



ONE HEALTH

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ONE HEALTH

Take

Take 3 minutes to think about and legibly write down on separate post-it notes the answers to the following questions:

Define

Define what One Health approach means

Identify

Identify two examples of One Health in practice

Identify

Identify two advantages to multiple disciplines working together to promote One Health

GOAL

- Foster an understanding of One Health principles and concepts and how One Health can be applied to create stronger and more efficient integrated health systems with inputs from multiple stakeholders in addressing global health issues
- Gain an understanding of the interactions of humans, animals and environment in an ecosystem, appreciate the influence of these interactions on health of humans, animals and environment as well as the risks of disrupted ecosystem services on human and animal health and some of the policies governing ecosystem health

CHARACTERISTICS OF WICKED PROBLEMS

Too complex to
fully understand

No simple
technical
“solution”

Actions precipitate
unanticipated and
unintended
consequences

Compelling and
demand action

Require innovative
approaches

SYSTEMS THINKING IS
IMPORTANT

- In deciphering the complexity of public health issues
- Identifying multifaceted problems
- In applying this understanding to design and evaluate interventions
- Generate solutions
- Way forward for operating more effectively and successfully in complex real world settings

ASIAN VULTURE CRISIS

<https://www.youtube.com/watch?v=3hMMrTw62lw>

<https://www.youtube.com/watch?v=59OldukZQZY>

RAPID RESEARCH TOPICS

- Will these efforts be sufficient to preserve the vultures? Why/why not?
- What other concerns are there which remain unaddressed or insufficiently addressed?
- Why have vulture populations continued to decline at 30-70% per year?
- What challenges/ international implications does the use of NSAIDS in livestock present in India? In Africa? Globally?

PART A

- What value do vultures bring to the subcontinental ecosystems?
- Besides a virus, what could be killing vultures?
- What other steps should the teams take to discern the cause of the vultures' decline?

PART B

- What are the challenges to reducing the vultures' exposure to diclofenac?
- What strategies should be used to keep vulture populations at ecologically functional levels in the subcontinent?
- What are some possible solutions to the crisis?

CASE STORY

- By 2007 ,India had lost 97% of its vultures
- Dead and dying vultures- collapsed from trees
- India, Pakistan, Nepal and Now Europe
- Their absence has affected many sectors, including human health, the fertilizer production industry, water provision, and waste management.
- Losing vultures has cost India an estimated 34 billion dollars in damages ((RSBP) 2013).
- Contaminated by residual pharmacologic agent given to livestock
- Diclofenac-NSAID-highly effective, low cost
- Widely used in humans- pain /arthritis and animals

THEMES

- Use of Diclofenac: NSAID: What is the pharmacology, use, mechanism of action of this drug and other NSAID and effects/long and short term
- Elimination of the vulture and consequences
- Obligate scavengers
- Cultural and religious implications: Vultures culturally respected in India-Hinduism- to the level of a god, Parsee religion- disposition of dead bodies
- Keystone species: Provides a valuable ecosystem service- consuming dead animals: The estimated 100 million plus vultures living in India in the 1990s consumed approximately 20 million tons of carrion each year ((SAVE) 2016
- Carcass clean up of bones for fertilizer use
- Stakeholders: governments, conservation groups, drug companies, religious groups, fertilizer companies
- Scientific evidence to affect conservation efforts and policy implications

THEMES CONTINUED

- The potential impacts: water and sanitation concerns, dog bites, and increased rat populations.
- Vultures are not affected by anthrax due to their specialized digestive systems, and their speedy consumption of carcasses reduces the opportunity for anthrax bacteria to sporulate and contaminate the environment (Pain et al. 2003).
- Feral dog and rat populations increased, begun taking over carcass dumps in the absence of vultures . Increased numbers of feral dogs and rats represented potential problems in rabies and bubonic plague control. These human health risks amplified the importance of India's vultures to the human ecosystem, in addition to their role in the larger ecosystem.
- In 2014, the World Health Organization reported that 36% of all rabies cases globally occurred in India alone, or 18-20,000 deaths from rabies
- Political and legal changes, as well as effective enforcement of any new laws.
- August 2006, manufacture of diclofenac for veterinary use was formally banned by the Drug Controller General of India
- Compliance-still available for human use

EXAMPLES OF ID THREATS OF ONE HEALTH SIGNIFICANCE

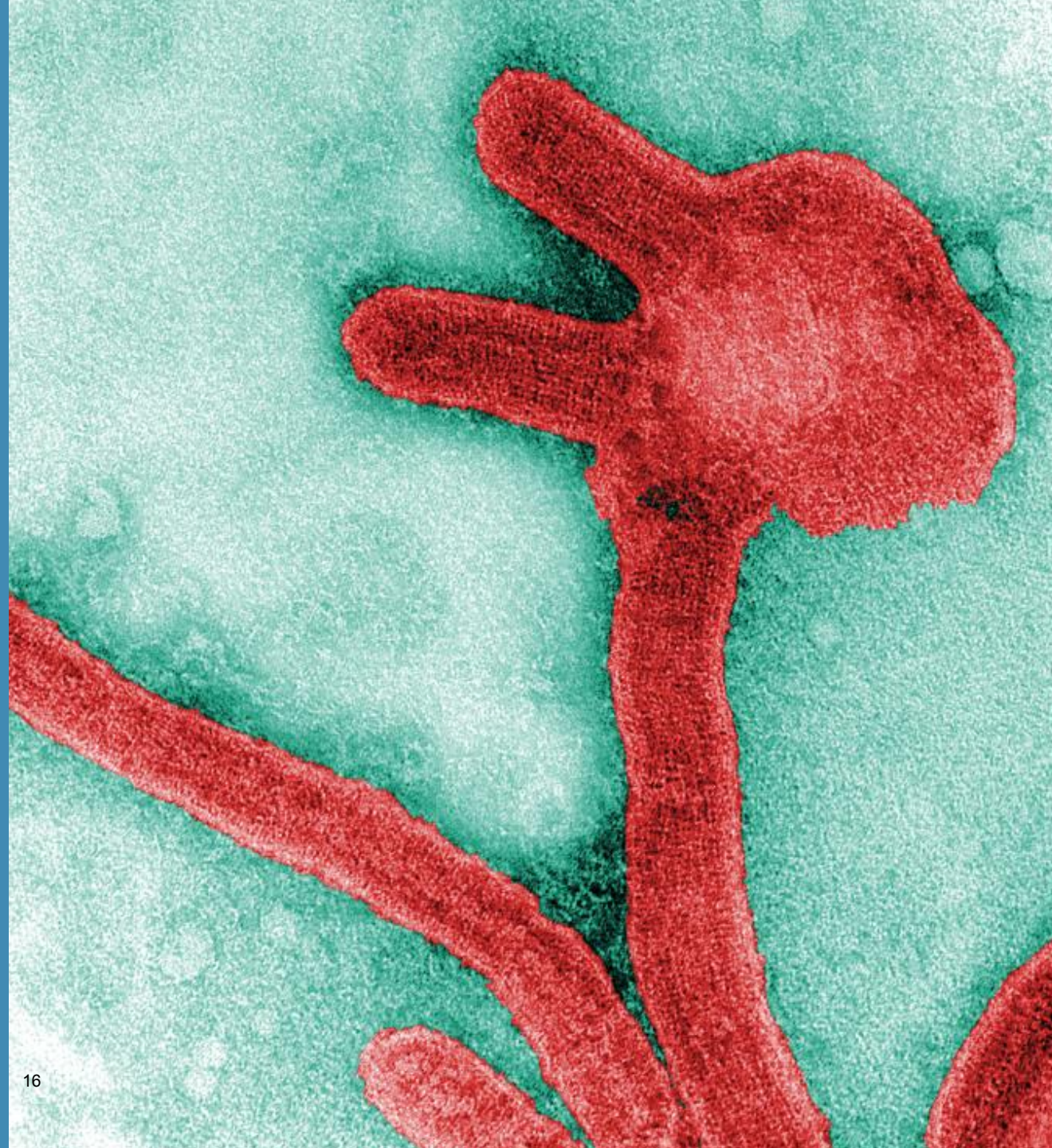
PLAGUE IN MADAGASCAR



SALMONELLA
INFECTIONS
LINKED WITH
MARADOL PAPAYAS
HIT 23 STATES



MARBURG VIRUS IN UGANDA



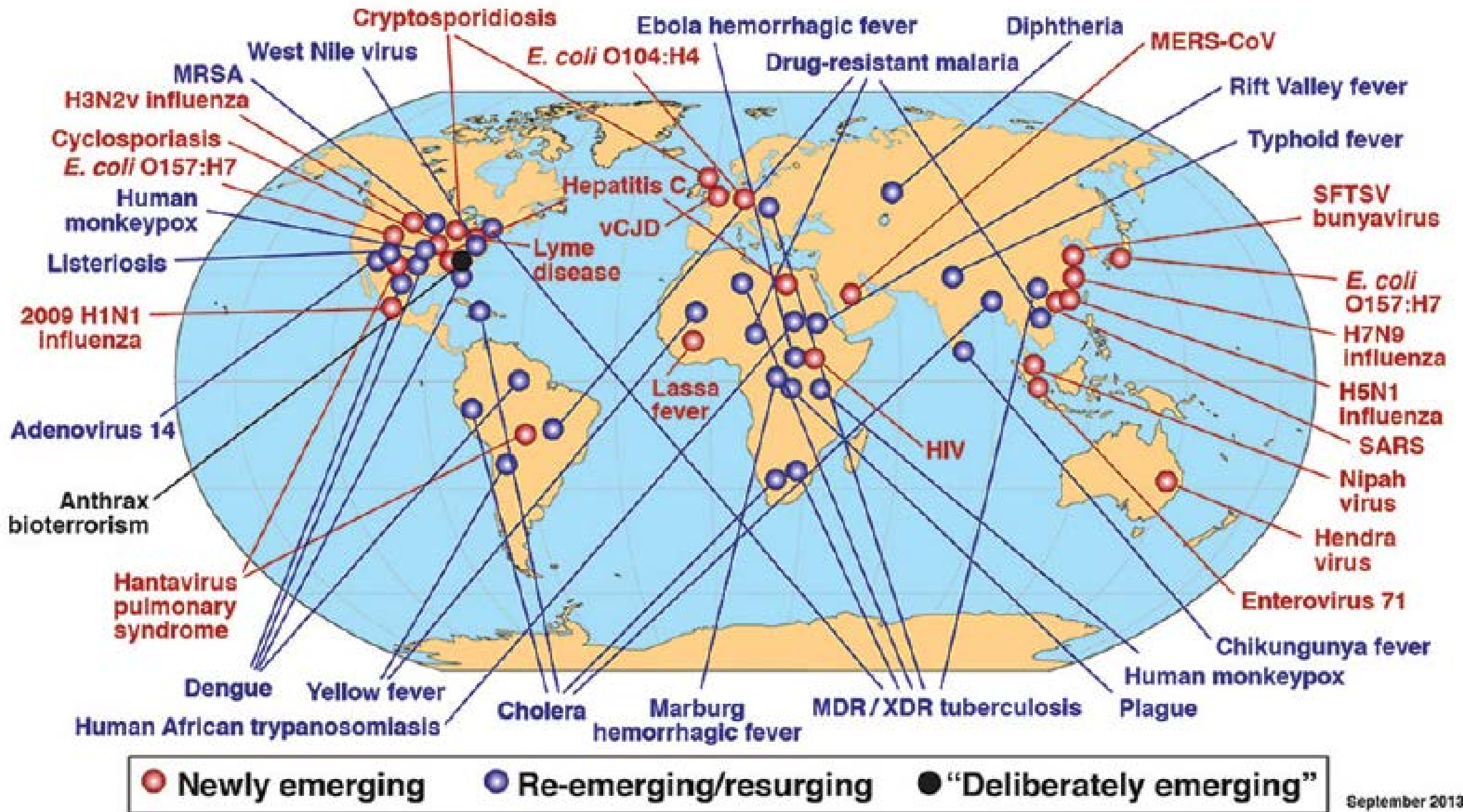
MONKEY
POX IN
NIGERIA

AVIAN
INFLUENZA
RETURNED TO
CHINA

H7N9 avian flu investigation. CDC/ Shuqing Zhao, China



Courtesy of [CDC/ Shuqing Zhao, China](#).
Image is in the public domain.

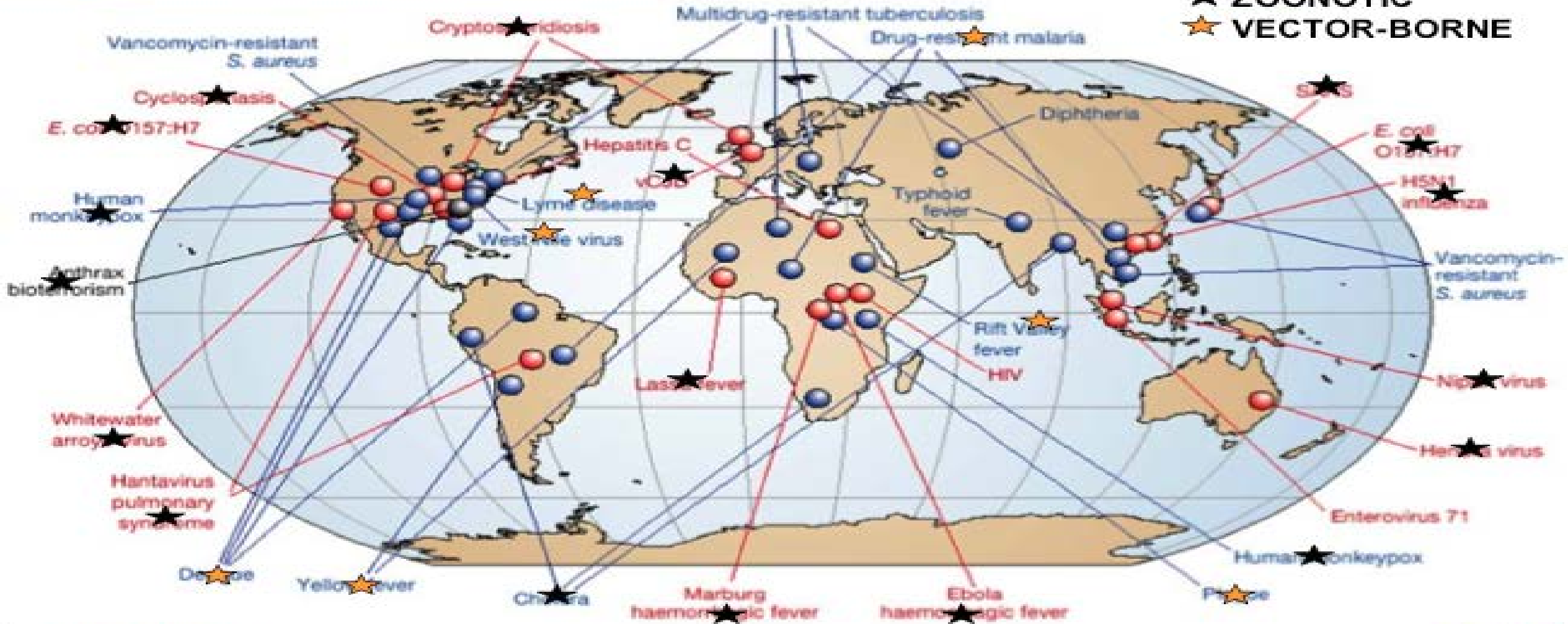


September 2013

Global Emerging Diseases*



★ ZONOTIC
 ★ VECTOR-BORNE



EMERGING
 RE-EMERGING

Courtesy of [NASA](http://NASA.gov). Image is in the public domain.



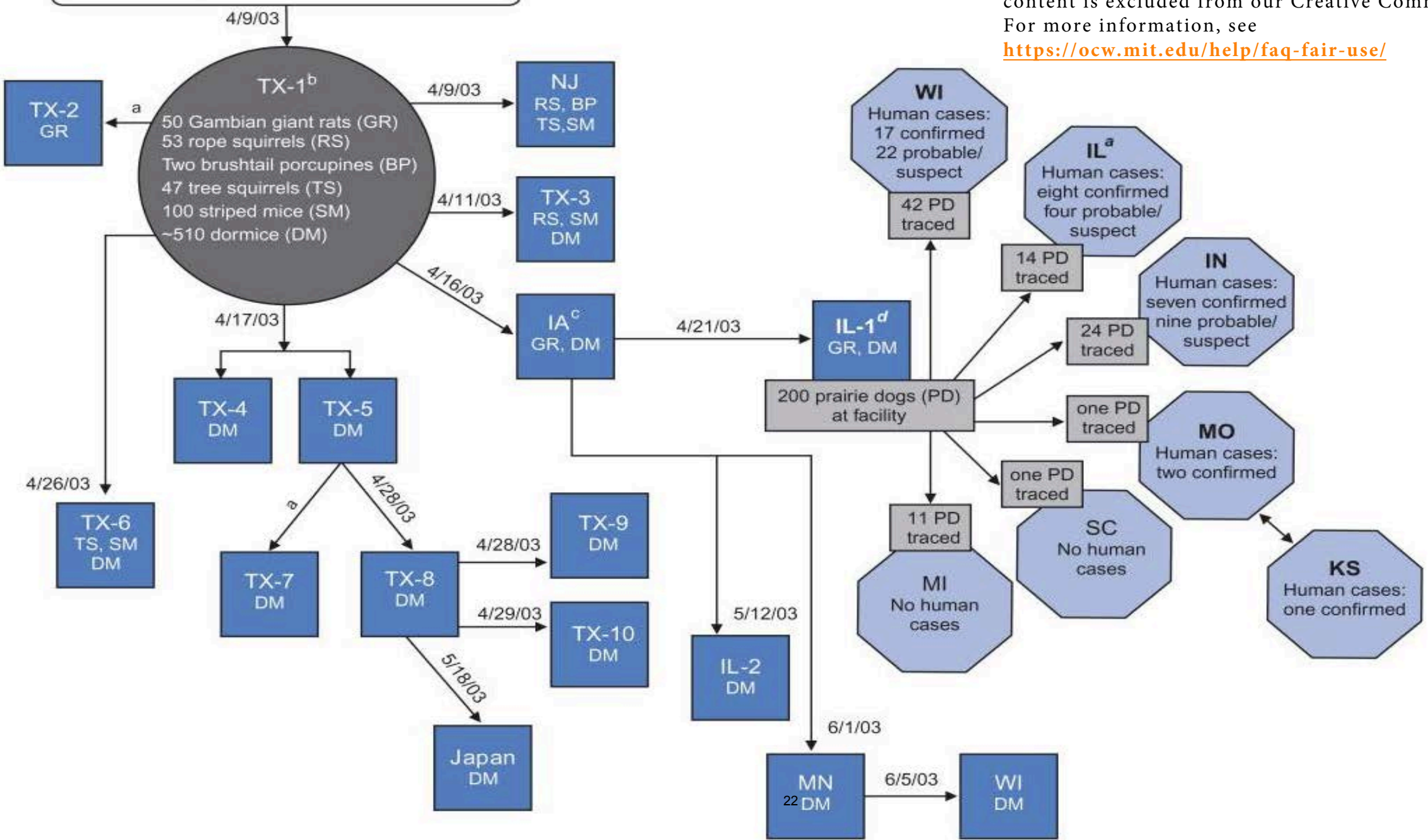
MONKEY POX OUTBREAK IN THE US IN 2003

<https://www.youtube.com/watch?v=6Ui3gs56p2I>



Rodent shipment from Accra, Ghana

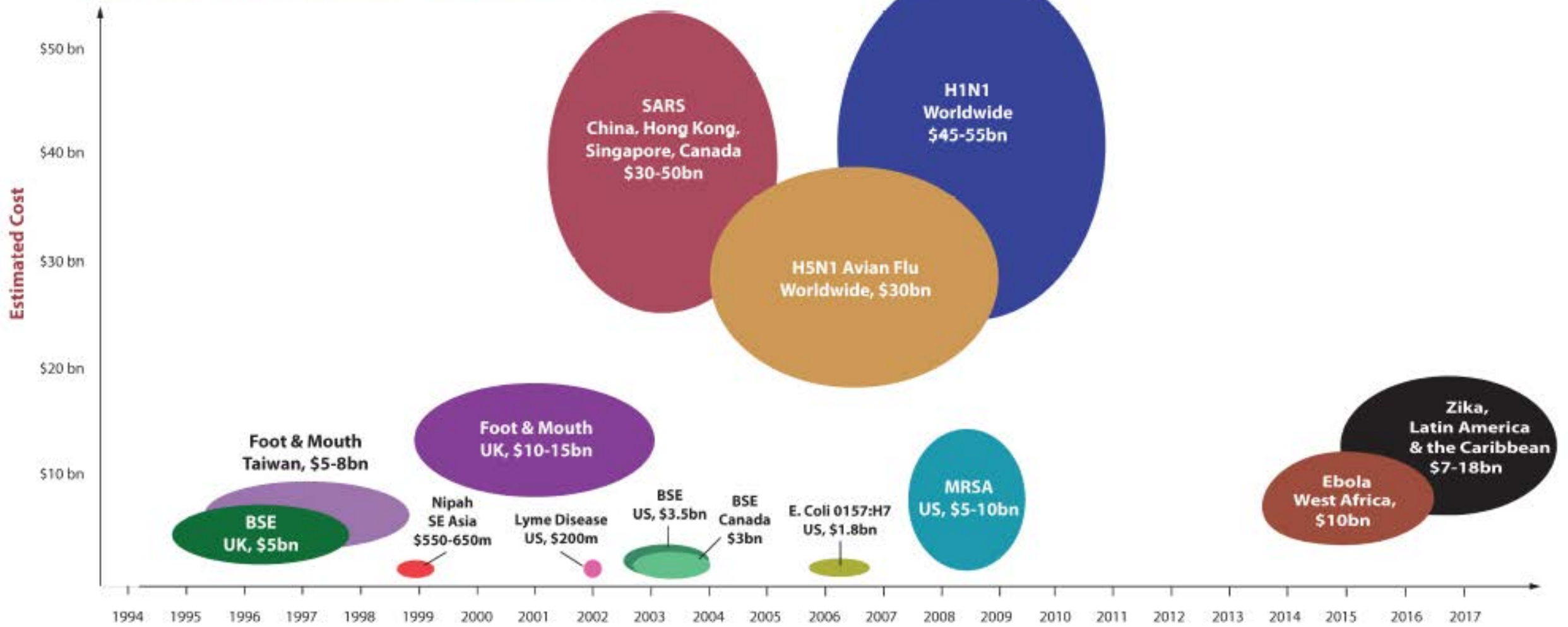
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CATS IN BORNEO

<https://www.youtube.com/watch?v=I7BP9n6gIF0>

Economic Impact of Selected Infectious Disease Outbreaks



Figures are estimates and are presented as relative size. Based upon bio-era, World Bank, and UNDP data. Chart updated by EcoHealth Alliance.

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ONE HEALTH

Collaborative effort of multiple disciplines working locally, nationally and globally to attain optimal health for humans, animals and the environment

AVMA One Health Initiative Task Force
2008

One Health approach has been advocated as the global framework for strengthening collaboration and capacities of the sectors and actors involved in health service delivery.



ONE HEALTH

- An interdisciplinary strategy to address health from an integrated perspective rather than a discipline-based fragmented perspective
- Is not a discipline, it's an approach

ONE HEALTH IN ACTION

<https://www.youtube.com/watch?v=TG0pduAYESA>

WHY DO WE NEED AN INTEGRATED
APPROACH?

EMERGING
INFECTIOUS
DISEASES: MAJOR
GLOBAL THREAT

Jones, et al
Global
trends in
emerging
infectious
diseases

On the rise – 335 (1940-2004)

60.3% are zoonotic

- 71.8% from wildlife

Wolfe et al.
Origins of
major
human
infectious
diseases

New evidence on origins of human
malaria

EMERGING DISEASES NOT JUST HUMANS....

- Avian Influenza H5N1
 - 475 humans : how many birds ?
- BSE & Chronic Wasting Disease
- Tuberculosis in wildlife reservoirs
- Chytridiomycosis in amphibians
- Morbillivirus in marine mammals
- White-Nose Syndrome in bats

SHRINKING HABITATS



Macaques and transmission of malaria
in Indonesia



Courtesy of [David Burdick/NOAA](#). Image is in the public domain.

POLLUTION

LOSS OF BIODIVERSITY

CLIMATE CHANGE



GLOBALIZATION AND TRAVEL

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GLOBAL TRADE OF WILDLIFE

Tiger: Courtesy of [Dave Pape](#) at English Wikipedia. Used with permission.

Ape: Courtesy of [deepphoto](#) on Flickr. Used under CC BY.

Turtle: Courtesy of [mentalblock](#) on Flickr. Used under CC BY-NC-SA.



BIO-TERRORISM
AS PART OF THE
THREAT

HUMAN BEHAVIOR

"Human behavior flows from three main sources: desire, emotion, and knowledge."

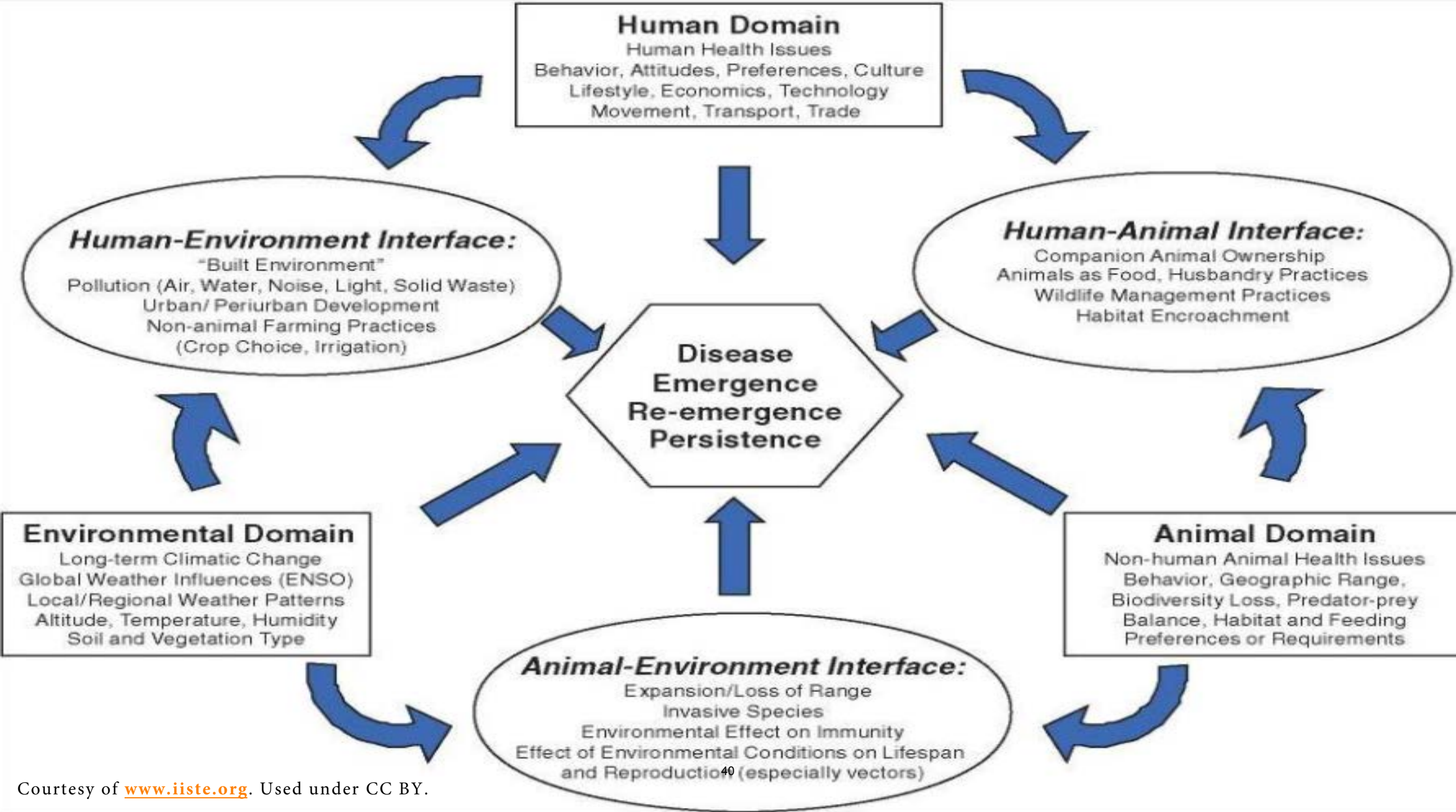
- Plato

Sexually transmitted diseases increased three fold when minimum age for teenagers having sex dropped

The development of complacent attitudes and lack of basic knowledge about risks have led to re-emergence of Syphilis in the UK

Sharing of blood contaminated needles by drug users has led to spread of hepatitis B and C

Increased popularity of body piercings and tattoos provides an opportunity for the spread of blood borne viruses



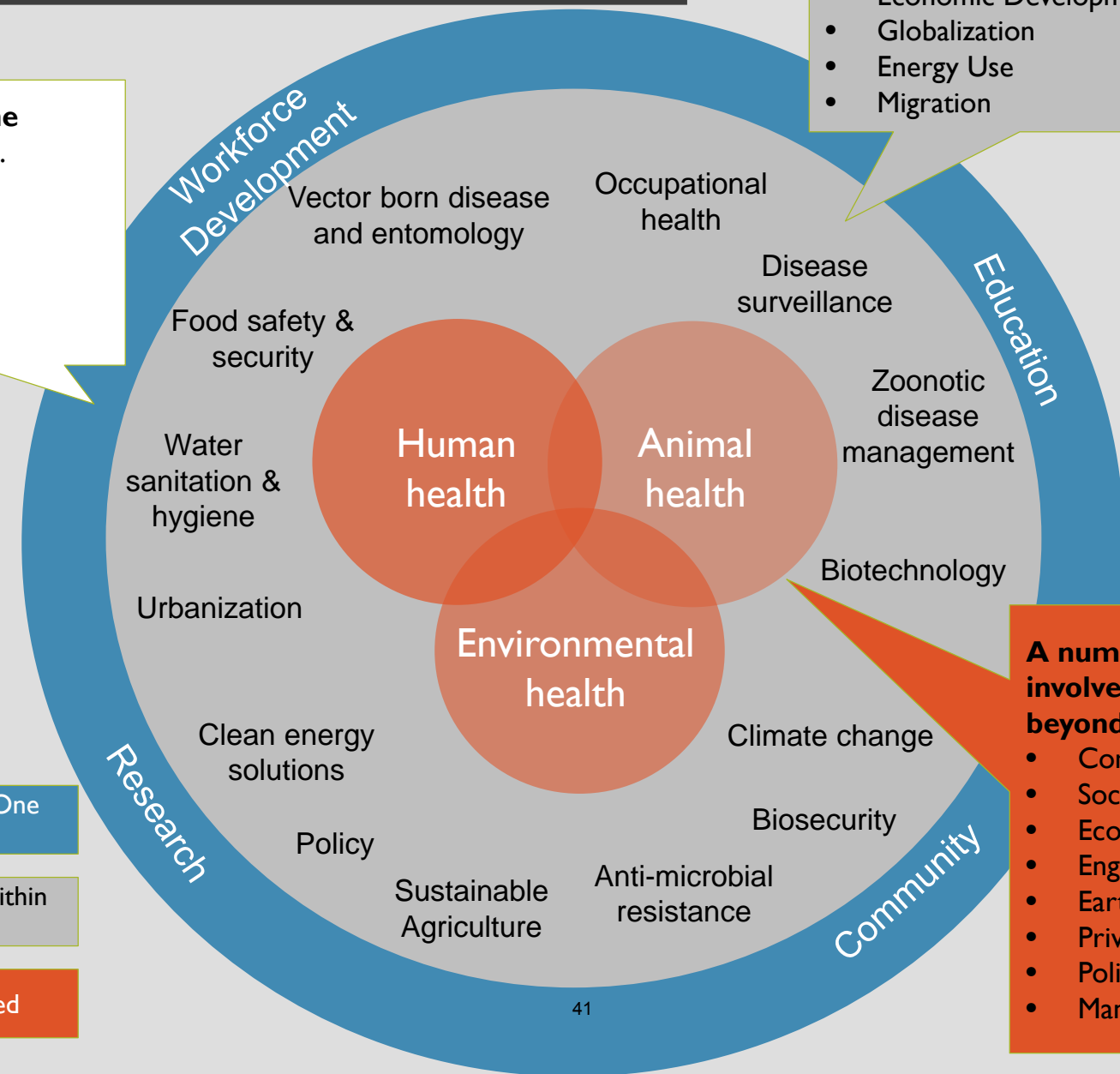
ANIMAL HEALTH, HUMAN HEALTH, AND ENVIRONMENTAL HEALTH ARE AT THE CORE OF ONE HEALTH

Influences of One Health include...

- Culture
- Economics
- Policy
- Behavior
- Education

Drivers of One Health include...

- Land Use
- Economic Development
- Globalization
- Energy Use
- Migration



A number of fields are involved within and beyond health...

- Comparative medicine
- Social science
- Ecology
- Engineering
- Earth science
- Private sector
- Politics
- Many more...

How we enter One Health

Areas of focus within One health

Who is involved

SCOPE OF ONE HEALTH

Combating existing and emerging diseases and zoonosis, biomedical research and clinical medicine, conservation medicine, diagnosis ,surveillance, control , response and recovery directed at natural and or intentional threats that are chemical , toxicological or radiological in nature, ethics, entomology food safety and security, global food and water systems, global trade and commerce, health of the environment and environmental conservation, implications of climate change, infectious disease ecology and integrated systems for disease detection, land use production systems and practice, mental and occupational health, public health , awareness and communication, support of biodiversity, wildlife promotion and conservation

REDEFINING HEALTH
THROUGH
TRANSDISCIPLINARY
COLLABORATION

Social

Cultural

Environmental

Physical

Characteristics of human animal and environmental health

THANK YOU!



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EC.715 / 11.474 D-Lab: Water, Sanitation, and Hygiene
Fall 2019

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