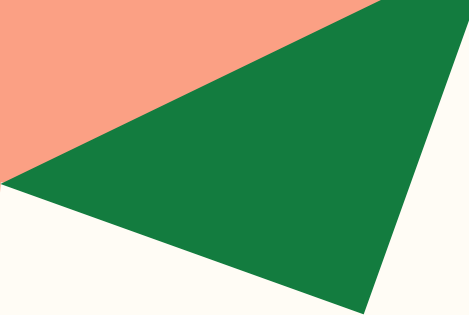




Disease Detectives: Tips & Tricks

Stephanie Wang
Harvard College '26
Seven Lakes High School '22

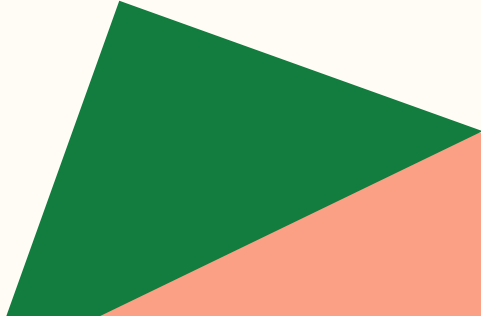


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About me

- Senior at Harvard studying Molecular & Cellular Biology on the pre-med track
- Seven Lakes High School '22
- Competed for 6 years
- Nationally ranked in Anatomy & Physiology, Disease Detectives, Protein Modeling, and more
- Occasionally write Disease Detectives tests (BirdSO, HUSO)

How to do well in Science Olympiad



Read books

Textbooks are the starting point to gain vast amounts of knowledge.



Talk to fellow scientists

Collaborate on notes, hold meetings, and share interesting ideas.



Compete

Motivate yourself to fulfill your utmost potential to learn more.

How To Prepare



01

Find resources

Read textbooks, watch online videos, read helpful websites (i.e. Wikipedia)



02

Create notes

Note-taking skills help you review the material and remember it well. Try to REMEMBER the material as you make notes.



03

Take practice tests

Take them under real contest circumstances (timed, no ctrl+F in notes)

The magic formula is the one that works for you.

1. Read, read, read

Skim through your textbook of choice (or official Scioly prep materials) and write down your own notes.



2. Practice, practice, practice

Scour publicly available tests from previous tournaments, take them under timed conditions, and track your progress.



3. Keep a rolling doc of content

Document the 1) concepts you're iffy about, 2) practice questions you missed, 3) new content you need to review or add to notes.



4. Recognize & solidify patterns

Is there a particular question type, diagram, disease etc. that keeps popping up? Make sure you know it well!



Finding the right resources

1. CDC Textbook

Principles of Epidemiology in Public Health Practice

Great intro to the field

[Link](#)

2. Gordis Epidemiology

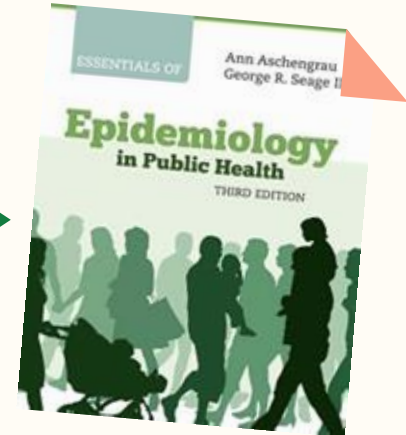
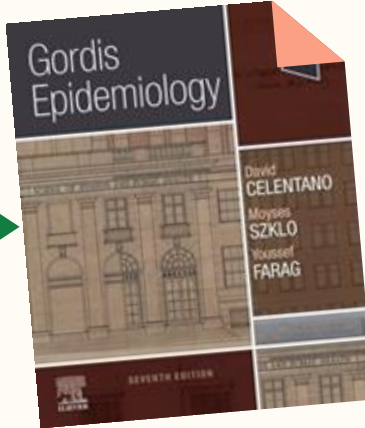
One of the most comprehensive and intro-friendly epidemiology textbooks I've ever read

[Link](#)

3. Essentials of Epidemiology in Public Health

If you're looking for a bit of a challenge

[Link](#)



Look in your local library!

Note-Taking Tips



Paraphrase

- Use abbreviations that you can understand but don't overdo it
- If you must copy-paste, read through it first & delete jargon



Microsoft Word

- OneDrive is a good way to share with partner
- Much easier to format than docs

Highlighting System



Have a color for different levels of topics, i.e. blue - headings, green - subheadings, yellow - definitions

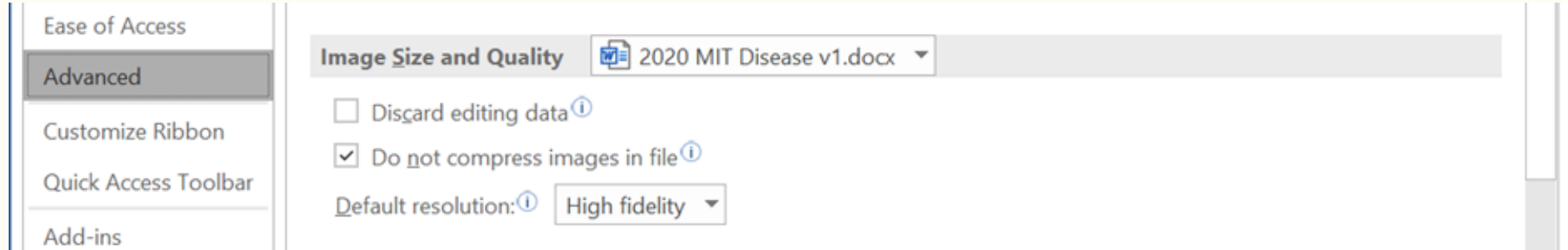
Space-saving formatting



- use textboxes
- reduce the margin size (min. printable is 0.17)
- single spacing
- turn off image compress

Making your notes

- Highly recommend using Microsoft Word over G-Suite
- Use OneDrive to share your files with your partner
- Changing image settings so that your images are clear: File -> Options -> Advanced -> Image size & quality
 - Check the box that says "do not compress images on file"
 - Change default resolution to "high fidelity"; if that option is not there, change it to the largest number



Notes cont'd

Textboxes (insert -> textbox -> draw horizontal textbox)

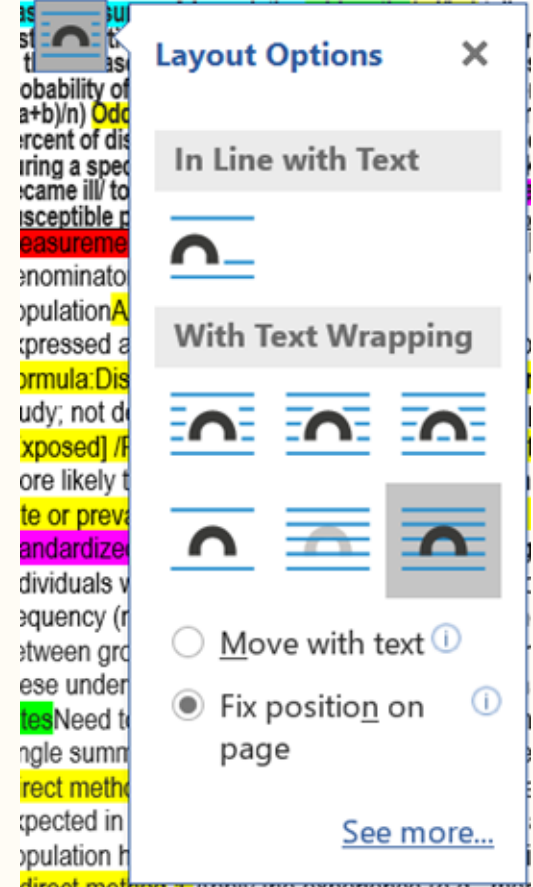
- Great way to organize your notes
- Use this layout for max flexibility ->

Margins: Change to 0.17 by 0.17

- Layout -> margins -> custom margins

Text & Spacing

- Single space your text
- Set image & text box margins to 0



Ready for some practice?

Questions are adapted from the 2023
BirdSO Invitational Div C Disease Detectives
test I wrote!

Publicly available via [scioly.org test
exchange](https://scioly.org/test-exchange).



Case Study

You work for the Harris County Public Health Department in Harris County, Texas. In July 2017, you receive several phone calls in a short span of time reporting a mysterious disease from local hospitals in which patients are presenting with watery diarrhea, greasy stools, dehydration, abdominal cramps, and fatigue.

****Disclaimer:** This is a made-up case study.

Initial Investigation

Does this constitute an outbreak? Why or why not?

To be classified as an outbreak, we need to know:

1. Is the volume of phone calls greater than expected?
2. Are these patients suffering from the same disease?



Not enough information!

List and describe five reasons why it is important to investigate outbreaks.

1. Control or prevention of health problem
2. Opportunity to learn (research opportunity)
3. Respond to public, political, or legal concerns
4. Public health program considerations
5. Training



Example of a *generic question*, put it in your notes!

Write a case definition for this mysterious disease with the information that you have been given.

1. **Person** - hospital patients
2. **Place** - Harris County, Texas
3. **Time** - July 2017
4. **Clinical information** - cough, fever, chills, shortness of breath, muscle aches, headaches, and/or diarrhea



One of the most common question types you'll see – practice writing case definitions often!

The diagnosis is in!

You patiently wait for the diagnosis to roll in. After a few days, you are told that these patients have tested positive for *Giardia lamblia*, the pathogen that causes giardiasis.



The incubation period of *Giardia lamblia* is about 1-14 days with an average of about 7 days. What is an incubation period, and why does it exist?

An incubation period is the period of time between exposure to the pathogen and onset of symptoms. It takes time for the pathogen to establish itself in the body and for an immune response to be elicited, which is when the onset of symptoms occurs.



*** Some basic microbiology is fair game on most Disease Detectives tests. I highly recommend you learn about some of the most common infectious diseases, how they spread, what causes them, and more. Even better, make a little database in your notes!

Investigate

To collect more information about the outbreak, you interview each giardiasis patient. What are three important questions that you should ask each patient that will assist you in solving the outbreak?

Be creative!!



1. When did you start experiencing symptoms?
2. What aquatic areas have you been to in the past week?
3. Who did you go with to these said aquatic areas?
4. What symptoms are you experiencing?
5. How long after going to the aquatic area did you start experiencing symptoms?

Basic Epidemiological Statistics

- **Incidence:** refers to new cases
- **Prevalence:** refers to existing cases
 - Point prevalence
 - Period prevalence

Cumulative incidence = # of new cases / population at risk / specified time period

Point prevalence = # of existing cases during a certain point in time / population at risk during certain point in time

Period prevalence = # of existing cases over a certain period of time / population at risk over that period of time

After collecting data from across the county, you find that there have been **451** new cases of Giardia infection in Harris County in the past month, which has a total population of about **5 million** people. During baseline, assume there are about **100** cases of Giardia infection in Harris County at any given point in time.

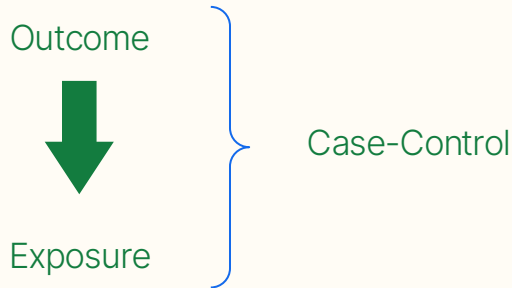
Calculate the incidence and prevalence.

- **Incidence** = 451 new cases / 5 million / 1 month = **9 cases per 100,000 people per month**
- **Prevalence** = 100 existing cases / 5 million = **2 cases per 100,000 people**

The stats roll in...

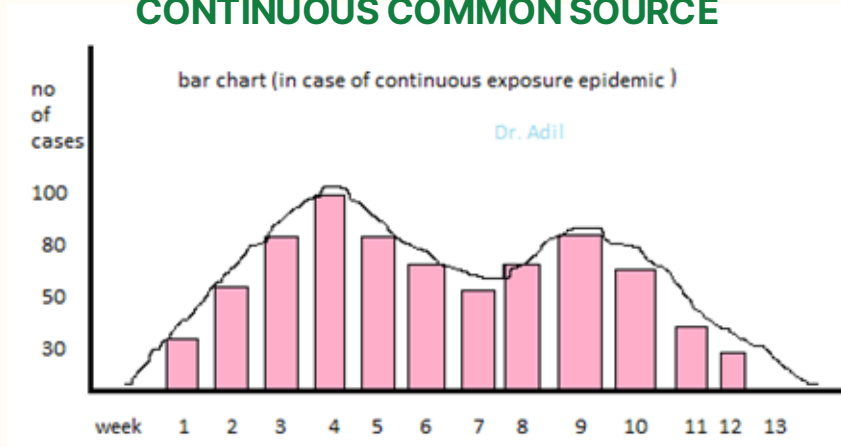
Representatives of the Harris County Public Health Department interviewed 34 patients infected and amongst the 34, 27 of them reported to have visited the Harris County Aquatics Center sometime before the outbreak occurred. The Public Health Committee also interviewed 40 patients who were not infected and amongst those, 10 reported to have visited the Harris County Aquatics Center. Epidemiologists are currently investigating this case.

What type of epidemiological study is being conducted? Why?



Types of Epidemic Curves (Epicurves)

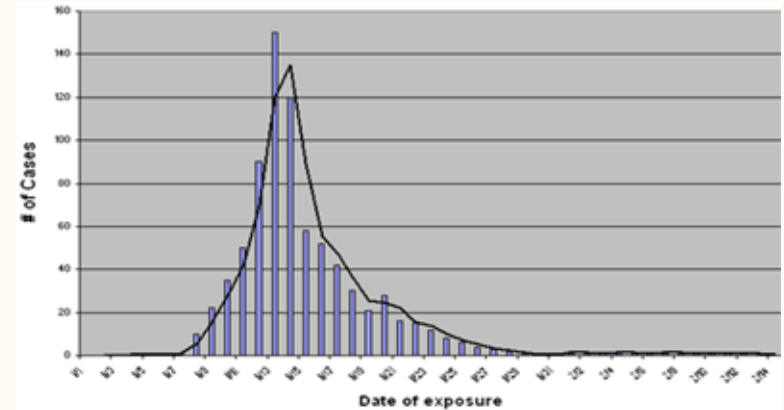
CONTINUOUS COMMON SOURCE



People are exposed to a single source of infection over a long period of time

Ex. an infected well of water being used for months

POINT SOURCE

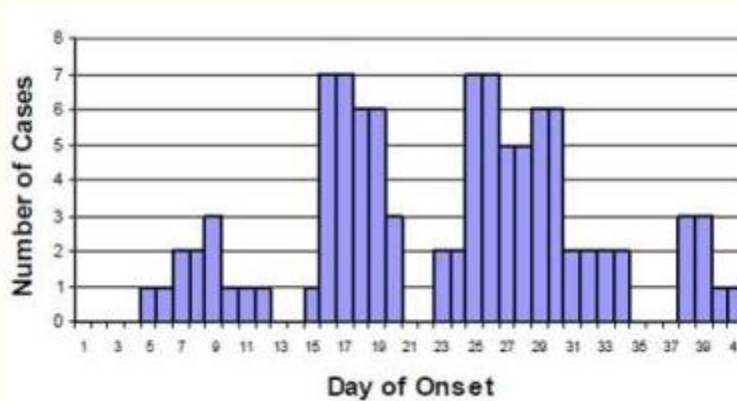


People are exposed to a single source of infection over a brief period of time

Ex. an infected oyster dish at a dinner party

Types of Epidemic Curves (Epicurves)

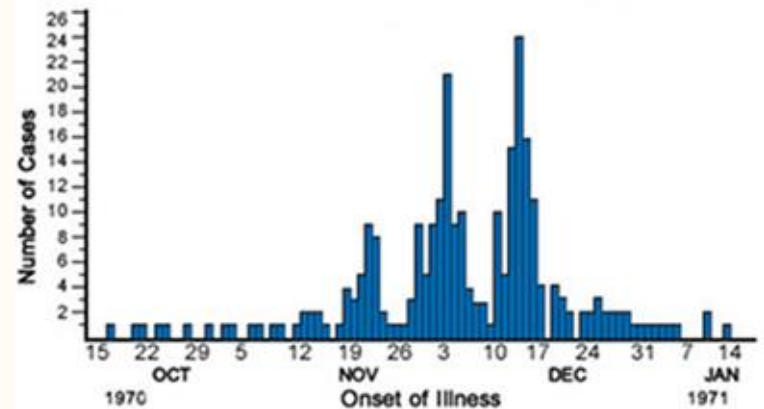
INTERMITTENT COMMON SOURCE



People are exposed to a single source of infection over intermittent time periods

Ex. Lyme disease is more common in summers

PROPAGATED SOURCE



Cases of the disease serve as sources of infection for subsequent cases

Ex. any infectious disease, such as the flu, that can be transmitted from person-to-person

	Contracted giardiasis	No giardiasis
Visited Harris County Aquatics Center	27	10
Did not visit Harris County Aquatics Center	7	30

Calculate & interpret the appropriate measure of risk.

Case-control = odds ratio.

$$ad/bc = (27*30) / (10*7) = 11.57$$

** Always show your work!

The odds of visiting the Harris County Aquatics Center were 11.6 times more likely among cases compared to controls. This high odds ratio makes it very likely that the source of contamination that led to this outbreak of giardiasis is the Harris County Aquatics Center.

Provide five recommendations to the Harris County Public Health Department to combat this outbreak.

Be creative!

1. Conduct a complete inspection of the Harris County Aquatics Center for potential contaminants
2. Temporarily close down the Harris County Aquatics Center to the public
3. Issue warnings to the public about preventing giardiasis
4. Publicize information on treating and reporting cases of giardiasis
5. Issue standard water safety protocols to prevent future outbreaks