1.1 Welcome | Introduction

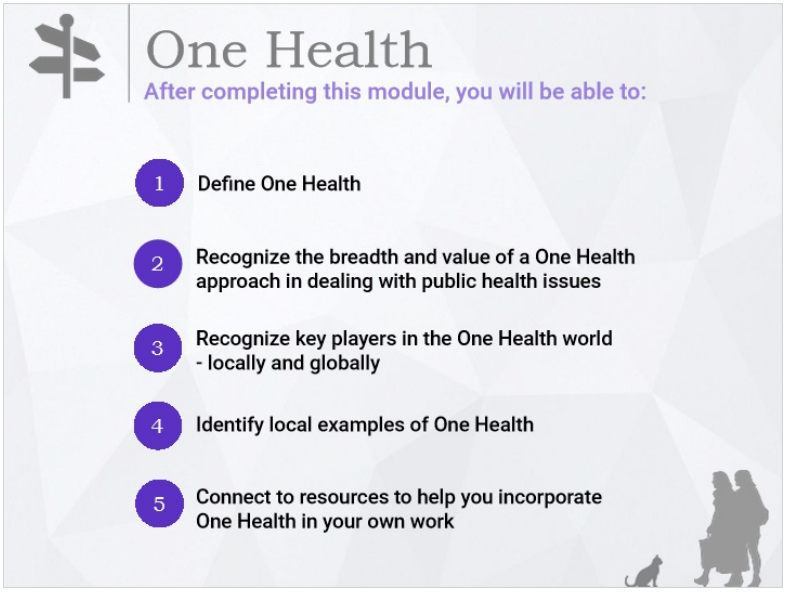
Hello, and welcome to this module on One Health, which explores how the health of humans, animals and the environment are linked. Whether you are a student working on a master of public health degree, a practicing clinician, or a public health professional, we will provide you with a basic foundation on One Health along with some resources and examples that are relevant to us all, here in Wisconsin.

My name is Dr. Janice Valenzuela, and my background includes both veterinary medicine and public health. I am passionate about the value of One Health approaches for solving some of today's biggest public health challenges. I hope you will find the information in this program useful.

We hope you will explore the many valuable sites and resources provided within the module and the course home page.

Click the Start button to begin!

1.2 Objectives



After completing this module, you will be able to:

- Define One Health.
- Recognize the full spectrum of One Health and the value of using a One Health approach in dealing with public health issues.
- Recognize key players in One Health both locally and abroad,
- Identify local examples of One Health, and
- Connect to resources to help you incorporate One Health in your own work.

1.3 Roadmap

Here's the roadmap for today. We will start by defining One Health and cover some brief history on its evolution.

Then we'll examine why One Health has emerged as a valuable theory of health promotion and a strategy for tackling complex public health issues, and you will have a chance to explore some of the changing factors that are bringing more focus on One Health.

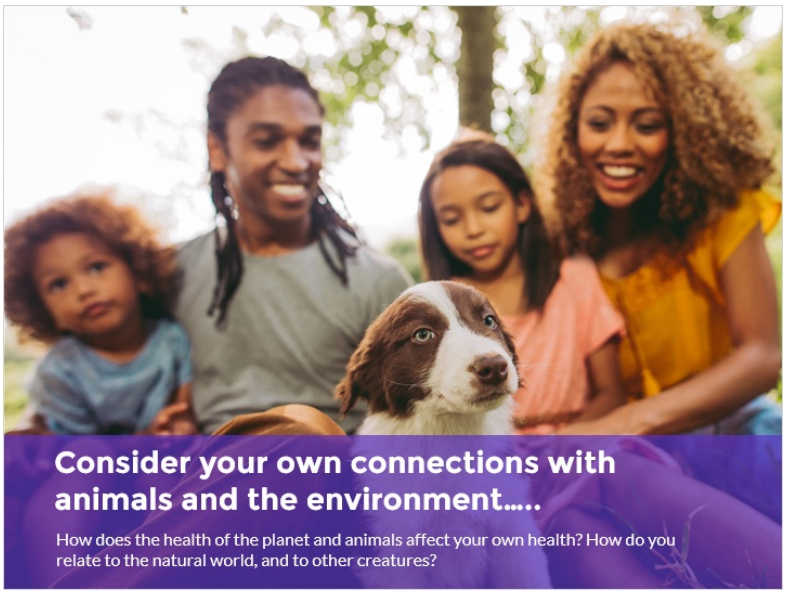
Next, we'll look at some ways that One Health applies as we consider infectious disease transmission as well as antimicrobial resistance. We'll look at environmental connections and the impact of climate change, as well as the human animal bond.

We highlight key players around the country and the world, and look at specific examples of One Health right here in Wisconsin.

We explore the evolution of One Health in Public Health, and briefly review some of the major challenges for implementing One Health more broadly.

We will finish up by identifying some action steps that you can take, as well as additional resources you can explore to engage further with the topic and start incorporating One Health into your work today!

1.4 Reflection



First, take a moment and briefly consider your own connections with animals and the environment - whether it's in your personal or professional life or both. How does the health of the planet and animals affect your own health? How do you relate to the natural world and to animals?

1.5 What is One Health?

On its most basic level, the concept of One Health simply recognizes that the health of humans, animals and the environment are interdependent and not in an insignificant way.

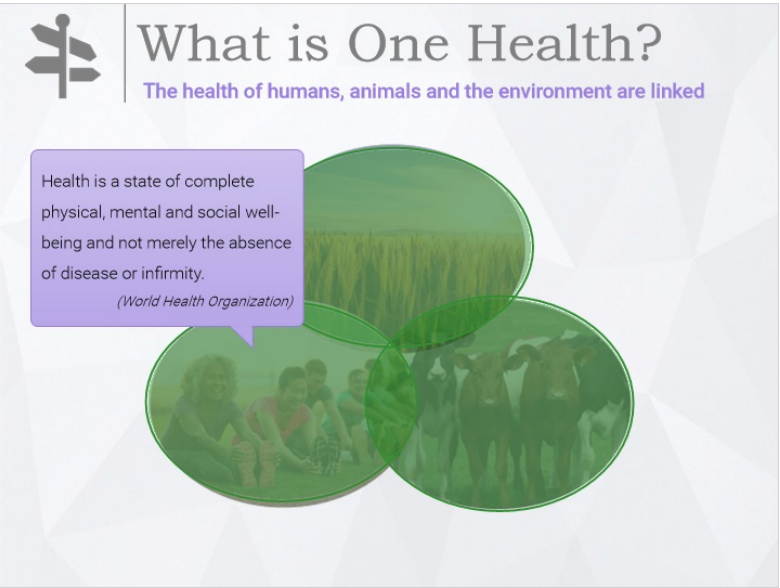
We can build on that basic definition by looking at what it means for each of those elements - humans, animals and environment - to be healthy.

By looking at where and how these pieces interact, and how their health is connected, One Health allows us to take a more integrated, systems-based approach to health. More and more today, we recognize the influence of various determinants on human health, we talk about incorporating health in all policies and we value inter-professional team approaches to care. One Health links to all those principles, and expands them to include animal and environmental health more broadly.

1.6 Definitions

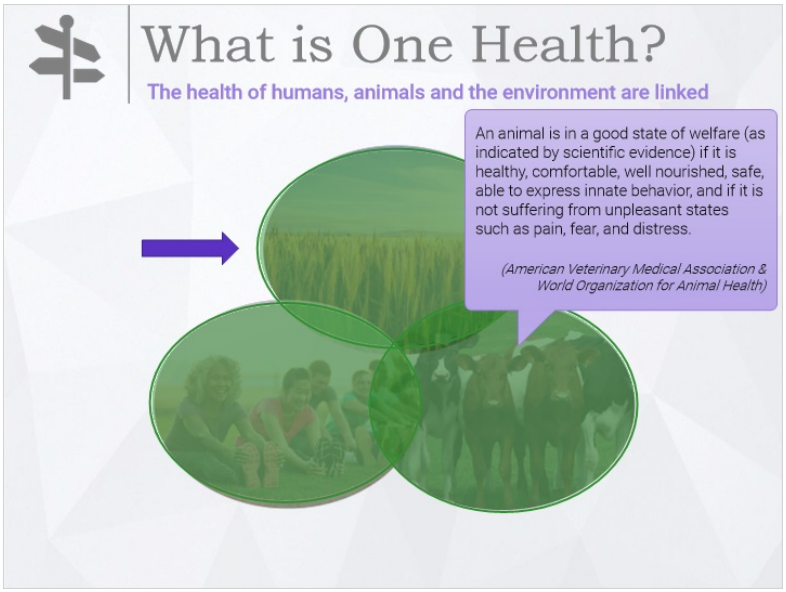
Click on each image to learn more.

Humans:



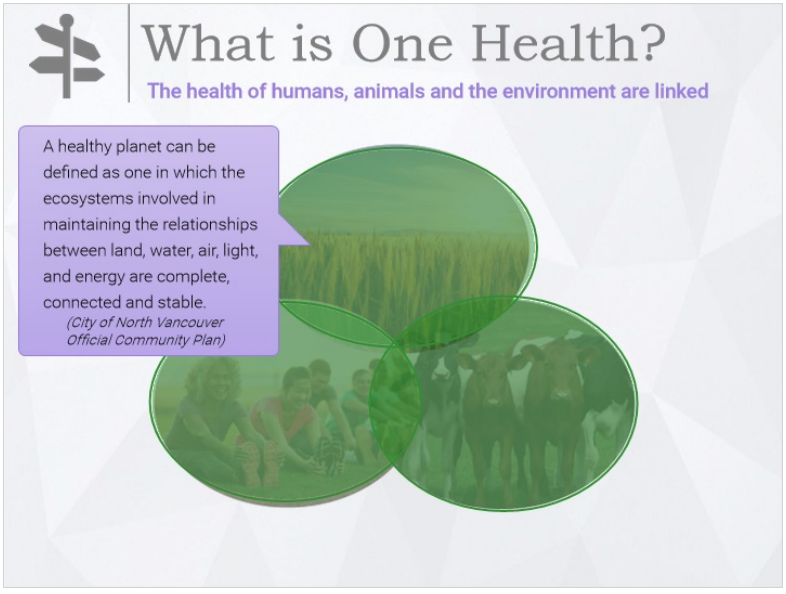
The World Health Organization defines health as a state of complete physical, mental and social well-being, and not merely the absence of disease or infirmity.

Animals:



An animal is in a good state of welfare if it is healthy, comfortable, well nourished, safe, able to express innate behavior, and is not suffering from unpleasant states such as pain, fear, and distress.

Healthy Planet:



A healthy planet is one in which the ecosystems involved in maintaining the relationships between land, water, air, light, and energy are complete, connected and stable.

1.7 Collaborative Effort

In 2007, the American Veterinary Medical Association established a One Health Initiative Task Force - with representation from human health, public health and veterinary medicine.

In their report, the task force defined One Health as…. "the collaborative effort of multiple disciplines - working locally, nationally and globally - to attain optimal health for people, animals and the environment".

With this definition, we move One Health from a concept to a functional, strategic framework for addressing complex health problems.

1.8 Brief History

If all this sounds familiar, it's because the concept is not new. Click on each item to learn more.

460 BC Hippocrates:

Hippocrates "urged physicians to consider where their patients lived, the food they ate and waters they drank, their lifestyles, and the seasons of the year".

19th Century Virchow:

Rudolf Virchow, who was considered the father of modern pathology, said “between animal and human medicine there are no dividing lines - nor should there be.”

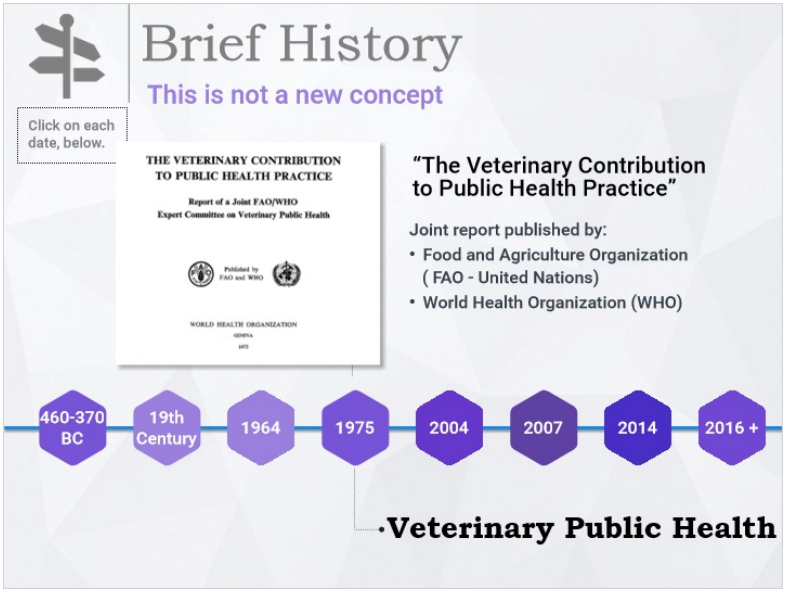
1964 Calvin Schwabe:

Calvin Schwabe was the founder of veterinary epidemiology. As a faculty member at both the University of California Davis School of Medicine and the School of Veterinary Medicine, he worked to bridge the veterinary and human health professions.

Schwabe coined the term "One Medicine" in his book, Veterinary Medicine and Human Health

in 1964, to capture the interrelatedness between the health of different species, and to recognize the importance of reducing risks that zoonotic diseases pose to people, their food supplies and their economies.

1975 Veterinary Public Health:



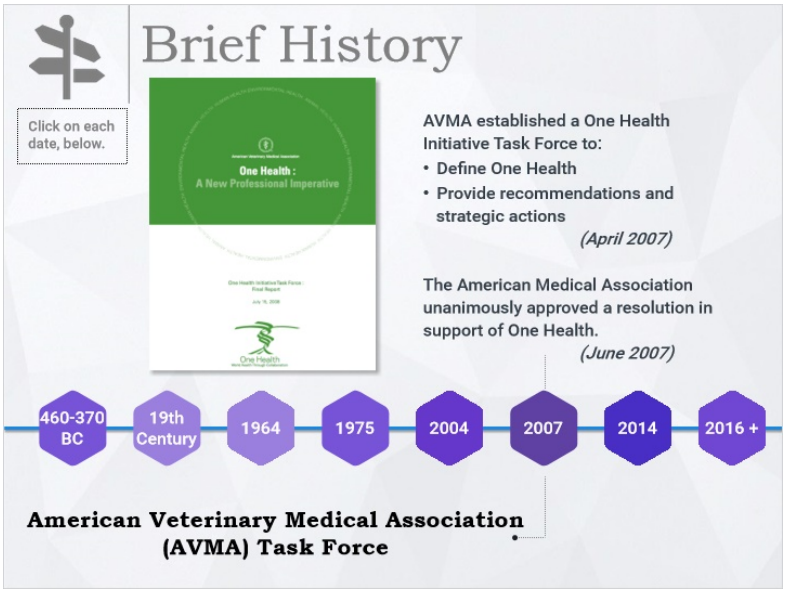
In 1975, a joint report was published, titled "The Veterinary Contribution to Public Health Practice". This was a collaborative effort by the Food and Agriculture Organization of the United Nations and the World Health Organization.

Later the World Health Organization described veterinary public health as: "the sum of all contributions to the physical, mental and social well-being of humans through an understanding and application of veterinary science".

2004 Wildlife Conservation Society:

In 2004 the Wildlife Conservation Society held a “One World, One Health” symposium appealing for more purposeful and systematic channels of communication among human, animal and wildlife health services.

2007 AVMA Task Force:

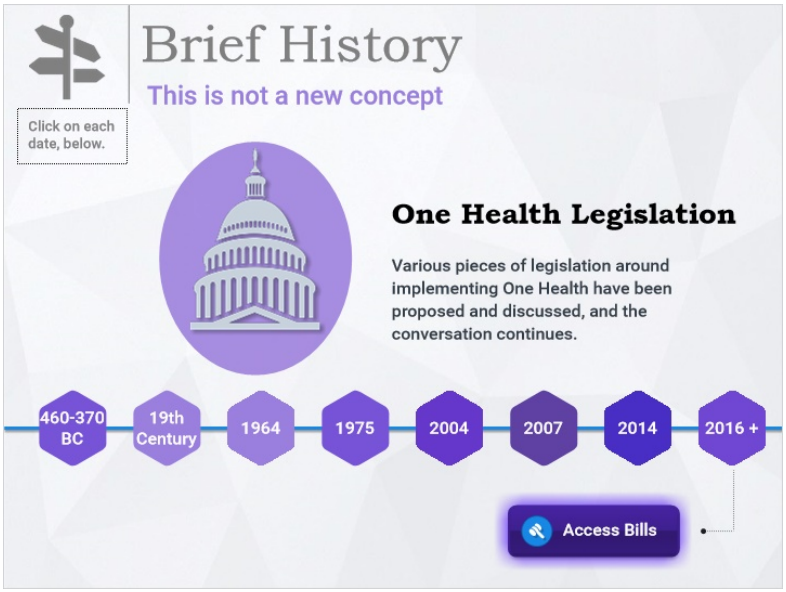


In addition to defining One Health, in 2007 the AVMA One Health Task Force provided recommendations and strategic actions to support and expand the concept of One Health across the health professions. Just two months later, the American Medical Association followed suit, with unanimous approval of a resolution in support of One Health.

2014 CARB:

In September of 2014, the White House outlined a National Strategy for Combating Antibiotic Resistant Bacteria. This included a goal to strengthen national One Health surveillance efforts to combat resistance.

2016+ One Health Legislation:



There have been various attempts at passing legislation around implementing One Health in recent years. The One Health Act of 2016 relates to addressing infectious diseases in animals and the environment, to prevent their spread to people. Another bill proposed in 2018 focuses on One Health in emergency preparedness.

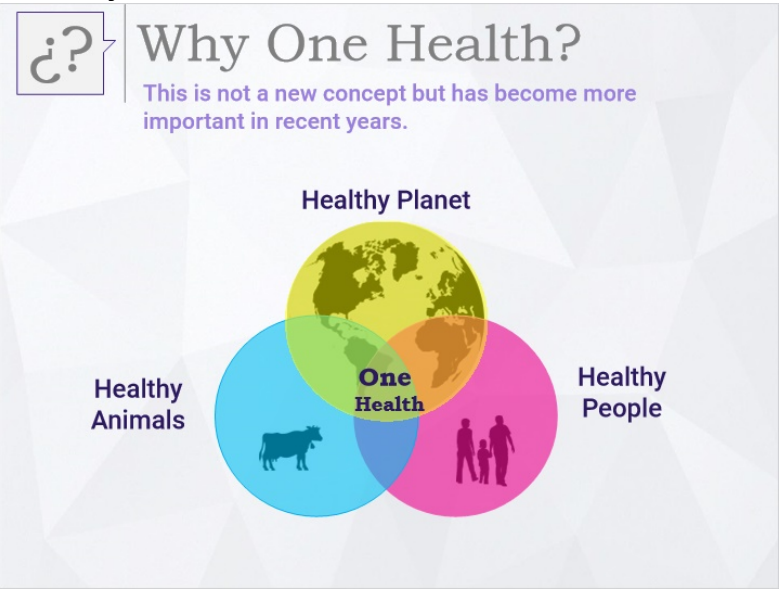
Click on the button to see the status of the most recent federal legislation around One Health.

****

Image Credits:

- Hippocrates:https://commons.wikimedia.org/wiki/File:Portrait_of_Hippocrates_from_Linden,_Magni_Hippocratis...1665_Wellcome_L0014825.jpg
- Virchow: https://en.wikipedia.org/wiki/Rudolf_Virchow
- Schwabe: https://wwwnc.cdc.gov/eid/article/17/12/11-0484_article#tnF1
  Wildlife Conservation Society: https://www.wcs.org/

1.9 Why One Health?



So One Health is not new, but it HAS been more widely embraced as both a concept and a strategy to address public health challenges in recent years, in part because many factors have changed the interactions between people, animals, and our environment.

1.10 Changing Factors

Explore some of these changing factors by clicking on each tab below.

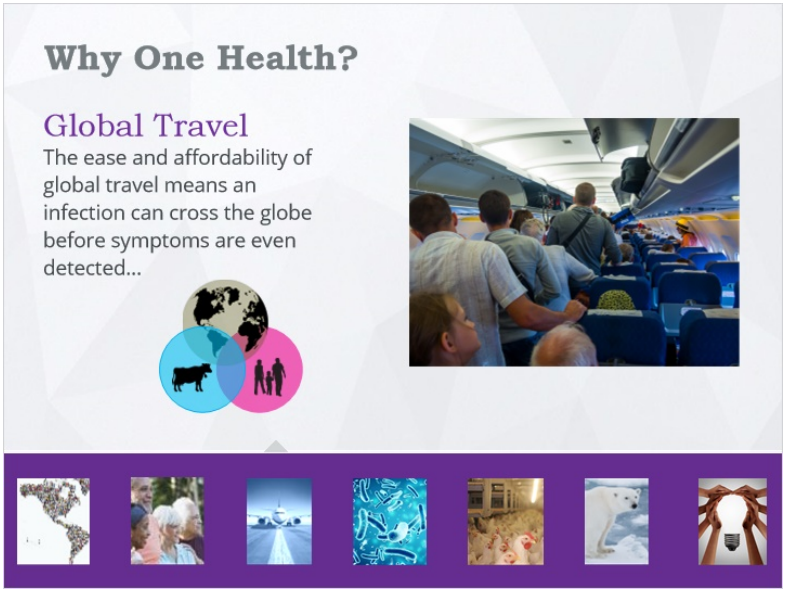
Population Increase:

The world's total population is projected to grow from 7.6 billion in 2018 to almost 10 billion by 2050. As our population expands geographically, contact between human and wild animal habitats increases, introducing the risk of exposure to new viruses, bacteria and other disease-causing pathogens. The expanding human population also puts considerable pressure on our global food supply - a problem that an innovative systems-based approach, like One Health - can help address.

Change in Population:

The makeup of that growing population is also significant. Advances in health and technology have resulted in a growing number of individuals who are immune-compromised due to factors such as advanced age, chronic illness or treatments like anti-rejection drugs for transplants or chemotherapy for cancer. People are living longer, with a broader range of chronic conditions - but they may also be at higher risk for certain infections.

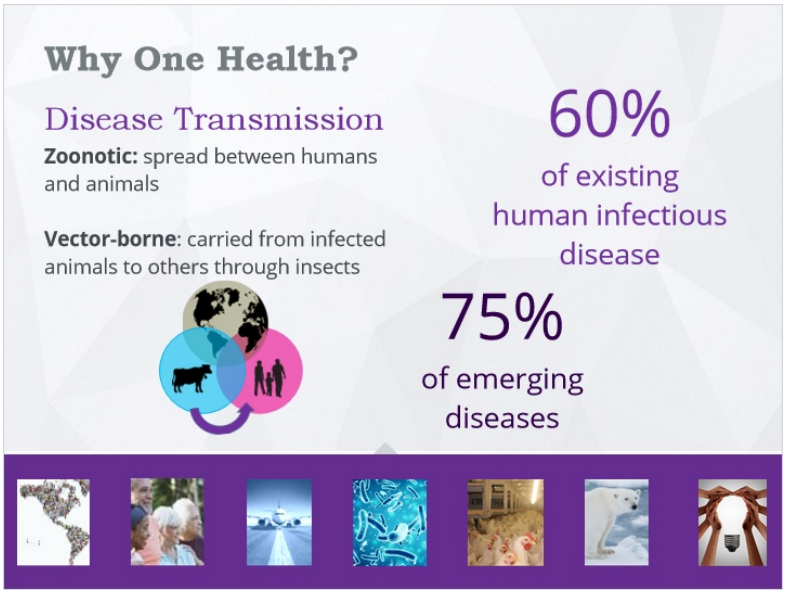
Global Travel:



Never before has this growing population been more well connected. Increased international travel and trade means infectious agents can spread quickly across the globe, before

symptoms of infection are even detected and can do so through movement of not just people, but also animals and animal products.

Disease Transmission:



It is estimated that 60% of existing human infectious disease and at least 75% of emerging and re-emerging diseases are either zoonotic (that is, spread between humans and animals) or vector-borne (carried from infected animals to others through insects).

Food & Feed Supplies:

Feeding a larger population, coupled with growing meat consumption in developing countries, have led to more intense farming practices. Vigilant protection of our human food products and

animal feed supplies from food-borne diseases, contamination, and acts of terrorism is critical for human and animal health.

Climate Change:

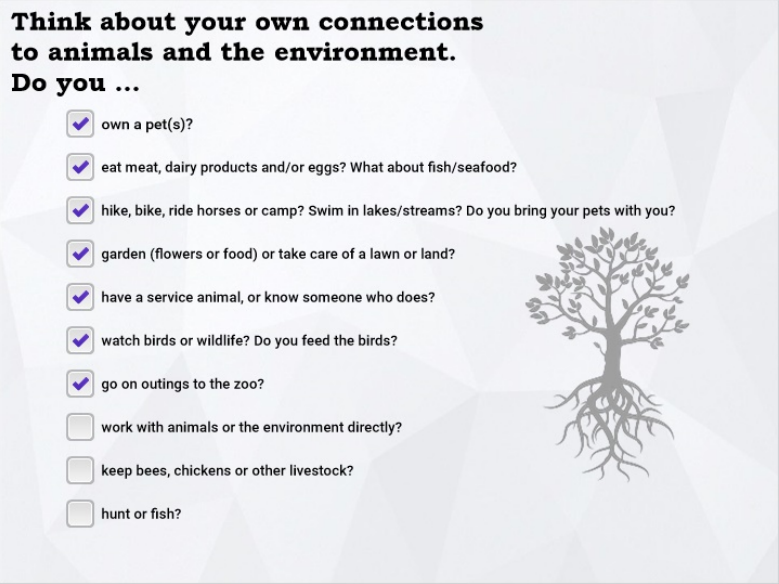
Changes in land use, such as deforestation, intensive farming, and encroachment into forest lands contribute to climate change. The resulting loss of biodiversity and disruptions in environmental conditions provide new opportunities for diseases to pass to animals, as well as a decreased capacity for recovery.

Multidisciplinary Approach:

No one group has the knowledge or the resources to combat these complex problems alone.

One Health offers a new strategic, multidisciplinary approach to tackling the so-called “wicked” problems facing our planet and the health of all.

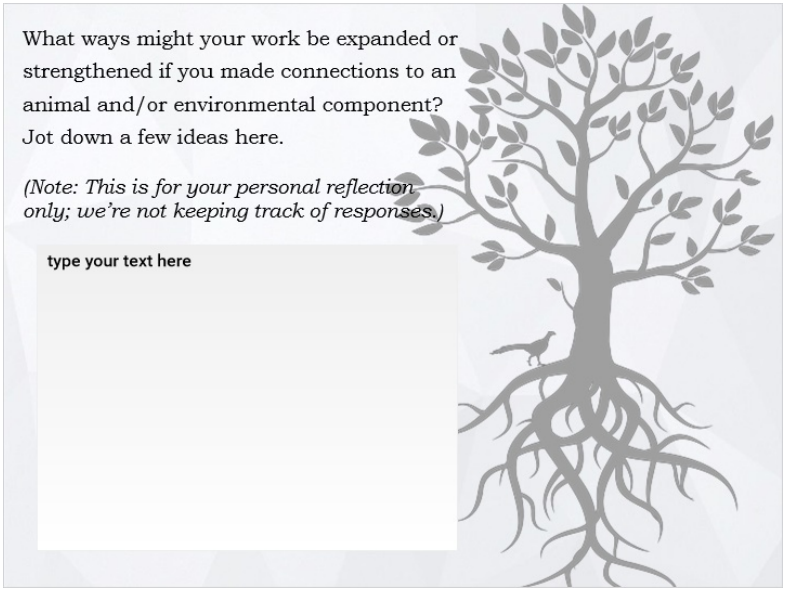
1.11 Think about your own connections to animals and the environment. Do you …



Choice
own a pet(s)?
eat meat, dairy products and/or eggs? What about fish/seafood?
hike, bike, ride horses or camp? Swim in lakes/streams? Do you bring your pets with you?
garden (flowers or food) or take care of a lawn or land?
have a service animal, or know someone who does?
watch birds or wildlife? Do you feed the birds?
go on outings to the zoo?
work with animals or the environment directly?
keep bees, chickens or other livestock?
hunt or fish?

Think again about your own personal connections to animals and the environment. Select all that apply.

1.12 What ways might your work be expanded or strengthened if you made connections to an animal and/or environmental component? Jot down a few ideas here.



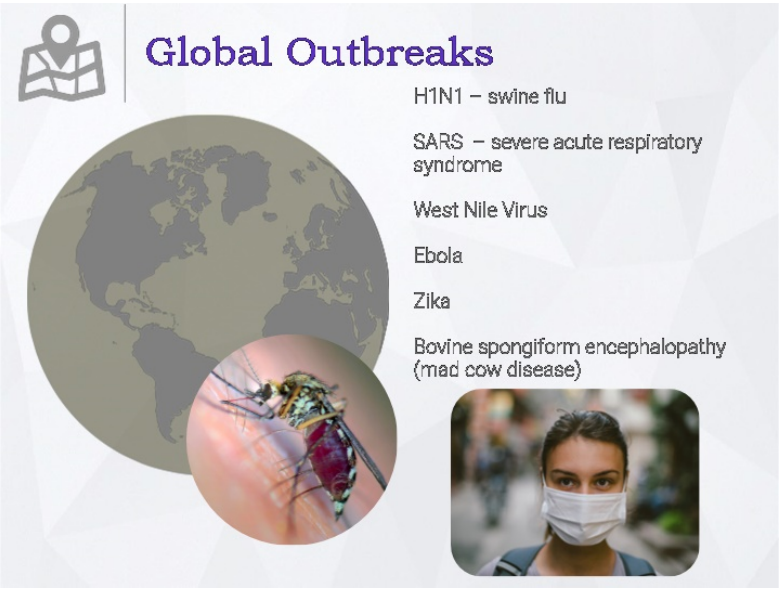
(Note: This is for your personal reflection only; we're not keeping track of responses.)
Now take a moment to reflect on your professional or educational position - what connections do you have already with animals and the environment? How might your work change if you connected more extensively with animal and environmental health components?

1.13 Disease Transmission & Antimicrobial Resistance

Now that we've explored the what and why of One Health, let's look at how and where One Health applies in public health.

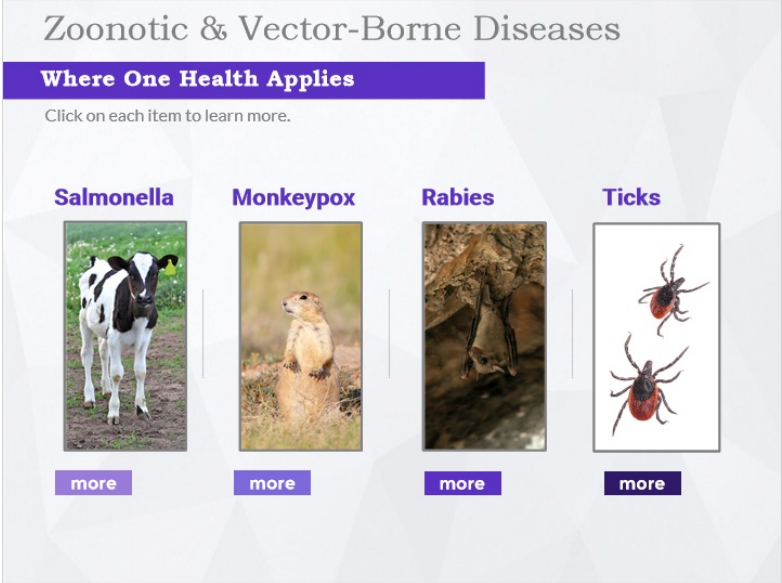
One area in which One Health has gained recognition over the years, is disease transmission, including both zoonotic diseases (those transmitted between animals and humans) and vector-borne diseases (those carried from infected animals to others, through insects).

The other main area where One Health has been recognized as a vital approach is antimicrobial resistance, which has grown exponentially with the widespread use of antibiotics in both humans and animals.



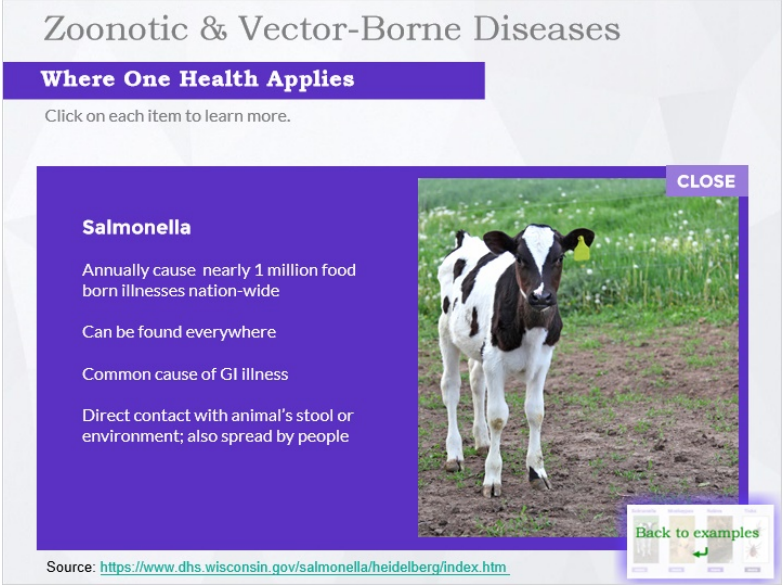
Recent outbreaks of diseases like Swine Flu, West Nile Virus, and Zika have served to highlight the importance of zoonotic and vector-borne diseases.

1.14 Zoonotic & Vector-Borne Diseases



Let's take a moment to explore some examples of zoonotic and vectorborne diseases of importance right here in Wisconsin. Click on each item to learn more.

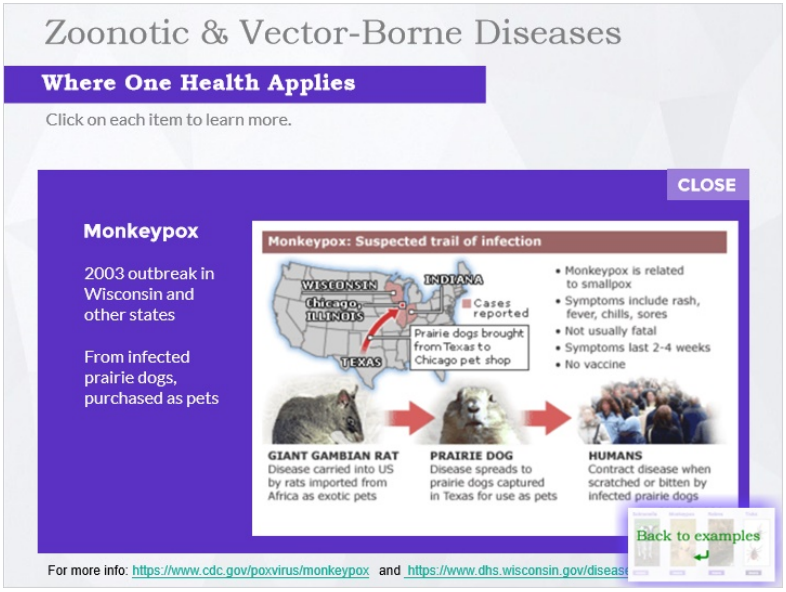
Salmonella:



Recently, the Wisconsin Department of Health Services helped investigate an outbreak of drug resistant Salmonella infections in people, believed to have come from contact with dairy bull calves. Nearly one million cases of food borne illnesses due to Salmonella occur in people nationwide each year. Certain strains of the bacteria can be more harmful than others.

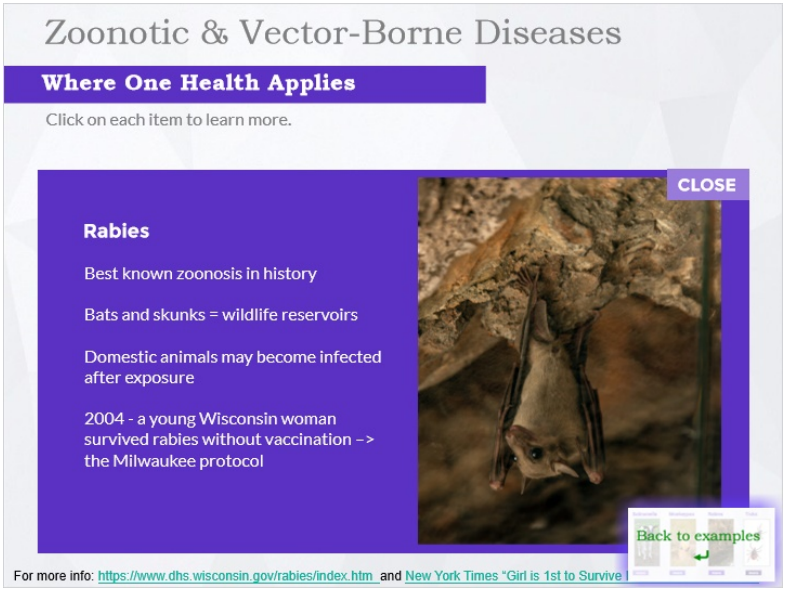
Salmonella can be found everywhere in the environment and is a common cause of gastrointestinal illness. The primary way people get infected from cattle on farms is through direct contact with the animal's stool or its environment. Salmonella can also be spread by person to person.

Monkeypox:



In 2003, over 30 people in Wisconsin -- along with other people across the Midwest -- became infected with monkeypox. This disease was transmitted from prairie dogs that were bought as pets. The source of the virus was ultimately thought to be exotic animals, such as Gambian rats, that were imported into the US.

Rabies:



Rabies is probably the most well-known zoonosis in history. The primary reservoirs of the rabies virus in Wisconsin are bats and skunks. (Raccoons and foxes are important reservoirs in other parts of the country.) Domestic animals almost always become infected from exposure to these wildlife reservoirs. Of the last four cases of human rabies in Wisconsin, all contracted the disease from bats.

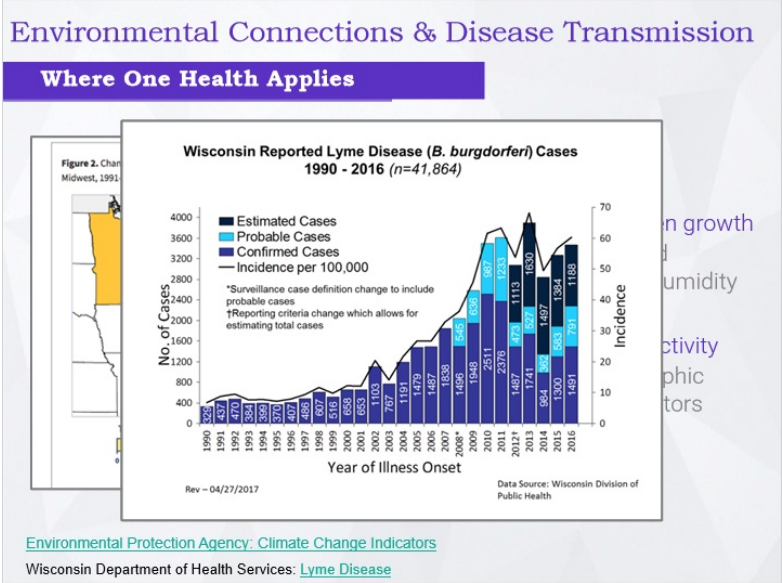
Probably the most famous rabies case in recent history is that of a young woman from Fond du Lac, Wisconsin who survived rabies without vaccination, through an experimental treatment now known as the Milwaukee protocol.

Ticks:

Deer ticks are known vectors for Lyme disease and anaplasmosis, the most common vectorborne diseases found in Wisconsin. Lyme disease is primarily found in the northwestern part of Wisconsin, but human cases can occur in all counties.

These tick-borne agents can also infect domestic pets, livestock, and wildlife.

1.15 Environment & Disease Transmission



The effects of climate change can translate into increased growth of certain pathogens in vectors, as well as wider geographic and temporal distributions of vector activity.

The statewide average incidence of Lyme disease has increased more than fivefold in the past 19 years. This is partly due to the warmer, wetter conditions, leading to increased breeding grounds and a wider distribution of these vectors.

1.16 Antimicrobial Resistance

Let's turn our attention now to antimicrobial resistance.

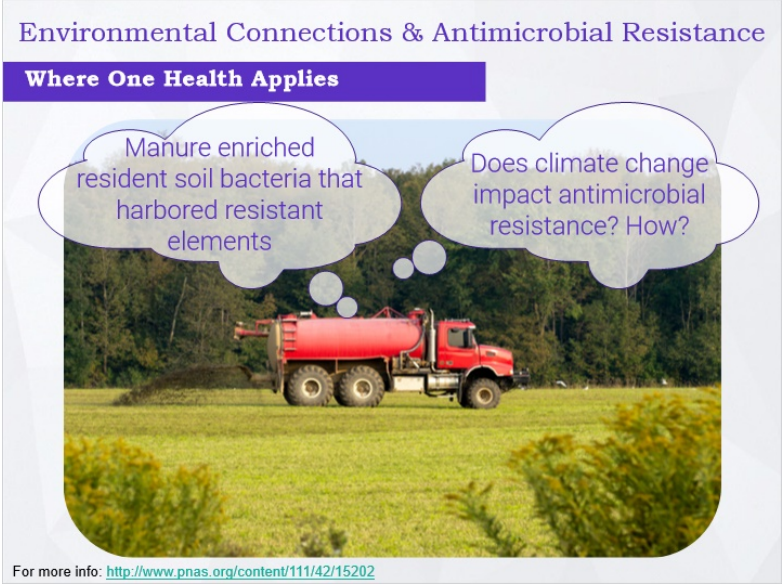
Antimicrobials are critical clinical tools, but their widespread use in humans and animals, can contribute both directly and indirectly to the development of resistance.

Antimicrobial resistance is one of the world's most pressing public health problems. Illnesses that were once easily treatable with antibiotics are becoming more difficult to cure and more expensive to treat. Cooperative One Health approaches to epidemiological investigations, joint surveillance for antimicrobial resistance and policies of antimicrobial use and stewardship are vital to addressing these challenges.

_____

(Infographic from Public Health Agency of Canada -https://www.canada.ca/en/public-health/corporate/publications/chief-public-health-officer-reports-state-public-health-canada/chief-public-health-officer-report-on-state-public-health-canada-2013-infectious-disease-never-ending-threat/antimicrobial-resistance-a-shared-responsibility.html#figure-1)

1.17 Environment & Antimicrobial Resistance

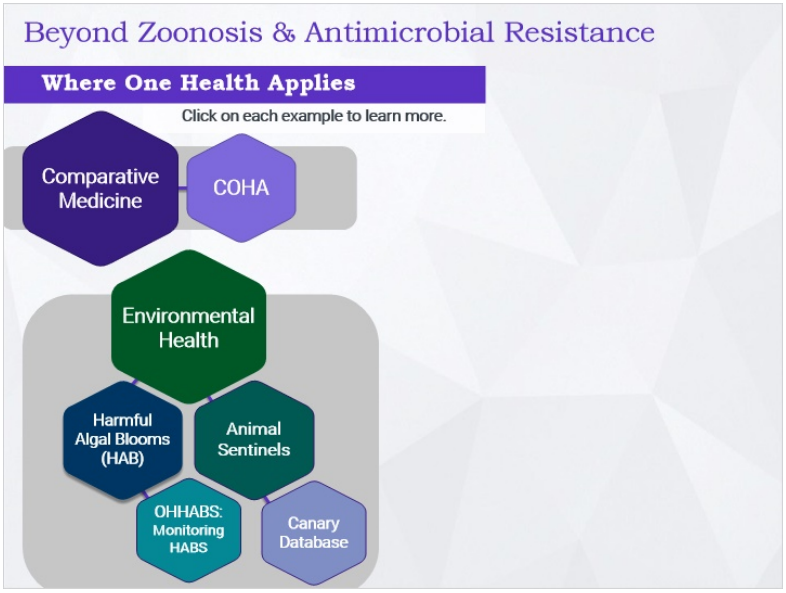


Most efforts around addressing antimicrobial resistance focus on the resistant organisms and the drugs being used in humans and animals.

However, research now suggests that higher local temperatures (as would be expected with climate change) are associated with a greater incidence of resistant infections.

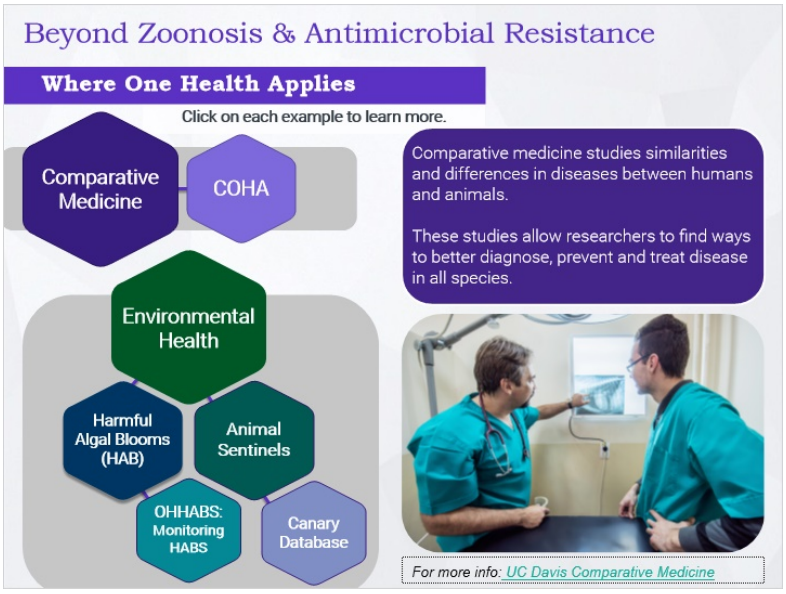
A recent article reported that application of manure to agricultural soil led to a bloom in antimicrobial resistance even though the animals that produced the manure had not been treated with antibiotics. The authors concluded that the manure fertilization allowed for enrichment of resident soil bacteria that harbored resistant elements.

1.18 Beyond Zoonosis & Antimicrobial Resistance



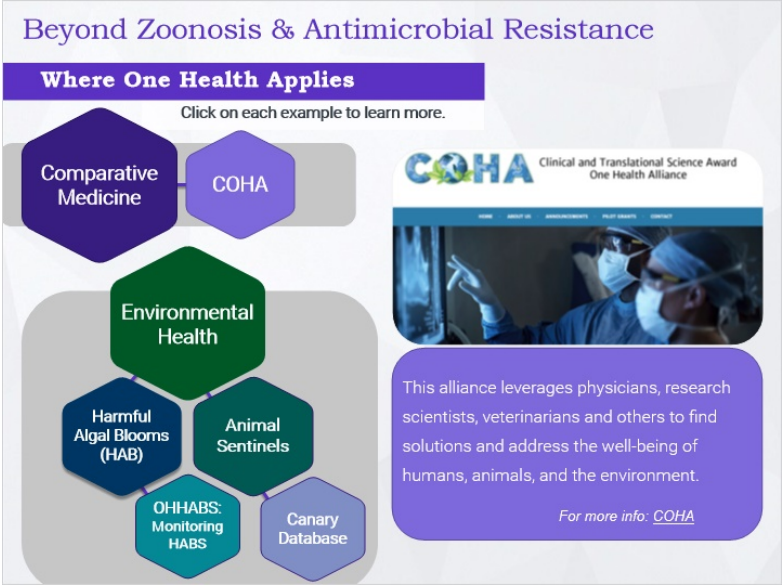
One Health encompasses much more than zoonotic disease and antimicrobial resistance. Click on each item to explore a few other examples of where One Health applies.

Comparative medicine:



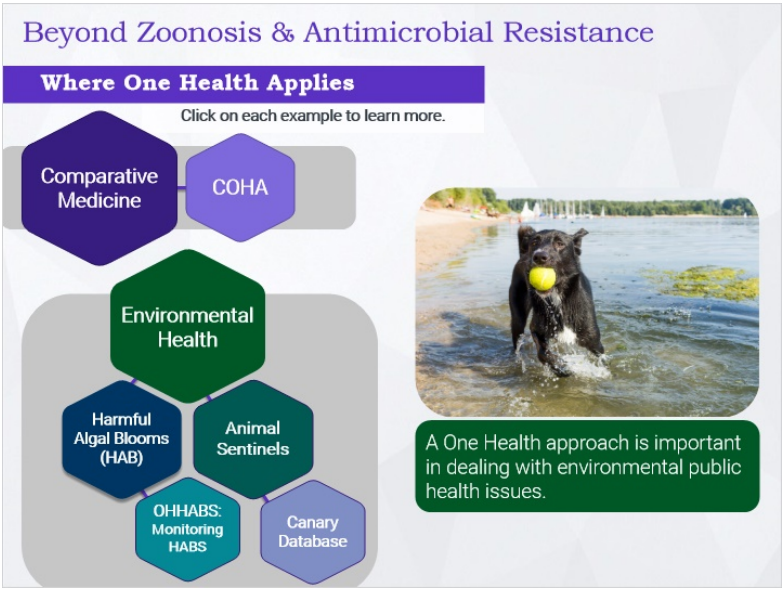
Comparative medicine is the study of disease in humans and animals, looking at similarities and differences between the two. This approach allows us to find ways to better diagnose, prevent and treat disease in all species. From cancer to heart disease to pain control, humans have a lot in common with other animals and studying these commonalities can help improve the health of all species.

COHA:



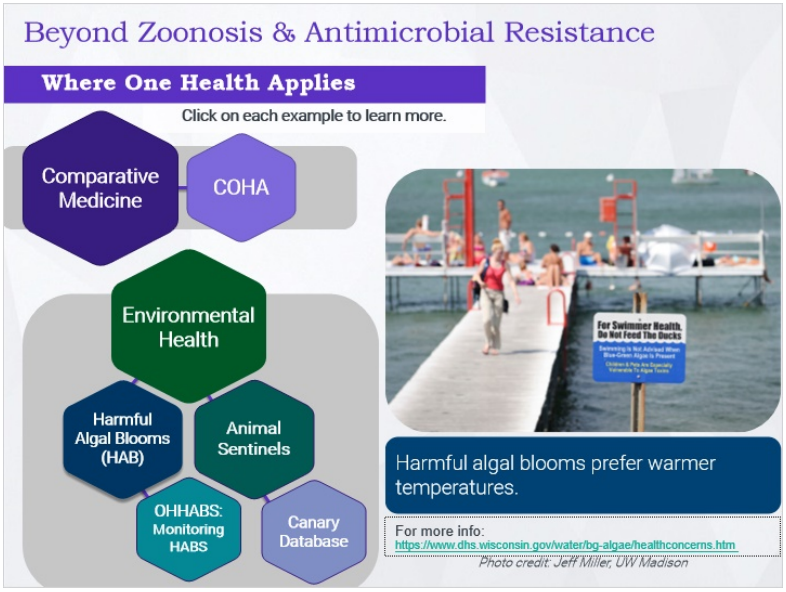
The Clinical One Health Alliance-also known as COHA-is an organization using a One Health approach to study the well-being of humans, animals and the environment. This alliance leverages the expertise of physicians, researchers, veterinarians, and other professionals to find solutions for medical problems.

Environmental Health:



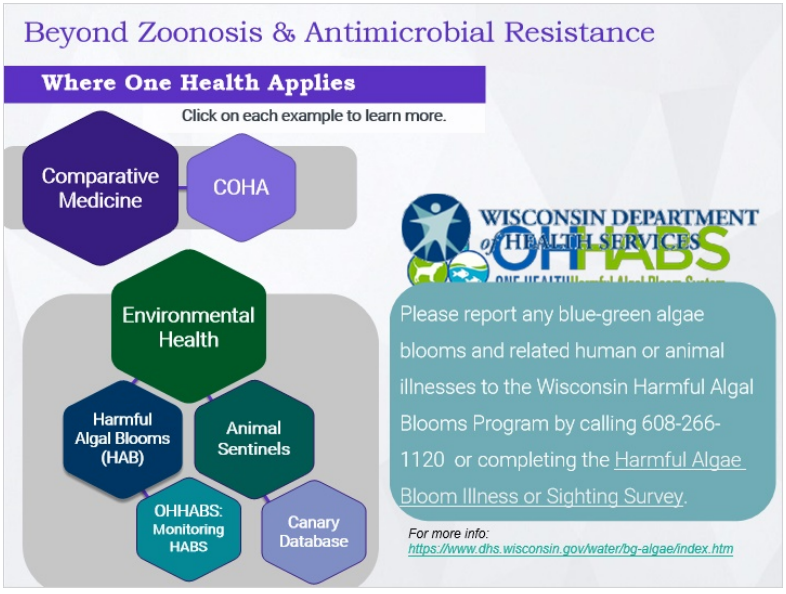
A One Health approach is also important when dealing with common environmental public health issues.

Harmful Algal Blooms (HABs):



Harmful algal blooms can contaminate the environment, drinking water, recreational water, and food. They are an emerging public health issue affecting both humans and animals. Climate change is likely increasing the risk for harmful algal blooms since most of these blooms prefer warmer temperatures.

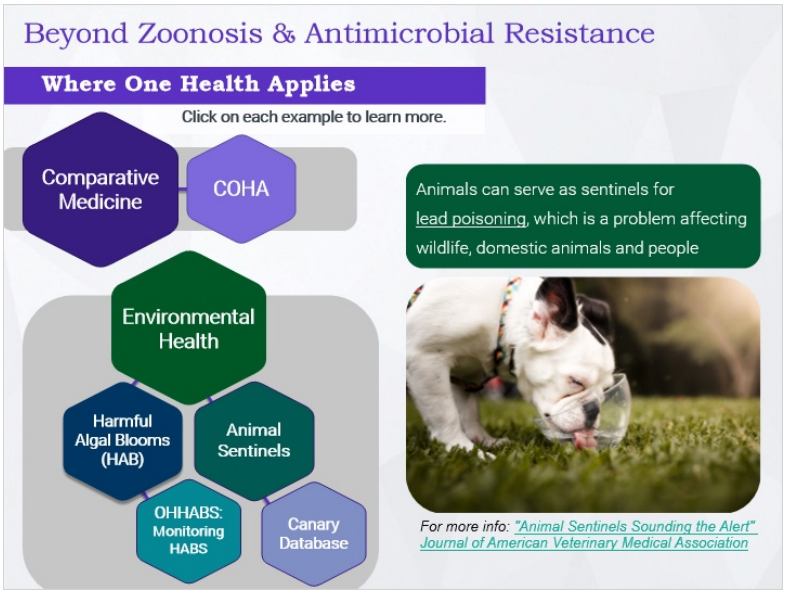
Monitoring HABs:



The One Health Harmful Algal Bloom System is a voluntary reporting system available to state and territorial public health departments and their partners. It collects data on human and animal cases of illnesses from these exposures, as well as related environmental data.

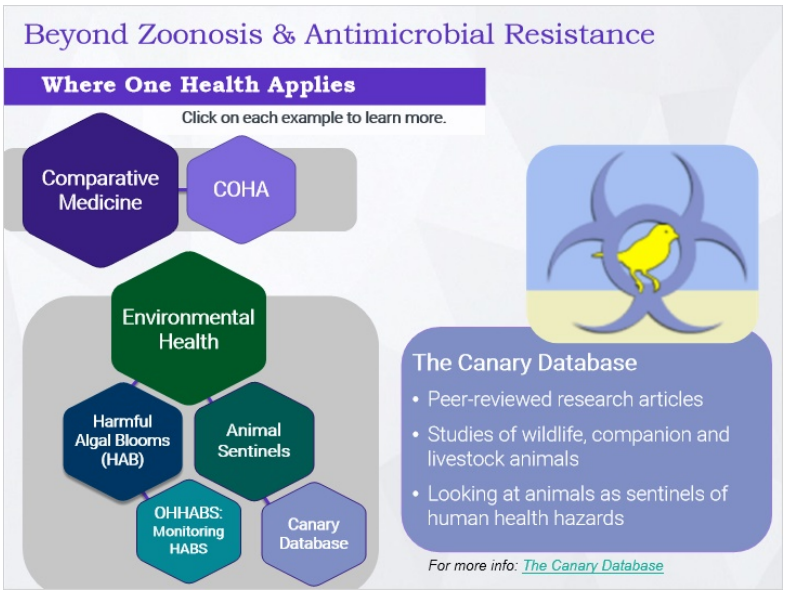
The Wisconsin Division of Public Health also collects information about human and animal illness resulting from exposure to blue-green algae in our lakes and rivers.

Animal Sentinels:



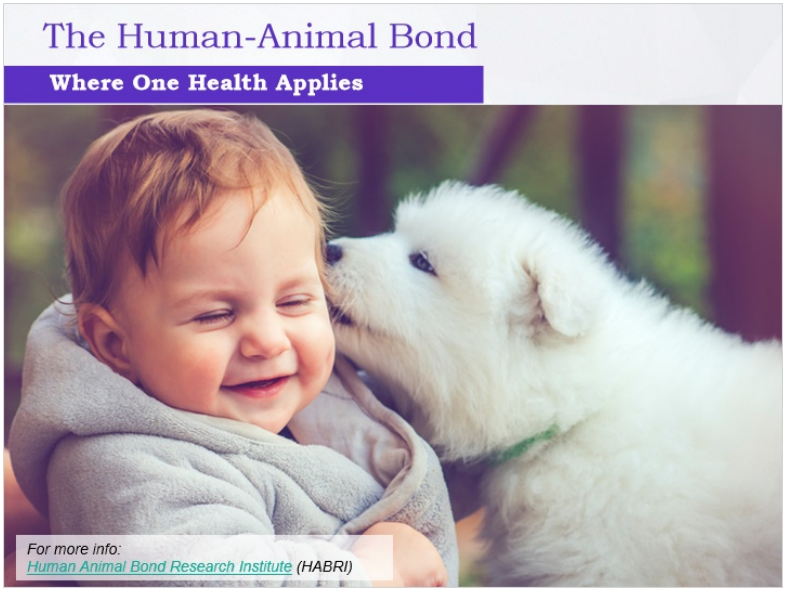
Animals are constantly exploring their environment by roaming, smelling and licking objects, and if they are small, they may be more sensitive than humans to a fixed dose of a toxin or infectious agent. These characteristics contribute to the ability of animals to serve as sentinels for detrimental agents that also affect humans. One example is lead poisoning, which is a problem affecting wildlife, domestic animals and people.

Canary Database



The Canary Database is an online resource providing evidence of animals as sentinels of environmental health threats from both toxic and infectious hazards. This database, from the University of Washington, includes studies of wildlife, companion animals, and livestock in which the exposure or the health effect is potentially relevant to human health.

1.19 The Human-Animal Bond



One Health also considers the importance of the human animal bond. People are happier and healthier in the presence of animals. An emerging body of research is recognizing the impact the human-animal bond can have on individual and community health.

Scientifically-documented benefits of the human-animal bond include improved cardiovascular health through increased physical activity and decreased blood pressure, as well as improved mental health and enhanced feelings of well-being through reduced stress, anxiety and depression.

More specifically, benefits of the human-animal bond have been demonstrated in people with conditions such as autism, PTSD & trauma, as well as Alzheimers and other dementia conditions.

Animals in HealthCare and Animal Assisted Interventions

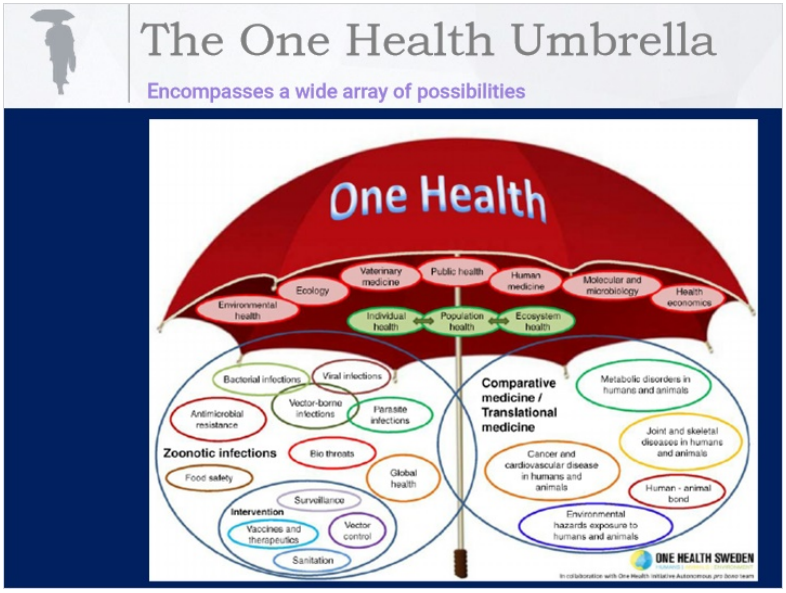
A better understanding of the positive effects animals can have on our psychological and physical health has led to broader use of animals in health care settings and various animal assisted interventions. However, the benefits must be balanced with the risks of zoonoses, injuries (such as bites, scratches, falls or kicks) and allergies, particularly given that most patients in a healthcare setting already have compromised immune systems, which increases their risk of infection.

Animal Abuse & Domestic Abuse

Over the past 35 years, researchers and professionals in a variety of human services and animal welfare disciplines have established significant correlations between animal abuse, and various forms of violence against people. Mistreating animals is often a warning sign that other family members in the household may not be safe.

The National Link Coalition is a collaborative network of individuals and organizations in human services and animal welfare who address the intersections between animal abuse and violence against people through research, public policy, programming and community awareness.

1.20 The One Health Umbrella



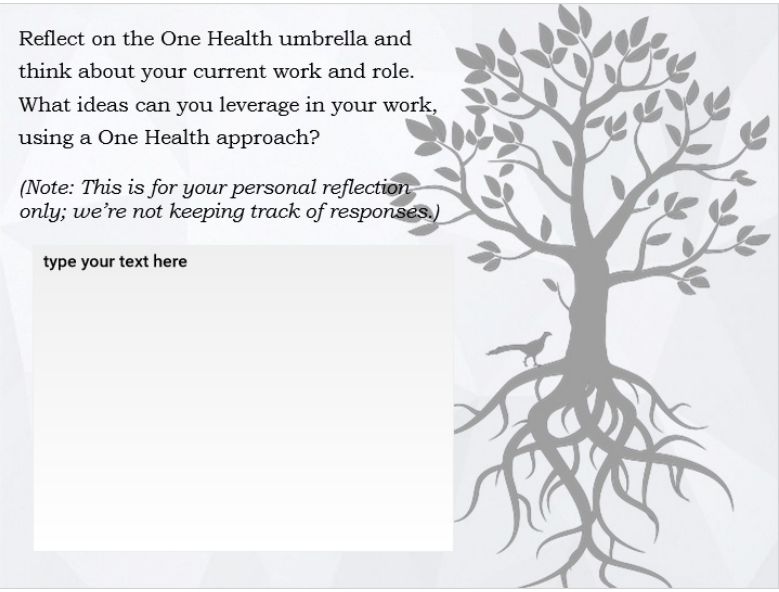
As you can see, One Health encompasses a wide array of possibilities.
The 'One Health Umbrella' developed by 'One Health Sweden' and the 'One Health Initiative', helps to illustrate the scope of the 'One Health concept'.

One of the great things about One Health is that the approach has yet to reach its full potential. Because we have worked in our separate silos for so long, it's possible, and likely, that we do not yet fully comprehend the many ways in which we may connect and mutually benefit each other's work.

Opioid Example:

Consider the current opioid epidemic affecting Wisconsin and the nation. What are ways in which the veterinary medical community can or should be involved in these efforts? Could they inform initiatives around prescribing practices? Does further regulation of pain medication negatively impact how we treat animal pain? What can we learn about pain in animals that might help us treat pain better, and reduce the risk of addiction? Could veterinary medical networks be leveraged to help address the opioid crisis?

1.21 Reflect on the One Health umbrella and think about your current work and role. What ideas can you leverage in your work, using a One Health approach?



(Note: This is for your personal reflection only; we're not keeping track of responses.)

Take a moment to think about innovative ways in which you can leverage One Health in your work. Where might there be connections still left to be made?

1.22 One Health International

Now that you have a better idea of what One Health encompasses, let's look at some key players in One Health - around the world and more locally.

One Health has been adopted with great enthusiasm by several international agencies, in particular those charged with control of zoonoses, most notably the Food and Agriculture Organization, the World Health Organization, and the World Organisation for Animal Health.

The coordinated international response to influenza is often considered the poster child of One Health in action.

Late in 2003 H5N1 highly pathogenic avian influenza spread through Asia, Europe and Africa. The global response led to collaboration between key political actors and five subsequent years of cooperation on the control of avian influenza. The international coordination established under the principles of One Health was activated again during the swine flu pandemic in 2009, and those surveillance systems remain in place today.

1.23 One Health United States

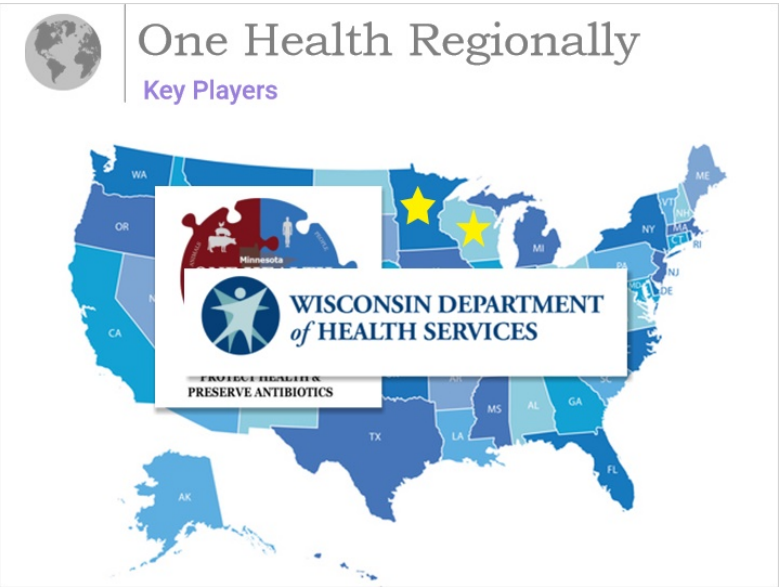
In the U.S., the value of One Health has been recognized by many agencies, including the US Department of Agriculture and the Centers for Disease Control, which hosts the CDC One Health Office.

Most of the movement around One Health is due in large part to the work of the One Health Commission, and the One Health Initiative.

Together with the One Health Platform Foundation, they have coordinated the One Health Day international campaign designed to engage as many individuals as possible from as many arenas as possible in One Health education and awareness events.

The first One Health Day was celebrated on November 3, 2016 with 156 One Health events held in 37 countries and this continues to grow each year.

1.24 One Health Regionally



Now let's look at what's happening regionally with One Health.

In Minnesota the One Health Antibiotic Stewardship Collaborative, with partners from multiple disciplines, is using a One Health approach to think innovatively and responsibly about optimizing antibiotic use within each health field.

In Wisconsin, the Department of Health Services recognizes the value of a One Health approach in combating antimicrobial resistance, and is coordinating efforts around the issue through the creation of an antimicrobial stewardship steering committee, with stakeholders from human and veterinary medicine.

1.25 One Health in Wisconsin

In Dane County, Wisconsin, we have a truly innovative example of One Health. Wisconsin Companion Animal Resources, Education, and Social Services (also known as “WisCARES”) is an outreach partnership at the University of Wisconsin that provides basic veterinary care, housing support and other services to pet owners experiencing homelessness.

It is estimated that over 22,000 people were experiencing homelessness across Wisconsin in 2016. This is both an urban and rural problem. More than half of people experiencing homelessness are located outside of Dane and Milwaukee counties.

There is currently no reliable data on the prevalence of pet ownership among the homeless population. Informal estimates by advocacy organizations range from between 5 and 10%, to as high as 24% of the U.S. homeless population.

For many people experiencing homelessness, pet ownership offers many benefits. These may include:

- physical well-being, such as warmth and protection;
- emotional well-being, through decreased stress and a sense of belonging; and
- motivational well-being, such as avoiding certain harmful behaviors out of a sense of responsibility to their pet.

The strong bond between homeless pet-owners and their animals offers public health practitioners a unique method of accessing a difficult-to-reach population by appealing to the needs of human and pet simultaneously.

WisCARES seeks to improve access to veterinary and human health resources for an at-risk population by leveraging the human-animal bond.

1.26 One Health in Public Health

Many in higher education and workforce development have recognized the value of One Health.

Most notably, the American Public Health Association recently released a policy statement on One Health emphasizing that “systemic and sustained One Health action is warranted to promote public health”.

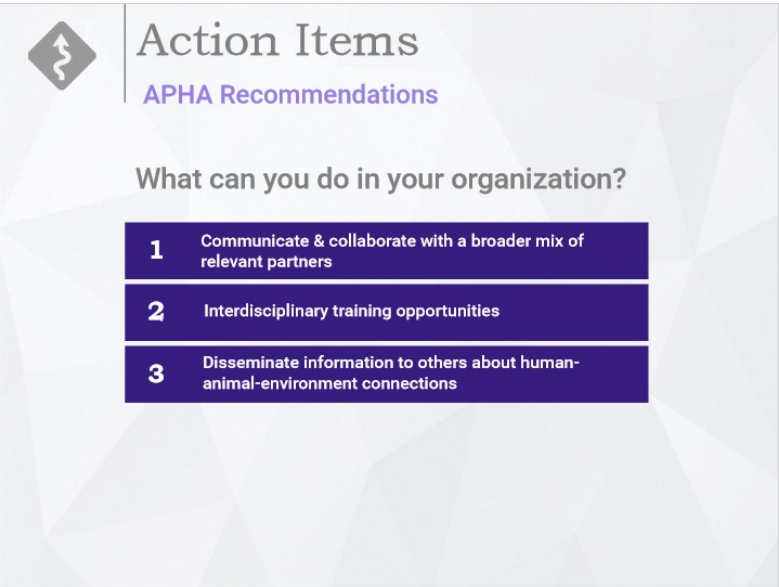
The Council on Education for Public Health states that “human, animal and ecosystem health connections” are foundational public health knowledge and should be incorporated into public health curricula.

1.27 Challenges

As we wrap up, let's briefly consider some of the challenges in implementing One Health. A variety of institutional barriers must be overcome to achieve a One Health operational approach. Most are also barriers to the creation of truly collaborative health systems. And they include:

- A lack of meaningful communication between different disciplines;
- Fragmented authority across agencies;
- Entrenched structures and processes;
- Budgetary constraints,
- And bureaucratic constraints to sharing information across agencies and species.

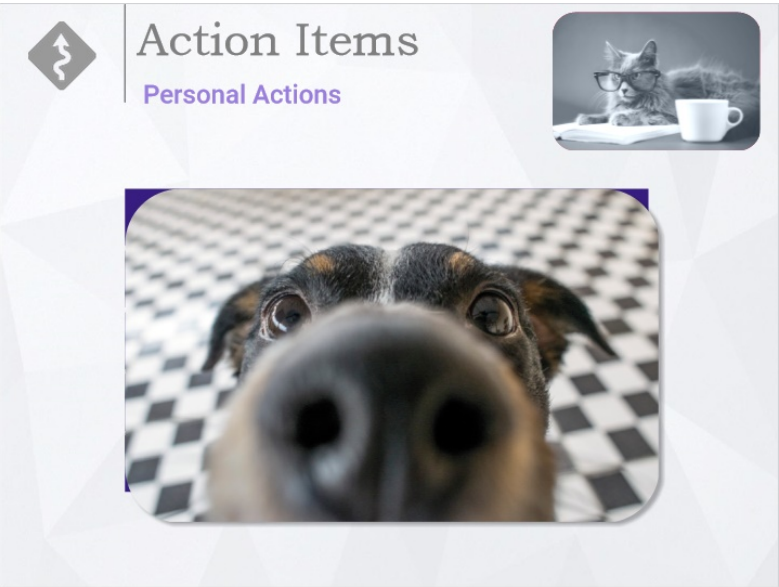
1.28 Action Items - APHA Recommendations



We'd like to take a moment to highlight a few action steps recommended by the American Public Health Association for advancing One Health:

1 Communicate and collaborate with a broader mix of partners in both routine and emergency situations. This can be done through the use of data-sharing systems, routine meetings or working groups.
2 Seek access to interdisciplinary training opportunities with veterinary and environmental health experts.
3 Disseminate information to both public health professionals and the general public about human-animal-environment connections.

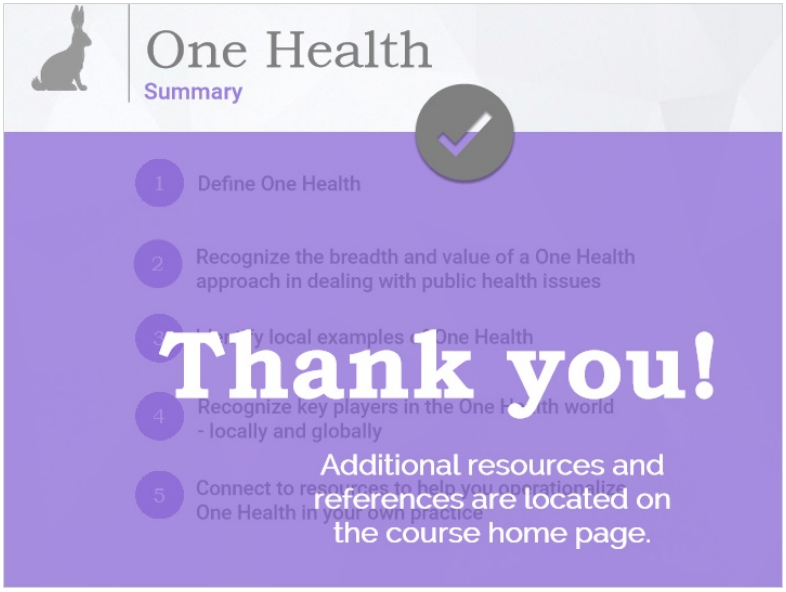
1.29 Personal Actions



You can also take action on an individual level. Here are a few ideas:

1 Explore some of the 'Additional Resources' provided to further your learning around One Health.
2 Even better - talk to colleagues about One Health and find opportunities to learn more together.
3 Advocate for One Health approaches when and where ever relevant.
4 Identify an issue that is important to your community and consider how existing networks to address that issue could be strengthened by using a One Health approach.
5 Plan a One Health Day Event in your community.

1.30 Summary



You have already taken the first step by going through this One Health module.

Thank you for your time. To access additional One Health resources and references, please return to the course home page.