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# **Tuberculosis in Wales Annual Report**

**Data to the end of 2021**

# Public Health Wales

Public Health Wales exists to protect and improve health and wellbeing and reduce health inequalities for people in Wales. We work locally, nationally and internationally, with our partners and communities.

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## Acknowledgements

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Report prepared by the BBV, STI, TB and Inequalities specialist subject group, Public Health Wales Communicable Disease Surveillance Centre (CDSC).

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# 1 Executive summary

## 1.1 Purpose

This report provides an epidemiological overview of tuberculosis (TB) in Wales. It includes data on newly diagnosed TB cases reported through the National Tuberculosis Surveillance System (NTBS). The report also includes Whole Genome Sequencing data provided by UKHSA, and supplemented using NTBS, to describe clusters of TB infection within Wales. The report is aimed at health professionals, policy makers, criminal justice, third sector agencies and academia.

## 1.2 Key findings and trends

- The number of newly diagnosed TB cases in Wales increased from 80 in 2020 to 90 in 2021, representing an increase in annual incidence from 2.5 per 100,000 to 2.8 per 100,000 respectively. Wales remains within the WHO definition of a low incidence country (<10 per 100,000 per year)
- Despite this recent increase, there is an overall decreasing trend in TB incidence since a peak of 4.6 per 100,000 population in 2013, and a reduction of 36% in 2021 compared to 2012
- Cardiff and Vale University Health Board continues to have the highest rates of TB (5.1 per 100,000 population in 2021), followed by Aneurin Bevan University Health Board with 3.4 cases per 100,000 population
- Rates of TB remain higher amongst males in 2021 with 3.6 per 100,000 population compared to 2.3 per 100,000 population in females, a relatively stable trend over time
- More than half (64%) of all newly diagnosed TB in Wales in 2021 were in people born outside the United Kingdom. Of these cases, 40% had an interval period of over 11 years between arrival in the UK and notification to the NTBS (median 9 year, IQR 2-18 years). It is not known what proportion of these cases are the result of reactivation of latent disease acquired prior to arrival, new acquisition overseas after initial arrival, or transmission within the UK subsequent to arrival.

The five-year average rate of TB remains the highest in cases of Pakistani or Black-African ethnicity (68.4 per 100,000 and 63.3 per 100,000 population respectively)

- The proportion of newly diagnosed TB cases in UK born Welsh residents has decreased by 10% over the last five years, from 44% to 34%

- Seventeen percent of TB cases in 2021 self-reported having at least one social risk factor, with drug misuse being the most prevalent risk factor (14%). Eight percent self-reported having two or more risk factors.
- Social risk factors were five times more frequently reported in UK-born cases with 35% of those reported having at least one social risk factor compared to 7% in the non-UK born cases.
- TB infection is more frequently reported in those living in the most deprived areas of Wales. The five-year average rate of TB was 12fold greater in those living within the most deprived decile compared to the least deprived (8.5 and 0.7 per 100,000 population respectively)
- In 2021, 74% of all cases were culture confirmed, and 95% of pulmonary cases (with or without extra pulmonary disease) were culture confirmed. This remains above the European Centre for Disease Prevention and Control (ECDC) target of 80% for culture confirmation of pulmonary tuberculosis<sup>1</sup>
- The majority (62%) of TB cases in 2021 had a pulmonary site of infection, with 95% of these cases having culture confirmation. Of the cases with a sputum smear sample, 70% were sputum smear positive indicating high potential risk of onward infection
- Trends in drug resistant TB in Wales remain relatively stable with those identified with 'Any resistance to one or more first line drugs' increasing slightly from 8% in 2020 to 9% in 2021
- Of the cases exhibiting TB symptoms, 43% had started treatment within two months of symptom onset. However, 16% of pulmonary cases started treatment more than four months after displaying symptoms
- No treatment outcome data has been provided on NTBS to date for 28% of cases (n=20) in Wales in 2020, up from 2% in the previous year

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<sup>1</sup> European Centre for Disease Prevention and Control (ECDC). – [101111\\_SPR\\_Progressing\\_towards\\_TB\\_elimination.pdf \(europa.eu\)](https://ecdc.europa.eu/en/our-work/research-and-data/101111-spr-progressing-towards-tb-elimination.pdf)

## **2 Data sources, limitations and methodology**

### **2.1 National TB Surveillance system**

The National TB Surveillance System (NTBS) is a surveillance system run by UK Health Security Agency (UKHSA) that provides detailed information on the epidemiology of tuberculosis in England, Wales and Northern Ireland. Clinical teams notify newly diagnosed cases and update information on treatment outcomes. All people diagnosed with TB in Wales are reported through NTBS. Data extraction and cleaning is carried out by UKHSA to ensure deduplication across England and Wales prior to release to Public Health Wales for publication.

### **2.2 Welsh Index of Multiple Deprivation**

The Welsh Index of Multiple Deprivation (WIMD)<sup>2</sup> is the official measure of relative deprivation for small areas in Wales. It is a National Statistic produced by Welsh Government. WIMD identifies areas with the highest concentrations of several different types of deprivation. The prime purpose of the index is to provide the evidence to inform planning and policy including funding or targeting of programmes and services for local areas. WIMD ranks all Lower Super Output Areas in Wales from 1 (most deprived) to 1,909 (least deprived).

WIMD is currently made up of eight separate domains (or types) of deprivation. Each domain is compiled from a range of different indicators. The domains included in WIMD 2019 are:

- Income
- Employment
- Health
- Education
- Access to Services
- Housing
- Community Safety
- Physical Environment

WIMD is a measure of multiple deprivation that is both an area-based measure and a measure of relative deprivation.

### **2.3 UKHSA Whole genome sequencing and cluster analysis**

Whole genome sequencing (WGS) on culture confirmed samples of TB in Wales is carried out by the Pathogen Genomics Unit (PenGU). Information on WGS-linked clusters of TB containing two or more Welsh cases is generated by UKHSA

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<sup>2</sup> Further information on the Welsh Index of Multiple Deprivation available at: <https://www.gov.wales/welsh-index-multiple-deprivation>

through the Forest pipeline using WGS results. There is a 12 single nucleotide polymorphism (SNP) distance cut off for clustering isolates. Public Health Wales link patient information from NTBS with the sequence data from isolates.

## **2.4 Office for National Statistics**

The Office for National Statistics (ONS) provides national and subnational mid-year population estimates for the UK and its constituent countries by administrative area, age and sex (including components of population change, median age and population density). Population statistics for gender, age and location of residence are based on 2021 mid-year figures<sup>3</sup>. Population estimates for Ethnicity are based on the 2011 ONS census<sup>4</sup>.

## **2.5 Wales national TB cohort review**

The National Cohort Review Programme has been running since 2012 involving the Welsh Respiratory Delivery Group and Public Health Wales. The cohort review provides enhanced data on all cases derived from the NTBS (previously the Enhanced Surveillance System (ETS) and meets quarterly. The Cohort Reviews have representation from medical and nursing staff in all health boards as well as the Health Protection Team and Communicable Disease Surveillance Centre (CDSC) from Public Health Wales. Within this report enhanced case data relating to co-morbidities have been used.

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<sup>3</sup> Office for National Statistics. Mid-2021 population estimates. [ONS mid-year population estimates](#)

<sup>4</sup> Office for National Statistics. 2021 census - Ethnicity and National Identity in England and Wales: 2021 [ONS 2021 Census data - Ethnicity](#)

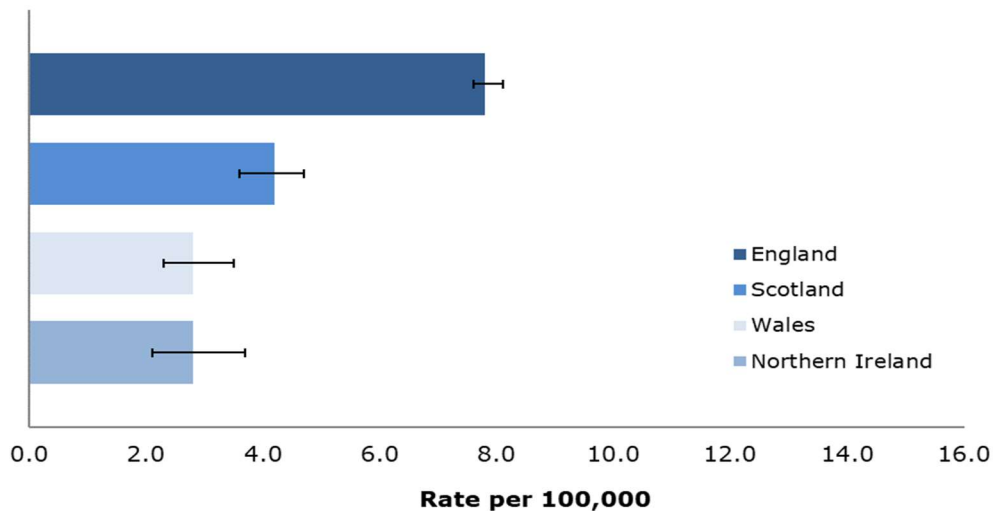


### 3 Tuberculosis (TB) notifications and incidence

In 2021, a total of 90 newly diagnosed cases of TB were reported in Wales (2.8 per 100,000 population). Whilst this represents an increase of 12.5% from the previous year (80 cases, 2.5 per 100,000 population) there has been a generally decreasing trend in cases reported in Wales over the last decade.

The rates of TB in Wales remain one of the lowest in the UK alongside Northern Ireland with a rate of 2.8 per 100,000 compared to the UK rate of 7.1 per 100,000 population (Figure 1).

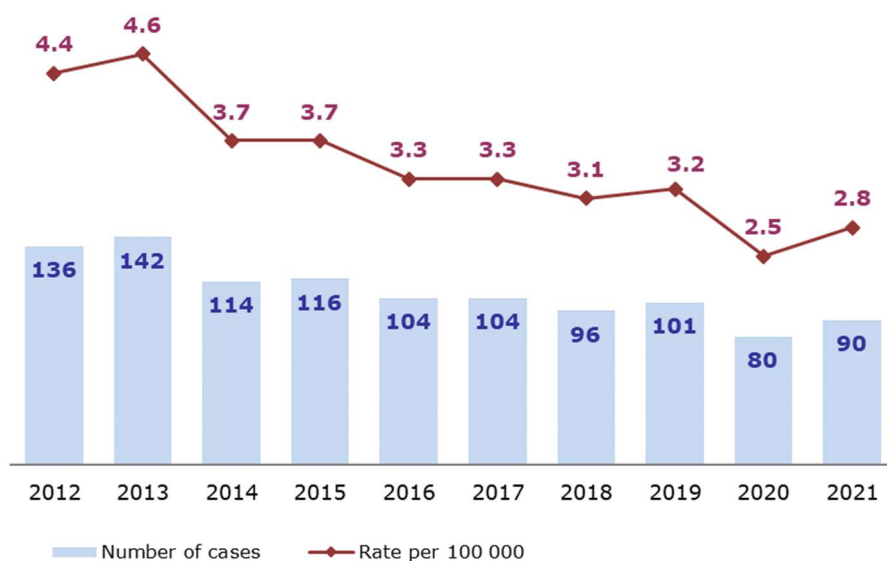
**Figure 1 Rates of Tuberculosis per 100,000 population in the UK, 2021**



Source: NTBS, 2023

Notifications and rates of TB in Wales have decreased by 34% over the past ten years from 2012 to 2021 (Figure 2).

**Figure 2 Number of Cases and Rate of TB per 100,000 population (red line) in Wales, 2012-2021**



Source: NTBS, 2023

### 3.1 Demographic profile of TB cases

#### 3.1.1 Geographical distribution

In 2021, the highest number of new TB cases reported were resident in the Cardiff & Vale University Health Board area (23 cases, 25.6%), representing a rate of 5.1 per 100,000 population. The lowest rate was reported in Powys Teaching Health Board at 1.5 per 100,000 population. Rates per 100,000 population by health board of residence are shown in Table 1.

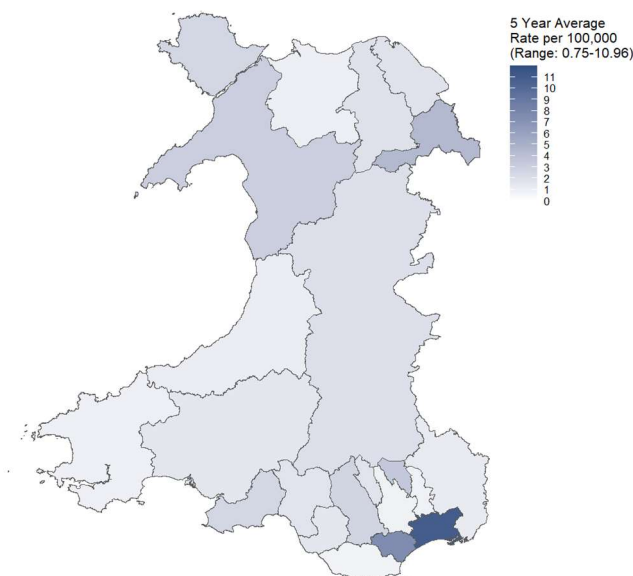
**Table 1 Rates per 100,000 population by health board of residence 2017 to 2021, Wales**

	2017	2018	2019	2020	2021
<b>Aneurin Bevan UHB</b>	4.6	3.2	5.2	3.0	3.4
<b>Betsi Cadwaladr UHB</b>	3.2	2.7	2.6	1.6	2.5
<b>Cardiff and Vale UHB</b>	5.5	6.6	5.6	5.6	5.1
<b>Cwm Taf Morgannwg UHB</b>	2.0	1.6	3.1	1.8	2.3
<b>Hywel Dda UHB</b>	1.6	1.6	0.8	0.5	1.8
<b>Powys THB</b>	2.3	0.8	2.3	3.0	1.5
<b>Swansea Bay UHB</b>	2.6	2.8	1.0	2.3	2.4
<b>Total</b>	3.3	3.1	3.2	2.5	2.8

Source: NTBS, 2023

Within health board area there is substantial variation in case rates by local authority of residence, as shown in Figure 3, with Newport and Cardiff reporting the highest rates year on year, with 5-year average rates (2017-2021) of 11 and 7.5 per 100,000 population respectively.

**Figure 3 Five-year average rate of TB per 100,000 population by Local Authority of Residence, 2017-2021**



Source: NTBS, 2023

### 3.1.2 Sex and age distribution

Of the 90 cases reported in 2021, 60% were male and 40% female (rates of 3.6 and 2.3 per 100,000 population respectively). This ratio has remained broadly stable over time (Table 2).

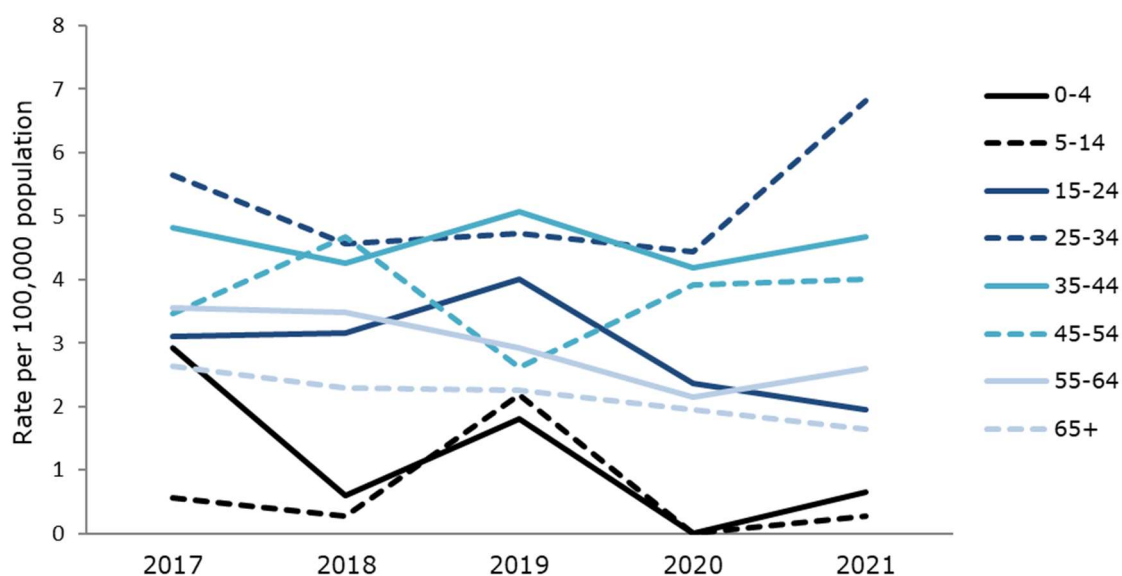
**Table 2 Number of notifications and rate of TB in Wales by sex, 2017-2021**

	2017		2018		2019		2020		2021	
	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate	Cases	Rate
<b>Male</b>	59	3.8	67	4.3	67	4.3	51	3.3	54	3.6
<b>Female</b>	45	2.8	29	1.8	34	2.1	29	1.8	36	2.3
	<b>104</b>		<b>96</b>		<b>101</b>		<b>80</b>		<b>90</b>	

Source: NTBS, 2023

The TB incidence rate has remained highest in those aged 25-34 years (6.8 per 100,000 population) in the last 5 years with the exception of 2019, and the case rate in those aged 65+ continues to decline, as shown in figure 4.

**Figure 4 Rate of TB per 100,000 population by age group and year 2017-2021**



Source: NTBS, 2023

### 3.1.3 Country of birth and ethnicity

#### Country of birth

More than half (64%) of TB cases reported in Wales were born overseas, 34% of cases were born in the UK and the remaining cases had unrecorded place of birth (Table 3). The proportion of cases born abroad has increase by 12 percentage points over the five years.

**Table 3 Number and proportion (%) of TB cases UK and non-UK born by year**

Place of Birth	2017		2018		2019		2020		2021	
	Cases	%	Cases	%	Cases	%	Cases	%	Cases	%
Born in UK	46	44	49	51	42	42	30	38	31	34
Born Abroad	54	52	45	47	53	52	48	60	58	64
Not Known	<5	4	<5	2	6	6	<5	3	<5	1
<b>Total</b>	<b>104</b>		<b>96</b>		<b>101</b>		<b>80</b>		<b>90</b>	

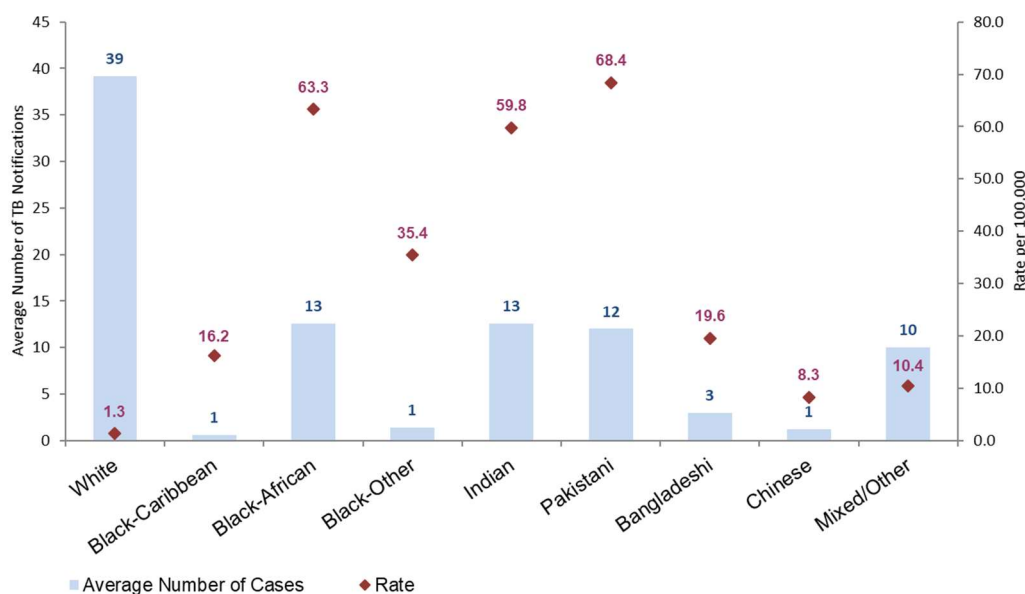
Source: NTBS, 2023

Of the 58 cases born outside the UK and notified in 2021, the majority of cases originated from South Asia (50%), Eastern Africa (10%) and Eastern Europe (10%).

### Ethnicity

In 2021, a third (32%) of TB cases were reported in the white ethnic group with the remaining 65% reported within other ethnic groups, an increase of 6% from 2020. The highest rates have been recorded in the Pakistani, Black-African and Indian populations<sup>5</sup> (Figure 5).

**Figure 5 Five-year average annual number of TB cases and rate per 100,000 population by ethnic group, 2017-2021, Wales**

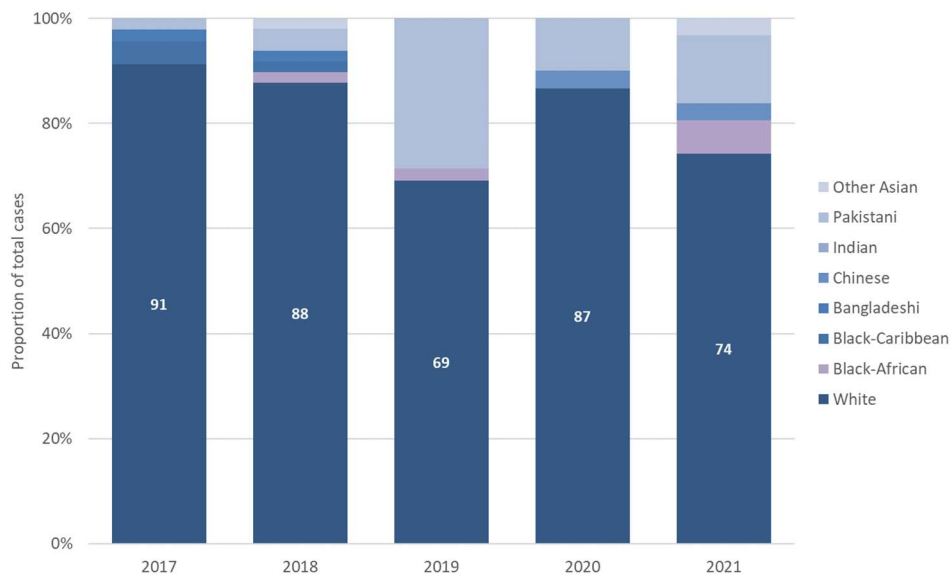


Source: NTBS, 2023

The majority of UK born cases are of White ethnicity, with increasing ethnic diversity in more recent years. The ethnic profile of UK born TB cases is shown in figure 6.

<sup>5</sup> Rates per 100,000 population by ethnicity derived using ONS census data 2021. [ONS 2021 census data - ethnicity](https://www.ons.gov.uk/peoplepopulationandcommunity/healthandlife/bulletins/articlesandreports/2021/03/2021-census-ethnicity)

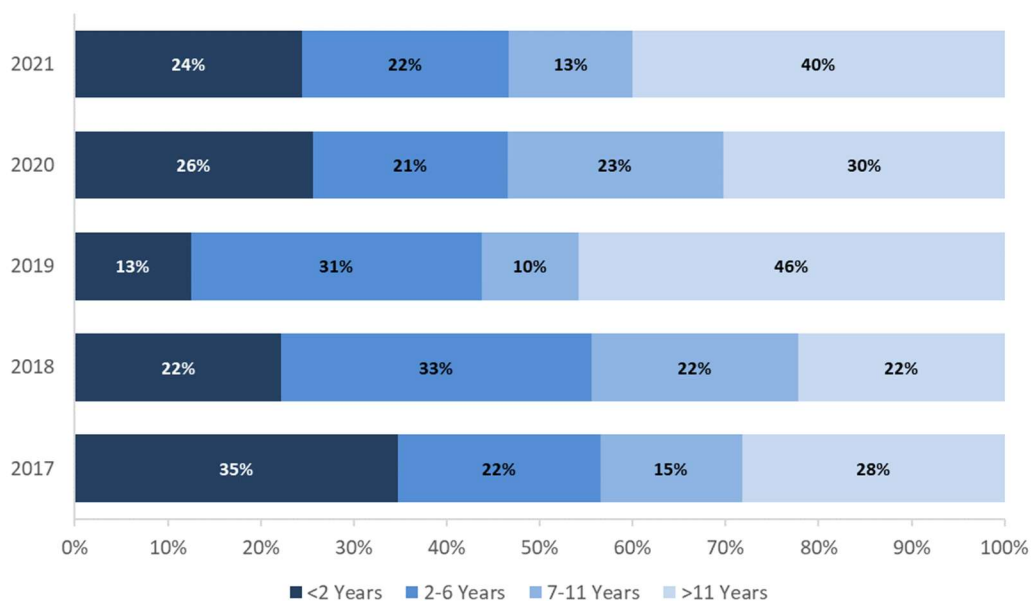
**Figure 6 Proportion (%) of UK born TB cases by ethnicity in Wales, 2017-2021**



Source: NTBS, 2023

Of the cases notified in 2021 with a date of arrival into the UK, 24% were diagnosed within 2 years of arrival. 40% were diagnosed with TB more than 11 years after arrival (Figure 7). It is not known what proportion of these cases are the result of reactivation of latent disease acquired prior to arrival, new acquisition overseas after initial arrival, or transmission within the UK subsequent to arrival.

**Figure 7 Time between entry to UK and TB notification for non-UK born cases in Wales, 2017-2021**



Source: NTBS, 2023

### 3.1.4 Social risk factors, deprivation and co-morbidities

#### Self-reported social risk factors

In 2021, overall, 17% of cases self-reported having at least one social risk factors (SRF), a reduction compared to the 2018-2020 period (Figure 8). The most common SRF in the cohort was drug misuse at 14%. Two or more SRF's, indicative of more complex risk, were reported by 8%.

**Figure 8 Self-reported history of or current social risk factors among TB patients in Wales 2017-2021**

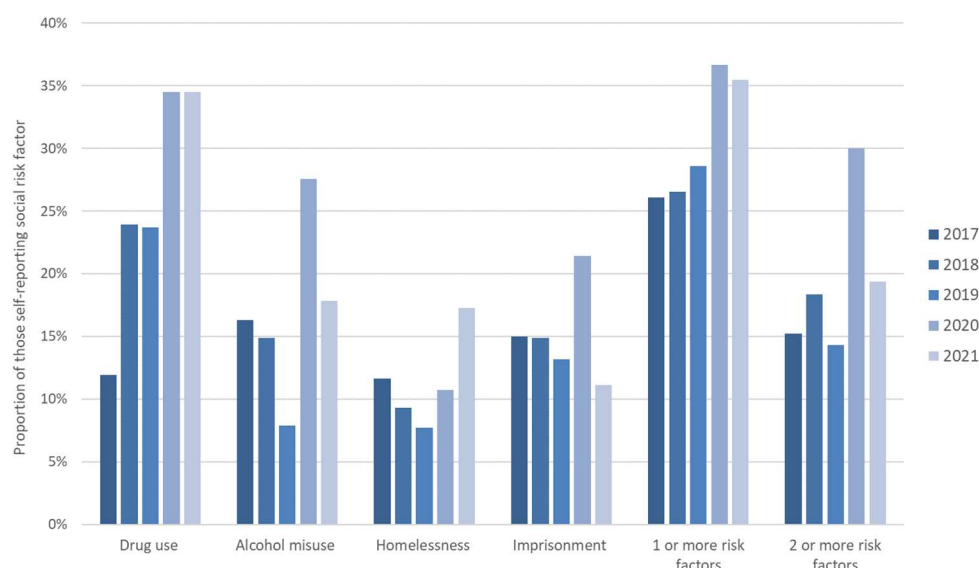
	2017	2018	2019	2020	2021
<b>Drug use</b>	7%	12%	11%	16%	14%
<b>Alcohol misuse</b>	9%	11%	3%	9%	7%
<b>Homelessness</b>	6%	7%	4%	7%	9%
<b>Imprisonment</b>	7%	10%	12%	8%	9%
<b>1 or more risk factors</b>	15%	18%	21%	20%	17%
<b>2 or more risk factors</b>	9%	11%	8%	15%	8%

Source: NTBS, 2023

However, rates of social risk factors vary substantially between UK and non-UK born patients as shown in Figures 9 and 10.

In 2021, 35% of UK-born cases reported having at least 1 SRF and 19% had two or more. The factor with the greatest proportion of cases was drug misuse (34%) and alcohol misuse (18%).

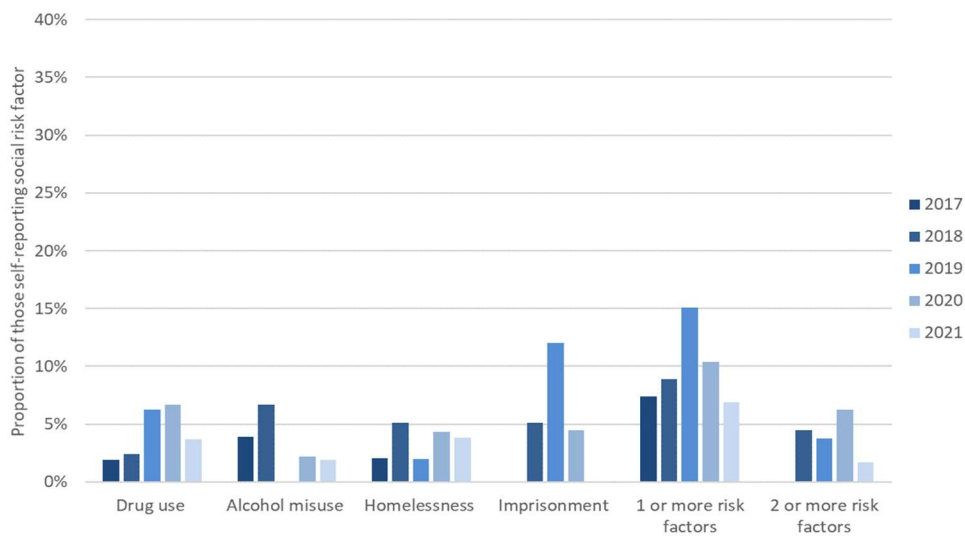
**Figure 9 History of or current self-reported social risk factors among UK-born TB patients in Wales, 2017-2021**



Source: NTBS, 2023

Of the cases born outside of the UK reported in 2021, 7% reported at least one SRF and 2% having two or more (Figure 10). Within this population, imprisonment and homelessness were the most frequently reported social risk factors.

**Figure 10 History of or current self-reported social risk factors among non-UK born TB patients in Wales, 2017-2021**

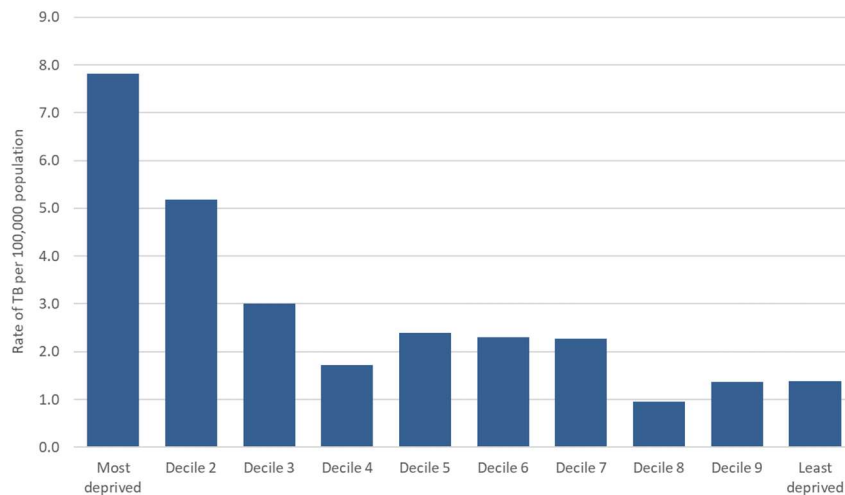


Source: NTBS, 2023

### Deprivation

TB infection is more frequently reported in those living in the most deprived communities in Wales (Figure 11). The rate of TB has been highest in the most deprived decile<sup>6</sup> since 2017. In 2021, the rate in the most deprived decile was 8.5 per 100,000 population and 0.7 per 100,000 population in the least deprived decile.

**Figure 11 5-Year average rate of TB in Wales per 100,000 population by deprivation decile, 2017-2021**



Source: NTBS, 2023

<sup>6</sup> As measured using the Welsh Index of Multiple Deprivation (WIMD). Further information can be found at <https://statswales.gov.wales/Catalogue/Community-Safety-and-Social-Inclusion/Welsh-Index-of-Multiple-Deprivation>

## Co-morbidities

Where co-morbidity status was known for those notified in 2021, 13% of cases had diabetes (Figure 4). The second most frequent co-morbidity was immunosuppression (7%).

**Table 4 Percentage of TB cases in Wales with co-morbidities, 2017-2021**

	<b>5-Year Average (% of total cases)</b>
Diabetes	10%
HIV	1%
Hepatitis B Virus	1%
Hepatitis C Virus	3%
Chronic Liver Disease	2%
Chronic Renal Disease	2%
Immunosuppression <sup>1</sup>	7%

<sup>1</sup>Immunosuppression includes those with certain diseases, chronic inflammatory conditions, those on biological therapy and transplant recipients

**Source: NTBS and Wales cohort review data, 2023**



## 4 Diagnosis, microbiology and drug resistance

### 4.1 Diagnosis and site of infection

Pulmonary tuberculosis with or without extra-pulmonary disease accounted for 62% of cases in 2021; of these 27% also had extra pulmonary disease.

**Table 5 Number and percentage of TB cases in Wales by site of disease, 2017-2021, Wales**

Site of Disease*	2017		2018		2019		2020		2021	
	Cases	%	Cases	%	Cases	%	Cases	%	Cases	%
Pulmonary**	60	58	73	76	76	75	46	58	56	62
Extra thoracic lymph nodes	21	20	9	9	9	9	9	11	10	11
Intra thoracic lymph nodes	7	7	7	7	5	5	10	13	10	11
Pleural	6	6	<5	<5	9	9	7	9	7	8
Gastrointestinal	9	9	<5	<5	<5	<5	<5	<5	<5	<5
CNS-meningitis	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
CNS-other	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Bone-Spine	<5	<5	<5	<5	<5	<5	<5	<5	6	7
Bone-other	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Genitourinary	<5	<5	5	6	<5	<5	<5	<5	<5	<5
Laryngeal	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Cryptic	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Other extra pulmonary	22	21	17	18	26	26	26	33	20	22
Unknown extra pulmonary	0	0	0	0	0	0	0	0	0	0
<b>Total cases</b>	<b>104</b>		<b>96</b>		<b>101</b>		<b>80</b>		<b>90</b>	

\*Patients may have disease at more than one site

\*\*Pulmonary TB includes miliary TB in accordance with the WHO's recommendation and international reporting definitions<sup>7</sup>

Source: NTBS, 2023

In 2021, 74% of all cases were culture confirmed, and 95% of pulmonary cases (with or without extra pulmonary disease) were culture confirmed. This remains above the European Centre for Disease Prevention and Control (ECDC) target of 80% for culture confirmation of pulmonary tuberculosis<sup>8</sup>.

Among 65 culture-confirmed cases:

- 93% were due to *M. tuberculosis*
- 3% were due to *M. bovis*
- 1% were due to *M. africanum*
- The remaining 3% cases were not reported

<sup>7</sup> World Health Organisation (WHO). - [9789241505345\\_eng.pdf;jsessionid=566A278C331FC702C9AFE216543CB6E2 \(who.int\)](https://www.who.int/publications/m/item/9789241505345-eng.pdf?jsessionid=566A278C331FC702C9AFE216543CB6E2)

<sup>8</sup> European Centre for Disease Prevention and Control (ECDC). - [101111\\_SPR\\_Progressing\\_towards\\_TB\\_elimination.pdf \(europa.eu\)](https://ecdc.europa.eu/en/our-work/progressing-towards-tb-elimination)

**Table 6 Number and percentage of TB cases in Wales with bacteriological confirmation, 2017-2021, Wales**

Bacteriological Results	2017		2018		2019		2020		2021	
	Cases	%	Cases	%	Cases	%	Cases	%	Cases	%
Culture confirmed <sup>1</sup>	75	72	79	82	82	81	66	83	67	74
Culture confirmed Pulmonary cases <sup>2</sup>	51	84	65	87	64	85	42	89	53	95
Pulmonary cases with sputum smear taken <sup>2</sup>	33	54	40	53	37	49	30	64	30	54
Positive sputum smear pulmonary cases <sup>3</sup>	21	64	29	73	25	68	19	63	21	70

<sup>1</sup>Denominator for percentage is total number of TB cases

<sup>2</sup>Denominator for percentage is total number of pulmonary TB cases

<sup>3</sup>Denominator for percentage is number of pulmonary cases with sputum smear taken

Source: NTBS, 2023

**Table 7 Number and percentage of TB Cases in Wales with previous diagnosis, 2017-2021, Wales**

Previous Diagnosis	2017		2018		2019		2020		2021	
	Cases	%	Cases	%	Cases	%	Cases	%	Cases	%
Yes	6	6	6	6	8	8	<5	<5	6	7
No	93	89	89	93	88	87	75	94	73	81
Not Reported	5	5	<5	<5	5	5	<5	<5	11	12
<b>Total</b>	<b>104</b>		<b>96</b>		<b>101</b>		<b>80</b>		<b>90</b>	

Source: NTBS, 2023

In 2021, 7% of cases reported having had a previous diagnosis of active TB as seen in Table 7. Where reported, all cases in 2021 with a previous diagnosis had received treatment for their previous episode.

## 4.2 Multi-drug (MDR) and extensively drug resistant (XDR) cases

MDR-TB is defined as a resistance to both rifampicin and isoniazid, two front line antibiotics used to treat TB. In 2021, the WHO created new definitions of pre-XDR and XDR<sup>9</sup>:

- Pre-XDR: TB strains fulfilling MDR definition with additional resistance to any fluoroquinolone
- XDR: TB strains fulfilling MDR definition with additional resistance to any fluoroquinolone and at least one Group A drug

In 2021 there was an increase of 3.1% in MDR-TB globally compared to 2020, potentially due to the effects of the COVID-19 pandemic on the detection of TB<sup>10</sup>. In the last 5 years, 10 MDR cases have been reported via NTBS, however, 3 were not rifampicin resistance (MDR marker) but have received MDR treatment. Two cases have received XDR treatment.

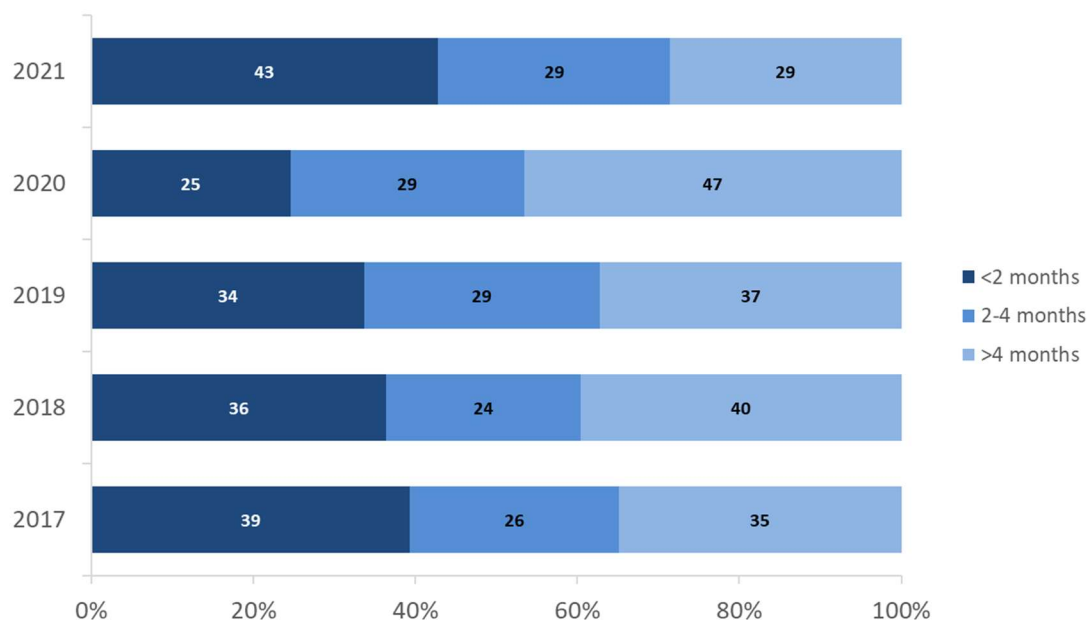
<sup>9</sup> World Health Organisation (WHO) [WHO announces updated definitions of extensively drug-resistant tuberculosis](#)

<sup>10</sup> World Health Organisation (WHO) [2.3 Drug-resistant TB \(who.int\)](#)

## 5 Treatment and outcomes

### 5.1 Symptom onset to treatment initiation

**Figure 12 Time between symptom onset and start of treatment for TB cases in Wales, 2017-2021**



Source: NTBS, 2023

In 2021:

- Of symptomatic cases, the proportion starting treatment less than two months after symptom onset increased from 25% in 2020 to 43%
- 16% of pulmonary cases started treatment over four months after symptom onset, compared to 25% in 2019 (Table 8)

There may be several factors influencing this delay from symptom onset to treatment start including healthcare seeking behaviour or delays in the clinical pathway. Delays in seeking care, particularly amongst smear positive pulmonary cases represent a potential risk of transmission to others.

**Table 8 Pulmonary TB cases with a time >4 months between symptom onset and start of treatment in Wales, 2017-2021**

Symptom onset to treatment start	2017 n %	2018 n %	2019 n %	2020 n %	2021 n %
>4 months	12 20%	18 25%	19 25%	14 30%	9 16%

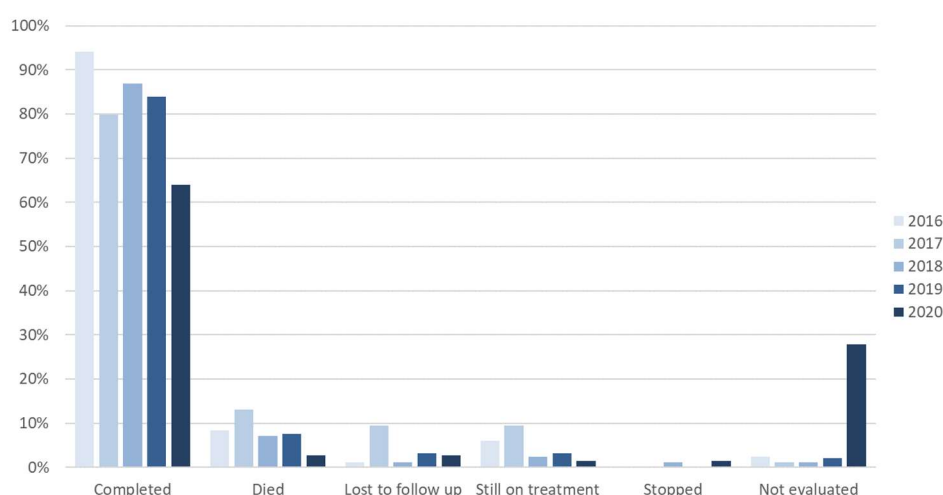
Source: NTBS, 2023

## 5.2 Treatment outcomes

Treatment outcome data for the drug sensitive cohort is routinely reported according to the year of notification. Outcome data for 2021 are not yet complete due to the duration of treatment.

Outcome data are available for 72 (90%) cases newly diagnosed in 2020<sup>11</sup>. The proportion of drug sensitive cases with expected treatment duration of less than 12 months and who had completed treatment decreased from 84% to 64% from the previous year. However, it should be noted that no treatment outcome data have been provided on NTBS to date for 28% of cases (n=20) in Wales in 2020, up from 2% in the previous year. As such, this data should be treated with caution.

**Figure 13 TB treatment outcome at 12 months for drug sensitive cases with expected treatment duration <12 months, Wales, 2016-2020<sup>10</sup>**



Source: NTBS, 2023

Tables 9 to 12 show treatment outcome by age group, sex profile, health board of residence and site of disease respectively.

**Table 9 TB treatment completion at 12 months by age group for drug sensitive cases with expected treatment duration <12 months, Wales, 2016-2020<sup>10</sup>**

Year	0-4		5-14		15-24		25-34		35-44		45-54		55-64		65+	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
2016	0	-	<5	100	7	88	17	94	19	95	14	93	10	67	10	59
2017	<5	40	<5	50	12	92	16	80	10	77	8	53	10	77	9	60
2018	<5	100	0	-	13	93	14	93	12	86	18	90	11	79	6	60
2019	<5	100	8	100	11	79	16	89	14	100	9	90	7	58	11	73
2020	0	-	0	-	8	89	7	44	8	53	8	62	6	86	9	75

Source: NTBS, 2023

<sup>11</sup> 8 cases excluded due to initial and amplified rifampicin resistance and MDR-TB treated cases and those with CNS, spinal, miliary or cryptic disseminated TB

**Table 10 TB treatment completion at 12 months by sex for drug sensitive cases with expected treatment duration < 12 months, Wales, 2020**

Year	Male		Female	
	n	%	n	%
2016	45	85	34	81
2017	42	79	26	60
2018	56	88	19	79
2019	48	80	31	91
2020	30	65	16	62

**Table 11 TB treatment outcome at 12 months by Health Board of residence for drug sensitive cases with expected treatment duration < 12 months, Wales, 2020**

LHB	2016			2017			2018			2019			2020		
	Total	Treatment completed		Total	Treatment completed		Total	Treatment completed		Total	Treatment completed		Total	Treatment completed	
		n	n		%	n		n	%		n	n		%	n
Aneurin Bevan	28	26	93	26	16	62	15	12	80	31	24	77	17	15	88
Betsi Cadwaladr	11	10	91	22	17	77	19	18	95	16	14	88	9	7	78
Cardiff and Vale	24	22	92	26	25	96	29	24	83	23	21	91	25	13	52
Cwm Taf Morgannwg	11	5	45	9	8	89	6	6	100	13	10	77	8	6	75
Hywel Dda	10	9	90	6	5	83	<5	<5	50	<5	<5	67	<5	<5	100
Powys Teaching	<5	<5	50	<5	<5	67	<5	<5	100	<5	<5	100	<5	<5	33
Swansea Bay	15	14	93	9	<5	56	10	10	100	<5	<5	100	8	<5	25
<b>Total</b>	<b>101</b>	<b>87</b>	<b>86</b>	<b>101</b>	<b>78</b>	<b>77</b>	<b>84</b>	<b>73</b>	<b>87</b>	<b>93</b>	<b>78</b>	<b>84</b>	<b>72</b>	<b>46</b>	<b>64</b>

Source: NTBS, 2023

**Table 12 TB treatment outcome at 12 months by site of disease for drug sensitive cases with expected treatment duration <12 months, Wales, 2016-2020<sup>a</sup>**

Site of disease	Completed		Died		Lost to follow-up		Still on treatment		Stopped		Not evaluated <sup>b</sup>		Total <sup>c</sup>
	n	%	n	%	n	%	n	%	n	%	n	%	
Pulmonary only	23	70	<5	<5	<5	<5	0	0	0	0	8	24	33
Pulmonary, with or without EP	30	68	<5	<5	<5	<5	<5	<5	0	0	11	25	44
Extrapulmonary only	16	57	<5	<5	<5	<5	0	0	<5	<5	9	32	28
Extra-thoracic lymph nodes	<5	<5	0	0	<5	<5	0	0	<5	<5	<5	<5	8
Intra-thoracic lymph nodes	5	50	0	0	0	0	0	0	0	0	5	50	10
Pleural	5	83	0	0	0	0	0	0	0	0	<5	<5	6
All other EP sites <sup>d</sup>	6	67	<5	<5	0	0	0	0	0	0	<5	<5	9
<b>Total</b>	<b>46</b>	<b>64</b>	<b>&lt;5</b>	<b>&lt;5</b>	<b>&lt;5</b>	<b>&lt;5</b>	<b>&lt;5</b>	<b>&lt;5</b>	<b>&lt;5</b>	<b>&lt;5</b>	<b>20</b>	<b>28</b>	<b>72</b>

<sup>a</sup>Excludes initial and amplified to rifampicin resistant TB and MDR-TB treated cases and those with CNS, spinal, miliary or cryptic disseminated TB

<sup>b</sup>Not evaluated includes missing, unknown and transferred out

<sup>c</sup>Multiple sites of disease can be reported so the total does not add up to the total number of cases

<sup>d</sup>All other extra-pulmonary sites includes gastrointestinal, genitourinary, laryngeal, other and unknown extra-pulmonary disease

<sup>1</sup>Excludes initial and amplified to rifampicin resistant TB and MDR-TB treated cases and those with CNS, spinal, miliary or cryptic disseminated TB

Source: NTBS, 2023

Of the 11 cases of Pulmonary with Extrapulmonary TB with treatment outcome reported, 7 (64%) completed treatment.

### 5.2.1 TB related mortality

In the 5 years 2016-2020, the proportion of deaths in TB cases has remained relatively low, with a high of 14% in 2017, as shown in Table 13.

**Table 13 All drug sensitive and severe TB cases reported to have died at last recorded outcome, Wales, 2016-2020**

Year	Cases reported	Total deaths		TB caused or contributed to death		TB incidental to death		Unknown		Post mortem	
	n	n	%	n	%	n	%	n	%	n	%
2016	101	8	8	<5	<5	<5	<5	<5	<5	<5	<5
2017	101	14	14	7	50	5	36	<5	<5	<5	<5
2018	93	9	10	5	56	<5	<5	<5	<5	<5	<5
2019	99	7	7	<5	<5	<5	<5	<5	<5	<5	<5
2020	79	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5

<sup>1</sup>Excludes initial and amplified to rifampicin resistant TB and MDR-TB treated cases

Source: NTBS, 2023

## 6 TB prevention and control

Information on pre-entry screening of UK migrants is not routinely available.

The provision of the Bacillus Calmette-Guérin (BCG) vaccine in the NHS vaccination schedule in Wales was ceased in 2005; it is only offered to children who are at higher risk of coming into contact with someone with TB<sup>12</sup>. The BCG vaccine is effective in protecting young children against severe forms of TB, such as meningitis, but does not prevent primary infection and reactivation of latent infection<sup>13</sup>.

**Table 14 Percentage of cases who have received BCG vaccinations and percentage of cases with known status, 2017-2021**

Age Group	2017		2018		2019		2020		2021	
	Vaccinated %	Known Status %	Vaccinated %	Known Status %	Vaccinated %	Known Status %	Vaccinated %	Known Status %	Vaccinated %	Known Status %
0-4	60	100	0	100	0	67	-	-	0	100
5-14	100	50	100	100	75	100	-	-	100	100
15-24	71	58	80	42	78	60	67	67	33	43
25-34	80	68	70	56	85	68	77	72	76	81
35-44	92	71	90	67	80	83	50	53	89	53
45-54	100	53	100	55	86	64	85	81	100	69
55-64	83	43	83	43	60	42	100	78	100	45
65+	67	35	90	67	57	47	43	54	71	64
<b>Total</b>	82	58	85	56	74	65	72	68	81	64

Source: NTBS, 2023

Of those with a known BCG vaccination status, 81% of cases in 2021 had been vaccinated previously, an increase from 2020 (72%). The highest rates of vaccination were in the 5-14, 45-54 and 55-64 year old age groups, where 100% with known status were vaccinated.

<sup>12</sup> Public Health Wales (PHW) [Bacillus Calmette-Guérin Vaccine \(BCG\) / TB vaccine - Public Health Wales \(nhs.wales\)](#)

<sup>13</sup> World Health Organisation (WHO) [BCG \(who.int\)](#)

## 7 Whole genome sequenced clusters

Whole genome sequencing (WGS) of tuberculosis isolates was introduced to Wales in 2019 in order to carry out species typing, resistance typing and cluster analysis.

A cluster identified with WGS is defined as “2 or more persons with a diagnosis of active TB that have less than 12 SNP difference”<sup>14</sup>. SNP difference refers to single polynucleotide polymorphisms (SNPs) a mutation at a single position in the DNA sequence. Whole-genome SNP comparison is performed to identify SNPs that differ between isolates in a genotype-matched cluster. While a 12 SNP difference can be defined as the upper threshold of genomic relatedness between epidemiologically related hosts, lower limits must be assessed on an individual situation or outbreak basis<sup>13</sup>.

Since the introduction of WGS and cluster analysis in Wales in 2019, a total of 35 clusters of TB with two or more Welsh cases have been identified.

In 2021, three new genomically linked clusters were identified. Of the 90 cases notified in 2021, 13 individuals were linked to clusters and were distributed across 9 clusters (including the three newly identified). Of these cases:

- All were *Mycobacterium tuberculosis*
- None were considered as Multi-drug resistant (MDR)
- All cases were pulmonary with or without extra-pulmonary disease, with 6/13 (46%) having a positive sputum smear result.
- Similar numbers of clustered TB cases were observed across Welsh Health Boards across Wales with the exception of Powys Teaching Health Board and Hywel Dda University Health Board
- Over half (7/13) of the WGS linked cases in 2021 had at least one social risk factor

Reporting of clusters identified with WGS is undertaken by Public Health Wales Communicable Disease Surveillance Centre to support Health Protection control measures. As such, these reports are restricted.

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<sup>14</sup> UKHSA *Mycobacterium tuberculosis* whole-genome sequencing and cluster investigation handbook. Available at: [TB WGS and cluster investigation handbook](#)