Legionnaires' Disease Investigations in Ohio

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Ohio | Department of Health

Legionellosis

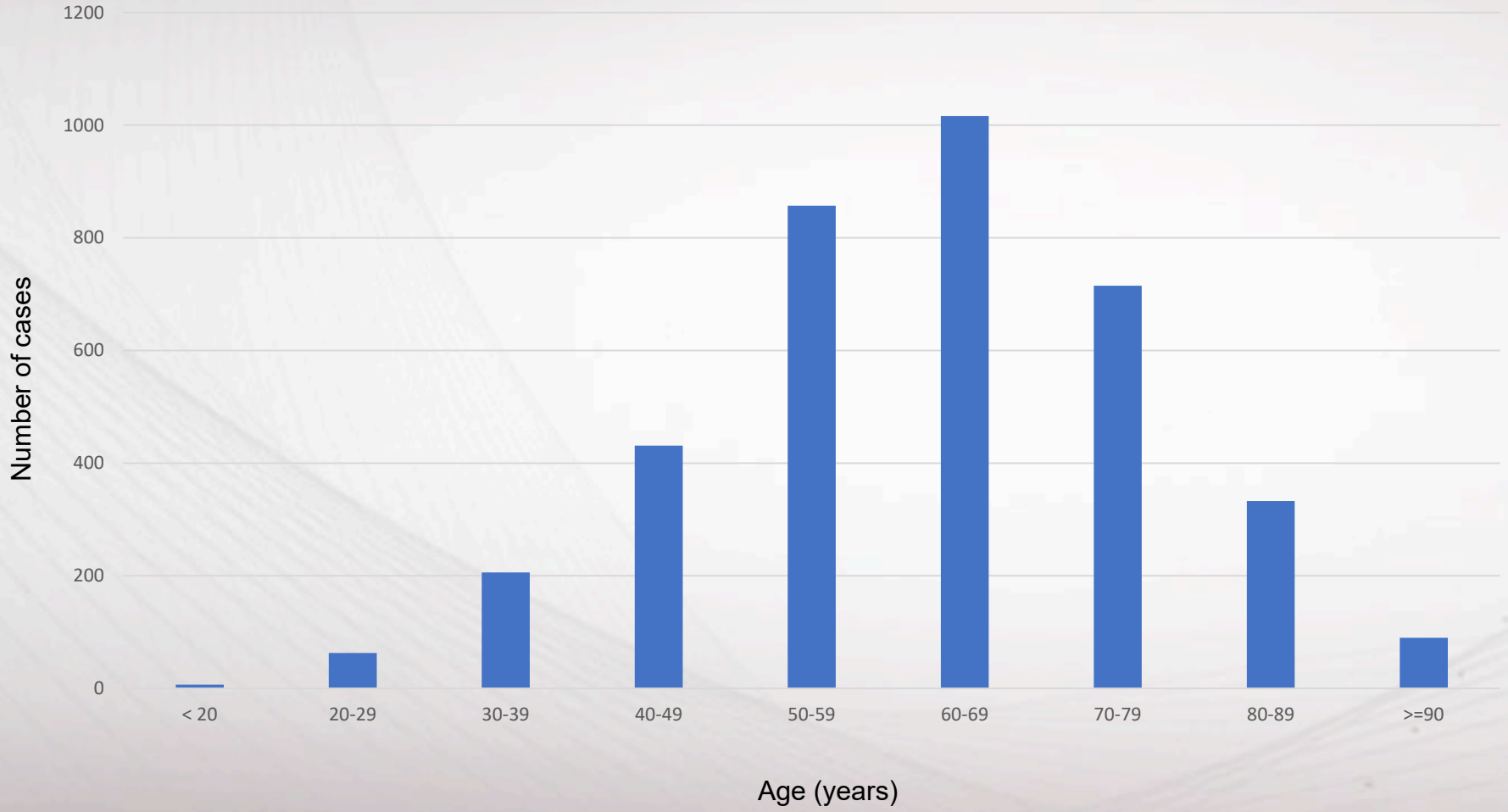
- Exposure to *Legionella* typically requires inhalation of the bacterium through aerosols
- *Legionella pneumophila* and several closely related species are the causal agents of legionellosis.
- Legionellosis refers to a lung infection by *Legionella* that can develop into multiple illnesses.

Source: CDC

Legionnaires' Disease

- Risk of disease increased in individuals who meet any of the following conditions:
  - Current or former smokers.
  - Cancer patients.
  - Chronic lung disease.
  - Compromised immune systems.
  - Above the age of 50.
- Onset of illness typically 2-10 days after exposure.
- Legionnaires' Disease has a mortality rate of around 10%.

Age at Onset: Legionellosis: Ohio: 2017-2021 (3718 cases)

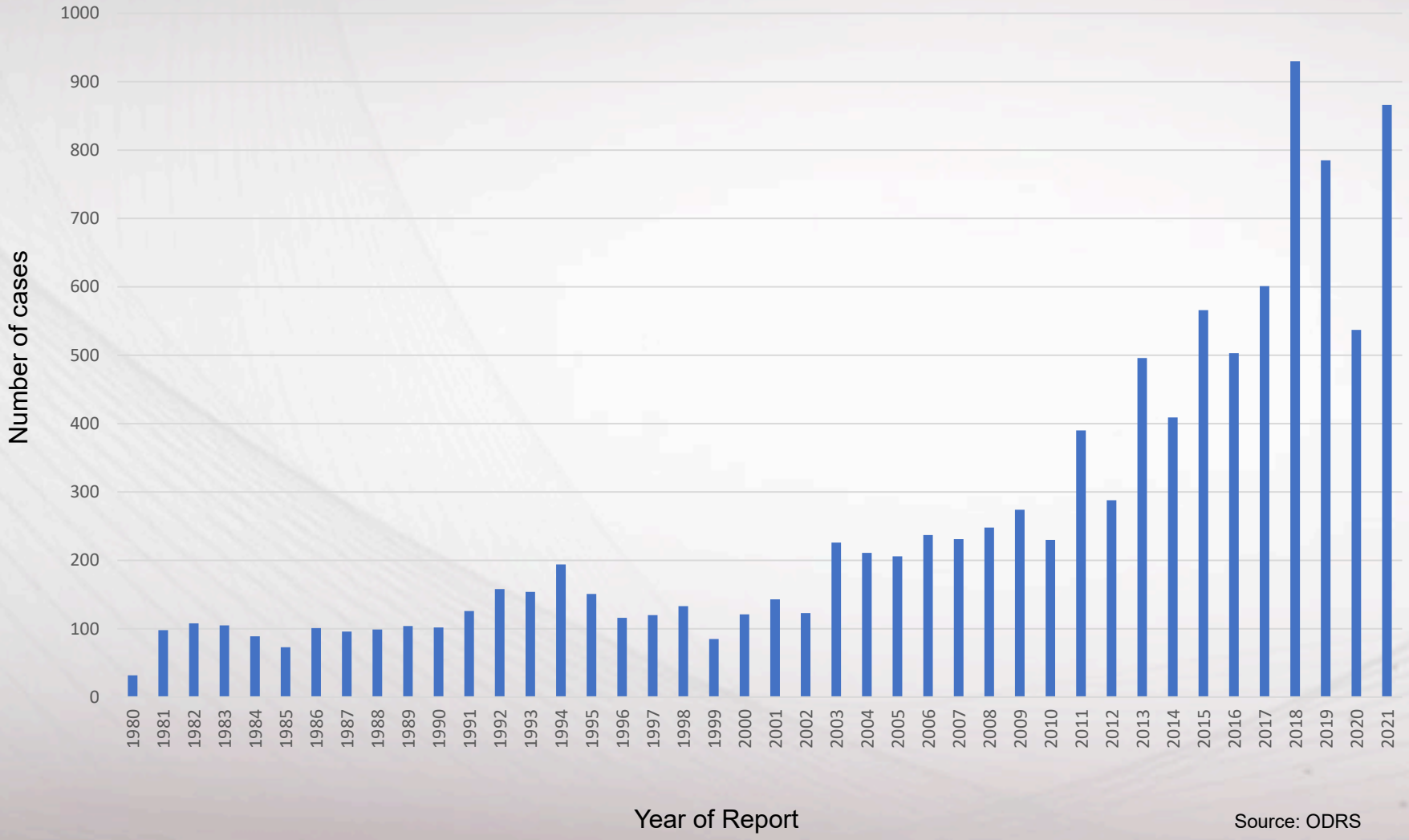


Source: ODRS

LEGIONELLOSIS in U.S. AND OHIO 1976-2021

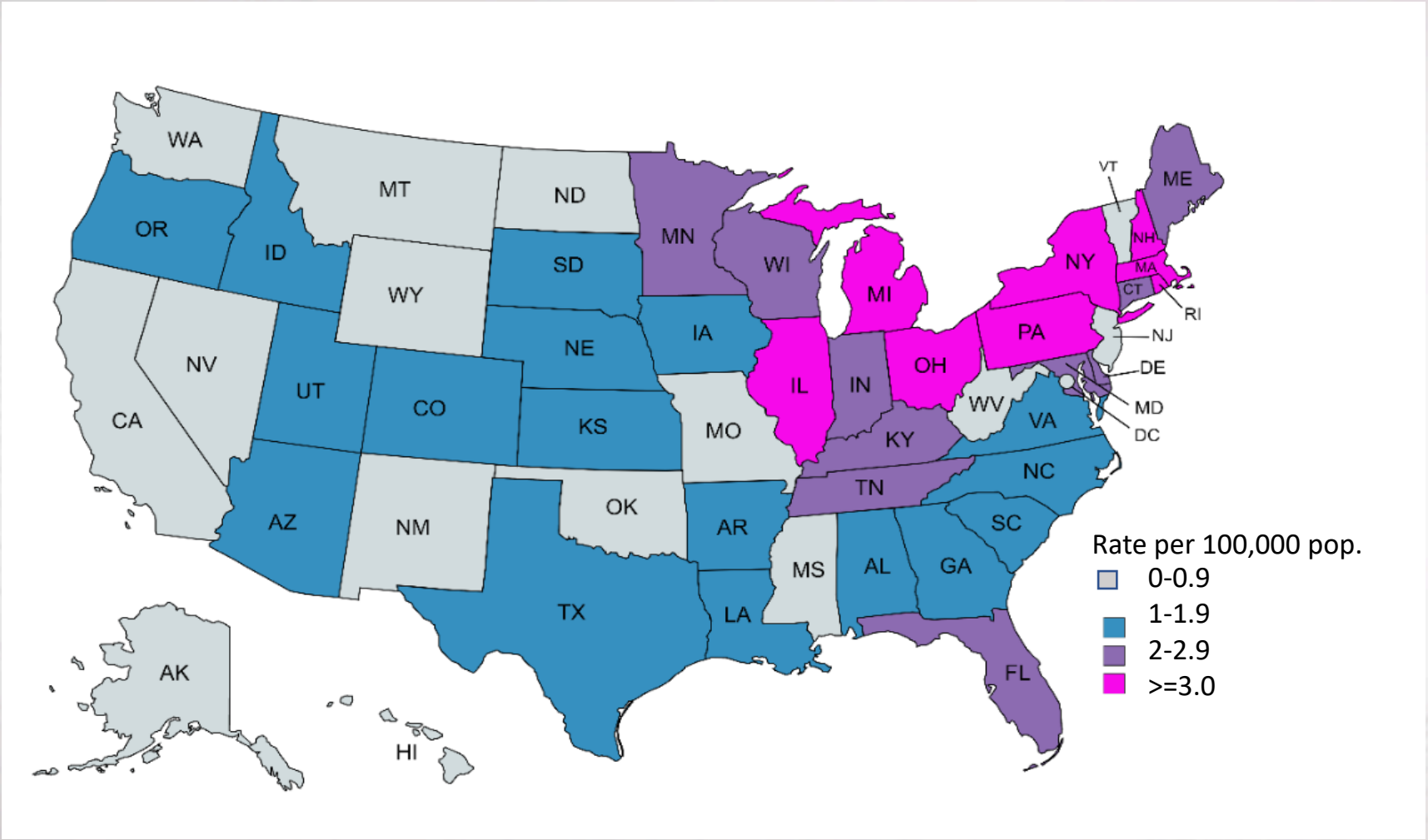
SOURCE: MMWR AND ODRS

LEGIONELLOSIS CASES: OHIO 1980 TO 2021



Source: ODRS

Legionnaires' Disease: 2021 (preliminary data): 6839 cases
Cases per 100,000 population



Source: CDC Wonder 01-24-2023

Legionellosis cases: 2020 and 2021

	2020	2021*
Ohio	537	866
U.S.	6060	6838

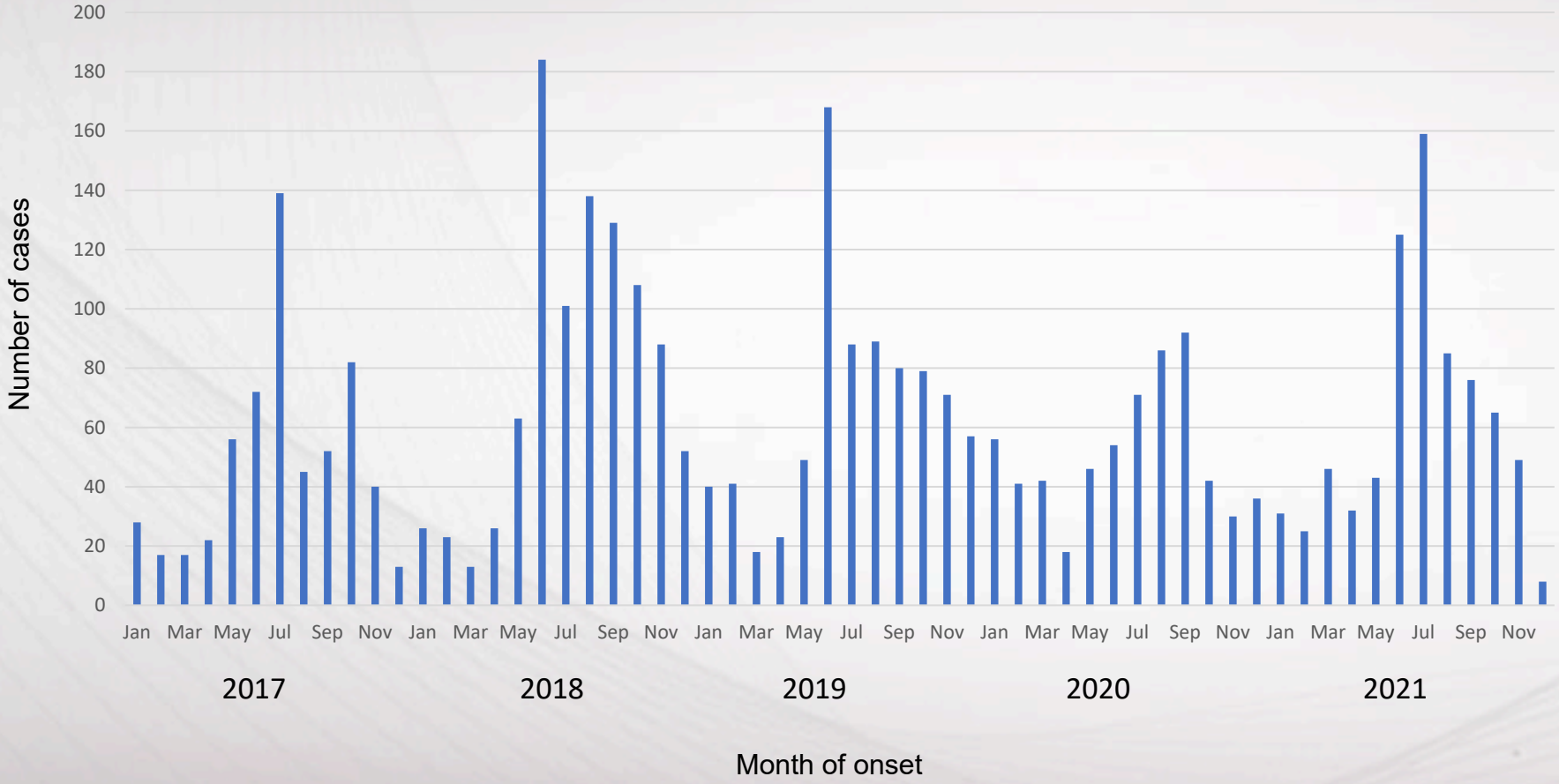
*2021 preliminary data

Source: CDC-MMWR & ODRS

Legionnaires' Disease in Ohio

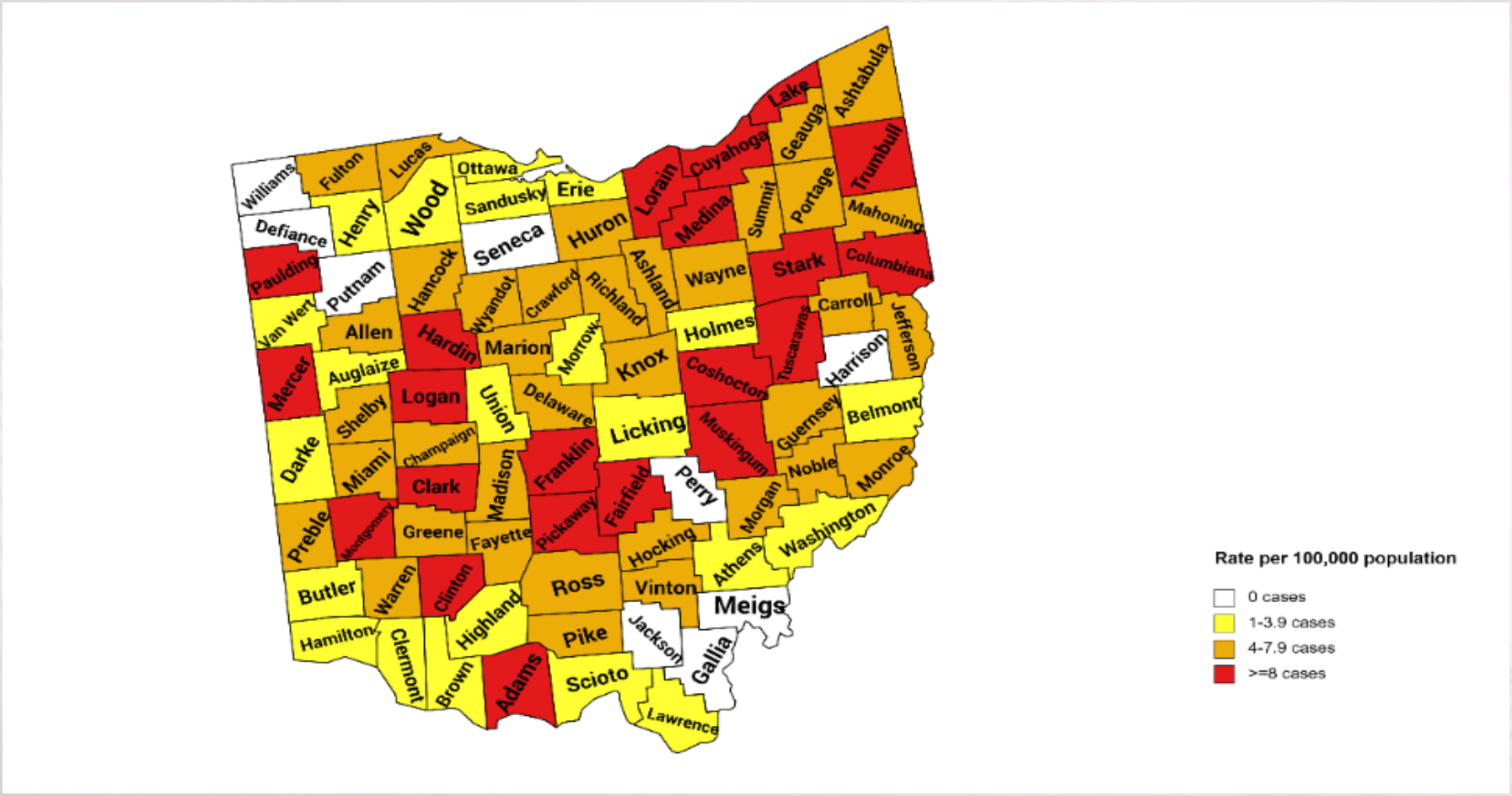
- Why are cases of LD increasing?
  - Population is aging.
  - More use of immune-suppressive drugs.
  - Higher prevalence of co-morbid conditions.
  - Growing dependence on heating/vent/cooling systems.
  - Increased complexity of indoor plumbing in large buildings.
  - Inadequate maintenance of public water supplies.

Month of Onset: Legionellosis: Ohio: 2017-2021 (3695 cases)



Source: ODRS

LEGIONELLOSIS: 2021: COUNTY RATE MAP CASES PER 100,000 POPULATION



Source: ODRS and US census, 2020

Legionella in Facilities

Source: CDC

Facilities with High *Legionella* Risk

- Facilities housing sensitive populations such as hospitals and long-term care facilities.
- Buildings with more than 10 stories.
- Buildings with cooling towers.
- Building with large, complex hot water distribution systems.
- Hospitals.
- Nursing Homes.
- Senior living/assisted living facilities.
- Hotels.
- Office buildings.
- Commercial operations using misting/spray.
- Churches.
- Dental equipment.

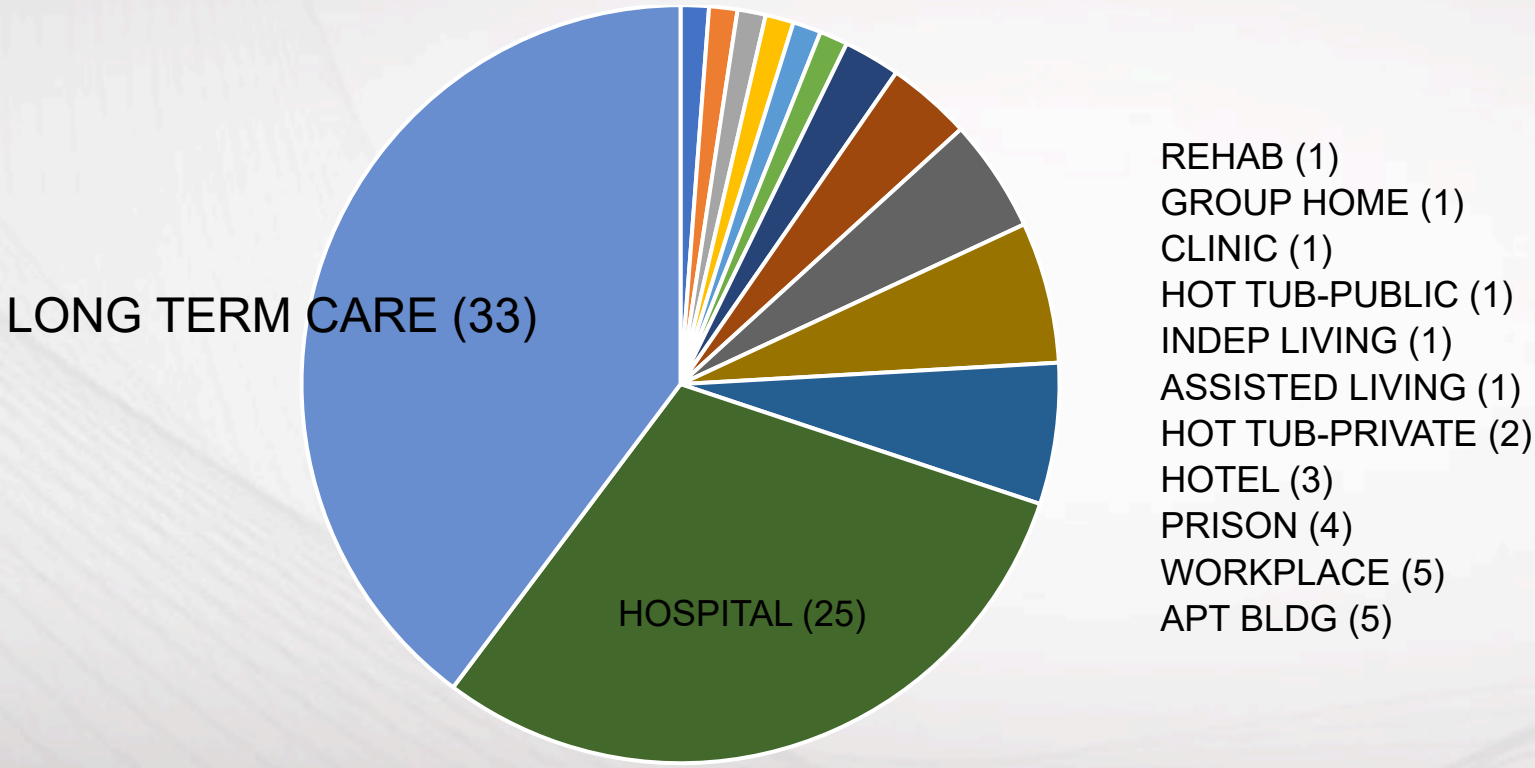
Responding to Facility-Associated LD

- When made aware of a facility-associated case of LD, ODH contacts the LHD to discuss next steps.
- LHD then reaches out to the facility to gather basic information (water management program, monitoring records, floor plans, etc.).
- A call is arranged between the three parties.

Legionellosis Investigations

- Coordination is key during legionellosis investigations:
  - The facility.
  - Outside consultants and other vendors.
  - Local health jurisdictions.
  - Ohio Department of Health.
  - Centers for Disease Control and Prevention (CDC).
- Between January 2021 and April 2022, BEHRP worked on a total of 83 investigations with over 35 LHDs.

LEGIONNAIRES' DISEASE IN OHIO:
ODH ENVIRONMENTAL HEALTH INVESTIGATIONS:



Role of ODH

Bureau of Infectious Diseases

- Responsible for case surveillance and disease monitoring.
- Supports epidemiology investigations and gives training to local health districts.
- Provides clinical assistance in case and outbreak response.
- Can request EPI-Aid from CDC.
- National reporting of disease occurrence.

Role of ODH

Bureau of Environmental Health and Radiation Protection

- Provides technical assistance to local health districts, facilities, building managers on *Legionella* prevention.
- Provides environmental technical assistance on cases and outbreaks.
- Provides training and outreach to local health districts and facilities.
- Organize and distribute resources for *Legionella* prevention.

Role of Local Health

In the event of a facility-associated case or outbreak, local health districts should:

- Conduct an epidemiological evaluation.
- Determine what category the case or outbreak belongs to- travel, healthcare, community acquired.
- Investigate potential sources and contact facility managers.
- Inform and work with facility managers in investigating *Legionella* cases.
- Make recommendations and document all actions taken by both the facility and the LHD.
- Communicate with ODH on case/outbreak information.
- Request ODH or CDC assistance if needed.

Requested Materials

- The facility's water management program.
- Any previous water sampling logs (for *Legionella*).
- Water system monitoring logs.
- A floor plan of the facility.
- Ice machine servicing logs.
- Cooling tower servicing and disinfectant residual logs.
- Additional water feature maintenance and disinfection records.
- Cleaning and disinfection records for any respiratory equipment used by the facility.

Full Investigation Procedure

Recommendations and steps to take in the event of a presumptive healthcare associated case or multiple possible cases within a 12-month period:

1. Implementation of water-use restrictions.
2. Communication to patients and staff.
3. Completion of a facility assessment for high-risk conditions.
4. Sample for *Legionella* in facility water systems.
5. Identify and address any water system concerns.

Full Investigation Procedure

6. Remediate potable water and/or additional water features.
7. Conduct at least additional sets of samples post-remediation.
8. Review and revise water management program in coordination with state and local health.
9. Flush fixtures and lift restrictions.

Consultants

- When initiating an investigation, it is strongly recommended for facilities to contract a water consultant with expertise in *Legionella.*
- Consultants can assist with the previously mentioned steps.
- State and local health departments can provide a list of consultants active in Ohio upon request.

Water-use Restrictions

- The purpose of water-use restrictions is to immediately eliminate exposure to aerosols that may contain *Legionella* within the facility.
- This can be accomplished by:
  - Turning off water at all locations throughout the facility including sinks, showers, hydrotherapy tubs, decorative water features, etc.
  - Installing 90-day medical-grade 0.2 micron filters designed to remove *Legionella* at all fixtures within the facility.
  - A combination of the two with filters at key locations for handwashing.

Water-use Restrictions

- Ensure staff is properly informed and trained on procedures while water restrictions are in place.
- Make sure staff is trained on filter use and that contact information is provided should a filter break or become clogged.
- Signage should be posted to inform patients and family on who to contact should a filter be damaged.
- Additional information on water-use restrictions may be found at: www.cdc.gov/legionella/health-depts/healthcare-resources/cases-outbreaks.html.

Water-use Restrictions

Communications

- The facility will need to communicate about the ongoing *Legionella* investigation.
- Communications should be provided to the following:
  - Patients.
  - Families.
  - Visitors.
  - Staff.
- The facility should provide copies of communication to the LHD and ODH.
- Resources may be found at: www.cdc.gov/legionella/health-depts/healthcare-resources/cases-outbreaks.html.

Environmental Assessment

- An environmental assessment allows a facility analyze facility history and features to identify areas of risk.
- This allows the facility to make informed decisions about sampling, plumbing corrections and remediation.
- The CDC assessment form may be found at: https://www.cdc.gov/legionella/downloads/legionella-environmental-assessment-p.pdf.

Centers for Disease Control and Prevention

Legionella Environmental Assessment Form

HOW TO USE THIS FORM

This form enables public health officials to gain a thorough understanding of a facility's water systems and assist facility management with minimizing the risk of legionellosis. It can be used along with epidemiologic information to determine whether to conduct *Legionella* environmental sampling and to develop a sampling plan. The assessment should be performed on-site by an epidemiologist and an environmental health specialist with knowledge of the ecology of *Legionella*. Keep in mind that conditions promoting *Legionella* amplification include water stagnation, warm temperatures (77–108°F or 25–42°C), availability of organic matter, and lack of residual disinfectant such as chlorine. For training and information, please visit CDC's legionellosis resources webpage at: https://www.cdc.gov/legionella/outbreak-toolkit/.

Complete the form in as much detail as possible. Do not leave sections blank; if a question does not apply, write "N/A". If a question applies but cannot be answered, explain why. Where applicable, specify the units of measurement being used (e.g., ppm). Completion of the form may take several hours.

BEFORE ARRIVING ON SITE

- ❒ Request the attendance of the lead facility manager as well as others who have a detailed knowledge of the facility's water systems, such as a facility engineer or industrial hygienist.
- ❒ Request that they have maintenance logs and blueprints available for the meeting.
- ❒ Bring a plastic bottle, thermometer, pH test kit, and a chlorine test kit that can detect a wide range of residual disinfectant (<1 ppm for potable water and up to 10 ppm for whirlpool spas).
- ❒ If the epidemiologic information available suggests a particular source (e.g., whirlpool spa, cooling tower), request that they shut it down (but do not drain or disinfect) in order to stop transmission.

INSTRUCTIONS FOR MEASURING WATER PARAMETERS IN THE PREMISE PLUMBING *(TABLE P. 8)*

It is very important to measure and document the current physical and chemical characteristics of the potable water, as this can help determine whether conditions are likely to support *Legionella* amplification.

STEP 1: Plan a sampling strategy that incorporates all central hot water heaters/boilers and various points along each loop of the potable water system. For example, if the facility has one loop serving all occupant rooms, an occupant room near (proximal) the central hot water heater and another at the farthest point (distal) of the loop should be sampled.

STEP 2: For each sampling point (e.g., tap in an occupant room):

a. Turn on the hot water tap. Collect the first 50 ml from the tap. Measure the free chlorine residual and pH. Document the findings in the table on p. 8. Note: If there is no residual chlorine in the hot water, measure it in the cold water. Note: Total chlorine should be measured instead of free chlorine if the method of disinfection is not chlorine (e.g., monochloramine).

b. Allow the hot water tap to run until it is as hot as it will get. Collect 50 ml and measure the temperature. Document the temperature and the time it took to reach the maximum temperature.

Centers for Disease Control and Prevention
National Center for Immunization and Respiratory Diseases

06/2019 CS306411-A

Source: CDC

Ohio Department of Health

LEGIONELLA ENVIRONMENTAL ASSESSMENT FORM

Person(s) completing the assessment:

Name: _____ Job Title: _____ Organization: _____

Telephone: _____ E-mail: _____

Name: _____ Job Title: _____ Organization: _____

Telephone: _____ E-mail: _____

Assessment details:

Facility Name: _____ Date of Assessment: _____

Facility Address: _____
street city state zip

Person(s) interviewed during assessment:

Name: _____ Job Title: _____

Name: _____ Job Title: _____

Name: _____ Job Title: _____

Facility Characteristics

1. Is this a healthcare facility or senior living facility with skilled nursing care (e.g., hospital, long term care/rehab/assisted living/skilled nursing facility, or clinic)?
   - ❑ YES → If yes, skip to Q.3 & also complete Appendix A.
   - ❑ NO
2. If NO, indicate type of facility (check all that apply):
   - ❒ Senior living facility (e.g., retirement home without skilled nursing care)
   - ❒ Other residential building (e.g., apartment, condominium)
   - ❒ Hotel, motel, or resort
   - ❒ Recreational facility (e.g., health club, water park)
   - ❒ Office building
   - ❒ Manufacturing facility
   - ❒ Restaurant
   - ❒ Other _____
3. Total number of buildings on campus: _____ Total number of buildings being assessed: _____
4. Total number of rooms that can be occupied overnight (e.g., patient rooms, hotel rooms): _____
5. Does occupancy vary throughout the year? ❑ YES ❑ NO
   If YES, seasons with lowest occupancy (check all that apply):
   ❑ Winter ❑ Spring ❑ Summer ❑ Fall
6. Are any occupant rooms taken out of service during specific parts of the year, e.g., low season?
   ❑ YES ❑ NO
   If YES, which rooms? _____

Source: CDC

16. Describe each building that shares water or air systems, including the main facility

Building Name (List main facility building first)	Original Construction Year Completed	Later Construction (renovation, expansion) From/To or "N/A"	Stories or Levels #	Occupancy rate (%)* Rate (%) or "N/A"	Daily Census (yr. avg.) #/day or "N/A"	Use (List all types of uses) e.g., occupant rooms, utilities, heating/AC plant For healthcare, specify: Outpatient = O Inpatient (acute) = I Chronic = C Intensive care = ICU Transplant = Tx
1.						
2.						
3.						
4.						
5.						
6.						
7.						

*[occupancy rate = (# of rooms occupied overnight / total # of rooms) X 100]

Source: CDC

30. Measured Water System Parameters (see instructions on p. 1)

Building name Copy from table for question 23 (p. 6)	Name of system (e.g., incoming water, Boiler #1, Loop #1) Copy from table for question 23 (p. 6)	Part of system (Central heater/ boiler=C Proximal occupant room=P Distal occupant room=D)	Sampling site (e.g., heater #1, hot water tap in room #436)	Free chlorine (ppm)	pH	Maximum measured temperature (°F)	Time to reach max temp (min)

Source: CDC

Pre-remediation Sampling

- Water samples collected prior to any remediation establish a "baseline" facility.
- Samples should be collected following CDC guidance: https://www.cdc.gov/legionella/downloads/cdc-sampling-procedure.pdf
- Samples are sent to a CDC ELITE certified lab: https://wwwn.cdc.gov/Elite/Public/MemberList.aspx.
- Samples are "a snapshot in time" and primarily a tool to inform best courses of action.
- The facility will send water sampling plans to LHD and ODH prior to sample collection.

Water System Corrections

- A consultant or additional third party may identify issues with the water system.
- Issues may include dead-end legs or other features conducive to *Legionella* growth.
- Any identified water system corrections should be made prior to remediation.

Remediation

- During investigations, facilities should conduct some form of remediation immediately reduce risk.
- Focuses on eliminating as much *Legionella* from the system as possible.
- Some methods render potable water temporarily unavailable; others may involve longer term treatment which will delay the next sample set.

Remediation

- These methods are intended to immediately reduce risk; however, they do not prevent recolonization over time.
- Examples of remediation include: Hyperchlorination, chlorine dioxide, and monochloramine.
- Current CDC guidance does **not** recommend thermal disinfection.
- Work with consultant to decide best approach for the facility.

Post-remediation Sampling

- Collect another set of samples no earlier than 72 hours after remediation.
- Samples should be collected in same locations.
- If pre-remediation samples were negative, 2 additional consecutive sets of negative samples are necessary prior to lifting water restrictions.

Water Management Programs

- WMPs are a proactive tool that identify hazardous conditions and take steps to minimize growth.
- A strong water management program (WMP) allows a facility to dramatically reduce the risk of *Legionella* growth and spread within the facility.

Water Management Programs

- CDC Recommendations and toolkit: https://www.cdc.gov/legionella/wmp/index.html.
- CDC and their partners also developed a training that covers effective WMP development: https://www.cdc.gov/nceh/ehs/elearn/prevent-LD-training.html.
- Council for State and Territorial Epidemiologists (CSTE) WMP Template: https://www.cste.org/page/Legionnaires.

Water Management Programs

- Ensure that the WMP is tailored to specific buildings and water systems.
- CDC identifies the following factors to consider:
  - Structure and size.
  - Age.
  - Location and surrounding conditions.
  - Unique areas of risk.
  - Susceptibilities of people within the facility.

Water Management Programs

- WMPs at certain facilities are often missing key components needed to adequately reduce risk.
- ODH strongly recommends revising WMPs prior to lifting water-use restrictions.

Lifting Water-use Restrictions

- The lifting of water-use restriction often carries risk.
- ODH recommends all fixtures are flushed for at least 30 minutes after lifting restrictions to remove any aged water due to lower flow conditions.
- Coordinate with consultant to see if any additional actions are needed.

Continued Monitoring

- After lifting water restrictions, additional sample sets should be collected at a reduced rate for several months before reverting to frequency specified in WMP for routine validation testing.
- If any samples test positive for *Legionella* during this time, revert to HICPAC. (https://www.cdc.gov/infectioncontrol/pdf/guidelines/healthcare-associated-pneumonia-H.pdf) and WMP guidance.

Contact Information

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