
Descriptive Epidemiology

June Bancroft, MPH

Oregon Health Authority

Acute & Communicable Disease Prevention Program



Descriptive Epidemiology



- Characterizes the amount and distribution of disease within a population
- Permits evaluation of trends and comparisons among groups
- Provides a basis for planning and evaluation of services
- Identifies problems to be studied further with analytic methods & comparison group

Describing the Data

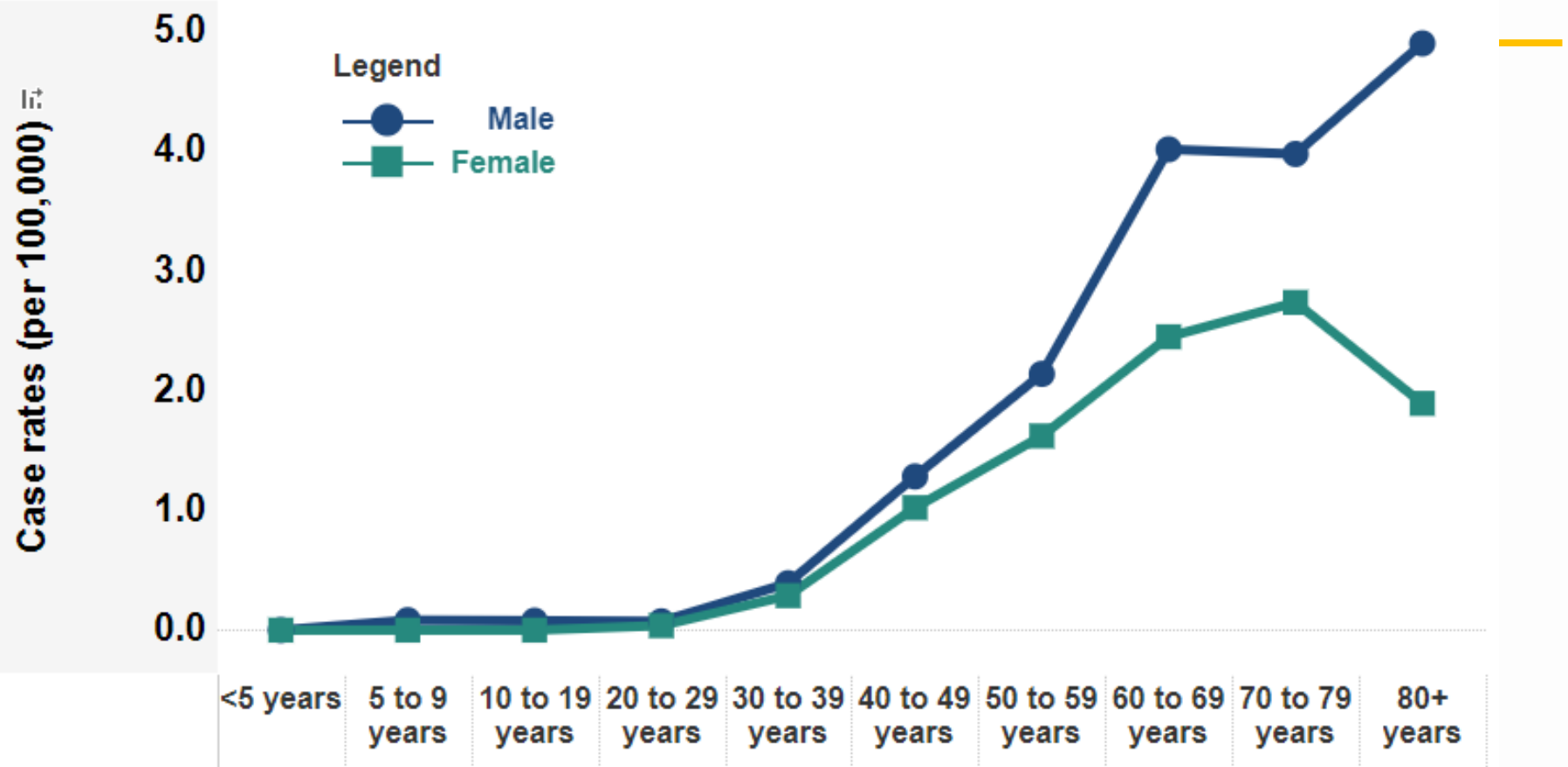
- Data= What: injuries, cancer, hepatitis
- Person- Who
- Place- Where
- Time- When
- Why & How are part of Analytic Epidemiology

Person

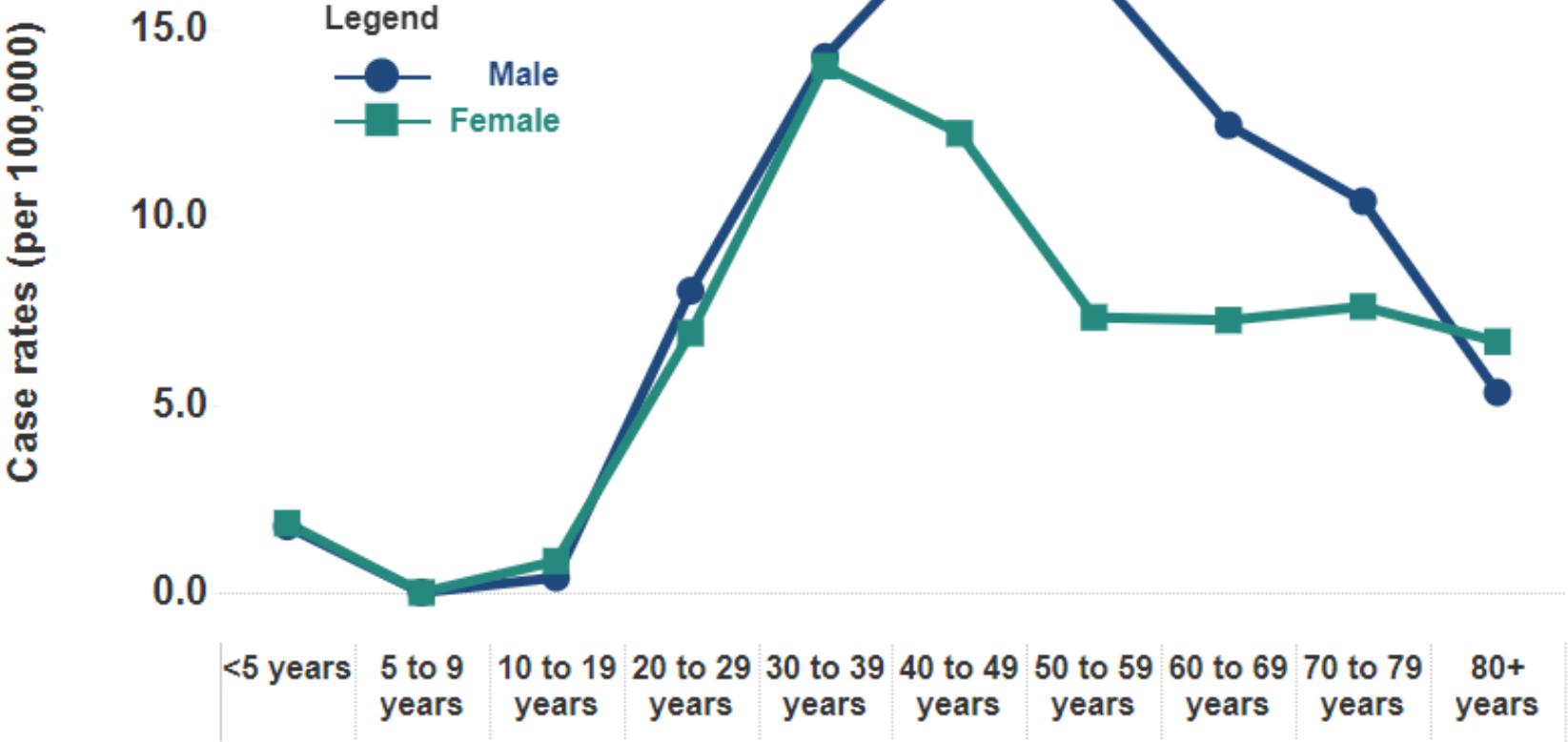
- Demographics: age, ethnicity, gender, SES
- Risk factors
 - Activities - work, leisure, use of medications/drugs/tobacco/alcohol
 - Behaviors – sex, drugs, food

Case rates of legionellosis by age and sex: Oregon, 2012 to 2021.

Due to low case counts, the average case rate over multiple years of data is shown.

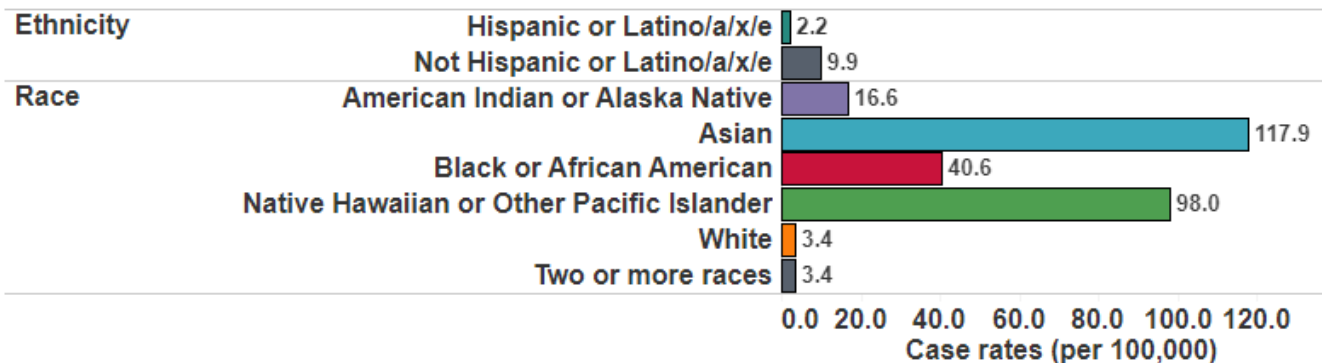


Case rates of chronic hepatitis B by age and sex: Oregon, 2021.



Case rates of chronic hepatitis B by reported race and ethnicity: Oregon, 2012 to 2021.

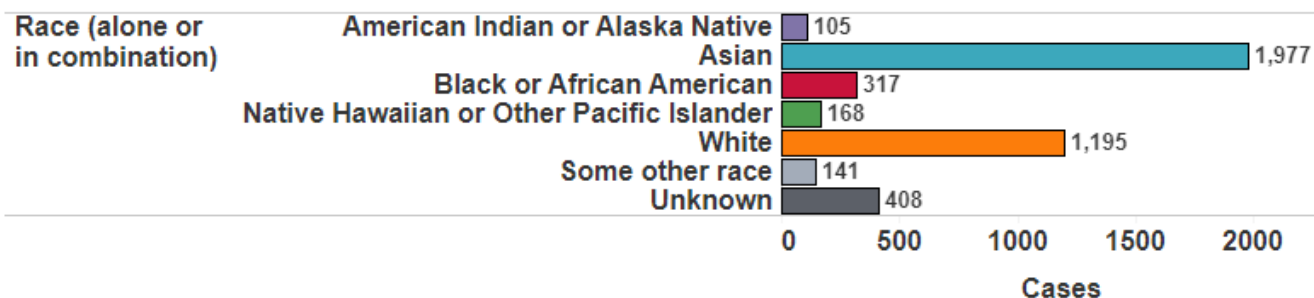
Race and Ethnicity are groupings determined by the Office of Management and Budget. Due to low case counts, the average case rate over multiple years of data is shown.



†Note: Rates based on small case counts (<5 cases) might be unstable.

Case counts of chronic hepatitis B by reported race and ethnicity: Oregon, 2012 to 2021.

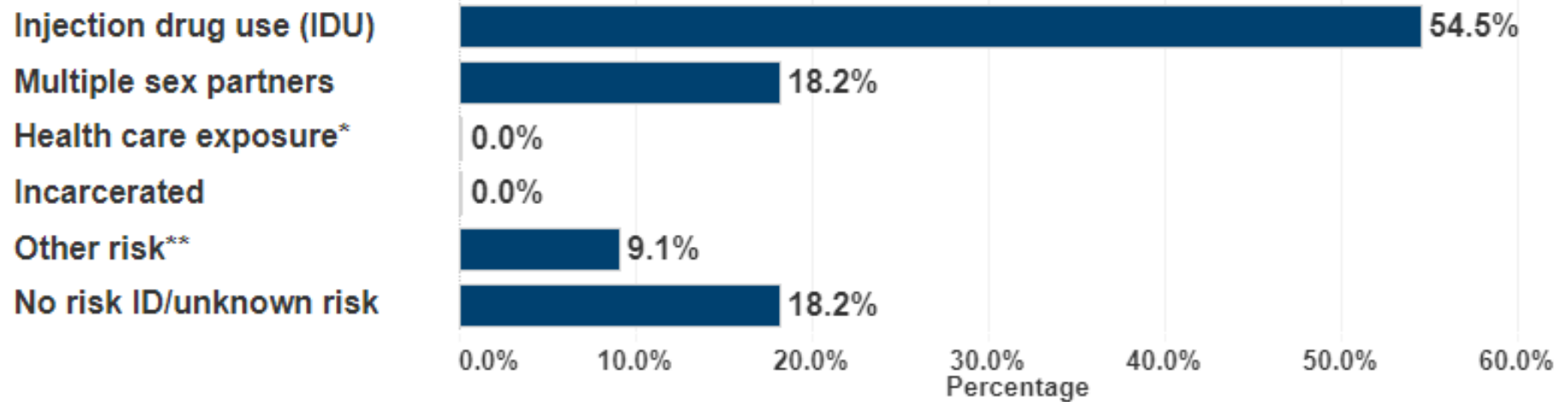
Race alone or in combination means cases may be counted in all races that apply.



Rates calculated using NCHS population estimates

Risk factors for acute hepatitis C among interviewed cases: Oregon, 2021.

Risk factors are mutually exclusive.



*Health care exposures include transfusions, infusions, dialysis, surgery.

**Other risks include street drugs, needlestick, tattoo, piercings, other blood exposure.

***MSM stands for men who have sex with men.

Place

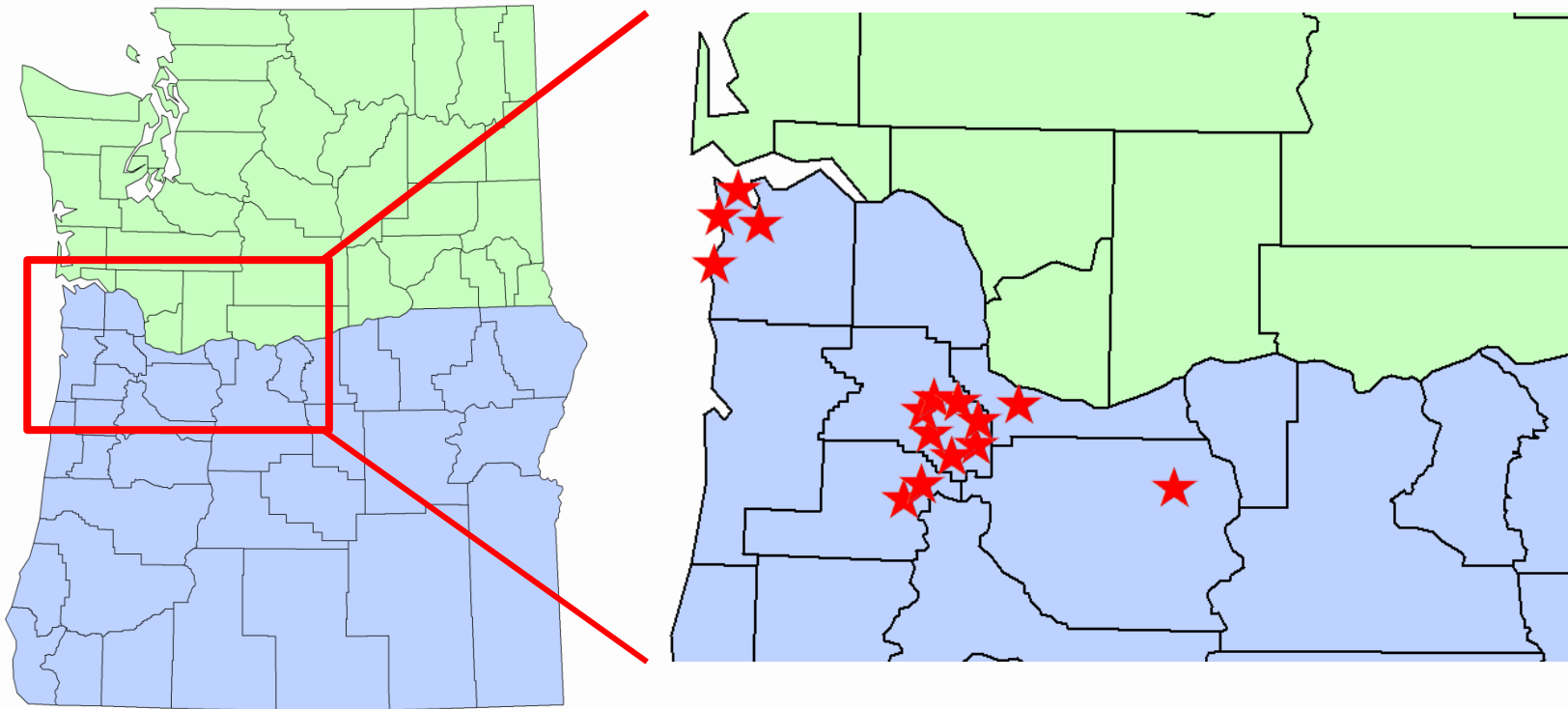
- Where a person lives, works, plays
- Patterns of activity
 - Seating arrangements
- Maps are a useful tool to understand what might be happening
- Field study or site visit also are helpful to see things that people might not have noticed or remember



Chat question



Residences of Cases



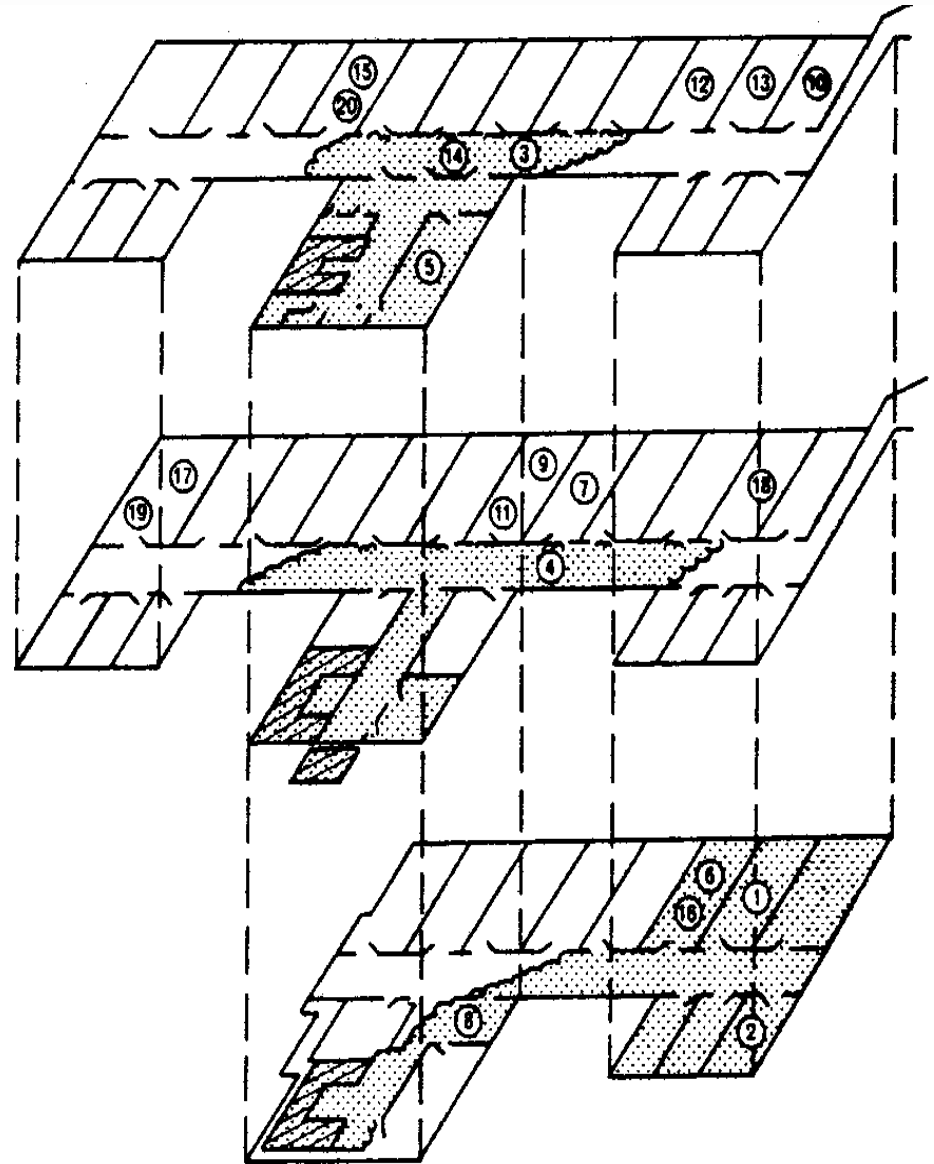
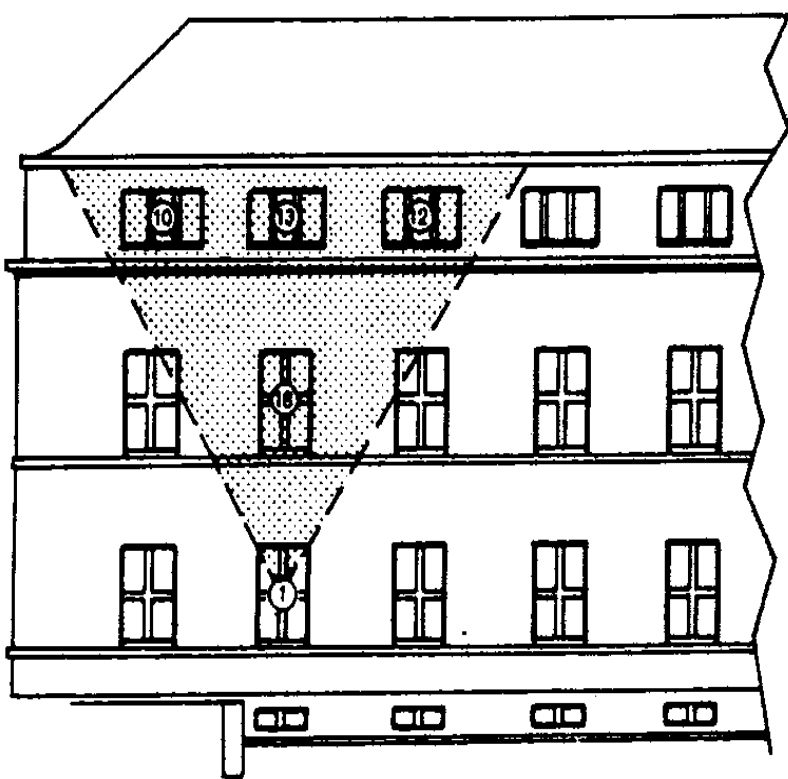




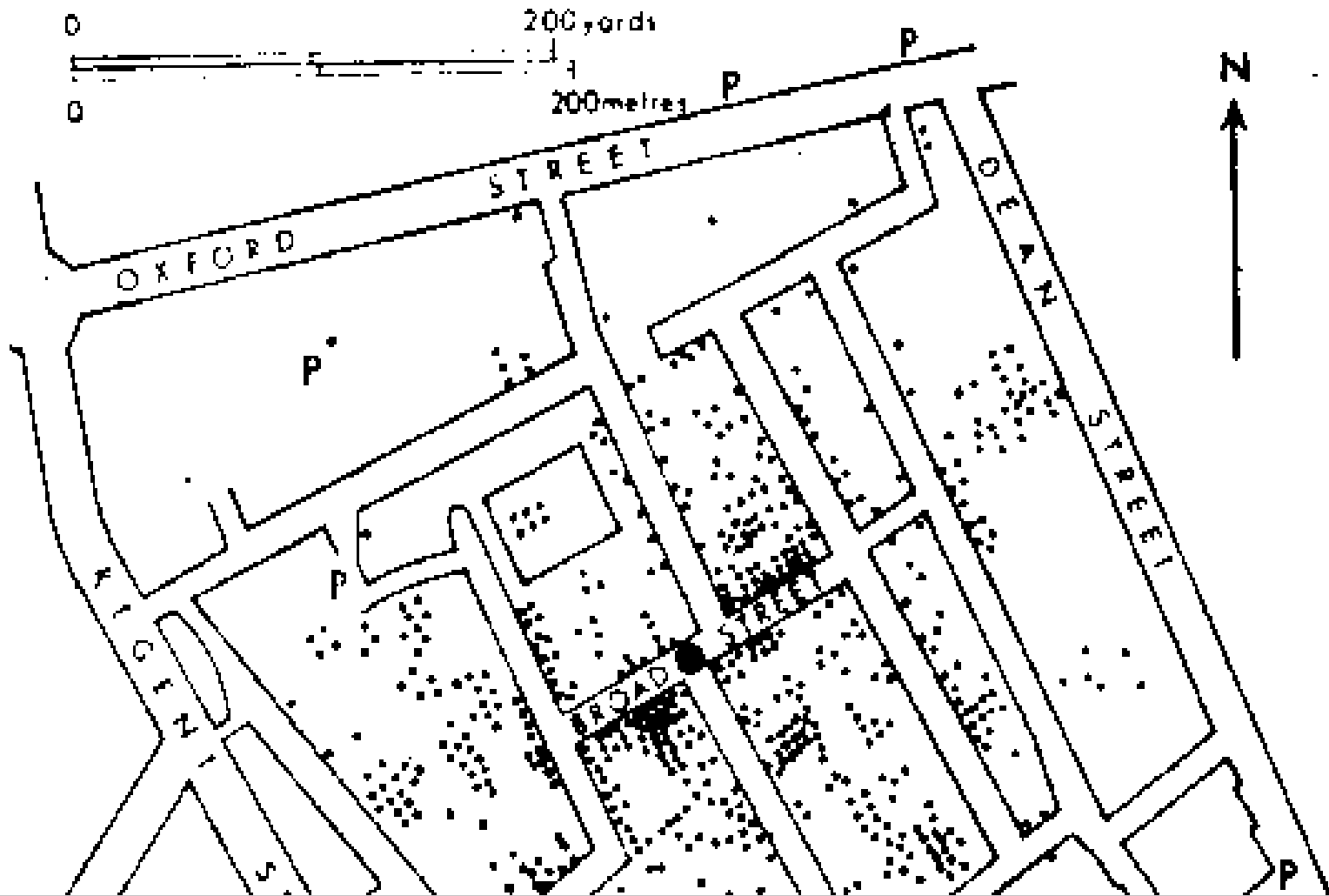
⓪ Case number

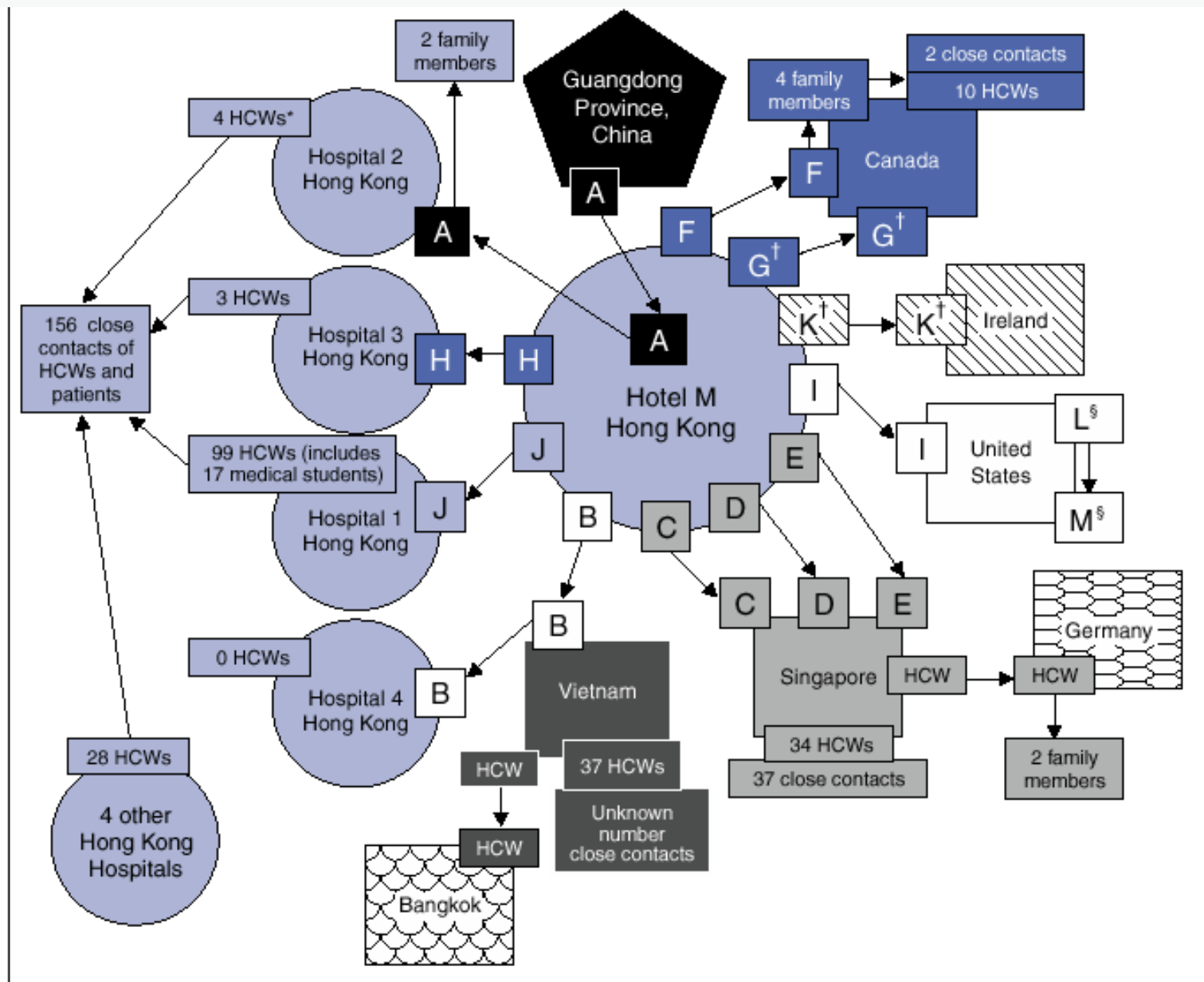
▨ Stairs

▤ Smoke pattern



Fenner; Wehrle
et al, 1970





* Health-care workers.

[†] All guests except G and K stayed on the 9th floor of the hotel. Guest G stayed on the 14th floor, and Guest K stayed on the 11th floor.

[§] Guests L and M (spouses) were not at Hotel M during the same time as index Guest A but were at the hotel during the same times as Guests G, H, and I, who were ill during this period.

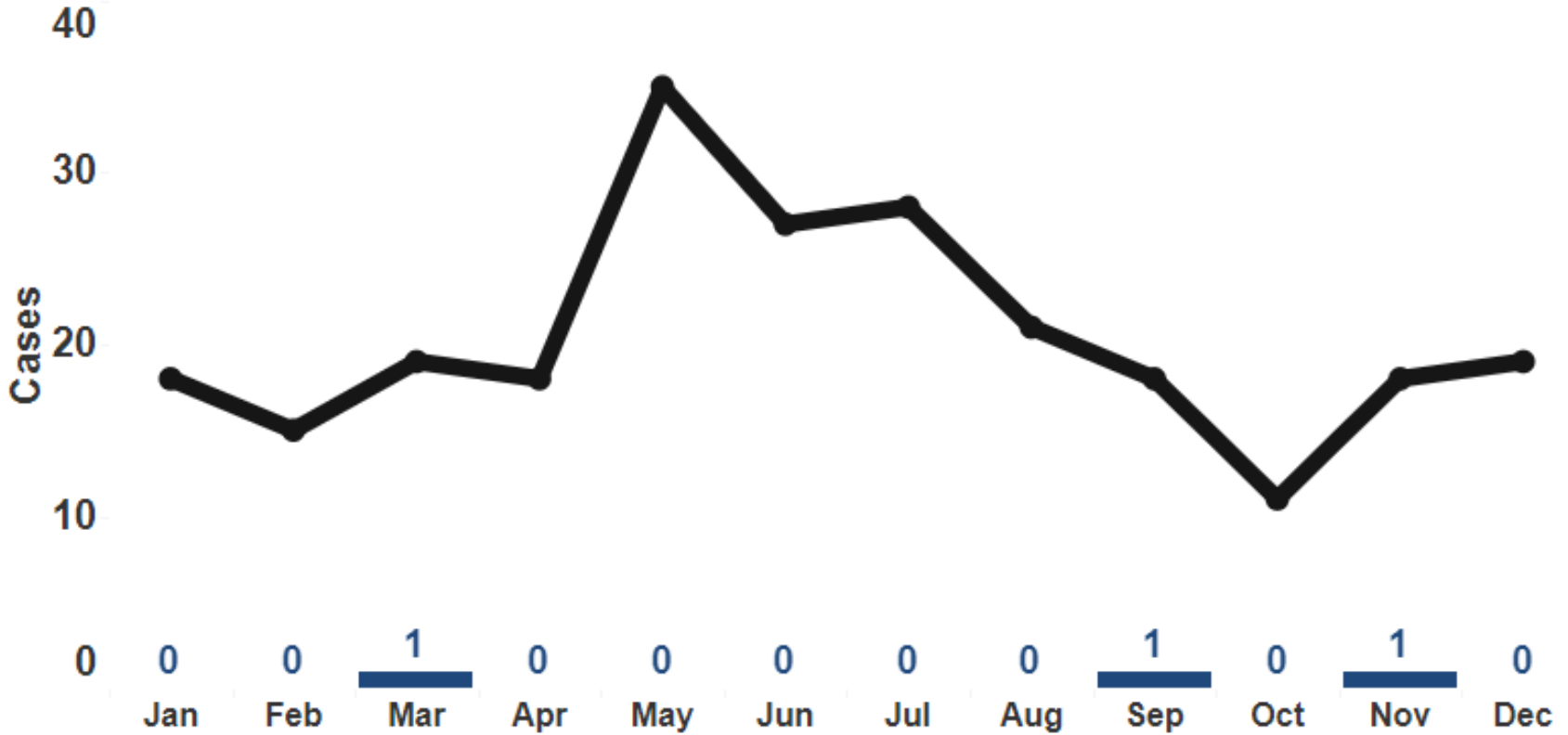
Time

- Trends over years
- Seasonal variations
- Onset: day, time

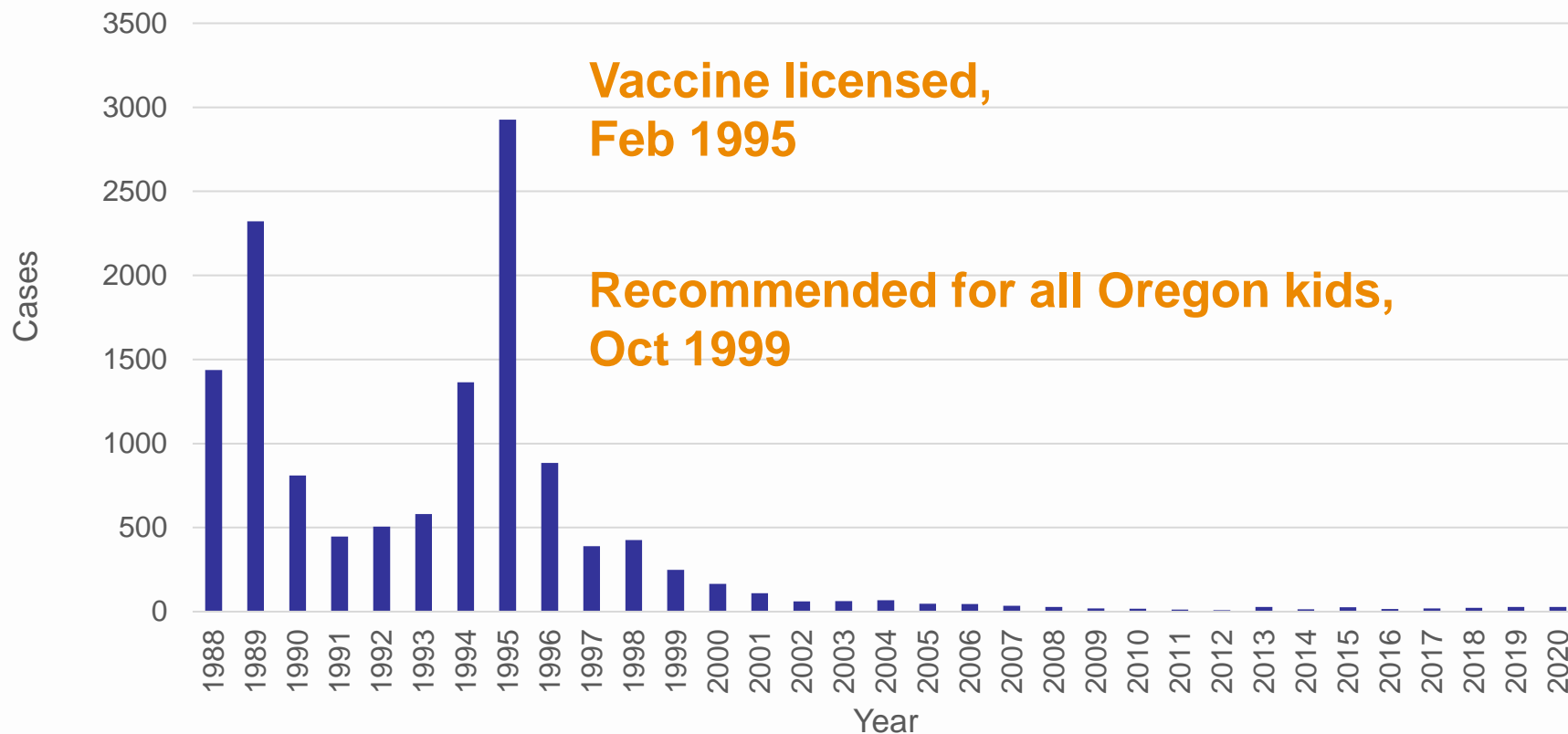


Case counts of pertussis by month: Oregon, 2021.

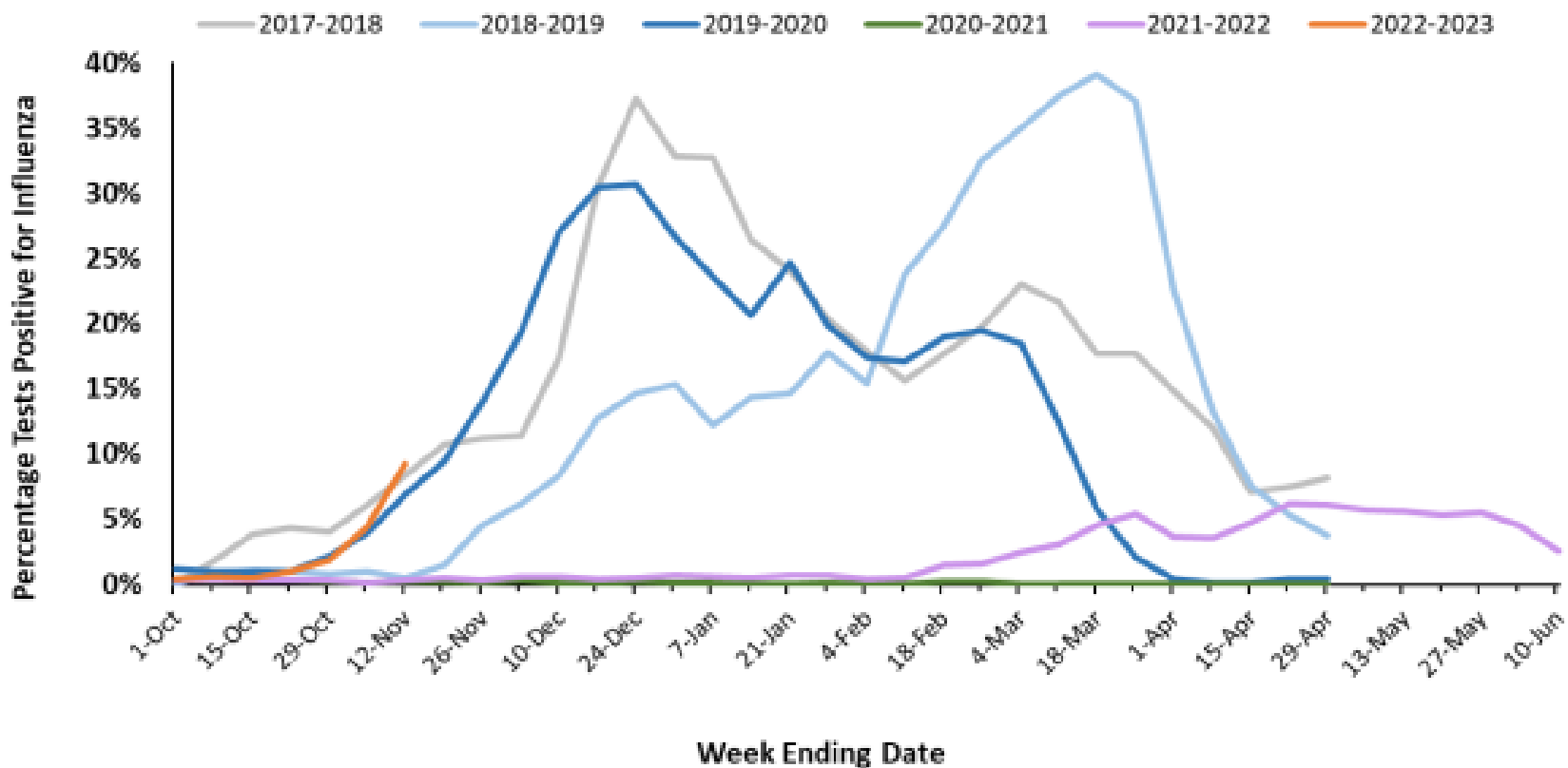
Bar chart shows case counts in 2021 while the line shows the median case counts for the previous 5 years.



Acute hepatitis A cases Oregon, 1988-2020



**Figure 2. Oregon Influenza Laboratory Surveillance
Percent Positive Influenza Tests by Season, NREVSS**



Case Definition

- Person
- Place
- Time
- Clinical and laboratory information

Constructing line list is helpful to understanding the data and can assist in developing the definition of a case. The case definition is a standard set of criteria for deciding if the person is a case or not



Outbreak ID 1900-2428

County Somewhere In Oregon

Facility Nursing Home A



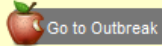
Print

Epi Curve



Type Gastrointestinal

Setting Nursing home or similar setting



Campylobacter coli, norovirus unknown,

1st notification to OPHD 1/1/1999

Online Case Log

New case

	Identifiers						Onset		Signs & Symptoms							Outcome							
	name	age	sex	person	room	job	onset Date	onset Time	nausea	vomiting	diarrhea	loose3	fever	cramp	bloody diarrhea	duration (in hours)	days Missed	lab spec collectd	lab +	MD	ER	Hosp	Died
1	Massie, Robert K	83	M	R	434	A	2/11/12		<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	72		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	O'Brian, Patrick	85	M	R	332		2/16/12		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	92		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	Hardy, Thomas	88	M	R	423		2/16/12		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	Lawrence, D H	45	M	S		P	2/14/12		<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	14	4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	Kundera, Milan	82	M	R	426		2/13/12		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	McCullough, Colleen	74	F	R	419		2/15/12		<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	24		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	Tolstoy, Leo	82	M	R	451		2/19/12		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	14		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8	Warren, Robert Penn	84	M	R	020		2/12/12		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	9		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9	Faulkner, William	65	M	R	438		2/12/12		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10	Fowles, John	79	M	R	411		2/06/12		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11	Burgess, Anthony	76	M	R	403		2/12/12		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	44		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12	Forster, E M	91	M	R	410		2/13/12		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13	Mann, Thomas	80	M	R	441		2/13/12		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	91		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14	Fleming, Ian	56	M	S		A	2/16/12		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15	Doctorow, E L	81	M	R	501		2/16/12		<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	21		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

32	actual cases*	M	25	75+	14	10-19	1		11	16	27	16	7	4	1		3	Min		5	4	1	1	
37	people entered	F	7	50-74	12	5-9	1		34.4%	50.0%	84.4%	50.0%	21.9%	12.5%	3.1%		24	Medn						
86.5%				20-49	3	1-4	0		Percentages are based on actual cases							98	Max		calculated from 19 cases					
*(Actual cases have vomiting or diarrhea)		Unk	0	infant	1																			

Types of Case Definitions

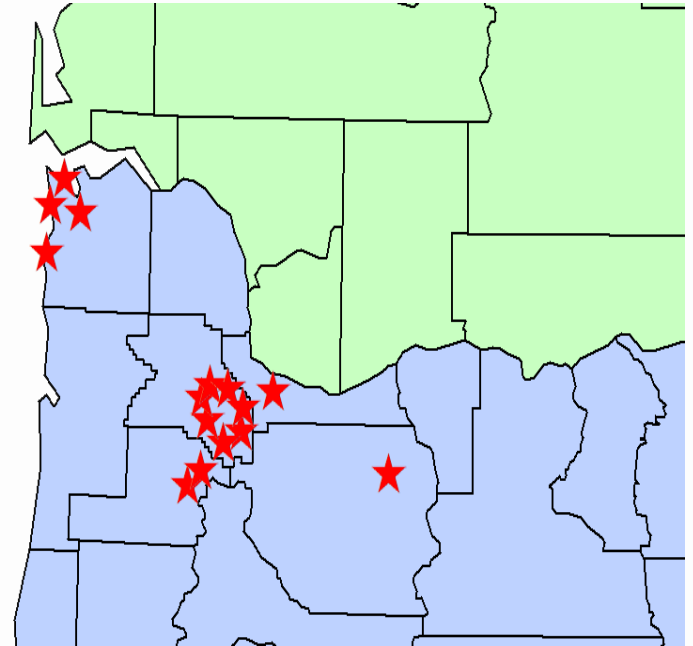
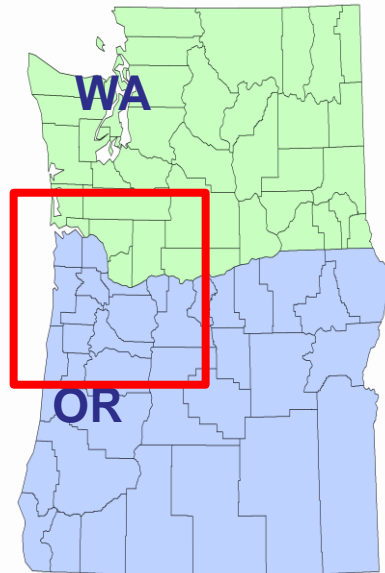
- Confirmed – identification of the agent via laboratory
- Probable/Presumptive – either linked to a confirmed case OR other lab tests suggestive of exposure
- Suspect – someone who might be ill but has no link or laboratory data

Strawberry outbreak - O157 Case Definition

- **Confirmed case**
 - Culture-positive, outbreak PFGE pattern, symptom onset July–August 2011
- **Presumptive case**
 - Coincident diarrheal illness in household member of confirmed case
- **Compatible case**
 - Culture-positive, PFGE result pending, symptom onset July–August 2011

Case Characteristics

- 15 cases (8 confirmed, 1 presumptive, 6 compatible)
- 11 female, 4 male
- Age 4–85 (median 68) years
- Onset July 10–28



Descriptive Epi exercise

The Oregon County Health Department assumed lead responsibility for the investigation. The State Office of Acute and Communicable Disease Prevention was asked to assist.

Over the next several days, more and more cases of diarrhea and bloody diarrhea were reported. While the earliest case was a child, cases occurred among all age groups.

The case-patients did not appear to have any consumption of food or water in common. However, they all had attended the Oregon County Fair. The investigators therefore felt comfortable focusing on the fair as the source of the outbreak.

Descriptive Epi exercise

Question 1

What might you use as a case definition?

Question 2

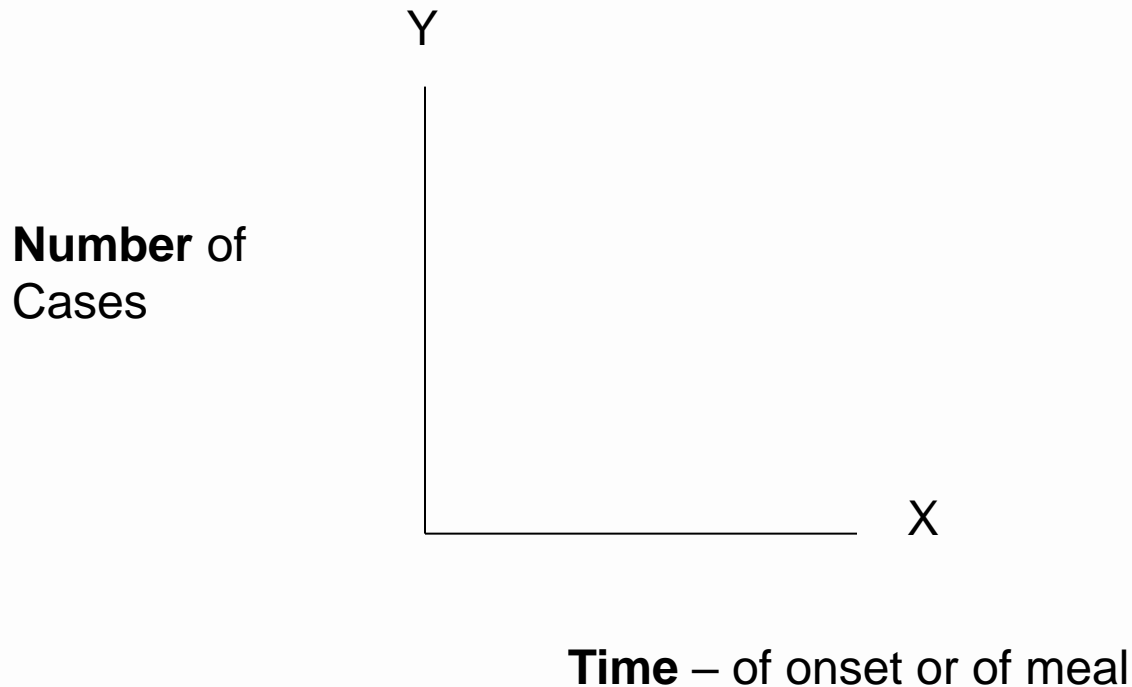
How are you going to look for additional cases?

Question 3

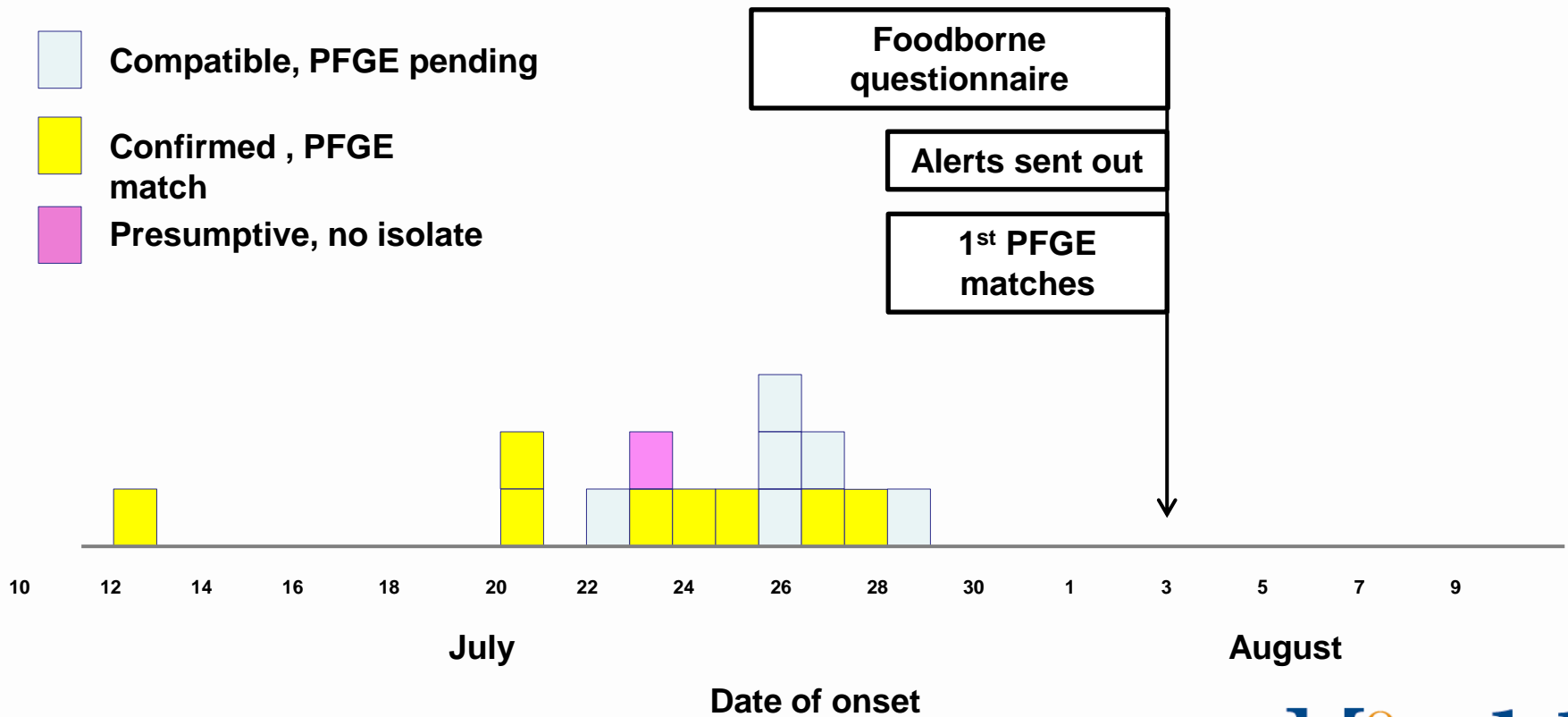
What information do you want to obtain in your questionnaire?

Epidemic Curve

- Visual graph
- Cases over time



Epidemic Curve — August 5

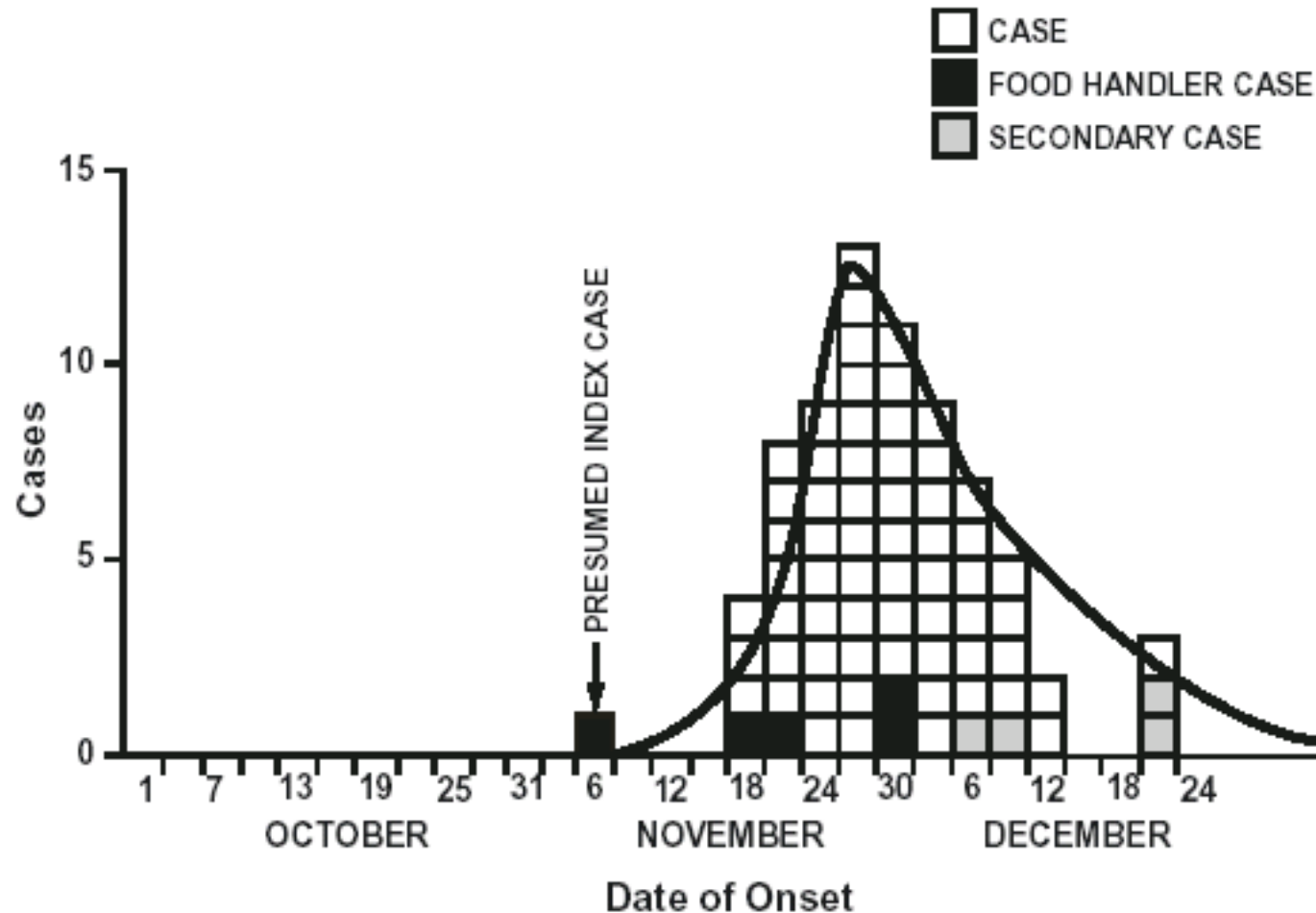


Different Patterns on Epi Curve

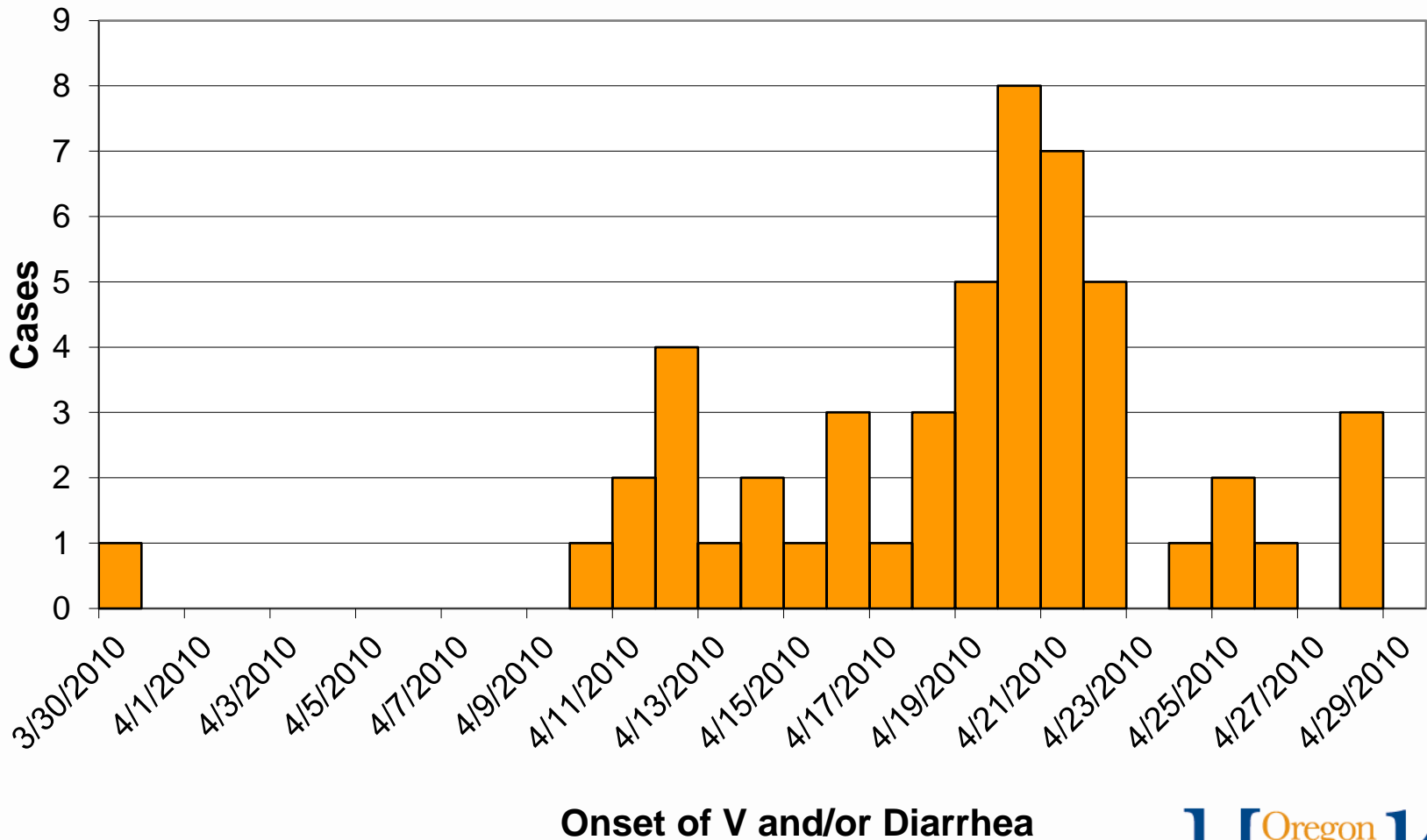
- Common source
 - Point source
 - Intermittent or continuous exposure
- Propagated (person-to-person)
- Mixed
- Other

Need to consider the incubation period
of the pathogen

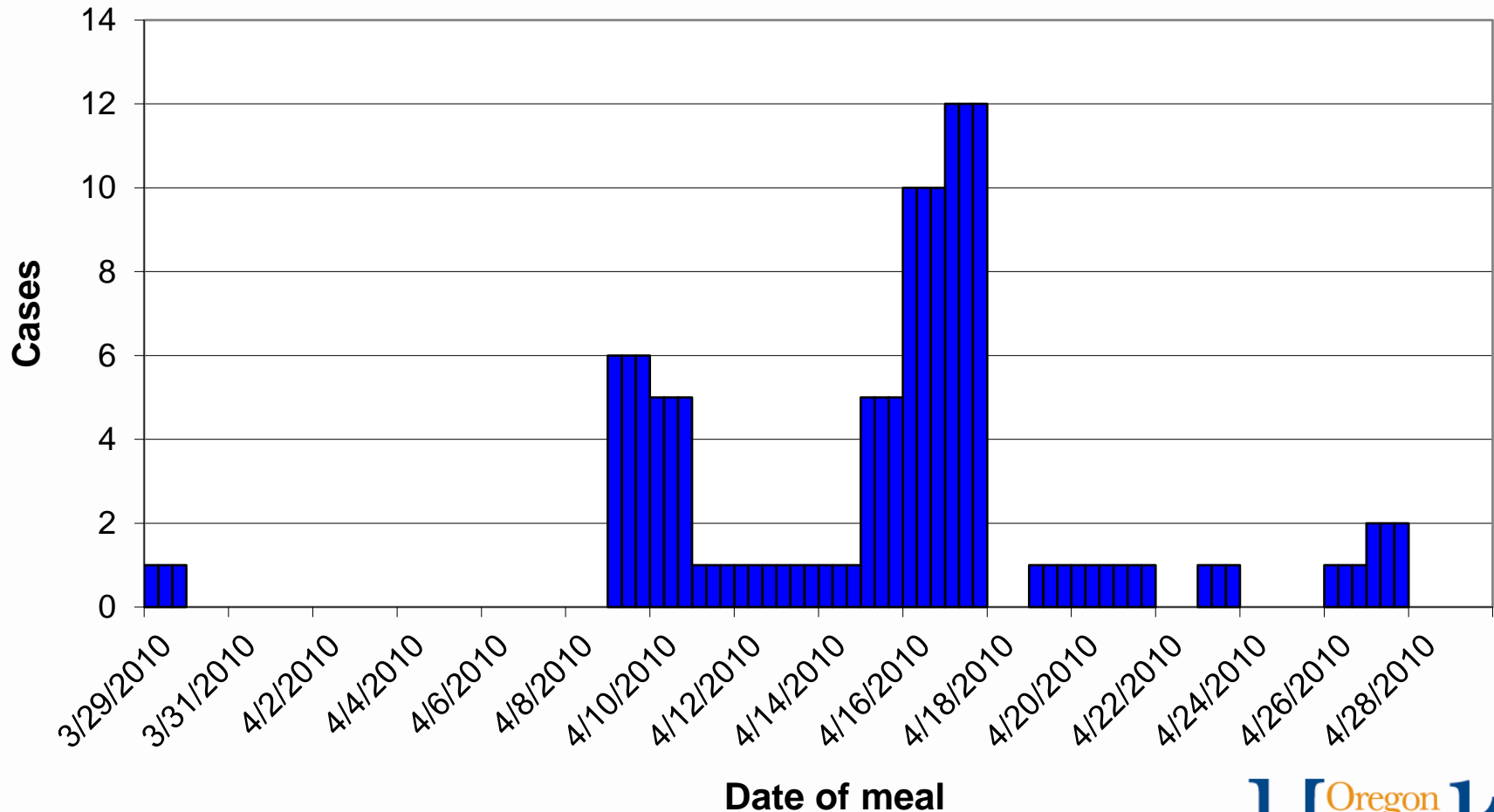
Common source outbreak with point source exposure: hepatitis A cases by onset date



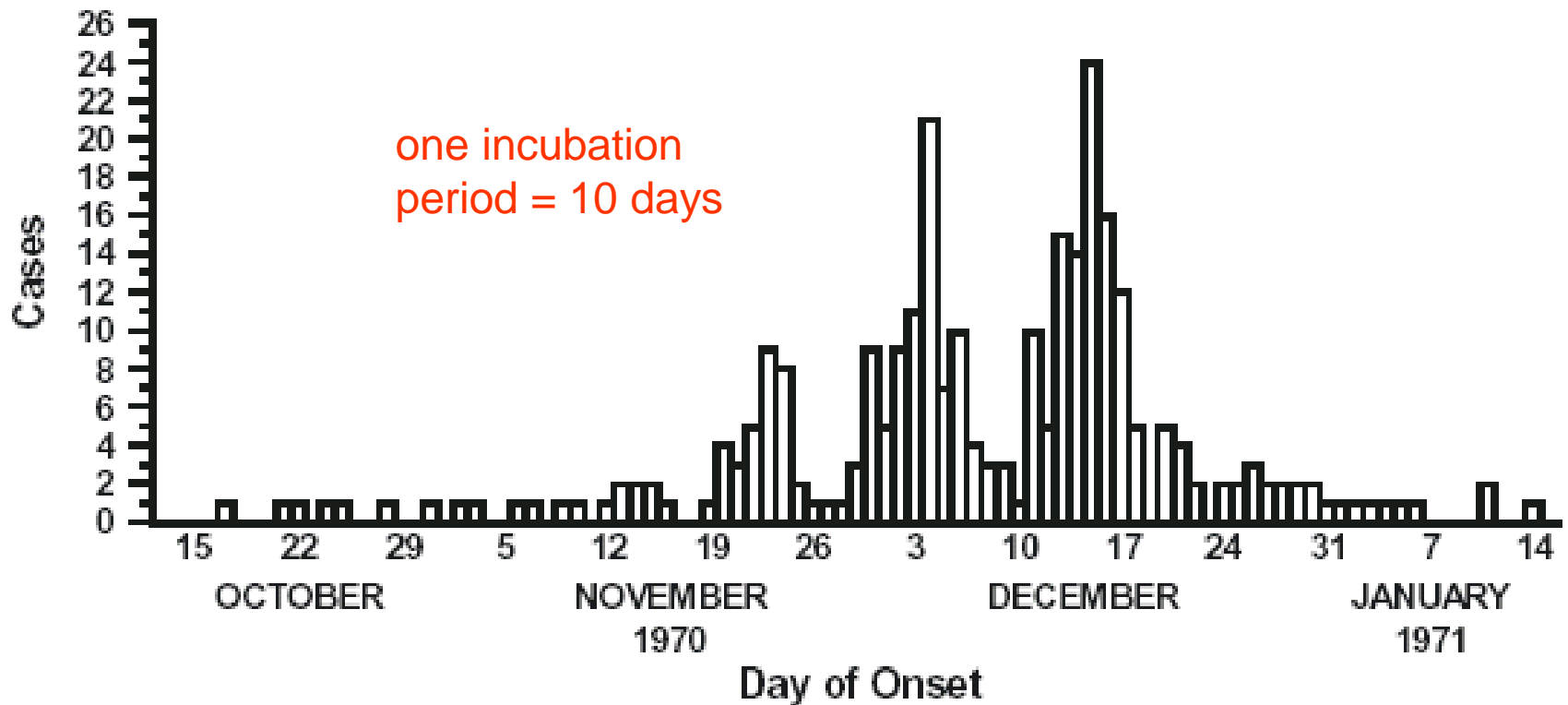
Common source outbreak, continuous exposure



Common source outbreak with continuous exposure, by meal date



Propagated outbreak: Measles cases by date of onset



Who, What, Where, When, Why, How?

- Using descriptive epidemiology helps guide:
 - what questions to ask
 - who to interview
 - what data is important to collect
 - which lab tests should I order
 - where to target prevention efforts

What do these case details suggest?

- Who is getting ill?
- What are their symptoms?
- What else would we want to know?

Sex Distribution

Male: 4 (22%)

Female: 14 (78%)

Age Distribution (N = 18 cases)

infants	0	(0%)
1–4	0	(0%)
5–9	0	(0%)
10–19	0	(0%)
20–49	14	(78%)
50–74	4	(22%)
75+	0	(0%)
unknown	0	(0%)

Signs and Symptoms (N = 18 cases)

any diarrhea	18	(100%)
3+ diarrhea	18	(100%)
vomiting	12	(67%)
bloody D	1	(6%)
cramps	17	(94%)
fever	12	(67%)
headache	13	(72%)
myalgia	10	(56%)
chills	13	(72%)
fatigue	18	(100%)
nausea	17	(94%)

What do these case details suggest?

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→ **20–49 14 (78%)**

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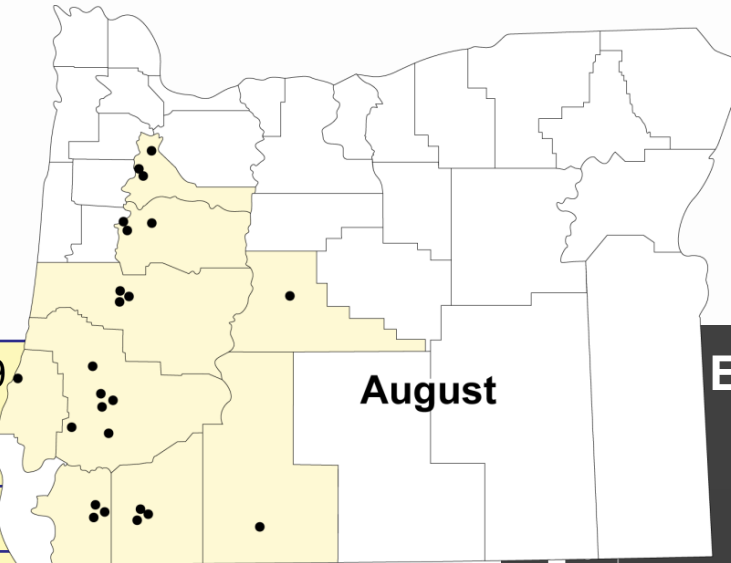
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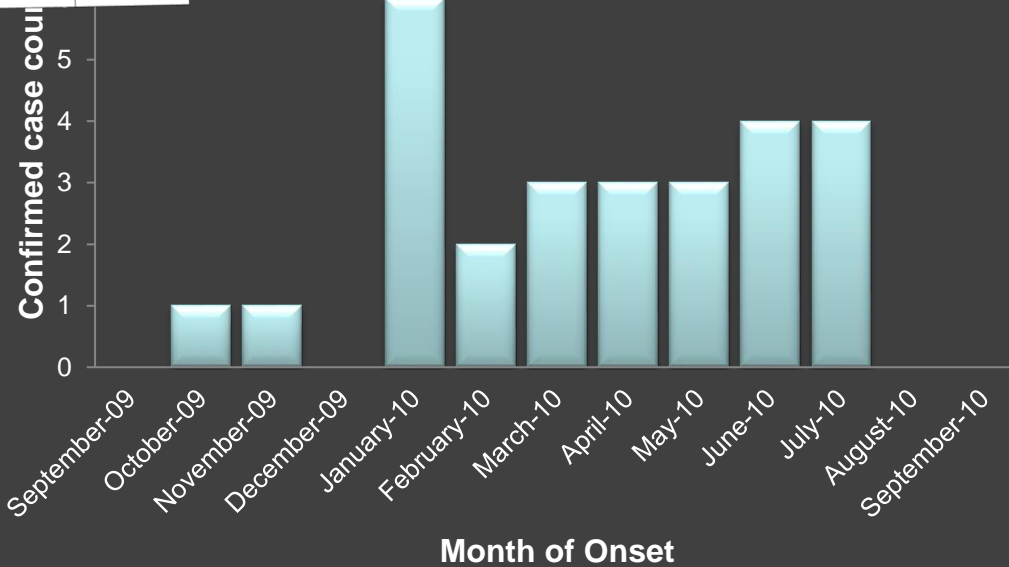
nausea 17 (94%)

Orient data by person, place, and time



15	F	10/21/09
81	F	11/5/09
4	M	1/16/10
26	M	1/12/10
1	M	1/17/10
2	M	1/18/10
17	M	1/10/10
22	F	1/31/10
16	F	2/13/10
10	F	2/13/10
85	M	Unknown
5	F	3/8/10

Epidemic Curve, *Salmonella* Braenderup, 2010-023



Is this an outbreak or something else?

- Use your surveillance data:
 - Reportable diseases data (state/local/national)
 - Hospital discharge data
 - Mortality statistics
 - Registries
 - Surveys
- Is this more than what is expected?
- Is there a single common exposure among cases?
- Could another event confound the situation?

Use the tools on our website

OREGON HEALTH SERVICES COMPENDIUM OF ACUTE FOOD-BORNE DISEASES ¹

Page 1

Agent	Usual Incubation Period (Range) ²	Symptom Profile	Duration of Illness ³	Period of Communicability	Characteristic Foods ⁴	Criteria for confirmation
						Type and amount of specimens; handling requirements for shipping to OSPHL*
I. Agents typified by nausea and vomiting, <i>without fever</i> , within 8 hours of eating						
<i>Bacillus cereus</i> ("emetic" variety)	2-4 hours (1-6 hours)	Vomiting, with nausea and diarrhea (abrupt onset)	24 hours	Not communicable (preformed enterotoxin)	Fried rice, meats, vegetables	Isolation of 10 ⁵ organisms per gram from stool of two or more ill persons OR isolation of 10 ⁵ organisms per gram from epidemiologically implicated food Collect at least 2 grams of fresh stool (pea size) within three days of illness and refrigerate prior to shipment. DO NOT FREEZE, DO NOT send in transport medium. Ship in a cold pack to OSPHL* with OSPHL Form 60, Request for Bacteriology/ Parasitology (available at http://oregon.gov/DHS/ph/ph/docs/75.pdf); must be ordered, not part of OSPHL routine enteric screening Collect 50-150 grams (about 2-6 oz.) of food

Oregon Outbreak Tools

www.healthoregon.org/fomes



Foodborne and Gastroenteritis Outbreaks

Oregon Public Health Division

Home > Public Health Division > Diseases and Conditions > Communicable Disease > Outbreak Investigation > Foodborne and Gastroenteritis Outbreaks > Foodborne Outbreak Investigation Tools

Foodborne Outbreak Investigation Tools

Foodborne and Gastroenteritis Outbreaks

Gastroenteritis Outbreaks in Long-term Care Facilities and Hospitals

Foodborne Outbreak Investigation Tools

Contact Us

For the consolidated tools of all five Centers of Excellence, please visit <http://coefoodsafetytools.org>.

To view a brief summary about the tools on this page, view the [Oregon Outbreak Investigation Tools \(PDF\)](#). For more information, contact the [FOMES staff](#).

On this page:

- [Shotgun Hypothesis-generating Questionnaire](#)
- [Binomial Probability Worksheet](#)
- [Event Outbreak Questionnaire](#)
- [The Gopher-Beaver Form](#)
- [CIFOR Foodborne Outbreak Guidelines](#)
- [Courses for CD Nurses](#)
- [It-Kit™ Stool Sample Collection Kit](#)
- [Interviewer Training Resources](#)
- [Remembering Dr. Bill Keene](#)



Continued Case Study

The Oregon County Health Department assumed lead responsibility for the investigation. The State Office of Disease Prevention and Epidemiology was asked to assist.

Over the next several days, more and more cases of diarrhea and bloody diarrhea were reported. While the earliest case was a child, cases occurred among all age groups. The case-patients did not appear to have any consumption of food or water in common. However, they all had attended the Oregon County Fair. The investigators therefore felt comfortable focusing on the fair as the source of the outbreak.

Preliminary data showed that there were 60 cases of lab confirmed O157 infections. 46 were primary cases and 14 were secondary cases. 46/60 (77%) were < 6 years of age and 48/60 (80%) were <19 years of age. Among these culture confirmed cases, 21 were hospitalized and 11 had hemolytic uremic syndrome (HUS).

See table in handout and draw epi curve

Question 4

What is an epidemic curve? What is the value of an epidemic curve?

Question 6

Based on curve and known incubation period estimate when peak exposure likely occurred.

Question 7

What can you conclude from the epidemic curve?

Outbreak Source Prediction Tool

Total Cases *required <input type="text" value="0"/>	Male <input type="text" value="0"/>
Month of first illness onset *required <input type="text" value="Choose one"/>	Female <input type="text" value="0"/>
Geography of exposures *required <input type="radio"/> Multi County <input type="radio"/> Multi State <input type="radio"/> Single County	Under 1 Year <input type="text" value="0"/>
Infectious Agent *required <input type="radio"/> STEC <input type="radio"/> Salmonella	1 yr to 4 yrs <input type="text" value="0"/>
Salmonella Serotype *required for Salmonella <input type="text" value="Choose STEC or Salmonella First"/>	5 yrs to 19 yrs <input type="text" value="0"/>
	20 yrs to 49 yrs <input type="text" value="0"/>
	50 yrs or older <input type="text" value="0"/>
	<input type="button" value="Submit"/>

Developed by the Colorado Integrated Food Safety Center of Excellence, the Outbreak Source Prediction Tool is a resource for public health professionals to help with hypothesis generation during an enteric disease outbreak investigation. The tool was developed using statistical prediction methods (code can be found [here](#)) and historical Salmonella and shiga toxin-producing E.coli(STEC) outbreak data from the [CDC's National Outbreak Reporting System](#). The tool is intended to be used, along with other resources, as a guide during hypothesis generation. This and other hypothesis generation resources should not be used in place of an epidemiological study or other outbreak investigation