

Health Protection Surveillance Centre

**Report on the Epidemiology of
Tuberculosis in Ireland 2003**

Epidemiology of Tuberculosis in Ireland 2003

A Report by the
Health Protection Surveillance Centre

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Introduction

The World Health Organisation (WHO) has estimated that, globally, there were 8.8 million new cases of tuberculosis (TB) in 2003, of which 3.9 million were smear positive cases. It is estimated that 1.75 million deaths resulted from TB in 2003.¹ In addition, EuroTB (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 over 400,000 cases of TB were notified in 2003 from the 52 countries in the WHO European region.²

The overall notification rate in the WHO European Region in 2003 was 47.2/100,000 population. The lowest rate occurred in Western Europe (EU countries plus Andorra, Iceland, Israel, Monaco, Norway, San Marino and Switzerland) at 13.6/100,000. In Central Europe (Albania, Bosnia and Herzegovina, Bulgaria, Croatia, F.Y.R. of Macedonia, Romania, Serbia and Montenegro, and Turkey), the overall TB notification rate was 48.6/100,000. Rates were particularly high in Romania (142.0/100,000 population). The highest rate occurred in the Eastern Region (Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Rep. of Moldova, Russian Federation, Tajikistan, Turkmenistan, Ukraine, Uzbekistan) at 103.6/100,000 population. In 2003, 290,395 cases of TB were reported from the East, of which 52% were from the Russian Federation.

Multi-drug resistant TB (MDR-TB) was more prevalent in the Baltic States (19%) than in other countries of the Western Region (2%). Drug resistance was poorly documented in the Eastern Region but evidence in recent years indicates that drug resistance is highly prevalent in most countries of the former Soviet Union.

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

This report presents an epidemiological review of TB cases notified to HPSC by each of the health boards in Ireland during 2003. Data for 2003 have been validated and updated to include information relating to treatment outcome. Provisional data for 2004 are presented in Appendix 1.

Case Definitions

The case definitions used for the analyses described in this report were those recommended by the National TB Working Party (1996).³

- **A notified case** of TB referred to clinically active disease due to infection with organisms of the *Mycobacterium tuberculosis* complex (*M. tuberculosis*, *M. bovis*, *M. africanum*). 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. The WHO defines pulmonary TB, for the purpose of analysis, as any case that has a pulmonary disease component.
- **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 2003 notification.
- **Multi-drug resistance (MDR)** was defined as resistance to at least isoniazid and rifampicin with or without resistance to ethambutol and streptomycin.

Methods

An enhanced TB notification form was completed by public health doctors for each case of TB notified in 2003. 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 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 TB notified to HPSC were collated at a national level. National quarterly reports were produced by HPSC. Information on all 2003 cases was updated and validated in mid/late 2005 by each health board to include outcome data.

Data analysis

National TB data from 1992 to 1997 were provided by the Department of Health and Children (DoHC). National TB data from 1998 onwards were obtained from the NTBSS system.

Rates for 1991, 1992 and 1993 are based on the 1991 population census; rates for 1994, 1995, 1996, 1997, 1998 and 1999 are based on the 1996 population census and rates for 2000, 2001, 2002, 2003 and 2004 are based on the 2002 population census.

For 2003 and 2004 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.

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. They are useful for smoothing irregularities in trend data and make it easier to discern long-term trends that otherwise might be obscured by short-term fluctuations.

Results: TB cases in Ireland, 2003

Overall cases and rates

There were 407 cases of TB notified in 2003. This represents a rate of 10.4/100,000 population. A summary of the 2003 data is shown in table 1.

The number of TB cases notified for each of the years from 1991-2003 is shown in table 2 and figure 1. Crude incidence rates for 1991 and 2003 were calculated and are shown in table 2. Three year moving averages are also shown in table 2.

Table 1: Summary of the epidemiology of TB in Ireland, 2003

Parameter	Number
Total number of cases	407
Crude notification rate per 100,000	10.4
Cases in indigenous population*	300
Cases in foreign-born persons*	89
Culture positive cases	262
Smear positive pulmonary cases	146
Multi-drug resistant cases	1
Monoresistant to isoniazid	8
Monoresistant to streptomycin	1
Resistant to isoniazid and streptomycin	2
Deaths attributable to TB	6
Outcomes reported in cases	345
TB meningitis cases	8

*Country of birth not available for 18 cases

Table 2: Notified cases of TB in Ireland 1991-2003 with crude rates per 100,000 population and 3-year moving averages 1992-2002

Year	Number of cases	Crude rate per 100,000 population	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	401
2003	407	10.4	

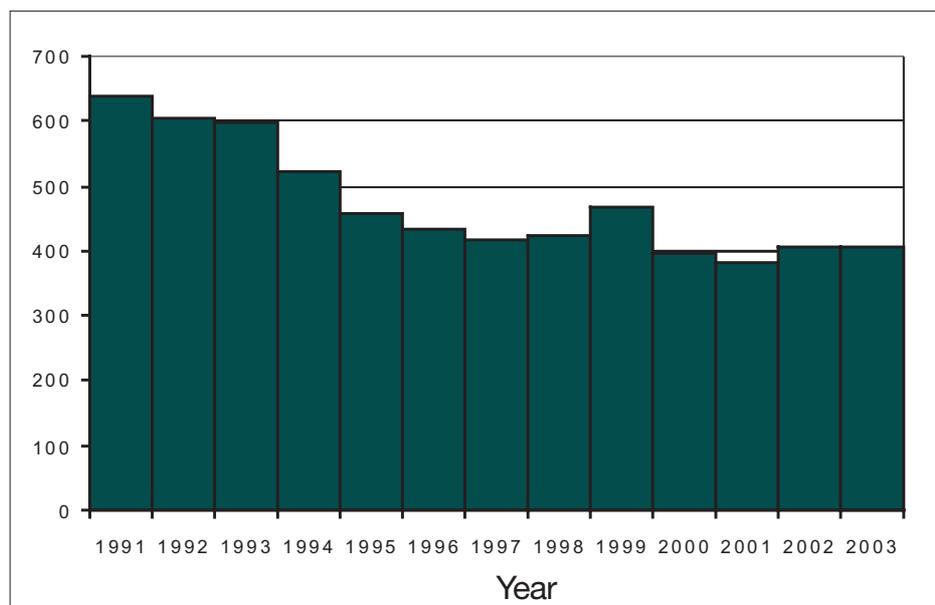


Figure 1: Notified TB cases in Ireland, 1991 to 2003

Health board crude incidence rates

The total number of TB cases in each health board is shown in table 3 with crude incidence rates and 95% confidence intervals included. The highest crude rate was reported in the SHB at 16.0/100,000 population. This was significantly higher than the national rate (10.4/100,000). The next highest rates were reported in the MWHB (12.4/100,000) and the ERHA (11.9/100,000). The NWHB had the lowest rate at 4.1/100,000 population. The rates in the NWHB, MHB and WHB were significantly lower than the national rate.

The crude incidence rates seen in each health board in the period 1992-2003 are shown in table 4 while the 3-year moving average TB notification rates for each health board for the period 1992-2002 are shown in table 5.

The crude TB rate in the indigenous population was 7.7/100,000 population.

Table 3: Notified TB cases by health board, 2003

Health Board	Cases	Crude Rate per 100,000	95% CI for rate
ERHA	167	11.9	10.1-13.7
MHB	12	5.3	2.3-8.3
MWHB	42	12.4	8.6-16.1
NEHB	26	7.5	4.6-10.4
NWHB	9	4.1	1.4-6.7
SEHB	35	8.3	5.5-11.0
SHB	93	16.0	12.8-19.3
WHB	23	6.0	3.6-8.5
Ireland	407	10.4	9.4-11.4

Table 4: Crude TB incidence rates per 100,000 population by health board, 1992-2003

Year	ERHA	MHB	MWHB	NEHB	NWHB	SEHB	SHB	WHB	Total
1992	16.1	18.7	20.9	10.0	15.9	12.3	21.4	22.2	17.1
1993	11.9	10.8	16.1	10.0	37.5	16.7	23.9	23.0	17.0
1994	12.9	14.6	17.3	11.4	9.0	11.0	17.4	22.7	14.5
1995	11.9	8.8	15.1	8.5	11.4	9.5	20.5	11.1	12.6
1996	8.7	8.3	17.7	12.1	7.1	6.9	22.5	13.1	12.0
1997	9.9	9.2	12.6	9.1	10.4	12.8	16.5	11.1	11.5
1998	11.7	4.9	14.8	9.5	9.0	8.9	14.3	15.3	11.7
1999	13.9	7.3	17.0	8.2	9.0	7.9	13.7	19.9	12.9
2000	10.2	7.1	13.8	6.1	4.1	9.7	13.8	10.0	10.1
2001	12.3	3.1	7.1	11.0	5.9	4.7	12.4	8.9	9.7
2002	11.6	8.4	9.4	7.0	5.4	11.6	13.3	8.7	10.4
2003	11.9	5.3	12.4	7.5	4.1	8.3	16.0	6.0	10.4

Table 5: 3-year moving average TB notification rate per 100,000 population, 1992-2002

Year	ERHA	MHB	MWHB	NEHB	NWHB	SEHB	SHB	WHB	Total
1992	14.7	16.1	20.3	10.1	20.2	12.6	21.7	26	17.3
1993	13.2	13.7	17.6	10.4	24.9	14.2	21.6	22.7	16.4
1994	12.4	12.2	16.5	10.3	16.7	12.0	19.8	19.9	14.6
1995	11.3	10.1	16.3	10.1	9.7	9.2	20.2	14.5	12.9
1996	9.8	8.6	15.8	10.5	9.0	9.0	20.5	12.1	12.0
1997	10.1	7.9	14.4	10.0	9.2	10.3	17.4	12.6	11.7
1998	11.8	6.6	14.8	9.1	9.4	9.6	14.7	15.4	11.9
1999	12.4	6.6	15.7	8.0	7.8	8.6	13.9	16.3	11.9
2000	11.7	6.2	12.9	7.8	5.8	8.0	13.4	12.2	10.7
2001	11.6	5.4	9.3	8.8	5.3	7.7	13.0	9.1	10.0
2002	11.8	6.3	9.6	8.1	5.2	9.0	13.7	8.1	10.2

Age and sex distribution

There were 252 (61.9%) cases of TB notified in males in 2003 and 154 (37.8%) in females, giving a male to female ratio of 1.6:1. Sex was not reported for one case. Table 6 gives the breakdown of notified TB cases by sex and by health board.

In 2003, the mean age of cases was 43.1 years (range 4 months to 98 years). Age was not reported for two cases. Ninety-three cases (22.9%) were aged 65 years and over. Table 7 describes the age-specific rates for males and females in 2003. Figure 2 shows the cases by age and sex and the male and female age-specific rates in Ireland for 2003.

Figure 3 shows the age-specific rates of TB in Ireland from 2000 to 2003.

Table 6: TB cases by health board and sex, 2003*

Health Board	Males	Females	Male:female ratio
ERHA	99	68	1.5
MHB	6	6	1.0
MWHB	28	14	2.0
NEHB	14	12	1.2
NWHB	6	3	2.0
SEHB	20	15	1.3
SHB	63	30	2.1
WHB	16	6	2.7
Ireland	252	154	1.6

*Sex was not reported in one case

Table 7: Age-specific TB rates per 100,000 population for males and females, 2003

Age Group (years)	Male	Female	Total
0-14	3.1	2.7	2.9
15-24	14.1	7.6	10.9
25-34	16.2	11.3	13.9
35-44	12.2	6.4	9.2
45-54	15.7	4.2	10.0
55-64	13.5	4.6	9.1
65+	24.8	18.6	21.3
Total	12.9	7.7	10.3

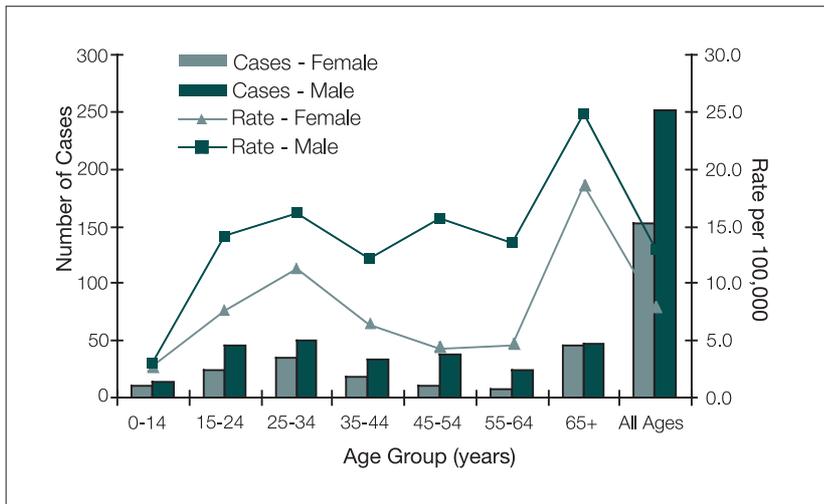


Figure 2: Cases of TB by age and sex, and age-specific rates per 100,000 population, 2003*

*Age was not reported in two cases and sex was not reported in one case

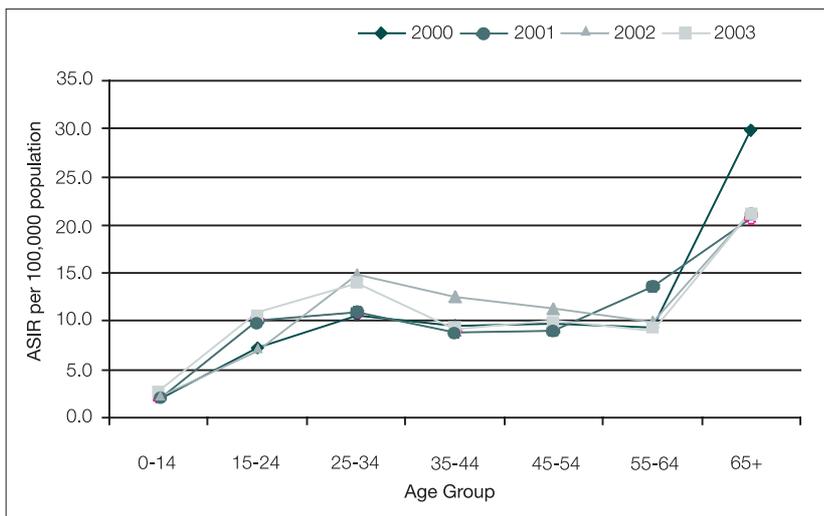


Figure 3: Age-specific rates of TB by year, 2000-2003

Age-standardised TB incidence rates

Age-standardised TB incidence rates for each health board are presented in figures 4 and 5 (figure 4 includes 95% confidence intervals).

The highest age-standardised TB incidence rates were seen in the SHB at 16.0/100,000 population. The NWHB reported the lowest age-standardised rates at 3.8/100,000 population. Furthermore, the age-standardised rates in the NWHB, WHB and NEHB were significantly lower than the national age-standardised incidence rate (10.3/100,000 population).

Age-standardised incidence rates for each county are shown in table 8 and figure 6 (95% confidence intervals are included in table 8). Limerick and Cork had significantly higher rates than the national figure. Counties with significantly lower incidence rates than the national rate were Galway, Wexford, Meath, Donegal, Roscommon and Offaly.

Table 8: Age-standardised TB incidence rates per 100,000 population by county with 95% confidence intervals, 2003

County	ASIR per 100,000	95% CI
Limerick	18.8	12.4-25.3
Cork	17.2	13.4-21.0
Dublin	12.8	10.7-14.8
Cavan	12.8	3.3-22.2
Waterford	12.7	5.8-19.6
Kerry	11.9	6.0-17.7
Kildare	11.4	5.2-17.6
Westmeath	11.4	3.5-19.3
Louth	11.4	4.7-18.1
Tipperary South [‡]	10.1	3.1-17.2
Kilkenny	9.0	2.3-15.7
Mayo	8.6	2.9-14.2
Monaghan	7.7	0.1-15.3
Carlow	6.8	0.0-14.5
Clare	6.6	1.7-11.4
Wicklow	5.6	1.1-10.0
Galway	5.4	2.2-8.5
Laois	5.3	0.0-11.3
Leitrim	5.2	0.0-15.4
Sligo	4.9	0.0-10.5
Meath	3.8	0.4-7.1
Wexford	3.5	0.1-6.9
Roscommon	3.4	0.0-8.0
Tipperary North [‡]	3.3	0.0-8.3
Donegal	2.6	0.1-5.1
Offaly	1.5	1.4-4.5
Ireland	10.3	9.3-11.4

[‡] The overall rate for Tipperary was 7.2 per 100,000

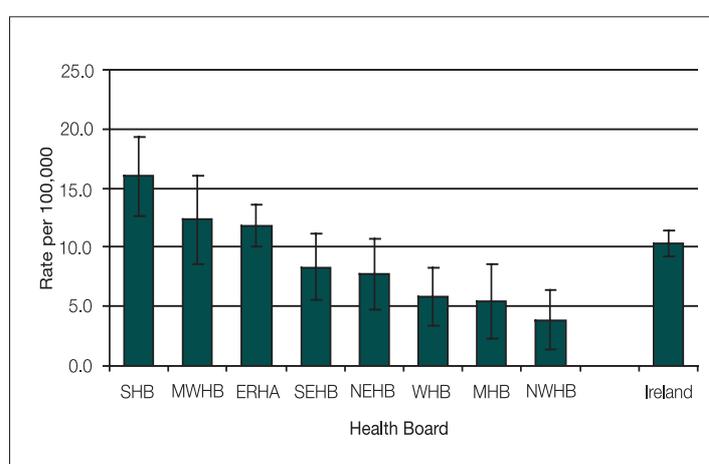


Figure 4: Age-standardised TB incidence rates per 100,000 population by health board with 95% confidence intervals, 2003*

*Age was not reported in two cases

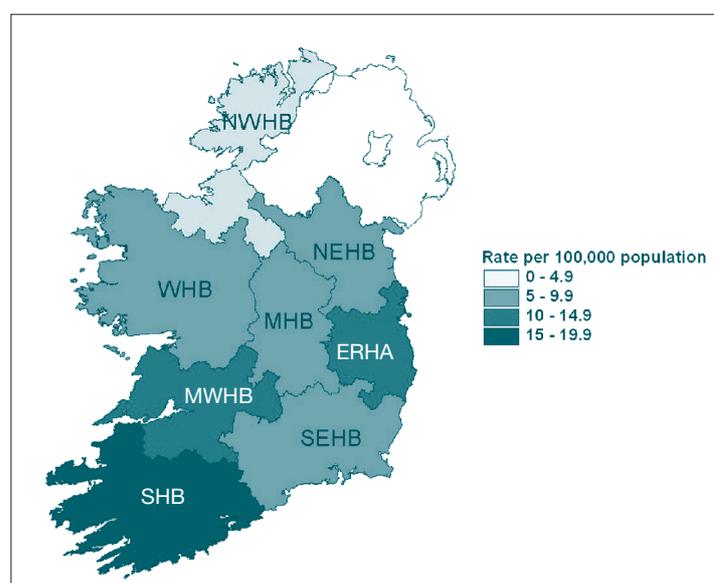


Figure 5: Age-standardised TB incidence rates per 100,000 population by health board, 2003

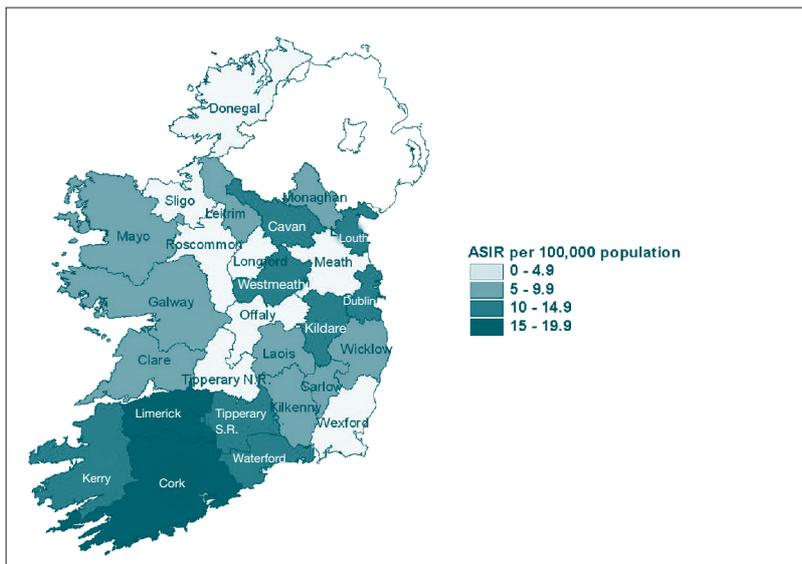


Figure 6: Age-standardised TB incidence rates per 100,000 population by county, 2003

Geographic origin

Of the 407 patients diagnosed with TB in 2003, 300 (73.7%) were born in Ireland, 89 (21.9%) were born outside Ireland and for the remaining 18 cases, the country of birth was unknown. Figure 7 shows TB cases by geographic origin from 1998 to 2003. Table 9 shows the breakdown of TB cases by health board and geographic origin.

Cases born outside Ireland originated from at least 33 countries. Table 10 shows the breakdown of these cases by country of birth and corresponding WHO region. The country of birth was unknown for 13 of the cases born outside Ireland.

Figure 8 shows the age distribution of cases notified in 2003 by geographic origin. The median age of cases born in Ireland was 47 years while the median age of those born outside Ireland was 27 years, a difference of 20 years.

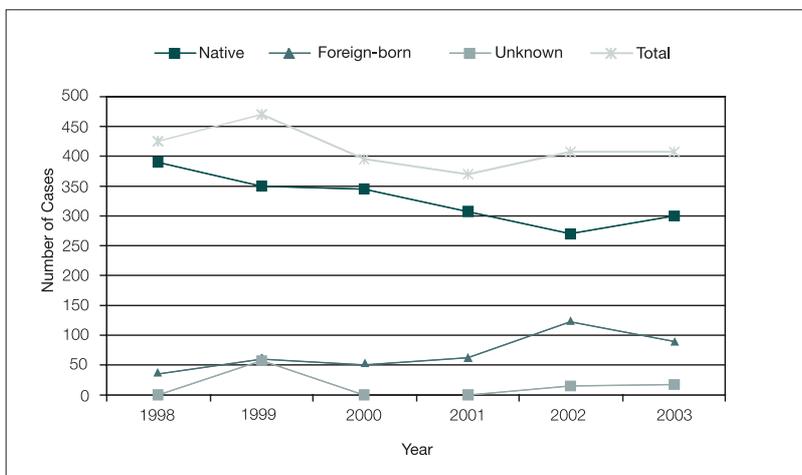


Figure 7: TB cases by geographic origin, 1998 to 2003

Table 9: Cases of TB by health board and geographic origin, 2003

Health Board	Born in Ireland	Born outside Ireland	Unknown	Total
ERHA	108	58	1	167
MHB	9	2	1	12
MWHB	38	4	-	42
NEHB	17	7	2	26
NWHB	8	1	-	9
SEHB	29	5	1	35
SHB	85	8	-	93
WHB	6	4	13	23
Ireland	300	89	18	407

Table 10: Countries of origin of foreign-born patients with TB, 2003

WHO Regions	Total	Country of birth	Cases
Europe	21	Albania	1
		Belarus	1
		Bosnia and Herzegovina	1
		France	1
		Georgia	1
		Serbia and Montenegro	1
		Rep. of Moldova	1
		Norway	1
		Romania	6
		Russian Federation	1
		Spain	1
		United Kingdom	5
Africa	18	Benin	1
		Congo	3
		Ethiopia	1
		Kenya	1
		Malawi	1
		Nigeria	7
		Sierra Leone	1
		South Africa	1
Zimbabwe	2		
Eastern Mediterranean	15	Pakistan	10
		Iraq	1
		Egypt	1
		Somalia	3
South East Asia	10	India	8
		Thailand	1
		Bangladesh	1
Western Pacific	9	China	3
		Philippines	3
		Vietnam	3
America	3	USA	2
		Argentina	1
Unknown	13		
Total	89		

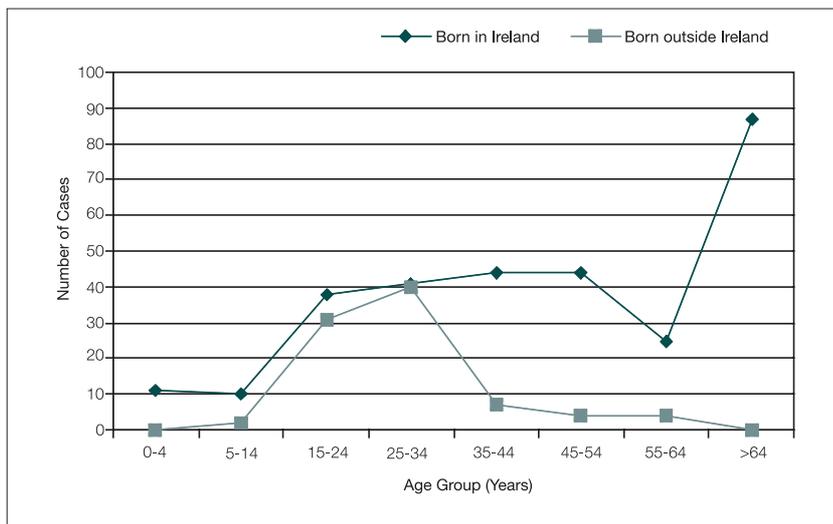


Figure 8: TB cases by age group and geographic origin, 2003

Site of disease

Of the 407 cases notified in 2003, 265 (65.1%) were pulmonary, 105 (25.8%) were extrapulmonary and 34 (8.4%) were pulmonary and extrapulmonary. For three cases (0.7%), the site was unspecified. TB cases by site of disease and health board are shown in table 11.

Pulmonary TB cases

There were 299 cases reported in 2003 with a pulmonary disease component (73.5% of all cases reported). Sputum smear and culture results for these cases are shown in table 12. Sputum microscopy results were available for 248 (82.9%) of the 299 cases. This is comparable to the figures from 2002 (82.6%) and 2001 (86.8%). There was a total of 152 cases where at least one sputum specimen was positive for AFB by microscopy. Of the 299 pulmonary cases, 211 (70.6%) were culture positive.

The proportion of pulmonary cases (with or without extrapulmonary site) was higher in persons born in Ireland (77.3%) compared to those born abroad (61.8%).

Pulmonary smear positive cases

In Ireland in 2003, 146 (48.8%) of the 299 cases with a pulmonary disease component were smear positive.

Table 11: TB cases by site of disease and health board, 2003**

Health Board	Pulmonary Number	Pulmonary %	Extrapulmonary Number	Extrapulmonary %	Pulmonary & extrapulmonary Number	Pulmonary & extrapulmonary %
ERHA	102	61.1	43	25.7	22	13.2
MHB	9	75.0	2	16.7	0	0.0
MWHB	29	69.1	12	28.6	1	2.4
NEHB	18	69.2	6	23.1	1	3.8
NWHB	8	88.9	1	11.1	0	0.0
SEHB	21	60.0	11	31.4	3	8.6
SHB	60	64.5	26	28.0	7	7.5
WHB	18	78.3	4	17.4	0	0.0
Ireland	265	65.1	105	25.8	34	8.4

**Site of disease was unspecified in three cases

Table 12: Sputum smear and culture status for pulmonary TB cases, 2003

Culture result	Sputum smear positive	Sputum smear negative	Sputum smear not done	Sputum smear unknown	Total
Culture Pos	138	48	12	13	211
Culture Neg	4	39	6	0	49
Culture not done	0	3	10	1	14
Culture unknown	10	6	4	5	25
Total	152	96	32	19	299

Extrapulmonary TB cases

Extrapulmonary TB was diagnosed in 105 (25.8%) cases of which 50 (47.6%) were laboratory-confirmed by culture. Forty (38.1%) of the 105 cases were histology positive, 21 of which were also culture positive and 19 of which were laboratory-confirmed by histology only.

One hundred and thirty nine (33.2%) of the cases reported in 2003 had an extrapulmonary disease component. The extrapulmonary sites reported are shown in table 13. The most frequent sites of extrapulmonary disease reported were pleura (35.3%) and extrathoracic lymph nodes (22.3%).

Table 13: Extrapulmonary disease sites in notified cases, 2003

Site	Number	Percentage
Pleural	49	35.3
Lymph - extrathoracic	31	22.3
Other	13	9.4
Genitourinary	11	7.9
Meningeal	8	5.8
Lymph - intrathoracic	7	5.0
Disseminated	6	4.3
Peritoneal	4	2.9
Spinal	3	2.2
Unknown	3	2.2
CNS other than meningitis	2	1.4
Bone/Joint other than spine	2	1.4
Total	139	100

TB meningitis

There were eight cases of TB meningitis reported in 2003 giving an incidence rate of 0.2/100,000 population (2.0/million population). A profile of these cases is provided in table 14. Of the eight cases, three were culture confirmed. Two of the cases were aged less than five years.

Between 1998 and 2003, a total of 35 cases of TB meningitis have been reported, eight in 2003, six in 2002, two in 2001, six in 2000, seven in 1999 and six in 1998. The cumulative incidence rates of TB meningitis in health boards and in Ireland for 1998-2003 are shown in table 15.

Table 14: TB meningitis cases in Ireland, 2003

Health Board	Age group (years)	History of BCG	Culture Status
ERHA	0-4	Yes	Negative
ERHA	25-34	Yes	Positive
ERHA	35-44	Yes	Negative
ERHA	65+	Unknown	Negative
NEHB	5-14	No	Unknown
NEHB	65+	Unknown	Unknown
SHB	0-4	No	Positive
WHB	25-34	Unknown	Positive
Total	8 cases		

Table 15: Cumulative incidence rate of TB meningitis in Ireland, 1998-2003

Health Board	Cases 1998 to 2003	Cumulative incidence rate per 100,000	95% CI
ERHA	14	1.0	0.5-1.5
MHB	0	-	-
MWHB	1	0.3	0.0-0.9
NEHB	4	1.2	0.0-2.3
NWHB	2	0.9	0.0-2.2
SEHB	1	0.2	0.0-0.7
SHB	10	1.7	0.7-2.8
WHB	3	0.8	0.0-1.7
Ireland	35	0.9	0.4-1.1

Note: Calculations based on 2002 census figures

Bacteriological results

The total number of cases laboratory confirmed (by culture, microscopy or histology) in 2003 was 302 (74.2%). Of these 302 cases, 262 cases were laboratory confirmed by culture. A total of 105 cases were not laboratory confirmed in 2003, including 67 cases with a pulmonary component. Table 16 shows the breakdown of laboratory-confirmed and culture-confirmed cases by site of disease.

Of the 265 pulmonary cases, 205 were laboratory confirmed with 188 confirmed by culture. Of the 34 cases diagnosed with pulmonary and extrapulmonary TB, 27 were laboratory confirmed with 23 confirmed by culture. Of the 105 cases with extrapulmonary TB, 69 were laboratory confirmed with 50 confirmed by culture.

Culture

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. In 2003, 262 (64.4%) of all TB cases notified were culture positive. This is an increase on the percentage reported in 2002 (61.0%) and 2001 (58.8%).

Seventy percent (211/299) of the pulmonary cases and 47.6% (50/105) of the extrapulmonary cases were culture confirmed.

Table 17 shows the breakdown by health board of the 262 culture positive TB cases notified in 2003.

Table 16: Laboratory-confirmed and culture-confirmed cases of TB by site of disease, 2003***

Site of disease	Total	Culture confirmed	% Culture confirmed	Laboratory confirmed	% Laboratory confirmed
Pulmonary	265	188	70.9	205	77.4
Pulmonary and Extrapulmonary	34	23	67.6	27	79.4
Extrapulmonary	105	50	47.6	69	65.7
Total	407	262	64.4	302	74.2

*** Site of disease unknown for three cases

Table 17: Culture status of TB cases by health board, 2003

Health Board	Culture positive	Culture negative	Culture not done	Culture unknown	Total
ERHA	106	45	10	6	167
MHB	9	-	-	3	12
MWHB	25	9	-	8	42
NEHB	13	6	-	7	26
NWHB	6	1	-	2	9
SEHB	23	4	8	-	35
SHB	66	12	7	8	93
WHB	14	-	1	8	23
Ireland	262	77	26	42	407

Species

Among the 262 culture-confirmed cases, information on species was reported for 255 (97.2%) of the cases. Of these, 250 (98.4%) were *M. tuberculosis*, four (1.6%) were *M. bovis* and one was *M. africanum*.

Antibiotic resistance

Information on the results of sensitivity testing was reported for 254 (96.8%) of the 262 culture-confirmed cases. Resistance was documented in 12 cases out of a total of 250 *M. tuberculosis* isolates (4.8%). Mono-resistance to isoniazid was recorded in eight cases and mono-resistance to streptomycin in one case. Two further cases were resistant to both isoniazid and streptomycin. There was one case of multi-drug resistant TB (MDR-TB) in 2003, which was resistant to isoniazid, rifampicin, pyrazinamide, ethambutol and streptomycin. Five of the 12 (41.7%) drug resistant cases were born outside Ireland. A profile of resistant cases in 2003 is shown in table 18.

Table 18: Sensitivity results of drug resistant TB cases in Ireland, 2003

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

(+ indicates resistance)

Outcomes

Outcome was recorded for 345 (84.8%) of the 407 cases notified in 2003. Of the 345 cases, 264 completed treatment, 32 died, 30 were recorded as being lost to follow up, treatment was interrupted in 12 cases, and seven cases were still on treatment at time of reporting. Of the 32 deaths reported, six (1.5% of total cases) were attributed to TB.

Of the 146 smear positive cases of pulmonary TB, 92 completed treatment, 12 died, seven were lost to follow up, treatment was interrupted in five cases and two were still on treatment at time of reporting. The outcome was unknown in 28 of the cases. Of the 12 deaths among smear positive cases, two were attributed to TB.

Of the 12 drug resistant cases, ten completed treatment while one case was still on treatment and one case was lost to follow up.

Details on treatment outcome for all cases and for smear positive cases only are shown in table 19.

Table 19: Treatment outcome for all cases and smear positive cases notified in 2003

Treatment outcome	Total cases		Smear positive cases	
	Number	%	Number	%
Completed treatment	264	64.9	92	63.0
Lost to follow up	30	7.4	7	4.8
Treatment interrupted	12	2.9	5	3.4
Still on treatment	7	1.7	2	1.4
Died (attributed to TB)	6	1.5	2	1.4
Died (not attributed to TB)	26	6.3	10	6.8
Outcome unknown	62	15.2	28	19.2
Total	407	100.0	146	100.0

Discussion

This is the sixth national report produced by HPSC on the epidemiology of TB in Ireland. The report is based on data from the enhanced national TB surveillance system (NTBSS 2000) that became operational in all health boards in Ireland in January 2000. The new system is based on the minimum dataset required by EuroTB (www.eurotb.org).

In 2003, 407 cases of TB were notified to HPSC giving a national crude incidence rate of 10.4/100,000 population. This is very similar to the rate notified in 2002 and 2001. 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 overall notification rate in countries of the EU and Western Europe which reported to EuroTB was 13.6/100,000, being highest in the Baltic States (47.0-82.0/100,000).²

Differences in age-standardised TB incidence rates persist between health board areas with the SHB having the highest rate in 2003 at 16.0/100,000 and the NWHB having the lowest rate at 4.1/100,000. This is similar to 2002, when the SHB had the highest rate (13.1/100,000) and the NWHB had the lowest rate (5.1/100,000). In 2003, rates in the NWHB, WHB, and NEHB were significantly lower than the national age-standardised rate (10.3/100,000).

The highest age-specific rate in 2003 occurred among those aged 65 years and over (21.3/100,000 population). This was similar to the rate observed in this age group in 2002. Between 2000 and 2003, the age-specific rate among the 25-34 year age group increased from 10.5/100,000 to 13.9/100,000 population. The male to female ratio (1.6:1) reported in 2003 was comparable with the rate reported in 2002 (1.8:1). The male to female ratio varied from 2.7 in the WHB to 1.0 in the MHB. Rates in males were higher than females in all age groups. There was a notable difference in age between those born in Ireland and those born outside Ireland. The median age of those born in Ireland was 47 years while the median age of those born outside Ireland was 27 years.

In 2003, 21.9% of TB cases were born outside Ireland compared to 30.1% in 2002 and 16.5% in 2001. In 2003, among countries in the EU and Western Europe who reported data to the EuroTB network, 31% of notifications were in foreign born patients. In the United Kingdom, France, Germany and Belgium, where crude incidence rates are similar to those reported in Ireland, the percentage of cases of foreign origin in 2003 ranged from 42-63%.² The crude rate of TB notifications in the indigenous population was 7.7/100,000 population which was very similar to the rate in 2002 (7.8/100,000 population).

In 2003, 262 of all cases of TB notified (64.4%) were culture positive. This is an increase on the proportion in previous years (61.0% in 2002 and 58.8% in 2001). The total number of cases laboratory confirmed was 302 (74.2%), an increase of 3.4% on the number laboratory confirmed in 2002.

There was one case of MDR-TB reported in 2003 (0.3% of total cases). There were no reported cases of MDR-TB in 2002 and two cases in 2001 (0.5% of total cases). In 2003, MDR-TB was more prevalent in the Baltic States with a combined percentage of 19% (range 15-23%) compared to 2% (range 0-6%) in the 15 other countries in the EU and Western Europe who provided data to EuroTB.² In 2003, mono-resistance to isoniazid was recorded in eight cases and mono-resistance to streptomycin in one case. Five of the drug resistant cases were born abroad. Drug resistance is an issue that needs to be kept under close surveillance. This will be greatly facilitated by the recent establishment of a National TB Reference Laboratory.

There were eight cases of TB meningitis in 2003, giving a rate of 0.2/100,000 population. This is the highest rate recorded since enhanced surveillance began in 1998. Between 1998 and 2003, four cases of TB meningitis were reported among 0-4 year olds. Two of the four cases occurred in 2003. The Report of the Working Party on Tuberculosis (1996)³, recommends that the cessation of neonatal BCG vaccination should be considered if certain criteria are met. The criteria for discontinuation of BCG vaccination are outlined in Appendix 2.

In recent years, the quality of the data, and in particular data on treatment outcome, has improved greatly. In 2003, information on treatment outcome was provided for 84.8% of cases compared to 77.2% in 2002 and 59.8% in 2001. It is of critical importance to TB control in Ireland that surveillance of TB and reporting of outcome data be maintained at a high level in view of the increased incidence of TB, in particular multi-drug resistant forms, worldwide.

Conclusions

- There was no increase in TB case notifications in 2003 compared to the previous year.
- There was a regional variation in the TB crude notification rates ranging from 4.1/100,000 population in the NWHB to 16.0/100,000 population in the SHB.
- The highest age-specific rate occurred among those aged 65 years and over. Rates in males were higher than rates in females for all age groups.
- The male to female ratio was 1.6:1 varying from 2.7 in the WHB to 1.0 in the MHB.
- In 2003, 21.9% of cases were born outside Ireland compared to 30.1% in 2002.
- The median age of those born outside of Ireland was 27 years while the median age of those born in Ireland was 47 years.
- In 2003, 73.5% of the TB cases had a pulmonary disease component of which 70.6% were culture positive and 48.8% were smear positive.
- There were eight cases of TB meningitis giving an incidence rate of 0.2/100,000 population. This is the highest rate since enhanced surveillance of TB began in 1998. Two of the cases in 2003 were in children aged less than five years.
- There was one case of MDR-TB which was resistant to rifampicin, isoniazid, pyrazinamide, ethambutol, and streptomycin.
- There were six deaths attributed to TB in 2003.
- Treatment outcome data was provided for 84.8% of cases, up 7.6% on the 2002 figure and 25.0% on the 2001 figure.

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Appendix 1:

TB Cases notified in Ireland in 2004, provisional data^ψ

There were 437 cases of TB provisionally notified in 2004. It is important to note that these data are provisional and **may change significantly following validation**.

A summary of the data is shown in table 20.

Table 20: Provisional summary of the epidemiology of TB in Ireland, 2004

Parameter	2004
Total number of cases	437
Crude notification rate per 100,000	11.2
Cases in indigenous population	282
Cases in foreign-born persons	120
Culture positive cases	210
Smear positive pulmonary cases	117
Monoresistance to isoniazid	6
Monoresistance to ethambutol	1
Monoresistance to streptomycin	2
Monoresistance to pyrazinamide	1
Resistant to isoniazid and streptomycin	3
Multi-drug resistant cases	0
TB meningitis cases	6

Incidence rates by health board

The total number of TB cases in each health board is shown in table 21 with crude incidence rates and 95% confidence intervals included.

Table 21: Provisional TB cases in each health board, 2004

Health Board	Cases	Crude rate per 100,000	95% CI for rate
ERHA	180	12.8	11.0-14.7
MHB	14	6.2	3.0-9.5
MWHB	43	12.7	8.9-16.4
NEHB	24	7.0	4.2-9.7
NWHB	17	7.7	4.0-11.3
SEHB	34	8.0	5.3-10.7
SHB	79	13.6	10.6-16.6
WHB	46	12.1	8.6-15.6
Ireland	437	11.2	10.1-12.2

The highest crude rates were reported in the SHB (13.6/100,000 population), ERHA (12.8/100,000) and MWHB (12.7/100,000). The lowest crude rate was reported in the MHB (6.2/100,000 population).

Age and sex distribution

There were 258 (59.0%) cases of TB notified in males and 175 (40.0%) cases in females in 2004, giving a male to female ratio of 1.5:1. Sex was not reported in four cases.

In 2004, the mean age of cases was 44.8 years (range 8 years to 95 years). Age was not reported in nine cases. One hundred and one cases (23.1%) were aged 65 years and over.

Geographic origin

Of the 437 cases provisionally notified in 2004, 282 (64.5%) were born in Ireland and 120 (27.5 %) were born outside Ireland. Information on country of birth was unavailable for 35 cases (8%).

Of the 120 cases born outside Ireland, 44 were born in Africa, 43 in Asia, 20 in Europe and two in the Americas. The country of birth was unknown for 11 of the cases born outside Ireland.

Site of disease

Of the 437 cases provisionally notified in 2004, pulmonary TB was diagnosed in 274 cases (62.7%), extrapulmonary TB in 117 cases (26.8%) and pulmonary and extrapulmonary TB in 26 cases.

There were 300 cases provisionally reported in 2004 with a pulmonary disease component (68.6% of all cases reported). Of the 300 cases with a pulmonary component, 165 (55.0%) were culture positive and 117 (39.0%) were smear positive.

One hundred and forty three (32.7%) of the cases provisionally reported in 2004 had an extrapulmonary disease component.

TB meningitis

There were six cases of TB meningitis provisionally reported in 2004 giving an incidence rate of 0.15/100,000 population (1.5/million population). All six cases were in the 25-34 year age group. Two of the six cases were culture confirmed. One of the six cases was reported as having received BCG vaccination.

Culture

Of the 437 cases provisionally notified in 2004, 210 (48.1%) were culture confirmed. Of the 300 cases with a pulmonary component, 165 (55.0%) were culture positive and of the 117 extrapulmonary cases, 41 (35.0%) were culture positive.

Among the 210 culture-confirmed cases, 185 (88.1%) were *M. tuberculosis* and four (1.9%) were *M. bovis*. There were no reported cases of TB as a result of infection by *M. africanum*. The species was not provided for 21 of the culture positive cases.

Antibiotic resistance

Resistance was documented in 11 cases out of a total of 185 *M. tuberculosis* isolates (5.9%). Mono-resistance was recorded in 10 cases (isoniazid in six cases, streptomycin in two cases, pyrazinamide in one case and ethambutol in one case). One further case was resistant to both isoniazid and streptomycin. There were no MDR-TB cases notified, in the provisional 2004 data.

‡ 2004 data as of 31st December 2005

Appendix 2: BCG Vaccination

The Report of the Working Party on Tuberculosis (1996)³ recommends, based on the recommendations of the International Union Against Tuberculosis and Lung Disease (IUATLD),⁴ that the cessation of neonatal BCG vaccination should be considered if certain criteria are met.

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 HPSC in the 1998 National TB Report. The 2003 report is the sixth 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 2003, the national rate for sputum positive pulmonary TB was 3.7/100,000, while in 2002 and 2001, the rates were 3.1/100,000 and 3.3/100,000 respectively.

Criterion 5

The average annual notification rate of TB 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. Between 1999 and 2003, there were three cases of TB meningitis in children under five years of age, two in 2003 and one in 2002. Of the three cases, one child had received BCG vaccination and the other two had not. Two of the three cases were culture confirmed.

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 less than 20.0/100,000 population, the 2003 age-specific incidence rate for children 0-14 years was 2.9/100,000, more than nine times the rate recorded in Sweden when they discontinued neonatal BCG vaccination. In 2002, 2001 and 2000, the age-specific incidence rate for children aged 0-14 years was 2.2/100,000, 1.9/100,000 and 1.9/100,000 respectively. 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 summary, Ireland does not yet meet all of the criteria (outlined above), for discontinuation of the national BCG vaccination programme.

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