Public Health England

Protecting and improving the nation's health

# Legionnaires' disease in residents of England and Wales – 2015

Official Statistics

# About Public Health England

Public Health England exists to protect and improve the nation's health and wellbeing, and reduce health inequalities. It does this through world-class science, knowledge and intelligence, advocacy, partnerships and the delivery of specialist public health services. PHE is an operationally autonomous executive agency of the Department of Health.

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# Information

Legionnaires' disease is a severe atypical pneumonia that can potentially be fatal. It is caused by exposure to bacteria of the genus Legionella which are ubiquitous and inhabit natural water systems such as streams, rivers and lakes. However, Legionella bacteria are also able to survive in artificial water systems, for example cooling towers, evaporative condensers, spa pools and hot/cold water systems. Such man-made water systems mimic the organism's natural habitat, thereby providing an ideal environment for growth.

The principal route of infection is through direct exposure to aerosols generated and dispersed from colonised man-made sources. Inhalation of these aerosols in high enough concentrations by individuals with risk factors, such as age, gender, smoking status, immunosuppression, can result in Legionnaires' disease. A colonised water system which is not appropriately managed can operate as a source of major outbreaks. Prevention of Legionnaires' disease is principally through the implementation of stringent legislation for the control and management of man-made water systems.

## Case definitions

Cases of Legionnaires' disease are defined as confirmed or presumptive based on their microbiology. The definitions are as follows:

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

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 ( eg 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).

## Cluster/outbreak definitions

Cluster

Two or more cases that initially appear to be linked by area of residence or work, including healthcare or other type of community setting and which have sufficient proximity in dates of onset of illness (eg six months) to warrant further investigation.
(This is a working definition: the decision to follow up cases is made locally).

**NB:** The area of residence should take account of population size and density when investigations are planned.
Consideration should be given to convening an incident control team if a cluster is identified.
If after investigation no common exposures to a potential source of infection are identified for the cases, other than the links mentioned above, then they should be classified as sporadic community acquired cases.

Outbreak

Two or more cases where the onset of illness is closely linked in time (weeks rather than months) and where there is epidemiological evidence of a common source of infection, with or without microbiological evidence.

**NB:** An incident control team should always be convened to investigate outbreaks.

## National enhanced Legionnaires' disease surveillance scheme

The national enhanced Legionnaires' disease surveillance scheme (NELSS) for residents in England and Wales was established in 1980 in order to collect enhanced surveillance data on all cases of Legionnaires' disease. The scheme is managed by the Respiratory Diseases Department, National Infections Service and Public Health England.

The primary objectives of NELSS is to identify clusters and outbreak, collaborate with the European Legionnaires' disease surveillance network (ELDSNet) and support the management and control of outbreaks and incidents nationally and internationally.

# Methodology

The data presented in this report is extracted from the national surveillance scheme database which holds data on all reported cases of Legionellosis in residents of England and Wales. Cases are reported through the submission of a national surveillance form which requests detailed information on each case's activities in the 14 days prior to onset of symptoms and information on potential exposures. The reported data is assessed and verified; once the case definition has been met the case is analysed against the national dataset for risk factors and potential associations with previously reported cases.

The national Legionella official statistics are organised by date of onset of symptoms across a calendar year, January to December. The data presented in this report is for cases with onset of symptoms reported from 1 January 2015 to 31 December 2015 in residents of England and Wales. Data from previous years (2006 to 2014) are presented for comparative purposes. All population data has been obtained from the Office of National Statistics (ONS):

- incidence rates – use ONS mid 2014 population estimates for England and Wales
- travel rates – use ONS travel trends for 2014

All statistical analysis was carried out using the statistical computer program, STATA, version 13.

# Official statistics

**Table 1: Number of cases of Legionellosis (including presumptive) by disease type and year of symptoms onset, 2013-2015**

| | Number of confirmed (presumptive) cases | | |
|---|---|---|---|
| | **2013** | **2014** | **2015** |
| **Legionnaires' disease** | 285 (2) | 331 (7) | 382 (1) |
| **Non-pneumonic Legionellosis** | 7 | 4 | 5 |
| **Pontiac Fever** | - | - | - |
| **Total** | **294** (292 confirmed, 2 presumptive) | **342** (335 confirmed, 7 presumptive) | **388** (387 confirmed, 1 presumptive) |

( ) additional presumptive cases (ie cases with a serological diagnosis (a single high titre) or PCR result)

**Figure 1: Number of cases of Legionellosis (including presumptive) by year of onset of symptoms, 2005-2014**

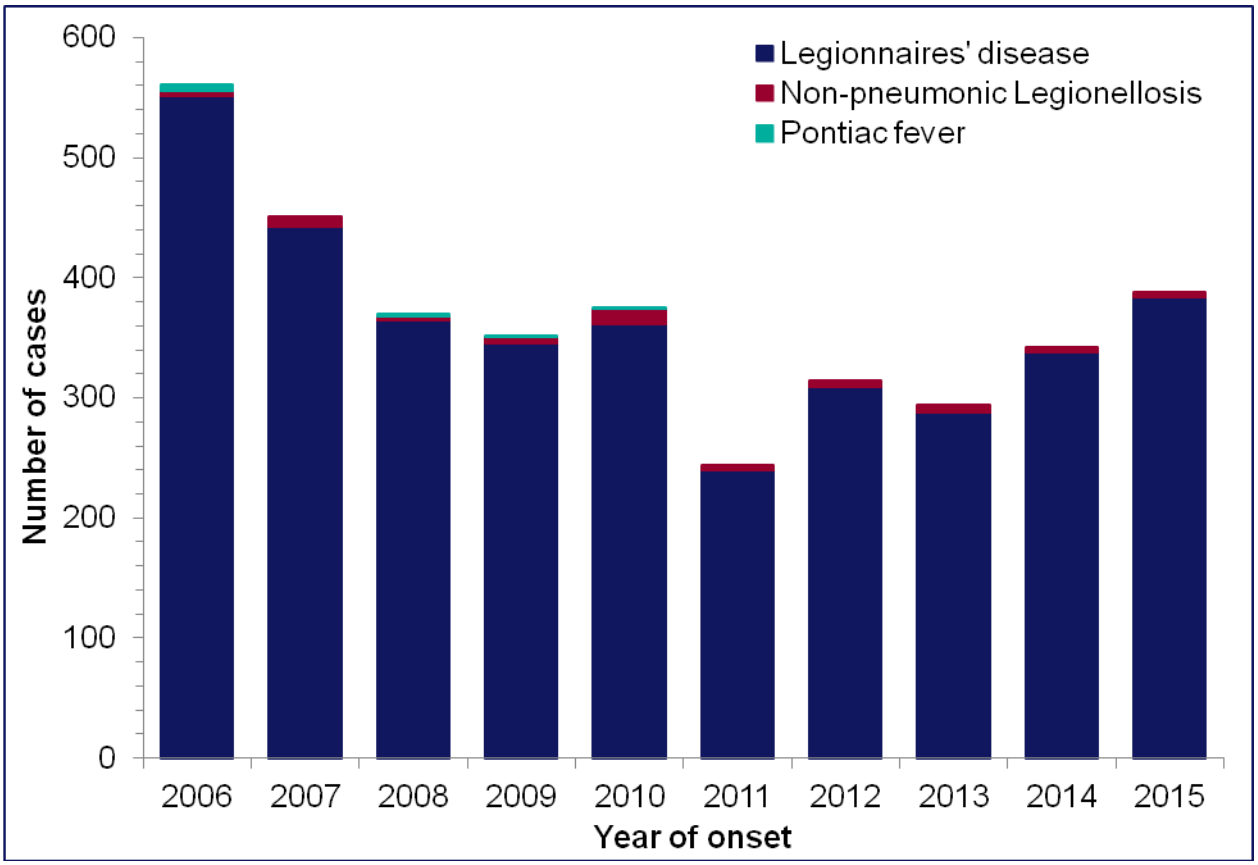



**Table 2a: Number and proportion (%) of confirmed cases of Legionnaires' disease by gender and age group, 2013-2015**

| | 2013 | | 2014 | | 2015 | | Total | |
|---|---|---|---|---|---|---|---|---|
| | Females | Males | Females | Males | Females | Males | Females | Males |
| **< 50 yrs.** | 13 (26.0) | 37 (74.0) | 11 (22.0) | 39 (78.0) | 13 (18.8) | 56 (81.2) | 37 (21.9) | 132 (78.1) |
| **50-59 yrs.** | 15 (26.3) | 42 (73.7) | 27 (32.5) | 56 (67.5) | 25 (25.5) | 73 (74.5) | 67 (28.2) | 171 (71.8) |
| **60-69 yrs.** | 23 (24.2) | 72 (75.8) | 31 (31.3) | 68 (68.7) | 32 (29.4) | 77 (70.6) | 86 (28.4) | 217 (71.6) |
| **70+ yrs.** | 21 (25.3) | 62 (74.7) | 32 (32.3) | 67 (67.7) | 25 (23.6) | 81 (76.4) | 78 (27.1) | 210 (72.9) |
| **All Ages** | **72 (25.3)** | **213 (74.7)** | **101 (30.5)** | **230 (69.5)** | **95 (24.9)** | **287 (75.1)** | **268 (26.9)** | **730 (73.1)** |

**Table 2b: Number and proportion (%) of confirmed cases of Legionnaires' disease by year of symptom onset and age group, 2013-2015**

| | **2013** (%) | **2014** (%) | **2015** (%) | **Total** (%) |
|---|---|---|---|---|
| **< 50 yrs.** | 50 (17.5) | 50 (15.1) | 69 (18.1) | **169 (16.9)** |
| **50-59 yrs.** | 57 (20.0) | 83 (25.1) | 98 (25.7) | **238 (23.8)** |
| **60-69 yrs.** | 95 (33.3) | 99 (29.9) | 109 (28.5) | **303 (30.4)** |
| **70+ yrs.** | 83 (29.1) | 99 (29.9) | 106 (27.7) | **288 (28.6)** |

**Figure 2: Number of confirmed cases of Legionnaires' disease by month and year of onset of symptoms, 2013-2015**

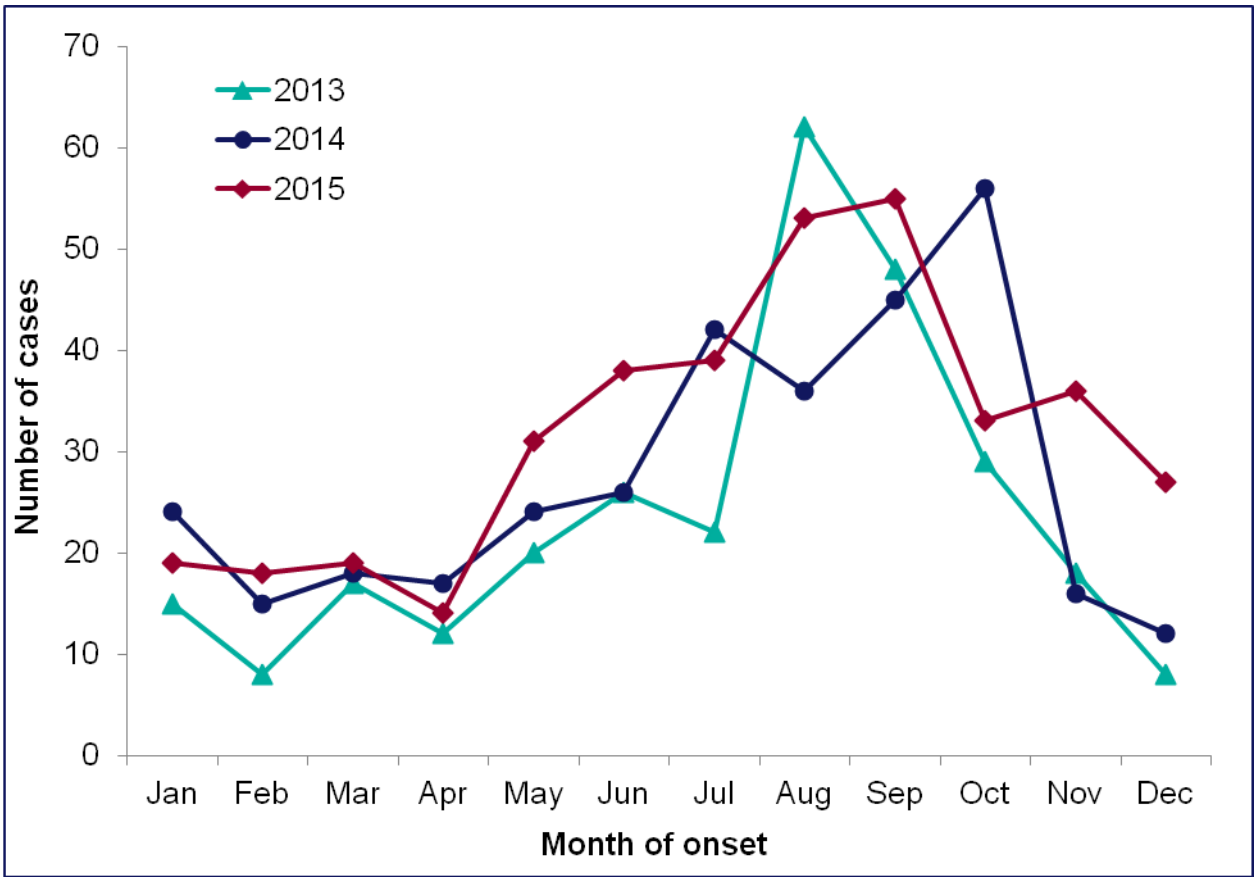
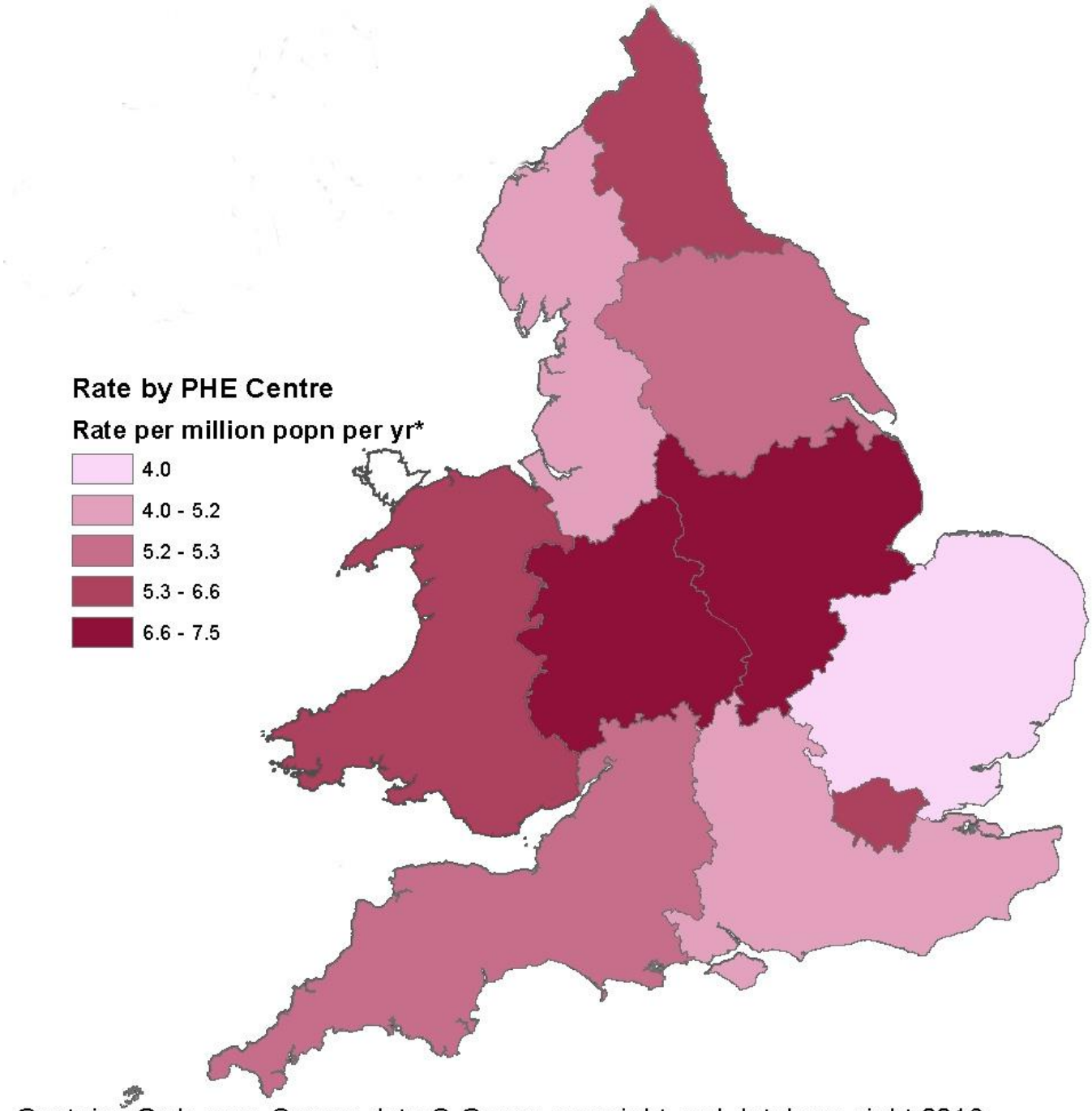


**Figure 3: Incidence rate per million population† of confirmed Legionnaires' disease cases by PHE centre of residence (and Wales) and year of onset, 2013-2015**

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† Population denominators based on mid-2014 population estimates from office of national statistics.

**Table 3: Average rate (million population†) of confirmed cases of Legionnaires' disease by PHE centre (and Wales) and year of symptom onset, 2013-2015**

| Public Health England centres and Wales | 2013 | 2014 | 2015 | Total | Average rate per million pop[n] per yr.† |
|---|---|---|---|---|---|
| **East Midlands** | 26 | 46 | 33 | 105 | **7.6** |
| **East of England** | 33 | 14 | 26 | 73 | **4.0** |
| **London** | 58 | 48 | 57 | 163 | **6.4** |
| **North East** | 10 | 15 | 27 | 52 | **6.6** |
| **North West** | 23 | 41 | 45 | 109 | **5.1** |
| **South East** | 38 | 46 | 54 | 138 | **5.2** |
| **South West** | 15 | 34 | 38 | 87 | **5.4** |
| **Wales** | 15 | 25 | 18 | 58 | **6.3** |
| **West Midlands** | 44 | 39 | 43 | 126 | **7.4** |
| **Yorkshire and Humber** | 23 | 22 | 40 | 85 | **5.3** |
| **Other** | - | 1 | 1 | 2 | **-** |
| **Total** | **285** | **331** | **382** | **998** | **17.4** |

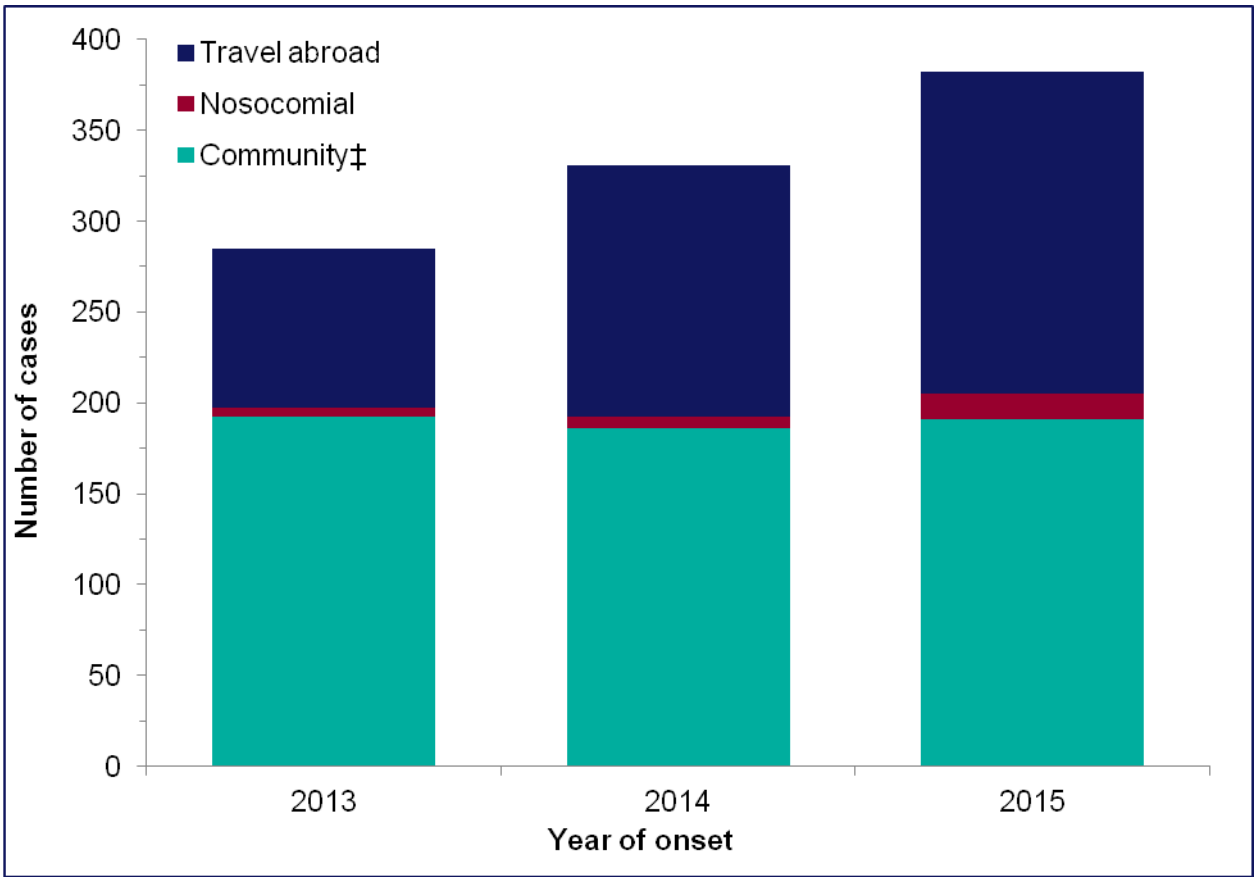
† Population denominators based on mid-2014 population estimates from office of national statistics.

**Table 4: Number of confirmed cases of Legionnaires' disease by exposure category and year of onset, 2013-2015**

| Category | Community‡ (%) | Nosocomial (%) | Travel abroad (%) |
|---|---|---|---|
| **2013** | 192 (67.4) | 5 (1.8) | 88 (30.9) |
| **2014** | 186 (56.2) | 6 (1.8) | 139 (42.0) |
| **2015** | 191 (50.0) | 14 (3.7) | 177 (46.3) |

‡ includes travel UK cases

**Figure 4: Number of confirmed Legionnaires' disease cases by year of onset and category of exposure, 2013-2015**




‡ includes travel UK cases

**Table 5: Underlying medical conditions and risk factors reported in confirmed cases of Legionnaires' disease, 2013-2015**

| | **2013** (%) | **2014** (%) | **2015** (%) |
|---|---|---|---|
| **Any underlying condition** | **213 (74.7)** | **243 (73.4)** | **284 (74.3)** |
| **Diabetes** | 42 (14.7) | 50 (15.1) | 67 (17.5) |
| **Heart conditions** | 89 (31.2) | 96 (29.0) | 121 (31.7) |
| **Immunosuppression^** | 31 (10.9) | 41 (12.4) | 44 (11.5) |
| **Liver conditions** | 14 (4.9) | 12 (3.6) | 15 (3.9) |
| **Neoplasms** | 30 (13.0) | 25 (7.6) | 28 (7.3) |
| **Renal disorders** | 9 (3.2) | 9 (2.7) | 19 (5.0) |
| **Respiratory conditions** | 37 (13.0) | 28 (8.5) | 51 (13.4) |
| **Smoking** | 78 (27.4) | 110 (33.2) | 110 (28.8) |

**^** immunosuppression due to other conditions or clinical treatments

**NB:** Individual cases may have reported more than one underlying condition

**Figure 5: Case fatality rates for Legionnaires' disease by year of symptoms onset, 2006-2015**

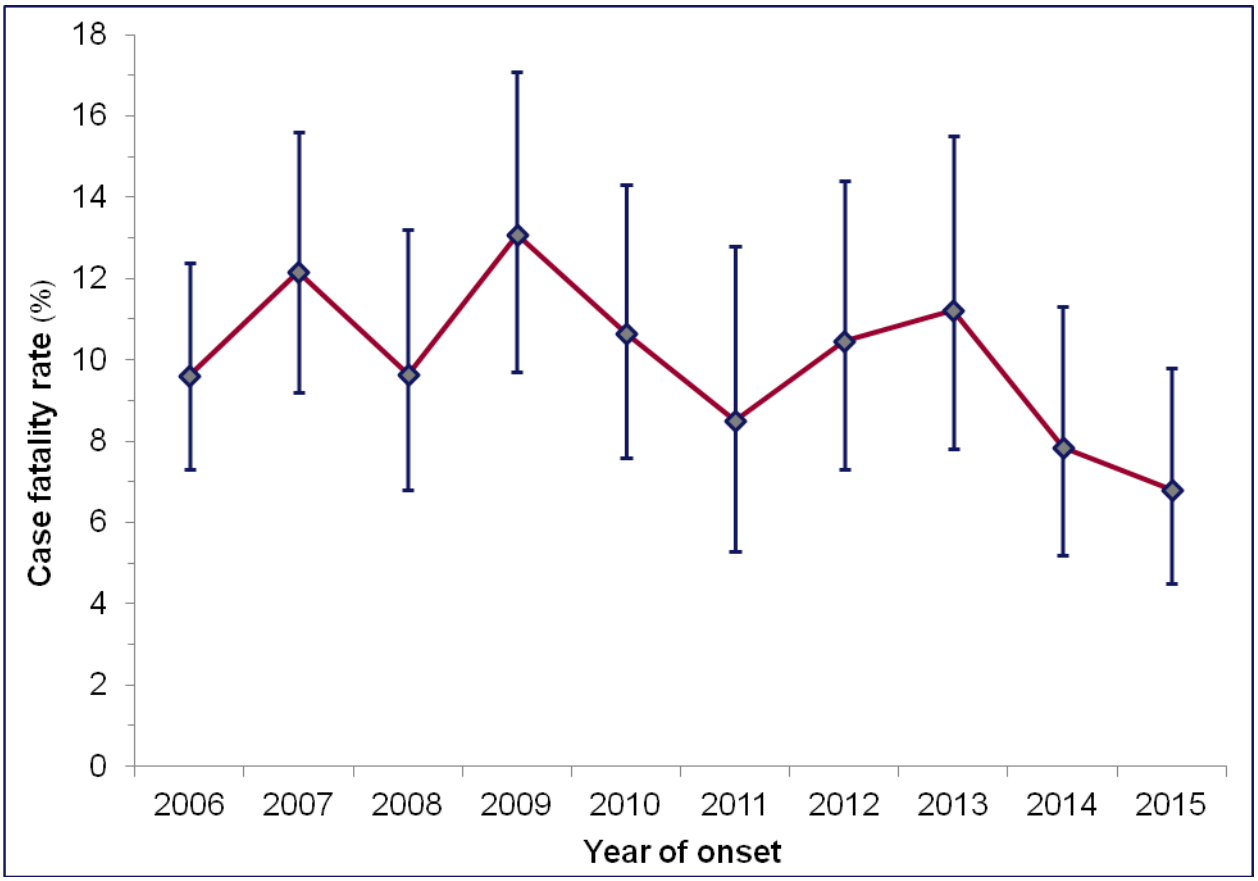



**Table 6: Case fatality rates for confirmed cases of Legionnaires' disease by category of exposure, 2013-2015**

| | Cases | Deaths | Case Fatality Rate (%) (95% CI) |
|---|---|---|---|
| **Community‡** | 569 | 66 | 11.6 (9.1 - 15.9) |
| **Nosocomial** | 25 | 4 | 16.0 (4.5 - 36.1) |
| **Travel Abroad** | 404 | 14 | 3.5 (1.9 - 5.7) |
| **Total** | **998** | **84** | **8.4 (6.8 - 10.3)** |

‡ includes travel UK cases

**Figure 6: Number of confirmed cases of Legionnaires' disease by age and gender, with case fatality rate (%) and 95% CI, 2013-2015**

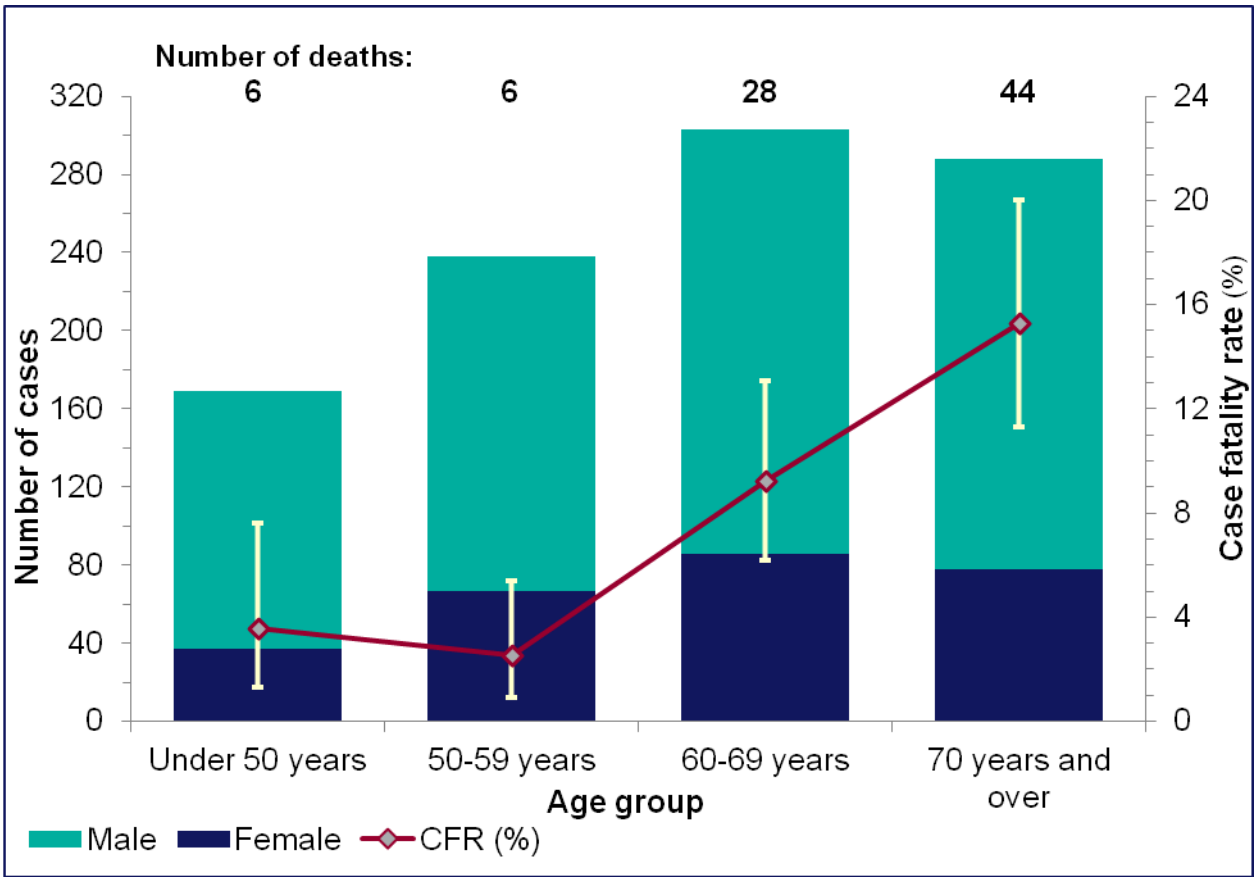



**Table 7: Number of confirmed cases of Legionnaires' disease by age group with case fatality rate (%) and 95% CI, 2013-2015**

| Age group | Cases | Deaths | Case Fatality Rate (%) (95% CI) |
|---|---|---|---|
| **Under 50 yrs.** | 169 | 6 | 3.6 (2.3 - 4.0) |
| **50-59 yrs.** | 238 | 6 | 2.5 (1.6 - 2.9) |
| **60-69 yrs.** | 303 | 28 | 9.2 (3.0 - 3.9) |
| **70 yrs. and over** | 288 | 44 | 15.3 (4.0 - 4.7) |

**Table 8: Legionnaires' disease cases by diagnostic test and year of onset, 2013-2015**

| **Diagnostic test** | **2013** (%) | **2014** (%) | **2015** (%) |
|---|---|---|---|
| **Culture** | 79 (27.7) | 82 (24.8) | 87 (22.8) |
| **Urinary antigen** | 280 (98.2) | 321 (97.0) | 374 (97.9) |
| **Four-fold rise -** (serology) | - | - | - |
| **Single High Titre -** (serology) | - | - | - |
| **Polymerase Chain Reaction[º]** | 105 (36.8) | 85 (25.7) | 115 (30.1) |

**º** includes positive tests with complete and partial sequence-based types deduced

**NB:** 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.

**Table 9: Ten most prevalent strains/sequence types of *L. pneumophila* identified in clinical isolates from confirmed cases of Legionnaires' disease, 2013-2015**

| **Sequence Type (ST)** | **Number of cases with isolates** | | | |
|---|---|---|---|---|
| | **2013** (%) | **2014** (%) | **2015** (%) | **Total** (%) |
| **47** | 14 (4.9) | 13 (3.9) | 13 (3.4) | **40 (4.0)** |
| **42** | 4 (1.4) | 9 (2.7) | 15 (3.9) | **28 (2.8)** |
| **1** | 6 (2.1) | 5 (1.5) | 9 (2.4) | **20 (2.0)** |
| **23** | 3 (1.1) | 2 (0.6) | 6 (1.6) | **11 (1.1)** |
| **62** | 4 (1.4) | 4 (1.2) | 3 (0.8) | **11 (1.1)** |
| **74** | 4 (1.4) | 3 (0.9) | 3 (0.8) | **10 (1.0)** |
| **46** | 7 (2.5) | 2 (0.6) | - | **9 (0.9)** |
| **1554** | 5 (1.8) | 3 0.9) | 1 (0.3) | **9 (0.9)** |
| **37** | - | 2 (0.6) | 5 1.3) | **7 (0.7)** |
| **616** | 1 (0.4) | 5 (1.5) | 1 (0.3) | **7 (0.7)** |

**Table 10: Number and proportion (%), of confirmed cases of Legionnaires' disease with complete sequence-based type (SBT) identified by category of exposure**

| **Category** | **2013** (%) | **2014** (%) | **2015** (%) |
|---|---|---|---|
| **Community‡** | 54 (28.1) | 53 (28.5) | 55 (28.8) |
| **Nosocomial** | 2 (40.0) | 2 (33.3) | 6 (42.9) |
| **Travel abroad** | 17 (19.3) | 29 (20.9) | 35 (19.8) |
| **Total cases with complete SBT** | **73 (25.6)** | **84 (25.4)** | **96 (25.1)** |

**‡** includes travel UK cases
**SBT**: sequence-based type

**Table 11: Number of outbreaks/clusters involving cases of Legionnaires' disease in residents of England and Wales by category of exposure, 2013-2015**

| | **2013** | | **2014** | | **2015** | |
|---|---|---|---|---|---|---|
| | **OB/Cl** | **Cases** | **OB/Cl** | **Cases** | **OB/Cl** | **Cases** |
| **Community** | 4 | 22 (10) | 4 | 25 (1) | 12 | 54 (3) |
| **Nosocomial** | 2 | 4 (2) | - | - | 3 | 9 (2) |
| **Travel Abroad** | 8 | 14 (5) | 20 | 47 (11) | 17 | 39 (7) |
| **Travel UK** | 3 | 6 (2) | 2 | 5 (1) | 3 | 8 (1) |
| **Total** | **17** | **46 (19)** | **26** | **77 (13)** | **35** | **110 (13)** |

( ) cases with onset of symptoms in other years that are included in the cluster/outbreak

**Figure 7: Number of confirmed cases of Legionnaires' disease associated with travel by year of onset of symptoms, 2006-2015**

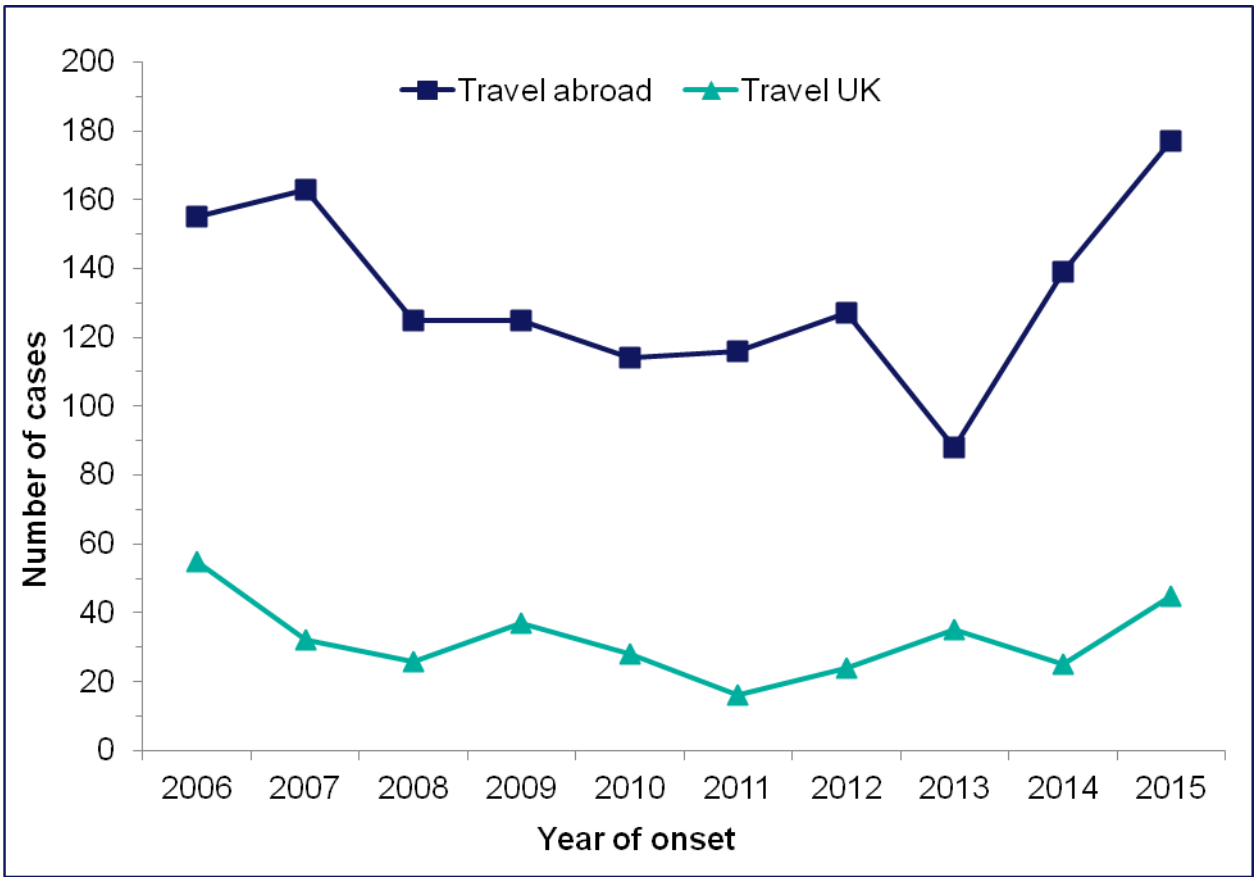


**Table 12: Ten most prevalent travel destinations visited by the greatest number of confirmed cases of Legionnaires' disease in residents of England and Wales with onset of symptoms in 2015**

| Country | LD cases | Visits by UK residents | Rate≠ of cases per million visits |
|---|---|---|---|
| **Spain** | 26 | 10,850,000 | **2.4** |
| **Italy** | 21 | 2,031,000 | **10.3** |
| **Greece** | 17 | 1,737,000 | **9.8** |
| **United Arab Emirates** | 17 | 415,000 | **41.0** |
| **Thailand** | 13 | 312,000 | **41.7** |
| **United States of America** | 13 | 2,062,000 | **6.3** |
| **France** | 12 | 5,969,000 | **2.0** |
| **Turkey** | 8 | 1,099,000 | **7.3** |
| **Bulgaria** | 6 | 193,000 | **31.1** |
| **Portugal** | 6 | 1,809,000 | **3.3** |

≠ denominators based on 2014 travel trends of UK residents visits abroad, from office of national statistics.

**Table 13: Destinations associated with clusters involving residents of England and Wales with onset of symptoms during 2015**

| Country of Travel | No. clusters | No. associated EAW cases |
|---|---|---|
| **Belgium** | 1 | 3 |
| **Bulgaria** | 1 | 5 |
| **Cruise** (>1 European country) | 1 | 1 |
| **Cyprus/Turkey**[ł] | 1 | 1 |
| **France** | 1 | 1 |
| **Greece** | 3 | 6 |
| **Italy** | 6 | 8 |
| **Kosovo** | 1 | 1 |
| **Mauritius** | 1 | 1 |
| **Portugal** | 1 | 2 |
| **Spain** | 5 | 5 |
| **Thailand** | 6 | 7 |
| **Turkey** | 3 | 3 |
| **United Arab Emirates** | 7 | 7 |
| **United Kingdom** | 1 | 2 |
| **United States of America** | 3 | 6 |

**EAW:** England and Wales, [ł] complex cluster – involves > 1 accommodation site in both countries