Legionellosis: Northern Ireland

Surveillance Report 2014 to 2024

Contents

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Data correct as of 25 February 2025.

Key Points

- 70 confirmed and presumptive cases of Legionellosis were reported to Health Protection Surveillance from 2014 to 2024. 68 cases were confirmed as Legionnaires' disease.

- In 2024, all 13 cases reported were confirmed as Legionnaires' disease.

- The estimated incidence of Legionnaires' disease in 2024 was 0.67 (95% confidence interval: 0.36 to 1.15) per 100,000 population.

- From 2014 to 2024, 39 cases (57.4%) were aged 60 years and over. The majority of cases in 2024 were aged 50 to 59 years (53.9%; 7 cases). 5 cases (38.5%) were aged 60 years and over.

- From 2014 to 2024 the male:female ratio was 1.6 to 1. In 2024, 8 cases (61.5%) were male and 5 cases (38.5%) were female.

- From 2014 to 2024, 35 cases (51.5%) were community acquired and 32 cases were travel associated (47.1%) of which 90.6% (29 cases) were associated with travel abroad. 5 cases (38.5%) were in the travel exposure category in 2024, and 7 cases (58.9%) were in the community category.

- From 2014 to 2024, 45 cases (66.2%) had at least one underlying risk factor. In 2024, 8 cases (61.5%) had at least one underlying health condition.

Introduction

Legionellosis is a spectrum of diseases caused by Legionella bacteria[1]. Illness can range from mild (non-pneumonic Legionellosis or Pontiac fever) through to severe (Legionnaires' disease). Legionnaires' disease is a form of pneumonia which can potentially be fatal and is caused by the bacterium *Legionella pneumophila*[2].

Legionella bacteria typically inhabit natural water systems such as streams, rivers, and lakes. However, the bacteria also thrive in artificial warm water environments such as hot tubs, cooling towers, and large plumbing systems[3].

When people inhale contaminated water droplets or vapour, they may become infected with Legionella. However, the likelihood of illness depends on the concentrations of Legionella in the water source, the production and dissemination of aerosols, host factors such as age and pre-existing health conditions and the virulence of the strain of Legionella.

Symptoms of Legionnaires' disease often mimic those of pneumonia and can include high fever, chills, cough, muscle aches, and shortness of breath[1]. The risk increases with age but some people are at higher risk including: people over 45 years of age; smokers and heavy drinkers; people suffering from chronic respiratory or kidney disease; people suffering from diabetes, lung and heart disease; and anyone with an impaired immune system[2]. Prompt diagnosis and treatment with antibiotics are crucial to prevent complications and serious outcomes.

Legionnaires' disease can sometimes occur in clusters and outbreaks, often linked to shared water systems in buildings or public spaces; however, in many cases, the source of the infection is not identified. Preventive measures include maintaining proper water hygiene in cooling systems, ensuring clean and well-maintained water sources, and following public health guidelines to minimise the risk of infection[2].

Public health surveillance and monitoring play an essential role in minimising the impact of this potentially dangerous bacterial infection.

Glossary and case definitions

Confirmed case

A clinical or radiological diagnosis of pneumonia with laboratory evidence of one or more of the following:

- isolation (culture) of Legionella species from a clinical lower respiratory tract specimen.

- detection of Legionella pneumophila antigen in a urine specimen (using a urine antigen test (UAT)).

- detection of Legionella species nucleic acid (such as via PCR) in a lower respiratory tract specimen (such as sputum, bronchoalveolar lavage (BAL)).

Presumptive/Probable case (following declaration of an outbreak only)

A case with clinical or radiological diagnosis of pneumonia but no microbiological evidence for confirmation of Legionella infection can be considered a probable LD case where the location and onset date(s) meet the outbreak case definition for the exposure category.

Category of exposure

Potential sources of exposure can broadly be divided into three categories: community-acquired, travel-associated and healthcare-associated:

- Community-acquired

A case where the most likely potential source of infection is in the community or where there is no evidence of travel or healthcare-associated exposure during the 2 to 10 days before symptom onset.

- Travel-associated

A case who either stayed overnight or was considered to have had significant exposure to the water system during a visit (for example the use of spa and leisure facilities) to holiday or business accommodation during the 2 to 10 days before symptom onset. Accommodation sites include hotels, campsites, ships, rented holiday apartments or other tourist facilities. Travel associated cases can be subdivided into travel abroad, and travel within the UK.

■ Healthcare-associated

A case who either stayed overnight or was considered to have had significant exposure to a healthcare-associated premises for some or all the 2 to 10 days prior to onset of symptoms.

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 (for example, 6 months) to warrant further investigation. This is a working definition, and the decision to follow up cases is made locally.

Outbreak

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

Data sources

Data collection

Legionnaires' disease is a notifiable infectious disease and suspected cases are legally required to be reported to the Public Health Agency (PHA) Health Protection Duty Room in Northern Ireland[4]. Additional follow-up by the Duty Room is undertaken and an enhanced legionella surveillance notification form is completed for each case, preferably with the case themselves, but a close family member may need to complete depending on individual circumstances of each case. This allows for a risk assessment to be completed and any subsequent health protection action to be initiated, including cluster and outbreak investigation. Northern Ireland residents notified abroad or in another United Kingdom region are notified directly with the Health Protection Duty Room. If an individual not normally resident in Northern Ireland is notified locally then the Health Protection Duty Room will record the case here and an enhanced legionella surveillance notification form is completed. Any subsequent public health actions are followed and the case details communicated to the local health protection team of the individual's country.

The surveillance notification form is uploaded to HPZone (a web-based system for communicable disease control) and the data is then inputted to the Northern Ireland

Legionella surveillance database for analysis. Only if a case is suspected to be travel associated will the Health Protection Duty Room notify the UKHSA International Health Regulations Team.

Diagnostic testing for *L. pneumophila* is obtained from local hospital diagnostic laboratories and appended to the HPZone record for each individual case. Urinary antigen tests (UAT) is the mostly frequently used diagnostic test, whereas respiratory samples, tested via PCR and culture, can provide greater insight in terms of serotyping of *L. pneumophila.*

Datasets are validated against HPZone, updated and analysed.

Population estimates

Rates per 100,000 population are calculated using the mid-year estimates of the Northern Ireland population from the Northern Ireland Statistics and Research Agency (NISRA). Revised 2012-2023 mid-year population estimates for Northern Ireland in line with the most recent Census 2021 population estimates were made available by NISRA on 19 September 2024. 2024 population estimate was estimated using the percentage increase from 2022 to 2023.

Statistical methods

The Poisson exact method was used to calculate 95% confidence intervals (CIs) for case rates, given the low number of cases each year in Northern Ireland.

Results

Cases of confirmed and presumptive/probable Legionellosis

From 2014 to 2024, 70 cases of confirmed and presumptive/probable Legionellosis was notified in Northern Ireland, with 68 cases being confirmed as Legionnaires' disease (97.1%). All 13 cases notified in 2024 were confirmed Legionnaires' disease. There was one case reported with non-pneumonic legionellosis in 2014 (Figure 1).
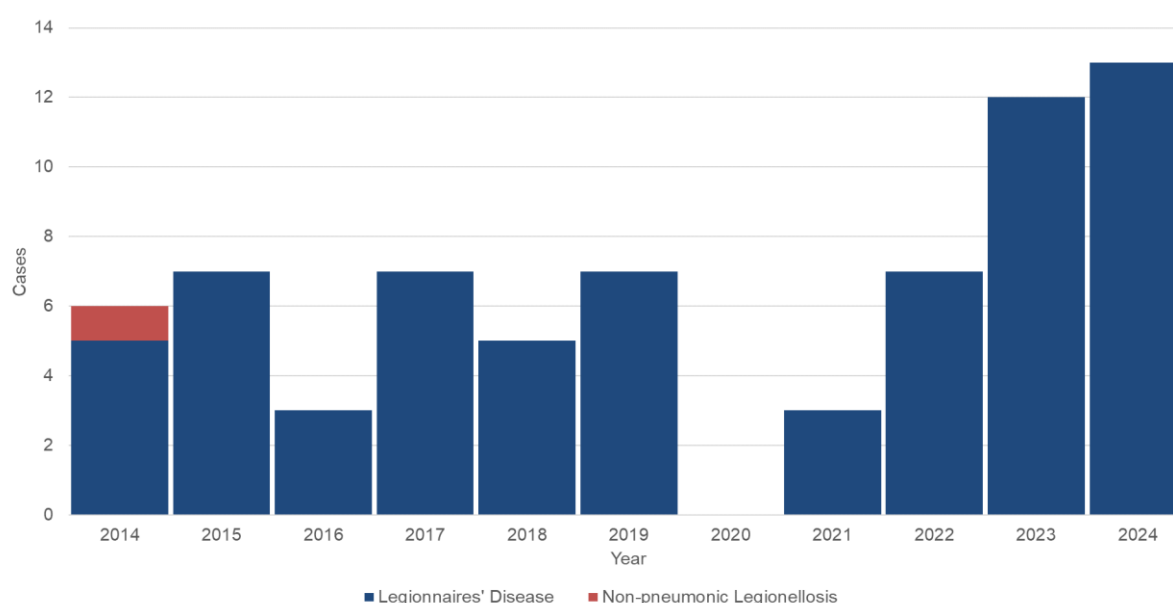

Figure 1. Number of confirmed and presumptive cases of Legionellosis by disease type and year, 2014 to 2024. See appendix Table A1 for data used in this graph.

Trends in Legionnaires' disease

From 2014 to 2024, cases of confirmed Legionnaires' disease followed a seasonal pattern, with activity increasing during the summer months, and usually reaching a peak between July and September (Figure 2). In 2024, this seasonal pattern was evident with 61.5% (n=8/13) of cases being recorded between June and October. The seasonal peaks were not as evident when cases associated with travel were removed, but this could be due to relatively low number of cases in Northern Ireland.
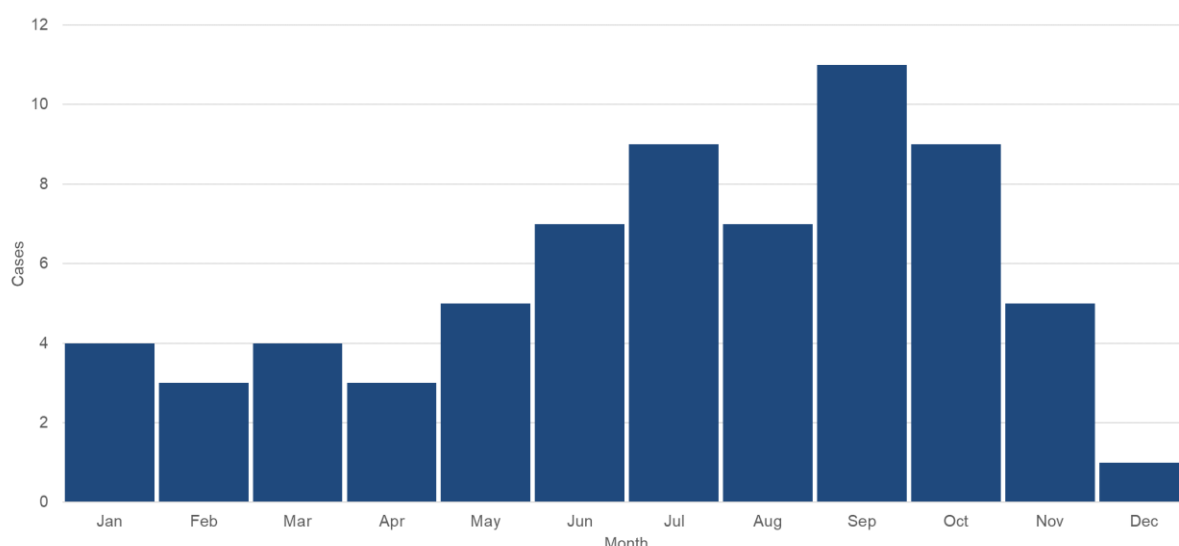
Figure 2. Number of confirmed cases of Legionnaires' disease by month, 2014 to 2024 (inclusive). See appendix Table A2 for data used in this graph.

Although the case rate per 100,000 population of confirmed Legionnaires' disease appears to increase from 2022 onwards, and surpasses pre-pandemic case rates (Figure 3), the overlapping 95% confidence intervals indicate that this difference may be due to random variation and relatively low number of cases in Northern Ireland.
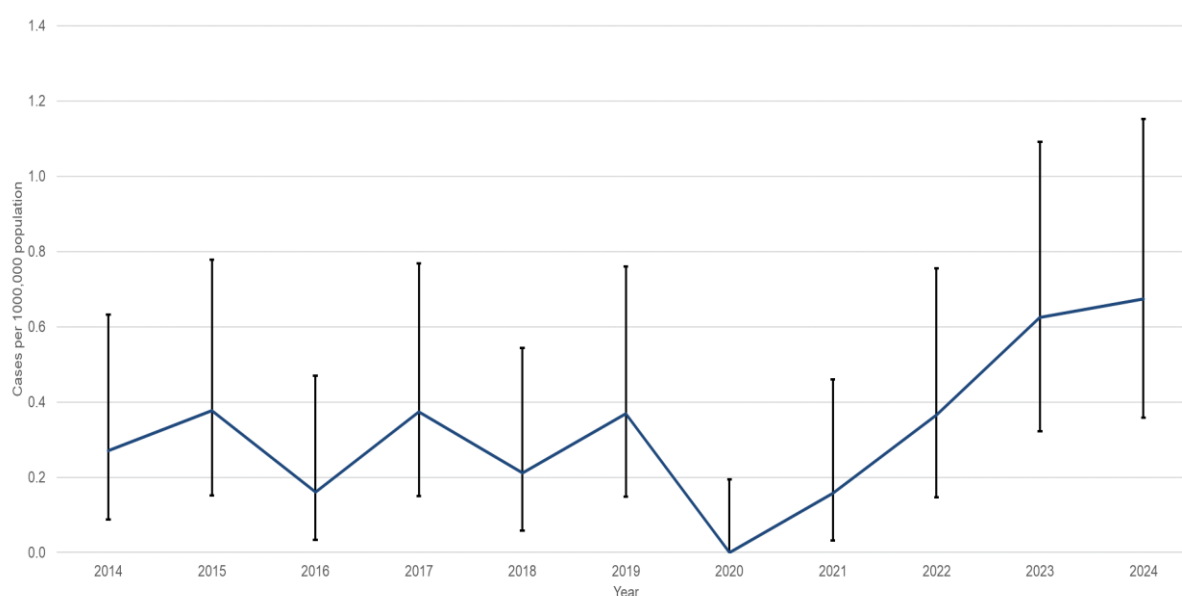

Figure 3. Rate of confirmed cases of Legionnaires' disease per 100,000 population, 2014 to 2024. See appendix Table A3 for data used in this graph.
Note: error bars represent 95% confidence intervals.

Age and sex distribution

From 2014 to 2024, 33.8% (n=23/68) of confirmed Legionnaires' disease cases were reported in those aged 60 to 69 years, followed by 26.5% (n=18/68) in those aged 50 to 59 years. In 2024, 53.9% (n=7/13) of cases were reported in those aged 50 to 59 years (Figure 4). This corresponds with older age being identified as a vulnerable population for Legionnaires' disease.

Figure 4. Number of confirmed cases of Legionnaires' disease by year and age group, 2014 to 2024. See appendix Table A4 for data used in this graph.

From 2014 to 2024, 61.8% (n=42/68) of confirmed Legionnaires' disease cases were male and 38.2% (n=26/68) were female. The overall male-to-female ratio was 1.6 to 1, corresponding with male sex being a known risk factor for Legionnaires' disease. In 2024, 61.5% (n=8/13) of cases were male (Figure 5). From 2014 to 2024, the highest proportion of both male and female cases were in those aged 60 to 69 years (33.3%, n=14/42 and 34.6%, n=9/26, respectively).
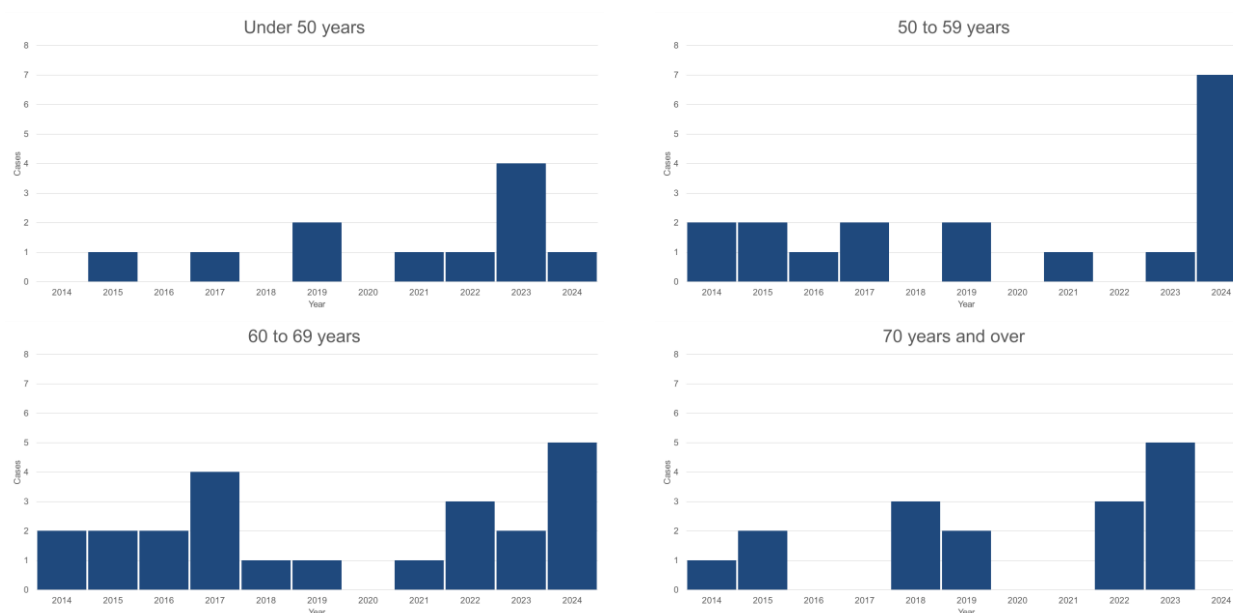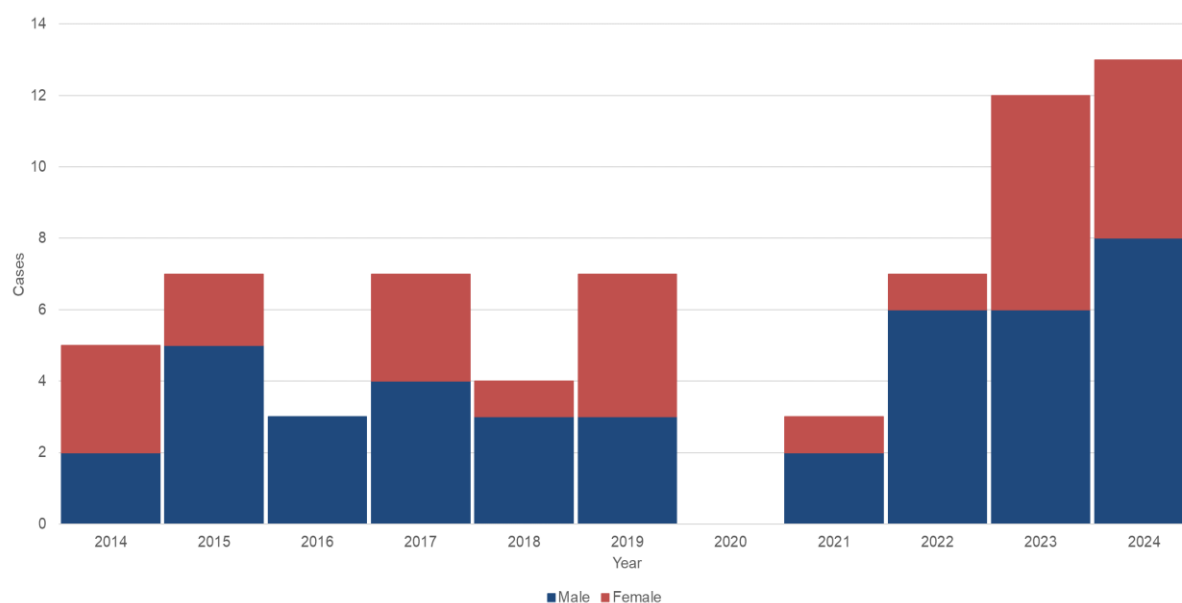
Figure 5. Number of confirmed cases of Legionnaires' disease by sex, 2014 to 2024. See appendix Table A5 for data used in this graph.

Trust distribution

From 2014 to 2024, 38.5% (n=25/65) of confirmed Legionnaires' disease cases were notified by the Belfast Health and Social Care Trust (BHSCT), followed by 26.2% (n=17/65) by the South Eastern Health and Social Care Trust (SEHSCT). Three cases from 2014 to 2024 were local residents notified outside of Northern Ireland. In 2024, 46.2% (n=6/13) of cases were reported in the BHSCT (Figure 6).

Figure 6. Number of confirmed cases of Legionnaires' disease by Health and Social Care Trust (HSCT) and year, 2014 to 2024. See appendix Table A6 for data used in this graph.

Category of exposure

From 2014 to 2024, a higher proportion of confirmed cases of Legionnaires' disease were in the community exposure category (51.5%, n=35/68), followed by the travel category (47.1%, n=32/68). Of those cases in the travel category, 90.6% (n=29/32) of cases reported travelling abroad. In 2024, a higher proportion of cases were in the community exposure category (58.9%, n=7/13) than in the travel category (41.1%, n=5/13) (Figure 6).

Figure 7. Number of confirmed cases of Legionnaires' disease by principal exposure category and year, 2014 to 2024. See appendix Table A7 for data used in this graph.

Risk factors

Underlying medical conditions such as immunosuppression, chronic respiratory diseases, and liver or kidney diseases, in addition to tobacco smoking, are well-known risk factors for Legionnaires' disease[5].

From 2014 to 2024, most confirmed cases of Legionnaires' disease had at least one underlying risk factor (66.2%, n=45/68). In 2024, 61.5% of cases (n=8/13) reported at least one underlying risk factor (Figure 8). From 2014 to 2024, 14.7% of cases (n=10/68) had incomplete information on risk factors. In 2024, the most prevalent underlying health conditions included hypertension and smoking.
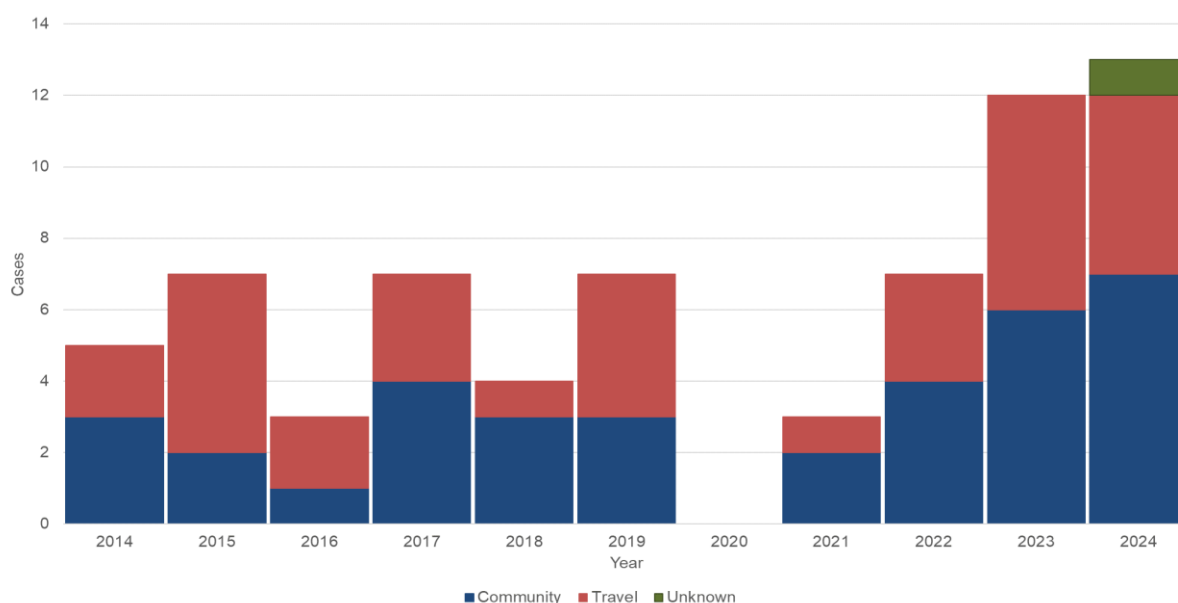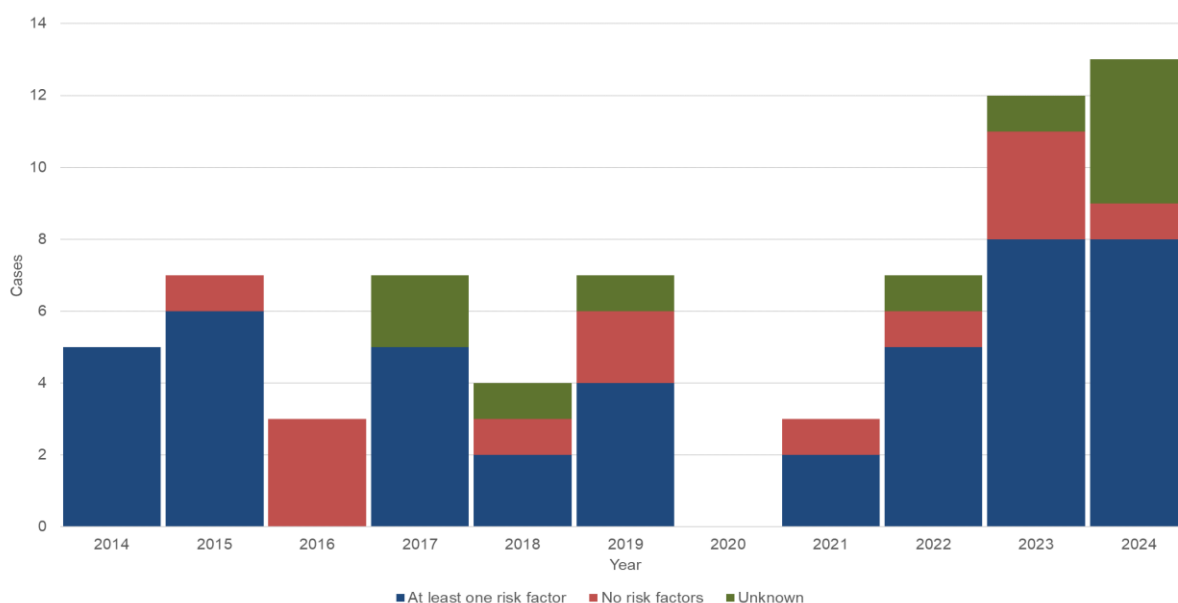
Figure 8. Number of confirmed cases of Legionnaires' disease by underlying risk factors and year, 2014 to 2024. See appendix Table A8 for data used in this graph.

Microbiology

Urinary antigen tests (UAT) remained the most frequently used diagnostic test among Legionnaires' disease cases, with 88.2% (n=60/68) positive UATs reported between 2014 and 2024 (Table 1).

Table 1. Confirmed Legionnaires' disease cases by diagnostic test, 2014 to 2024*

		Urinary antigen		Culture		PCR	
Year	Total cases	N	% total cases	N	% total cases	N	% total cases
2014	5	5	100%	1	20.0%	0	0%
2015	7	7	100%	1	14.3%	0	0%
2016	3	3	100%	0	0%	1	33.3%
2017	7	6	85.7%	1	14.3%	3	42.9%
2018	4	4	100%	0	0%	1	25.0%
2019	7	7	100%	0	0%	2	28.6%
2020**	0	0	0%	0	0%	0	0%
2021	3	1	33.3%	1	33.3%	1	33.3%
2022	7	5	71.4%	0	0%	2	28.6%
2023	12	11	91.7%	0	0%	1	8.3%
2024	13	11	84.6%	2	15.4%	5	38.5%

*Cases may have more than one diagnostic test reported
**No cases reported in 2020

Clusters and outbreaks

From 2014 to 2024, two potential clusters were identified. The first was a community cluster of two cases with a common area of residence in Northern Ireland and close proximity of onset date. The second cluster involved two cases with a travel history to United Arab Emirates and close proximity of onset dates. After investigation, no epidemiological evidence of a common source of infection was identified in both potential clusters.

In the same period, two outbreaks were identified. The first was an outbreak among travellers returning from the same resort in Spain, which involved tourists from Northern Ireland. Environmental testing identified *L. pneumophila* in nearby locations within the resort. The second outbreak involved two cases with a common area of residence in Northern Ireland and close proximity of onset date. Environmental testing and whole genome sequencing suggested epidemiological evidence of a common source of infection.

Discussion

Although confirmed cases of Legionnaires' disease remain low in Northern Ireland, there has been a slight upward trend since 2022, following the COVID-19 pandemic. In 2024, 13 cases were reported, compared to an average of 6 cases between 2014 and 2023. The estimated incidence has also risen, reaching 0.67 cases per 100,000 population in 2024 (95% confidence interval: 0.36 to 1.15). However, this increase may partly reflect changes in testing and diagnosis rather than a genuine rise in disease burden. This is supported by overlapping confidence intervals, suggesting that fluctuations could be due to random variation and the relatively low number of cases in Northern Ireland.

Recent data from across the United Kingdom (UK), Ireland and the EU/EEA also show continued increases since 2022. In 2023, the estimated incidence of Legionnaires' disease was 1.0 per 100,000 population in England[6], 1.4 per 100,000 population in Wales[6], and 0.99 per 100,000 population in Scotland[7]. In Ireland, the estimated incidence was 0.10 per 100,000 in 2021 (during the COVID-19 pandemic)[8], rising to approximately 0.64 per 100,000 in 2023. Across the EU/EEA, the highest annual notification rate recorded was 2.4 cases per 100,000 population in 2021 (latest available report)[8]. While this peak occurred during the pandemic, it was in line with an increasing trend observed in the years leading

up to COVID-19, and may be linked to the reopening of premises after the first year of prolonged pandemic-associated closures[9].

The main characteristics of Legionnaires' disease cases reported in Northern Ireland between 2014 and 2024 align with patterns observed across the UK, Ireland, and the EU/EEA. Most cases continue to be sporadic and community-acquired, predominantly affecting older males with at least one underlying risk factor.

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Appendix

Table A1. Number of confirmed and presumptive cases of Legionellosis by disease type and year, 2014 to 2024

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Legionnaires Disease	5	7	3	7	5	7	0	3	7	12	13
Non-pneumonic Legionellosis	1	0	0	0	0	0	0	0	0	0	0
Total	6	7	3	7	5	7	0	3	7	12	13

Table A2. Number of confirmed cases of Legionnaires' disease by month, 2014 to 2024 (inclusive)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Legionnaires Disease	4	3	4	3	5	7	9	7	11	9	5	1

Table A3. Rate of confirmed cases of Legionnaires' disease per 100,000 population, 2014 to 2024.

Year	Cases	Mid-year population	Rate per 100,000	Lower 95% CI	Upper 95% CI
2014	5	1,843,186	0.27	0.09	0.63
2015	7	1,854,943	0.38	0.15	0.78
2016	3	1,866,042	0.16	0.03	0.47
2017	7	1,875,178	0.37	0.15	0.77
2018	4	1,886,259	0.21	0.06	0.54
2019	7	1,898,519	0.37	0.15	0.76
2020	0	1,900,523	0.00	0.00	0.19
2021	3	1,904,564	0.16	0.03	0.46
2022	7	1,910,543	0.37	0.15	0.75
2023	12	1,920,382	0.62	0.32	1.09
2024	13	1,929,984	0.67	0.36	1.15

Poisson Exact Method used to calculate 95% confidence intervals due to small case numbers.

Table A4. Number of confirmed cases of Legionnaires' disease by year and age group, 2014 to 2024.

Age Group	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
<50 years	0	1	0	1	0	2	0	1	1	4	1
50-59 years	2	2	1	2	0	2	0	1	0	1	7
60-69 years	2	2	2	4	1	1	0	1	3	2	5
70+ years	1	2	0	0	3	2	0	0	3	5	0
Total	5	7	3	7	4	7	0	3	7	12	13

Table A5. Number of confirmed cases of Legionnaires' disease by sex, 2014 to 2024

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Female	3	2	0	3	1	4	0	1	1	6	5
Male	2	5	3	4	3	3	0	2	6	6	8
Total	5	7	3	7	4	7	0	3	7	12	13

Table A6. Number of confirmed cases of Legionnaires' disease by Health and Social Care Trust (HSCT) and year, 2014 to 2024

	2014	2015*	2016*	2017	2018	2019	2020	2021	2022*	2023	2024
BHSCT	0	2	0	4	3	1	0	2	2	5	6
NHSCT	3	0	1	1	0	2	0	0	0	1	2
SEHSCT	2	2	1	1	1	2	0	0	2	3	3
SHSCT	0	1	0	1	0	1	0	1	1	1	1
WHSCT	0	1	0	0	0	1	0	0	1	2	1
Total	5	6	2	7	4	7	0	3	6	12	13

*Three cases excluded as notified outside of Northern Ireland

Table A7. Number of confirmed cases of Legionnaires' disease by principal exposure category and year, 2014 to 2024

Exposure category	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024*
Community	3	2	1	4	3	3	0	2	4	6	7
Travel	2	5	2	3	1	4	0	1	3	6	5
Unknown	0	0	0	0	0	0	0	0	0	0	1
Total	5	7	3	7	4	7	0	3	7	12	13

Table A8. Number of confirmed cases of Legionnaires' disease by underlying risk factors and year, 2014 to 2024

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
At least 1 risk condition	5	6	0	5	2	4	0	2	5	8	8
No risk conditions	0	1	3	0	1	2	0	1	1	3	1
Unknown	0	0	0	2	1	1	0	0	1	1	4
Total	5	7	3	7	4	7	0	3	7	12	13