

Tuberculosis in the UK

Tuberculosis in the UK: 2012 report





lechyd Cyhoeddus Cymru Public Health Wales





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Authors and contributors

This report was prepared by Debora Pedrazzoli, Nicholas Fulton, Dr Laura Anderson, Dr Maeve Lalor, Professor Ibrahim Abubakar and Dr Dominik Zenner – Tuberculosis Section, Health Protection Services, HPA.

Additional contributors

Kunju Shaji, Dr Jo Southern, Ritu Shah, Natasha Ratna, Professor John Watson, Professor Maria Zambon, Dr Paul Cosford (HPA Health Protection Services, Colindale); Dr Brian Smyth (Public Health Agency for Northern Ireland); Dr Martin Donaghy (Health Protection Scotland); Dr Roland Salmon (Public Health Wales); Dr Stephen Morton (HPA Health Protection Services); Paul Clowry, Dr Philip Monk (HPA East Midlands); Caroline Black, Dr Mike Lilley (HPA East of England); Jacqueline Carless, Lamya Kanfoudi, Charlotte Anderson, Suad Jama, Neelam Alhaddad, Dr Sarah Anderson (HPA London); Angela Cox, Dr Peter Acheson (HPA North East); Stefanie Davies, Dr Marko Petrovic (HPA North West); Gail Morgan, Sofia Saeed, Dr Muhammad Abid (HPA South East); Elizabeth Tempest, Sue Appleby (HPA South West); Helen Bagnall, Jianxia Sun, Dr Nic Coetzee (HPA West Midlands); Ivan Probert, Jennifer Thorpe, Dr Ebere Okereke (HPA Yorkshire and the Humber); Cathriona Kearns (Public Health Agency for Northern Ireland); Jennifer Davidson, Daniel Thomas, Dr Lika Nehaul (Public Health Wales); Alyson Smith-Palmer, Fiona Johnston, Eisin McDonald (Health Protection Scotland); Professor Francis Drobniewski, Phil More, Dr Tim Brown, Madeline Stone (HPA National Mycobacterium Reference Laboratory); Dr Grace Smith, Jason Evans, Janet Mowbray (HPA Regional Centre for Mycobacteriology, Birmingham); Professor John Magee, Andrew Sails, Debbie Osborne (HPA Regional Centre for Mycobacteriology, Newcastle); Katie Burns, Karren Fenna-Johns (Royal Brompton Hospital Microbiology Department, London); Lewis White, Dr Michael Ruddy (Public Health Wales, Wales Centre for Mycobacteriology); Timothy Stanley (Northern Ireland Public Health Laboratory); Dr Ian Laurenson, Louise Seagar (Scottish Mycobacteria Reference Laboratory), James Lewis (Microbial Risk Assessment, Emergency Response Department, HPA Porton).

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Chapter 1 - Tuberculosis case reports, UK, 2000-2011

Key messages

- In 2011 in the UK, a total of 8,963 cases of tuberculosis (TB) were reported.
- TB notifications and rates have remained relatively stable since 2005.
- The majority of cases were notified from urban centres, amongst young adults, those from countries with high TB burdens, and those with social risk factors for TB.
- Over half of reported TB cases had pulmonary TB.
- The proportion of eligible patients reported to have received Directly Observed Therapy (DOT) remains low.

Overall numbers, rates and geographical distribution

In 2011 in the UK, a total of 8,963 cases of tuberculosis (TB) were reported, a rate of 14.4 cases per 100,000 population (95% confidence interval (Cl) 14.1-14.7) (Table 1)¹. TB notifications and rates increased until 2005, and have remained high but relatively stable since.

As in previous years, London accounted for the highest proportion of cases in the UK (39%, 3511/8963) and the highest rate of disease (44.9 cases per 100,000; 95% Cl 43.4-46.4), followed by the West Midlands region (11%, 1,011; 18.5 per 100,000; Cl 17.4-19.7). The main burden of disease remains concentrated in large urban areas (Figure 1).

Demographic characteristics

Just over half of all cases in 2011 were male (57%, 5112/8923). Over sixty percent were 15 to 44 years old (5425/8963). Patients aged 45 to 64 years accounted for 21% and those aged 65 years and over for 14% of all cases. Three percent of patients were aged 5 to 14 and 2% were aged less than five years.

In England, the rate in UK-born children under five years of age, an indicator of recent transmission, was 3.6 per 100,000. In 2011, the UK child-to-adult ratio in notification rate, which is a proxy for ongoing transmission in a community, was 0.24. This is higher than the average ratio reported by the European Centre of Disease Prevention and Control (ECDC) in 2010 for European Union (EU)/European Economic Area (EEA) countries (1). However, the UK has observed a decreasing trend since 2007 when the ratio peaked (0.34)².

¹ This represents a 5.7% increase in the rate from 2010. However, this followed a 5.6 % decrease in 2009.

² The child-to-adult ratio is the ratio of the case notification rate in children under 15 years of age, to that in adults. A declining trend in the ratio suggests a decrease in ongoing transmission.

Place of birth was known for 95% (8513/8963) of cases reported in the UK in 2011. Similar to 2010, 74% (6287/8513) of these were born outside the UK. The rate of TB amongst the non-UK-born population was 20 times the rate in the UK-born (Table 1). The rate in the UK-born remains similar to 2010 at 4.1 per 100,000. As in previous years, the majority of non-UK born cases originated from South Asia (59%, 3694/6287) and sub-Saharan Africa (24%, 1484). Time between entry to the UK until TB diagnosis was known for 87% (5441/6287) of non-UK-born cases. Of these, 23% (1229) were diagnosed within two years of entering the UK. Information on ethnic group was available for 96% of cases reported in 2011 (8597/8963). The largest proportions of cases were from the Indian (26%, 2261/8597), White (20%, 1762) and Black African (18%, 1557) ethnic groups. The highest rates were in the Indian, Pakistani and Black ethnic groups (162, 134 and 100 per 100,000 respectively).

Table 1. Tuberculosis case reports, rates, annual percentage change by place of birth, UK, 2000-2011

	Total*		Annual change in	Annual change in	Place of birth**				
Year					U	K-born	Non-UK-born		
	Number of cases	Rate per 100,000 (95% CI)	case numbers (%)	rate (%)	Number of cases	Rate per 100,000 (95% CI)	Number of cases	Rate per 100,000 (95% CI)	
2000	6724	11.4 (11.1 - 11.7)	-	-	2176	4.1 (3.9 - 4.2)	3458	76.5 (73.9 - 79.1)	
2001	6864	11.6 (11.3 - 11.9)	2.1	1.7	2236	4.1 (4 - 4.3)	3588	77.2 (74.7 - 79.8)	
2002	7330	12.4 (12.1 - 12.6)	6.8	6.4	2198	4.1 (3.9 - 4.3)	4294	88.4 (85.7 - 91)	
2003	7266	12.2 (11.9 - 12.5)	-0.9	-1.3	2025	4.1 (3.6 - 3.9)	4538	88.9 (86.3 - 91.5)	
2004	7650	12.8 (12.5 - 13.1)	5.3	4.8	2182	4.1 (3.9 - 4.2)	4825	93.5 (90.9 - 96.2)	
2005	8349	13.9 (13.6 - 14.2)	9.1	8.4	2154	4.1 (3.8 - 4.2)	5445	98.6 (96 - 101.2)	
2006	8363	13.8 (13.5 - 14.1)	0.2	-0.4	2055	4.1 (3.7 - 4)	5455	91.6 (89.2 - 94.1)	
2007	8332	13.7 (13.4 - 14)	-0.4	-1.1	2129	4.1 (3.8 - 4.1)	5481	84.9 (82.7 - 87.2)	
2008	8603	14 (13.7 - 14.3)	3.3	2.6	2189	4.1 (3.9 - 4.2)	5818	86.7 (84.4 - 88.9)	
2009	8917	14.4 (14.1 - 14.7)	3.6	3.0	2286	4.1 (4.1 - 4.4)	6001	85.8 (83.7 - 88)	
2010	8410	13.6 (13.3 - 13.9)	-5.7	-5.6	2110	4.1 (3.7 - 4.1)	5822	81.6 (79.6 - 83.8)	
2011	8963	14.4 (14.1 - 14.7)	6.6	5.7	2226	4.1 (3.9 - 4.3)	6287	83.6 (81.6 - 85.7)	

*Including where place of birth unknown **Excluding where place of birth unknown

Rates by place of birth calculated using Labour Force Survey population estimates; total rates calculated using ONS mid-year population estimates

CI - confidence interval

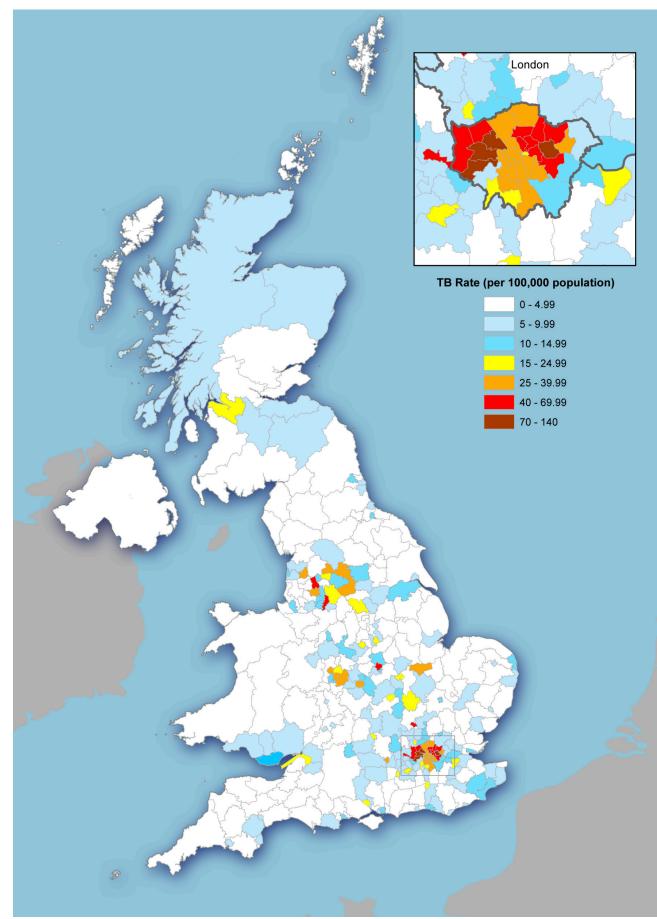


Figure 1. Three-year average tuberculosis case rates by Local Authority, UK, 2009-2011

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Clinical characteristics

Just over half of TB cases reported in 2011 had pulmonary disease (52%, 4603/8916 where site of disease was known). Almost 1 in 5 cases (898) with pulmonary disease were reported to have extra-pulmonary disease in at least one site.

Data on the planned course of treatment were known for 56% of cases (4983/8963); 92% (4563) of these were started on a standard 6-month course of treatment. For 50% of cases (4489/8963) it was known, whether a patient was treated with DOT. Of these, 16% (703) were reported to have received DOT treatment.

Information on previous history of TB was available for 88% (7850/8963) of cases; of these, 6% (452) had a previous diagnosis of tuberculosis more than 12 months before. Among cases known to have a previous diagnosis of TB, 33% (103/310) were assigned to DOT. About 48% (2423/5095) of cases were hospital in-patients at diagnosis in England, Wales or Northern Ireland, but this information was only available for 57% of cases (5095/8963).

Data on Bacillus Calmette-Guérin (BCG) vaccination were available for 66% of cases (5881/8963), and 71% (4181) of these had previously received BCG vaccination.

Social risk factors

The completeness of information on four individual social risk factors ranged from 84-92% of cases. Amongst cases with known information, 2.5% (201/8059) had a history of problem drug use, 3.5% (273/7894) of alcohol misuse/abuse, 2.5% (202/8101) of homelessness and 2.6% (207/7858) had a history of imprisonment. Approximately 8.6% of cases (634/7372) had at least one of these social risk factors. Around 1 in 5 of these cases (127/634) had more than one risk factor. Of cases with at least one social risk factor, only 40% (253/634) were reported to have been placed on DOT.

Chapter 2 - Microscopy, culture confirmation, speciation and drug susceptibility

- The number and proportion of isoniazid resistant and multi drug resistant (MDR) cases increased in 2011.
- Over the last decade, the proportion of MDR cases has gradually but significantly increased.
- The proportion of cases resistant to any first line drug was higher in those with a previous history of diagnosis of TB, compared to those without; and non-UK born cases compared to UK born. This pattern is similar in MDR cases.
- 24 XDR cases have been reported since 1995, six of whom were reported in 2011.

Microscopy, Culture and Species Identification

Of all TB cases reported in 2011, 59% (5284/8963) were culture confirmed. This proportion was higher for pulmonary cases compared to extra-pulmonary cases (70%, 3212/4603 versus 48%, 2067/4313). The proportion of culture confirmed pulmonary cases exceeded the goal of 65% in the Chief Medical Officer's (CMO's) Action Plan (2) but did not reach the target of 80% suggested by ECDC.

Among all culture-confirmed cases, 96.4% (5093/5284) were identified with *Mycobacterium tuberculosis*; 0.6% (31) with *Mycobacterium bovis*; 0.7% (36) with *Mycobacterium africanum*; and 2.3% (124) with *Mycobacterium tuberculosis* complex bacteria which were not further differentiated. This distribution is similar compared to previous years.

For 60% of pulmonary TB cases (2763/4603) a sputum smear result was known, and of these 50% (1384/2763) were sputum smear positive.

Trends in First Line Drug Resistance and Multi Drug Resistant (MDR) Tuberculosis

Drug susceptibility test results, for at least isoniazid and rifampicin, were available for 97% (5127/5284) of the culture-confirmed cases. At the start of treatment, 7.6% (388/5127) of these were resistant to isoniazid, 1.7% (89/5127) were resistant to rifampicin, 1.1% (58/5120) were resistant to ethambutol, 1.1% (56/5056) were resistant to pyrazinamide, 8.4% (431/5127) had resistance to at least one first line antibiotic and 1.6% (81/5127) were MDR.

The proportion of isoniazid resistant cases increased from 6.4% (311/4840) in 2010 to 7.6% (388/5127) and exceeded the CMO's Action Plan goal of 7% in five of nine regions in England; East of England (8.8%; 26/294), London (9.2%; 180/1968), South East (7.7%; 37/481), South West (8.3%; 15/181), and Yorkshire and Humber (7.4%; 27/363) and in Northern Ireland (8.8%; 3/34)³.

³ Numbers and proportions are accurate at the time of data collation (April 2012). DST results submitted at a later date are not included and this may affect proportions of resistance, particularly in regions with small numbers. Numbers in the South West of England and in Northern Ireland were small so these results should be interpreted with caution.

The proportion of isoniazid resistance was higher in non-UK born compared to UK born cases (8%, 295/3689 versus 6%, 72/1187). The proportion of isoniazid resistance was higher in the UK born population in some areas of England; in particular London (12.6%, 36/285) and in the South East (9.4%, 10/107). The proportion of cases resistant to isoniazid was also higher in those with known social risk factors (history of drug or alcohol use, imprisonment or homelessness) compared to those known to have none of these risk factors (11%, 49/456 versus 7.2%, 269/3757).

Thirty of the cases with isoniazid resistance had the same strain type and were due to an ongoing outbreak centred around "hard-to-reach" groups. Twenty three of the cases in this cluster were in London, representing 13% (23/180) of the total isoniazid resistant cases in London. Forty eight percent (10/21) of the London cases in this cluster with known country of birth and ethnicity were UK born and of White ethnicity, and more than half (11/21) had a known social risk factor.

Excluding the cases from this cluster, the proportion of isoniazid resistance in patients with any risk factor compared to patients with no risk factors was similar (7.7%, 34/441 versus 6.9%, 257/3745). The proportions of MDR in patients with risk factors and without risk factors were also similar (1.6%, 7/456 versus 1.6% 59/3757).

Compared with 2010, there was an increase in the proportion of resistance to any first line drug (2010: 7%, 342/4846 versus 2011: 8.4%, 431/5127). The number and proportion of MDR cases has increased from 1.3% (65/4846) in 2010 to 1.6% (81/5127) in 2011. Over the last decade, gradual increases in the proportion of multi drug resistance has amounted to a significant overall upward trend (from 0.9%, 28/3228 cases in 2000 to 1.6% in 2011, p<0.001) (Figure 2.1). The greatest increase was observed in the East of England from 1.1% (3/277) in 2010 to 3.7% (11/294) in 2011.

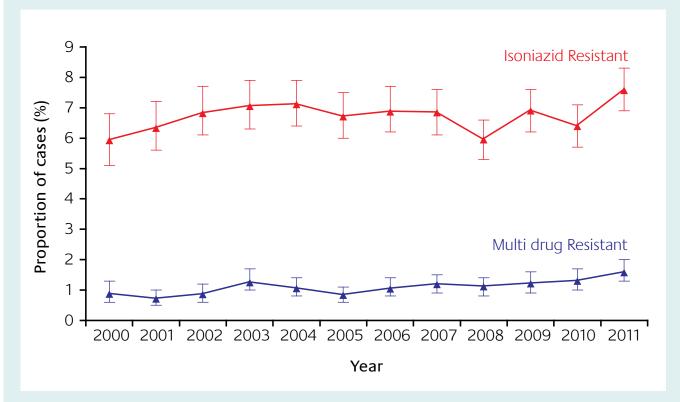


Figure 2.1. Proportion of tuberculosis cases with first line drug resistance, UK 2000-2011.

The proportion of cases resistant to any first line drug was higher in those with a previous history of TB diagnosis compared to those without (13.3%, 31/234 versus 8.2%, 371/4549), with the same pattern observed in MDR cases (5.6%, 13/234 versus 1.3%, 61/4549).

First line drug resistance was similar in cases with pulmonary (8%, 250/3117) and extra-pulmonary (9%, 181/2005) TB, and between patients with smear positive (8.2%, 102/1242) and smear negative pulmonary TB (8.7%, 95/1091).

The proportion of resistance to any first line antibiotic was higher in non-UK born cases compared to UK born (8.8%; 326/3689 versus 6.7%; 79/1187) and 95% (76/80) of MDR cases were not born in the UK. The majority of MDR cases were born in South Asia (54.4%, 43/79), Eastern Europe (17.7%, 14/79) and sub-Saharan Africa (15.2%, 12/79). MDR cases represented 2% (43/2157) of all TB cases from those born in South Asia, 27% (14/52) from Eastern Europe and 1.4% (12/873) from sub-Saharan Africa.

Second line drug resistance and Extensively Drug Resistant (XDR) TB

Of those cases that were tested for all first line drugs (isoniazid, rifampicin, ethambutol and pyrazinamide), almost one quarter were resistant to all four (18/79). Fifty eight percent (47/81) of MDR cases were resistant to at least one second line drug. Twenty percent (16/79) were resistant to an injectable agent (amikacin, capreomycin or kanamycin), 10 of which were also resistant to at least one other second line drug. Twenty two percent (18/77) were resistant to a fluoroquinolone (either ofloxacin or moxifloxacin).

A greater proportion of MDR strains from cases born in Eastern Europe had resistance to an injectable (78.6%; 11/14) compared to those from South Asia (7.1%, 3/42) (Figure 2.2). Fluroquinolone resistance was similar in both regions (28.6%; 4/14 and 24.3%, 10/41 respectively). Fifty percent (7/14) of the Eastern European MDR patients had MDR with resistance to either an injectable or a fluoroquinolone, compared to 26.8% (11/41) of patients who were born in South Asia.

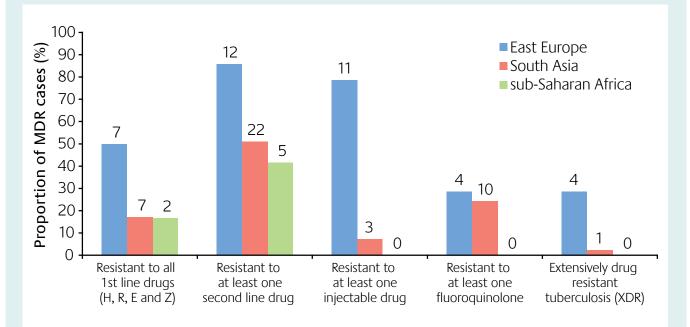


Figure 2.2. Proportion of MDR cases from Eastern Europe, South Asia and sub-Saharan Africa with additional resistance, UK 2011*.

*Number of cases given above each bar, proportions were calculated out of those who were tested

A total of 24 XDR cases have been reported since 1995, six of whom were reported in 2011. The majority were pulmonary cases (79%, 19/24). Information on previous TB treatment was available for 71% (17). None of these were previously treated in the UK, but 41% (7) were previously treated abroad, the remainder (10) had not received previous treatment. Information on country of birth was available for 83% (20) of XDR cases. The majority of these cases were non-UK born (18/20) of which nine were born in Eastern Europe, one in Western Europe, two in East Asia, two in South Asia, two in sub-Saharan Africa and two with unknown region of birth.

Chapter 3 – Tuberculosis treatment outcomes reported in 2011

- Treatment completion at 12 months has steadily increased over recent years.
- Three regions exceeded the 85% goal for treatment completion this year.
- About 4.4% of cases were lost to follow up; for the majority of these this was due to a move abroad.
- Treatment completion at 24 months was 80% for 2009 MDR TB cases.

Information on treatment outcomes was available for 8,171 (97.2%) of the 8,410 cases reported in 2010. Of these, 83.8% completed treatment within one year (Table 3), which is similar to the 83.6% observed in 2009.

Treatment outcome	n	%
Completed	6850	83.8
Died	436	5.3
Lost to follow-up	359	4.4
Still on treatment	325	4.0
Stopped	81	1.0
Transferred out	95	1.2
Not completed (unknown reason)	4	0.1
Unknown outcome*	21	0.3
Total	8,171	100

Table 3. Tuberculosis treatment outcomes at 12 monthspost-diagnosis of cases reported in 2010, UK.

*Cases where the outcome of treatment was recorded.

Death was the most common reason for not completing treatment (5.3 %). Amongst cases reported to have died, 19% (83/436) were diagnosed post-mortem. TB caused or contributed to 63.2% (203/321) of deaths, where cause of death was known⁴. Being lost to follow up accounted for 4.4%. of those for whom treatment outcome was known. This was most commonly as a result of moving abroad (175/266; 65.8%), where a reason was known.

⁴ Please note that data has been supplemented using information from ONS death records and the proportion and number of TBattributable deaths may differ from previous years.

The highest level of treatment completion was seen in London where 86% completed treatment within 12 months. The North West (85.9%) and the South East of England (85%) also met the target of 85% set out in the CMO's Action Plan in the 2010 cohort, and three further regions (South West, 84.8%, East Midlands, 84.2% and West Midlands, 83.0%) were close to achieving this target (2).

Treatment completion levels declined with age from 93.8% (349/372) in 0-14 year olds to 68.9% (802/1164) in those aged 65 years and over, while the proportion reported to have died before completing treatment rose from 1.1% (4/372) in 0-14 year olds to 24.1% (280/1164) in patients aged 65 years and over.

Completion was higher amongst non-UK born cases compared with UK-born cases (85.5%, 4903/5732 versus 81.1%, 1648/2031, p<0.0001), while a lower proportion died (2.9%, n=164 versus 10.3\%, n=209, p<0.0001).

Patients with a history of problem drug or alcohol use, imprisonment and/or homelessness completed treatment less often compared to patients without such a history (74.6%, 478/641 versus 86.0%, 5179/6022) and a higher proportion died (6.9%, 44 versus 4.3%, 259) or were lost to follow-up (7.6%, 49 versus 3.7%, 225).

Pulmonary sputum smear positive cases had the lowest level of treatment completion (79.8%, 1086/1361), followed by pulmonary smear negative cases (81%, 2404/2967) and extra pulmonary cases (86.5%, 3332/3854). Completion was also lower in cases with a previous history of TB compared to those not having reported TB previously (77.3%, 456/590 versus 85.8%, 6017/7014).

Of the 60 cases of MDR reported in 2009, 48 (80%) completed their treatment within 24 months. Treatment completion has improved compared to 2008 (64%). Two patients (3.3%) died, 7 (11.7%) were lost to follow-up, and 3 (5%) were still on treatment. Of the 7 patients lost to follow up, 6 had left the UK.

Chapter 4 - National Strain Typing Service

The National Strain Typing Service began in England in January 2010 and involves prospectively typing TB isolates using 24 loci Mycobacterial Interspersed Repetitive Unit-Variable Number Tandem Repeats (MIRU-VNTR). Molecular clusters of patients with indistinguishable 24 loci MIRU-VNTR profiles are investigated to identify epidemiological links and transmission settings. In the event that previously unrecognised transmission with the potential for spread is found, further investigation can be launched in order to take appropriate public health action.

Key messages

- In 2011 the proportion of culture confirmed cases with a completed strain type increased compared with last year, illustrating improvements in the service.
- Just over half of the clusters investigated (62/115) remained active by December 2011.
- The majority of clusters were under the threshold for investigation and a higher proportion of these were in areas with a low burden of TB.

In 2011, the number of culture confirmed cases in England for which strain typing was completed and reported, increased to 94.1% (4974/5284) compared with 84.7% in 2010. Between January 2010 and December 2011 there were a total of 6946 strains (74.8%) on which strain typing was completed for at least 23 loci and of these, 3236 cases were in 853 molecular clusters and 3710 cases had a unique strain type. There were 519 new clusters in 2011 compared to 334⁵ in 2010. The majority of clusters from 2010 (58.7%, 196/334) increased in size, and the remainder had no new additional cases in 2011.

Using the n-1 method⁶(3), the proportion of cases in England estimated to have arisen from recent transmission was 34.3%. This proportion varied by region with the highest estimated rate of transmission in London (28.2%) and the lowest in the North East (10.4%) (Table 4). However, in the absence of epidemiological data the proportion of patients in clusters that are part of the same chain of transmission and the amount of transmission that has occurred in the UK is unclear. This is because molecular clustering can arise from clustering of common endemic strains that are circulating either in the UK or abroad, hence patients may not actually be epidemiologically linked. Furthermore, in cases that are linked, transmission may have occurred outside of the UK prior to entry.

Overall the median cluster size was 2 (range 2-75), and the majority of clusters had fewer than 5 cases (83.6%) and were therefore under the current threshold for investigation (4). Only 10.9% (93) and 5.5% (47) exceeded the thresholds for investigation at a local (5 cases) or regional/national level (10 or more cases within a region or spanning more than one region), respectively (Figure 4). London and the West Midlands had the largest number of clusters exceeding the threshold and there were none in the North East. Forty-five percent (307/689) of regional clusters were exclusive to the region (Table 4). The North East and London had the highest proportion of clusters with strain types specific to the region (55.6%; 5/9 and 54.6% 190/348, respectively).

⁵ Retrospective typing has increased the number of cases in 2010 with a strain type since the publishing of the 2011 annual report.

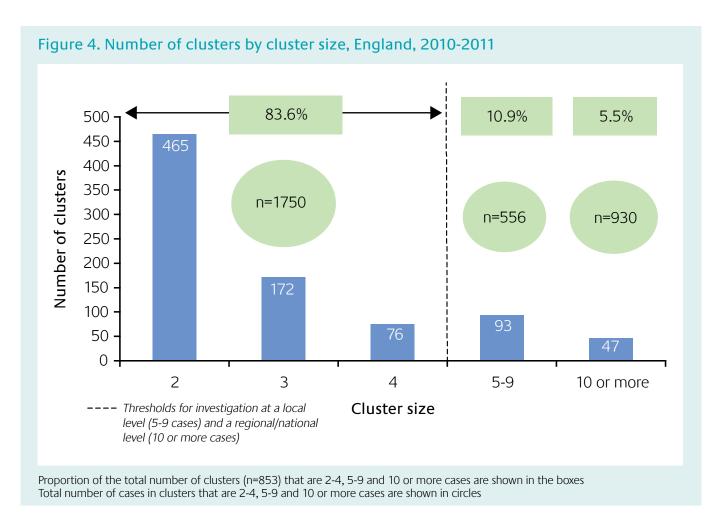
⁶ Calculated using the n-1 method (number of cases in a cluster-number of clusters/number of cases with a strain type).

Table 4. Number of clusters and proportion of clustering by region, England, 2010-2011

Region	Culture confirmed cases 2010- 2011	Cases with a strain type*	Number of cases clustered	Number of clusters	Number of clusters by cluster size			Estimated proportion of cases arising due to recent transmission**	Proportion of clusters below threshold for investigation
	n	n (%)	n	n	2-4	5-10	More than 10	%	%
East Midlands	582	421 (72.3)	115	39	34	5	0	18.1	87.2
East of England	579	440 (76.0)	96	36	34	1	1	13.6	94.4
London	3880	3084 (79.5)	1218	348	295	39	14	28.2	85.1
North East	185	125 (67.6)	22	9	9	0	0	10.4	100.0
North West	965	659 (68.3)	163	52	45	6	1	16.8	86.5
South East	923	710 (76.9)	176	66	63	1	2	15.5	95.5
South West	328	226 (68.9)	51	19	17	2	0	14.2	89.5
West Midlands	1117	766 (68.6)	276	80	69	9	2	25.6	86.3
Yorkshire and the Humber	726	515 (71.0)	130	40	35	2	3	17.5	87.5
England***	9285	6946 (74.8)	3236	853	713	93	47	34.3	83.6

* Culture confirmed cases with a MIRU-VNTR profile with at least 23 complete loci that matched to a notified case.

** Calculated using the n-1 method (number of cases in a cluster-number of clusters/number of cases with a strain type). ***The number of clusters in England is higher than the sum of all regional clusters because it includes all intra-regional clusters in addition to those that span more than one region.



One quarter of clusters had at least one case with a social risk factor (217/853). Risk factors were more common in clusters consisting of UK born cases (41.2%, 33/80) or clusters consisting of cases with mixed UK and non-UK born (37.5%, 114/304) compared to clusters of non-UK born individuals (13.4%, 54/403).

About 35% (301) of clusters consisted of exclusively pulmonary cases and 9.7% (83) of exclusively extra-pulmonary cases, with the remainder being mixed. Most cases in clusters had fully sensitive TB. About 14% (121) of clusters had one or more isoniazid resistant cases and 3% (26) had one or more than one MDR TB case.

A total of 115 clusters (13.5%) were investigated over the last two years. By December 2011, 62 clusters remained active and 53 (46%) had been closed following investigation because either no epidemiological links were found or links were found but no further public health action was required.

Chapter 5 - Surveillance Data Quality

Key messages

- The monitoring of data completeness is important to assess surveillance systems, conclusions drawn from surveillance data analysis, and to identify areas for improved data collection in the future.
- In 2011 UK data, the information fields for which completeness did not meet the targets set by the 2007 Department of Health TB Toolkit for Commissioners were *"Previous treatment"*, *"Start of treatment"*, *"Previous TB diagnosis" and "Sputum smear status"*.
- "Sputum smear status" had the lowest completion (58%) and had decreased from 2010.
- Data on TB risk factors and BCG vaccination have increased since 2009 when data collection in these fields was implemented.

The collection of data through the national Enhanced Tuberculosis Surveillance (ETS) system, including the recording of treatment outcome, is governed by an overarching quality framework developed by the Surveillance and Epidemiology Governance Group, Health Protection Services, Colindale. A steering group with stakeholders' engagement oversees the national surveillance system. The principles of governance of the quality system include the commitment of senior management, a circle of local and national audits and evaluation, record-keeping to allow tracing of problems, customer input allowing for complaints and feedback, a documented development process which includes tests for quality and user satisfaction and mechanisms for implementing quality improvement through software development.

Monitoring of key data fields

Audits of records are undertaken annually based on the criteria suggested in the 2007 Department of Health TB Toolkit for Commissioners (5) which outlines the minimum quality standards for surveillance. Table 5 shows the level of completeness of the information for the Toolkit fields and their targets for completion. This year, the fields *"Name"*, *"Postcode"*, *"Date of birth"* and *"Date of notification"* were mandatory fields in ETS, so completeness was 100%, and therefore are not included in Table 5.

The level of completion shows some variation across different countries/regions. Similarly to UK completeness last year, the information fields for which completeness did not meet the targets set by the toolkit were, "*Previous treatment*", "*Start of treatment*", "*Previous TB diagnosis*" and "*Sputum smear status*". Encouragingly, with the exception of "*Sputum smear status*", the completeness of these fields has increased since 2010. The decrease in completeness of "*Sputum smear status*" indicates the need for further measures to improve information completion in this field.

In 2009, the collection of information on BCG vaccination and social risk factors was initiated in England, Wales and Northern Ireland, however reporting on these variables began in each region at different points throughout the year. As expected, completeness levels of this information have increased compared to last year (http://www.hpa.org.uk/web/HPAweb&Page&HPAwebAutoListName/Page/1294739536811#End).

	Data Field - Proportion Completed* (%)										
Region/Country	Sex	Ethnic group	Born/not born in UK	Previous treatment**	Start of treatment ^s	Previous TB diagnosis	Sputum smear status‡	Site of Disease§	Treatment Outcome reported [#]		
East Midlands	99	99	99	74	96	93	60	99	97		
East of England	99	94	99	73	97	96	35	99	99		
London	100	99	99	85	94	96	93	100	100		
North East	100	98	93	50	94	97	53	100	94		
North West	99	94	100	68	95	85	37	99	94		
South East	99	95	98	82	96	91	52	98	93		
South West	98	88	97	48	95	95	53	100	87		
West Midlands	100	96	99	78	95	94	56	99	100		
Yorkshire and the Humber	99	92	98	86	90	94	53	99	99		
England	100	96	99	79	94	94	59	99	98		
Northern Ireland	100	94	100	67	86	97	73	100	96		
Scotland	100	90	83	67	92	87	68	100	90		
Wales	98	92	99	100	90	91	60	100	99		
England, Wales and Northern Ireland	100	96	99	80	94	94	58	99	98		
UK	100	96	98	79	94	93	58	99	97		
Target for completeness	95	95	95	95	95	-	95	95	95		

Table 5. Completeness of key data fields, UK, 2011

All figures are rounded to nearest whole percentage.

* Percentage of cases with known information

** Cases with previous diagnosis only

\$ Excluding cases diagnosed post mortem

‡ Pulmonary cases only

§ Pulmonary and extra pulmonary

For cases reported in 2010

! No target as this field was included in this analysis in order to make this audit consistent with the data presented in international reports by the European Centre for Disease Control and Prevention and the World Health Organization

Conclusions

In 2011, TB cases have increased slightly compared with 2010, but overall TB incidence rates in the UK appear to have stabilised since 2005. Whilst this trend is encouraging, these figures should not lead to complacency. Similar to recent years and other European countries (6), the majority of cases were notified from urban centres, amongst young adults, those from countries with high TB burdens, and those with social risk factors for TB.

The majority of UK cases are likely to result from the reactivation of latent TB infection in persons who were born in high incidence areas outside the UK (6). Hence, despite improvement in treatment completion in the last decade, TB incidence has not yet declined. Highly targeted prevention activities, which focus on high risk groups, are cost-effective (7). For example, universal and coordinated implementation of the NICE recommended (8) latent TB screening amongst recent migrants would contribute to current effort to decrease TB in migrants (9).

The rise of drug-resistant TB globally is an area of major concern (10-12). In the UK the number and proportion of drug resistant cases is still relatively small. However, over the last decade, a small sustained increase in first line drug resistance and MDR has been observed. The majority of patients with MDR/XDR TB were born in regions of the world with a high burden of drug resistant TB such as the Indian subcontinent and Eastern Europe. As confirmed transmission events involving MDR/XDR cases remain uncommon in the UK, the resistance pattern of these strains probably reflects the epidemiology of TB in the respective countries of origin (12).

The lower risk of acquisition of MDR TB in UK born persons implies effective clinical and public health action is being taken, supported by rapid diagnosis of drug resistant TB (13). Unfortunately, social risk factors and inappropriate treatment interruption remain major contributors to the spread of drug resistant TB in the UK as exemplified by the ongoing circulation of an isoniazid-resistant strain amongst hard-to-reach groups. This emphasises the importance of implementing NICE guidance on hard-to-reach groups (14) and of dedicated outreach services, such as Find and Treat (15). Other specific measures which would contribute to the control of TB include the increasing use of enhanced case management, increased application of DOT, and the national roll out of cohort reviews by local TB programmes (16).

Treatment completion has improved in the last decade. Treatment completion is also high (80%) for MDR. Nevertheless, sustained efforts are needed to achieve the recommended 85% completion rate in all UK countries and regions (2). The proportion of patients who died whilst on treatment has remained constant in recent years; however targeted awareness-raising among clinicians may help to decrease missed opportunities, particularly amongst those diagnosed post mortem. The most common reason for loss to follow up was moving abroad. This probably reflects the practical challenges of smooth hand-overs of patients to resource poor settings and raises the importance of well-planned and communicated international transfers.

In conclusion, the stabilisation of TB rates, the rising proportion of patients completing treatment and the increasing culture confirmation proportions are all encouraging trends. Whilst improving indicators such as treatment completion suggest that progress is being made in service provision, this has yet to translate into sustained reductions in rates of TB. Targeted efforts at both the service and population level are

needed to achieve a sustained decrease in TB rates and to ensure that the threats of MDR and XDR are contained. Key measures to achieve this would include the following:

- Coherent joint strategies involving local government, NHS commissioners and providers, and the future Public Health England are needed to coordinate TB prevention and control. This will help ensure best practice in detection and treatment of TB, particularly in high incidence areas.
- Local Authorities with their new public health responsibilities, acting through the leadership of Health and Wellbeing Boards would be well placed to lead and challenge local services to ensure the implementation of control measures.
- Robust clinical and public health networks are also needed in low incidence areas to support the universal implementation of best practice.
- The recently announced quality-assured pre-entry migrant screening will contribute to TB prevention in the UK and a robust latent TB screening service for new entrants would be desirable, and could have a significant impact on TB rates within a few years.
- TB remains a global disease and the UK must continue its close collaboration with international partners in the quest to stop the global epidemic.

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Appendix A – Glossary

Cluster

Clusters in this document refer to molecular clusters only. These are defined as a group of patients who are infected with a strain of *Mycobacterium tuberculosis* complex with indistinguishable MIRU-VNTR profiles.

Multi-drug resistance (MDR)

MDR is defined as resistance to at least isoniazid and rifampicin, with or without resistance to other drugs.

First line drug resistance is defined as resistance to at least one of the first line drugs (isoniazid, rifampicin, ethambuthol, pyrazinamide).

Extensively drug resistant (XDR)

XDR is defined as resistance to at least isonaizid and rifampicin (MDR), one injectable agent (capreomycin, kanamycin or amikacin) and one fluoroquinolone.

Pulmonary tuberculosis

A pulmonary case is defined as a case with tuberculosis involving the lungs and/or tracheo-bronchial tree, with or without extra-pulmonary TB diagnosis.

Rates

Overall tuberculosis rates per 100,000 population, as well as those by age, sex and region of reporting, have been calculated using the 2010 mid-year estimates provided by the Office for National Statistics (ONS).

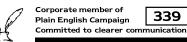
Rates by place of birth and ethnic group presented in this report have been calculated using population estimates from the Labour Force Survey (LSF).

World region

Information on country of birth of TB cases is collected. Countries were grouped into world regions based on the United Nations (UN) classifications, adjusted to take into account the global epidemiology of tuberculosis and migration patterns to the UK.

Health Protection Agency

2nd Floor 151 Buckingham Palace Road London SW1W 9SZ www.hpa.org.uk



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For information or queries relating to this document please contact: Respiratory Diseases Department Email: tbsection@hpa.org.uk

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