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Tuberculosis in Wessex: Annual review (2013 data)

Data from 1999 to 2013

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Executive summary

In 2013, 137 tuberculosis (TB) cases were reported among Wessex residents, a rate of 5 per 100,000 population. After a relatively stable period over the past ten years, this was a decrease of 17% compared to 2012.

The TB rate varied considerably across Wessex, with the highest numbers and rates reported among residents of Rushmoor and Southampton local authorities, although case numbers in 2013 had declined in these areas. Although rates of TB were highest among young adults in 2013, the number aged 20 to 29 decreased compared to 2012.

The majority of TB patients (72%) in Wessex were born outside the UK. The decrease in TB cases in 2013 compared to 2012 was among those born abroad, with no change in the numbers of UK born patients, which has remained fairly stable at around 40 patients per year in recent years. This decrease was mostly among individuals with TB who had entered the country in the previous two years, down to the lowest number since 2001, and was mostly among patients born in south Asia. The number of cases occurring in individuals who had been resident in the UK for ten or more years has continued to increase since 2004.

Although white was the most common ethnic group of TB patients in Wessex, numbers continued to fall in this group. Numbers among patients of mixed/other ethnicity have increased over the last decade or more, although numbers fell in 2013 compared to 2012. The Pakistani, black other, Bangladeshi and Chinese ethnic groups in Wessex have seen little change in TB case numbers over this period. The most common country of birth of non-UK born TB patients in 2013 was India followed by Nepal.

A small proportion (5%) of patients were known to have one or more social risk factor (homelessness, imprisonment and drug or alcohol misuse). These individuals were all born in the UK or Central Europe. A very small proportion of patients had a previous history of TB.

The median time between onset of symptoms and starting treatment was 102 days (interquartile range (IQR) of 60-189 days), and 91(IQR 60-184) among those with pulmonary disease. Long delays were experienced by those born in the UK, particularly those of white ethnicity (181.5 days, IQR 83-327.5 for those with pulmonary disease). Those of mixed/other ethnicity also had long delays to starting treatment (173 days, IQR 91-190 for those with pulmonary disease), while those of black African ethnicity had the shortest (66 days, IQR 53-69).

Where reported, almost all patients were offered an HIV test, and uptake of testing was also extremely high in Wessex. This information was missing, however, on 16% of patients.

Over half of reported patients had pulmonary disease, of which 71% were sputum smear positive. Just 64% of cases were confirmed by culture, increasing to 71% among those with pulmonary disease. Overall, drug resistance was low.

In Wessex, 85% of culture confirmed cases were strain typed with at least 23 loci since 2010. In total, 69 cases clustered with at least one other case in Wessex, a proportion of 21% of all the strain typed cases in the area. When considering cases that cluster with at least one case nationally, the proportion of clustering was 40%.

The majority of clusters consisted of two people and were predominantly of the Euro-American lineage strain. A higher proportion of clustering was observed in cases infected with a Beijing lineage strain; however, half of these cases were part of the same cluster. The majority of clustered cases were male, aged 15 to 44 years old, non-UK born, of black African ethnicity or born in Nepal. Any interpretation of the clustering proportion within these characteristics should be interpreted with caution due to an outbreak of TB in Southampton in 2011. This outbreak comprised nearly a quarter of the strain typed cases since 2010 and therefore influenced the characteristics of the whole clustered population.

According to the revised outcome categories, 82% of patients reported in 2012 with rifampicin sensitive, non-CNS, spinal, miliary or cryptic disseminated disease completed treatment within 12 months. The most common reason for not completing treatment was being still on treatment.

Eight TB incidents, where potential TB exposure occurred outside the household setting, were reported to the Wessex PHE Centre during 2013. These occurred in a variety of settings including the workplace, healthcare and educational venues. One unusual incident involved a cluster of *Mycobacterium bovis* in domestic cats.

While the low and decreasing TB rate in Wessex is encouraging, the report has highlighted significant diagnosis delays within certain population sub-groups: the white UK born patients, females, and those of mixed/other ethnicity (most often born in Nepal).

Recommendations for local NHS and PHE staff include ensuring accurate information is completed on the PHE Enhanced TB Surveillance system, that best case management is followed for all patients, including universal HIV testing, obtaining smear results, and

reviewing cases through cohort review to ensure opportunities for prevention, early detection of cases and successful treatment are not missed.

More detailed information is available in the appendices. This includes information on TB residents in Wessex (Appendix B) and all patients notified by Wessex hospitals (Appendix C).

Background

Tuberculosis (TB) continues to be a serious public health problem in the UK. Surveillance provides relevant information on TB cases to local teams, to help plan and evaluate their services. This report is based on surveillance data on patients from TB clinics collected via the national Enhanced TB Surveillance (ETS) system and National Mycobacterium Reference Laboratory (NMRL). This dataset includes characteristics and distribution of TB cases, trends in anti-TB drug resistance, clustering of TB cases, and also the outcome of patients.

Objectives

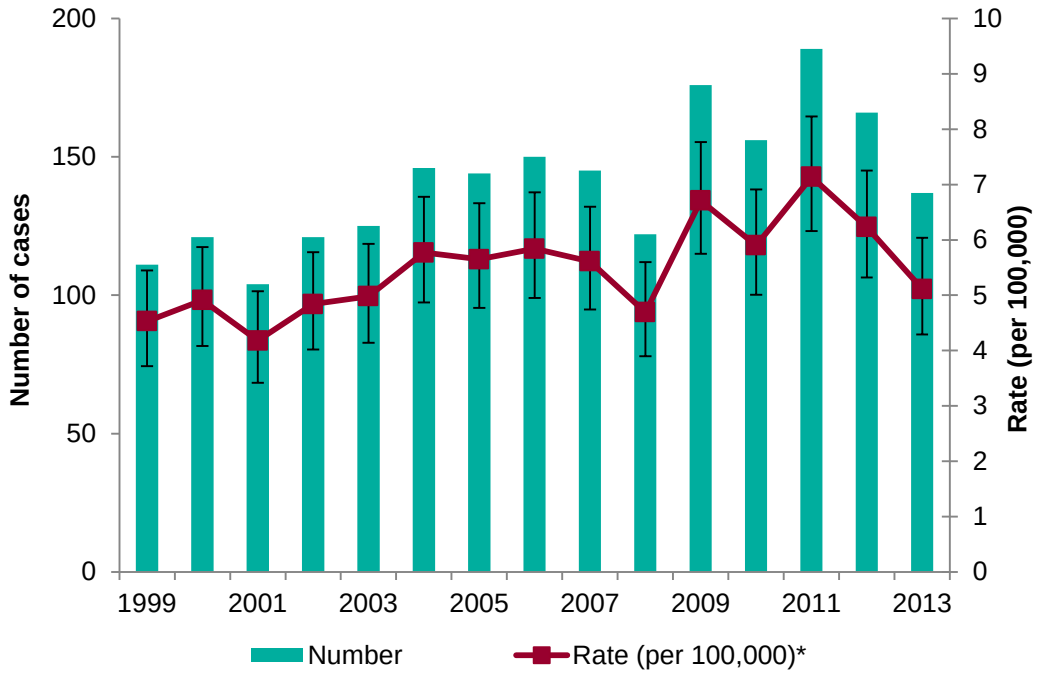
This report describes the recent epidemiology of TB in Wessex. We aim to update public health, clinical and allied colleagues, including clinical commissioning groups and NHS England of the latest trends, at risk population groups, and opportunities for interventions and prevention of future cases among Wessex residents.

Tuberculosis epidemiology

Overall numbers, rates and geographical distribution

In 2013, 137 tuberculosis (TB) cases were reported among Wessex residents, a rate of 5.1 per 100,000 population. After increasing to a peak in 2011, this was a decrease of over 17% compared to 2012, and 28% compared to 2011 (Figure 1).

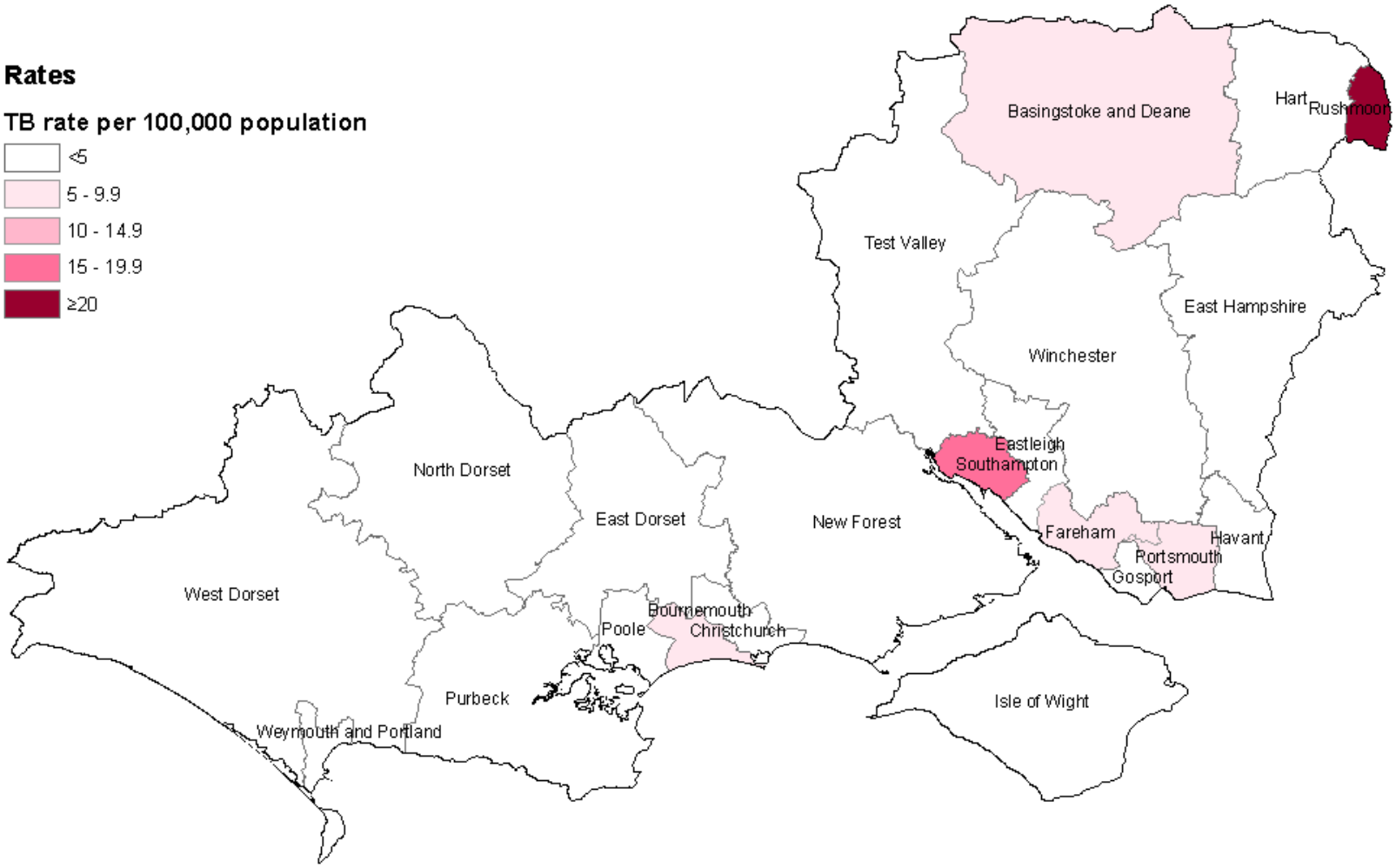
Figure 1: Tuberculosis case reports and rates, Wessex, 1999 – 2013



*rate calculated using ONS mid-year population estimates

The highest rates and numbers continued to occur in Rushmoor (three-year average from 2011 to 2013 of 29 per 100,000), followed by Southampton, (18 per 100,000) (Figure 2).

Figure 2: Three-year average TB rate by lower tier local authority of residence, Wessex, 2011 – 2013



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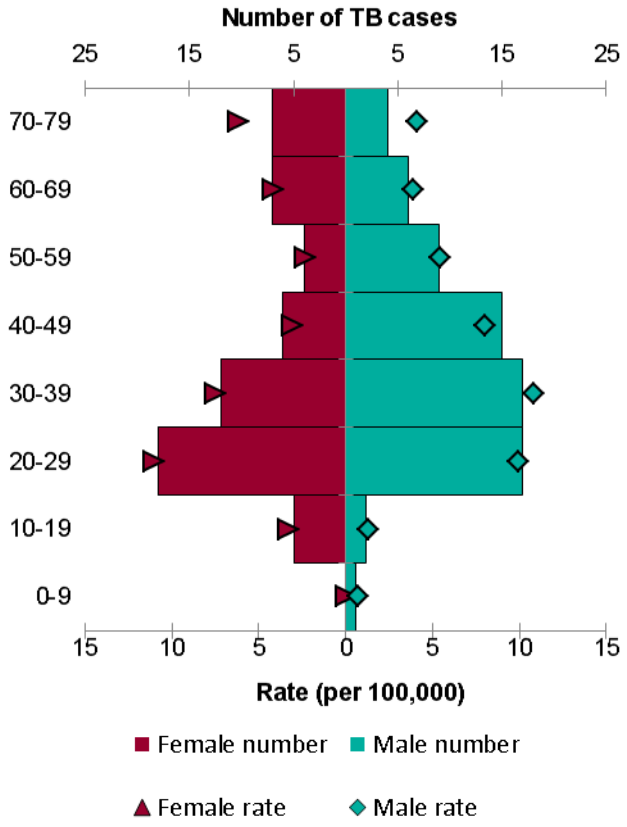
Demographic characteristics

Age and sex

In 2013, 55% of TB patients were male, and rates among males were slightly higher than females as in recent years (5.3 per 100,000 vs. 4.6 per 100,000 in females). Numbers and rates were highest among females aged 20 to 29 and males aged 20 to 39 years old (Figure 3).

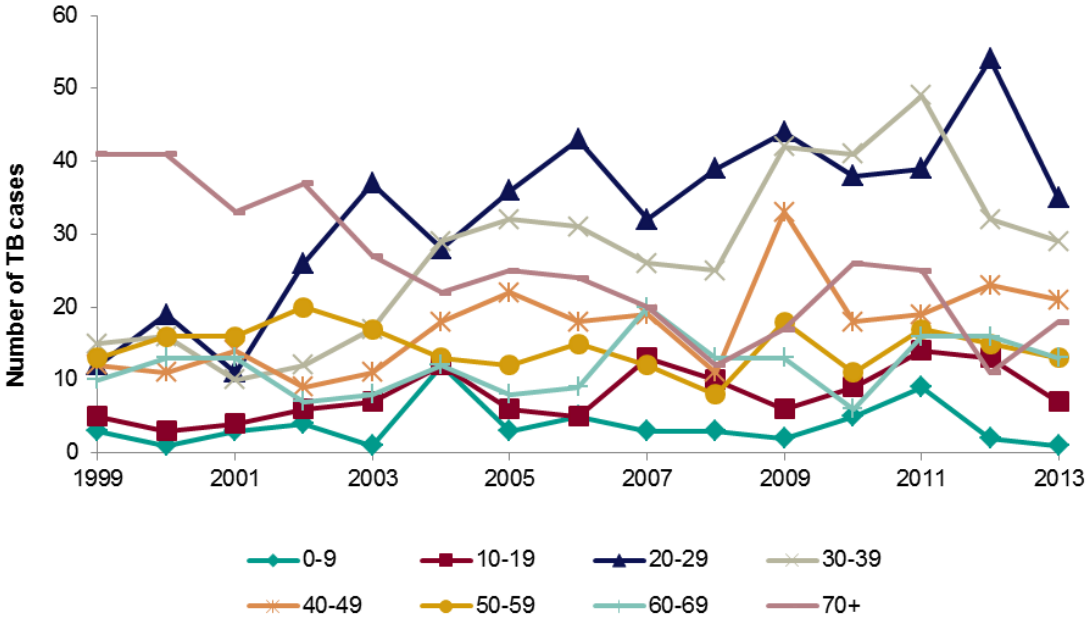
Figure 3: Number and rate of TB by age and sex, Wessex, 2013



Cases among those aged 70 years or older have reduced since 1999, when they accounted for 37% of all TB patients in Wessex, and in 2013 accounted for 13% of patients (Figure 4). Cases of TB among those aged 20 to 29 years increased from 1999 to 2012, but then decreased by 35% from 54 in 2012 to 35 in 2013.

In 2013, two children aged less than 16 years old were reported (a rate of 8 per 100,000) and no children aged less than five years old were diagnosed with TB. Both children had pulmonary TB and were recorded as having a BCG vaccination. The children were of mixed/other ethnicity, one was UK born and the other was born outside of the UK (in Europe).

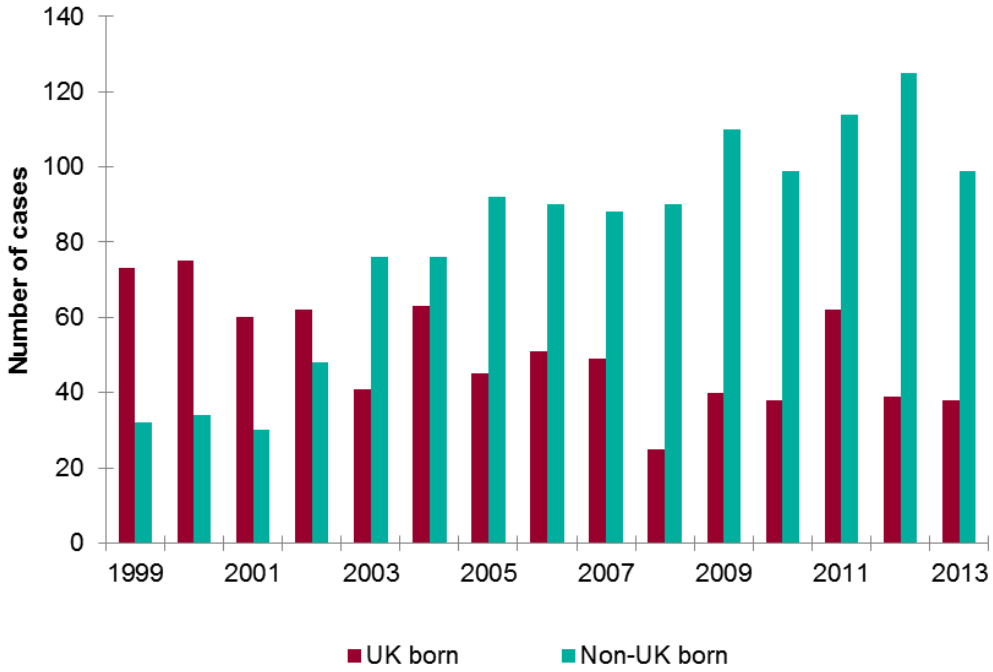
Figure 4: TB case numbers by age group, Wessex, 1999 – 2013



Place of birth and time since entry

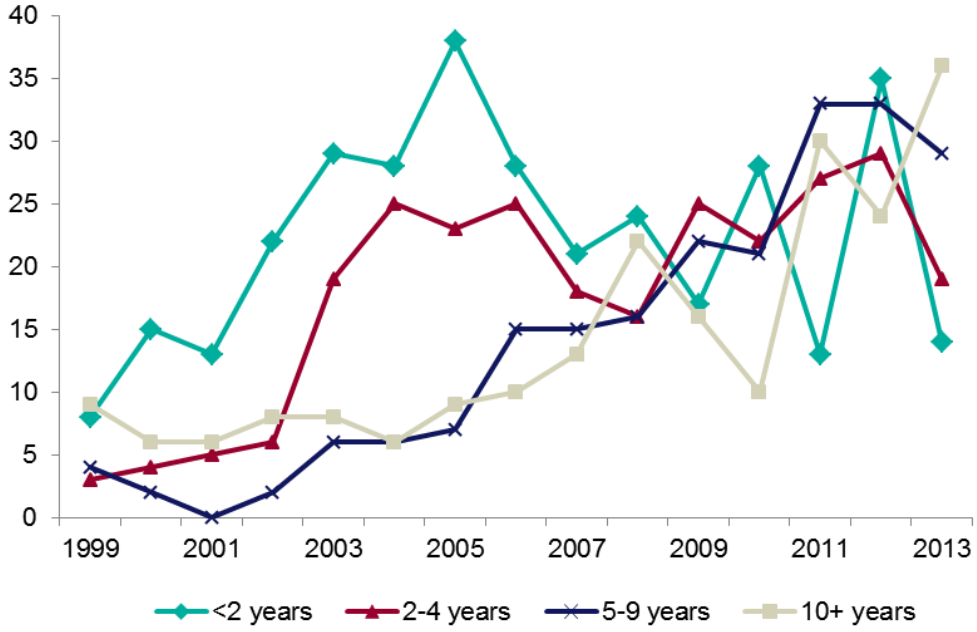
In 2013, 72% of TB patients were born outside of the UK. After increasing steadily from 2003, the number of non-UK born TB patients decreased to 99 in 2013 (Figure 5), but remained twice as many as the number of UK born patients. Among the UK born population 38 cases of TB occurred in 2013, similar to the previous year (39 cases).

Figure 5: Tuberculosis case numbers by place of birth, Wessex, 1999 – 2013



The biggest decrease was among non-UK born individuals who had recently entered the country. In 2013, only 14 and 10% of all TB patients in Wessex had entered the UK within the previous two years: this was less than half the number reported in 2012 (35), and the lowest number since 2001 (Figure 6). There was also a small decrease in numbers diagnosed within two to four years of arriving in the UK (from 29 in 2012 to 19 in 2013). The number of cases among those born outside the UK, but resident here for ten or more years increased in 2013, continuing an increasing trend since 2004.

Figure 6: TB case numbers by time since entry, Wessex, 1999 – 2013



The decrease in recent migrants was almost entirely among those born in south Asia (including India, Nepal and Pakistan). In particular, while those of mixed/other ethnicity still accounted for 36% of recent migrants with TB in 2013, numbers had more than halved compared to 2012 (5 vs. 18). The decrease was also most pronounced among recent migrants aged 20 to 29 years old (21 in 2012 to five in 2013).

The most common country of birth of non-UK born TB patients in 2013 was India, followed by Nepal, which has seen a 46% decrease since 2012 (from 37), Pakistan, Zimbabwe and Romania (Table 1).

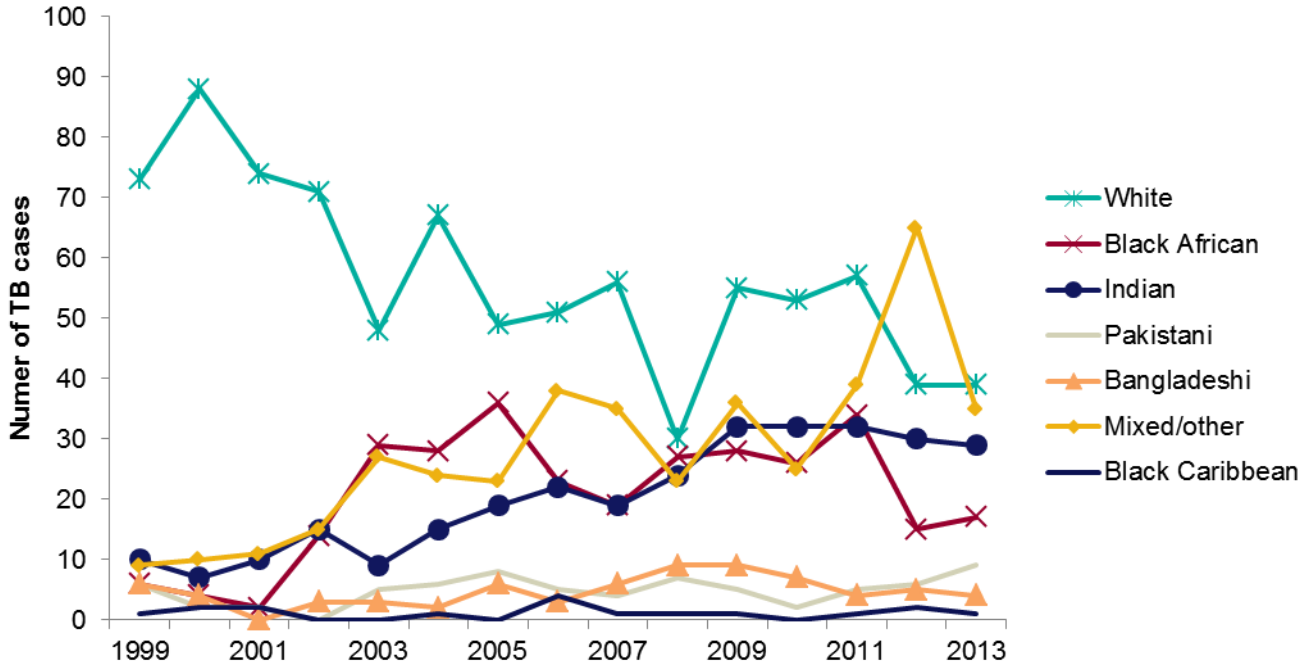
Table 1: Most common countries of birth of non-UK born TB patients, Wessex, 2013

Country of birth	n	% of 99 non-UK born patients
India	25	25
Nepal	20	20
Pakistan	7	7
Zimbabwe	6	6
Romania	5	5

Ethnicity

The most common ethnic group of TB patients in 2013 was white, accounting for over a quarter of cases: 74% of these were UK born, 13% from Romania and the remainder from a variety of western or central European countries. After decreasing in the early part of the 2000s, when up to 75% of all TB patients in Wessex were white (and over 90% of these were UK born), numbers stayed stable in recent years, between around 30 to 50 cases per year, and included more individuals born abroad (Figure 7).

Figure 7: TB case numbers by ethnicity and year, Wessex, 2013



The next highest number was among the mixed/other population, who comprised 26% (35) of patients in 2013, although after increasing since 1999 numbers decreased by half compared to 2012. More than half of these were born in Nepal. The third highest number comprised those of Indian ethnicity who accounted for one in five patients (29 cases): numbers have been stable in this group since 2009. The number and proportion of black African TB patients decreased by half since 2011 (34 cases) and has remained stabled with 17 cases in 2013.

Social risk factors

In 2013, seven TB patients reported one or more social risk factor (5%). Four reported prison history, three homelessness, two alcohol misuse and one reported drug misuse. Five of the seven were UK born, with the other two from central Europe, and all were male.

Clinical characteristics

Site of disease

More than half (57%) of all TB patients in 2013 had pulmonary disease. The next most common site of disease was extra-thoracic lymph node TB (Table 2).

Pulmonary disease was more common among the UK born: 68% (26/38) vs. 53% (52/99) among the non-UK born in 2013. It was also more common among white (77%, 30/39) and mixed/other patients (58%, 19/33). The majority of patients with social risk factors had pulmonary disease (71%, 5).

Table 2: Site of disease of TB cases, Wessex, 2013

Site of disease*	2013	
	n	%
Pulmonary	78	57
Lymph Node (extra thoracic)	31	23
IT Lymph Nodes	13	9
Other	5	4
Pleural	11	8
Gastrointestinal/Peritoneal	1	1
Bone/Joint (spine)	5	4
Bone/Joint (other - not spine)	4	3
Miliary	2	1
CNS (meningitis)	3	2
Genitourinary	1	1
CNS (Other - not meningitis)	1	1
Cryptic Disseminated	1	1
Laryngeal	0	0

*patients may have disease at more than one site, so the total % will not equal 100%

Previous diagnosis of tuberculosis

In 2013, 4% (5/137) of cases occurred in individuals with a previous history of TB.

BCG vaccination

Information on BCG vaccination was available on 77% of cases in 2013 (106), and 75% of these reported being vaccinated (Table 3). A higher proportion of non-UK born patients had been vaccinated. Both of the two children under 16 diagnosed with TB in 2013 were vaccinated.

Table 3: Number and proportion of TB cases with BCG vaccination, Wessex 2013

	All ages		
	n	%	N
UK born	19	63	30
Non-UK born	61	80	76
All cases	80	75	106

Time symptomatic

The time between onset of symptoms and starting treatment was available for 93% of Wessex patients in 2013 (126, Table 4). The median number of days was 102 with an interquartile range (IQR) of 60-189 days. This was only slightly lower among those with pulmonary disease, at 91 days (IQR 60-184).

Among those with pulmonary disease, patients born in the UK had a longer delay to treatment than those born abroad (127 vs. 79 days). In particular, white UK born patients with pulmonary disease had the longest treatment delay (181.5, IQR 83-327.5). Long delays were also experienced, however, by those of mixed/other ethnicity with pulmonary disease (173 days, IQR 91-190), while those of black African ethnicity had the shortest (66 days, IQR 53-69). Females with pulmonary disease also had longer delays (116 days, IQR 59-180) compared to males (75 days, IQR 45-187).

Table 4: Time between symptom onset and treatment start*, Wessex 2013

	Median days (IQR)	0-2 months		2-4 months		>4 months		
		N	%	n	%	n	%	N
Extra-pulmonary	**117 (52-205)**	16	30	13	25	24	45	53
Pulmonary	**91 (60-184)**	21	29	25	34	27	37	73
Pulmonary smear positive	**94 (66-187)**	7	24	11	38	11	38	29
All cases	**102 (60-189)**	37	29	38	30	51	40	126

*excluding asymptomatic cases, and those with missing onset dates

HIV testing

Information on HIV testing was available for 84% of patients (115/137), and 97% were offered an HIV test, or their HIV status was already known (112 /115). Among those offered, uptake of testing was extremely high, and 94% of patients actually had an HIV test, or their status was already known (108). Information was missing, however, on 16% of patients (22/137).

Microbiological information

Sputum smear and culture confirmation

Of the 78 pulmonary cases in 2013, 64% (50) had a sputum smear result. Of these, 62% (31) were sputum smear positive.

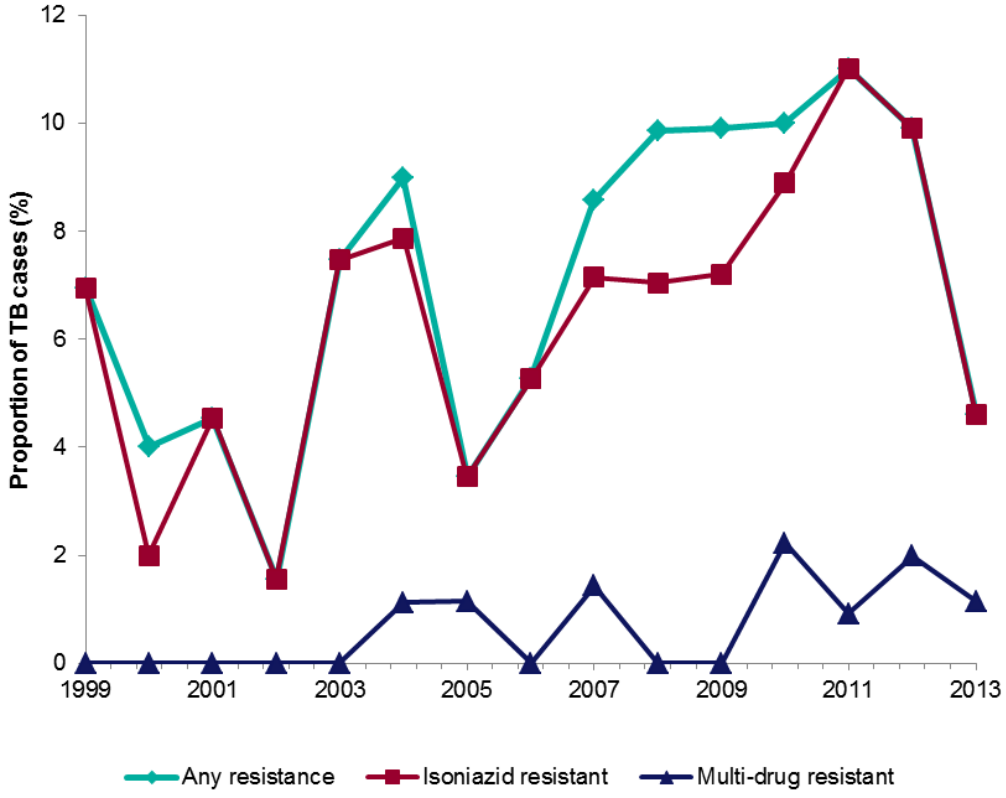
In 2013, 64% of all cases were confirmed by culture (87/137). This increased to 70% (55/78) among pulmonary cases vs. 59% among those with extra-pulmonary disease (42/71).

Drug resistance

Overall drug resistance and geographical distribution

The proportion of TB cases resistant to one or more first line drug decreased to 4.6% (4/87) compared to 10% in 2012 (10/101), although numbers were very small and year-on-year changes should be interpreted with caution (Figure 9). This mostly reflected a decrease in isoniazid resistance (to 4.6%, 4). Just one patient with multi-drug resistant disease was diagnosed in 2013 (1.1%).

Figure 9: Proportion of TB cases with first line drug resistance, Wessex 1999 – 2012



The four patients in 2013 with drug resistant TB were aged between 20 and 69 years and male. One was UK born (mixed/other ethnicity, with social risk factors), and three born abroad (one in India, one in Turkey and one in Nepal). None had a previous history of TB.

TB clusters identified through molecular strain typing

The PHE National Strain Typing Service was established in January 2010. All TB isolates were typed using 24 loci mycobacterial interspersed repetitive unit-variable number tandem repeats (MIRU-VNTR) at the National Mycobacterium Reference Laboratory (NMRL). Cases with an identical strain pattern are considered clustered.[1] All data shown are for patients reported between 2010 and 2013.

Proportion of cases clustered

There were 387 culture confirmed TB cases in Wessex between 2010 and 2013 (Table 5). Of these, 85% (327) of isolates were strain typed with at least 23 loci completed. A fifth (21%) of these isolates clustered with at least one other case in Wessex. In total, 21 clusters were identified in Wessex since 2010. Of note, if nationally clustered individuals were considered, there were 156 clustered cases in Wessex, a cluster rate of 40%.

Table 5: Clustering of TB cases in Wessex, 2010 – 2013

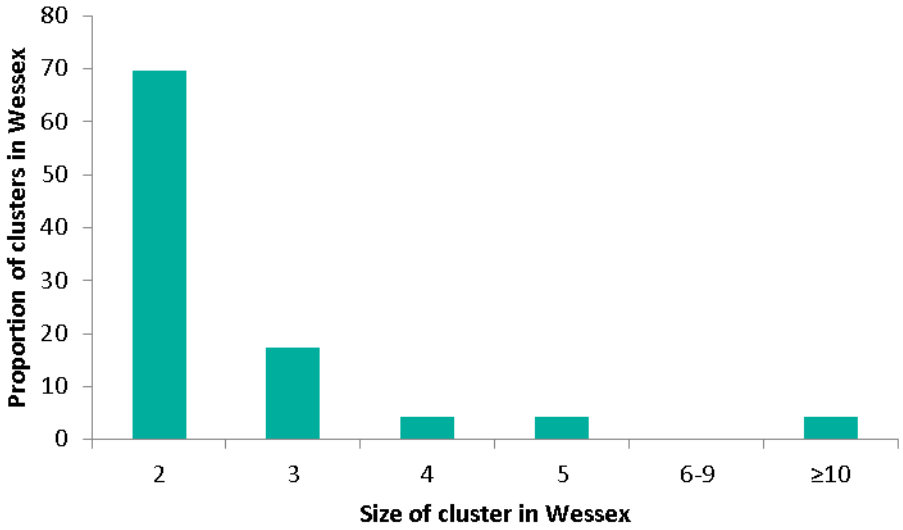
Year	Culture confirmed cases	Strain typed cases*		Cases clustered		Number of clusters
		N	% of culture confirmed	n	% of strain typed	
2010-2013	387	327	85%	69	21	23

*culture confirmed cases with a MIRU-VNTR profile with at least 23 complete loci

Size of clusters

More than two-thirds of the clusters consisted of just two individuals (Figure 15). A quarter consisted of three to five cases. The largest cluster contained 16 individuals: 15 were based in Southampton and one case in Bournemouth. This cluster was attributable to an outbreak of TB in Southampton in 2011.

Figure 15: Size of clusters in Wessex, 2010 – 2013



Cluster Lineage

The most common strain lineage was Euro-American (Table 6), followed by the Central Asian strain, the Beijing strain then the East African Indian strain. As in other regions, a higher proportion of clustering was observed in cases infected with the Beijing strain than other circulating strains. More than half of the clustered Beijing strain cases were born in Nepal, who were all in the same cluster. The outbreak of TB in Southampton in 2011 had a Euro-American lineage, with a third of the cases born in the UK and another third born in Somalia.

Table 6: Lineage of reported TB clusters*, Wessex, 2010 – 2013

Lineage	Clustered cases		Number of cases
	N	%	n
Euro American	40	31	131
Central Asian	11	18	63
East African Indian	5	11	44
Beijing	9	35	26
Other*	4	13	31

***including *M. bovis* cases, *M. africanum* cases, cases with multiple lineages and cases with no lineage known

Characteristics of cases in clusters

A quarter of strain typed male cases were in clusters compared to one in six females. Although two-thirds of children (under 15 years) clustered with another case in Wessex, this was only three cases since 2010.

Table 7: Characteristics of clustered cases, 2010 – 2013

Characteristic		Number of clustered cases*		Total
		N	%	n
Sex	Male	47	24	194
	Female	22	17	133
Age	0-14 years	2	67	3
	15-44 years	48	22	221
	45 – 64 years	15	29	52
	>65 years	4	8	51
Country of birth	UK born	18	23	78
	Non-UK born	47	20	236
Non-UK born years since UK entry	<2 years	10	20	51
	2-10 years	26	20	132
	>10 years	10	24	42
Ethnic group	White	18	20	92
	Black African	14	31	45
	Black Caribbean	1	33	3
	Indian	5	9	53
	Pakistani	2	22	9
	Bangladeshi	2	18	11
	Mixed/Other	26	26	101
Social risk factor	One or more social risk factors	6	23	26
Clinical characteristics	Pulmonary disease	55	23	239
	Sputum smear positive**	33	29	116
	Previous TB diagnosis	2	14	14
	Isoniazid resistant	11	38	29
	Multi-drug resistant	0	0	6

*denominator varies slightly depending on variable completeness

** of pulmonary cases

Two-thirds of the clustered cases in Wessex were born abroad. Among non-UK born cases 20% were clustered compared to 23% of UK born cases.

One in four clustered cases were white, one in five were black African and more than a third were of mixed/other ethnicity. Of the mixed/other ethnicities, six in ten were born in Nepal. Among all strain typed black African cases in Wessex, 31% were in clusters: half of these black African clustered cases were part of the Southampton TB outbreak. Of the mixed/other ethnicities, a quarter of the Nepal born cases clustered with at least one other case in Wessex.

Among those clustered, 80% had pulmonary disease of which 60% were sputum smear positive. Despite this, just 23% of strain typed pulmonary TB cases were in clusters.

Eleven clustered cases in Wessex were isoniazid resistant. There was one cluster in Wessex consisting of four isoniazid resistant cases and further three clusters consisted of two people each. Among the isoniazid resistant cases in Wessex, 38% were in clusters. If considering cases clustering nationally, 72% of isoniazid resistant cases in Wessex clustered with at least one case nationally. No individual with multi-drug resistant TB clustered with another case in Wessex.

Treatment outcome

TB patient outcomes are reported in accordance with the revised 2013 World Health Organization (WHO) treatment outcome definitions.[2] Under these, outcome at 12 months is reported for the cohort of patients diagnosed in 2012 with drug (rifampicin) sensitive TB (excluding patients with initial or acquired rifampicin or multi-drug resistance) with expected course of treatment of less than 12 months (cohort 1A below), and separately for those with CNS, spinal, miliary or cryptic disseminated disease (cohort 1B below).

Outcome at 24 months was reported for the cohort (2) of patients diagnosed in 2011 with initial or acquired rifampicin or multi-drug resistance.

The national surveillance team also further revised the outcome data provided by clinics, and where the time between treatment start and end dates was greater than 365 days, any coded as completed within 12 months were reassigned to still on treatment at one year, and similarly for 24 and 36 month outcomes. PHE will be working with clinic staff to improve and validate any amendments to outcome data.

1: Outcomes for patients with an expected course of treatment of less than 12 months

In 2012, 166 TB cases were notified, 164 (99%) of whom were not resistant to rifampicin and so included in cohort 1 with treatment outcome reported at 12 months. Twelve had CNS, spinal, miliary or cryptic disseminated disease and outcomes are presented in 1B: the remaining 152 are presented in 1A.

1A: Outcomes for patients with rifampicin sensitive TB: non CNS, spinal, miliary or cryptic disseminated disease

Of the 152 patients with non-CNS, spinal, miliary or cryptic disseminated disease, 82% completed treatment within 12 months, lower than in 2011 but higher than previous years (Table 8).

Table 8: TB patients completing treatment at 12 months, Wessex, 2002 – 2012*

	TB patients		
	N	%	Total*
2002	37	33	113
2003	32	27	119
2004	100	72	139
2005	96	72	134
2006	104	75	139
2007	88	69	128
2008	76	68	111
2009	119	75	159
2010	116	82	142
2011	147	84	176
2012	124	82	152

*excludes rifampicin resistant TB, and patients with CNS, spinal, miliary or cryptic disseminated disease

The most common reason for not completing treatment was being still on treatment (7%, Table 9). Information on the reason was not available for almost all of these (as recoded to still on treatment by the national surveillance team), however, one was recorded as having their treatment interrupted. The next most common reason was loss to follow-up (6%): of these, 56% had left the UK (5/9).

Table 9: TB outcome at 12 months, Wessex, 2012*

Outcome at 12 months	n	%
Completed	124	82
Died	4	3
Lost to follow up	9	6
Still on treatment	10	7
Treatment stopped	1	1
Not evaluated	4	3
Total	152	

*excludes rifampicin resistant TB, and patients with CNS, spinal, miliary or cryptic disseminated disease

Four deaths occurred, in all of whom TB was only diagnosed post-mortem. Two individuals were aged over 80 years old (TB contributed to one and was incidental to the other), but deaths were also reported in an individual aged between 30 and 39 years old (TB contributed to death), and an individual aged 50 to 59 years old (relationship between TB and death unknown).

An additional death occurred in a patient: this patient was still on treatment at 12 months, and died 15 months after starting treatment. TB was recorded as incidental to death.

Older patients were less likely to complete: just 68% of those aged 65 or older completed (13/19), with higher rates of death (10%, 2). Treatment completion was similar among males and females (84%, 52/62 vs. 80%, 72/90).

Treatment completion was slightly higher among the UK born (86% vs. 80% among those born abroad) as those born abroad were more often lost to follow up (7%, 8 vs. 3%, 1) or still on treatment (7%, 8 vs. 5%, 2).

Outcomes also varied across Wessex with the lowest levels of treatment completion in areas of low TB incidence (Table 10) such as Poole and Dorset, with the exception of the Isle of Wight, which had the highest completion outcome: however the small numbers in these areas mean these results should be interpreted with caution.

Table 10: TB outcome at 12 months by upper tier local authority*, Wessex, 2012*

	Completing treatment		Died		Lost to follow up		Still on treatment		Treatment stopped		Not evaluated		Total
	n	%	n	%	n	%	n	%	n	%	n	%	
Bournemouth	11	79	0	0	1	7	1	7	0	0	1	7	14
Dorset	5	50	1	10	2	20	0	0	0	0	2	20	10
Hampshire	55	87	1	2	3	5	3	5	1	2	0	0	63
Poole	0	0	0	0	0	0	0	0	0	0	1	100	1
Portsmouth	18	86	1	5	1	5	1	5	0	0	0	0	21
Isle of Wight	6	100	0	0	0	0	0	0	0	0	0	0	6
Southampton	29	78	1	3	2	5	5	14	0	0	0	0	37
Wessex	124	81	4	3	9	6	10	7	1	1	4	2.6	152

*excludes rifampicin resistant TB, and patients with CNS, spinal, miliary or cryptic disseminated disease

1B: Outcomes for patients with rifampicin sensitive TB with CNS, spinal, miliary or cryptic disseminated disease

Half of the 12 patients with CNS disease reported in 2012 completed treatment within 12 months (Table 11). Patients were commonly (42%) still on treatment. All were recoded as still on treatment by the national surveillance team so additional information on reason was missing.

Table 11: TB outcome at 12 months for patients with CNS, spinal, miliary or cryptic disseminated disease*, Wessex, 2012

Outcome at 12 months	n	%
Completed	6	50
Died	0	0
Lost to follow up	1	8
Still on treatment	5	42
Treatment stopped	0	0
Not evaluated	0	0
Total	12	

*excludes rifampicin resistant TB

2: TB outcome at 24 months for patients with rifampicin resistant disease

In 2011, only one TB patient was initially rifampicin resistant at start of treatment (multi-drug resistant), and none were extensively-drug resistant (XDR). At 12 months, the patient was still on treatment and went on to complete within 24 months.

Difference between original and revised 12-month outcomes:

Outcomes for patients reported between 2002 and 2012 were revised, and a number originally reported as completing within 12 months were reassigned to another category, particularly to still on treatment if treatment start and end dates suggested patients were treated for longer than 365 days (or 730 for 24 month outcomes). PHE will be working with clinics to validate this further.

Of the 152 patients with non CNS, spinal, miliary or cryptic disseminated disease 86% were reported as completed treatment within 12 months by the clinics, but after revisions based on treatment dates this was reduced to 81%. This was due to outcomes being recoded to ‘still on treatment at 12 months’, which increased to 7% (10) of patients from the original clinic data of just 2% (3).

Among patients with CNS, spinal, miliary or cryptic disseminated disease, again a number of patients who were reported to have completed treatment within 12 months were recoded to still in treatment (seven out of 12). In addition five patients with no outcome information recorded were recoded to not evaluated and still on treatment.

TB incidents in Wessex

There were eight incidents involving potential exposure to TB reported to the PHE Centre in Wessex in 2013. Incident settings included the workplace (3); hospital (2) college (1); school (1) visitor attraction (1); and congregation (1). One case required investigation in two settings – workplace and hospital. One incident crossed the border between Wessex and Thames Valley PHE Centres.

In all, screening took place in six of the eight incidents. Numbers of contacts screened per case varied from four to 29. In general, a high proportion of contacts identified for screening were successfully screened across all settings. Additional screening resources to support existing TB services were required in one of the eight incidents.

An unusual incident, jointly managed by PHE Centres in Wessex and Thames Valley along with the Animal Health and Veterinary Laboratories Agency (AHVLA), centred on a cluster of nine cases of *Mycobacterium bovis* in domestic cats in Berkshire and Hampshire. Screening of contacts of infected cats identified two people with active TB, both confirmed with *M. bovis*. Two others were diagnosed with latent TB.

These cases were the first documented cases of cat to human transmission. In general, however, the risk of cat to human transmission is still considered to be very low.

Discussion

Numbers and rates of TB in Wessex remain below the national average. After increasing steadily over the past decade there was a further decrease down from a peak in 2011. This decrease was among the non-UK born population, with the numbers of UK born individuals diagnosed with TB stable in recent years.

The decrease was due to a decline in numbers of patients who were recent entrants to the UK particularly young adults from south Asia. This may be due to changes in immigration patterns, but may also be a result of the roll out of pre-entry screening for TB by chest x-ray in all high incidence countries from autumn 2012.[3]

Although HIV testing offer and uptake was excellent where reported, this information was missing on 16% of patients. UK guidance states all TB patients should be offered a test, regardless of age or ethnicity.[4]

Information on symptom onset of patients was well completed, and identified longer delays were experienced by white UK born patients, those of mixed/other ethnicity (predominantly born in Nepal) and females. This should be investigated further to identify any barriers to early identification of cases. Delays in diagnosis in low incidence areas such as Wessex may be due to a low index of suspicion among health care workers. Delays lead to worse outcomes for the patient and increased risk of transmission to others. Comprehensive contact tracing around all new cases of TB can also identify others at an earlier stage of illness, as well as those with signs of infection that may benefit from preventative treatment.

In Wessex, just 69 clustered cases were identified between 2010 and 2013; therefore the observations should be interpreted with caution. One in five strain typed TB case of TB clustered with at least one other individual in Wessex. If including cases clustered with national cases, two in five cases clustered with at least one case nationally. The majority of clusters consisted of two individuals. The largest cluster consisted of 16 cases in the region, and was attributable to an outbreak of TB that occurred in Southampton in 2011.

Treatment completion at 12 months among patients with rifampicin sensitive and non-CNS, spinal, miliary or cryptic disseminated disease was slightly below average for the UK. The most commonly reported reason for not completing was still being on treatment. Additional information on the reasons patients were still on treatment was not available as the majority were recoded to still on treatment by the national surveillance team. While only a small number of deaths occurred, these were all diagnosed at post

mortem, and included two adults aged between 30 and 59. These deaths should be reviewed to identify if opportunities for prevention were missed.

Eight incidents involving potential exposure to TB were reported to the Wessex PHE Centre during 2013. These occurred in a variety of settings, and included an unusual cluster of *M. bovis* in domestic cats and their human contacts.

Conclusion and recommendations

This report updates the latest epidemiology of TB in Wessex, describing those populations at increased risk of disease. This evidence can help services implement the basic elements of TB control, namely prompt identification of active cases of disease, supporting patients to successfully complete, and preventing new cases of disease occurring. The information will also be useful to target resources effectively.

Key recommendations for the NHS and PHE derived from the data presented in this report include:

1. Ensure relevant information is completed accurately on the PHE Enhanced TB Surveillance system. In particular ensure treatment outcome is recorded for all patients.

2. Review reasons for delays to diagnosis among TB patients, particularly among those of Nepali origin and females.

3. Audit deaths among TB patients to ensure opportunities to prevent such events happening were not missed.

4. Use cohort review as the standard tool to routinely review appropriate case management including HIV test offer and opportunities for prevention or earlier identification of all cases. Refer to NICE guidance and the Royal College of Nursing guidance on TB case management as best practice.[5,6]

PHE and NHS England will shortly publish the Collaborative TB Strategy for England 2015-2020, which sets out the improvements that need to be achieved across 10 key areas to bring about a sustained decline in TB in England.

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Appendix A: Description of data sources and definitions

Data sources
Data on tuberculosis cases in Wessex comes from the national Enhanced TB surveillance (ETS) system. Data collected include notification details, and demographic, clinical and microbiological information. Patients were assigned to geographical areas based on residential postcode. Where unavailable, clinic postcode was used.

Information on treatment outcomes are reported for all cases reported in the previous year, excluding those with known rifampicin resistant disease: treatment outcomes for these cases are reported at 24 months. Definitions for treatment outcome are based on World Health Organization (WHO) and European definitions, but adapted to the UK context. In this report, all data were obtained from the ETS matched dataset provided in August 2013.

Proportions
All proportions in this report are calculated among cases with known information or a known result, except where otherwise stated.

Confidence Intervals
A 95% confidence interval for incidence was obtained using the relevant procedure in Stata, assuming a Poisson distribution. For prevalence data (proportions) a binomial distribution was assumed.

Rates
Tuberculosis rates by Wessex, individual local authority were calculated using ONS mid-year population estimates.

Cluster definitions
Strain typing was performed at the TB reference laboratories using 24 MIRU-VNTR profiling. Analysis was undertaken on strain type clusters defined as two or more people with TB caused by indistinguishable 24 loci strains, with at least one case which has a complete 24 VNTR, additional cases of the cluster may each have one missing locus. Analysis of clustering in Wessex was carried out on cases that clustered in Wessex and notified in 2010, 2011 or 2012. Recent transmission was defined using the calculation (no. of isolates in clusters-no. of clusters) / total no isolates with a strain type.

Appendix B: TB among Wessex residents

Table Bii: TB case numbers by lower tier local authority of residence, Wessex, 1999 – 2013

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Basingstoke and Deane	6	3	3	6	3	14	4	7	7	6	11	11	15	9	8
Bournemouth	13	17	12	18	13	14	24	23	13	18	14	15	24	17	11
Christchurch	4	4	4	1	2	2	3	3	4	0	3	1	2	2	0
East Dorset	5	3	6	2	2	3	1	1	2	2	5	1	1	2	3
East Hampshire	1	4	4	5	2	7	5	4	3	1	5	6	3	3	1
Eastleigh	1	2	2	4	3	2	5	6	2	4	7	8	4	5	4
Fareham	5	4	2	1	4	3	1	2	3	2	3	1	3	6	8
Gosport	1	6	2	3	5	1	3	2	2	3	2	7	7	2	1
Hart	3	1	2	0	0	5	2	3	4	1	4	1	3	2	2
Havant	5	5	3	5	2	3	5	2	4	5	1	1	1	3	1
Isle of Wight	3	1	7	3	1	1	3	0	7	1	3	3	6	7	1
New Forest	2	3	9	8	6	10	4	10	6	4	4	2	6	2	2
North Dorset	4	1	3	2	3	2	3	4	0	1	4	3	2	4	1
Poole	5	12	8	9	5	10	11	6	8	11	5	7	2	1	5
Portsmouth	19	24	12	15	15	23	20	23	23	23	30	25	17	23	19
Purbeck	0	0	2	1	2	2	1	3	2	1	3	3	2	1	2
Rushmoor	4	2	1	3	7	3	4	7	15	8	17	19	28	33	20
Southampton	18	18	16	27	36	33	31	34	24	24	36	27	51	40	39
Test Valley	0	1	1	2	7	2	3	2	7	2	8	8	5	1	2
West Dorset	4	3	1	2	3	2	5	3	2	4	2	2	2	1	1
Weymouth and Portland	2	4	2	1	1	3	4	4	6	0	6	0	1	1	2
Winchester	6	3	2	3	3	1	2	1	1	1	3	5	4	1	4
Wessex	**111**	**121**	**104**	**121**	**125**	**146**	**144**	**150**	**145**	**122**	**176**	**156**	**189**	**166**	**137**

Table Bii: TB case rates by lower tier local authority of residence, Wessex, 1999 – 2013

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Basingstoke and Deane	4.0	2.0	2.0	3.9	1.9	8.9	2.5	4.4	4.3	3.7	6.6	6.6	8.9	5.3	4.7
Bournemouth	8.0	10.5	7.3	11.0	7.9	8.4	14.4	13.5	7.6	10.3	7.8	8.2	13.1	9.1	5.8
Christchurch	9.0	8.9	8.9	2.2	4.4	4.4	6.5	6.5	8.5	0.0	6.3	2.1	4.2	4.2	0.0
East Dorset	6.0	3.6	7.1	2.3	2.3	3.5	1.2	1.2	2.3	2.3	5.7	1.2	1.2	2.3	3.4
East Hampshire	0.9	3.7	3.7	4.6	1.8	6.3	4.5	3.6	2.7	0.9	4.3	5.2	2.6	2.6	0.9
Eastleigh	0.9	1.7	1.7	3.4	2.6	1.7	4.2	5.0	1.7	3.3	5.6	6.4	3.2	3.9	3.1
Fareham	4.7	3.7	1.8	0.9	3.7	2.8	0.9	1.8	2.7	1.8	2.7	0.9	2.7	5.3	7.0
Gosport	1.3	7.8	2.6	3.9	6.4	1.3	3.8	2.5	2.5	3.7	2.4	8.5	8.5	2.4	1.2
Hart	3.6	1.2	2.4	0.0	0.0	5.7	2.3	3.3	4.4	1.1	4.4	1.1	3.3	2.2	2.2
Havant	4.3	4.3	2.6	4.3	1.7	2.6	4.2	1.7	3.4	4.2	0.8	0.8	0.8	2.5	0.8
Isle of Wight	2.3	0.8	5.2	2.2	0.7	0.7	2.2	0.0	5.1	0.7	2.2	2.2	4.3	5.1	0.7
New Forest	1.2	1.8	5.3	4.7	3.5	5.8	2.3	5.8	3.4	2.3	2.3	1.1	3.4	1.1	1.1
North Dorset	6.6	1.6	4.8	3.1	4.6	3.0	4.5	5.9	0.0	1.5	5.9	4.4	2.9	5.8	1.4
Poole	3.6	8.7	5.8	6.5	3.6	7.2	7.8	4.2	5.6	7.6	3.4	4.7	1.4	0.7	3.4
Portsmouth	10.1	12.8	6.4	7.9	7.8	11.7	10.2	11.8	11.7	11.6	14.8	12.2	8.3	11.1	9.2
Purbeck	0.0	0.0	4.5	2.3	4.5	4.5	2.2	6.7	4.4	2.2	6.6	6.7	4.4	2.2	4.4
Rushmoor	4.4	2.2	1.1	3.3	7.8	3.3	4.4	7.6	16.2	8.6	18.2	20.3	29.7	34.8	21.1
Southampton	8.3	8.3	7.3	12.2	16.1	14.6	13.7	15.0	10.5	10.4	15.5	11.4	21.6	16.7	16.1
Test Valley	0.0	0.9	0.9	1.8	6.3	1.8	2.6	1.8	6.1	1.7	6.9	6.9	4.3	0.9	1.7
West Dorset	4.4	3.3	1.1	2.1	3.1	2.1	5.2	3.1	2.0	4.1	2.0	2.0	2.0	1.0	1.0
Weymouth and Portland	3.2	6.3	3.1	1.6	1.6	4.6	6.2	6.2	9.2	0.0	9.2	0.0	1.5	1.5	3.1
Winchester	5.6	2.8	1.9	2.8	2.8	0.9	1.8	0.9	0.9	0.9	2.6	4.3	3.4	0.9	3.4
Wessex	**4.5**	**4.9**	**4.2**	**4.8**	**5.0**	**5.8**	**5.7**	**5.8**	**5.6**	**4.7**	**6.7**	**5.9**	**7.1**	**6.2**	**5.1**

*rates calculated using ONS mid-year population estimates

Appendix C: all TB patients notified by Wessex hospitals

Table Ci: Number of all TB notifications and pulmonary notifications reported by Wessex hospitals, 2010 – 2013

	2010		2011		2012		2013	
	Total	*Pul*	Total	*Pul*	Total	*Pul*	Total	*Pul*
Basingstoke & North Hampshire Hospital	13	*3*	16	*6*	8	*3*	8	*2*
Dorset County Hospital	5	*4*	2	*0*	2	*2*	2	*2*
North Hampshire Hospital	1	*1*	0	*-*	0	*-*	0	*-*
Poole General Hospital	7	*6*	5	*4*	2	*1*	9	*8*
Queen Alexandra Hospital	40	*29*	31	*23*	36	*26*	30	*20*
Royal Bournemouth General Hospital	1	*0*	2	*2*	4	*3*	5	*3*
Royal Hampshire County Hospital	11	*7*	8	*4*	5	*4*	6	*3*
Royal South Hants Hospital	28	*12*	57	*37*	45	*26*	47	*19*
Southampton General Hospital	8	*5*	1	*1*	0	*-*	0	*-*
St Mary's Hospital [Isle Of Wight]	3	*2*	5	*4*	7	*5*	1	*1*
Private Clinics	0	*-*	1	*0*	0	*-*	0	*-*
Wessex	117	*69*	128	*81*	109	*70*	108	*58*

Table Cii: HIV testing (offered and uptake) among all TB notifications reported by Wessex hospitals, 2013

	2013 Total notifs	Offered And Done	Offered But Refused	Offered But Not Done	HIV Status Already Known	Not Offered	Null	Test offered (or status known)	Test done (or status known)
Basingstoke & North Hampshire Hospital	8	7	0	0	1	0	0	100%	100%
Dorset County Hospital	2	1	0	0	0	0	1	50%	50%
Poole General Hospital	9	5	0	0	0	0	4	56%	56%
Queen Alexandra Hospital	30	30	0	0	0	0	0	100%	100%
Royal Bournemouth General Hospital	5	4	0	1	0	0	0	100%	80%
Royal Hampshire County Hospital	6	1	0	2	2	0	1	83%	50%
Royal South Hants Hospital	47	31	0	0	3	2	11	72%	72%
St Mary's Hospital [Isle Of Wight]	1	1	0	0	0	0	0	100%	100%
Wessex	108	80	0	3	6	2	17	82%	80%

Table Ciii: Social risk factors* among all TB notifications reported by Wessex hospitals, 2010 – 2013

	2010		2011		2012		2013	
	n	%	n	%	n	%	n	%
Basingstoke & North Hampshire Hospital	0	-	0	-	0	-	0	-
Dorset County Hospital	2	40%	1	50%	0	-	0	-
North Hampshire Hospital	0	-	-	-	-	-	-	-
Poole General Hospital	1	14%	0	-	0	-	0	-
Queen Alexandra Hospital	5	13%	5	16%	1	3%	1	3%
Royal Bournemouth General Hospital	0	-	0	-	0	-	0	-
Royal Hampshire County Hospital	0	-	0	-	2	40%	0	-
Royal South Hants Hospital	1	4%	4	7%	1	2%	4	9%
Southampton General Hospital	0	-	1	100%	-	-	-	-
St Mary's Hospital [Isle Of Wight]	1	33%	1	20%	1	14%	0	-
Private Clinics	-	-	0	-	-	-	-	-
Wessex	10	9%	12	9%	5	5%	5	5%

* social risk factors include drug use, homelessness, alcohol misuse/abuse, prison

Table Civ: Drug resistance amongst all TB notifications reported by Wessex Valley hospitals, 2013

	Any drug resistance*		Isoniazid resistant		Multi-drug resistant		Total**
	n	%	n	%	n	%	
Basingstoke & North Hampshire Hospital	1	17%	1	17%	1	17%	6
Dorset County Hospital	0	-	0	-	0	-	2
Poole General Hospital	1	14%	1	14%	0	-	7
Queen Alexandra Hospital	1	7%	1	7%	0	-	15
Royal Bournemouth General Hospital	0	-	0	-	0	-	3
Royal Hampshire County Hospital	0	-	0	-	0	-	4
Royal South Hants Hospital	0	-	0	-	0	-	24
St Mary's Hospital [Isle Of Wight]	0	-	0	-	0	-	1
Wessex	3	5%	3	5%	1	2%	62

*resistant to at least one first line drug (isoniazid, rifampicin, ethambutol or pyrazinamide)
**total patients with culture confirmed disease with drug susceptibility testing results

Table Cv: Number and proportion of culture positive notifications amongst all TB notifications and pulmonary notifications; number of pulmonary notifications with a smear result reported by Wessex hospitals, 2013

	Culture positive (all)		Total notifs	Culture positive (pulmonary)		Pulmonary with smear result		Total Pulmonary
	n	%	N	n	%	n	%	
Basingstoke & North Hampshire Hospital	6	75%	8	1	50%	1	50%	2
Dorset County Hospital	2	100%	2	2	100%	1	50%	2
Poole General Hospital	7	78%	9	6	75%	3	38%	8
Queen Alexandra Hospital	15	50%	30	11	55%	14	70%	20
Royal Bournemouth General Hospital	3	60%	5	2	67%	1	33%	3
Royal Hampshire County Hospital	4	67%	6	1	33%	2	67%	3
Royal South Hants Hospital	24	51%	47	13	68%	14	74%	19
St Mary's Hospital [Isle Of Wight]	1	100%	1	1	100%	1	100%	1
Wessex	62	57%	108	37	64%	37	64%	58

Table Cvi: TB patient outcome at 12 months for all notifications with rifampicin sensitive non-CNS, spinal, miliary or cryptic disseminated TB reported by Wessex hospitals, 2012

	2012 Total Notifs	Treatment completed	Still on treatment	Died	Lost to follow up	Treatment stopped	Not Evaluated
Basingstoke & North Hampshire Hospital	7	100%	0%	0%	0%	0%	0%
Dorset County Hospital	2	100%	0%	0%	0%	0%	0%
Poole General Hospital	2	50%	0%	0%	0%	0%	50%
Queen Alexandra Hospital	34	85%	3%	6%	6%	0%	0%
Royal Bournemouth General Hospital	4	100%	0%	0%	0%	0%	0%
Royal Hampshire County Hospital	5	40%	40%	0%	20%	0%	0%
Royal South Hants Hospital	39	77%	15%	3%	3%	0%	3%
St Mary's Hospital [Isle Of Wight]	6	100%	0%	0%	0%	0%	0%
Wessex	99	82%	9%	3%	4%	0%	2%

*excludes rifampicin resistant TB, and patients with CNS, spinal, miliary or cryptic disseminated disease
Outcome collected 12 months after notification, during 2013