

SURVEILLANCE OF TUBERCULOSIS
IN NORTHERN IRELAND
IN 2000

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Summary

In 2000 as part of the enhanced surveillance of tuberculosis notification scheme, CDSC (NI) received 60 notifications of tuberculosis. Eight were subsequently identified as having infections with mycobacteria other than tuberculosis complex (MOTTs) and another was subsequently diagnosed as having a condition other than tuberculosis. Thirty-seven cases were culture confirmed as *M. tuberculosis* infection. There were no culture confirmed cases of *M. bovis* during 2000. In addition to the culture confirmed cases, 2 cases were sputum smear positive, 1 case was bronchoscopy smear positive and 3 cases were positive by histological examination of lymph nodes. The outstanding 8 cases remain notified on the basis of clinical and other laboratory diagnosis, giving a total of 51 notified cases of tuberculosis identified through this programme in 2000. The annual notification rate of tuberculosis was estimated at 3.0 cases per 100,000 population.

Of the 51 cases, 28 had pulmonary disease and 23 had non-pulmonary disease. Out of the 28 cases of pulmonary tuberculosis: 4 were both sputum smear and culture positive, 18 were culture positive only and 2 were smear positive only. Eleven patients with pulmonary disease died. Tuberculosis was the cause of death in 2 cases and was implicated in 1 further case.

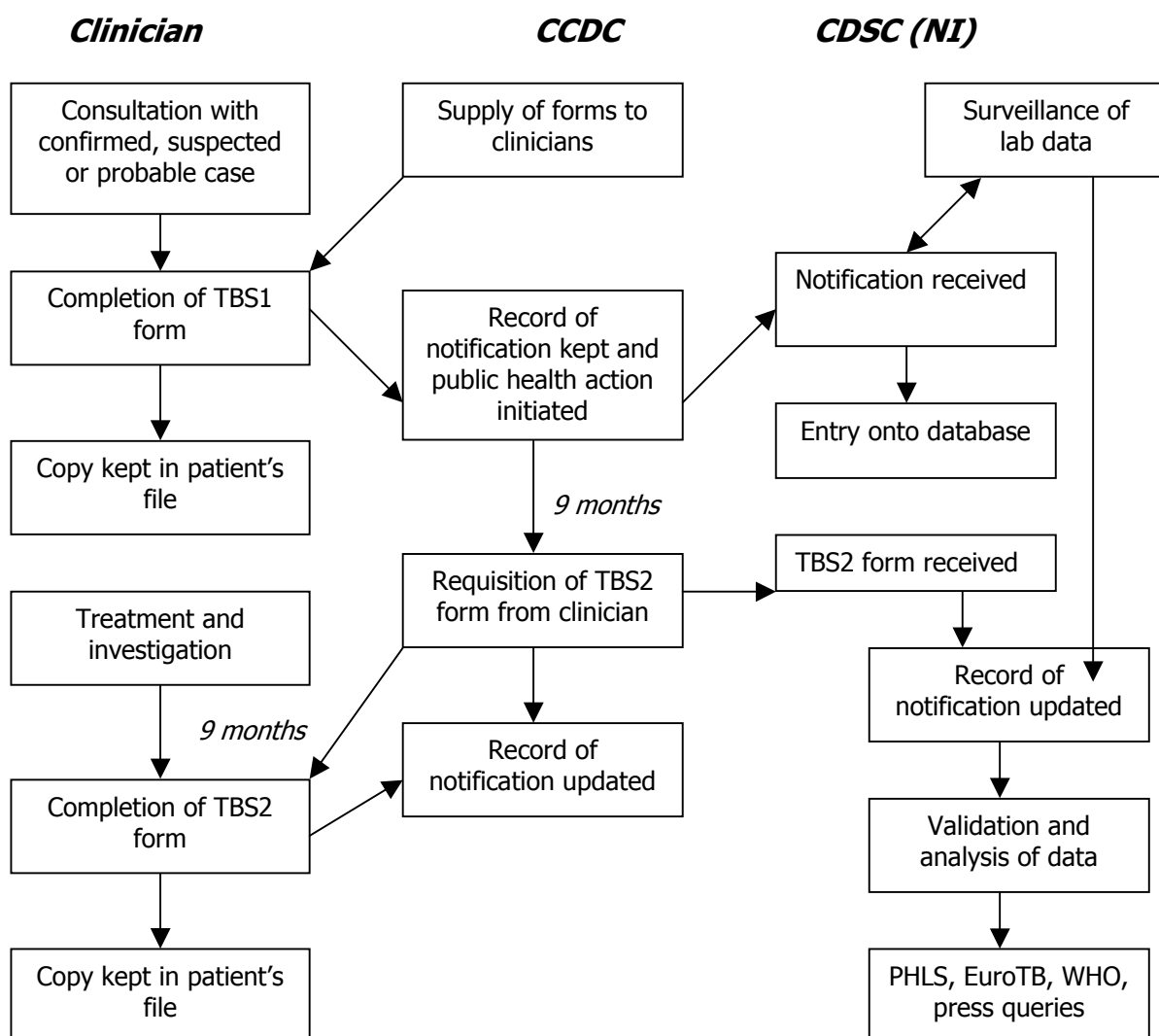
Fifteen of the 23 non-pulmonary tuberculosis cases were confirmed by culture. The sites of disease reported in these cases were: lymph nodes (15), pleura (5), genitourinary (2) and gastrointestinal (1).

Details of initial treatment were recorded for 27/51 cases, of which 24 received a combination of rifampicin, isoniazid and pyrazinamide. Continuation therapy was recorded for 23 cases, of which 20 received a combination of rifampicin and isoniazid.

Antimicrobial sensitivity testing results were available for 35 isolates. Resistance, to streptomycin only, was found in 1 isolate.

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 Northern Ireland Communicable Disease Surveillance Centre 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:



Northern Ireland Tuberculosis notification forms were modified in January 2001 in order to facilitate the direct comparison of data with that of England and Wales. In addition, collection of outcome data on notified cases is to be introduced to England and Wales for the first time using a "Tuberculosis Treatment Outcome Surveillance Form". Therefore, for all cases notified in Northern Ireland after 1st January 2001, this new form will replace TBS2. These forms will be generated at CDSC (NI) and forwarded to each Board, at the appropriate time, for completion by the relevant clinician.

This report presents the epidemiological data for tuberculosis cases reported in Northern Ireland (NI) from 1st January 2000 to 31st December 2000. 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)¹.

"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). The 2000 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 2000. Of these 60 notifications, 8 were laboratory confirmed as infections with mycobacteria other than tuberculosis (MOTTs) and another was subsequently diagnosed as having an illness other than tuberculosis. These 9 patients who were either diagnosed with another condition 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 51 cases of tuberculosis notified during the course of 2000, of which 37 (72%) were culture confirmed. Thirteen cases were notified on the basis of clinical or non-culture diagnosis and response to anti-tuberculous therapy. Of these 13 cases, 2 were sputum smear positive, 1 was bronchoscopy smear positive, and 3 were positive by histological examination of lymph nodes. One further case was notified on the basis of post mortem findings. Of the 51 tuberculosis cases, 28 (55%) had pulmonary disease and 23 (45 %) had non-pulmonary disease. Follow-up information (either TBS2 or death certificate) was provided for 42 (82%) cases (Table 1).

Table 1: Enhanced TB surveillance notification forms submitted in Northern Ireland, 2000

	<i>TBS1</i>	<i>Follow-up</i>	<i>TBS1/follow-up (%)</i>
NI Total	51	42*	82

*this figure includes death certificates for 2 cases where the primary cause of death was tuberculosis.

3.2 Tuberculosis cases

The annual notification rate of tuberculosis for Northern Ireland in 2000, based on 51 notifications, was estimated at 3.0 cases per 100 000 population (Table 2).

Table 2: Tuberculosis cases in 2000

	<i>Confirmed</i>	<i>Lab Only*</i>	<i>Non culture confirmed</i>	<i>Total</i>	<i>Rate per 100 000</i>
NI Total	37	2	14	51	3.0

* "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.

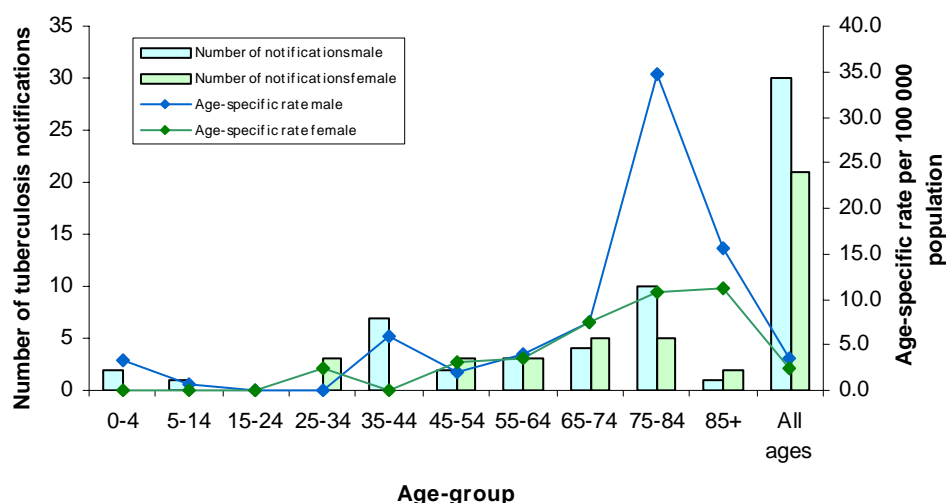
Of the 51 tuberculosis cases, 30 were male and 21 female, giving a sex ratio M/F of 1.4. The ages ranged from 2 to 99 years with a median of 68 and a mean of 61 years. The age-sex distribution is shown in Figure 1. The highest proportion of cases for men was in the 75-84 age-group and, for women, in the 65-74 and 75-84 age-groups.

The highest age-specific rates occurred in male patients aged 75-84 years and female patients aged 85+. The age-specific rate in men was generally higher than that in women, except for the 25-34 and 45-54 age-groups (Table 3 and Figure 1).

Table 3: Rates of notification of tuberculosis cases per 100 000 population in Northern Ireland by age and sex, 2000

<i>Age-group</i>	Male	Female	Total
0-4	3.3	0.0	1.7
5-14	0.7	0.0	0.4
15-24	0.0	0.0	0.0
25-34	0.0	2.4	1.2
35-44	5.9	0.0	2.9
45-54	2.0	3.0	2.5
55-64	3.9	3.6	3.8
65-74	7.4	7.4	7.4
75-84	34.8	10.8	20.0
85+	15.7	11.3	12.5
Total	3.6	2.4	3.0

Figure 1: Notified cases of tuberculosis by age and sex, and age-specific rates per 100 000 population, Northern Ireland, 2000



In 2000, the country of birth was recorded for 47 people. Forty-three (91%) were born in the United Kingdom, 2 in Hong Kong, 1 in Pakistan and 1 in Vietnam. The birthplace of the remaining 4 individuals was either unknown or unrecorded. Since 1992, when enhanced surveillance of tuberculosis commenced in Northern Ireland, an average of 91% (range 83%-100%) of all notified individuals were born in the UK or Ireland.

Information on any previous treatment for tuberculosis was available for 50 of the 51 cases notified. Eight were reported to have received previous treatment for tuberculosis. In 5 of these cases, previous treatment was received during the 1940's and 1950's. The remaining 3 cases were treated previously in the 1970's (aged 37, 41 and 43 at the time of treatment). No notified cases were identified through contact tracing.

3.3. Pulmonary tuberculosis cases

Of the 51 tuberculosis cases notified, 28 (55%) were diagnosed with pulmonary tuberculosis. Of these 28 cases, 22 (79%) were confirmed by culture. Six (21%) of the 28 pulmonary cases were sputum smear positive. Four of these sputum smear positive cases were also confirmed by culture. Although samples for culture were taken from the remaining 2 cases that were sputum smear positive, culture results are unknown. Each of these patients was given anti-tuberculous therapy on the basis of their positive sputum smear results and clinical findings. Eleven patients with pulmonary TB died. Tuberculosis was registered as the primary cause of death in two cases and as a secondary cause of death in a third case. In 7 of the 8 remaining cases, tuberculosis was not stated to have been a primary or secondary cause of death. One further case was identified and notified after death, following a road-traffic accident.

The annual notification rate for pulmonary tuberculosis in Northern Ireland was 1.6 cases per 100 000 population (Table 4).

Table 4: Pulmonary tuberculosis notifications in Northern Ireland, 2000

	<i>Culture confirmed</i>	<i>Lab Only*</i>	<i>Non-culture confirmed</i>	<i>Total</i>	<i>Rate per 100 000</i>
NI Total	22	2	6	28	1.6

* "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.

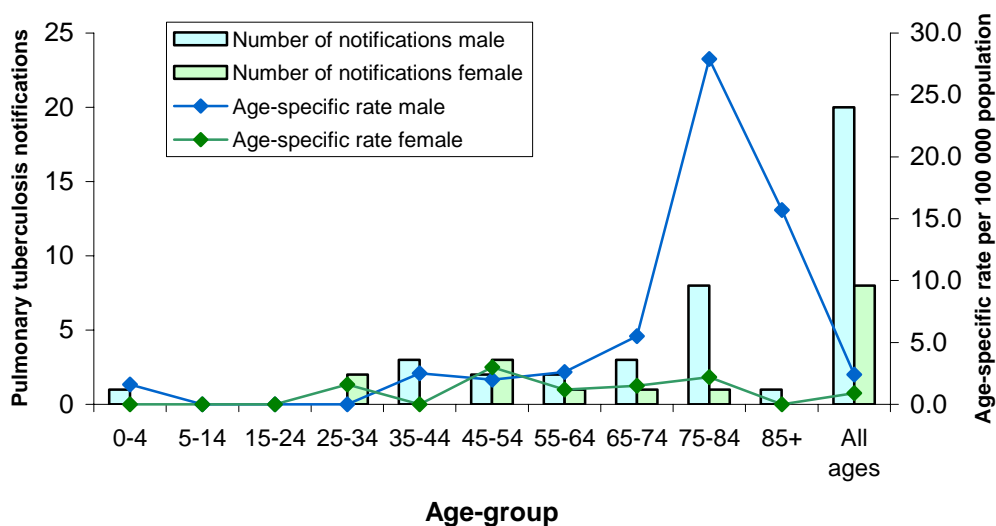
Of the 28 pulmonary tuberculosis cases, 20 were male and 8 were female. The ages ranged from 2 to 85 years with an average of 61 years and a median of 66 years. The highest proportion of cases occurred in the 75-84 age-group for men and the 45-54 age-group for women. The highest proportion overall was in the 75-84 age-group (Figure 2).

The age-sex distribution shows that the highest age-specific rate occurred in the 74-85 age group for men and the 45-54 age group for 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, 2000

Age-group	Male	Female	Total
0-4	1.6	0.0	0.8
5-14	0.0	0.0	0.0
15-24	0.0	0.0	0.0
25-34	0.0	1.6	0.8
35-44	2.5	0.0	1.2
45-54	2.0	3.0	2.5
55-64	2.6	1.2	1.9
65-74	5.5	1.5	3.3
75-84	27.9	2.2	12.0
85+	15.7	0.0	4.2
Total	2.4	0.9	1.6

Figure 2: Notified cases of pulmonary tuberculosis by age and sex, and age-specific rates per 100 000 population, Northern Ireland, 2000



3.4. Non-pulmonary tuberculosis cases

Altogether, 23 notifications of non-pulmonary tuberculosis were received. Fifteen of these (65%) were culture-confirmed.

The sites of disease were:

- Lymph nodes: 15
- Pleura: 5
- Genitourinary: 2
- Gastrointestinal: 1

Four patients with non-pulmonary disease are known to have died. In 2 cases, the cause of death was not related to TB. The cause of death in the other 2 cases is unknown.

The annual notification rate for non-pulmonary tuberculosis was 1.4 cases per 100 000 population (Table 6).

Table 6: Non-pulmonary tuberculosis notifications in Northern Ireland, 2000

	<i>Culture confirmed</i>	<i>Lab Only*</i>	<i>Non-culture confirmed</i>	<i>Total</i>	<i>Rate per 100,000</i>
NI Total	15	0	8	23	1.4

“*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.

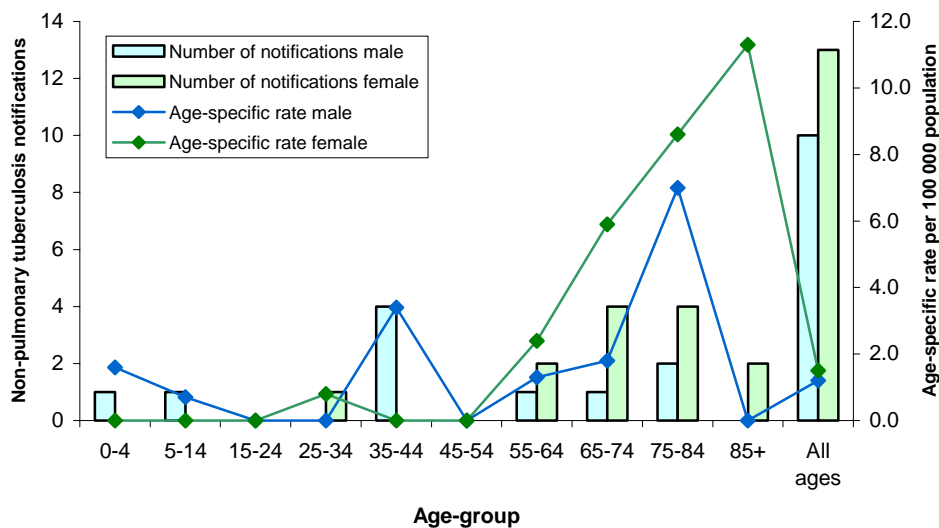
Of the 23 non-pulmonary tuberculosis cases, 10 were male and 13 were female. The ages ranged from 2 years to 99 years with an average of 61 years and a median of 69 years. The highest proportion of cases occurred in the 35-44 age-group in men and in the 65-74 and 75-84 age-groups in women. The highest proportion overall was in the 75-84 age-group (Figure 3).

The highest age-specific rate was in men aged 75-84 years and in women aged 85+ years. The highest age-specific rate overall occurred in the 85+ 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, 2000

Age-group	Male	Female	Total
0-4	1.6	0.0	0.8
5-14	0.7	0.0	0.4
15-24	0.0	0.0	0.0
25-34	0.0	0.8	0.4
35-44	3.4	0.0	1.6
45-54	0.0	0.0	0.0
55-64	1.3	2.4	1.9
65-74	1.8	5.9	4.1
75-84	7.0	8.6	8.0
85+	0.0	11.3	8.3
Total	1.2	1.5	1.4

Figure 3: Notified cases of non-pulmonary tuberculosis by age and sex, and age-specific rates per 100 000 population, Northern Ireland, 2000



3.5. Anti-tuberculous treatment

Initial therapy

Initial therapy was recorded for 31 (61%) tuberculosis patients notified in 2000, a slightly higher percentage than that recorded in 1999 (35/59 patients – 59%). However, these figures contrast sharply with the data for cases notified in 1998, where

initial therapy was recorded for 50/61 (82%) patients. The most commonly reported treatment regimen in 2000 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, 2000

Initial therapy	Number of cases
Isoniazid/Rifampicin/pyrazinamide/ Ethambutol	14
Isoniazid/Rifampicin/pyrazinamide	14
Isoniazid/Rifampicin	1
Isoniazid/Rifampicin/ Ethambutol	2

Continuation therapy

In 2000, continuation therapy was recorded for 25 (49%) of tuberculosis cases. This compares to a figure of 34 (58%) during 1999 and 46 (75%) in 1998. In all but one of these 25 cases, the treatment regimen was a combination of rifampicin and isoniazid (Table 9).

Adverse drug reactions were recorded in 4 cases (13% of cases for which initial therapy details were recorded). Hepatotoxicity was reported in 1 case receiving rifampicin, pyrazinamide isoniazid and ethambutol. A rash, caused by reaction to pyrazinamide, was reported in 2 further cases. The fourth case initially received rifampicin, pyrazinamide and isoniazid for a period of 3 weeks, but developed an adverse reaction to both rifampicin and pyrazinamide within this time. A combination of isoniazid, ethambutol and streptomycin was therefore selected for continuation therapy. After several months' treatment, following another adverse drug reaction, clarithromycin was substituted for streptomycin.

Table 9: Continuation therapies employed for the treatment of tuberculosis in Northern Ireland, 2000

Continuation therapy	Number of cases
Isoniazid/Rifampacin	24
Isoniazid/Ethambutol/Streptomycin	1

3.6. Non-tuberculosis cases

Eight notified cases were found subsequently to be due to MOTTs and were therefore excluded from the main analysis. The mycobacterial species breakdown of these cases was as follows:

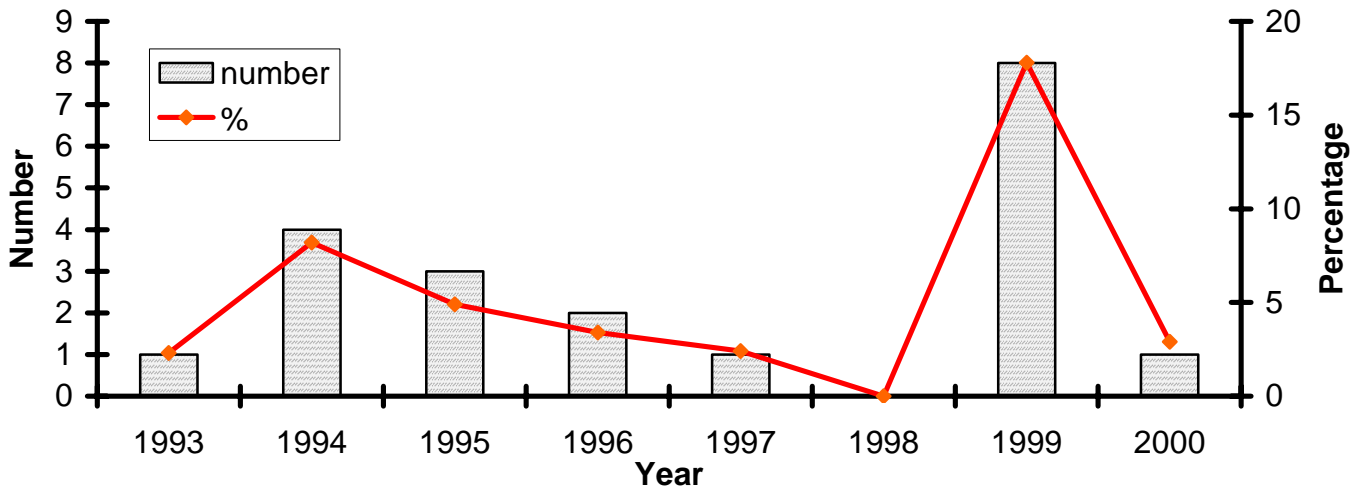
- 5 *M. avium-intracellulare*
- 2 *M. malmoense*
- 1 *M. kansasii*

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

In 2000, from the 37 culture-confirmed cases of tuberculosis, 35 isolates of *M. tuberculosis* complex were examined for susceptibility to anti-tuberculous drugs. Resistance, to streptomycin only, was found in 1 (non-pulmonary) case.

This level of resistance in 2000 is very much lower than that observed in 1999 (Figure 4), when resistance was recorded in 8 isolates. Four of these 8 resistant isolates were *M. bovis* and a further 3, all *M. tuberculosis*, came from patients who were born outside the UK. However, preliminary examination of available susceptibility data for 2001 indicates resistance to a single anti-tuberculous drug in at least 5 isolates.

Figure 4: Incidence of drug resistance in isolates of *M. tuberculosis* complex organisms in Northern Ireland, 1993-2000



4. Discussion

Notification rates for tuberculosis in several Western European countries, including England and Wales, have been increasing since the late 1980's. In 1999, the notification rates for England and Wales and for Ireland were 10.2 and 12.9 per 100 000 population respectively^{2,3}. Provisional figures for England and Wales for 2000 indicate a further rise in the statutory notification rate to 12.9 per 100 000 population⁴. This difference in rates between Northern Ireland and England and Wales is largely due to the high numbers of notifications from the London Region. In 1988, the rate for this Region was 19.4 per 100 000 population² and, within 5 years, the figure had increased to 28.3 per 100 000 population. Since then, there has been a year-on-year rise and, for 2000, the provisional rate for London is 40.3 per 100 000 population⁴. A steady rise in the Northern Ireland rate has not, to date, been observed. The rate for Northern Ireland in 1999 was 3.5 per 100,000 population and, in 2000, 3.0 per 100 000 population (Table 10). Provisional examination of available data suggests that, for 2001, the Northern Ireland rate will remain at between 3.0 and 3.5 per 100 000 population.

Table 10: Number of tuberculosis notifications and rates per 100 000 population, Northern Ireland, 1992-2000

Year	Number of cases	Rate per 100 000
1992	71	4.4
1993	77	4.7
1994	87	5.3
1995	84	5.1
1996	78	4.7
1997	65	3.9
1998	61	3.6
1999	59	3.5
2000	51	3.0

Tuberculosis in Northern Ireland remains largely confined to older age groups. In 1999, 27 (46%) of tuberculosis notifications were in those aged 65+ and, for 2000, this number remains unchanged at 27 (53%). Such age-distribution is in direct contrast to England and Wales, where the largest number of tuberculosis notifications in 1999 (36%) occurred in those aged between 15 and 34 years and only 22% of cases occurred in those aged 65+. In 2000, the proportion of notifications in those aged between 15 and 34 years has increased to 37% and, in those aged 65+, has fallen to 20%⁴.

Provisional Northern Ireland figures for 2001 and 2002 indicate little change in the age range of those notified with tuberculosis. However, preliminary analysis of the data suggests that both the mean and median ages of those notified are falling. In addition, such changes cannot be attributed solely to the importation of tuberculosis from other EU countries, or from elsewhere.

Several studies have attributed the increase in cases of tuberculosis in the UK, particularly among younger age groups, to changing socio-economic conditions and the incidence of HIV infection. Outside London, the incidence rates have changed little between 1988 and 1999. However, the incidence rate for London has increased by 66% during the same period of time. In 1999, 43% of all notifications in England and Wales were in the London Region². There is also an increasing incidence of tuberculosis within higher risk minority groups, some of who may be recent immigrants from endemic areas. In England and Wales between 1988 and 1999, the percentage of total cases has been falling progressively in the White ethnic group and has remained fairly stable amongst those from the Indian sub-continent. In contrast, the percentage of total cases seen amongst Black Africans has risen from 2% to 15% within the same time period². Such effects are very 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 has continued to remain at similar levels for the past 10 years.

The overall rate of notification of tuberculosis in 2000 was 3.0 per 100 000 population, and therefore remains at similar levels to previous years (Table 10). No clusters were reported in 2000 and cases were distributed all over Northern Ireland. The rate of notification compares favourably to rates seen in both England and Wales and to the Republic of Ireland. This overall UK rate for 1999 (10.7 per 100 000 population) also compares favourably to other countries within the EU⁵. 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 need for vigilance and the importance of functional and informative surveillance strategies. The predictive value of surveillance systems may well be tested in the future, particularly with large population movements from central and Eastern Europe to the UK.

During 1998 in Northern Ireland, no *M. tuberculosis* complex isolates expressed resistance to any of the first-line anti-tuberculous antibiotics. In 1999 however, resistance either to pyrazinamide, isoniazid or streptomycin was seen in 7 isolates (4 *M. tuberculosis*; 3 *M. bovis*) and 1 further isolate (*M. bovis*) was found resistant to both pyrazinamide and isoniazid. In 2000, only one isolate (*M. tuberculosis*) has been found resistant, to streptomycin. However, provisional data indicates that the number of drug resistant isolates in Northern Ireland for 2001 will be similar to that observed in 1999. Northern Ireland is a relatively closed community with lower levels of immigrants and, generally, less crowding and movement of people. Only one multi-drug resistant isolate has been seen to date in Northern Ireland (in 1995). In the Republic of Ireland, 2 multi-drug resistant isolates were found in 1999 and provisional figures for 2000 indicate another 2 such isolates³. It is, therefore, important to monitor closely any increase in drug resistance in the Province, particularly the re-emergence of any multi-drug resistant strains.

The importance of notification of suspected tuberculosis cases and the completion of as many fields as possible on (a) the initial TBS1 Notification form and (b) the new Treatment Outcome Surveillance form should be emphasised. Data quality, and potential usefulness of the surveillance system, depends on accurate and timely completion of both these forms – particularly within a small population such as Northern Ireland. It is also noteworthy that collection of outcome data (via the TBS2 form) has been operational in Northern Ireland since 1992, and has now been introduced to England and Wales for all cases notified since 1st January 2001.

CDSC (NI) would like to acknowledge the 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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