

A microscopic view of cells, likely from a tissue sample, showing various cellular structures and organelles. The image is dominated by shades of blue and green, with some darker, more complex structures visible. The overall appearance is that of a biological specimen under a microscope.

Health Protection Surveillance Centre

**Report on the Epidemiology of
Tuberculosis in Ireland 2002**

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Féidhmeannacht na Seirbhíse Sláinte
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Introduction

The World Health Organisation (WHO) has calculated that, globally, there were 8.8 million new cases of tuberculosis in 2002, of which 3.9 million were smear positive cases.¹ In addition, EuroTB² (the agency responsible for collating national TB data for countries within Europe and for reporting data to the WHO global TB control programme) reported that in the 52 countries in the WHO European region, over 400,000 cases of tuberculosis were notified in 2002.³

Among the 25 countries of the Western Region of Europe (EU countries, Andorra, Iceland, Israel, Monaco, Norway, San Marino and Switzerland), the overall notification rate was 14 per 100,000 population. Approximately one-third of TB cases in this region were of foreign origin. Multi-drug resistance (MDR-TB) was more prevalent in the Baltic States (21%) than in other countries of the Western Region (1.7%). In Central Europe, TB notification rates were 153 per 100,000 in Romania and 20 – 62 per 100,000 in other countries (Albania, Bosnia & Herzegovina, Bulgaria, Croatia, F. Y. R. of Macedonia, Serbia & Montenegro and Turkey). Notification rates were higher in the Eastern Region (Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Rep. of Moldova, Russian Federation, Tajikistan, Turkmenistan, Ukraine, Uzbekistan), at 97 per 100,000 population. Drug resistance was poorly documented apart from a national survey in Kazakhstan indicating 9% MDR-TB among new cases in 2001.

In Ireland, national epidemiological data on TB have been collated by the Health Protection Surveillance Centre (formerly the National Disease Surveillance Centre) since 1998. From January 1st 2000, this information has included enhanced surveillance data items based on the minimum dataset reported to EuroTB.² The resulting National Tuberculosis Surveillance System (NTBSS) was set up following consultation with the eight health boards and the National Tuberculosis (TB) Advisory Committee. This National Tuberculosis (TB) Advisory Committee was reconvened in October 2004.

This report presents a review of the epidemiology of tuberculosis cases notified to HPSC by each of the health boards in Ireland during 2002 and 2003. Preliminary data presented for 2003 are provisional only and have not been validated. This report provides an epidemiological review of the 408 cases (10.4 /100,000 population) of TB reported to HPSC in 2002. In addition, preliminary analyses are presented for the 425 cases of TB reported to HPSC in 2003.

Case Definitions

The case definitions used for the analyses described in this report were those recommended by the National TB Working Party (1996).⁴

A notified case of TB referred to clinically active disease due to infection with organisms of the *Mycobacterium tuberculosis* complex. Active disease was presumed if the patient was commenced on a full curative course of anti-tuberculosis chemotherapy. Persons placed on chemoprophylaxis for preventive treatment or infected by *Mycobacterium* other than *M. tuberculosis* complex were not included as cases.

A definite case of tuberculosis was a case with culture confirmed disease due to *M. tuberculosis* complex.

An other than definite case met both of the following conditions: (1) it was the clinician's judgement that the patient's clinical and/or radiological signs and/or symptoms were compatible with tuberculosis and (2) the physician took the decision to treat the patient with a full course of anti-tuberculosis therapy.

Pulmonary TB was defined as a laboratory-confirmed case - either a positive smear, histology or culture - with or without radiological abnormalities consistent with active pulmonary TB or a case where the physician took the decision that the patient's clinical symptoms and/or radiological signs were compatible with pulmonary TB.

Extra-pulmonary TB was defined as a patient with a smear, culture or histology specimen, from an extra-pulmonary site, that was positive for *M. tuberculosis* complex or a case with clinical signs of active extra-pulmonary disease in conjunction with a decision taken by the attending physician to treat the patient with a full curative course of anti-tuberculosis chemotherapy.

Pulmonary and extra-pulmonary TB was a case of tuberculosis that met the previous two definitions.

Smear positive case was defined as a patient with at least two sputum specimens positive for acid-fast bacilli by microscopy; or a patient with at least one sputum specimen positive for acid-fast bacilli and radiographic abnormalities consistent with active tuberculosis; or a patient with at least one sputum specimen positive for acid-fast bacilli, which is culture positive for *M. tuberculosis*.

A recurrent case was defined as a patient with a documented history of TB prior to their 2002 notification.

Multi drug resistance (MDR) was defined as resistance to at least isoniazid and rifampicin with or without resistance to ethambutol and streptomycin.

Materials and Methods

An enhanced tuberculosis notification form was completed by public health doctors for each case of TB notified in 2002. These forms summarise all available clinical, microbiological, histological and epidemiological data. Forms were then collated in the regional Departments of Public Health, where data were also entered onto an Epi Info 2000 database. An anonymised dataset from the Epi Info database was submitted electronically to HPSC on a quarterly basis. All cases of tuberculosis notified to HPSC were collated at a national level on a single Epi Info 2000 database for detailed analysis. Reports summarising results were produced on a quarterly basis by HPSC. Information on all cases was updated and validated in late 2003/early 2004 by each health board to include outcome data.

Data analysis

Population figures, used as the denominator for calculations for data from 2000-2003, were taken from the 2002 census of population. Population data from the 1996 census were used for calculations for data from 1994 to 1999. Calculations for data from 1990 to 1993 were performed using population data from the 1991 census.

For 2002 and 2003 data, the indigenous population was defined as those persons who were born in Ireland. Population data for the indigenous population only were taken from table 29A, volume 4 of the 2002 census, 'persons usually resident in each province and county, and present in the state on census night, classified by country of birth'. Direct methods of standardisation were used to allow comparison of rates between geographical areas using the 2002 Irish population as the standard population. In order to compare rates between groups of interest, 95% confidence intervals were used.

Results

Notified TB cases in Ireland in 2002

There were **408** cases of TB notified in the period January 1st - December 31st, 2002. A summary of the data is shown in table 1.

Table 1: Summary of the epidemiology of TB in Ireland, 2002

Parameter	Number
Total number of cases	408
Crude notification rate per 100,000	10.4
Cases in indigenous population	271
Cases in non-nationals	123
Culture positive cases	249
Smear positive pulmonary cases	117
Cases resistant to isoniazid	9
Cases resistant to rifampicin	0
Cases resistant to ethambutol	0
Cases resistant to pyrazinamide	0
Cases resistant to streptomycin	2
Multi-drug resistant cases	0
Deaths attributable to TB	5
Outcomes reported in cases	315
TB meningitis cases	6

Table 2 shows the number of TB cases notified in each quarter of 2002. Eleven cases could not be allocated to a specific quarter of the year. Notifications were lowest in the first quarter and highest in the third quarter.

Table 2: Number of TB notifications in each quarter in 2002

Quarter (2002)	No. of cases notified	Percentage (%)
<i>January-March</i>	91	22.3
<i>April-June</i>	95	23.3
<i>July-September</i>	107	26.2
<i>October-December</i>	104	25.5
<i>Unassigned[†]</i>	11	2.7
Total	408	100

[†]11 cases could not be allocated to a specific quarter

The number of cases notified for each of the years from 1991-2002 is shown in table 3. Crude incidence rates for 1991 to 1993 were calculated using the 1991 census of population. Census data from 1996 were used in the calculation of crude incidence rates for years 1994-1999 and 2002 census data were used to calculate crude incidence rates for 2000-2002.

Table 3: Notified cases of TB in Ireland 1991-2002 with crude rates per 100,000 population and 3-year moving averages 1992-2001*

Year	Number	Crude rate per 100,000	3-year moving average
1991	640	18.2	
1992	604	17.1	612
1993	598	17.0	581
1994	524	14.5	526
1995	458	12.6	469
1996	434	12.0	436
1997	416	11.5	423
1998	424	11.7	433
1999	469	12.9	439
2000	395	10.1	410
2001	381	9.7	391
2002	408	10.4	

* Three-year moving averages were calculated by applying the formula $(a+2b+c)/4$ to each three successive points a, b and c (each letter representing a year) in the series and the result was used as the smoothed value of b.

Health board crude incidence rates

The total number of TB cases in each health board is shown in table 4 with crude incidence rates and 95% confidence intervals included. Table 5 shows the total number of cases for the indigenous population in each health board with crude incidence rates and 95% confidence intervals included.

The highest crude rate was reported in the Southern Health Board (13.3/100,000 population). Both the ERHA and SEHB reported a crude rate of 11.6/100,000 population. The North Western Health Board reported the lowest crude rate at 5.4/100,000. Furthermore, the crude rate in the NWHB was significantly lower than the national crude incidence rate (10.4/100,000 population).

The crude TB incidence rates for the indigenous population alone were highest in the SHB (12.0/100,000 population) and were lowest in the MHB (3.9/100,000 population).

The crude incidence rates seen in each health board in the period 1992-2002 are shown in table 6 while the 3-year moving average TB notification rates for each health board for the period 1992-2001 are shown in table 7.

Table 4: TB cases in each health board in 2002

Health Board	Cases	Crude rate/100,000	95% CI for rate
ERHA	162	11.6	9.8-13.3
MHB	19	8.4	4.6-12.2
MWHB	32	9.4	6.2-12.7
NEHB	24	7.0	4.2-9.7
NWHB	12	5.4	2.4-8.5
SEHB	49	11.6	8.3-14.8
SHB	77	13.3	10.3-16.2
WHB	33	8.7	5.7-11.6
Ireland	408	10.4	9.4-11.4

Table 5: TB cases in each health board in 2002 for the indigenous population only

Health Board	Cases	Crude rate/100,000	95% CI for rate
<i>ERHA</i>	103	8.4	6.8-10.0
<i>MHB</i>	8	3.9	1.2-6.6
<i>MWHB</i>	22	7.3	4.2-10.3
<i>NEHB</i>	17	5.5	2.9-8.2
<i>NWHB</i>	10	5.3	2.0-8.6
<i>SEHB</i>	34	8.8	5.9-11.8
<i>SHB</i>	62	12.0	9.0-15.0
<i>WHB</i>	15	4.6	2.2-6.9
<i>Ireland</i>	271	7.8	6.9-8.8

Table 6: Crude TB incidence rates per 100,000 population by health board, 1992-2002

Health Board	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
<i>ERHA</i>	16.2	11.6	13.4	12.4	8.7	9.9	11.7	13.9	10.2	12.3	11.6
<i>MHB</i>	18.7	10.8	14.7	8.9	8.3	9.7	4.9	7.3	7.1	3.1	8.4
<i>MWHB</i>	20.9	18.0	17.7	15.4	17.7	15.1	14.8	17.0	13.8	7.1	9.4
<i>NEHB</i>	10.0	7.8	18.3	8.7	12.1	9.8	9.5	8.2	6.1	11.0	7.0
<i>NWHB</i>	15.9	26.3	9.1	11.5	7.1	10.4	9.0	9.0	4.1	5.9	5.4
<i>SEHB</i>	12.3	16.4	11.2	9.7	6.9	12.8	8.9	7.9	9.7	4.7	11.6
<i>SHB</i>	21.5	23.3	17.8	21.0	22.5	17.4	14.3	13.7	13.8	12.4	13.3
<i>WHB</i>	22.2	22.5	23.3	11.4	13.1	10.8	15.3	19.9	10.0	8.9	8.7
<i>Ireland</i>	17.1	17.0	14.5	12.6	12.0	11.5	11.7	12.9	10.1	9.7	10.4

Table 7: 3-year moving average TB notification rate per 100,000 population, 1992-2001

Health Board	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
<i>ERHA</i>	14.7	13.2	12.7	11.7	9.9	10.1	11.8	12.4	11.7	11.6
<i>MHB</i>	16.1	13.8	12.3	10.2	8.8	8.2	6.7	6.7	6.2	5.4
<i>MWHB</i>	20.3	18.7	17.2	16.6	16.5	15.7	15.4	15.7	12.9	9.4
<i>NEHB</i>	10.1	11.0	13.3	12.0	10.7	10.3	9.3	8.0	7.9	8.8
<i>NWHB</i>	20.2	19.4	14.0	9.8	9.0	9.2	9.4	7.8	5.8	5.3
<i>SEHB</i>	12.6	14.1	12.1	9.4	9.1	10.4	9.6	8.6	8.0	7.7
<i>SHB</i>	21.7	21.5	20.0	20.6	20.9	17.9	14.9	13.9	13.4	13.0
<i>WHB</i>	26.0	22.6	20.1	14.8	12.1	12.5	15.3	16.3	12.2	9.1
<i>Ireland</i>	17.3	16.4	14.7	12.9	12.0	11.7	12.0	11.9	10.7	10.0

Age and sex breakdown of TB cases notified in 2002

There were 259 cases of TB notified in males (63.5%) in 2002 and 148 in females (36.3%), giving a male to female ratio of 1.8:1. Sex was not reported in one case. Table 8 gives the breakdown of notified TB cases by sex and by health board.

In 2002, the mean age of cases was 44.6 years with a range from less than one year of age to 94 years. The age was not reported in one case. Ninety-three cases (23.6%) were aged 65 years or over. Figure 1 shows the national age- and sex-specific notification rates in Ireland for 2002.

Table 8: Sex breakdown of TB cases by health board in Ireland, 2002*

Health Board	Males	Females	Male:Female ratio
ERHA	99	63	1.6
MHB	12	7	1.7
MWHB	23	9	2.6
NEHB	16	8	2.0
NWHB	6	6	1.0
SEHB	31	18	1.7
SHB	54	23	2.3
WHB	18	14	1.3
Total	259	148	1.8

*Sex not reported in one case

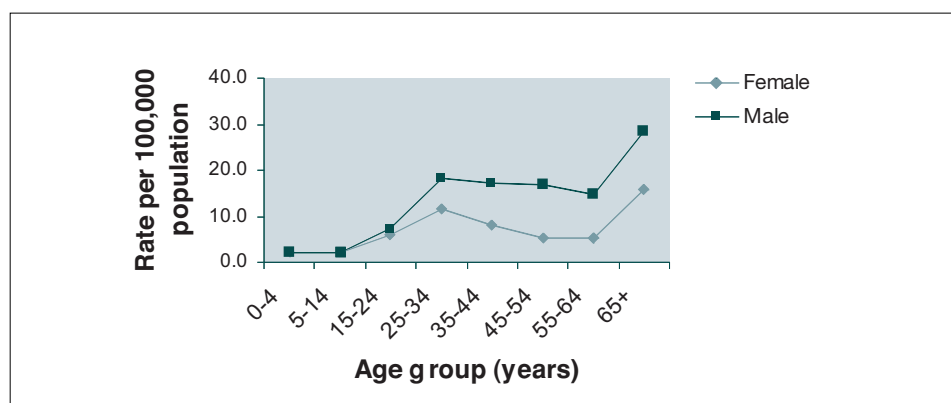


Figure 1: Age- and sex-specific notification rates per 100,000 population, 2002†

†Age unknown in one case and sex unknown in one case

Age-standardised TB incidence rates

Age-standardised TB incidence rates are presented by health board and by county. Age-standardised TB incidence rates for each health board are presented in figures 2 and 3 (figure 2 includes 95% confidence intervals).

The highest age-standardised TB incidence rates were seen in the Southern Health Board at 13.1 per 100,000 population. The North Western Health Board reported the lowest age-standardised rates at 5.1/100,000 population. Furthermore, the age-standardised rate in the NWHB was significantly lower than the national age-standardised incidence rate (10.4 per 100,000 population).

Age-standardised incidence rates for each county are shown in table 9 and figure 4 (95% confidence intervals are included in table 9).

Waterford had a significantly higher rate than the national figure. This can be accounted for by a cluster of cases that occurred in that year. Counties with significantly lower incidence rates than the national rate were Galway, Wexford, Meath, Donegal, Tipperary and Wicklow.

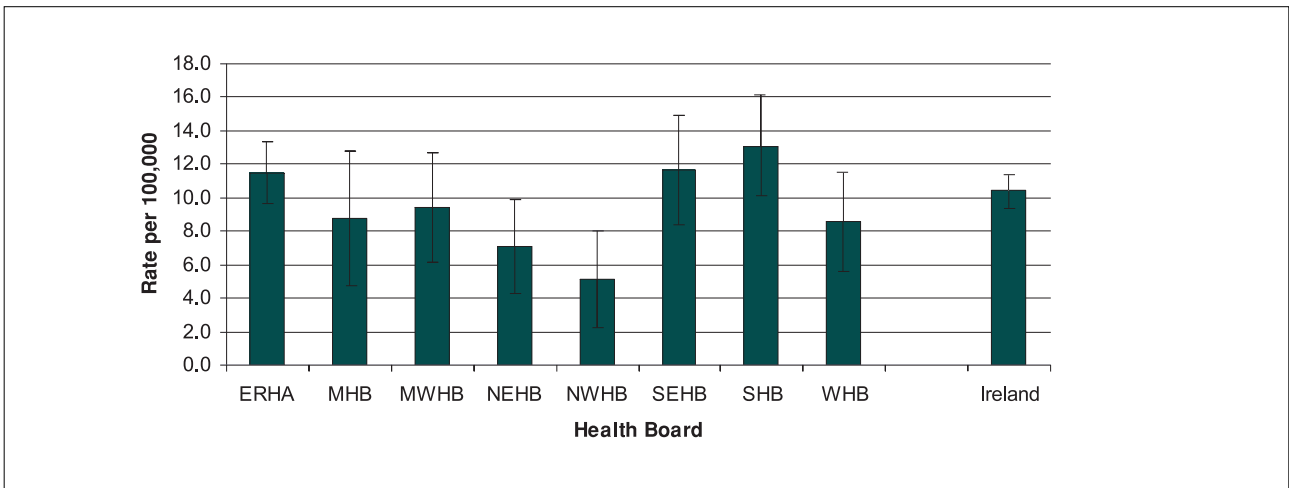


Figure 2: Age-standardised TB incidence rates per 100,000 population by health board with 95% confidence intervals, 2002.

*Age not reported in one case

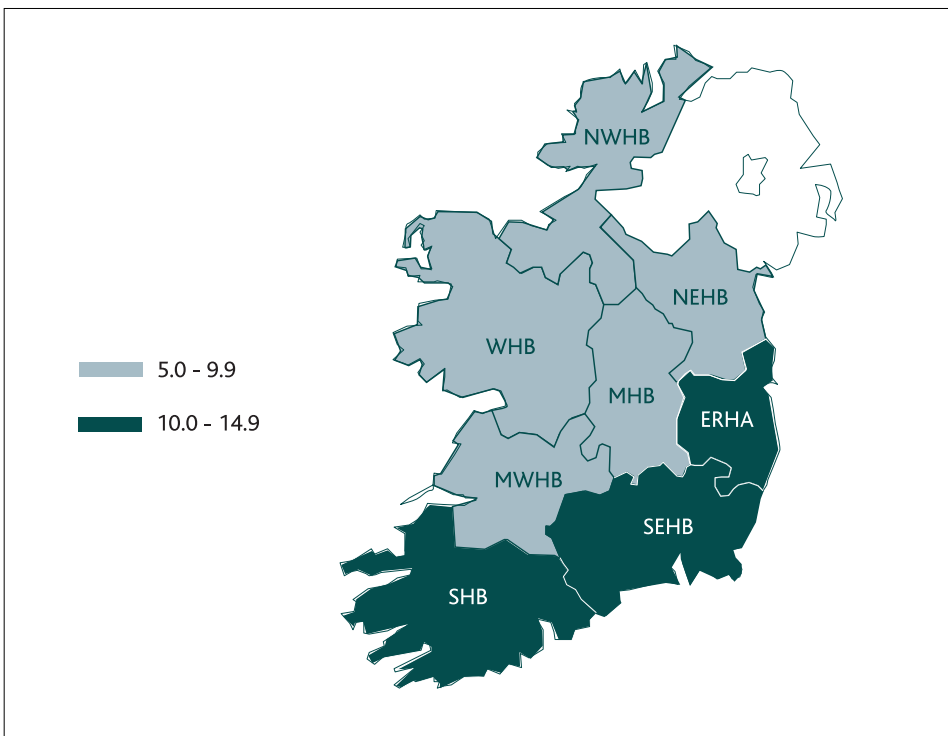
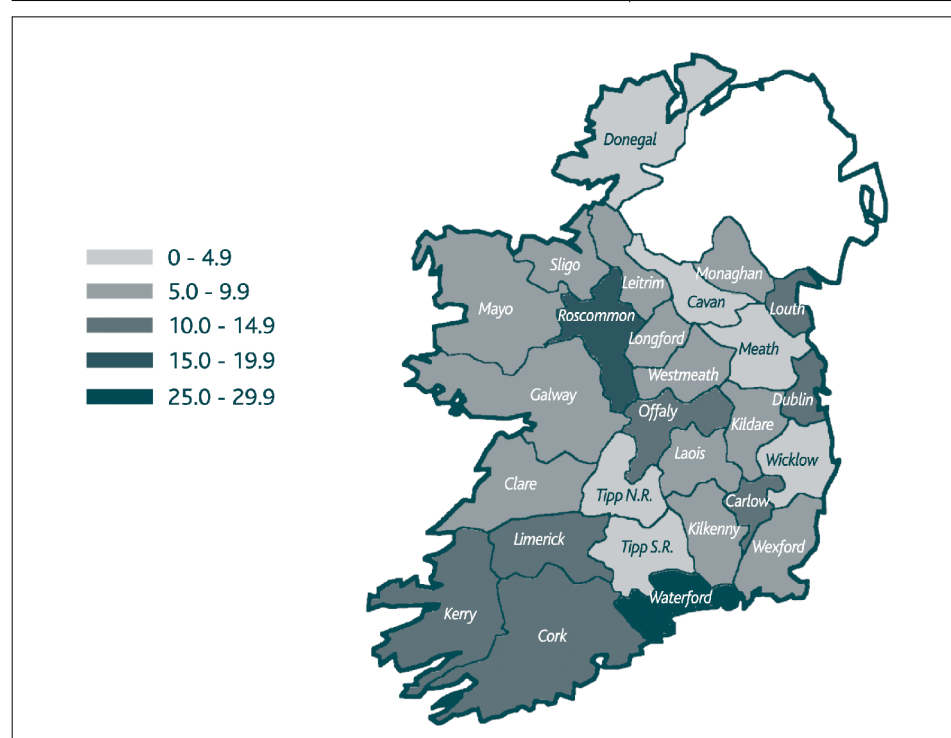


Figure 3: Age-standardised TB incidence rate per 100,000 population by health board in 2002

Table 9: Age-standardised TB incidence rates per 100,000 population by county with 95% confidence intervals, 2002

County	Incidence rate/100,000	95% CI
Waterford	27.0	16.8-37.2
Roscommon	18.7	6.8-30.5
Cork	14.0	10.5-17.5
Dublin	12.9	10.8-15.0
Louth	12.1	5.2-19.0
Limerick	12.1	6.9-17.2
Offaly	11.6	3.0-20.2
Carlow	11.1	1.4-20.7
Kerry	10.3	4.9-15.8
Clare	9.8	3.7-15.9
Kildare	9.1	4.2-14.0
Kilkenny	8.9	2.3-15.5
Mayo	8.8	3.5-14.0
Westmeath	8.6	1.7-15.5
Leitrim	7.9	0.0-19.4
Laois	7.0	0.0-13.8
Longford	7.0	0.0-16.7
Sligo	5.9	0.1-11.7
Galway	5.4	2.2-8.5
Monaghan	5.2	0.0-11.0
Wexford	5.1	1-9.3
Meath	4.9	0.9-8.8
Cavan	4.7	0.0-10.0
Donegal	4.3	0.8-7.7
Tipperary	3.3	0.4-6.2
Wicklow	0.9	0.9-2.7
Ireland	10.4	9.4-11.4

**Figure 4:** Age-standardised TB incidence rate per 100,000 population by county in 2002

Geographic origin of TB cases

One hundred and twenty three of the TB cases (30.1 % of all notified cases) notified in 2002 were known to have been born outside Ireland. The corresponding figure for 2001 was 16.5% (n=63). In 2002, non-national patients with TB originated from at least 38 countries. One case was known not to have been born in Ireland, but the country of birth was not recorded. Forty nine cases were born in Africa, 44 in Asia, 25 in Europe, three in South America and one in North America. TB cases in non-nationals are shown in tables 10 and 11 by health board and country of origin respectively.

Table 10: Cases of TB in non-national patients in 2002

Health Board	Born outside Ireland	% of health board cases
ERHA	59	36.4
MHB	8	42.1
MWHB	10	31.3
NEHB	4	16.7
NWHB	2	16.7
SEHB	14	28.6
SHB	15	19.5
WHB	11	33.3
Total	123	30.1

Table 11: Countries of origin of non-national patients with TB, notified in 2002

Country of birth	Cases	Country of birth	Cases
Albania	1	Moldova	1
Bosnia	2	Nigeria	17
Brazil	3	Pakistan	18
Burma/Myanmar	1	Philippines	6
China	1	Poland	1
Congo	1	Portugal	1
Croatia	1	Romania	3
Estonia	1	Saudi Arabia	1
Germany	1	Sierra Leone	1
Greece	1	South Africa	8
Guinea	1	Spain	1
India	12	Sudan	5
Italy	1	Thailand	2
Kazakstan	1	United Kingdom	8
Kenya	2	Ukraine	1
Latvia	1	USA	1
Liberia	1	Vietnam	1
Malawi	2	Zambia	1
Malaysia	1	Zimbabwe	10
		Total[#]	122

[#]Country of origin not available for one case

Diagnostic classification

The diagnostic categories reported for Ireland and by health board are shown in tables 12 and 13 respectively.

Pulmonary TB was diagnosed in 268 (65.7%) of the 408 cases notified in 2002, of which 178 (66.4%) were laboratory-confirmed by culture. Thirteen pulmonary cases were laboratory-confirmed by microscopy only (4.9%). A further five cases (1.9%) were confirmed by histology only. One culture negative case was positive on both microscopy and histology.

Pulmonary and extrapulmonary TB was diagnosed in 37 (9.0%) cases, of which 24 (64.9%) were laboratory-confirmed by culture. An additional two cases were confirmed by histology only. One further case was confirmed by microscopy only.

Extrapulmonary TB was diagnosed in 95 (23.3%) cases of which 46 (48.4%) were laboratory-confirmed by culture. Thirty two (33.7%) of the 95 cases were histology positive, 15 of which were culture positive and 17 of which were laboratory-confirmed by histology only.

Of the eight cases where diagnostic type was not specified, one case was culture positive and one case was histology positive.

Laboratory confirmation by culture was therefore available for 249 (61.0%) of the 408 cases notified in 2002. A further 14 cases were laboratory-confirmed by microscopy only and an additional 25 cases were confirmed by histology only. One culture negative case was positive on both microscopy and histology. Thus, the total number of cases laboratory-confirmed by culture, microscopy or histology was 289 (70.8%).

Definite cases

In countries where laboratories capable of identification of *M. tuberculosis* complex are routinely available, a definite case of TB has been defined as a case with culture confirmed disease due to *M. tuberculosis* complex (EuroTB, 1999). In 2002, 61.0% (249/408) of all TB cases notified were culture positive. This is an increase on the figures reported in previous years when 58.8% (224/381) of cases reported in 2001 were confirmed by culture compared to 58% (229/395) in 2000. In 1999, 55.4% of TB cases in Ireland were culture positive and in 1998, 56.8% of cases were culture positive.

Table 12: Diagnostic categories of TB cases in Ireland, 2002

Diagnosis	No. cases	%
Pulmonary	268	65.7
Pulmonary+Extrapulmonary	37	9.0
Extrapulmonary	95	23.3
Unspecified	8	2.0
Total	408	100

Table 13: Diagnostic categories of TB cases by health board, 2002

Health Board	Pulmonary		Extrapulmonary		Pulmonary + extrapulmonary		Unknown		Total n
	n	%	n	%	n	%	n	%	
ERHA	109	26.7	36	8.8	17	4.2	0	0	162
MHB	12	2.9	4	1.0	0	0.0	3	0.7	19
MWHB	15	3.7	12	2.9	4	1.0	1	0.2	32
NEHB	11	2.7	5	1.2	4	1.0	4	1.0	24
NWHB	10	2.5	1	0.2	1	0.2	0	0	12
SEHB	33	8.1	10	2.5	6	1.4	0	0	49
SHB	54	13.2	20	4.9	3	0.7	0	0	77
WHB	24	5.9	7	1.7	2	0.5	0	0	33
Total	268	65.7	95	23.3	37	9.0	8	2.0	408

*Pulmonary TB**

There were 305 cases reported in 2002 with a pulmonary disease component (74.8% of all cases reported). Sputum smear and culture status for these cases are presented in table 14. Sputum microscopy results were available for 252 (82.6%) of the 305 cases with a pulmonary disease component notified in 2002. This is comparable to the figures from 2001 (86.8%) and 2000 (84.1%).

Table 14: Sputum smear and culture status for pulmonary TB cases, 2002

	Sputum smear +ve	Sputum smear -ve	Sputum smear not done	Sputum smear unknown	Total
<i>Culture +ve</i>	107	79	10	6	202
<i>Culture -ve</i>	1	36	7	2	46
<i>Culture not done</i>	0	3	12	0	15
<i>Culture unknown</i>	14	12	5	11	42
Total	122	130	34	19	305

Pulmonary smear positive cases

In Ireland in 2002, 117 (38.4%) of the 305 cases with a pulmonary disease component were smear positive.† There were a total of 122 cases where at least one sputum specimen was positive for AFB by microscopy.

Extrapulmonary disease sites

One hundred and thirty two (32.4%) of the cases reported in 2002 had an extrapulmonary disease component. The extrapulmonary sites reported are shown in table 15.

Table 15: Extrapulmonary disease sites in notified cases, 2002

Site	Number
Pleural	44
Lymph-intrathoracic	6
Lymph-extrathoracic	38
Spinal	2
Bone/joint other than spine	3
Meningeal	6
CNS other than meningitis	1
Genitourinary	11
Disseminated	2
Peritoneal/digestive	4
Other	13
Site not reported	2
Total	132

* WHO defines pulmonary TB, for the purpose of analysis, as any case that has a pulmonary disease component.

†Based on the definition of the Report of the Working Party on Tuberculosis.

TB meningitis

There were six cases of TB meningitis reported in 2002 giving an incidence rate of 1.5 cases per million. There were two cases reported in 2001, six cases in 2000, seven cases in 1999 and six cases in 1998. Some details on these cases are provided in table 16. The cumulative incidence rates of TB meningitis in the health boards and in Ireland for 1998-2002 are shown in table 17.

Table 16: TB meningitis cases in Ireland, 2002

Health Board	Age group (years)	History of BCG
ERHA	35-44	U
ERHA	35-44	N
ERHA	35-44	Y*
ERHA	15-24	N
MWHB	15-24	U
WHB	0-4	N
Total	6 cases	

* 'GivenBCG' field = Unknown, 'ScarBCG' field = Yes,

Table 17: Cumulative incidence rate of TB meningitis in Ireland, 1998-2002

Health Board	Cases 1998-2002	Cumulative incidence rate	95% CI
ERHA	10	0.71/100,000	0.27-1.16
MWHB	1	0.29/100,000	0-0.87
NEHB	2	0.58/100,000	0-1.38
NWHB	2	0.90/100,000	0-2.15
SEHB	1	0.24/100,000	0-0.70
SHB	9	1.55/100,000	0.54-2.56
WHB	2	0.53/100,000	0-1.25
Ireland	27	0.69/100,000	0.43-0.95

Note: Calculations based on 2002 census figures

Culture status

Figure 5 shows the breakdown by health board of the 249 culture positive TB cases notified in 2002 (61.0% of cases notified). The isolate was not specified in ten cases. Of the 239 cases where isolates were specified, there were five cases of TB as a result of infection by *Mycobacterium bovis*. There were no cases of TB as a result of infection by *Mycobacterium africanum*. Table 18 shows the breakdown of isolates cultured in TB cases notified in Ireland in 2002.

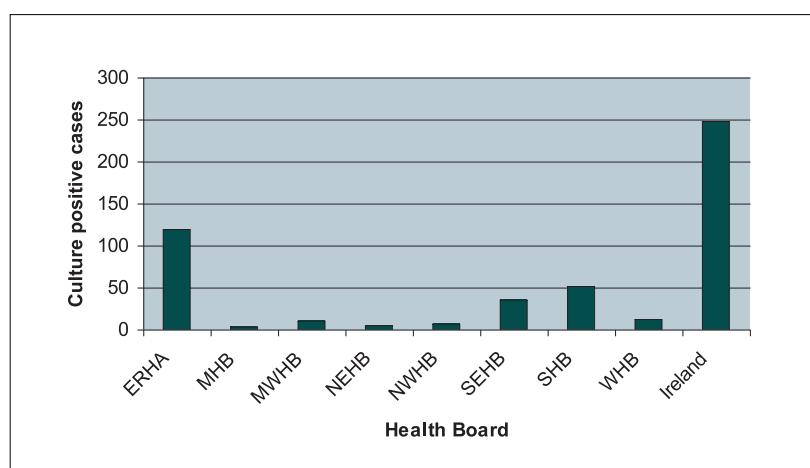
**Figure 5:** TB culture positive cases by health board, 2002

Table 18: Isolates detected in TB notifications in Ireland in 2002

Isolate	No	(%)
<i>Mycobacterium tuberculosis</i>	234	97.9
<i>Mycobacterium bovis</i>	5	2.1
<i>Mycobacterium africanum</i>	0	0
Total	239	100

Antibiotic resistance

Resistance was documented in ten cases out of a total of 234 *M. tuberculosis* isolates (4.3%). Mono-resistance to isoniazid was recorded in eight cases, mono-resistance to streptomycin in one case. One case was resistant to both isoniazid and streptomycin. In 2002, there were no multi-drug resistant[†] TB cases (MDR-TB) notified. Seven of the drug resistant cases were born outside Ireland.

Table 19: Sensitivity results of resistant cases in Ireland, 2002 (+ indicates resistance)

Diagnosis	Isolate	Isoniazid	Rifampicin	Pyrazinamide	Ethambutol	Streptomycin
Pulmonary	M.TB	+				
Pulmonary	M.TB	+				
Pulmonary	M.TB	+				
Pulmonary	M.TB	+				
Extrapulmonary	M.TB	+				
Extrapulmonary	M.TB	+				
Pulmonary + Extrapulmonary	M.TB	+				+
Pulmonary	M.TB	+				
Extrapulmonary	M.TB	+				
Pulmonary	M.TB					+

Outcomes

Treatment outcome

Of the 408 cases notified in 2002, the outcome was recorded in 315 cases (77.2%). Two hundred and fifty nine cases (82.2%) completed treatment. Sixteen patients (5.1%) were recorded as being lost to follow up. There were 30 deaths (9.5%) from all causes recorded. Treatment was interrupted in five (1.6%) cases and five cases were continuing to receive treatment at the time of reporting (1.6%).

Of the 117 smear positive cases of pulmonary TB, 91 (77.7%) completed treatment, seven (6.0%) died, four (3.4%) were lost to follow up and one (0.9%) was still on treatment at the time of reporting. Outcome was unknown for 14 cases (12.0%).

Of the 10 drug resistant cases, eight of the cases completed treatment while one case was lost to follow up and one case had treatment interrupted.

Deaths

There were 30 deaths among the 408 cases of TB notified in 2002 (7.4%). In five of these cases, TB was recorded as the cause of death (1.2% of cases notified). TB as a cause of death was reported in five cases in 2001, in six cases in 2000, in nine cases in 1999 and in six cases in 1998.

[†] defined as resistance to at least isoniazid and rifampicin with or without resistance to ethambutol and streptomycin.

Notified TB cases in Ireland in 2003

There were **421** cases of TB provisionally notified in the period January 1st - December 31st, 2003. A summary of the data is shown in table 20.

Table 20: Provisional summary of the epidemiology of TB in Ireland, 2003

Parameter	Number
Total number of cases	421
Crude notification rate per 100,000	10.7
Cases in indigenous population	294
Cases in non-nationals	84
Culture positive cases	173
Smear positive pulmonary cases	160
Cases resistant to isoniazid	7
Cases resistant to rifampicin	1
Cases resistant to ethambutol	2
Cases resistant to pyrazinamide	1
Cases resistant to streptomycin	2
Multi-drug resistant cases	1
TB meningitis cases	6

Table 21 shows the number of TB cases notified in each quarter of 2003. Eighteen cases could not be allocated to a specific quarter of the year. Notifications were lowest in the first quarter and highest in the second and fourth quarters.

Table 21: Provisional number of TB notifications in each quarter in 2003

Quarter (2003)	No. of cases notified	Percentage (%)
January-March	92	21.9
April-June	108	25.7
July-September	95	22.6
October-December	108	25.7
Unassigned [†]	18	4.3
Total	421	100

[†]18 cases could not be allocated to a specific quarter

Health board crude incidence rates in 2003

The total number of TB cases in each health board is shown in table 22 with crude incidence rates and 95% confidence intervals included. Table 23 shows the total number of cases for the indigenous population in each health board with crude incidence rates and 95% confidence intervals included.

The highest crude rates were reported in the SHB (16.4/100,000 population), MWHB (13.5/100,000) and ERHA (12.0/100,000). The lowest crude rates were reported in the MHB (5.8/100,000 population) and the NWHB (5.9/100,000).

The crude TB incidence rates for the indigenous population alone were highest in the SHB (16.6/100,000 population) and were lowest in the WHB (1.5/100,000 population).

Table 22: Provisional TB cases in each health board in 2003

Health Board	Cases	Crude rate/100,000	95% CI for rate
ERHA	168	12.0	10.2-13.8
MHB	13	5.8	2.6-8.9
MWHB	46	13.5	9.6-17.5
NEHB	27	7.8	4.9-10.8
NWHB	13	5.9	2.7-9.1
SEHB	33	7.8	5.1-10.4
SHB	95	16.4	13.1-19.7
WHB	26	6.8	4.2-9.5
Ireland	421	10.7	9.7-11.8

Table 23: Provisional TB cases in each health board in 2003 for the indigenous population only

Health Board	Cases	Crude rate/100,000	95% CI for rate
ERHA	104	8.5	6.9-10.1
MHB	7	3.4	0.9-5.9
MWHB	42	13.9	9.7-18.1
NEHB	17	5.5	2.9-8.2
NWHB	7	3.7	1.0-6.5
SEHB	26	6.8	4.2-9.4
SHB	86	16.6	13.1-20.1
WHB	5	1.5	0.2-2.8
Ireland	294	8.5	7.5-9.5

Age and sex breakdown of TB cases notified in 2003

There were 261 cases of TB notified in males (62.0%) in 2003 and 156 in females (37.1%), giving a male to female ratio of 1.7:1. Sex was not reported in four cases. Table 8 gives the breakdown of TB cases, provisionally notified in 2003, by sex and by health board.

In 2003, the mean age of cases was 43.9 years with a range from less than one year of age to 98 years. The age was not reported in three cases. One hundred and one cases (24.0%) were aged 65 years or over.

Table 24: Sex breakdown of TB cases by health board in Ireland, 2003*

Health Board	Males	Females	Male:Female ratio
ERHA	100	67	1.5
MHB	7	6	1.2
MWHB	28	18	1.6
NEHB	14	13	1.1
NWHB	9	4	2.3
SEHB	21	12	1.8
SHB	64	31	2.1
WHB	18	5	3.6
Total	261	156	1.7

*Sex not reported in four cases

Geographic origin of TB cases

Eighty four of the TB cases (20.0 % of all cases) provisionally notified in 2003 were known to have been born outside Ireland. Two hundred and ninety four cases were born in Ireland (69.8%). Information on country of birth was unavailable for 43 cases (10.2% of cases provisionally notified).

Of the 84 cases born outside Ireland in 2003, 30 cases were born in Asia, 19 cases in Europe, 18 in Africa and three in the Americas. Fourteen cases were known not to have been born in Ireland, but the country of birth was not recorded. TB cases in non-nationals are shown in table 25.

Table 25: Cases of TB in non-national patients in 2003

Health Board	Born outside Ireland	% of health board cases
<i>ERHA</i>	52	31.0
<i>MHB</i>	3	23.1
<i>MWHB</i>	4	8.7
<i>NEHB</i>	7	25.9
<i>NWHB</i>	3	23.1
<i>SEHB</i>	5	15.2
<i>SHB</i>	8	8.4
<i>WHB</i>	2	10.5
Total	84	20.0

Diagnostic classification

The diagnostic categories reported for Ireland and by health board are shown in tables 26 and 27 respectively.

Pulmonary TB was diagnosed in 272 (64.6%) of the 421 cases notified in 2003, of which 125 (46.0%) were laboratory-confirmed by culture. Pulmonary and extrapulmonary TB was diagnosed in 27 (6.4%) cases, of which 15 (55.6%) were laboratory-confirmed by culture. Extrapulmonary TB was diagnosed in 97 (23.0%) cases of which 28 (28.9%) were laboratory-confirmed by culture. Of the 25 cases where diagnostic type was not specified, five cases were culture positive.

There were 299 cases provisionally reported in 2003 with a pulmonary disease component (71.0% of all cases reported). One hundred and sixty cases (53.5% of cases with a pulmonary disease component) were smear positive.[†]

Table 26: Diagnostic categories of TB cases provisionally notified in Ireland, 2003

Diagnosis	No. cases	%
Pulmonary	272	64.6
Pulmonary+Extrapulmonary	27	6.4
Extrapulmonary	97	23.0
Unspecified	25	6.0
Total	421	100

[†]WHO defines pulmonary TB, for the purpose of analysis, as any case that has a pulmonary disease component.

Table 27: Diagnostic categories of TB cases by health board, 2003

Health Board	Pulmonary		Extrapulmonary		Pulmonary + extrapulmonary		Unknown		Total
	n	%	n	%	n	%	n	%	n
ERHA	106	25.2	39	9.3	13	3.1	10	2.4	168
MHB	9	2.1	1	0.2	0	0.0	3	0.7	13
MWHB	32	7.6	12	2.9	1	0.2	1	0.2	46
NEHB	14	3.3	7	1.7	1	0.2	5	1.2	27
NWHB	10	2.4	1	0.2	0	0.0	2	0.5	13
SEHB	21	5.0	7	1.7	4	1.0	1	0.2	33
SHB	61	14.5	26	6.2	8	1.9	0	0.0	95
WHB	19	4.5	4	1.0	0	0.0	3	0.7	26
Total	272	64.6	97	23.0	27	6.4	25	5.9	421

Extrapulmonary disease sites

One hundred and twenty four (29.5%) of the cases provisionally reported in 2003 had an extrapulmonary disease component. The extrapulmonary sites reported are shown in table 28.

Table 28: Extrapulmonary disease sites in provisionally notified cases, 2003

Site	Number
Pleural	39
Lymph-intrathoracic	6
Lymph-extrathoracic	27
Spinal	3
Bone/joint other than spine	1
Meningeal	6
CNS other than meningitis	2
Genitourinary	4
Disseminated	4
Peritoneal/digestive	6
Other	12
Site not reported	14
Total	124

TB meningitis

There were six cases of TB meningitis provisionally reported in 2003 giving an incidence rate of 1.5 cases per million. Two cases were reported in children aged 0-4 years, both of whom were culture confirmed. One of these cases had received BCG vaccine and the other had not. One further adult case was also culture confirmed. Two of the six cases were reported as having received BCG vaccination.

Culture status

Table 29 shows the breakdown by health board and culture status of the 421 TB cases provisionally notified in 2003. There were 173 culture positive cases reported in 2003. The isolate was not specified in 20 cases. Of the 153 cases where isolates were specified, there were 147 cases as a result of infection by *Mycobacterium tuberculosis* and six cases as a result of infection by *Mycobacterium bovis* (table 30). There were no cases of TB as a result of infection by *Mycobacterium africanum*.

Table 29: Provisional culture status of TB cases by health board, 2003

Health Board	Culture positive	Culture negative	Not done	Unknown	Missing	Total
ERHA	51	13	3	5	96	168
MHB	6	1	0	0	6	13
MWHB	18	9	1	4	14	46
NEHB	9	2	0	1	15	27
NWHB	10	1	0	0	2	13
SEHB	23	3	4	0	3	33
SHB	42	8	3	1	41	95
WHB	14	0	0	2	10	26
Total	173	37	11	13	187	421

Table 30: Isolates detected in provisional TB notifications in Ireland in 2003

Isolate	No	(%)
<i>Mycobacterium tuberculosis</i>	147	96.1
<i>Mycobacterium bovis</i>	6	3.9
<i>Mycobacterium africanum</i>	0	0.0
Total	153	100

Antibiotic resistance

Eight *Mycobacterium tuberculosis* isolates were documented which were resistant to at least one antibiotic. Five isolates were mono-resistant to isoniazid and one case was mono-resistant to ethambutol. One case was resistant to both isoniazid and streptomycin. One multi-drug resistant[†] case was identified which was resistant to isoniazid, pyrazinamide, ethambutol, rifampicin and streptomycin.

[†]Defined as resistance to at least isoniazid and rifampicin with or without resistance to ethambutol and streptomycin.

Discussion

This is the fifth national report on the epidemiology of TB in Ireland produced by the Health Protection Surveillance Centre (formerly known as the National Disease Surveillance Centre). This report is based on data from the enhanced national TB surveillance system (NTBSS 2000) that became operational in all health boards in Ireland on January 1st 2000. The new system is based on the minimum dataset required to be reported by Ireland to EuroTB, the European agency located at the Institut de Veille Sanitaire in Paris which collates national TB data within Europe and contributes epidemiological data to the WHO global TB control programme for Europe.

In 2002, 408 cases of tuberculosis were notified to HPSC giving a national crude incidence rate of 10.4/100,000 population. This represents a 7.1% increase in TB notifications compared to 2001 and a 3.3% increase compared to 2000. However, it remains lower than the crude incidence rates reported between 1991 and 1999, which ranged from 11.5/100,000 to 18.5/100,000. The 3-year moving average continues to demonstrate a general downward trend in TB incidence in Ireland in recent years.

Differences in age standardised TB incidence rates persist between health board areas. In 2002, the SHB had the highest rates of TB (13.1/100,000) followed by the SEHB (11.7/100,000) and ERHA (11.5/100,000). In 2001, the highest rates were seen in the SHB and ERHA at 12.4 per 100,000 population each. While in 2000, rates were highest in the MWHB and the SHB. In 2002, the NWHB reported the lowest age standardised TB incidence rates at 5.1/100,000 population. This was significantly lower than the national age standardised rate (10.4 per 100,000). In 2001, the lowest rates were reported in the MHB (3.1/100,000), SEHB (4.7/100,000) and the NWHB (5.4/100,000) and all were significantly lower than the national age standardised rate (9.7/100,000). While in 2000, rates were lowest in the NWHB.

Those aged 65 and over had the highest age-specific rate in 2002 (21.3/100,000 population). This is comparable to the rate observed in this age group in 2001 (20.6/100,000 population).

The male:female ratio of 1.8:1 reported in 2002 was also comparable with the rate reported in 2001 (1.7:1). However, in 2002, higher ratios were seen in the MWHB, SHB and NEHB where the ratios were 2.6:1, 2.3:1 and 2.0:1 respectively. No health board had a female preponderance.

When compared with previous years, 2002 saw an increase in the percentage of cases born outside Ireland. One hundred and twenty three cases (30.1%) were born outside Ireland in 2002, compared to 63 cases (16.5%) in 2001, 45 cases (11.1%) in 2000 and 65 cases (13.9%) in 1999. The crude rate of TB notifications in the indigenous population only in 2002 was 7.8/100,000 while the national crude rate for all cases notified in 2002 was 10.4/100,000. However, the percentage of foreign-born cases reported in Ireland in 2002 remains lower than other Western European countries. For example, in 2002, in Belgium, France, Germany and the United Kingdom where crude incidence rates (9.3 – 12.6 per 100,000 population) are similar to those reported in Ireland (10.4/100,000) the percentage of cases of foreign origin ranged from 38.1% to 55.3%.⁵

In 2002, 249 of all cases of TB notified (61.0%) were culture positive. This figure is comparable to that reported in 2000 (58.8%). The total number of cases laboratory-confirmed by culture, microscopy or histology was 289 cases (70.8%). A total of 100 cases were not laboratory-confirmed in 2002 and this number included 81 cases with a pulmonary component.

Resistance was documented in ten cases out of a total of 234 *M. tuberculosis* isolates (4.3%). There were no cases of multi-drug resistance (MDR) reported in 2002. In 2001 and 2000, two and three MDR cases respectively were reported. In 2002, mono-resistance to isoniazid was recorded in eight cases, mono-resistance to streptomycin in one case and one case was resistant to both isoniazid and streptomycin. Seven of the drug resistant cases were born abroad. Drug resistance is an issue that needs to be kept under close surveillance and is something that will be greatly facilitated by the recent establishment of a National TB Reference Laboratory.

Over the past number of years, the quality of data in Ireland has improved steadily. The percentage of cases reported with outcome data included was 77.2% in 2002. This represents an increase of approximately 17% on percentage of outcome data available in 2001 and 2000. It is also notable that 82% (259) of these cases completed treatment. This has facilitated more accurate analysis of TB data. This increase may be partly due to the fact that 2002 was the first year where data were collected using

the Epi-Info 2000 system. The windows-based system is more user friendly than the previous Epi-Info 6 system. It is of critical importance to TB control in Ireland that surveillance of TB be maintained at a high level, in view of the increased incidence of tuberculosis, and in particular, multi-drug resistant forms, worldwide.

Provisional Data for 2003

This is the first year that provisional data have been provided for the succeeding year. It is important to note that these data are only provisional and may change significantly following validation and some cases may also be denotified.

In 2003, 421 cases of TB were notified to HPSC giving a national crude incidence rate of 10.7/100,000 which is approximately the same as 2002 (10.4/100,000). These provisional data indicate that 20% of cases notified in 2003 were born outside Ireland representing a decrease from 2002. However, it is notable that 43 cases (10.2% of cases provisionally notified in 2003) did not have any information recorded on country of origin.

Variations in crude incidence rates for TB were noted across health boards with the highest rates reported in the SHB (16.4/100,000), MWHB (13.5/100,000) and ERHA (12.0/100,000). The lowest crude incidence rates were seen in the MHB (5.8/100,000) and the NWHB (5.9/100,000).

The male:female ratio among TB cases notified nationally was 1.7:1. The mean age of cases was 43.9 years with a range from less than one year of age to 98 years. Those aged 65 years and over represented 24% of all cases notified.

Of all cases notified in 2003, 71.0% had a pulmonary component of which 53.5% were sputum smear positive. Provisionally, 42.0% (173/421) of all TB cases notified in 2003 were culture positive. Six cases of TB meningitis were notified giving an incidence rate of 1.5 cases per million. Two of these cases were reported in children aged 0-4 years, both of whom were culture confirmed. Two of the six cases were reported as having received BCG vaccination.

One case of MDR-TB was notified in 2003, which was resistant to isoniazid, pyrazinamide, ethambutol, rifampicin and streptomycin. Five cases demonstrated mono-resistance to isoniazid and one case was mono-resistant to ethambutol. One further case was resistant to both isoniazid and streptomycin.

BCG vaccination

As reported by the Working Party on Tuberculosis in their Report on Tuberculosis (Department of Health and Children, 1996*), cessation of neonatal BCG should be considered provided certain basic requirements are in place:

Criterion 1

There is a well functioning tuberculosis control programme.

Ireland

Yes

Criterion 2

There has been a reliable reporting system over the previous five or more years, enabling the estimation of the annual incidence of active tuberculosis by age and risk groups, with particular emphasis on tuberculosis meningitis and sputum smear positive pulmonary tuberculosis.

Ireland

Yes

National data enabling a detailed epidemiological analysis for the country as a whole was first presented by the HPSC in the 1998 National TB Report. The 2002 national TB report is the fifth national TB report produced by HPSC.

Criterion 3

Due consideration has been given to the possibility of an increase in the incidence of tuberculosis resulting from the epidemiological situation of AIDS in that country.

Ireland

Yes

Criterion 4

The average annual notification rate of sputum smear positive pulmonary tuberculosis should be 5/100,000 or less during the previous three years.

Ireland

Yes

In 2001, the national rate for sputum positive pulmonary TB was 3.3/100,000, while in 2000 and 1999, the rates were 4.0/100,000 and 3.3/100,000 respectively.

Criterion 5

The average annual notification rate of tuberculosis meningitis in children under five years of age should be less than one case per ten million general population over the previous five years.

Ireland

No

In 2002, there was one case of TB meningitis in a child less than five years of age in the WHB and in 1998 there was a case of TB meningitis in a one year old child. These children had not received the BCG vaccination. In 2003, two cases of TB meningitis were reported in children aged 0-4 years, both of whom were culture confirmed. One of these cases has received BCG vaccine and the other had not.

Criterion 6

The average annual risk of tuberculosis infection should be 0.1% or less.

Ireland

Not applicable

When considering the importance of neonatal BCG vaccination, it is worth considering the practice in other European countries. For example, Sweden discontinued routine neonatal BCG vaccination in 1975 when they had a total notification rate of 20/100,000 population and an age-specific incidence rate for children aged 0-14 years of 0.3/100,000. While the national crude rate in Ireland is <20/100,000 population, the 2002 age-specific incidence rate for children 0-14 years was 2.2/100,000, more than seven times the rate

recorded in Sweden when they discontinued neonatal BCG vaccination. In 2001 and 2000, the age-specific incidence rate for children aged 0-14 years was 1.9/100,000. In 1999, the age-specific incidence rate for children aged 0-14 years was 4.7/100,000 population, almost sixteen times the rate recorded in Sweden. In 1998, the corresponding figure was 3.5/100,000 population almost twelve times the rate recorded in Sweden when they discontinued BCG vaccination.

In summary, Ireland does not yet meet all of the criteria set by the International Union Against Tuberculosis and Lung Disease for discontinuation of national BCG vaccination programmes. ⁶

Conclusions

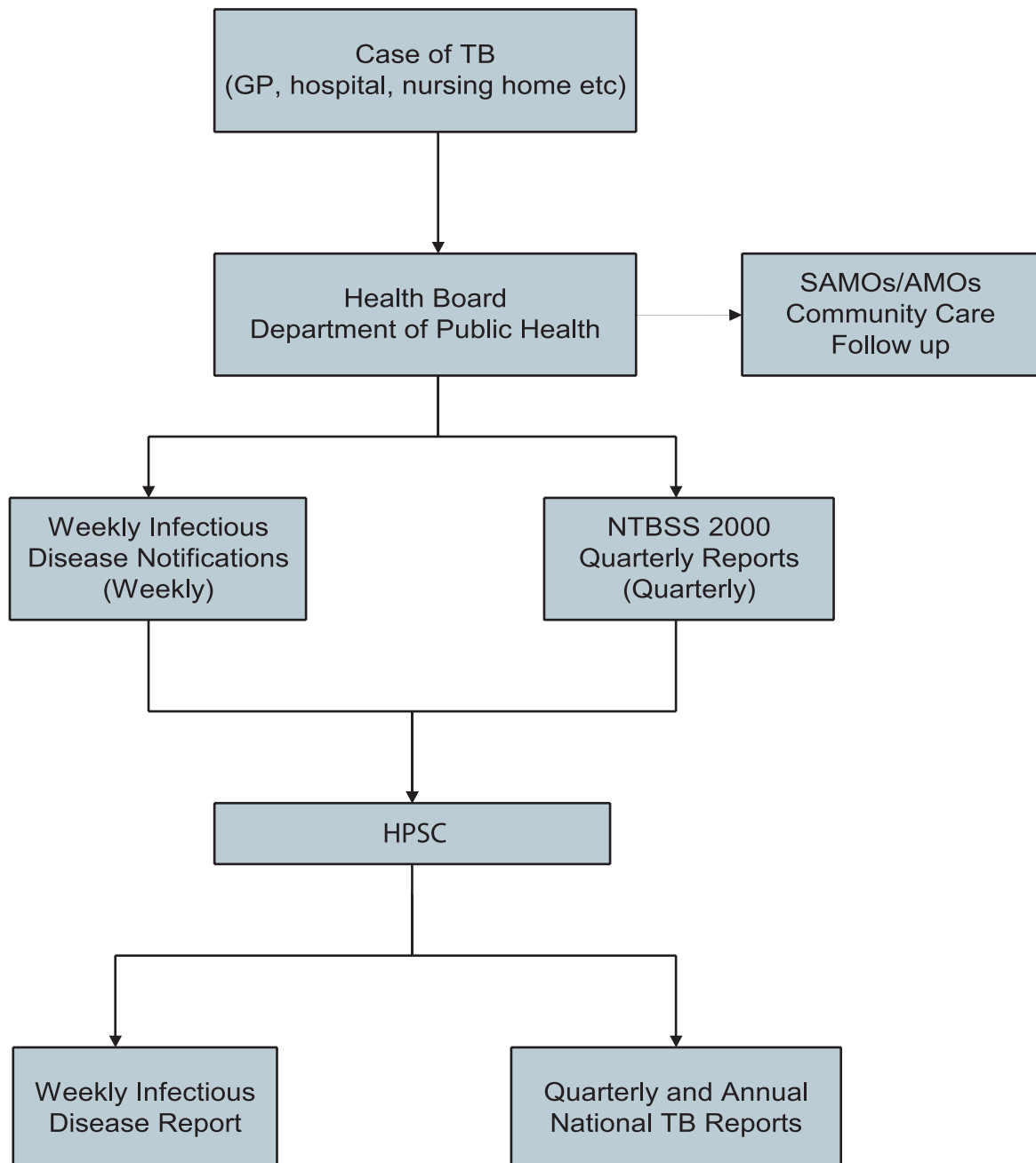
- There was a 7.1% increase in TB case notifications in 2002 compared to the previous year.
- There was a regional variation in the TB crude notification rates from 13.3/100,000 population in the Southern Health Board to 5.4/100,000 population in the North Western Health Board.
- The age standardised incidence rates were highest in the SHB at 13.1/100,000 population and lowest in the NWHB at 5.1/100,000.
- The male:female ratio among TB cases was 1.8:1 nationally, varying from 2.6:1 in the Mid-Western Health Board to 1:1 in the North Western Health Board.
- 30.1% of all TB cases notified in 2002 were in people known to have been born outside of Ireland, an increase on the proportion of foreign-born cases noted in the previous year (16.5%).
- 74.7% of the TB cases notified in 2002 had a pulmonary component.
- 38.4% of pulmonary TB cases notified in 2002 were sputum smear positive.
- 61.0% of pulmonary TB cases notified in 2002 were culture positive.
- There were no cases of MDR-TB notified in 2002.
- Recorded treatment outcome data on TB case notification forms were available on 77.2% of cases notified in 2002.
- There were 6 cases of TB meningitis reported in 2002.
- TB was recorded as the cause of death in 5 cases in 2002 (1.2% of cases notified).

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Appendix 1:

Notification pathway for a case of TB



TB is a notifiable disease. A case of TB should be notified to the Department of Public Health in the relevant health board. The Department of Public Health in turn notifies HPSC in 2 ways: (a) in its weekly infectious disease returns to HPSC and (b) through the enhanced TB surveillance system each quarter. HPSC produces a Weekly Infectious Disease Report, which will include TB case notifications. HPSC also produces Quarterly and National TB Reports.

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