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# Legionnaires' disease in England and Wales 2013

## **Citation**

This report from Public Health England evaluates and summarises data analysed from cases of Legionellosis reported to the National Surveillance Scheme for Legionnaires' disease in residents of England and Wales with onset of symptoms in 2013.

# About Public Health England

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## Summary

In 2013, 286 cases of Legionnaires' disease (confirmed and presumptive) were reported to the National Surveillance Scheme for Legionnaires' disease in residents of England and Wales.

Of the 284 confirmed cases of Legionnaires' disease reported in 2013, 212 (74.6%) were male and 72 (25.4%) were female, giving a male to female ratio of 2.90.

Two hundred and thirty-five (82.7%) of the 284 confirmed cases of Legionnaires' disease were in individuals over 50 years of age.

Over the three-year period 2011 to 2013, the incidence rate in England and Wales was 4.90 per million population (pmp). Peak incidence was reported in the areas covered by Mid and West Wales Health Protection Team (8.07 pmp), the West Midlands (6.95 pmp) and East Midlands PHE Centre (6.59 pmp).

Of the 284 confirmed cases of Legionnaires' disease, 191 (67.3%) cases were considered to have been exposed to the infecting organism in the community, 88 (31.0%) cases were associated with travel abroad and 5 (1.8%) were considered to have links to a healthcare facility (nosocomial).

At least one underlying condition/risk factor was found in 212 (74.6%) confirmed cases of Legionnaires' disease; with heart disease being the most frequently reported underlying condition.

Mortality analysis over the period 2004 to 2013 suggests there has been no change to the death rate. A high level of mortality remains among individuals diagnosed with Legionnaires' disease.

The number of cases identified by polymerase chain reaction (PCR) testing has doubled since 2012 from 18.3 in 2012 to 36.6% of cases tested by PCR during 2013.

The two most common *Legionella pneumophila* serogroup 1 subtypes were ST1 and ST47.

Fewer than half the number of clusters/outbreaks were identified in 2013 compared to 2012; seven clusters/outbreaks in 2013 compared to 20 in 2012. There were no nosocomial outbreaks/clusters identified.

Of the 88 cases of Legionnaires' disease in residents of England and Wales associated with travel abroad in 2013, Spain was the most frequent destination with 15 cases reported. However, the country with the highest incident rate was India with 7.56 cases per million visits, followed by Malta with 6.54 cases per million visits.

## Introduction

Legionnaires' disease is a severe atypical pneumonia caused by exposure to *Legionella* bacteria that inhabit natural and man-made water systems. The disease has been notifiable since April 2010, although records have been kept since 1980, with enhanced surveillance undertaken on every case reported in residents of England and Wales with the primary purpose of identifying clusters and prevent or minimise the impact of potential outbreaks.

The data presented in this report is collected by teams from Public Health England (PHE) centres. The data is collated and verified by the National Surveillance Scheme for Legionnaires' disease, managed at PHE's Centre for Infectious Disease Surveillance and Control in Colindale, London. This report presents the epidemiological data based on reported cases of Legionnaires' disease among residents of England and Wales who experienced the onset of symptoms during 2013. Data from previous years has been included, where appropriate, for comparison.

### Prevention and control of Legionellosis

Legionellosis is the generic term used to describe human infection with any species of the *Legionella* bacteria but predominantly *Legionella pneumophila*. Infection by the organism can cause one of two recognised syndromes; Legionnaires' disease [1,2], a severe, potentially fatal, form of pneumonia and Pontiac fever [3], a self-limiting, non-fatal, mild influenza-like illness. A third atypical form of the disease also exists and is characterised by symptoms similar to those of Legionnaires' disease but with the absence of pneumonia and termed non-pneumonic Legionellosis. Further information on these conditions are included in previous reports [4].

There have been no documented cases of Legionnaires' disease associated with person to person spread. The principal route of infection occurs through

direct exposure to aerosols/droplets from an environmental source colonised by the *Legionella* bacteria but in rare instances can be caused through aspiration. *Legionella* naturally grows in the environment, in warm, stagnant water such as ponds, lakes and streams. Artificial water systems have been created by man which mimic the natural environment conducive to the growth of *Legionella spp.* In particular, cooling towers, evaporative condensers, hot and cold water systems and spa pools are ideal for growth and have the added benefit of providing the organism with the means to spread out into the atmosphere through the creation and dispersal of aerosols/droplets.

The most effective method of preventing the disease has been proven to be through the introduction of stringent regulations on the management and maintenance of man-made water systems. The regulations aim to limit the environmental factors that support the growth and dissemination of *Legionella*, thereby preventing the exposure of susceptible hosts to this organism. Regulations and guidance are in place to ensure water systems are designed to avoid stagnation, regulate cold and hot water temperatures independently, minimise the production and dissemination of aerosols/droplets and where appropriate, incorporate regular disinfection of the system [5]. Mis-managed and poorly maintained water systems can rapidly become colonised and become the source of major outbreaks of Legionnaires' disease similar to those that occurred in Murcia in Spain (2001) [6], Barrow-in-Furness (2002) [7] and the outbreak associated with the BBC (1988) [8].

## The national surveillance scheme

Legionnaires' disease was first identified in 1976 in Philadelphia, USA, and by 1980 the National Surveillance Scheme for Legionnaires' disease was established to collect enhanced surveillance data on all cases of Legionnaires' disease in residents of England and Wales. The scheme is managed by the Legionella Section, Respiratory Diseases Department, Colindale, with the aim of:

- identifying clusters to prevent potential outbreaks
- validate and assure the quality of the data submitted to the scheme
- issue notifications and alerts to Health Protection Teams (HPTs)
- support the management and control of outbreaks and incidents
- monitor trends over time
- identify risk group and categories
- report travel-associated cases of Legionnaires' disease to the European Legionnaires' Disease Surveillance Network (ELDSNet)

- as a collaborating member of ELDSNet, implement the European guidelines for travel associated cases of Legionnaires' disease
- collaborate with international counterparts to follow up cases associated with accommodation sites in England and Wales
- issue alerts on possible travel-associated clusters in other countries

Other formal responsibilities of the National Surveillance Scheme include the composition and provision of the following outputs:

- local and regional datasets to support investigations, outbreaks, and research
- monthly *Legionella* reports
- annual Office for National Statistics (ONS) dataset for Legionnaires' disease
- annual statistics for the World Health Organization
- annual dataset for ELDSNet operated by the European Centre for Disease Prevention and Control (ECDC)

## Methodology

All the data presented in this report was extracted from the national surveillance scheme database, which holds data on confirmed and suspected cases of Legionellosis in residents of England and Wales; the majority of which were reported to the national surveillance scheme by HPTs. Some cases were reported by the national reference laboratory, Respiratory and Vaccine Preventable Bacterial Reference Unit (formerly the Respiratory and Systemic Infection Laboratory), at PHE Colindale.

### Case definition – confirmed case of Legionnaires' disease

- A clinical and/or radiological diagnosis of pneumonia with microbiological evidence of one or more of the following:
  - isolation (culture) of *Legionella* spp. from clinical specimens
  - the presence of *L. pneumophila* urinary antigen determined using validated reagents/kits

### Case definition – presumptive case of Legionnaires' diseases

- A clinical and/or radiological diagnosis of pneumonia with microbiological evidence of one or more of the following:

- detection of *Legionella* spp. nucleic acid (e.g. PCR) in a clinical specimen
- a positive direct fluorescence (DFA) on a clinical specimen using validated *L. pneumophila* monoclonal antibodies (also referred to as a positive result by direct immunofluorescence (DIF))

Population data was used from the Office for National Statistics mid-2011 population estimates. Travel statistics were obtained from the Office for National Statistics 2012 travel trends for 'UK residents visits abroad'. Statistical analysis was carried out using STATA 12.

## Descriptive epidemiology

### Legionellosis

A total of 384 individual reports of Legionellosis, human infection caused by *Legionella* spp., was reported to the National Surveillance Scheme for Legionnaires' disease in residents of England and Wales, during 2013. Of these reports, 293 were classified as confirmed or presumptive cases of Legionellosis (Table 1). In accordance with the case definitions above, 284 cases with onset of symptoms during 2013 met the case definition for a confirmed case of Legionnaires' disease and two were classified as presumptive cases.

**Table 1: Number of cases of Legionellosis (including presumptive) by disease type and year of onset, 2011–2013**

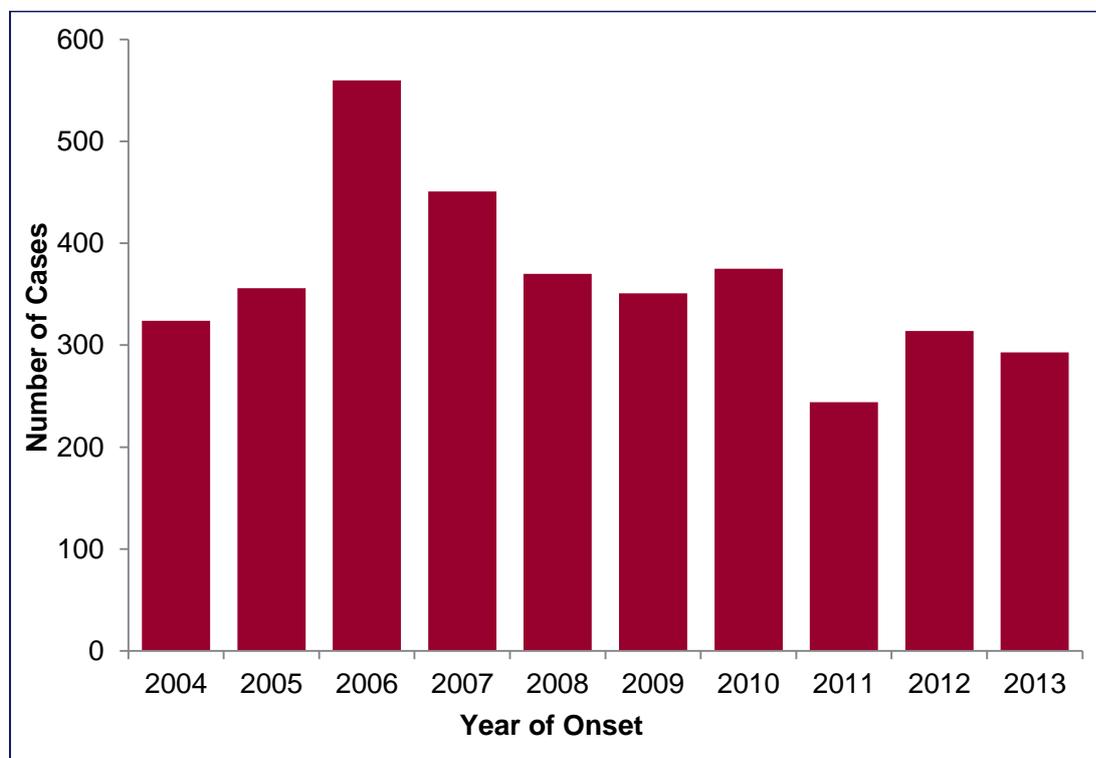
	Number of confirmed (presumptive*) cases		
	2011	2012	2013
<b>Legionnaires' disease</b>	235 (4)	306 (3)	284 (2)
<b>Non-pneumonic Legionellosis</b>	5	5	7
<b>Pontiac Fever</b>	-	-	-
<b>Total</b>	<b>240 (4)</b>	<b>311 (3)</b>	<b>291 (2)</b>

\* Presumptive cases are cases with a serological diagnosis (a single high titre) or PCR result

Figure 1 indicates that the number of cases of Legionnaires' disease with onset of symptoms during 2013 is consistent with most years of the past

decade with the exception of the rise in case numbers seen in 2006 and 2007; possibly a consequence of certain meteorological conditions [9]. The reduction in numbers observed in 2011 remains unexplained [10].

**Figure 1: Number of cases of Legionellosis (confirmed and presumptive) in residents of England and Wales by year of onset, 2004–2013**



### Age and gender distribution

Legionnaires' disease is known to affect males more than females, [11], at a male: female ratio of 3:1. In 2013, 212 (74.6%) reported cases of Legionnaires' disease were in males and 72 (25.4%) were females, resulting in a male: female ratio of 2.9, compared to 2011 and 2012 when the male: female ratio was 2.6 and 2.5, respectively (Table 2a). Risk factors considered to contribute to the higher proportion of cases in males compared to females include differences in occupation (with men more likely to be working in industrial and labour-intensive occupations) and lifestyle-related risk factors, such as drinking and smoking.

**Table 2a: Number and proportion (%) of confirmed cases of Legionnaires' disease by gender and age group, 2011–2013**

	2011 (%)		2012 (%)		2013 (%)	
	Females	Males	Females	Males	Females	Males
<b>&lt; 50 yrs</b>	16 (32.7)	33 (67.3)	7 (18.4)	31 (81.6)	13 (26.5)	36 (73.5)
<b>50-59 yrs</b>	10 (21.7)	36 (78.3)	23 (29.5)	55 (70.5)	15 (26.3)	42 (73.7)
<b>60-69 yrs</b>	22 (26.5)	61 (73.5)	28 (30.4)	64 (69.6)	23 (24.2)	72 (75.8)
<b>70+ yrs</b>	17 (29.8)	40 (70.2)	30 (30.6)	68 (69.4)	21 (25.3)	62 (74.7)
<b>All ages</b>	<b>65 (27.7)</b>	<b>170 (72.3)</b>	<b>88 (28.8)</b>	<b>218 (71.2)</b>	<b>72 (25.4)</b>	<b>212 (74.6)</b>

Age is a well-documented risk factor for Legionnaires' disease [11]. The risk of infection increases with age and individuals over the age of 50 years have the highest risk. Table 2b illustrates this commonly observed pattern with only 49 (17.3%) of the 284 cases in 2013 aged below 50 years. Fifty-seven cases (20.1%) were aged 50–59 years, and 95 cases (33.5%) were aged 60–69 years.

IN 2013, the age of male cases ranged from 18–94 years, with a median age of 63 years. For female cases ages ranged from 32–94 years, with a median age of 63 years.

**Table 2b: Number and proportion (%) of confirmed Legionnaires' disease cases by year of onset and age group, 2011–2013**

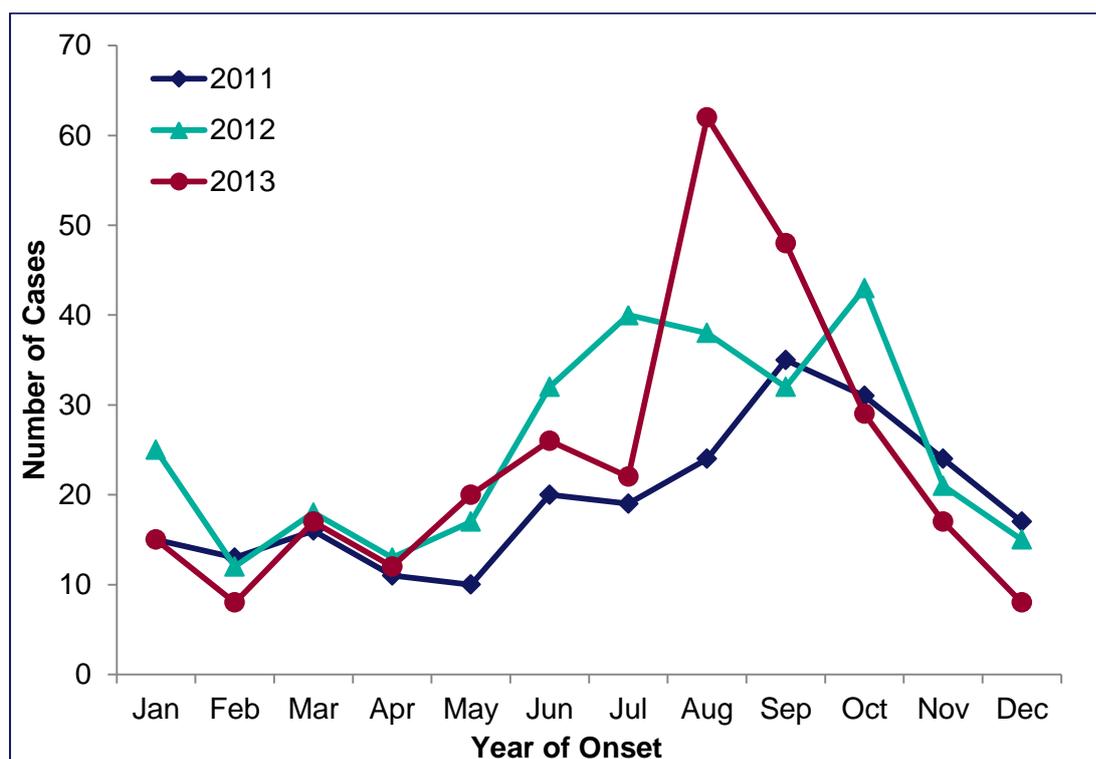
	2011 (%)	2012 (%)	2013 (%)
<b>&lt; 50 yrs.</b>	73 (20.4)	49 (20.9)	49 (17.3)
<b>50-59 yrs.</b>	76 (21.3)	46 (19.6)	57 (20.1)
<b>60-69 yrs.</b>	118 (33.1)	83 (35.3)	95 (33.5)
<b>70+ yrs.</b>	90 (25.2)	57 (24.3)	83 (29.2)

## Seasonality

Legionnaires' disease is a seasonal disease with activity in England and Wales increasing during the summer months, usually reaching a peak

between July and September. In 2013, more than a fifth of all cases (21.8%) reported onset of symptoms during August compared to a peak in September 2011 and a later than expected peak in October 2012 (Figure 2). Higher temperatures and humidity are thought to contribute to the rise in cases observed during the summer months [12].

**Figure 2: Number of confirmed cases of Legionnaires' disease by month and year of onset, 2011–2013**

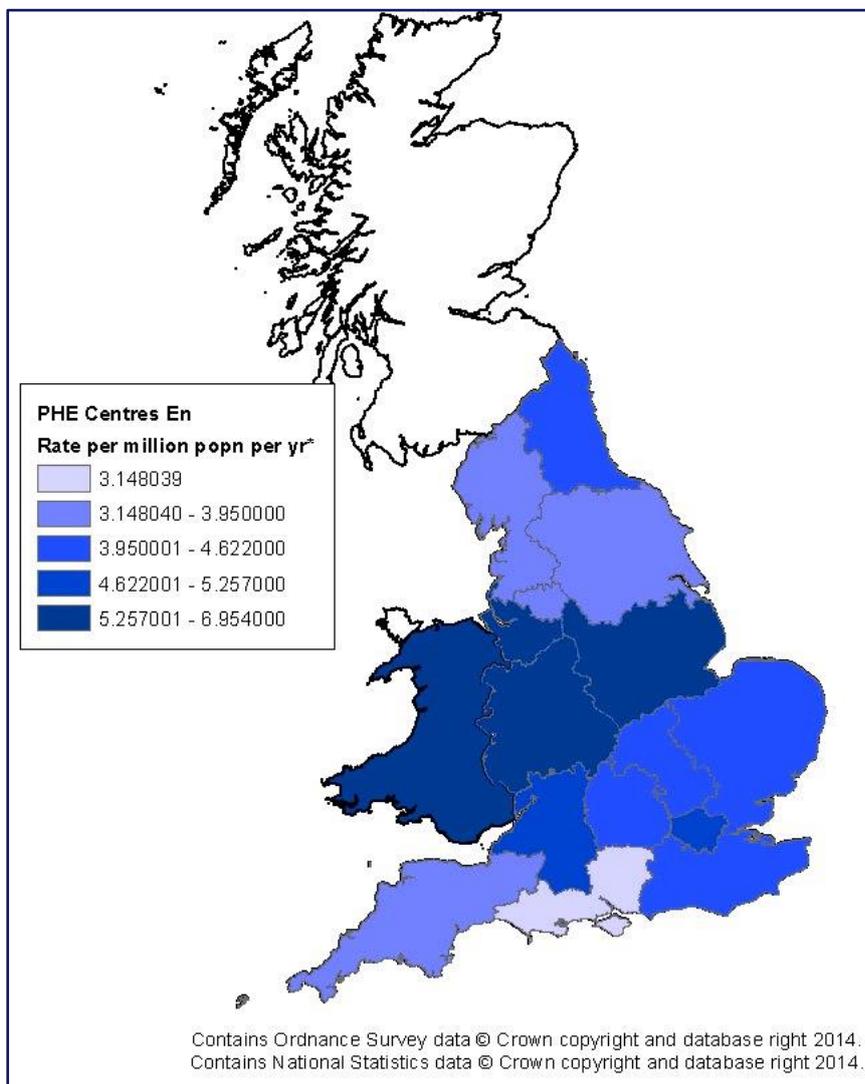


### Geographic distribution

The distribution of cases of Legionnaires' disease reported to the national surveillance scheme varies across the 15 PHE centres and three centres in Wales. The highest number of cases with onset of symptoms during 2013 was observed in London followed by the West Midlands; 58 (20.4%) of all cases were reported in London residents and 44 (15.5%) cases in West Midlands residents (Table 3).

However, the highest average incidence rate for 2011–2013 of eight cases per million population was observed in Mid and West Wales followed by seven cases per million population in residents of the West Midlands (Figure 3 and Table 3).

**Figure 3: Incident rate per million population\* of confirmed Legionnaires' disease cases by PHE Centre of residence and year of onset, 2011–2013**



\* Population denominators based on the ONS 2011 population.

**Table 3: The incidence rate per million population\* of confirmed Legionnaires' disease cases by area of residence and year of onset, 2011–2013**

<b>Public Health England centres and Wales</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>Total</b>	<b>Average Rate per million pop<sup>n</sup> per yr*</b>
<b>Anglia and Essex</b>	15	21	21	57	<b>4.61</b>
<b>Avon, Gloucestershire and Wiltshire</b>	16	13	6	35	<b>4.96</b>
<b>Cheshire and Merseyside</b>	11	19	8	38	<b>5.26</b>
<b>Cumbria and Lancashire</b>	12	6	5	23	<b>3.91</b>
<b>Devon, Cornwall and Somerset</b>	8	12	4	24	<b>3.63</b>
<b>East Midlands</b>	25	30	21	76	<b>6.59</b>
<b>Greater Manchester</b>	8	11	10	29	<b>3.60</b>
<b>London</b>	26	40	58	124	<b>5.04</b>
<b>Mid and West Wales</b>	8	13	4	25	<b>8.07</b>
<b>North East</b>	14	12	10	36	<b>4.62</b>
<b>North Wales</b>	6	4	3	13	<b>6.29</b>
<b>South East Wales</b>	11	5	8	24	<b>5.96</b>
<b>South Midlands and Hertfordshire</b>	6	13	17	36	<b>4.48</b>
<b>Sussex, Surrey and Kent</b>	18	15	24	57	<b>4.25</b>
<b>Thames Valley</b>	5	10	9	24	<b>3.95</b>
<b>Wessex</b>	5	11	9	25	<b>3.15</b>
<b>West Midlands</b>	22	51	44	117	<b>6.95</b>
<b>Yorkshire and Humber</b>	19	17	23	59	<b>3.72</b>
<b>Other</b>	-	1	-	1	-
<b>Unknown</b>	-	2	-	2	-
<b>Total</b>	<b>235</b>	<b>306</b>	<b>284</b>	<b>825</b>	<b>4.90</b>

\* Population denominators based on the ONS 2011 population.

## Source of exposure

Two thirds of the cases reported with onset of symptoms during 2013 were thought to have acquired their infection within the community (Table 2). The proportion of community acquired cases has steadily increased since 2011 when less than half (45.5%) of the annual number of cases were community acquired. Conversely, since 2011, the proportion of cases diagnosed following travel during the incubation period has decreased from 49.4% of cases in 2011 to 31.0% in 2013, (Figure 4).

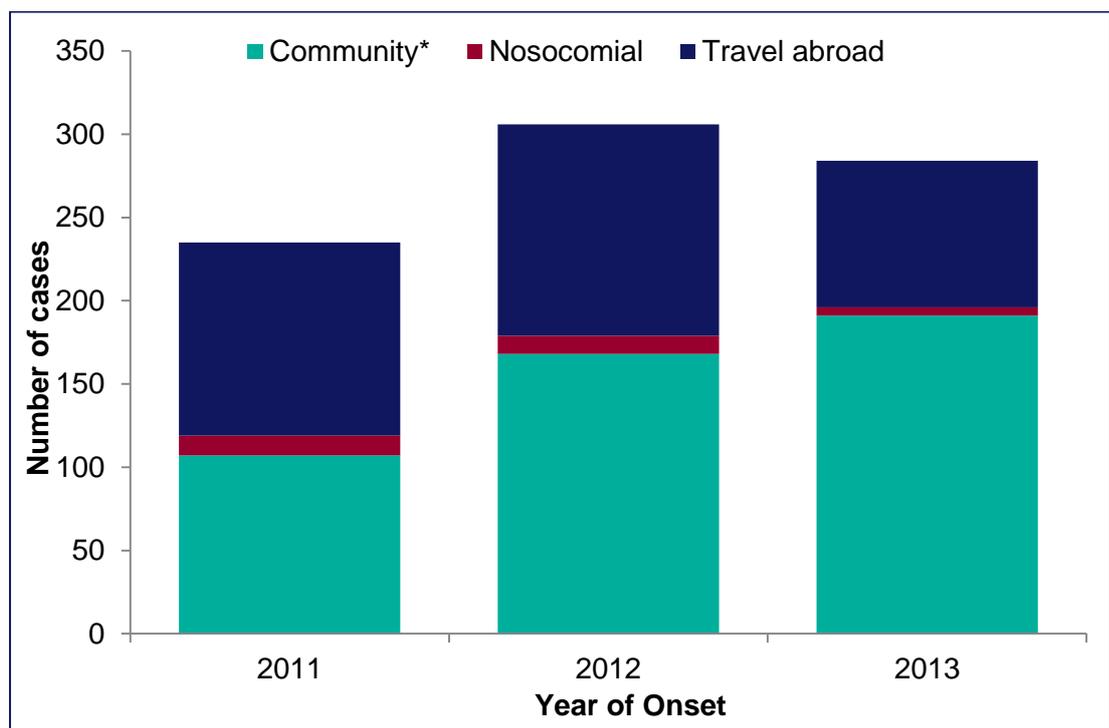
Since 2011, the number of cases considered to have acquired their infection from a healthcare facility has reduced by more than half, from 12 cases in 2011 to five in 2013.

**Table 4: Number of confirmed Legionnaires' disease cases by category of exposure and year of onset, 2011–2013**

Category	Community* (%)	Nosocomial (%)	Travel abroad (%)
2011	107 (45.5)	12 (5.1)	116 (49.4)
2012	168 (54.9)	11 (3.6)	127 (41.5)
2013	191 (67.3)	5 (1.8)	88 (31.0)

\* Includes cases who travelled within the UK

**Figure 4: Number of confirmed Legionnaires' disease cases by year of onset and category of exposure, 2011–2013**



*Includes cases who travelled within the UK*

## Risk factors

The proportion of cases with one or more reported underlying medical conditions/risk factors in 2013 was 74.6%, an increase compared to 2011 and 2012 when 69.4 and 63.1% of cases, respectively, reported an underlying condition (Table 5). Some underlying medical conditions are known to be associated with Legionnaires' disease such as heart disease and diabetes [13]. The conditions predominantly reported in residents of England and Wales diagnosed with Legionnaires' disease has shown little change since 2011, with heart disease reported most frequently followed by smoking then diabetes.

**Table 5: Cases of Legionnaires' disease with underlying conditions/risk factors, 2011–2013**

	<b>2011</b> (%)	<b>2012</b> (%)	<b>2013</b> (%)
<b>Any underlying condition</b>	<b>163 (69.4)</b>	<b>193 (63.1)</b>	<b>212 (74.6)</b>
<b>Diabetes</b>	38 (15.3)	43 (15.1)	42 (12.8)
<b>Heart disease</b>	74 (29.8)	103 (36.3)	89 (27.1)
<b>Immunosuppression*</b>	33 (13.3)	31 (10.9)	31 (9.5)
<b>Liver conditions</b>	9 (3.6)	9 (3.2)	14 (4.3)
<b>Neoplasms</b>	21 (8.5)	22 (7.7)	30 (9.1)
<b>Renal disorder</b>	12 (4.8)	10 (3.5)	9 (2.7)
<b>Respiratory conditions</b>	18 (7.3)	34 (12.0)	36 (11.0)
<b>Smoking</b>	43 (17.3)	32 (11.3)	77 (23.5)

*NB -More than one risk factor may be recorded for a patient*

*\* Immunosuppression due to conditions other than neoplasms*

## Mortality

Between 2004–2013, the annual number of deaths, reported to the national surveillance scheme or from death certificates recording Legionnaires' disease as the cause of death, ranged from 20 deaths in 2011 to 53 in 2007. However, the case fatality rate (CFR) across this period remained fairly constant, oscillating within a CFR of 8.5 and 13.1 (Figure 5).

A chi-square test for trend at 0.05 level of significance indicated that the number of deaths per year between 2003 and 2012 shows no evidence of a linear trend between the year of onset of symptoms and a fatal outcome (p-value; 0.9333 not significant). This suggests that there has been no improvement in the death rate over this period. A high level of mortality is associated with Legionnaires' disease, with a CFR of 11.3% in 2013.

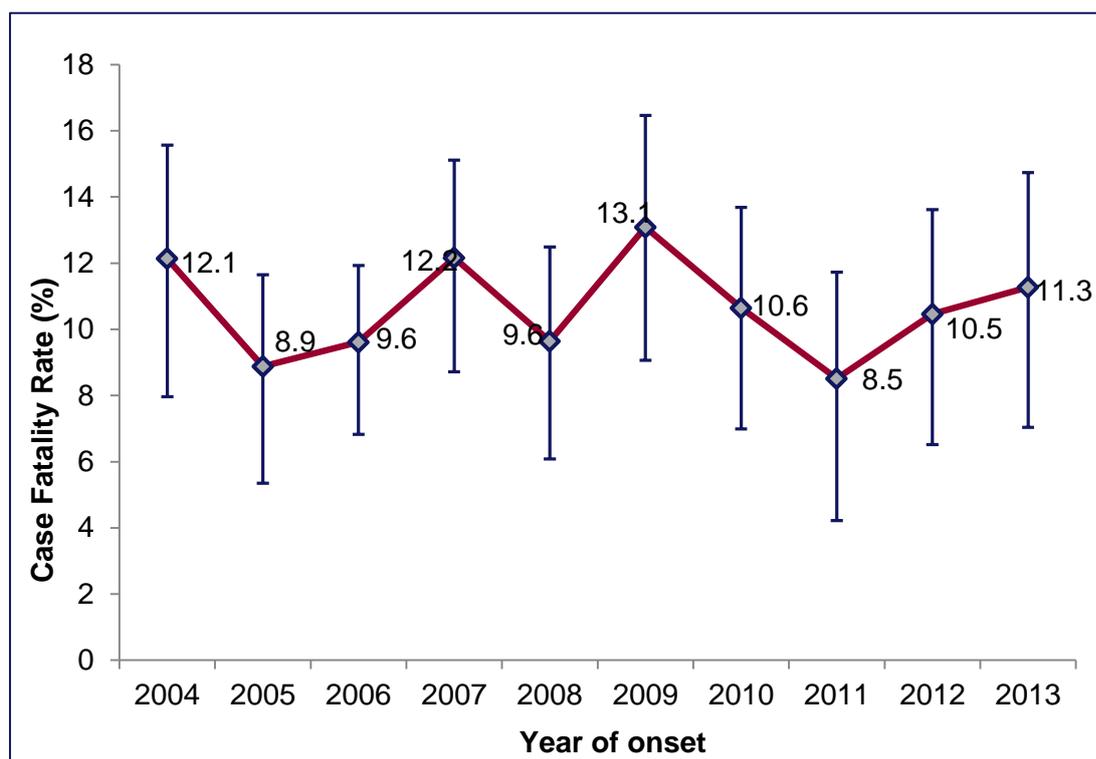
**Figure 5: Legionnaires' disease case fatality rate by year, 2004–2013**

Table 6 shows further analysis of fatalities associated with Legionnaires' disease by comparing the number and CFR of cases between 2011 and 2013 by the category of exposure. Although there are ten times the number of deaths in cases associated with a community exposure compared to the number of deaths associated with a healthcare facility, the CFR for nosocomial cases is more than double that of community acquired cases; one in four nosocomial cases proved fatal. High mortality in nosocomial cases may be expected as those exposed are usually of the older age group and with co-morbidities warranting admission to hospital [14]. Cases associated with travel abroad had the lowest CFR at 5.3%.

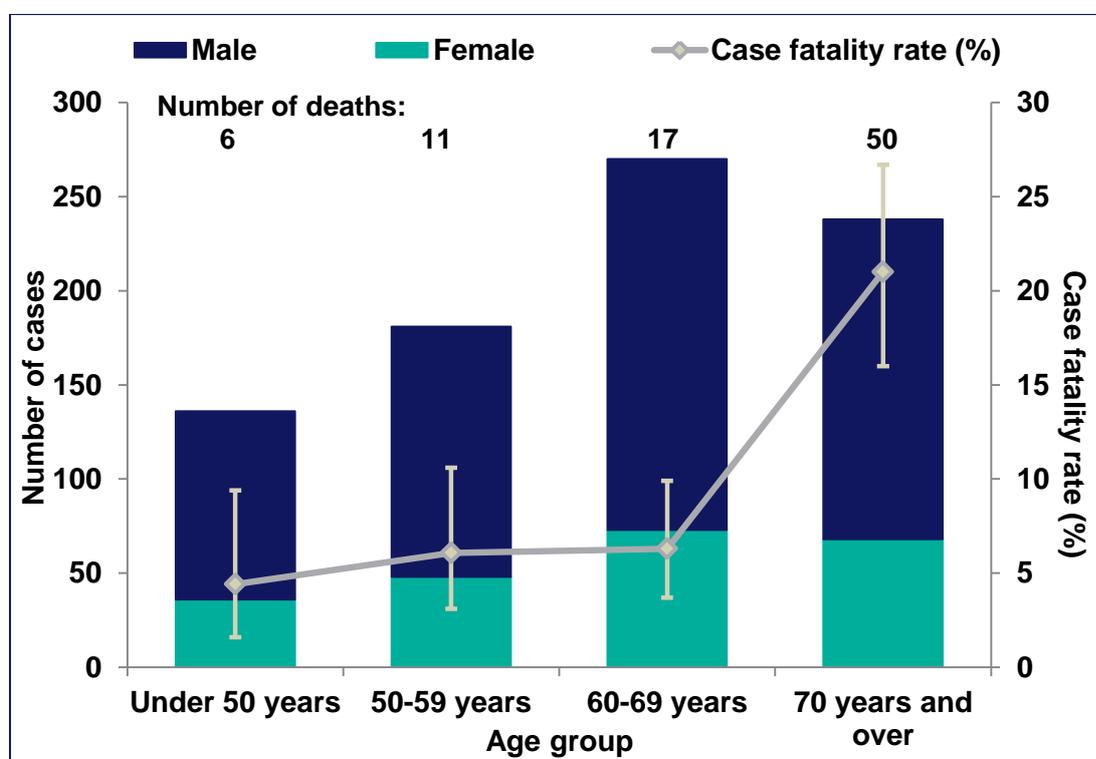
**Table 6: Legionnaires' disease case-fatality rates by category of exposure, 2011–2013**

	Cases	Deaths	Case Fatality Rate (%) (95% CI)
<b>Community*</b>	466	60	<b>12.1</b> (9.3 - 15.3)
<b>Nosocomial</b>	28	6	<b>25.0</b> (13.2 - 40.3)
<b>Travel Abroad</b>	331	18	<b>5.3</b> (3.2 - 8.2)
<b>Total</b>	<b>825</b>	<b>84</b>	<b>10.0</b> (8.1 - 12.2)

\* Includes travel UK cases

As shown in Table 2b, people in older age groups are at higher risk of developing Legionnaires' disease [11], so it is unsurprising that the CFR increases with age (Figure 6). During 2011–2013, the CFR for the under 50yrs age group was 4.8% (95% CI 2.1–9.2) increasing to a CFR of 17.2% (95% CI 13.1–22.0) in those 70 years or older. The observed increase in mortality with age is supported statistically with a chi-square test for trend at 0.05 level of significance. A p-value of <0.0001 indicates that there is strong evidence of linear association between mortality and age. Similarly, there is strong evidence of an association between gender and mortality (chi-square test for association, at 0.05 level of significance, gives a  $p = 0.009$ ).

**Figure 6: Number of confirmed cases of Legionnaires' disease by age and gender, with case fatality rate (%) and 95% CI, 2011–2013**



## Microbiology

As in previous years the principal method of diagnosis for the majority of cases of Legionnaires' disease in 2013 was the urinary antigen test, 279 cases were positive for *Legionella pneumophila* using this method (Table 7). Of the five cases that were either negative or not tested by urinary antigen, all were diagnosed by culture; two of which showed that infection was caused by the species *Legionella longbeachea*, often associated with compost [15].

Urinary antigen tests may be the primary method used for diagnosis of Legionnaires' disease but culture still remains the gold standard due to its higher sensitivity and specificity and its ability to isolate non-serogroup 1 and non *L. pneumophila* species. A positive culture result was obtained in 79 (27.8%) of the 284 cases of Legionnaires' disease reported in 2013; a higher proportion than observed in the previous two years.

No confirmed cases were diagnosed using serological methods in 2013. Polymerase chain reaction (PCR) has doubled in a year from 18.3% of PCR positive cases reported in 2012 to 36.6% in 2013.

**Table 7: Legionnaires' disease cases by diagnostic test and year of onset, 2011–2013**

	<b>2011</b> (%)	<b>2012</b> (%)	<b>2013</b> (%)
<b>Culture</b>	61 (26.0)	50 (16.3)	79 (27.8)
<b>Urinary antigen</b>	227 (96.6)	304 (99.3)	279 (98.2)
<b>Four fold rise - (serology)</b>	1 (0.4)	-	-
<b>Single high titre - (serology)</b>	5 (2.1)	-	-
<b>Polymerase chain reaction*</b>	38 (16.2)	56 (18.3)	104 (36.6)

*\* Includes positive tests with complete and partial sequence-based types deduced*

*Individual cases may have been tested using one or more of the methods of diagnosis. Culture and PCR are usually only undertaken where a patient has already been confirmed by urinary antigen testing.*

PCR enables respiratory samples to be analysed further to deduce the sequence-based type in order to identify the strain of organism infecting the case. Of the 284 cases reported with onset during 2013, 82 cases had the complete or partial sequence-based type of the infecting strain determined with ST47 most frequently identified (Table 8). Between 2011 and 2013, the two most commonly identified stains were ST1 and ST47, which concurs with previous studies [16].

**Table 8: Complete or partial sequence-based types of *L. pneumophila* identified in clinical isolates, 2011–2013**

Sequence Type (ST)	Number of Cases			
	2011 (%)	2012 (%)	2013 (%)	Total (2011–2013)
1	5 (16.1)	9 (15.8)	6 (7.3)	20 (11.8)
23	5 (16.1)	2 (3.5)	3 (3.7)	10 (5.9)
27	2 (6.5)	-	2 (2.4)	4 (2.4)
37	3 (9.7)	-	-	3 (1.8)
42	1 (3.2)	1 (1.8)	4 (4.9)	6 (3.5)
46	-	-	7 (8.5)	7 (4.1)
47	2 (6.5)	10 (17.5)	14 (17.1)	26 (15.3)
62	3 (9.7)	2 (3.5)	4 (4.9)	9 (5.3)
74	1 (3.2)	2 (3.5)	4 (4.9)	7 (4.1)
1268	-	9 (15.8)	-	9 (5.3)
1554	-	-	5 (6.1)	5 (2.9)
<b>11 different ST's identified in two cases</b>	3 (9.7)	9 (15.8)	10 (12.2)	22 (12.9)
<b>32 different ST's identified in one case</b>	6 (19.4)	12 (21.1)	14 (17.1)	32 (18.8)
<b>10 partially sequenced or novel ST's in one case</b>	-	1 (1.8)	9 (11.0)	10 (5.9)
<b>Total isolates</b>	<b>31</b>	<b>57</b>	<b>82</b>	<b>170</b>

The proportion of cases where a sequence-based type has been determined has continued to increase since 2011, when 31 cases (13.2%) of cases had a partial or complete sequence deduced compared to 82 (28.9%) of cases in 2013 with a partial or complete sequence-based type determined using PCR (Table 9). During this period, cases associated with hospital exposure were more frequently tested by PCR to determine the identity of the infecting strain. This may be due to the investigating team more readily encouraging clinicians to attempt to obtain respiratory samples from nosocomial cases or the greater ability of these cases to provide a respiratory sample compared to cases from other categories of exposures. The significance of having a clinical sample tested by PCR is that it is the only method by which the infecting strain can be identified and subsequently compared with environmental samples from potential sources.

**Table 9: Number and proportion, (%), of cases of Legionnaires' disease with sequence-based type identified by category of exposure, 2011–2013**

Category	2011 (%)	2012 (%)	2013 (%)
Community*	15 (14.0)	36 (21.4)	61 (31.9)
Nosocomial	5 (41.7)	6 (54.5)	2 (40.0)
Travel abroad	11 (9.5)	15 (11.8)	19 (21.6)
<b>Total</b>	<b>31 (13.2)</b>	<b>57 (18.6)</b>	<b>82 (28.9)</b>

\* includes UK travel cases

## Clusters and outbreaks

Unlike other respiratory diseases, Legionnaires' disease is contracted from environmental sources generating droplets or aerosols; thus, although the majority of cases reported to the national surveillance scheme are sporadic cases, every case has the potential to be the first case of an outbreak. Therefore, each case reported to the national surveillance scheme undergoes detailed analysis in order to check if the case may be associated with any other recently reported case(s) in terms of geography, time, travel or any other possible links particularly where cases may be in neighbouring areas.

All identified clusters/outbreaks are notified to the appropriate HPTs and travel clusters cases are reported to the European Legionnaires' Disease Surveillance Network (ELDSNet). There were less clusters/outbreaks reported in 2013 compared to 2012 (Table 10).

A similar reduction in outbreak/cluster associated cases was also observed in cases associated with travel abroad, but on this occasion both the number of clusters/outbreaks and the number of associated cases fell. This reduction in the number of outbreaks/clusters may be due to the overall drop in the number of travel-associated cases reported to the national surveillance scheme in 2013 (Figure 5). There were no hospital associated clusters/outbreaks identified during 2013.

**Table 10: Number of outbreaks/clusters by category of exposure, 2011–2013**

	2011		2012		2013	
	OB/CI	Cases	OB/CI	Cases	OB/CI	Cases
<b>Community</b>	4	10 (4)	5	43	3	12
<b>Nosocomial</b>	1	5 (2)	5	14 (1)	-	-
<b>Travel Abroad</b>	13	33 (6)	10	35 (2)	4	7
<b>Total</b>	18	48 (12)	20	92 (3)	7	19

( ) number of cases associated with cluster/outbreak with onset of symptoms in year(s) prior to identification of the cluster/outbreak.

### Travel associated Legionnaires' disease (TALD)

During 2013, 88 travel associated cases of Legionnaires' disease were reported. These cases had travelled to one or more of 30 different countries during their incubation period; the most frequently visited destinations are listed in Table 11. In order to determine the rate of infection associated with each of the countries, we used the estimated number of visits by UK residents as the denominator. As in 2012, Spain was the destination most frequently travelled to by residents of England and Wales during their incubation period in 2013, but India had the highest rate of infection at 7.56 cases per million visits compared to Thailand, which had the highest rate in 2012.

**Table 11: Top travel destinations for reported Legionnaires' disease in residents of England and Wales 2013**

Country	LD cases	Visits by UK residents**	Rate of cases per million visits
Spain	15	11,110,000	1.35
United States of America	10	3,011,000	3.32
France	7	8,781,000	0.80
Greece	7	1,824,000	3.84
India	6	794,000	7.56
Italy	6	2,630,000	2.28
Portugal	5	1,900,000	2.63
Turkey	5	1,419,000	3.52
Cuba	3	481,000	6.24
Malta	3	459,000	6.54
United Arab Emirates	3	580,000	5.17
Cyprus	2	821,000	2.44
Germany	2	2,307,000	0.87
Thailand	2	371,000	5.39
The Netherlands	2	1,900,000	1.05

\*\* According to 'Travel Trends' by the Office of National Statistics (2012)

Half of the countries travelled to by residents of England and Wales during 2013 were reported by ELDSNet to have a cluster involving an accommodation site where one or more England and Wales residents stayed (Table 12). No individual country stands out as having an exceptionally high number of clusters or cases. Greece was reported to have the highest number of clusters, with three clusters, involving one England and Wales resident and one or more cases from other member countries (i.e. countries who have also signed up to ELDSNet). Turkey was associated with two clusters involving three residents of England and Wales.

**Table 12: Countries associated with clusters involving residents of England and Wales with onset of symptoms during 2013**

Country of Travel	No. Clusters	No. Associated Cases
Cayman Islands	1	1
Cruise/Ferry	2	2
Cuba	1	2
Cyprus	1	1
France	1	1
Greece	3	3
India	2	2
Indonesia	1	1
Italy	2	2 (1*)
Malta	1	1
Portugal	1	1
Spain	2	2
Thailand	1	1
Turkey	2	3
United Arab Emirates	2	2

( \*) number of non-pneumonic cases

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