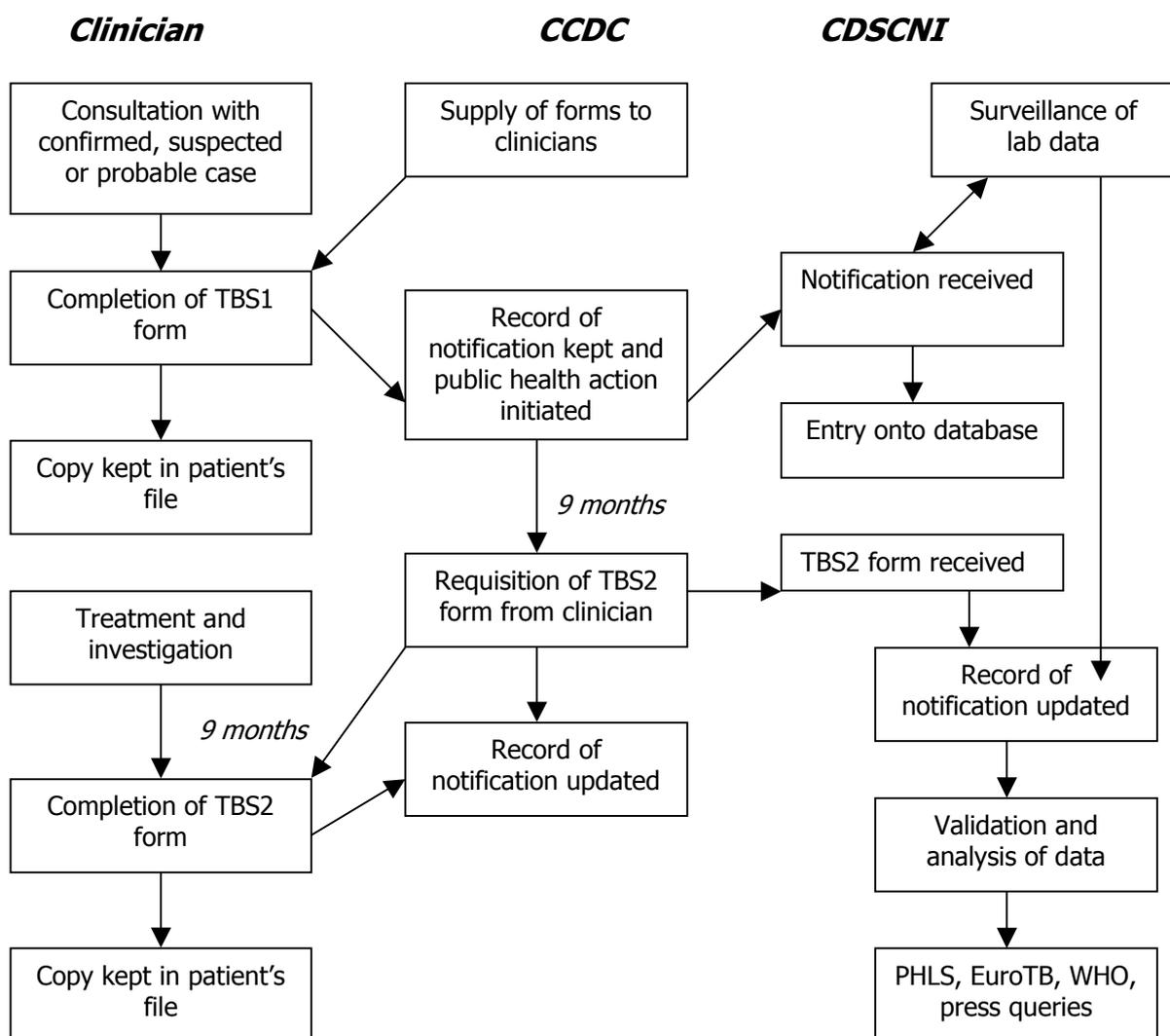
Of the 15 cases of non-pulmonary tuberculosis, 12 were confirmed by culture. The sites of disease reported in the 15 non-pulmonary cases were lymph nodes (8), genitourinary (1), bone (3), skin (1), pleura (1) and unknown (2).

Details of treatment were recorded for 35/59 cases, of whom 28 received a combination of rifampicin, isoniazid and pyrazinamide. Continuation therapy was recorded for 34 cases, of whom 28 received a combination of rifampicin and isoniazid.

Antimicrobial sensitivity testing results were available for 45 isolates; eight were found to be resistant to at least one first line antituberculous antibiotic.

## 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 (TBS1 and TBS2). TBS1 was designed to collect clinical, demographic and microbiological information, as available at the time of notification. TBS2 is a follow-up surveillance form, which is issued, by the Consultant in Communicable Disease Control (CCDC) in the appropriate HSSB, to the notifying clinician approximately 9 months after initial notification. The purposes of this second form are to collect details of treatment, outcome and further clinical and/or microbiological information not available at the time of notification. All forms are subsequently forwarded to the Communicable Disease Surveillance Centre (Northern Ireland) (CDSC NI) where the information is entered onto a secure database, validated, updated and analysed. All notifications are collated into a Northern Ireland dataset which is validated using laboratory reports and anti-microbial resistance information. The information is then used for inclusion in national and European reports, as well as for disease surveillance at a local level. A summary of the process is shown below:



This report presents the epidemiological data for tuberculosis cases reported in Northern Ireland (NI) in from 1<sup>st</sup> January 1999 to 31<sup>st</sup> December 1999.

## 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.

**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 PHLS Regional Module for Enhanced TB Surveillance (2000 version 1) and onto Epi-Info version 6.03. The 1999 mid-year population estimates (Registrar General Northern Ireland, NISRA) were used for calculating rates.

### 3. Results

#### 3.1. Notifications

A total of 87 cases were notified through the surveillance scheme during 1999. Among the 87 notifications, 2 were diagnosed as having other illnesses and 26 were laboratory confirmed as infections with mycobacteria other than tuberculosis (MOTTs). These 28 patients who were either diagnosed with other conditions or infections with MOTTs were de-notified but remained recorded in the dataset. They were excluded from the main analysis and analysed separately. This gave a total of 59 cases of tuberculosis notified during the course of 1999, of which 45 (76 %) were culture confirmed. Twelve were notified on the basis of clinical or non-culture diagnosis and response to anti-tuberculous therapy. Two were notified on the basis of post mortem findings. Of the 59 tuberculosis cases, 44 (75 %) had pulmonary disease and 15 had non-pulmonary tuberculosis. Follow-up information (either TBS2 or death certificate) was provided for 56 (86%) cases.

**Table 1: Enhanced TB surveillance notification forms submitted in Northern Ireland by Health and Social Services Board, 1999**

<i>HSSB</i>	<i>TBS1</i>	<i>Follow-up</i>	<i>TBS1/follow-up (%)</i>
EHSSB	33	26*	79
NHSSB	19*	18	95
SHSSB	9	9*	100
WHSSB	4	3	75
Total	65	56	86

\*these figures include death certificates where tuberculosis was implicated as cause of death, clinician's letters and *M.bovis* questionnaires. These questionnaires are carried out by CCDCs in response to laboratory confirmation of *M. bovis* infections.

#### 3.2 Tuberculosis cases

With a total of 59 notified cases of tuberculosis in 1999, the annual notification rate of tuberculosis for Northern Ireland was estimated at 3.5 cases per 100,000 population. The Eastern Board had the highest annual notification rate for tuberculosis with 5.0 cases notified per 100,000 population.

**Table 2: Tuberculosis cases by Board, 1999**

<i>Boards</i>	<i>Confirmed</i>	<i>Lab Only*</i>	<i>Non culture confirmed</i>	<i>Total</i>	<i>Rate per 100,000</i>
EHSSB	26	4	8	34	5.0
NHSSB	8	0	3	11	2.6
SHSSB	6	0	3	9	2.9
WHSSB	5	1	0	5	1.8
Total	45	5	14	59	3.6

\* "Lab only" are those cases for which official notification forms were not received, but laboratory confirmation of infection with *M. tuberculosis* complex organisms was received.

Of the 59 tuberculosis cases, 33 were male and 26 female, giving a sex ratio M/F of 1.3. The ages ranged from 0 to 91 years with a median of 61 and a mean of 55 years. The age-sex distribution is shown in table 3a. The highest proportion of cases in women was in the 65-74 age-group, and in the 25-34 age-group in men. The highest proportion overall was in the 65-74 age-group.

**Table 3a: Notified cases of tuberculosis in Northern Ireland by age and sex, 1999**

	0-4	5-14	15-24	25-34	35-44	45-54	55-64	65-74	75-84	85+	Total
Male	2	3	1	7	2	3	2	5	6	2	<b>33</b>
Female	0	0	0	1	3	2	6	7	5	2	<b>26</b>
<b>Total</b>	<b>2</b>	<b>3</b>	<b>1</b>	<b>8</b>	<b>5</b>	<b>5</b>	<b>8</b>	<b>12</b>	<b>11</b>	<b>4</b>	<b>59</b>

The highest age-specific rate occurred in patients aged 85 years and over for both males and females. The age-specific rate in men was generally higher than that in women, except for the 35-44, 55-64 and 65-74 age-groups (table 3b).

**Table 3b: Rates of notification of tuberculosis cases per 100 000 population in Northern Ireland by age and sex, 1999**

<b>Age-group</b>	<b>Male</b>	<b>Female</b>	<b>Total</b>
<b>0-4</b>	3.2	0.0	<b>1.7</b>
<b>5-14</b>	2.2	0.0	<b>1.1</b>
<b>15-24</b>	0.8	0.0	<b>0.4</b>
<b>25-34</b>	5.3	0.8	<b>3.1</b>
<b>35-44</b>	1.7	2.5	<b>2.1</b>
<b>45-54</b>	3.1	2.0	<b>2.6</b>
<b>55-64</b>	2.6	7.5	<b>5.1</b>
<b>65-74</b>	9.2	10.4	<b>9.9</b>
<b>75-84</b>	21.1	10.8	<b>14.7</b>
<b>85+</b>	32.6	11.4	<b>16.9</b>
<b>Total</b>	<b>4.0</b>	<b>3.0</b>	<b>3.5</b>

The country of birth was recorded for 54 people. Forty-six (85.2%) were born in the United Kingdom, two in Pakistan, one in India and one in Nigeria. The birthplace of the remaining 9 people was either unknown or unrecorded.

Of the 50 cases from whom information was available, seven were reported to have received previous treatment for tuberculosis. In five of these cases, previous treatment was received during the 1940's and 1950's; no information was provided for the remaining cases. One case was treated surgically. Only one case was known to have been identified through contact tracing. The cases concerned was a seven year-old male child with pulmonary tuberculosis who received anti-tuberculous drugs and was considered to have made a full recovery.

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

Among the 59 tuberculosis cases, 44 (75%) were suffering from pulmonary tuberculosis. Of these 44 cases, 34 (77%) were confirmed by culture. Twenty (45%) of the 44 pulmonary cases were sputum smear positive. All of these were also confirmed by culture. Eight patients with pulmonary TB died. Tuberculosis was registered as the primary or secondary cause of death in five of the cases. It is not known if tuberculosis was responsible for or contributed to death of the remaining cases.

The annual notification rate for pulmonary tuberculosis in Northern Ireland was 2.6 cases per 100,000 inhabitants (table 4). The Eastern Board had the highest annual notification rates for pulmonary tuberculosis with 4.1 cases per 100,000 population.

**Table 4: Pulmonary tuberculosis notifications in Northern Ireland by HSSB, 1999**

<i>HSSB</i>	<i>Culture confirmed</i>	<i>Lab Only*</i>	<i>Non-culture confirmed</i>	<i>Total</i>	<i>Rate per 100,000</i>
EHSSB	22	3	6	28	4.1
NHSSB	5	0	3	8	1.9
SHSSB	5	0	1	6	1.9
WHSSB	2	0	0	2	0.7
<b>Total</b>	34	3	10	44	2.6

\* "*Lab only*" are those cases for which official notification forms were not received, but laboratory confirmation of infection with *M. tuberculosis* complex organisms was received.

Of the 44 pulmonary tuberculosis cases, 25 were male and 19 females (table 5a). The ages ranged from 0 to 91 years with an average of 57 years and a median of 64 years. The highest proportion of cases occurred in the 75-84 age-group for males and the 55-64 age-group for females. The highest proportion overall was in the 75-84 age-group.

**Table 5a: Pulmonary tuberculosis notifications in Northern Ireland by age and sex, 1999**

	0-4	5-14	15-24	25-34	35-44	45-54	55-64	65-74	75-84	85+	<b>Total</b>
Male	2	3	1	3	2	1	1	4	6	2	<b>25</b>
Female	0	0	0	0	2	2	5	4	4	2	<b>19</b>
<b>Total</b>	<b>2</b>	<b>3</b>	<b>1</b>	<b>3</b>	<b>4</b>	<b>3</b>	<b>6</b>	<b>8</b>	<b>10</b>	<b>4</b>	<b>44</b>

The age-sex distribution shows that the highest age-specific rate occurred in the over 85 agegroup for both sexes (table 5b).

**Table 5b: Rates of notification of pulmonary tuberculosis in Northern Ireland per 100 000 population by age and sex, 1999**

<b>Age-group</b>	<b>Male</b>	<b>Female</b>	<b>Total</b>
<b>0-4</b>	3.2	0.0	<b>1.7</b>
<b>5-14</b>	2.2	0.0	<b>1.1</b>
<b>15-24</b>	0.8	0.0	<b>0.4</b>
<b>25-34</b>	2.3	0.0	<b>1.2</b>
<b>35-44</b>	1.7	1.7	<b>1.7</b>
<b>45-54</b>	1.0	2.0	<b>1.5</b>
<b>55-64</b>	1.3	6.2	<b>3.8</b>
<b>65-74</b>	7.4	5.9	<b>6.6</b>
<b>75-84</b>	21.1	8.6	<b>13.4</b>
<b>85+</b>	32.6	11.4	<b>16.9</b>
<b>Total</b>	<b>3.0</b>	<b>2.2</b>	<b>2.6</b>

### **3.4. Non-pulmonary tuberculosis cases**

Altogether 15 notifications of non-pulmonary tuberculosis were received, twelve of which were culture-confirmed.

The sites of disease were:

- Lymph nodes: 8
- Bone/joint: 3
- Genitourinary: 1
- Pleura: 1
- Unknown: 2

None of the patients are known to have died.

The annual notification rate for non-pulmonary tuberculosis was 0.9 cases per 100,000 inhabitants. Rates in all four Boards were all very similar.

**Table 6: Non-pulmonary tuberculosis notifications in Northern Ireland by HSSB and case-definition, 1999**

<i>HSSB</i>	<i>Culture confirmed</i>	<i>Lab Only</i>	<i>Non-culture confirmed</i>	<i>Total</i>	<i>Rate per 100,000</i>
EHSSB	5	1	1	6	0.9
NHSSB	3	0	0	3	0.7
SHSSB	1	0	2	3	1.0
WHSSB	3	1	0	3	1.1
<b>Total</b>	<b>12</b>	<b>2</b>	<b>3</b>	<b>15</b>	<b>0.9</b>

Of the 15 non-pulmonary tuberculosis cases, 8 were males and 7 females (table 7). The ages ranged from 26 years to 78 years with an average of 51 years and a median of 48 years. The highest proportion of cases occurred in the 25-34 age-group in men and in the 65-74 age-group in women. The highest proportion overall was in the 25-34 age-group.

**Table 7: Non-pulmonary tuberculosis notifications in Northern Ireland by age and sex, 1999**

	0-4	5-14	15-24	25-34	35-44	45-54	55-64	65-74	75-84	85+	<b>Total</b>
Male	0	0	0	4	0	2	1	1	0	0	<b>8</b>
Female	0	0	0	1	1	0	1	3	1	0	<b>7</b>
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>5</b>	<b>1</b>	<b>2</b>	<b>2</b>	<b>4</b>	<b>1</b>	<b>0</b>	<b>15</b>

The highest age-specific rate was in males aged 25-34 years and in females aged 65-74 years. The highest age-specific rate overall occurred in the 65-74 age-group (table 8).

**Table 8: Rates of notification of non-pulmonary tuberculosis in Northern Ireland per 100 000 population by age and sex, 1999**

<b>Age-group</b>	<b>Male</b>	<b>Female</b>	<b>Total</b>
<b>0-4</b>	0.0	0.0	<b>0.0</b>
<b>5-14</b>	0.0	0.0	<b>0.0</b>
<b>15-24</b>	0.0	0.0	<b>0.0</b>
<b>25-34</b>	3.1	0.8	<b>1.9</b>
<b>35-44</b>	0.0	0.8	<b>0.4</b>
<b>45-54</b>	2.1	0.0	<b>1.0</b>
<b>55-64</b>	1.3	1.2	<b>1.3</b>
<b>65-74</b>	1.8	4.4	<b>3.3</b>
<b>75-84</b>	0.0	2.2	<b>1.3</b>
<b>85+</b>	0.0	0.0	<b>0.0</b>
<b>Total</b>	<b>1.0</b>	<b>0.8</b>	<b>0.9</b>

### **3.5. Anti-tuberculous treatment**

#### **Initial therapy**

Initial therapy was recorded for 35 (59.3 %) patients. The most commonly reported treatment regimen was a combination of rifampicin, isoniazid and pyrazinamide (see Table 9).

**Table 9: Initial therapies employed for the treatment of tuberculosis in Northern Ireland, 1999**

Initial therapy	Number of cases
Isoniazid/Rifampicin/pyrazinamide/ Ethambutol	1
Isoniazid/Rifampicin/pyrazinamide	27
Isoniazid/Rifampicin	1
Isoniazid/Rifampicin/ Ethambutol	4
Isoniazid/Pyrazinamide/ Ethambutol	1
Rifampicin/ Ethambutol /Streptomycin	1

#### **Continuation therapy**

Continuation therapy was recorded for 34 (58 %) of the cases. The most commonly reported treatment regimen was a combination of rifampicin and isoniazid (see Table 10). One patient who received initial anti-tuberculous therapy was switched to anti-bacterial therapy after laboratory confirmation of infection with a MOTT.

Adverse drug reactions were recorded in nine cases (22.5% of cases for which initial therapy details were recorded). Hepatotoxicity was reported in 3 cases who were being treated with rifampicin, pyrazinamide and isoniazid. Rifampicin was described as producing toxic allergic reactions on 2 cases. A rash due to reaction to pyrazinamide was reported in 2 cases. An exacerbation of gout was reported in one case and an increase in uric acid levels was reported in another.

**Table 10: Continuation therapies employed for the treatment of tuberculosis in Northern Ireland, 1999**

Continuation therapy	Number of cases
Isoniazid/Pyrazinamide	2
Isoniazid/Rifampacin	28
Pyrazinamide/Ethambutol	2

\* in two cases, only duration of therapy was known

### **3.6. *Non-tuberculosis cases***

Twenty six cases were later found to be due to MOTTs and so were excluded from the main analysis. The mycobacterial species breakdown was as follows:

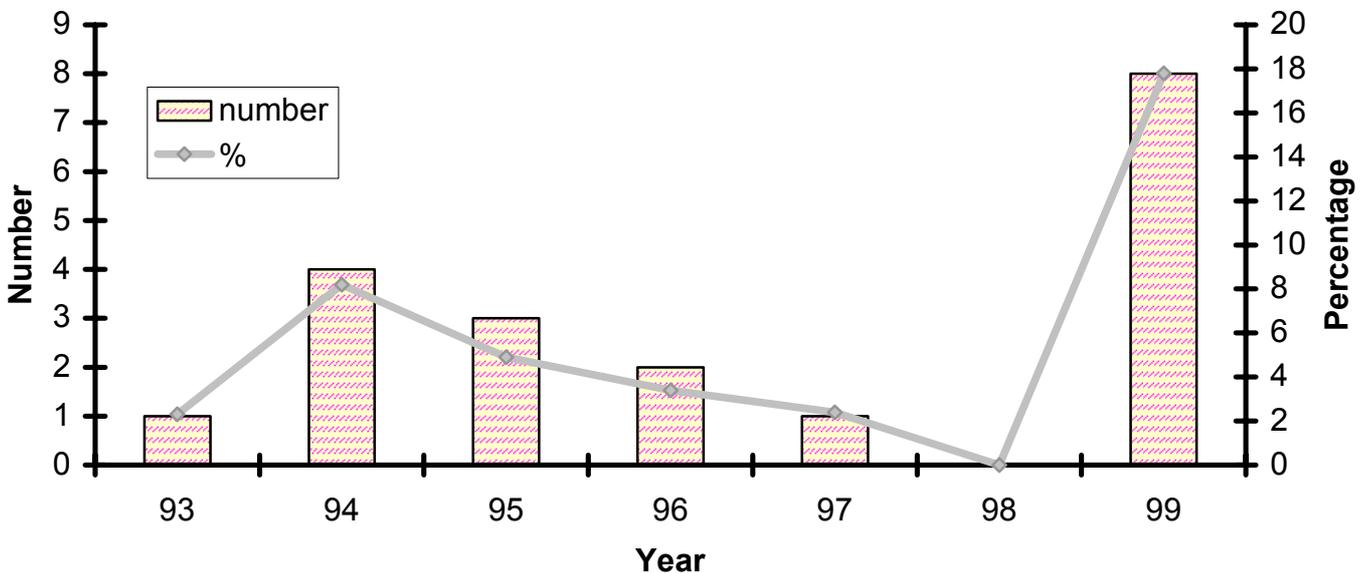
12 *M. avium-intracellulare*  
7 *M. malmoense*  
6 *M. kansasii*  
1 *M. scrofulaceum*

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

In 1999, 49 isolates of *M. tuberculosis* complex were examined, of which 45 were clinical cases confirmed during this period. Resistance was recorded in 8 (18 %) cases. Three isolates were resistant to pyrazinamide (all *M. bovis*), two were resistant to isoniazid (*M. tuberculosis*), two were resistant to streptomycin (*M. tuberculosis*) and one was resistant to both pyrazinamide and isoniazid (*M. bovis*). Three of the patients from whom these organisms were isolated were not born in the United Kingdom; countries of birth were supplied as India, Pakistan and Nigeria. All isolates from these patients were *M. tuberculosis*.

Data on 7 of these cases were provided by MYCOBNET. Information on the remaining case was obtained from the PHLS Mycobacterium Reference Unit and Regional Centre for Mycobacteriology in Dulwich. This level of resistance is high when compared to recent years (see Figure 1).

Incidence of drug resistance in isolates of *M. tuberculosis* complex organisms in Northern Ireland, 1993-1999



## 4. Discussion

Although notification rates for tuberculosis in several European countries, including England and Wales, showed a marked increase during the late 1980's and early 1990's, a similar trend has not been observed in Northern Ireland. This trend has continued throughout the decade as notification levels continue to increase in Ireland and England & Wales. Several studies have attributed the increase to changing socioeconomic conditions, incidence of HIV infection and AIDS and to association with higher risk minority groups, some of whom may be recent immigrants from endemic areas. Between 1988 and 1992, an overall 12% increase in incidence of tuberculosis was observed in England and Wales, with the largest increase occurring in the poorest 30% of the community. Such effects are much less pronounced in Northern Ireland, with lower levels of HIV infection and a lower proportion of ethnic groups in the population. This may in part explain why a similar increase in tuberculosis notifications has not been observed, and why the rate of notification continues to remain at similar levels for the past 10 years.

The overall rate of notification of tuberculosis in 1999 was 3.5 per 100,000 population, and therefore remains at similar levels to previous years. No clusters were reported in 1999 and cases were distributed all over Northern Ireland, as was the case in previous years. The rate of notification compares to a crude rate of 12.9/100,000 in the Republic of Ireland and 11.7/100,000 in England and Wales during the same period. This overall rate also compares favourably to most other countries in Europe, with notification rates of 100+/100,000 being reported in some countries during 1998. Although tuberculosis is not considered a major communicable disease problem in Northern Ireland, changing disease patterns and epidemiology in demographic groups observed elsewhere, and particularly in England and Wales, indicate the importance of functional and informative surveillance strategies. The predictive value of surveillance systems may well be tested in the future.

Antibiotic resistance in eight isolates in one year is unusually high, though only one isolate (*M. bovis*) exhibited resistance to 2 antibiotics. During 1998, none of the isolates expressed resistance to any of the first-line anti-tuberculous antibiotics. It is perhaps significant that higher levels of resistance are beginning to appear in Northern Ireland somewhat later than the initial rises in the rest of the UK. Northern Ireland is a relatively closed community with lower levels of immigrants, and generally lower levels of crowding and movement of people. Multi-drug resistant organisms are yet to appear in Northern Ireland or the Republic of Ireland, and it will be important to remain vigilant, and employ measures to limit the potential spread of such organisms to the island and the Province.

England and Wales will be developing outcome surveillance for cases notified after 1 January 2002. Northern Ireland has had outcome surveillance in place since 1992, but in order to compare and contrast future tuberculosis outcome information with other parts of the UK, it will be necessary to amend the TBS2 data collection form. The importance of completion of data items on these forms should be reiterated, since data quality, and hence potential usefulness of the surveillance system, depend on accurate

completion of the collection forms. It is also noteworthy that submission of a TBS2 form leads to a more complete and hence accurate case. The usefulness of the surveillance system for the production of accurate data for epidemiological monitoring hinges on this point, particularly in a small population like Northern Ireland.

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