

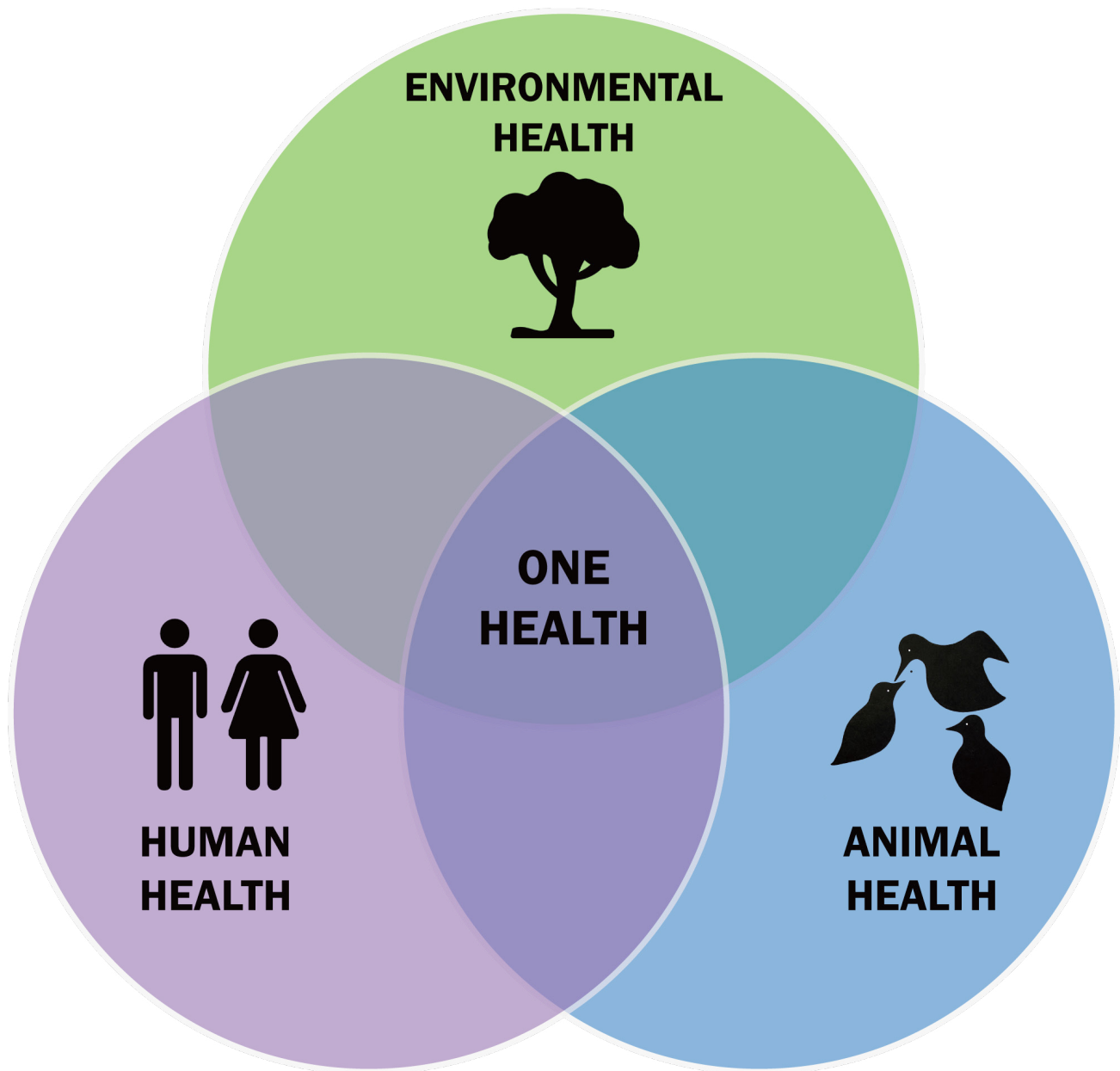
ONE HEALTH

What's All the Fuss About?

Deborah Thomson, DVM, Developer and Owner of onehealthlessons.com

Adapted for use in 4-H by:

Jennifer Richards, Curriculum Specialist, 4-H Youth Development



Tennessee 4-H Youth Development

One Health

What's All the Fuss About?

Skill Level

Intermediate, 6th-8th Grades

Learner Outcomes

The learner will be able to:

- Explain how the health of people is dependent on the health of animals and the environment
- Discuss the importance of vaccines
- Give examples of how health professionals are combating the SARS-CoV-2 ("COVID-19") pandemic
- Value the importance of effective communication between different professions

Educational Standard(s) Supported

6.LS2.5

8.LS2.4

Success Indicator

Learners will be successful if they:

- Can explain One Health and its importance
- Define new OH-related vocabulary words

Time Needed: 60 minutes

Materials List

When taught online/remotely:

- PowerPoint presentation (Link at end of lesson)
- Online platform that permits:
 - Screen sharing
 - Muting/Unmuting participants
 - Typing in chat box (for ages 8+)

When used in a physical classroom:

- PowerPoint presentation
- Computer projector with screen

Introduction to Content

This lesson introduces students to the topic of outbreaks from the lens of One Health. Students will learn about outbreaks and connect the dots between this background information and the current global SARS-CoV-2 pandemic.

Introduction to Methodology

This lesson can be taught in either a traditional classroom setting or an online-learning environment. The material will be presented to students via PowerPoint slides.

Resources

This PowerPoint lesson is designed to be easily taught to students online or in the classroom, using the "slide show" mode. A free "Train the Trainer" video about this lesson is available for review on [OneHealthLessons.com](https://onehealthlessons.com).

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Terms and Concepts Introduction

One Health – The beneficial collaboration of health professionals working with animals, people and their shared environment.

Outbreak – A sudden increase in the incidence of disease.

SARS-CoV-2 – The scientific name of the new strain of coronavirus. In people, the disease caused by the virus is called Coronavirus Disease 2019, or COVID-19.

Zoonotic – A disease that can jump between different species (ex. rabies, Leptospirosis).

Species – A group of organisms that are similar enough to one another that they can produce offspring together (ex. cats, dogs, humans).

Mutation – A change in an organism's genetic code that affects behavior or development.

Vaccine – A substance that stimulates the production of antibodies to strengthen the body's defense against a particular disease (ex. flu vaccine).

Setting the Stage and Opening Questions

Lead a discussion with students by asking the following questions:

- Have you ever thought about how disease outbreaks start? (*Germ find a perfect environment/location. Then they run out of control!*)
- What are some things we can do to stop germs from spreading? (*Washing our hands, covering nose/mouth when coughing and sneezing, disinfecting surfaces, etc.*)
- Do you think germs for people can infect animals, too? (*Some germs can spread from humans to animals and from animals to humans*)
- What are some ways we can protect people and animals from germs?

Tell students: **Today we are going to discuss a field of study called *One Health* to learn how we can protect ourselves now and in the future from disease outbreaks. By the end of this lesson, you will be able to explain how the health of people is dependent on the health of animals and the environment.**

Experience

Use the PowerPoint presentation from http://www.onehealthlessons.com/lessons/2/lesson_registrants/897 to guide this lesson. You will have to provide your name and an email address to download the presentation.

Slide 2: Each keyword has an individual slide with its definition in the following five slides

Slide 3: Emphasize here that veterinarians can work closely with (human) doctors and environmental health scientists to efficiently improve the health of animals, people and the environment at the same time.

Definition from the U.S. Centers for Disease Control and Prevention website (<https://www.cdc.gov/media/releases/2019/s0506-zoonotic-diseases-shared.html>): One Health is an approach that recognizes the connection between people, animals, plants and their shared environment and calls for experts in human, animal and environmental health to work together to achieve the best health outcomes for all.

Tips for Engagement

While students are listening to the presentation, make sure to ask them to repeat some of the new terminology. Throughout the presentation, stop to review terms and concepts, such as "One Health" and "zoonotic," and ask "What disease are we currently experiencing?"

Slide 4: (Note: This slide requires slideshow view. If you are not already using this method of review, it is best to start now.)

Ask how many species are in each picture. Note that there are more than three species in the top picture because plants have different species.

Tip for teachers:

A good way to explain this slide is:

Two cats can make kittens and two dogs can make puppies. Can a cat and a dog together have babies? No, because they are different species.

Slide 5: **Ask** how many species are represented on this slide (answer: five because humans are a type of animal species)

Tip for teachers:

Emphasize the “zoo” in zoonotic. Ask how many species are in the zoo? (A lot.) Let’s name some! (Make sure that they say people who are visiting the zoo in order to drive home the point that human is a type of animal.)

Slide 6: Emphasize here that viruses, bacteria, parasites and even cells inside people and animals can mutate (ex. some people, like this cat, have an extra toe or two!).

A good tip here is to have all the students repeat the phrase: “Mutation is change.” This phrase can be repeated throughout the class. (Later on, the students learn that a mutation can strengthen or weaken a virus’ ability to infect a cell and replicate. Sometimes a mutation does not make much of a difference and is just a benign change. Other times, the difference is important.)

Scientists today (March 2020) believe that COVID-19 is a disease that was caused by a virus that either:

1. Mutated inside an animal to make it easier to spread to and then between people or
2. Mutated inside of a human to make it easier to spread between humans

Slide 7: Vaccines are meant to strengthen a body to fight an upcoming germ. Note that a person (or animal) who gets a vaccine does not become invincible against that particular germ/microbe (which the vaccine is developed to fight). A person or animal can still get sick from the germ but, often, not nearly as sick as a person or animal that never received that vaccine.

Review that:

- An important point should be made to avoid confusion: a vaccine is NOT a medication. A vaccine is given BEFORE somebody gets exposed to a germ (ex. virus or bacteria) and a medication (ex. antiviral drug or an antibiotic) is only given AFTER somebody gets sick from that germ.
- Both veterinarians and (human) doctors and researchers are working together to develop the best vaccine to protect people against the virus that causes COVID-19.
- Medications can be developed from plants, microbes and other items found in the environment.
 - For Example: Penicillin <https://www.kidsdiscover.com/quick-reads/penicillin-foundfunctional-fungus/>
- Specialists who work with the environment, people and animals are all working together to make people better protected against SARS-CoV-2 (the virus that causes COVID-19). They must communicate efficiently so that they do not waste any time. This is One Health in action!

Tip for teachers: use an example from a veterinarian's point of view.

A dog that receives a vaccine (ex. the rabies vaccine) will not be as sick from the germ it was designed to fight against (ex. the rabies virus) compared to a dog that does NOT get the vaccine. The same general principal is true for people. (If the students ask, the unvaccinated dog would likely die from the disease IF it gets infected by the rabies virus, and the dog could bite people and spread it because it is a zoonotic disease).

Slide 8: **Ask** the students: "What are the three parts of One Health?" (Answer: human health, animal health and environmental health)

Say that this is a picture of a busy and healthy forest. The animals are evenly spread out and there is no stress to any of the animals. The trees look healthy, too.

(The teacher can discuss that clean water also plays a role in this forest ecosystem. This slide covers United Nations Sustainable Development Goals of "Clean Water and Sanitation" and "Life on Land.")

Slide 9: **Ask** the students:

- Why are there less trees? (Either from deforestation due to people or because of climate change which makes life for those plants more difficult in that area of the world.)
- Where are the animals going when there are less trees? (They are starting to crowd together in a smaller area. They are more stressed because they have more competition for food/shelter and have less space to live. Some animals are even leaving the forest to find food and are now near people).

The teacher can discuss that water quality also plays a role in this changing ecosystem. If animals drink dirty water that is contaminated by either people or animals then they can get sick. Besides deforestation, the teacher can discuss how climate change can alter natural habitats and lead to animals (including insects) moving into new territories. This slide would then cover the following UN Sustainable Development Goals:

- Climate Action
- Affordable and Clean Energy
- Sustainable Cities and Communities
- Responsible Consumption and Production
- Clean Water and Sanitation
- Life on Land

Slide 10: **Ask** the students:

- What changes do you see with this slide compared to the previous slide? (There are more people, fewer trees and more animals near people). Note that there are no actual changes to the number of animals between the slides.
- What is a zoonotic disease? Review that, in this slide, there are more people in the area where animals have been living. This is an area where zoonotic diseases can easily "spill over" and spread between animals and people. Emphasize that the novel coronavirus is a zoonotic disease.

Slide 11: Review that the birds are either leaving the smaller forest or they are dying because of the increased competition for food and shelter (trees).

Climate change can further shrink an animal's habitat and lead to species extinction by changing what plants grow in the area or make the temperature unsuitable for life for that (animal or plant) species. Climate change affects animals, people and plants in this way.

Slide 12: Compare and contrast this slide with the previous slide. Slowly go back and forth several times. Ask students if they can name the five changes between the two slides. (The answers are in the “notes” section of the next slide.)

Slide 13: Teacher answers:

- No more birds because there is too much competition for food and shelter (due to habitat loss). Fewer trees because either people are chopping them down or because some birds serve as pollinators and are responsible for eating fruits and dispersing seeds. A decrease in birds can also mean a decrease in trees.
- More mice because other types of birds eat mice and when there are no longer these birds in the forest, the mouse population increases.
- More foxes because when the mouse population increases, there are more mice for foxes to eat.
- More animals in human areas because the animals have no other choice (their home is gone or it is easier for them to survive/find food near people). Emphasize that this situation can increase the spread of zoonotic diseases. Emphasize that COVID-19 is a zoonotic disease.

Slide 14: Emphasize that COVID-19 is a zoonotic disease.

Review terms zoonotic and mutation (on the next two slides). COVID-19 is the disease caused by the novel coronavirus (the scientific way to refer to the virus is “SARS-CoV-2”).

Slide 15: Review quickly: This is a disease that can jump between different species.

Slide 16: Review quickly.

Slide 17: Explain that:

- The reason why we are talking about mutations today is because the novel coronavirus mutates. That is how this virus has been able to jump from animals to people and then between people.
- A model is like pretend. Models sometimes help scientists guess the future so that we can stay healthy (ex. scientists create models that try to guess that ‘x’ amount of people will be sick from a virus, therefore we all need to practice social distancing for ‘y’ amount of time).

Slide 18: Review that “mutation is change.”

Ask for 2-3 volunteers to quickly read this bold sentence five times. This tongue-twister serves as a model for a type of mutation—the simplest kind of mutation called a point mutation.

Slide 19: Explain that another way viruses can mutate is by mixing in an animal (ex. a pig, bat). Review that this “animal” could also be a person!

The first animal example here is a pig. This is because swine flu (an influenza virus) occurred after a pig combined different viruses inside of itself. (A pig can mix bird, human and pig viruses!

<https://www.ncbi.nlm.nih.gov/pubmed/19565018>)

The second animal example here is a bat. Ask the students if a bat is responsible for something like this, what can be done about it? (Some students here say to keep your distance—which is the correct answer—and other students say to kill the bats. As a response to that second answer, the next slide is presented which says that bats are very important for the ecosystem!)

For the teacher: this slide models a style of mutation called genetic reassortment (and, more specifically, antigenic shift). Through genetic reassortment, a new virus can be made.

Slide 20: In the previous slide, a bat was the second example. Keep in mind bats are very important. They eat insects and they are pollinators and disperse seeds.

For more information on this topic:

General information: <https://www.bats.org.uk/about-bats/why-bats-matter>

PDF for bats that live in caves (and mentions white-nose syndrome):

<https://www.fs.fed.us/biology/resources/pubs/tes/wns-brochure8310.pdf>

Slide 21: This activity models another way a virus can mutate, called genetic reassortment.

Slide 22: This activity models genetic reassortment.

The students will eventually be filling in blanks in a similar sentence. The next slide demonstrates an example of what the students will eventually do themselves.

Slide 23: Review that the red sentence is like the red virus. The blue sentence is like the blue virus. What happens when we combine these two sentences together to make a mutated sentence? (see next slide)

Slide 24: Review the example of the mutated sentences.

Slide 25: **Ask** the students to use the chat box and write the entire sentence with the blanks filled in (ideally, the new words are written in CAPITAL LETTERS). Have the students submit their entry to everybody in the chat. If the chat box is not possible, then the students can submit answers by speaking or displaying their sentence on a small white board or piece of blank paper.

Tip: The suggested time for students is three minutes but this can be adjusted based on the group.

Slide 26: Once everybody has typed the entire sentence with the blanks filled in (ideally, in CAPITAL LETTERS), the teacher can demonstrate how to combine two student sentences together to make a strange mutated sentence.

Ask the students after creating the mutated (combined) sentence, if the mutation strengthened or weakened the original sentences' messages or simply made the sentence very strange.

Ask for 1-2 student volunteers to combine other sentences found in the chat box to make a newly mutated sentence.

Review: this sentence activity is another model of how a mutation can happen in a virus or in a cell. Sometimes, mutations change a virus to become stronger or weaker.

Slide 27: **Ask:** What songs the students sing to get them to wash their hands for at least 20 seconds. (Ex. Happy Birthday twice, Let It Go, The ABC's)

With this slide, students are reminded that human health is dependent on environmental health. We need to make sure that the environment is clean so that people can stay healthy.

What happens if you sneeze or cough into your elbow and then you fold your arms? (You'll need to go wash your hands again for at least 20 seconds!)

Link to source of the slide's information: <https://www.cdc.gov/coronavirus/2019-ncov/if-you-are-sick/steps-when-sick.html>

Slide 28: WARNING: The word "crap" is in this video. Remind students to not do this activity with food coloring dye at home.

This video lasts three minutes and 20 seconds and shows how far a sneeze can travel using different food coloring dye. It also shows what happens if you cover your cough with your hand vs. elbow vs. tissue. (Keep in mind that the tissue example shows more droplets on the floor and contamination of the hands. This demonstrates even more reason to wash your hands after sneezing and disposal of a tissue in a lined waste basket.)

Original link: <https://m.youtube.com/watch?v=3vw0hIs2LEg&feature=share>

Ask the students what surprised them in the video.

Share

Slide 29: **Ask:** What are the three parts of One Health?

For the first point, emphasize that veterinarians are working to develop a human vaccine (because animal models are used in a vaccine's development process). Also, veterinarians and environmental health scientists (like ecologists) have been surveying viruses in wild animals for the last ten years. Because of this work, researchers in China already knew that coronaviruses were near Wuhan, China (the city where the first human cases were identified) and the identification of the novel coronavirus (called SARS-CoV-2) was done within two weeks instead of several months (like what happened with SARS in 2002).

Process

Slide 29 Continued: For the second point, emphasize that people are often taking up the space where wild animals once lived. Because of the smaller natural habitat for animals, they are being forced out of the forest/natural habitat to scavenge for food and survive. Review that people have germs that can spread to animals and animals can have germs that spread to people and other animals.

For the last point, ask if students think that planting trees is the only way to rebuild a forest and review that decreasing paper usage can lead to less deforestation. If people demand less from the environment, nature can heal itself with time.

Example of decreasing paper usage: use a reusable cloth bag when shopping instead of getting a new paper bag each time.

Generalize

Slide 30: Review:

- Vaccines are meant to prevent you from getting very sick. Medications can help you only when you are already sick. (Children seem to confuse these two ideas, so be sure to emphasize this point.)
- Both veterinarians and human doctors and researchers are working together to develop the best vaccine to protect people against the virus that causes COVID-19.
- Medications can be developed from plants, microbes and other items found in the environment. (Another example of how environmental scientists are involved in human health care too!)

Example: Penicillin <https://www.kidsdiscover.com/quick-reads/penicillin-foundfunctional-fungus/>

Specialists who work with the environment, people and animals are all working together to make people better protected against SARS-CoV-2 (the virus that causes COVID-19).

They must communicate efficiently so that they do not waste any time. This is One Health in action!

Apply

Slide 31: Encourage students to play the game at this link:

<https://e-bug.eu/menupage.html?type=games&level=junior>

The e-bug.eu site has games for older students as well.

Life Skill(s)

6th Grade

Know how the human body works. (Health, Living)

7th Grade

Understand that disease spreads when we do not practice good sanitation. (Health, Living)

8th Grade

Practice cleanliness and self-protection measures, such as Universal Precautions and handwashing. (Health, Living)

Supplemental Information

Educational Standards Met

6.LS2.5: Analyze existing evidence about the effect of a specific invasive species on native populations in Tennessee and design a solution to mitigate its impact.

8.LS4.4: Develop a scientific explanation of how natural selection plays a role in determining the survival of a species in a changing environment.

This power point lesson is designed to be easily taught to students online or in the classroom, using the “slide show” mode. A free “Train the Trainer” video about this lesson is available for review on

[OneHealthLessons.com](https://www.onehealthlessons.com).

Choose your lesson based on the age of your students on OneHealthLessons.com. For every lesson, there are detailed notes associated with each slide. Some notes make suggestions for when it is appropriate to highlight words from previous lessons (ex. Ecology terms like “keystone species” for older students).

It is highly recommended that you either:

- review the notes before giving the lesson or
- have the notes printed out to guide you during the lesson or
- use another (hidden) computer screen (or phone) to show you the notes and share only the powerpoint presentation in “slide show” mode on a second computer.

Teachers who wish to extend the impact of this One Health lesson will find supplemental material listed in the notes section of the last slide as well as on OneHealthLessons.com.

The creative team is always looking for feedback from teachers so that the next lesson is even better! After teaching the lesson, please have the students’ full-time teacher complete this 2-minute survey:

<https://www.surveymonkey.com/r/DZK3FP3>