Report on the Epidemiology of Tuberculosis in Ireland 2007

Health Protection Surveillance Centre

Feidhmeannacht na Seirbhíse Sláinte
Health Service Executive

hpsc

Report on the Epidemiology of Tuberculosis in Ireland 2007

Health Protection Surveillance Centre

January 2010

ISSN 1649-1106

Feidhmeannacht na Seirbhíse Sláinte
Health Service Executive

hpsc

Table of Contents

Acknowledgements

Sincere thanks are extended to all those who participated in the collection of data used in this report. This includes the notifying physicians, public health doctors, surveillance scientists, microbiologists, nurses, laboratory staff and administrative staff.

Report prepared by Kate O'Donnell, Joan O'Donnell, Lorraine Hickey and Darina O'Flanagan HPSC.

Summary

- There was a slight increase in TB case notifications in 2007 (n=480) compared to 2006 (n=465).

- A regional variation was noted in TB notification rates (per 100,000) ranging from 6.1 in HSE North East to 16.4 in HSE South. A large crèche-related TB outbreak involving 21 cases, contributed to the high rate in HSE South.

- Certain local health offices in HSE East (Dublin South City, Dublin North West and Dublin North Central) and HSE South (South Lee) reported rates greater than 20 per 100,000 population in 2007.

- The highest age-specific rate in 2007 occurred among those aged 25-34 years (17.9/100,000).

- The age-specific rate (per 100,000) among 25-34 years olds increased to 17.9 from 16.6 in 2006 and 13.0 in 2005.

- Rates were higher in males than females for all age groups except for the 0-14 year age group (same rate: 4.7). The highest rates among males were in those aged greater than 64 years and in the 25-34 year age group in females.

- In 2007, 40.0% of cases were born outside Ireland compared to 34.6% in 2006 and 33.8% in 2005.

- There was a notable difference in age between cases born in Ireland (median age 44 years) and cases born outside Ireland (median age 31 years).

- In 2007, 349 (72.7%) of the TB cases had a pulmonary disease component of which 246 (70.5%) were culture positive and 153 (43.8%) were smear positive.

- There were six cases of TB meningitis notified in 2007 (age range: 29 to 64 years).

- Treatment outcome data were provided for 86.0% of cases. Treatment was completed for 332 (69.2%) of the cases notified in 2007 and there were 40 deaths reported (7 attributable to TB).

- There were 24 drug-resistant cases notified in 2007. Of the 24, 19 were resistant to izoniazid, including seven MDR-TB cases.

- There were 470 cases of TB provisionally notified in 2008.

Introduction

The World Health Organization (WHO) has estimated that globally, there were 9.27 million new cases of tuberculosis (TB) in 2007 (139 per 100,000 population). Of these, 44% (4.1 million) were new smear positive cases. Approximately 1.7 million TB deaths occurred globally in 2007.[1]

In 2007, 477,327 cases of TB were reported by 51 of the 53 countries of the WHO European Region (plus Liechtenstein). The overall notification rate averaged 54 cases per 100,000, with a wide variability between countries and an incremental west-to-east gradient.[2] Figure 1 displays a map of TB notification rates in the WHO European region.

The lowest rate in the region occurred in Western Europe (EU countries plus Iceland, Norway and Switzerland) at 17 per 100,000 population, with rates lower than 10 per 100,000 reported in 15 countries and higher than 20 per 100,000 in Romania (118), the Baltic States – Lithuania (71), Latvia (55) and Estonia (36), Bulgaria (40) and Portugal (30). In 2007, 21% of reported TB cases in this region were of foreign origin. This proportion ranged from 26% to 79% across 17 countries. Overall, the proportion of cases with multidrug-resistant TB (MDR-TB) in the region was 4.0%.

The seven Balkan countries in Central Europe (Albania, Bosnia and Herzegovina, Croatia, F.Y.R. of Macedonia, Montenegro, Serbia and Turkey) reported 26,296 cases of TB in 2007, corresponding to an overall notification rate of 29 per 100,000 population. In 2007, Turkey accounted for 75% of the 26,296 cases reported from this region.

In 2007, the overall TB notification rate in the 12 non-EU eastern European and central Asian countries was 131 per 100,000 (365,233 cases). More than half of the cases in the East were reported by the Russian Federation, which is the only European country on the WHO list of 22 high TB-burden countries in the world. Data on drug resistance in recent years suggest high levels of MDR in most countries in this region.

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 the European Centre for Disease Prevention and Control (ECDC). The resulting National Tuberculosis Surveillance System (NTBSS) was set up following consultation with the eight former health boards and the National TB Advisory Committee. The National TB Advisory Committee was reconvened in October 2004 and is currently finalising new guidelines for TB prevention and control in Ireland.

This report presents an epidemiological review of all TB cases notified in 2007. Data for 2007 have been validated and updated to include information relating to treatment outcome. Provisional data for 2008 are presented in Appendix 1.

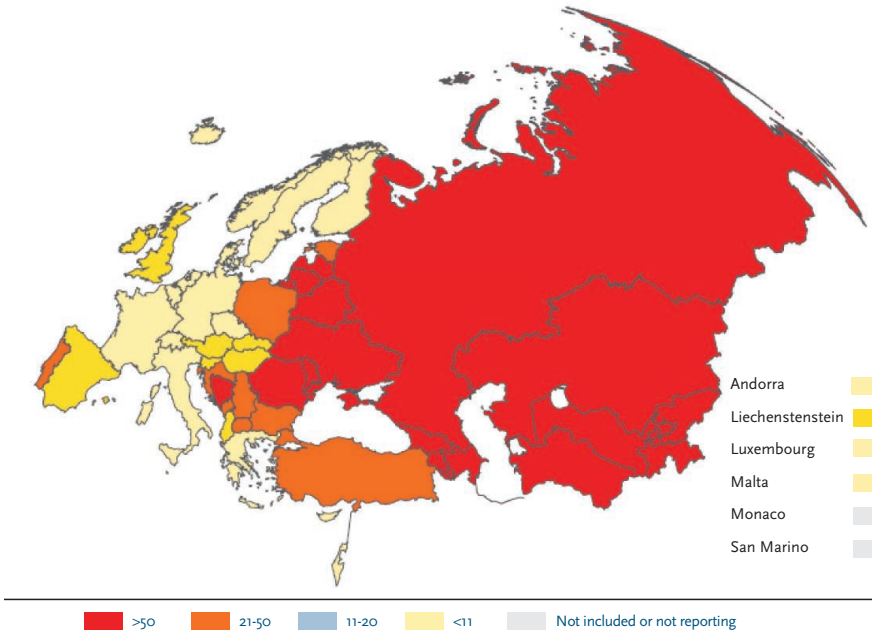

Figure 1: Tuberculosis notification rates per 100,000 population, WHO European region, 2007

Case Definitions

The case definitions used for the analyses described in this report were those recommended by the Commission of the European Communities (2008).[3]

Tuberculosis: (*Mycobacterium tuberculosis* complex including *M. tuberculosis, M. africanum*, *M. bovis*, *M. canetti*, *M. caprae*, *M. microti* and *M. pinnipedii*)

Clinical Criteria - Any person with:

- Signs, symptoms and/or radiological findings consistent with active tuberculosis in any site

AND

- A clinician's decision to treat the person with a full course of anti-tuberculosis therapy

OR

- A case discovered post-mortem with pathological findings consistent with active tuberculosis that would have indicated anti-tuberculosis antibiotic treatment had the patient been diagnosed before dying

Confirmed case - A person meeting the clinical criteria with at least one of the following two:

- Isolation of *M. tuberculosis* complex (excluding *M. bovis*-BCG) from a clinical specimen

OR

- Detection of *M. tuberculosis* nucleic acid in a clinical specimen

AND

- Positive microscopy for acid-fast bacilli or equivalent fluorescent staining bacilli on light microscopy

Probable case - A person meeting the clinical criteria with at least one of the following:

- Microscopy positive for acid-fast bacilli or equivalent fluorescent staining bacilli on light microscopy

OR

- Detection of *Mycobacterium tuberculosis* nucleic acid in a clinical specimen

OR

- Histological appearance of granulomata

Possible case: A person meeting the clinical criteria without laboratory confirmation

Pulmonary TB: TB of the lung parenchyma or the tracheo-bronchial tree. The WHO defines pulmonary TB, for the purpose of analysis, as any case that has a pulmonary disease component

Extra-pulmonary TB: TB affecting any site other than pulmonary as defined above

Pulmonary and extra-pulmonary TB is a case of TB that met the previous two definitions

Smear positive case[4]**:** A patient with the presence of at least one acid fast bacillus (AFB+) in at least one sputum sample in countries with a well functioning external quality assurance (EQA) system

Multidrug-resistant (MDR) TB is defined as a TB case resistant to at least isoniazid and rifampicin with or without resistance to ethambutol and streptomycin

Extensively drug-resistant TB (XDR-TB) is defined as a TB strain resistant to any fluoroquinolone and at least one of three injectable second-line drugs (capreomycin, kanamycin and amikacin), in addition to MDR-TB. This definition of XDR-TB was agreed by the WHO Global Task Force on XDR-TB in October 2006.[5]

Methods

Data collection

An enhanced TB notification form was completed by public health doctors for each case of TB notified in 2007. 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 Epi2000 database (NTBSS). Each HSE area provided finalised 2007 data with outcome information to HPSC between March and August 2009. Data were validated with each area and national data were collated. Provisional 2008 data were obtained from each area in August 2009.

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 NTBS 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; rates for 2000, 2001, 2002 and 2003 are based on the 2002 population census and rates for 2004, 2005, 2006, 2007 and 2008 are based on the 2006 population census. For the calculation of rates in the indigenous and foreign-born population, population data were taken from table 32, volume 4, 2006 census, 'persons usually resident in each province and county, and present in the state on census night, classified by place of birth'. The indigenous population was defined as those persons who were born in Ireland.[6]

Direct methods of standardisation were used to allow comparison of rates between geographical areas using the 2006 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.

For 2007 data, analysis was performed using local health office (LHO) denominators rather than community care area (CCA) denominators. The LHOs came into operation on 1st September 2005.

Results: TB cases in Ireland, 2007

Overall cases and rates

There were 480 cases of TB notified in 2007, a rate of 11.3 per 100,000 population. A summary of the 2007 data is shown in table 1.

Table 1: Summary of the epidemiology of TB in Ireland, 2007

Parameter	Number (% of total)
Total number of cases	480
Crude notification rate per 100,000	11.3
Cases in indigenous population[1]	283 (59.0%)
Cases in foreign-born persons	192 (40.0%)
Culture positive cases	315 (65.6%)
Pulmonary cases	349 (72.7%)
Of which sputum smear positive	153 (43.8%)
Resistance cases	24 (5.0%)
Multi-drug resistant cases	7 (1.5%)
Deaths attributable to TB	7 (1.5%)
Outcomes reported in cases	413 (86.0%)
TB meningitis cases	6 (1.3%)

The number of TB cases notified for each of the years from 1991-2007 is shown in table 2. Crude incidence rates from 1991 to 2007 with three-year moving averages are also shown in table 2.

Table 2: Notified cases of TB in Ireland 1991-2007 with crude rates per 100,000 population and 3-year moving averages 1992-2006

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	581
1994	524	14.5	526
1995	458	12.6	469
1996	434	12	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	414
2004	431	10.2	430
2005	450	10.6	449
2006	465	11.0	465
2007	480	11.3	-

1 Country of birth unavailable for 5 cases

Crude incidence rates by HSE area

The total number of TB cases in each HSE area is shown in table 3 with crude incidence rates and 95% confidence intervals included.

The highest crude rate was reported in HSE South at 16.4 per 100,000 population, which was significantly higher than the national rate. The next highest rate, reported in HSE East (14.6), was also significantly higher than the national rate. Rates in HSE Midlands (6.4), HSE North East (6.1) and HSE South East (6.3) were significantly lower than the national rate.

The crude incidence rates seen in each HSE area from 1992 to 2007 are shown in table 4 while the 3-year moving average TB notification rates for each HSE area from 1992 to 2006 are shown in table 5.

Table 3: Notified TB cases by HSE area, 2007

HSE area	Cases	Crude rate per 100,000	95% CI for rate
HSE E	219	14.6	12.7-16.5
HSE M	16	6.4	3.2-9.5
HSE MW	29	8.0	5.1-11.0
HSE NE	24	6.1	3.7-8.5
HSE NW	17	7.2	3.8-10.6
HSE S	102	16.4	13.2-19.6
HSE SE	29	6.3	4.0-8.6
HSE W	44	10.6	7.5-13.8
Ireland	**480**	**11.3**	**10.3 - 12.3**

Table 4: Crude TB incidence rates per 100,000 population by HSE area, 1992-2007

Year	HSE E	HSE M	HSE MW	HSE NE	HSE NW	HSE S	HSE SE	HSE W	Total
1992	16.1	18.7	20.9	10.0	15.9	21.4	12.3	22.2	17.1
1993	11.9	10.8	16.1	10.0	37.5	23.9	16.7	23.0	17.0
1994	12.9	14.6	17.3	11.4	9.0	17.4	11.0	22.7	14.5
1995	11.9	8.8	15.1	8.5	11.4	20.5	9.5	11.1	12.6
1996	8.7	8.3	17.7	12.1	7.1	22.5	6.9	13.1	12.0
1997	9.9	9.2	12.6	9.1	10.4	16.5	12.8	11.1	11.5
1998	11.7	4.9	14.8	9.5	9.0	14.3	8.9	15.3	11.7
1999	13.9	7.3	17.0	8.2	9.0	13.7	7.9	19.9	12.9
2000	10.2	7.1	13.8	6.1	4.1	13.8	9.7	10.0	10.1
2001	12.3	3.1	7.1	11.0	5.9	12.4	4.7	8.9	9.7
2002	11.6	8.4	9.4	7.0	5.4	13.3	11.6	8.7	10.4
2003	11.9	5.3	12.4	7.5	4.1	16.0	8.3	6.0	10.4
2004	12.6	3.6	12.2	5.8	6.7	11.8	7.4	10.6	10.2
2005	13.0	6.4	14.7	3.3	6.3	12.2	8.0	10.9	10.6
2006	12.9	6.0	10.2	8.4	3.8	15.3	11.1	7.7	11.0
2007	14.6	6.4	8.0	6.1	7.2	16.4	6.3	10.6	11.3

Table 5: 3-year moving average TB notification rate per 100,000 population by HSE area, 1992-2006

Year	HSE E	HSE M	HSE MW	HSE NE	HSE NW	HSE S	HSE SE	HSE W	Total
1992	14.7	16.1	20.3	10.1	20.2	21.7	12.6	26	17.3
1993	13.2	13.7	17.6	10.4	24.9	21.6	14.2	22.7	16.4
1994	12.4	12.2	16.5	10.3	16.7	19.8	12.0	19.9	14.6
1995	11.3	10.1	16.3	10.1	9.7	20.2	9.2	14.5	12.9
1996	9.8	8.6	15.8	10.5	9.0	20.5	9.0	12.1	12.0
1997	10.1	7.9	14.4	10.0	9.2	17.4	10.3	12.6	11.7
1998	11.8	6.6	14.8	9.1	9.4	14.7	9.6	15.4	11.9
1999	12.4	6.6	15.7	8.0	7.8	13.9	8.6	16.3	11.9
2000	11.7	6.2	12.9	7.8	5.8	13.4	8.0	12.2	10.7
2001	11.6	5.4	9.3	8.8	5.3	13.0	7.7	9.1	10.0
2002	11.8	6.3	9.6	8.1	5.2	13.7	9.0	8.1	10.2
2003	12.0	5.7	11.6	7.0	5.1	14.3	8.9	7.8	10.3
2004	12.5	4.7	12.9	5.6	6.0	12.9	7.8	9.4	10.3
2005	12.9	5.6	12.9	5.2	5.8	12.9	8.6	10.0	10.6
2006	13.3	6.2	10.8	6.5	5.3	14.8	9.1	9.2	11.0

Age and sex distribution

There were 296 (61.7%) cases of TB notified in males in 2007 and 184 (38.3%) in females, giving a male to female ratio of 1.6:1. Table 6 gives the breakdown of notified TB cases by sex and HSE area.

Table 6: TB cases by HSE area and sex, 2007

HSE area	Male	Female	Male:Female ratio	Total
HSE E	131	88	1.5	219
HSE M	8	8	1.0	16
HSE MW	19	10	1.9	29
HSE NE	15	9	1.7	24
HSE NW	12	5	2.4	17
HSE S	68	34	2.0	102
HSE SE	18	11	1.6	29
HSE W	25	19	1.3	44
Total	**296**	**184**	**1.6**	**480**

In 2007, the median age of cases was 35 years (range: 0-94 years). One hundred and twenty nine cases (26.9%) were aged between 25 and 34 years.

Table 7 shows the number of cases and the age-specific rates for males and females in 2007. Rates in males were higher than females in all age groups except in the 0-14 age group (rate was 4.7 in males and females). The highest rate among females was in the 25-34 year age group (16.6) and the highest rate among males was in the over 65 year age group (26.1). Figure 2 shows the cases by age and sex and the male and female age-specific rates in Ireland for 2007. Figure 3 shows the age-specific rates of TB in Ireland from 2000 to 2007.

Table 7: Age-specific TB rates per 100,000 population for males and females, 2007

Age Group (Years)	Female		Male		Total	
	Cases	Rate	Cases	Rate	Cases	Rate
0-14	20	4.7	21	4.7	41	4.7
15-24	22	7.1	37	11.5	59	9.3
25-34	59	16.6	70	19.1	129	17.9
35-44	32	10.4	55	17.4	87	14.0
45-54	16	6.2	30	11.4	46	8.8
55-64	10	5.0	29	14.1	39	9.6
65+	25	9.6	54	26.1	79	16.9
Total	**184**	**8.7**	**296**	**14.0**	**480**	**11.3**

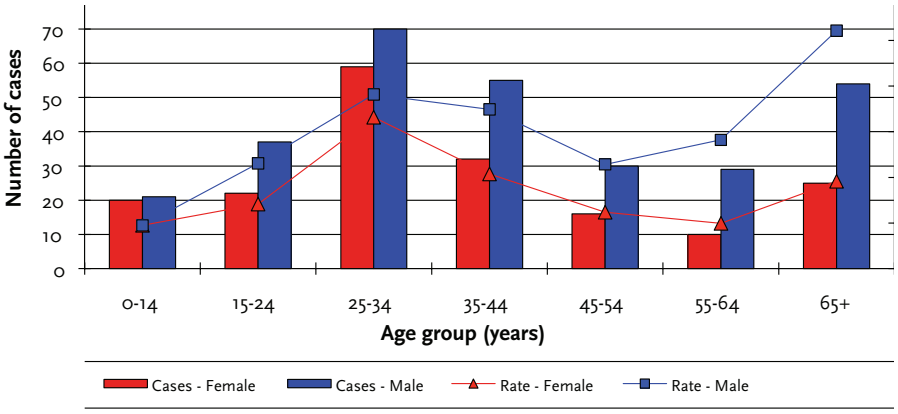

Figure 2: Cases of TB by age and sex, and age-specific rates per 100,000 population, 2007

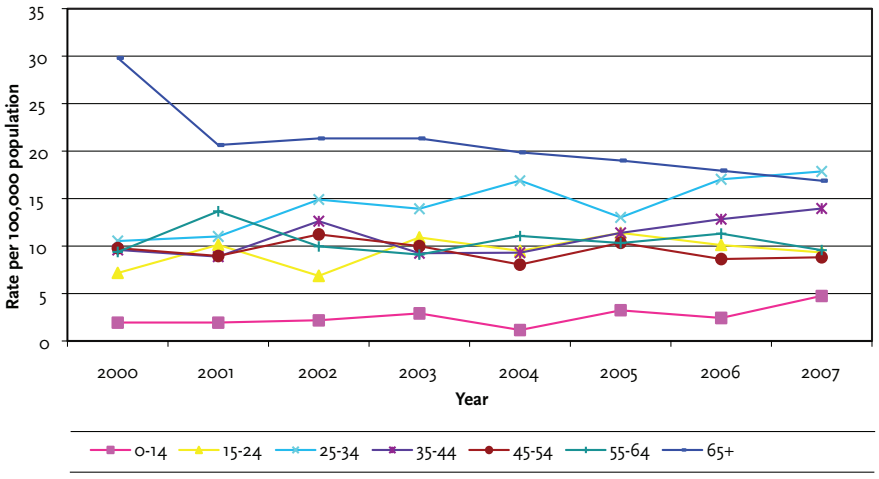

Figure 3: Age-specific rates of TB by year, 2000-2007

Age-standardised TB incidence rates by HSE area, county and LHO

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

The highest age-standardised TB incidence rates (per 100,000 population) were seen in HSE South (16.4) followed by HSE East (13.3) and HSE West (10.4). HSE South East, HSE North East and HSE Midlands reported the lowest age-standardised rates at 6.2, 6.3 and 6.6 per 100,000 population respectively. These rates were significantly lower than the national rate.

Age-standardised incidence rates for each county for 2007 are shown in table 8 and figure 6 (95% confidence intervals are included in table 8). The highest rates (per 100,000 population) were reported from Cork (19.3), Dublin (16.2) and Galway (13.3). The rates in Cork and Dublin were significantly higher than the national rate. The lowest rates (per 100,000) were in Monaghan (1.6), Wexford (3.1) and Wicklow (3.2).

Crude incidence rates for each local health office (LHO)[2] in 2007 are shown in table 9. Three-year moving averages for the crude incidence rates are presented in table 10. In 2007, the highest crude rates (per 100,000 population) were in South Lee (30.1) in HSE South, Dublin South City (29.8), Dublin Northwest (24.7) and Dublin North Central LHO (23.7) in HSE East.

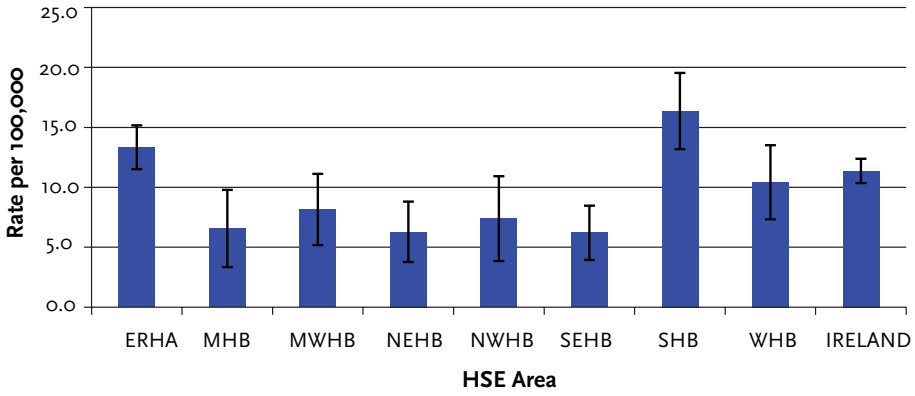

Figure 4: Age-standardised TB incidence rates per 100,000 population by HSE area with 95% confidence intervals, 2007

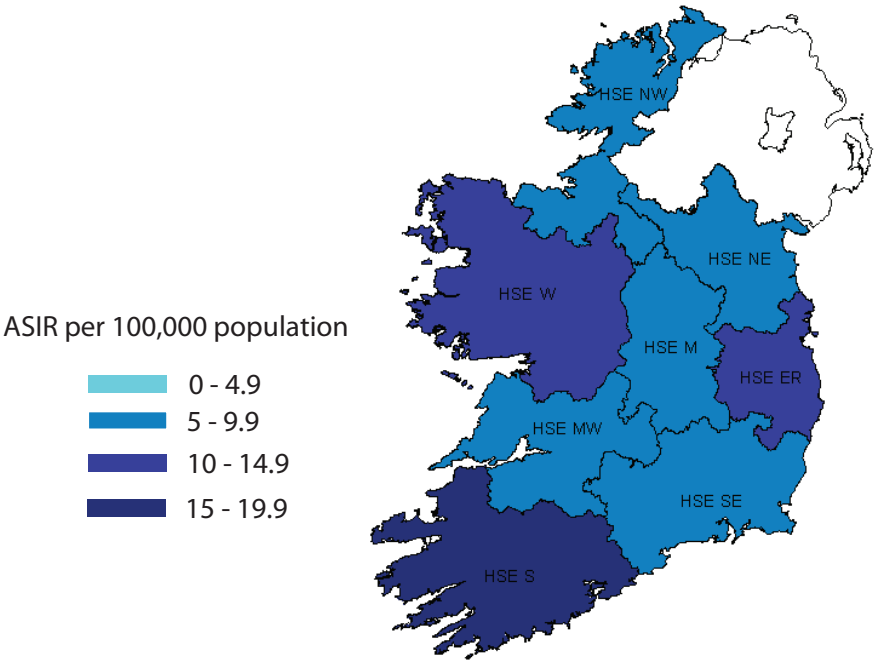

Figure 5: Age-standardised TB incidence rates per 100,000 population by HSE area, 2007

2 Note: Local Health Offices (LHOs) came into operation on 1st September 2005, taking over operations from Community Care Areas (CCAs)

Table 8: Age-standardised TB incidence rates (per 100,000 population) by county with 95% confidence intervals, 2007

County	ASIR	95% CI
Cork	19.3	15.4 - 23.2
Dublin	16.2	14.0 - 18.5
Galway	13.3	8.6 - 18.0
Longford	12.7	0.2 - 25.3
Roscommon	9.8	2.5 - 17.2
Laois	9.5	1.9 - 17.1
Tipperary	9.2	4.4 - 14.1
Waterford	8.9	3.4 - 14.5
Sligo	8.5	0.9 - 16.0
Kildare	8.3	3.8 - 12.7
Limerick	8.3	4.1 - 12.5
Cavan	8.2	1.0 - 15.5
Leitrim	8.1	0.0 - 19.3
Louth	7.3	2.2 - 12.4
Clare	7.2	2.2 - 12.2
Donegal	7.0	2.6 - 11.4
Kerry	6.6	2.2 - 10.9
Kilkenny	5.8	0.7 - 11.0
Meath	5.4	1.9 - 8.9
Mayo	4.7	0.8 - 8.5
Offaly	4.4	0.0 - 9.3
Carlow	3.9	0.0 - 9.4
Westmeath	3.7	0.0 - 7.9
Wicklow	3.2	0.1 - 6.3
Wexford	3.1	0.1 - 6.1
Monaghan	1.6	0.0 - 4.8
Ireland	**11.3**	**10.3 – 12.3**

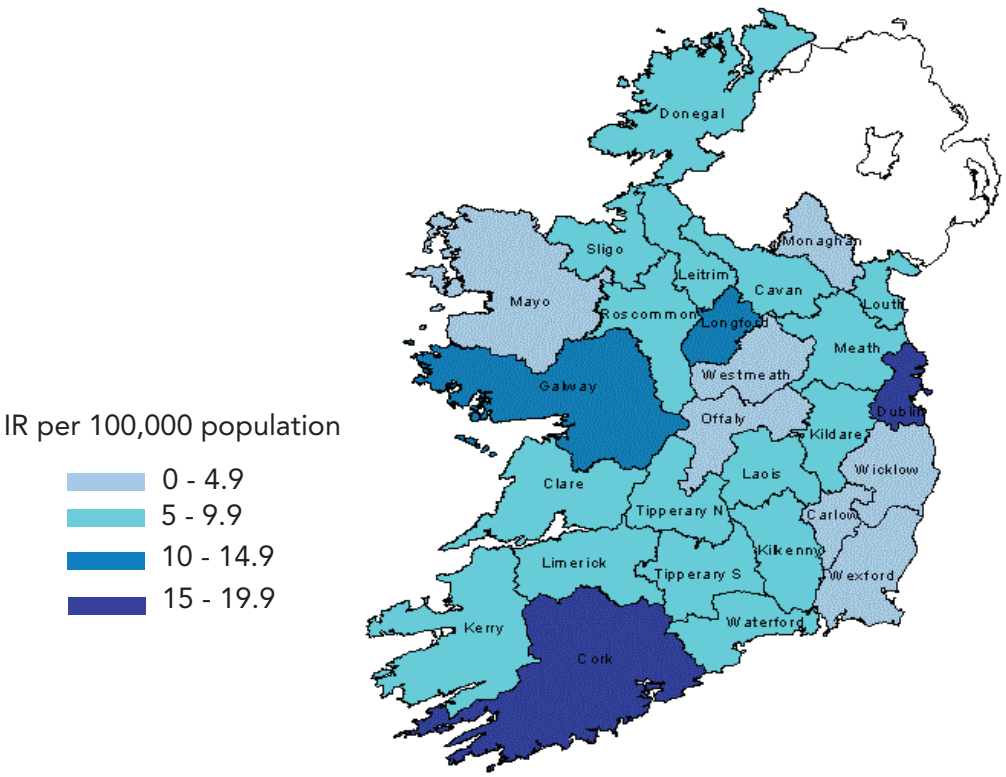

Figure 6: Age-standardised TB incidence rates per 100,000 population by county, 2007

Table 9: Crude incidence rate per 100,000 population by local health office (LHO)[3], 2000 to 2007

HSE area	LHO	Rate per 100,000 population							
		2000	2001	2002	2003	2004	2005	2006	2007
HSE E	**Total**	**10.2**	**12.3**	**11.6**	**11.9**	**12.6**	**13.0**	**12.9**	**14.6**
	Dun Laoghaire	5.4	2.3	4.7	4.7	9.5	4.0	5.5	8.7
	Dublin South East	13.3	5.7	7.6	7.6	10.9	7.2	5.4	10.0
	Dublin South City	7.7	26.1	21.5	23.0	23.1	20.1	19.4	29.8
	Dublin South West	6.9	8.2	7.5	10.3	8.1	12.2	5.4	14.9
	Dublin West	11.9	10.3	18.3	19.1	20.1	18.7	17.9	16.4
	Dublin North West	16.8	18.7	23.0	17.4	12.9	19.4	21.0	24.7
	Dublin North Central	18.8	27.8	18.8	21.2	25.3	24.5	26.9	23.7
	Dublin North	10.8	11.8	5.4	4.9	11.3	10.4	11.7	8.6
	Kildare/West Wicklow	5.0	5.0	7.8	8.4	5.4	7.9	6.9	7.4
	Wicklow	5.0	8.0	1.0	5.0	2.7	5.5	8.2	2.7
HSE M	**Total**	**7.1**	**3.1**	**8.4**	**5.3**	**3.6**	**6.4**	**6.0**	**6.4**
	LD/WH	8.7	6.8	7.8	7.8	4.4	8.8	5.3	6.2
	LS/OY	5.7	0.0	9.0	3.3	2.9	4.4	6.5	6.5
HSE MW	**Total**	**13.8**	**7.1**	**9.4**	**12.4**	**12.2**	**14.7**	**10.2**	**8.0**
	Clare	11.6	5.8	9.7	6.8	10.8	19.8	8.1	7.2
	Limerick[4]	na	na	na	na	na	na	na	na
	Tipp Nth/East Limerick[4]	na	na	na	na	na	na	na	na
HSE NE	**Total**	**6.1**	**11.0**	**7.0**	**7.5**	**5.8**	**3.3**	**8.4**	**6.1**
	Cavan/Monaghan	3.1	16.7	6.3	10.4	4.2	5.1	8.4	4.2
	Louth/Sth Monaghan	11.4	8.8	10.5	9.6	9.0	3.6	7.2	9.0
	Meath	3.7	9.0	4.5	3.7	4.9	1.8	9.2	5.5
HSE NW	**Total**	**4.1**	**5.9**	**5.4**	**4.1**	**6.7**	**6.3**	**3.8**	**7.2**
	Donegal	2.9	3.6	4.4	2.9	6.8	4.1	2.7	6.8
	Sligo/Leitrim	5.9	9.4	7.0	5.9	6.6	9.9	5.5	7.7
HSE S	**Total**	**13.8**	**12.4**	**13.3**	**16.0**	**11.8**	**12.2**	**15.3**	**16.4**
	Kerry	8.3	6.8	10.6	12.1	10.0	6.4	6.4	6.4
	North Cork	21.8	9.5	15.0	10.9	12.4	6.2	8.7	7.4
	North Lee	16.7	21.8	18.6	22.4	14.9	21.5	28.0	19.7
	South Lee	10.7	10.7	12.5	19.7	11.2	11.7	16.2	30.1
	West Cork	13.8	7.9	3.9	2.0	7.5	9.3	5.6	0.0
HSE SE	**Total**	**9.7**	**4.7**	**11.6**	**8.3**	**7.4**	**8.0**	**11.1**	**6.3**
	Carlow/Kilkenny	13.5	8.1	8.1	9.0	7.5	6.6	7.5	5.8
	Tipperary South	10.7	2.4	4.7	9.5	7.9	13.6	20.4	9.0
	Waterford	12.6	7.2	23.3	11.7	13.3	9.2	13.3	8.3
	Wexford	2.6	0.9	8.6	3.4	1.5	4.6	6.1	3.0
HSE W	**Total**	**10.0**	**8.9**	**8.7**	**6.0**	**10.6**	**10.9**	**7.7**	**10.6**
	Galway	10.5	10.0	5.7	5.3	9.9	11.2	8.2	13.4
	Mayo	8.5	4.3	10.2	8.5	7.3	9.7	7.3	4.8
	Roscommon	11.2	14.9	16.7	3.7	20.4	11.9	6.8	11.9
Ireland		**10.1**	**9.7**	**10.4**	**10.4**	**10.2**	**10.6**	**11.0**	**11.3**

3 In some areas, LHO does not always correspond to county

4 Rates cannot be calculated for these LHO's as the population in the LHO is not known

Table 10: 3 year moving average rates (per 100,000 population) by local health office (LHO)[3], 2001 to 2006

HSE area	LHO	2001	2002	2003	2004	2005	2006
HSE E	**Total**	**11.6**	**11.8**	**12.0**	**12.5**	**12.9**	**13.3**
	Dun Laoghaire	3.7	4.1	5.9	6.9	5.7	5.9
	Dublin South East	8.1	7.1	8.4	9.1	7.7	7.0
	Dublin South City	20.3	23.0	22.6	22.3	20.7	22.1
	Dublin South West	7.7	8.4	9.1	9.7	9.5	9.5
	Dublin West	12.7	16.5	19.2	19.5	18.8	17.7
	Dublin North West	19.3	20.6	17.7	15.7	18.2	21.5
	Dublin North Central	23.3	21.6	21.6	24.1	25.3	25.5
	Dublin North	9.9	6.9	6.6	9.4	10.9	10.6
	Kildare/West Wicklow	5.7	7.3	7.5	6.8	6.9	7.0
	Wicklow	5.5	3.8	3.4	4.0	5.5	6.2
HSE M	**Total**	**5.4**	**6.3**	**5.7**	**4.7**	**5.6**	**6.2**
	Longford/Westmeath	7.5	7.5	6.9	6.3	6.8	6.4
	Laois/Offaly	3.7	5.3	4.6	3.4	4.5	6.0
HSE MW	**Total**	**9.3**	**9.6**	**11.6**	**12.9**	**12.9**	**10.8**
	Clare	8.2	8.0	8.5	12.1	14.6	10.8
	Limerick[4]	na	na	na	na	na	na
	Tipperary North/East Limerick[4]	na	na	na	na	na	na
HSE NE	**Total**	**8.8**	**8.1**	**7.0**	**5.6**	**5.2**	**6.5**
	Cavan/Monaghan	10.7	9.9	7.8	6.0	5.7	6.5
	Louth/Sth Monaghan	9.9	9.9	9.7	7.8	5.8	6.7
	Meath	6.5	5.4	4.2	3.8	4.5	6.4
HSE NW	**Total**	**5.3**	**5.2**	**5.1**	**6.0**	**5.8**	**5.3**
	Donegal	3.6	3.8	4.2	5.1	4.4	4.1
	Sligo/Leitrim	7.9	7.3	6.3	7.2	8.0	7.1
HSE S	**Total**	**13.0**	**13.7**	**14.3**	**12.9**	**12.9**	**14.8**
	Kerry	8.1	10.0	11.2	9.6	7.3	6.4
	North Cork	13.9	12.6	12.3	10.5	8.4	7.7
	North Lee	19.7	20.3	19.6	18.4	21.5	24.3
	South Lee	11.2	13.9	15.8	13.4	12.7	18.5
	West Cork	8.4	4.4	3.8	6.6	7.9	5.1
HSE SE	**Total**	**7.7**	**9.0**	**8.9**	**7.8**	**8.6**	**9.1**
	Carlow/Kilkenny	9.4	8.3	8.4	7.6	7.0	6.8
	Tipperary South	5.0	5.3	7.9	9.7	13.9	15.8
	Waterford	12.6	16.4	15.0	11.9	11.2	11.0
	Wexford	3.2	5.4	4.2	2.8	4.2	4.9
HSE W	**Total**	**9.1**	**8.1**	**7.8**	**9.5**	**10.0**	**9.2**
	Galway	9.1	6.7	6.5	9.1	10.1	10.3
	Mayo	6.8	8.3	8.6	8.2	8.5	7.3
	Roscommon	14.4	13.0	11.1	14.1	12.8	9.4
Total		**10.0**	**10.2**	**10.3**	**10.3**	**10.6**	**11.0**

3 In some areas, LHO does not always correspond to county

4 Rates cannot be calculated for these LHO's as the population in the LHO is not known

Geographic origin

Of the 480 patients diagnosed with TB in 2007, 283 (59.0%) were born in Ireland, 192 (40.0%) were born outside Ireland and for the remaining five cases (1.0%), the country of birth was unknown. The crude TB rate in the indigenous population was 8.0 per 100,000 population while the crude rate in the foreign-born population was 31.3 per 100,000 population.

Figure 7 shows TB cases by geographic origin from 1998 to 2007.

Table 11 shows the breakdown of TB cases by HSE area and geographic origin.

Cases born outside Ireland originated from at least 43 countries. Table 12 shows the breakdown of these cases by country of birth and corresponding continent. Of the 192 cases born outside Ireland, 46.4% were born in Asia, 27.6% were born in Africa and 18.3% were born in Europe. The exact country of birth was unknown for 14 cases.

Figure 8 shows age specific rates by geographic origin during 2007. The majority (84.9%) of cases born outside Ireland were aged between 15 and 44 years compared to 38.9% of Irish cases in this age range. The median age among foreign born cases was 31 years (range: 3-83 years) compared to a median age of 44 years (range: 1-94 years) among Irish born cases.

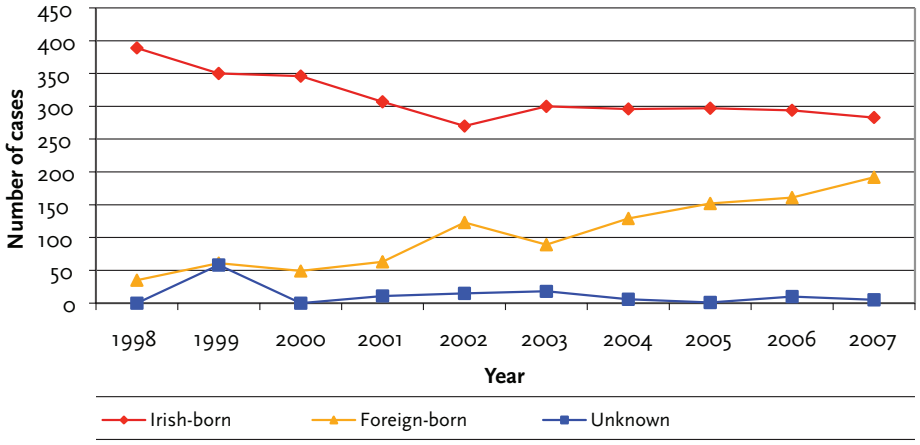

Figure 7: TB cases by geographic origin, 1998 to 2007

Table 11: Cases of TB by HSE area and geographic origin, 2007

HSE area	Irish-born		Foreign-born		Unknown	Total
	Number	%	Number	%		
HSE E	90	41.1	128	58.5	1	**219**
HSE M	10	62.5	6	37.5	0	**16**
HSE MW	20	69.0	9	31.0	0	**29**
HSE NE	19	79.2	5	20.8	0	**24**
HSE NW	8	47.1	9	52.9	0	**17**
HSE S	88	86.3	12	11.8	2	**102**
HSE SE	18	62.1	11	37.9	0	**29**
HSE W	30	68.2	12	27.3	2	**44**
Ireland	**283**	**59.0**	**192**	**40.0**	**5**	**480**

Table 12: Countries of origin of foreign-born patients with TB, 2007

Continent	Total	Country	Cases
Africa	**53**	Algeria	2
		Angola	1
		Burundi	1
		Congo	3
		Côte d'Ivoire	1
		Egypt	1
		Eritrea	1
		Kenya	1
		Malawi	1
		Mauritius	4
		Nigeria	19
		Somalia	6
		South Africa	1
		Sudan	2
		Uganda	2
		Zimbabwe	7
America	**1**	Brazil	1
Asia	**89**	Bangladesh	7
		China	4
		Georgia	3
		Indonesia	1
		India	33
		Iran	1
		Iraq	1
		Myanmar	1
		Malaysia	4
		Mongolia	3
		Nepal	1
		Pakistan	16
		Philippines	10
		Vietnam	3
		Yemen	1
Europe	**35**	Croatia	1
		Estonia	1
		France	1
		Germany	2
		Italy	1
		Latvia	4
		Lithuania	4
		Poland	7
		Romania	7
		Turkey	1
		UK	6
Unknown	**14**		
Total			**192**

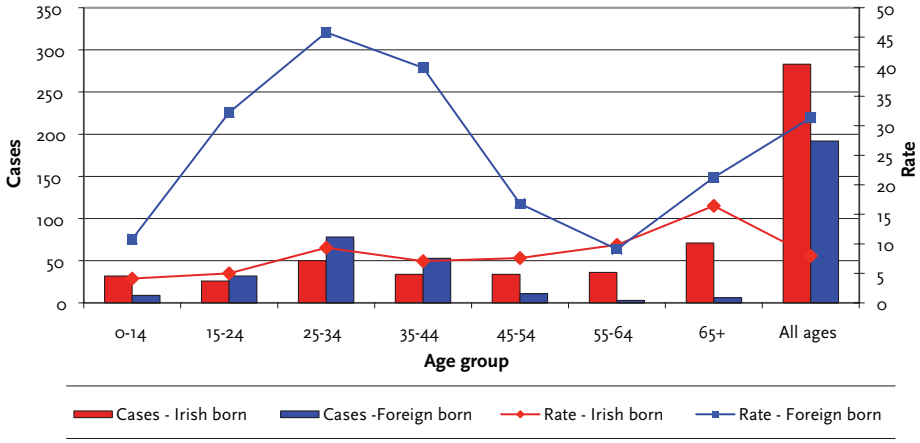

Figure 8: TB cases by age group (years) and age specific rates by geographic origin, 2007

Site of disease

Of the 480 cases notified in 2007, 316 (65.8%) were pulmonary, 131 (27.3%) were extrapulmonary and 33 (6.9%) were pulmonary and extrapulmonary. TB cases by site of disease and HSE area are shown in table 13.

Table 13: TB cases by site of disease and HSE area, 2007

HSE area	Pulmonary only		Extrapulmonary only		Pulmonary + Extrapulmonary	
	Number	%	Number	%	Number	%
HSE E	141	64.4	61	27.9	17	7.8
HSE M	13	81.3	3	18.8	0	0.0
HSE MW	20	69.0	9	31.0	0	0.0
HSE NE	17	70.8	3	12.5	4	16.7
HSE NW	12	70.6	5	29.4	0	0.0
HSE S	62	60.8	34	33.3	6	5.9
HSE SE	22	75.9	5	17.2	2	6.9
HSE W	29	65.9	11	25.0	4	9.1
Total	**316**	**65.8**	**131**	**27.3**	**33**	**6.9**

Pulmonary TB cases

The WHO defines pulmonary TB, for the purpose of analysis, as any case that has a pulmonary disease component. There were 349 cases reported in 2007 with a pulmonary disease component (72.7% of all cases reported). Sputum smear and culture results for these cases are shown in table 14. Sputum microscopy results were available for 249 (71.3%) of the 349 cases. This is similar to the figure in 2006 (74.0%) and is a decrease compared to the figures from 2005 (89.0%), 2004 (83.5%), 2003 (82.9%) and 2002 (82.6%).

Of the 349 pulmonary cases, 153 (43.8%) were sputum positive for AFB by microscopy and 246 (70.5%) were culture positive.

The proportion of pulmonary cases (with or without an extrapulmonary site) was higher in persons born in Ireland (77.7%) compared to those born abroad (65.1%).

Table 14: Sputum smear and culture status for pulmonary TB cases, 2007

Culture result	Sputum smear positive	Sputum smear negative	Sputum smear not done	Total
Culture positive	141	60	45	**246**
Culture negative	7	32	26	**65**
Culture not done	-	2	26	**28**
Culture not known	5	2	3	**10**
Total	**153**	**96**	**100**	**349**

Extrapulmonary TB cases

One hundred and thirty one cases (27.3%) had exclusively extrapulmonary TB of whom 69 (52.7%) were culture confirmed and twenty two (16.8%) were histology positive.

One hundred and sixty four (34.1%) of all cases reported in 2007 had an extrapulmonary disease component. The extrapulmonary sites reported are shown in table 15. The most frequent sites of extrapulmonary disease reported were pleura (32.9%) and extra-thoracic lymph nodes (22.6%). There were six cases of TB meningitis in 2007.

Table 15: Extrapulmonary disease sites in notified cases, 2007

Site of disease	Number	Percentage
Pleural	54	32.9
Lymph (extra-thoracic)	37	22.6
Other	19	11.6
Genitourinary	6	3.7
Lymph (intra-thoracic)	16	9.8
Spinal	3	1.8
Bone	6	3.7
Disseminated	4	2.4
Meningeal	6	3.7
Peritoneal	4	2.4
CNS	5	3.0
Site not specified	4	2.4
Total	**164**	**100.0**

TB meningitis

There were six cases of TB meningitis reported in 2007 giving an incidence rate of 0.14 per 100,000 population (1.4 per million population). A profile of these cases is provided in table 16. Of the six cases, five were diagnosed as extrapulmonary and one was diagnosed as pulmonary and extrapulmonary. Three of the TB meningitis cases were culture confirmed.

Between 1998 and 2007, a total of 63 cases of TB meningitis have been reported, six in 1998, seven in 1999, six in 2000, two in 2001, six in 2002, eight in 2003, six in 2004, nine in 2005, seven in 2006 and six in 2007. The cumulative incidence rates of TB meningitis in each HSE area and in Ireland for 1998-2007 are shown in table 17. The highest cumulative rate of TB meningitis between 1998 and 2007 is in HSE South (3.4 per 100,000).

Table 16: TB meningitis cases in Ireland, 2007

HSE Area	Age (years)	History of BCG	Culture Status
HSE E	29	Unknown	Unknown
HSE E	64	Yes	Yes
HSE E	35	Yes	No
HSE MW	40	Unknown	Unknown
HSE S	56	Yes	Yes
HSE S	55	Yes	Yes

Table 17: Cumulative incidence rate of TB meningitis in Ireland, 1998-2007

HSE area	Cases 1998 to 2007	Cumulative incidence rate (per 100,000)	95% CI
HSE E	22	1.6	0.9 - 2.2
HSE M	0	0.0	0.0 - 0.0
HSE MW	5	1.5	0.2 - 2.8
HSE NE	7	2.0	0.5 - 3.5
HSE NW	2	0.9	0.0 - 2.2
HSE S	20	3.4	1.9 - 5.0
HSE SE	2	0.5	0.0 - 1.1
HSE W	5	1.3	0.2 - 2.5
Ireland	**63**	**1.6**	**1.5 - 2.5**

Note: Calculations based on 2002 census figures

Bacteriological results

Of the 480 cases notified in 2007, 351 (73.1%) were laboratory confirmed by culture, microscopy or histology.

Of the 349 cases with a pulmonary component, 267 (76.5%) were laboratory confirmed (by culture, microscopy or histology) and of the 131 extrapulmonary cases, 84 (64.1%) were laboratory confirmed (by culture, microscopy or histology).

Culture

In 2007, 315 (65.6%) of all TB cases notified were culture positive. This is a slight decrease on the percentage in 2006 (68.2%) but is an increase on the proportion reported in 2005 (62.9%), 2004 (64.6%), 2003 (64.4%), 2002 (61.0%) and 2001 (58.8%).

Of the 349 cases with a pulmonary component, 246 (70.5%) were culture confirmed and of the 131 extrapulmonary cases, 69 (52.7%) were culture confirmed. Table 18 shows a breakdown by culture status and HSE area of TB cases notified in 2007.

Species

Information on species was reported for 313 (99.4%) of the 315 culture confirmed cases. Of these, 305 (96.8%) were *M. tuberculosis*, six (1.9%) were *M. bovis* and two (0.6%) were *M. africanum*.

Table 18: Culture status of TB cases by HSE area, 2007

HSE area	Positive	Negative	Not done	Unknown	Total
HSE E	166	42	9	2	**219**
HSE M	9	4	2	1	**16**
HSE MW	17	9	2	1	**29**
HSE NE	14	-	-	10	**24**
HSE NW	13	4	-	-	**17**
HSE S	56	25	19	2	**102**
HSE SE	14	8	7	-	**29**
HSE W	26	9	8	1	**44**
Ireland	**315**	**101**	**47**	**17**	**480**

Anti-TB drug resistance

Information on the results of drug sensitivity testing (DST) was reported for 297 (94.3%) of the 315 culture-confirmed cases. Of the 297 cases where sensitivity results were reported, resistance was documented in 24 cases (8.1%; 5.0% of total cases), including seven cases of MDR-TB (representing 2.4%; 1.5% of total cases). Resistance to isoniazid was recorded in 19 cases, to rifampicin in 10 cases, to pyrazinamide in eight cases, to ethambutol in six cases and to streptomycin in six cases.

Fifty percent (12 cases) of the drug resistant cases, including five of the seven MDR-TB cases, were born outside Ireland. A summary of drug resistance in 2007 is shown in table 19 and a breakdown of resistant cases is shown in table 20.

Table 19: Summary of drug resistant TB cases in Ireland, 2007

DST results	Number	%
Cases with DST results	297	
Resistant cases	24	8.1
Cases resistant to at least Isoniazid	19	6.4
Cases resistant to at least Rifampicin	10	3.4
MDR cases	7	2.4
Cases resistant to at least Pyrazinamide[5]	8	2.7
Cases resistant to at least Ethambutol	6	2.0
Cases resistant to at least Streptomycin	9	3.0

Table 20: Anti-TB drug resistance in TB cases, 2007

	Total cases	Cases with DST results	CASES RESISTANT TO AT LEAST					
			Isoniazid	Rifampicin	Isoniazid & Rifampicin (MDR)	Pyraz-inamide	Etham-butol	Strep-tomycin
Total	480	297	19(6.4%)	10 (3.4%)	7 (2.4%)	8 (2.7%)	6 (2.0%)	9 (3.0%)
Pulmonary	349	231	19(8.2%)	9(3.9%)	7 (3.0%)	8 (3.5%)	6 (2.6%)	9 (3.9%)
Extra-pulmonary	131	65	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Irish born	283	159	8 (5.0%)	5 (3.1%)	2 (1.3%)	3 (1.9%)	2 (1.3%)	3 (1.9%)
Foreign born	192	136	11 (8.1%)	5 (3.7%)	5 (3.7%)	5 (3.7%)	4 (2.9%)	6 (4.4%)

5 Excludes *M.bovis* cases which are innately resistant to pyrazinamide

Case classification

Using the ECDC case definitions (described in the Methods section), 2007 cases can be classified into Confirmed, Probable and Possible cases as outlined in Table 21. Of the 480 cases, 315 (65.6%) were confirmed, 36 (7.5%) were probable and 129 (26.9%) were possible cases.

Table 21: Case classification of TB cases by site of disease, 2007 (using ECDC case definitions)

Site of disease	Confirmed	%	Probable	%	Possible	%	Total
Pulmonary	246	70.5	21	6.0	82	23.8	349
Extrapulmonary	69	52.7	15	11.5	47	35.9	131
Total	**315**	**65.6**	**36**	**7.5**	**129**	**26.9**	**480**

Treatment outcome

Outcome was recorded for 413 (86.0%) of the 480 cases notified in 2007. Of the 413 cases, 332 completed treatment, 40 died, 18 were recorded as being lost to follow up, 17 cases were still on treatment at time of reporting and treatment was interrupted in six cases. Of the 40 deaths reported, seven (1.5% of total cases) were attributed to TB.

Outcome was reported for 136 (88.3%) of the 154 smear positive cases. Of the 136, 111 completed treatment, 10 died, 10 were still on treatment, four were lost to follow up and treatment was interrupted in one case at the time of reporting. Of the 10 deaths among smear positive cases, two were attributed to TB.

Of the 24 drug-resistant cases, 13 completed treatment, seven were still on treatment at the time of reporting, treatment was interrupted in one case and treatment outcome was unknown in three cases. Of the seven MDR-TB cases, one case completed treatment and five were still on treatment at the time of reporting. Outcome was unknown for the remaining case.

Details on treatment outcome for all cases and for smear positive cases only are shown in table 22 while treatment outcome by HSE area is shown in table 23.

Table 22: Treatment outcome for all cases and smear positive cases, 2007

Treatment outcome	Total		Smear Positive	
	Number	%	Number	%
Completed	332	69.2	111	72.1
Lost to follow up	18	3.8	4	2.6
Died (attributed to TB)	7	1.5	2	1.3
Died (not attributed to TB)	33	6.9	8	5.2
Still on treatment	17	3.5	10	6.5
Interrupted (>2mths)	6	1.3	1	0.6
Unknown	67	14.0	18	11.7
Total	**480**	**100**	**154**	**100**

Table 23: Treatment outcome by HSE area, 2007

		Outcome known	Outcome unknown	Lost to follow up	Total
HSE E	**Number**	163	47	9	**219**
	%	*74.4*	*21.5*	*4.1*	***100***
HSE M	**Number**	12	0	4	**16**
	%	*75.0*	*0.0*	*25.0*	***100***
HSE MW	**Number**	28	0	1	**29**
	%	*96.6*	*0.0*	*3. 4*	***100***
HSE NE	**Number**	7	17	0	**24**
	%	*29.2*	*70.8*	*0.0*	***100***
HSE NW	**Number**	17	0	0	**17**
	%	*100.0*	*0.0*	*0.0*	***100***
HSE S	**Number**	99	2	1	**102**
	%	*97.0*	*2.0*	*1.0*	***100***
HSE SE	**Number**	27	0	2	**29**
	%	*93.1*	*0.0*	*6.9*	***100***
HSE W	**Number**	42	1	1	**44**
	%	*95.4*	*2.3*	*2.3*	***100***
Total	**Number**	**395**	**67**	**18**	**480**
	%	***82.3***	***14.0***	***3.7***	***100***

Case ascertainment

Table 24 summarises the method by which cases notified in 2007 were found. The majority (77.7%) presented as a case with a further 13.8% found by contact tracing.

Table 24: Method of case finding, 2007

Case found by	Total	Percentage
Presenting as case	373	77.7
Contact tracing	66	13.8
Other	19	4.0
Other screening	7	1.5
Immigrant screening	2	0.4
Unknown	13	2.7
Total	**480**	**100.0**

Previous history of TB

Fifty six (11.6%) of the 480 cases were reported to have a previous history of TB. The previous year of diagnosis was provided for 40 cases and ranged from 1940 to 2006 with 26 of the 40 cases (65.0%) reported to have had TB in the previous ten years.

HIV status

Sixteen of the 480 cases (3.3%) notified in 2007 were reported as HIV positive while 35 (7.3%) were reported as HIV negative. Information on HIV status was not provided or was unknown for 429 (89.4%) of cases.

Discussion

This is the tenth 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) which became operational in all HSE areas in Ireland in January 2000. This system is based on the minimum dataset required by the TB Surveillance Unit at the European Centre for Disease Prevention and Control (ECDC).

In 2007, 480 cases of TB were notified to HPSC, a national crude incidence rate of 11.3 per 100,000 population. This is slightly higher than the rates reported between 2000 and 2006, which ranged from 9.7 per 100,000 to 11.0 per 100,000 population, but is lower than the crude incidence rates reported between 1991 and 1999, which ranged from 11.5 per 100,000 to 18.2 per 100,0000 population. The overall notification rate in countries of the EU and Western Europe who report to ECDC was 17.0 per 100,000 population in 2007, ranging from 4.5 per 100,000 population in Iceland to 118.3 per 100,000 population in Romania.[2]

Differences in age-standardised TB incidence rates persist between HSE areas with HSE South having the highest rate in 2007 followed by HSE East and HSE West. HSE North East had the lowest rate in 2007, followed by HSE South East and HSE Midlands. Certain local health offices (LHOs) were found to have particularly high rates of TB incidence including Dublin South City, Dublin Northwest and Dublin North Central in HSE East and South Lee in HSE South. According to the 2006 Census, between 19 to 30% of the population in these LHOs belong to social class 6 and 7 (see Appendix 2 for descriptions of social class).[6]

The highest age-specific rates (per 100,000) in 2007 occurred among those aged 25-34 years (17.9) and those over 65 years (16.9). There were 41 cases in children under 15 years of age in 2007, a rate of 4.7 per 100,000 population, which is twice the rate reported in 2006 (2.4). A large crèche-related TB outbreak in 2007 in HSE South contributed to the higher than usual number of cases in this age group. The outbreak involved 21 cases of TB (18 children and 3 adults) and involved two crèches. The vast majority of child cases were toddlers (children aged 2 to 3 years). Twenty-nine percent of children in one of the crèches and 19% in the other had evidence of BCG vaccination. None of the 18 cases in children had BCG vaccination. The *M. tuberculosis* strain isolated from the index case was reported as pan-sensitive.

Rates among males were higher than females for all age groups except for those in the 0-14 year age group where the rate was equal (4.7). In 2007, the highest rate in females was in those aged 24-34 years (16.6) and the highest rate among males was in those aged 65 years and over (26.1). The male to female ratio (1.6:1) reported in 2007 was consistent with the rate reported in 2005 and 2006 (1.5:1). Males are predominant among TB cases in nearly all European countries with an overall M:F ratio in 2007 of 2.4:1.[2]

During 2007, 40.0% of TB cases notified were born outside Ireland. This proportion has steadily increased and compares to 34.6% in 2006, 33.8% in 2005, 30% in 2004, and 21.9% in 2003. In 2007, among countries in the EU and Western Europe who reported data to ECDC, 21% of notifications were in foreign-born patients. In the United Kingdom, Belgium and Austria, where crude incidence rates are similar to those reported in Ireland, the percentage of cases of foreign origin in 2007 ranged from 36 to 65%.[2] The crude rate of TB notifications in the indigenous population was 8.0 per 100,000 population which is slightly lower than the rate in 2006 (8.3) and 2005 (8.3). The crude rate in foreign-born cases was 31.3 which is higher than the rate in 2006 (26.3) and 2005 (24.8).

There was a notable difference in age between those born in Ireland and those born outside Ireland. In cases born in Ireland, there was a peak among those aged greater than 64 years with a median age of 44 years. In cases born outside Ireland, the peak occurred in those aged 25-34 years with a median age of 31 years.

There were six cases of TB meningitis in 2007, a rate of 0.14 per 100,000 population. Of the six cases of TB meningitis, all were aged greater than 25 years and three were greater than 50 years old. Between 1998 and 2007, five cases of TB meningitis were reported among 0-4 year olds. The Report of the Working Party on Tuberculosis (1996),[7] recommends that the cessation of neonatal BCG vaccination should be considered if

certain criteria are met. One of these criteria is that 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. Between 2003 and 2007, there were three cases of TB meningitis in children under five years of age, one in 2006 and two in 2003, giving an average notification rate of 1.4 per 10 million population. The criteria for discontinuation of BCG vaccination and how they apply to Ireland are outlined in Appendix 3. All of these criteria are not yet met in full.

In 2007, 315 (65.6 %) of all cases of TB notified were culture positive. This is a decrease on the proportion in 2006 (68.2%) but is an increase compared to previous years. In the 27 EU countries, the culture confirmed rate ranged from 16% (in Romania) to 87% (in Slovenia).

Pulmonary TB was reported in 73% of cases and 27% had exclusively extrapulmonary TB. Forty four percent of pulmonary TB cases were sputum smear positive and the sputum smear-positive rate for 2007 was 3.6 per 100,000 population.

There were 24 drug-resistant cases notified in 2007, including seven cases of MDR-TB. MDR-TB cases and cases resistant to isoniazid represented 1.5% and 4.0% of total cases respectively. This compares to 0.9% and 3.0% respectively in 2006. In 2007, the proportion of cases with MDR ranged from 0-17% in the EU and Western Europe. MDR-TB or XDR-TB is more likely in patients previously treated for TB or in immigrants from countries with a high burden of MDR-TB. In Europe, drug resistance was higher in cases of foreign origin compared to nationals.

Drug resistance is an issue that needs to be kept under close review especially with the emergence of XDR-TB. In October 2006, the World Health Organization (WHO) expressed concern over the emergence of XDR-TB and called on countries to strengthen and implement measures to prevent the global spread of these virulent drug resistant strains of TB. In this context, WHO recommends strengthening of basic TB care and public health infrastructures to prevent the emergence of drug resistance, increased collaboration between HIV and TB control programmes and increased investment in laboratory infrastructure to enable better detection and management of resistant cases of TB. They also recommend strengthening of surveillance and infection control systems and that low-priced, high quality drugs be more readily available.[5]

In recent years, the quality of the data, and in particular, data on treatment outcome, has improved greatly. For cases notified in 2007, information on treatment outcome was provided for 86% of cases, which is a marked increase on the proportion in 2006 (78.9%). This compares to 87.1% in 2005, 84.3% in 2004, 84.8% in 2003, 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 with the global threat of resistant strains. This is especially true for sputum smear positive cases.

The Global Plan to Stop TB 2006-2015 was launched in January 2006 and aims to reduce the global prevalence of, and deaths due to TB by 50% in 2015 relative to 1990. In addition, it proposes to eliminate TB as a public health problem (<1 case per million population) by 2050. This strategy calls on countries to strengthen health systems for TB treatment and control and to address MDR-TB, TB/HIV and other challenges e.g. high risk groups and areas where TB rates are high.[8] The importance of good surveillance data cannot be underestimated in this context as they will help guide where resources should be directed in order to ensure the effective prevention and control of TB in Ireland and in order to reach the elimination target by 2050.

References

1. World Health Organization. Global Tuberculosis Control: Surveillance, Planning, Financing. WHO Report 2007. (WHO/CDS/TB/2007.372). WHO, Geneva, Switzerland. 2007.
2. European Centre for Disease Prevention and Control/WHO Regional Office for Europe: Tuberculosis Surveillance in Europe 2007. Stockholm, European Centre for Disease Prevention and Control, 2009. http://ecdc.europa.eu/en/publications/Publications/0904_SUR_Tuberculosis_Surveillance_in_Europe.pdf
3. EU case definitions for reporting communicable diseases, Commission Decision 28/04/2008.
4. World Health Organization. Definition of a new sputum smear-positive TB case. 02/04/2007. Geneva, Switzerland. Available at: http://www.who.int/tb/dots/laboratory/policy/en/index1.html
5. World Health Organization, Global Task Force on XDR-TB, outcomes and recommendations, October 2006. Available at http://www.who.int/mediacentre/news/notes/2006/np29/en/index.html
6. Central Statistics Office, Dublin. Census 2006. Dublin, 2007.
7. Department of Health. Report of the Working Party on Tuberculosis. September 1996.
8. World Health Organization, Stop TB Partnership. The global plan to stop TB 2006-2015. Actions for life-towards a world free of tuberculosis.
9. International Union Against Tuberculosis and Lung Disease. Criteria for discontinuation of vaccination programmes using Bacille Calmette-Guerin (BCG) in countries with a low prevalence of tuberculosis. A statement of the International Union against Tuberculosis and Lung Disease. *Tuber Lung Dis,* 2004; **75**(3): 179-80.

Appendix 1: TB Cases Notified in Ireland in 2008, Provisional Data (as of 31st August 2009)

There were 470 cases of TB provisionally notified in 2008. 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 A1.

Table A1: Provisional summary of the epidemiology of TB in Ireland, 2008

Parameter	2008
Total number of cases	470
Crude notification rate per 100,000	11.1
Cases in indigenous population[6]	265 (56.4%)
Cases in foreign-born persons	186 (39.6%)
Culture positive cases	209 (44.5%)
Pulmonary cases	329 (70.0%)
Of which sputum smear positive	159 (48.3%)
Resistant cases	15 (3.2%)
Multi-drug resistant cases	3 (0.6%)
TB meningitis cases	5 (1.1%)

Crude incidence rates by HSE area

The total number of TB cases in each HSE area is shown in table A2 with crude incidence rates and 95% confidence intervals included.

Table A2: Provisional TB cases in each HSE area, 2008

HSE Area	Cases	Crude rate per 100,000	95% CI for rate
HSE E	224	14.9	13.0 - 16.9
HSE M	25	9.9	6.0 - 13.8
HSE MW	29	8.0	5.1 - 11
HSE NE	18	4.6	2.5 - 6.7
HSE NW	14	5.9	2.8 – 9.0
HSE SE	30	6.5	4.2 - 8.8
HSE S	96	15.5	12.4 - 18.5
HSE W	34	8.2	5.4 - 11
Ireland	**470**	**11.1**	**10.1 - 12.1**

Age and Gender

There were 288 cases (61.3%) of TB notified in males and 182 cases (38.7%) in females, giving a male to female ratio of 1.6:1. The mean age of cases notified was 43.5 years (range 1 to 93 years).

Geographic origin

Of the 470 cases provisionally notified in 2008, 265 (56.4%) were born in Ireland and 186 (39.6%) were foreign-born. Information on country of birth was not reported for 19 cases.

6 Country of birth unknown for 19 cases

Site of disease

Of the 470 cases provisionally notified in 2008, pulmonary TB was diagnosed in 297 cases (63.2%), extrapulmonary TB in 123 cases (26.2%) and pulmonary and extrapulmonary TB in 32 cases (6.8%). The site of disease was unknown for 18 cases (3.8%).

Of the 329 cases with a pulmonary disease component, 148 (45.0%) were culture positive and 159 (48.3%) were smear positive.

TB meningitis

There were five cases of TB meningitis provisionally notified in 2008 giving an incidence rate of 0.18 per 100,000 population (1.8 per million population). One of the cases was in the 0-14 year age group, two were in the 25-34 year age group and two were aged over 65 years. One of the cases was reported as having received the BCG vaccination (also reported as having scar from BCG vaccination). Of the five cases, two were culture positive and three were culture negative.

Culture

Of the 470 cases provisionally notified in 2007, 209 (44.5%) were culture confirmed. Of the 329 cases with a pulmonary component, 150 (45.6%) were culture positive and of the 123 extrapulmonary cases, 52 (42.3%) were culture positive.

Species

Among the 209 culture positive cases, 177 (84.7%) were *M. tuberculosis* and ten (4.8%) were *M. bovis*. The species was not provided for 22 (10.5%) of the culture positive cases.

Antibiotic resistance

Resistance was reported in 15 out of a total of 174 *M. tuberculosis* isolates (8.5%). There were three cases of MDR-TB and four cases which were mono-resistant to isoniazid. Ten of the 15 resistant cases, including one of the MDR-TB cases, were born outside Ireland.

Appendix 2: Social Class (Source: CSO)[6]

Social Class

The entire population is classified into one of the following social class groups (introduced in 1996) which are defined on the basis of occupation:

1 Professional workers

2 Managerial and technical

3 Non-manual

4 Skilled manual

5 Semi-skilled

6 Unskilled

7 All others gainfully occupied and unknown

The occupations included in each of these groups have been selected in such a way as to bring together, as far as possible, people with similar levels of occupational skill. In determining social class no account is taken of the differences between individuals on the basis of other characteristics such as education. Accordingly social class ranks occupations by the level of skill required on a social class scale ranging from one (highest) to seven (lowest). This scale combines occupations into six groups by occupation and employment status following procedures similar to those outlined above for the allocation of socio-economic group. A residual category "All others gainfully occupied and unknown" is used where no precise allocation is possible.

Appendix 3: BCG vaccination

The Report of the Working Party on Tuberculosis (1996),[7] based on the recommendations of the International Union Against Tuberculosis and Lung Disease (IUATLD),[9] recommends 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: The tuberculosis control programme is currently being reviewed and it is likely that recommendations will be made for strengthening the programme.

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 were first presented by HPSC in the 1998 National TB Report. The 2007 report is the tenth 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 per 100,000 population or less during the previous three years.

Ireland: Yes. In 2007, the national rate for sputum smear positive pulmonary TB was 3.6 per 100,000 population while in 2006, 2005, 2004, 2003 and 2002, the rates were 3.7, 3.3, 3.5, 3.7 and 3.1 per 100,000 population 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. Over the previous five years (2003-2007), the average annual notification rate of TB meningitis in children aged less than five years is 1.42 per 10 million general population. Between 2003 and 2007, there were three cases of TB meningitis in children under five years of age, one in 2006 and two in 2003. Of the three cases, one child had received BCG vaccination and the other two had not. One of the three cases was 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 per 100,000 population and an age-specific incidence rate for children aged 0-14 years of 0.3 per 100,000. While the national crude rate in Ireland is less than 20.0 per 100,000 population, the 2007 age-specific incidence rate for children 0-14 years was 4.7 per 100,000, nearly 16 times the rate recorded in Sweden when they discontinued neonatal BCG vaccination. In 2006, 2005, 2004 and 2003, the age-specific incidence rate for children aged 0-14 years was 2.4, 3.0, 1.2 and 2.9 per 100,000 population respectively.

In summary, Ireland does not yet meet all of the criteria (outlined above), for discontinuation of the national BCG vaccination programme.

Index of Tables and Figures

Tables

Figures

Feidhmeannacht na Seirbhíse Sláinte
Health Service Executive

hpsc

Health Protection Surveillance Centre

25-27 Middle Gardiner Street Dublin 1 Ireland
Tel +353 1 **876 5300** **Fax** +353 1 **856 1299**
Email hpsc@hse.ie www.hpsc.ie

This report is also available to download on the HPSC website at www.hpsc.ie