



Department of
BioTechnology,
Government
of India



ONE HEALTH

Collaboration for a resilient health of all



“Establishment of a consortium for One Health to address Zoonotic and Transboundary Diseases in India including the Northeast region”

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Centre for One Health

College of Veterinary Science

Guru Angad Dev Veterinary & Animal Sciences University Ludhiana, Punjab

Preface

In the recent times, many novel public health emergencies have emerged due to changing dynamics of human, animal and environment interactions. The spill over of infectious agents from wildlife, their rapid spread around the globe due to increased travel, and trade, changing food habits cause the devastating impacts on the health of animals, human and environment that would require years of social and economic recovery.

At the dawn of 21st century, India has witnessed the emergence of Crimean-Congo haemorrhagic fever (CCHF), Kyasanur forest disease (KFD), 2009-H1N1 pandemic, Nipah, Avian Influenza including the COVID-19 pandemic and rising antimicrobial resistance have shown that an imbalance in ecosystem can lead to the human, animal and environment health emergencies.

These emerging issues cannot be solved alone by any single discipline, it demands the collaborative efforts from human, animal, environment, wildlife sectors, and policy makers. One Health approach is the only solution to tackle these budding problems of antimicrobial resistance, zoonoses, emerging novel environmental pathogens, and food safety. The concept of One Health is now well acknowledged in India. Various leading organization/institutes in India have stepped forward for the implementation of a legal framework, coordination among government and private agencies for animal disease surveillance, transparent data-sharing between veterinary and human health sectors.

Recently, the Department of Biotechnology (DBT), Ministry of Science and Technology, Govt has taken initiative for a mega consortium on 'One Health' to bring the expertise from wide sectors under one roof to achieve health for all. The aim is to survey important zoonotic bacterial, viral and parasitic infections as well as transboundary pathogens prevalent in India. The One health consortium comprised of 29 consortium partners including medical, veterinary and wildlife institutes.

Considering the crucial role of One Health, the "Centre for One Health", GADVASU, Ludhiana in collaboration with National Institute of Biotechnology (NIAB), Hyderabad has drafted this booklet which presents an insight to the historical perspective of One Health and discusses some of the important One Health issues such as Zoonoses, Food Safety, Antimicrobial resistance, and Environment Hygiene. This booklet also briefs about the top ten important zoonotic diseases in purview of One Health significance in India.

I congratulate the authors for taking this initiative to pen down the important aspect of One Health issues in India. I hope that this booklet would reach to the maximum readers to make them understand that the health of all living beings and environment are interlinked and can be preserved through collaborative efforts of all.

Dr. Inderjeet Singh
Vice-Chancellor, GADVASU



One Health is a concept that acknowledges an inter-link between the well-being of Human, Animal and Environment in a shared habitat.

When we protect **One**,
we help protect **All**

Physician

Veterinarian



Epidemiologists

Environmentalist

ONE HEALTH concept encourages a multi-disciplinary & cross-sectoral participation to address the potential risks that originate at the animal-human-environment interface.

In recent times, the outbreaks of Nipah, Ebola, Severe Acute Respiratory Syndrome (SARS), Middle East Respiratory Syndrome (MERS), Avian Influenza, COVID-19, Antimicrobial Resistance and Climate Change have armoured the need for One Health approach for meticulously understanding the interdependence between the environment, animals, and human health for better global health outcomes.

Need for One Health Concept

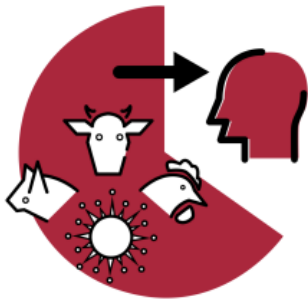
The concept of One Health is gaining momentum due to rapidly changing interactions of humans with animals, plants, and environment. The fast growing urbanization, deforestation and intensive farming have dynamically changed the environmental conditions providing unique pathways for the rapid spread of infectious agents.

- ❖ The expansion of human population into new geographic areas has increased the proximity of humans with wildlife
- ❖ Increasing closeness between animals and their environments provides more opportunities for infectious pathogens to spill between animals and people
- ❖ More than 1.7 million microbes circulating in wildlife species, and many of them are capable of infecting animals and humans
- ❖ If zoonotic agents are not timely detected, world would face a threat of many more pandemics in near future
- ❖ The inter-collaborative efforts from various discipline is the only key to prevent global health emergencies in future
 - Human rabies can be prevented if controlled in dogs
 - Knowledge of influenza strains circulating in animals is crucial for developing vaccines against human influenza viruses
 - Coordination between human, animal and agriculture sector can prevent the spread of drug-resistant microbes between animals and humans through food and environment



Domains of ONE HEALTH

One Health provides a useful framework to examine complex subjects such as global sustainability, food safety, food security, antimicrobial resistance and emergence of disease outbreaks



World Health

- 60% of infectious human pathogens originate from animals
- 75% of emerging pathogens are of animal origin
- 80% of bioterrorism pathogens originates in animals



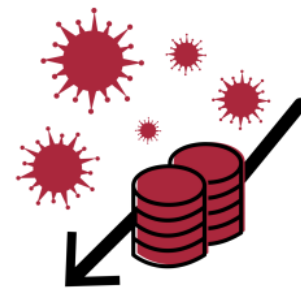
Food Security

- 811 million people sleep hungry each night
- By 2050, there will be >70% additional demand of animal protein to feed world
- Animal diseases cause >20% loss in animal production globally



Environment

- More spillage of diseases from wildlife when > 25% of an original forest cover is lost
- Human activities have altered 75% of terrestrial and 66% of marine environment



Economy

- Animal diseases cause a direct threat to rural economy that depend on livestock production
- Animal diseases risk >75% of the billion people who depend on subsistence farming and raising livestock to survive

Origin and Historical Insight of One Health



19th century AD

Animal domestication & emergence of diseases

- Cattle: Measles, Brucellosis
- Goats & sheep: Q fever
- Rabbits : Tularemia

Sanitation in Ancient Rome



Tuberculosis from humans to their livestock

- *M. tuberculosis* existed in human 40K years ago
- Animal lineage emerged 20K-30K years ago from *M. tuberculosis*

Variolation



Lady Mary Wortley Montagu



ca. 460 BCE-370 BCE

Hippocrates

- Linked human health with the environment health
- He believed that bad air caused malaria

Smallpox Immunity from Cowpox



Dr John Fever (1738-1824)



Bubonic Plagues (14th Century)

- Caused by *Yersinia pestis*, spread by fleas, carried by rats

Mass burial of Plague Victims from western Civilization

Smallpox Vaccination



Dr Edward Jenner (1749-1823)

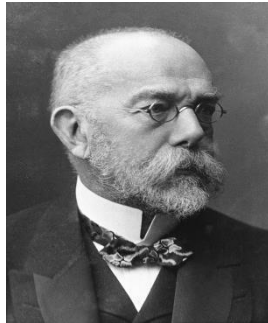
Stepping Stone for One Health

Theory of Immunity (1880)
Developed rabies vaccine



Dr Louis Pasteur
(1822-1895)

Germ Theory of Disease
Established Koch postulates



Dr Robert Koch
(1843-1910)

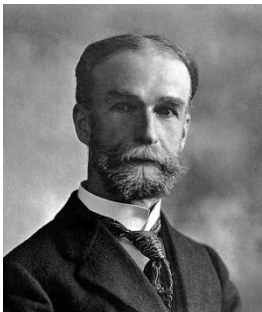
Coined the term zoonoses
Meat inspection for food safety



Dr Rudolf Virchow
(1821-1902)

Arthropod-borne Diseases (1893)

Cattle tick transmitting *Babesia bigemina*
that causes cattle fever



Dr Theobald Smith
(1859-1914)



Dr Frederick
Kilbourne

Aedes mosquito in transmitting
Yellow fever disease

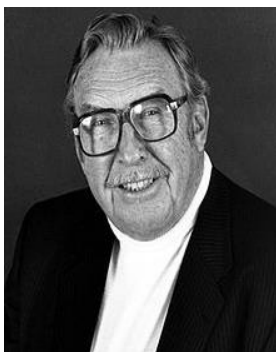


Dr Carlos Finlay
(1833-1915)



Maj. Walter Reed
(1851-1902)

Pioneers of One Health



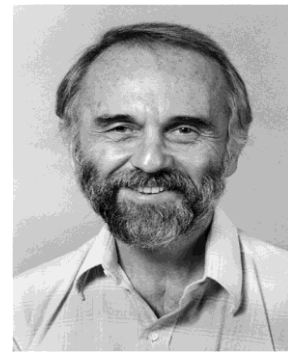
Dr James H. Steele
(1913-2013)

Father of "Veterinary Public Health"
Early advocate of **One Health**
The first chief veterinary officer of
the US Public Health Services in 1950



Dr Martin Kaplan
(1915-2004)

In 1949, joined WHO as chief of Veterinary Public Health
Developed **new rabies vaccines** for humans and animals



Dr Calvin W. Schwabe
(1927-2006)

Coined term "One Medicine"
Wrote textbook, "**Veterinary
Medicine and Human Health**"

Global One Health Initiatives

“One Health” In the 21st Century

- Aims to ensure the biotic integrity of the earth for future generations through interdisciplinary and cross-sectoral efforts for disease prevention, surveillance, monitoring, control and mitigation as well as for environmental conservation

One Health Commission

- In June, 2006, **American Veterinary Medical Association (AVMA)** initiated One Health concept for collaboration and cooperation among health professionals
- In June, 2009, AVMA task force presented recommendation for formation of the One Health Commission. **American Medical Association (AMA)** joined AVMA to form the One Health Commission



1350

Plague Kills 50 million in Europe



2200 BC

Mesopotamian laws of Eshnunna described rabies & **preventive measures for owners bitten by a rabid dog**



1885

Louis Pasteur produced **rabies vaccine**



1976

spillover viruses: Ebola, AIDS, Hendra, Nipah, SARS, MERS



1918

Spanish flu kills 50 million



1930s



Vector borne diseases identified: West Nile, Zika, Lyme etc.



Wildlife Conservation Society (WCS)

- Introduced the term “**One World, One Health**” in a meeting held in September 2004 hosted by Rockefeller University, New York
- Developed 12 recommendation, “**Manhattan Principles**”

Manhattan Principles

1. Recognize the link between human, domestic animal and wildlife health
2. Recognize that decisions regarding land and water use have real implications for health
3. Include wildlife health science as an essential component of global disease prevention, surveillance, monitoring, control and mitigation
4. Recognize that human health programs can greatly contribute to conservation efforts
5. Devise adaptive, holistic and forward-looking approaches to the prevention, surveillance, monitoring, control and mitigation of emerging and resurging diseases
6. Seek opportunities to fully integrate biodiversity conservation perspectives and human needs when developing solutions to infectious disease threats
7. Reduce the demand for and better regulate the international live wildlife and bush meat trade
8. Restrict the mass culling of free-ranging wildlife species for disease control to situations where wildlife poses a significant threat to human health, food security, or wildlife health
9. Increase investment in the global human and animal health infrastructure commensurate with the serious nature of emerging and resurging disease threats
10. Form collaborative relationships among governments, local people, and private & public sectors
11. Provide adequate resources and support for global wildlife health surveillance networks
12. Invest in educating and raising awareness among the people and in influencing the policy makers

Working together is a key to One Health

Definition: One Health is a collaborative, multi-sectoral, and trans-disciplinary approach working at the local, regional, national, and global levels with the goal of achieving optimal health outcomes recognizing the interconnection between people, animals, plants, and their shared environment (www.cdc.gov/onehealth)

One Health involves everyone



The blueprint of '**One Health**' was cropped out from the tripartite-plus alliance between the Food and Agriculture Organization of the United Nations (FAO), the World Organisation for Animal Health (OIE)

Joint Tripartite (FAO, OIE, WHO) and UNEP support OHHLEP's definition of "One Health"

One Health is an integrated, unifying approach that aims to sustainably balance and optimize the health of people, animals and ecosystems

FAO: The Food and Agriculture Organization

OIE/ WOA: The World Organisation for Animal Health

WHO: World Health Organization

UNEP: the United Nations Environment Programme

OHHLEP: One Health High Level Expert Panel

Why **ONE HEALTH** is Important

The human population is increasing day by day, and so is the hunt for new land, and food continues. Consequently this has dramatically changed the interactions of human with animals and his environment creating a conflict between them for habitat and resources.

Factors Contributing to the Easy and Quick Spread of Diseases



Changing climate



Increasing population and proximity



More global travel & trade



Animals are more than just food

Source: www.cdc.gov/onehealth

A **One Health** approach looks at all the aspects of human, animals, plant, & environment to tackle the shared health risks at their interface

The scientific and technological advancements have reduced the topographic distance between the people, changed ecosystem and increased the risk for the emergence of potential zoonotic infections that outspreads more quickly over a wide geographical area.



More than half of the infections that people can get are zoonotic which spread from animals to people

Important ONE HEALTH Approaches



Zoonotic diseases



Occupational health



Antibiotic resistance



Food safety & security



ONE WORLD, ONE HEALTH



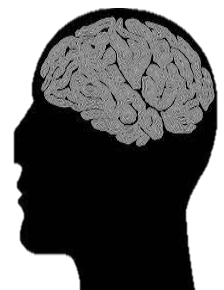
Environmental health



Vector borne disease



Chronic diseases

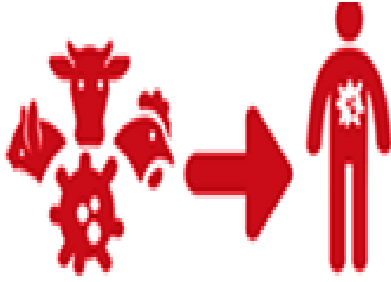


Mental health

--- And more! 10

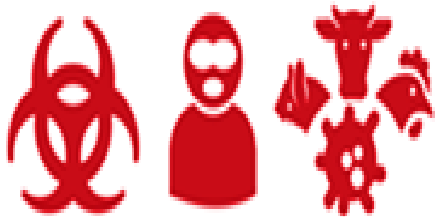
Why **ZOONOSES** is a **ONE HEALTH** Problem?

60% of existing human infectious diseases are zoonotic



At least **75%** of emerging human infectious diseases have an animal origin

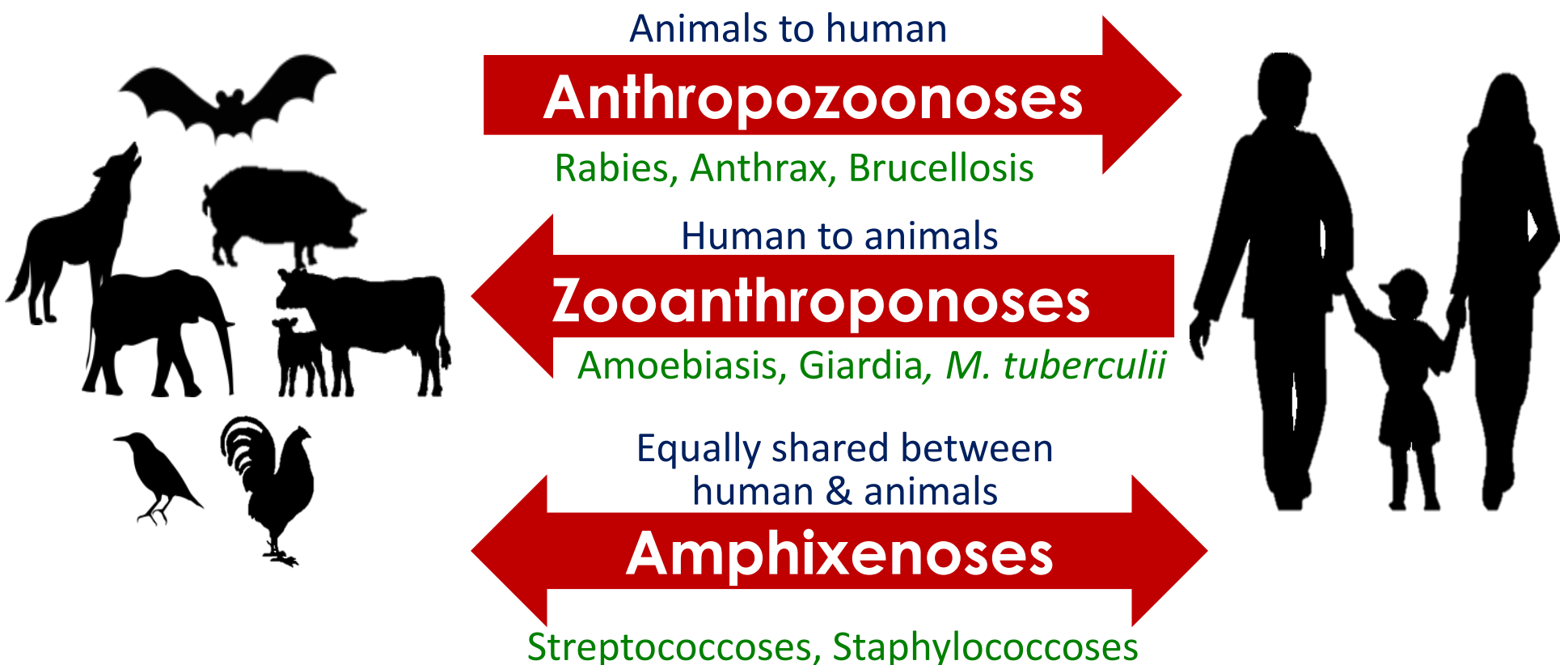
3 out of 5 human diseases emerging every year are zoonotic in nature



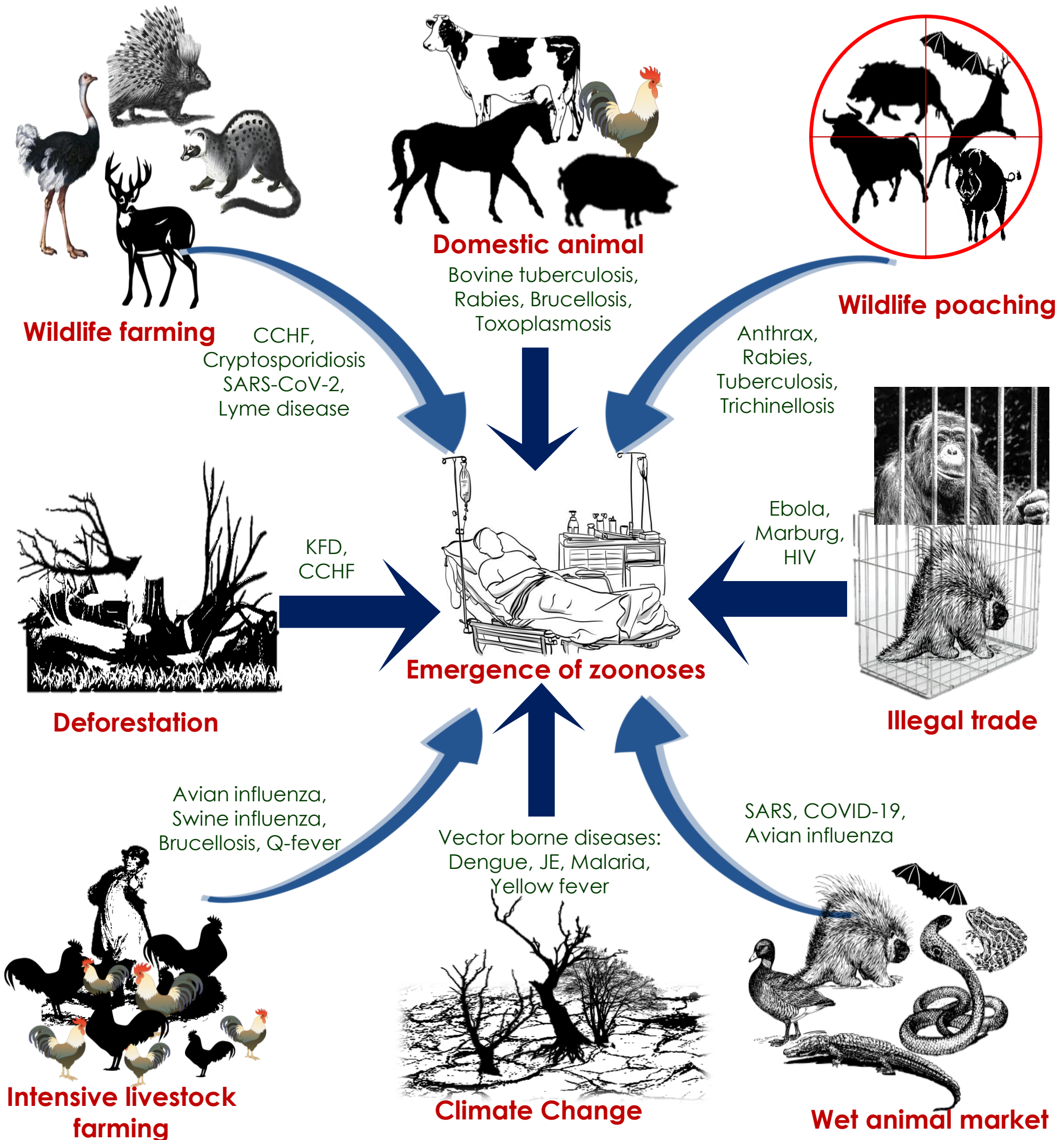
80% of infectious agents with potential bioterrorist use are zoonotic pathogens

ZOONOSES is a disease(s) transmissible from **vertebrate animals to humans**

TO PREVENT EMERGENCE OF DISEASE IN HUMAN, IT IS IMPORTANT TO CONTROL DISEASE IN ANIMALS

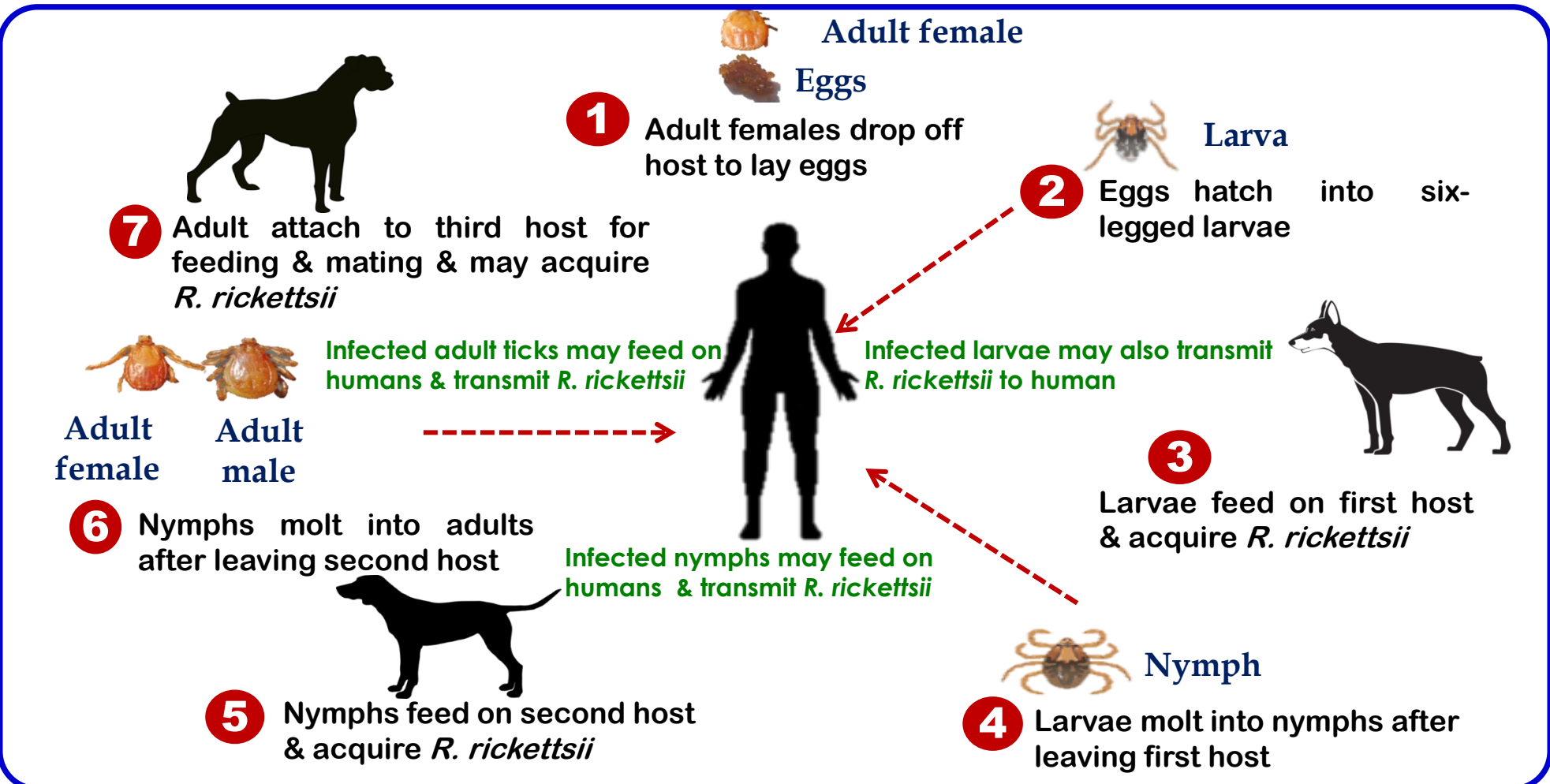


Factors contributing to emergence of ZOOONOSES

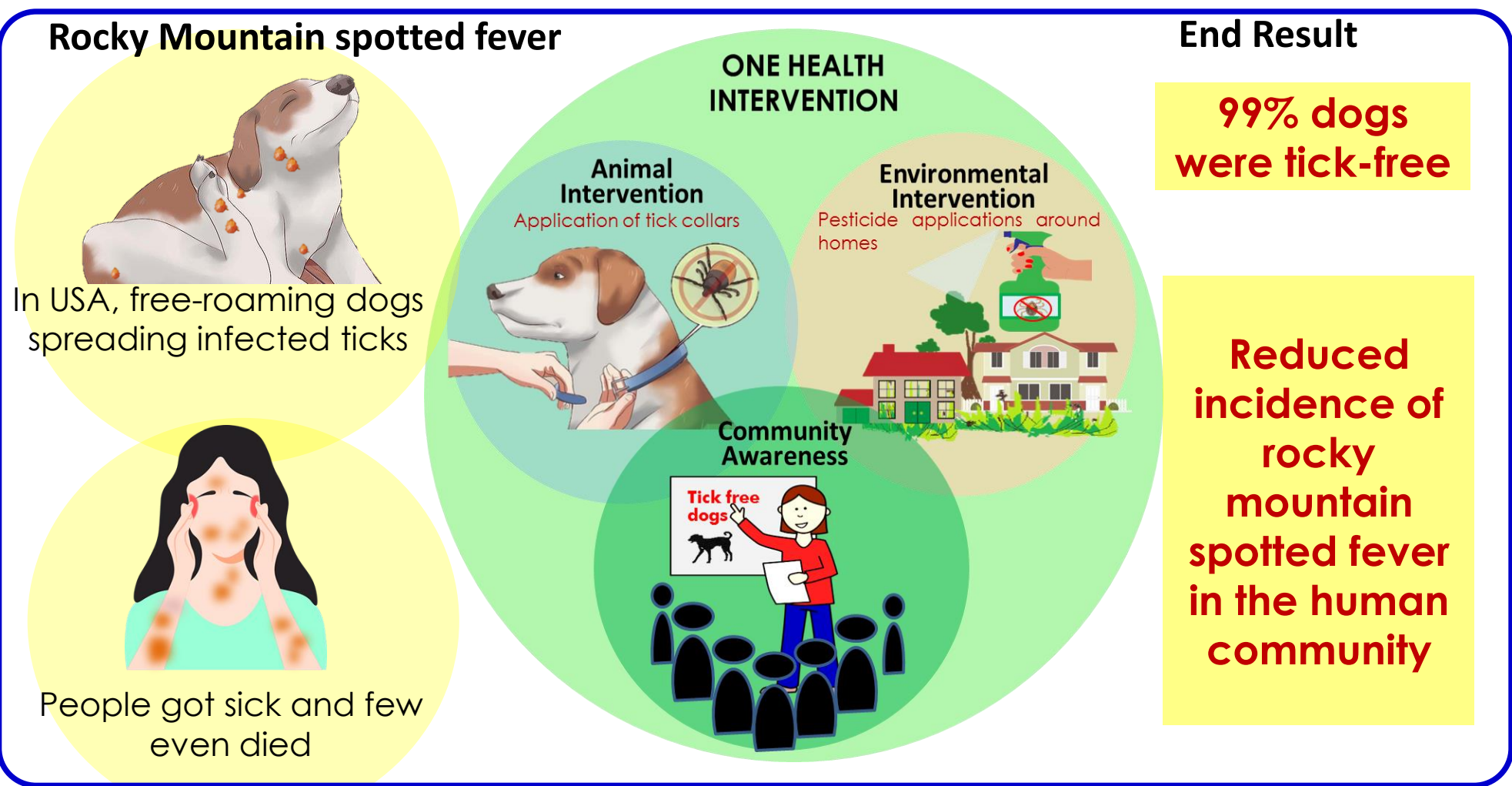


A Success Story of ONE HEALTH approach in controlling ZOOZOSES

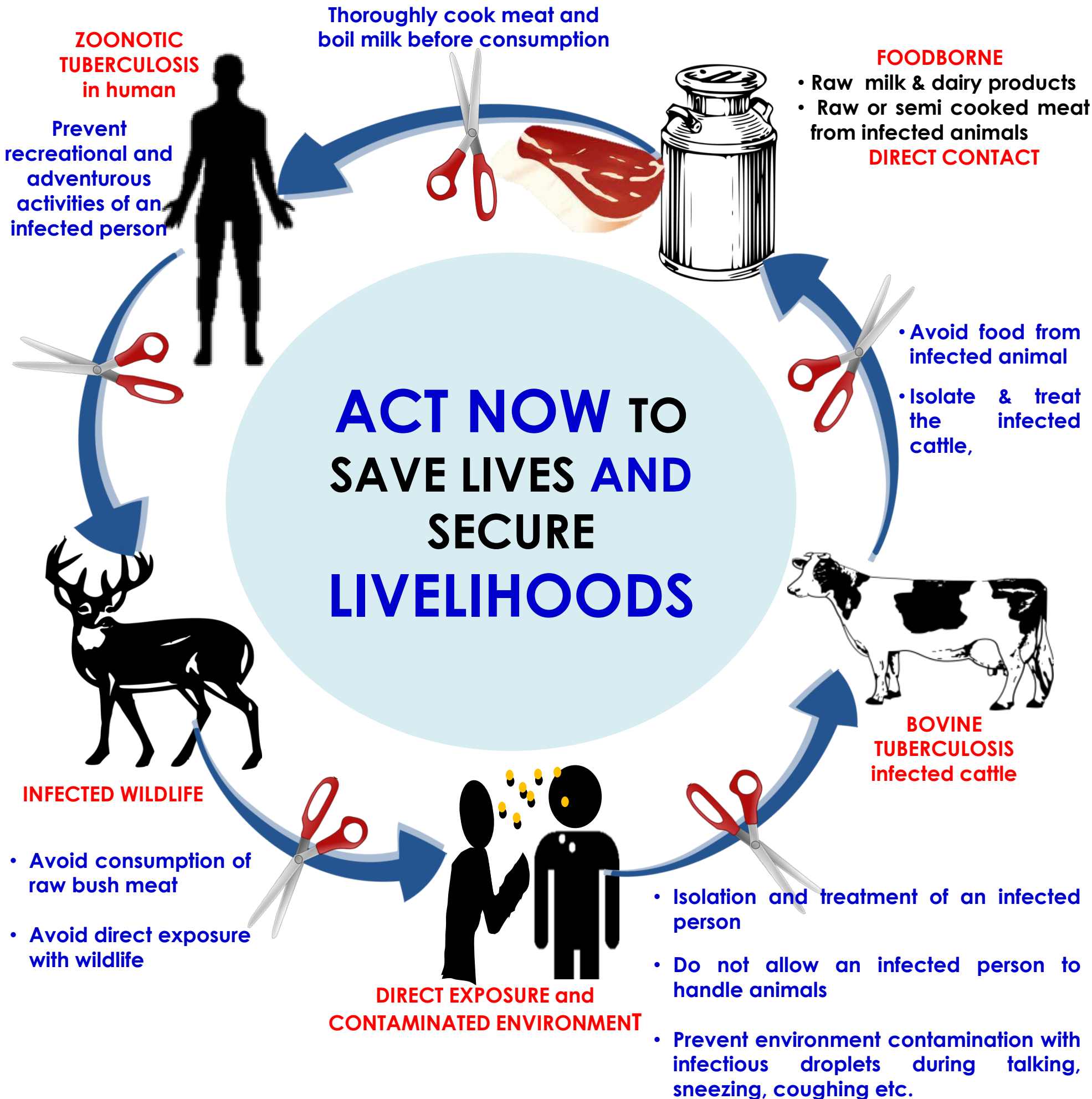
Life Cycle of *Rhipicephalus sanguineus* & Transmission of *Rickettsia rickettsii*



One Health Approach for Controlling Rocky Mountain Spotted Fever



OHE HEALTH approach to break the transmission chain of Zoonotic Bovine Tuberculosis



Ten Priority Endemic Diseases in India of Economic and One Health Importance

1. BRUCELLOSIS: an endemic diseases of zoonotic and economic importance

IN LIVESTOCK:

- ❖ A median loss of **US \$ 3.4 billion**

IN HUMAN

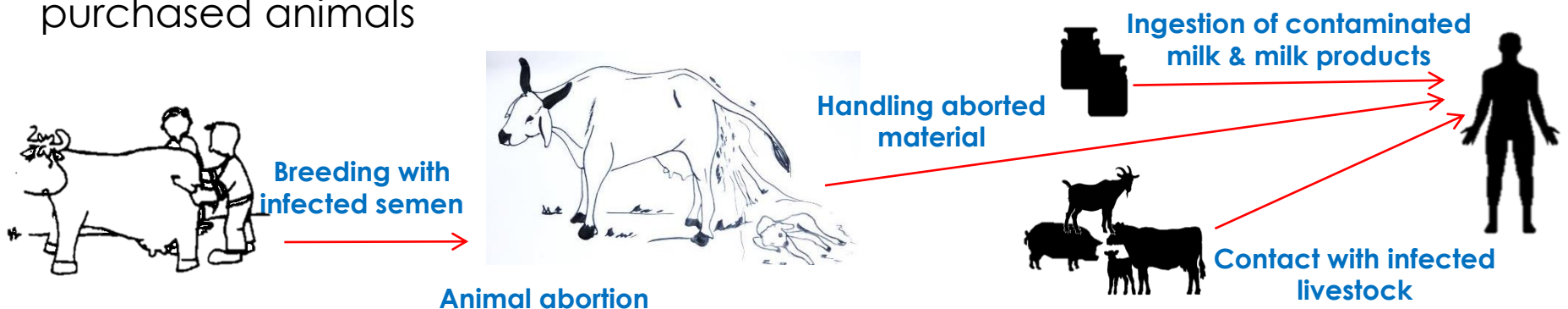
- ❖ Median losses of **Rs 627.5 million**

Singh et al, 2015

PREVENTION & CONTROL

- ❖ Calf-hood vaccination in female
- ❖ Isolation of infected animals
- ❖ Do not breed infected animals
- ❖ Proper disposal of infected afterbirth
- ❖ Quarantine & testing of newly purchased animals

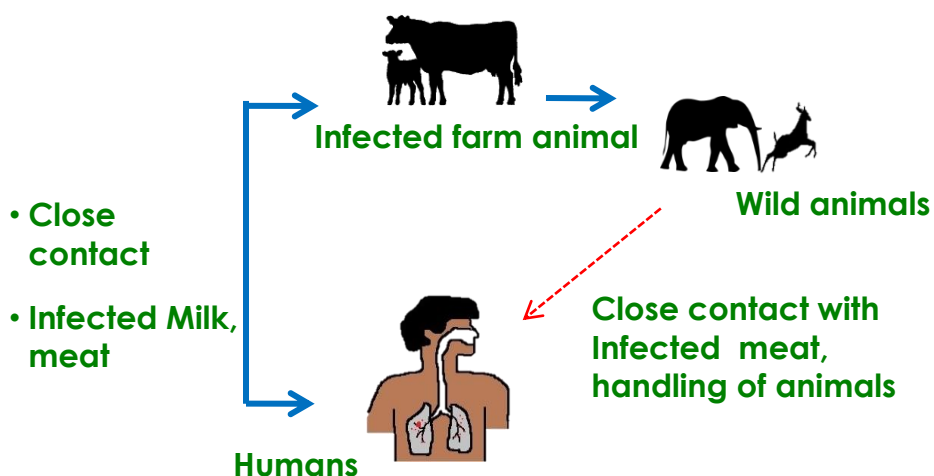
- ❖ Use of PPE (gown, mask, gloves)
- ❖ Avoid consumption of raw milk and milk products
- ❖ Follow hand hygiene practices



2. TUBERCULOSIS: a neglected and underreported zoonoses

IN LIVESTOCK

- ❖ **21.8 million** infected (1.6 to 51.2%) cattle in India *Srinivasan et al 2018*



IN HUMANS

- ❖ ~10% of total human TB cases in developing countries are due to *M. bovis* *OIE: Bovine Tuberculosis*
- ❖ In 2019, *M. bovis* caused 1.43 lac new human TB cases and 12.3 K deaths globally *WHO: Global Tuberculosis Report 2019*
Tulu et al 2021
- ❖ Poorly treated patients can develop **drug resistance**

PREVENTION & CONTROL

- ❖ Test & segregation of the suspected animal(s)
- ❖ Testing of animal before purchase
- ❖ Sanitization of animal farm
- ❖ Prevent animal grazing at infected sites

- ❖ Use proper PPE (wear lab coat, mask, gloves, goggles) while handling infected animals.
- ❖ Do not consume raw milk and milk products

Ten Priority Endemic Diseases in India of Economic and One Health Importance

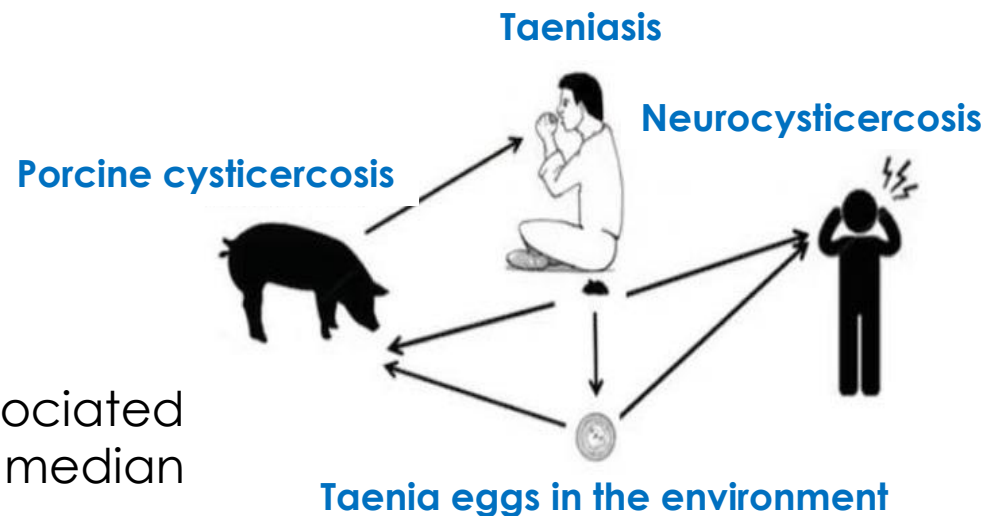
3. CYSTICERCOSIS: a 'biological marker' for social and economic development of the community

IN PIGS

- ❖ Huge economic loss on account of
 - Reduced meat sales
 - Condemnation of infected meat and edible organs

IN HUMAN

- ❖ In 2011, neurocysticercosis associated active epilepsy caused an annual median loss of **Rs. 12.03 billion** *Singh et al, 2017*



PREVENTION & CONTROL

- ❖ Anthelmintics in pigs and humans
- ❖ Restrain free roaming of pigs in endemic regions
- ❖ Break pig-human transmission
- ❖ Avoid human open defecation
- ❖ Cook pork (above 70°C)

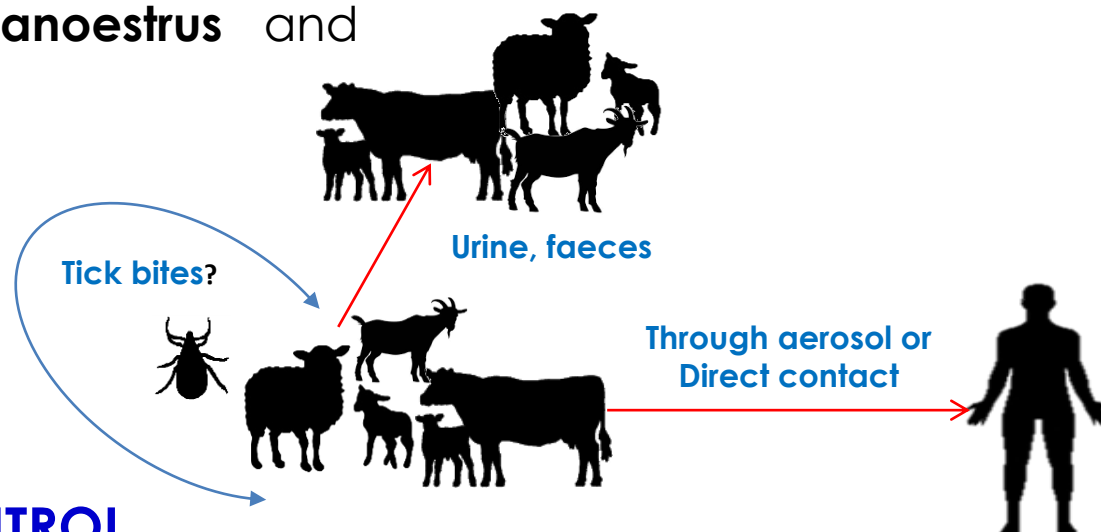
4. Q-FEVER: the hidden menace

IN LIVESTOCK

- ❖ **Economically important disease** in sheep and goats farms
- ❖ Associated with **abortions, stillbirth, repeat breeding, anoestrus** and **premature birth**

IN HUMANS

- ❖ **Occupational risk** to animal handlers and abattoir workers
- ❖ Highly **neglected zoonosis** in India



PREVENTION & CONTROL

- ❖ Dispose off animal birth products properly and do not throw in open ground
- ❖ Wear protective clothing while handling suspected animals
- ❖ Consumption of pasteurized milk and milk products

Ten Priority Endemic Diseases in India of Economic and One Health Importance

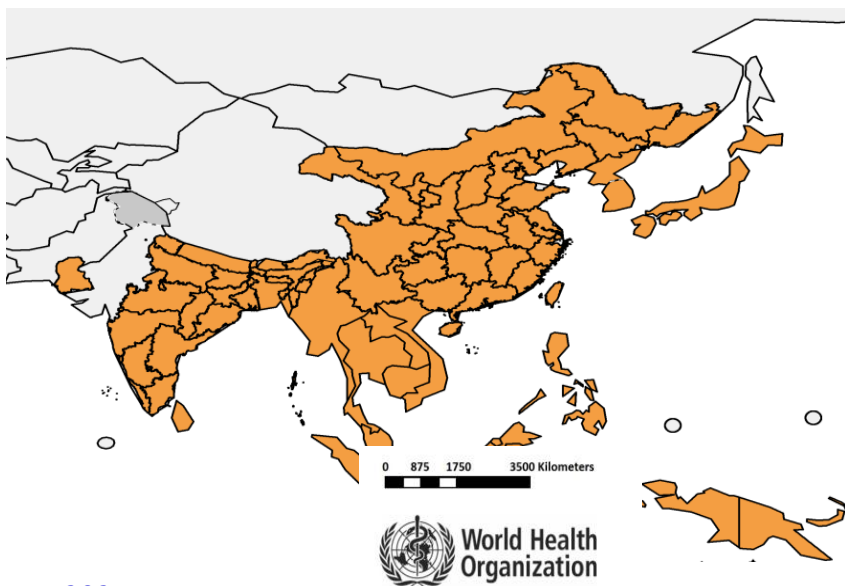
5. JAPANESE ENCEPHALITIS: cause of epidemic encephalitis

IN PIGS

- ❖ Pigs are the **reservoir & amplifier host** for the virus

IN HUMAN

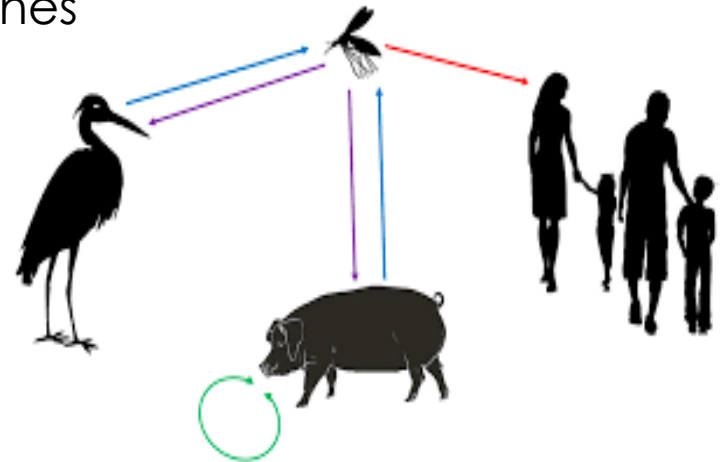
- ❖ In 2019: India had a largest JE burden with **22,219 cases** and **8,081 deaths**



Moore, 2021

PREVENTION & CONTROL

- ❖ Careful rearing of pigs in endemic regions
- ❖ Vaccination in children, especially in endemic region
- ❖ Use mosquito nets & sprays in highly endemic areas
- ❖ Eliminate mosquito breeding areas
- ❖ Wear long sleeved protective clothes

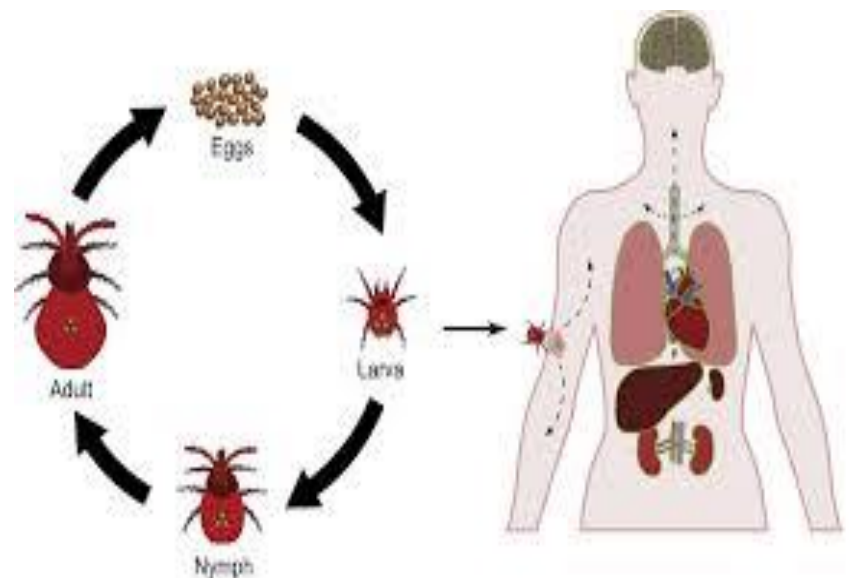


6. SCRUB TYPHUS: the gripping mystery fever

- ❖ Zoonotic infection caused by the rickettsia **Orientia tsutsugamushi**
- ❖ **Leptotrombidium deliense** & **L. akamushi** transmits infection to humans
- ❖ In the last decade in India:
 - **18,781** confirmed cases
 - **6.3%** case-fatality rate

PREVENTION & CONTROL

- ❖ Veterinary attention is crucial
- ❖ Use flea & tick collars or sprays for pets
- ❖ Control rodent population
- ❖ Wash hands after playing with dogs
- ❖ Wear protective clothing while caring infected animals



Devasagayam et al, 2021

Ten Priority Endemic Diseases in India of Economic and One Health Importance

7. LEPTOSPIROSIS: a forgotten tropical disease

IN ANIMALS

- ❖ **Cattles:** Drop in milk production
Infertility, abortion, stillbirths
- ❖ **Dogs:** Fever, blood tinged stool & urine and jaundice

IN HUMAN

- ❖ **Endemic states:** Gujarat, Kerala, Tamil Nadu, Maharashtra, Karnataka & Andaman & Nicobar Island
- ❖ In Kerala alone **194623 confirmed cases & 202 deaths** in 2018-2021

PREVENTION & CONTROL

- ❖ Vaccination in dogs
- ❖ Rodent control
- ❖ Interrupt transmission route of bacteria
- ❖ Wear protective clothing while handling animals
- ❖ Hygiene and sanitation- Farm biosecurity



8. LISTERIOSIS: the circling Disease in livestock

- ❖ *Listeria monocytogenes* is a **foodborne pathogen**
- ❖ Survives & grows under **refrigeration**
- ❖ **1,600 cases 260 deaths** each year globally
- ❖ Organism occurs in **soil, water, sewage, animal & human feces, and manures**



IN ANIMALS

- ❖ Abortion
- ❖ Unilateral facial paralysis
- ❖ Difficulty in swallowing
- ❖ Encephalitis

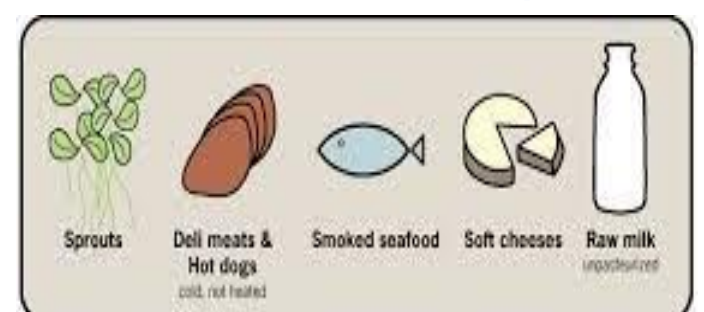
IN HUMANS

- ❖ Diarrhoea, fever, Stiff neck
- ❖ Meningitis, loss of balance
- ❖ Abortion in pregnant woman

PREVENTION & CONTROL

- ❖ Do not graze animals in contaminated areas
- ❖ Do not eat raw milk, meat, and veggies
- ❖ Adopt good farm management practices
- ❖ Hygienic handling, and cooking of food

Listeria can hide in many food



Ten Priority Endemic Diseases in India of Economic and One Health Importance

9. CRYPTOSPORIDIOSIS: cause of diarrhoeal deaths in young ones

- ❖ **Fifth leading diarrhoeal** aetiology in children younger than 5 years
 - ❖ Foodborne illness: **>8 million cases** annually globally
 - ❖ In India, Cryptosporidium alone contributed to **3.9–7.1 million diarrheal cases** & **58,000–146,000 deaths each year** in children < 2Yrs
- Murugesan et al 2017*



Transmission:

- ❖ Oocyte contaminated Water
- ❖ Undercooked food or unpasteurized milk
- ❖ Contact with the faeces of an infected person or animal
- ❖ Unclean hands

PREVENTION & CONTROL

- ❖ Use of prescribed anti-parasitic drugs
- ❖ Rats, mice and flies should be controlled
- ❖ Use water after proper treatment
- ❖ Sanitation of calf rearing houses
- ❖ Hygienic environment in calving place

10. TOXOPLASMOSIS: an emerging but underreported zoonoses

- ❖ *T. gondii* is the **4th most globally important parasite** (FAO/WHO, 2014)

IN ANIMALS

- ❖ Abortion, stillbirth
- ❖ Neurologic disorder
- ❖ Multi-organ failure



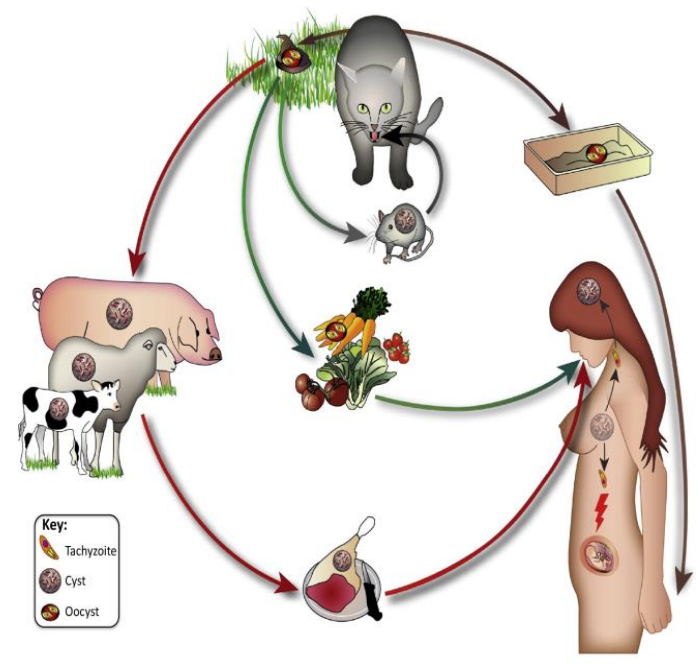
Neglected and Underreported in India

IN HUMANS

- ❖ Abortion in pregnant ladies
- ❖ Neurologic disorder
- ❖ Ocular toxoplasmosis
- ❖ Congenital toxoplasmosis

PREVENTION & CONTROL

- ❖ Handle cat little carefully
- ❖ Pregnant ladies & immunocompromised people should not handle cat litter
- ❖ Do not eat raw or under cooked meat
- ❖ Do not eat unwashed fruits & vegetables
- ❖ Do not drink unpasteurized milk
- ❖ Wash hands with soap after gardening or touching soil



Trends in Parasitology

OCCUPATIONAL ZOOONOSES

Occupational zoonotic diseases are the Infections which are transmitted from animals to humans by virtue of their occupation.



The knowledge of human getting sick while working with animals and animal products was known to human even before the concept of infections and zoonosis were understood. The link between the type of work and associated disease can be traced back to the outbreaks of human tuberculosis during the Neolithic period when human first started domesticating cattle for food.

The very first diseases those led to the concept of occupational zoonosis are **anthrax**, **glanders** and **scabies**. Scabies was probably the first occupational zoonosis for which the King Francis Bourbon of the Two Sicilies gave the compensations to the stablemen who contracted scabies while tending the infected dromedaries

The prevention of occupational disease is not only instrumental to safeguard workers health but is also important for preserving quality of balanced and healthy human-animal-environment relationship.

DISEASE KNOWS NO BOUNDARIES

OCCUPATIONAL ZONNOSES Related to Farming and Slaughter House Activities

Laboratory workers

Rabies (animal bite/saliva, aerosol)

Brucellosis

(aborted material, aerosol, milk, meat)

Rice field worker's disease

Leptospirosis Sugarcane worker's disease

(skin wounds/abrasion; infected animal urine)

Greengroceries

Cystic Echinococcosis

(Pastoral environment)

Dairy workers/ cattle handler's disease

Bovine Tuberculosis (infected environment, aerosol, milk)

Animal
Bite/scratch

Contact with
infected
animal

Aerosol
Inhalation



Contact with
excretions /
secretions

Abattoir's infections

Q fever

(infected environment, aerosol, milk)

Parturition
and aborted
material

Wool sorter's disease

Anthrax (Hide, wool, infected carcass)

Irrigation and Swimmers diseases

Schistosomiosis (Contaminated water bodies, snail)

Dermatomycosis

(animal handlers, pet owners)

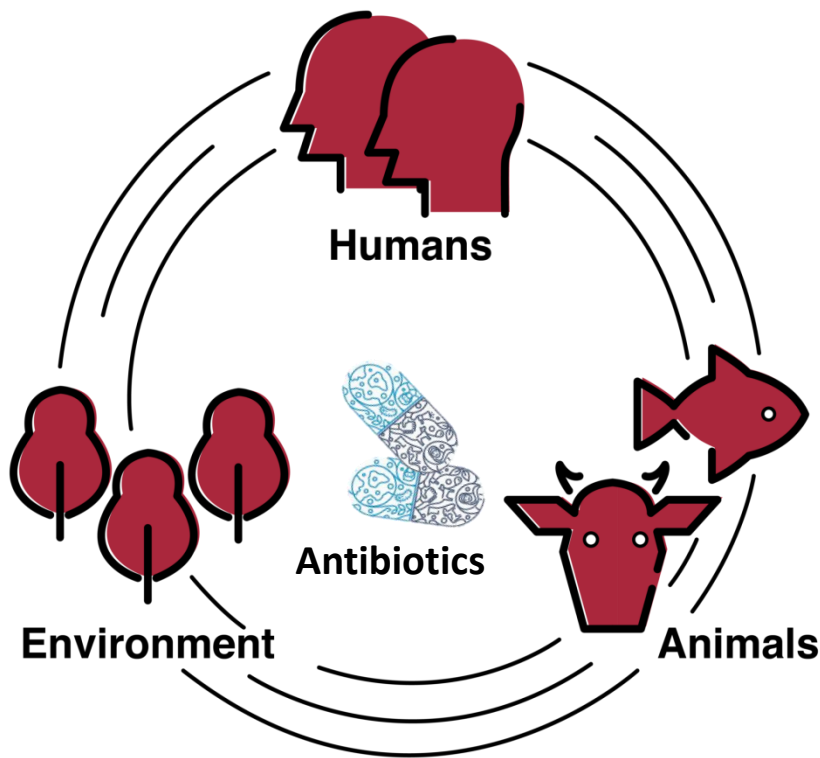
Tetanus

(Contaminated soil with animals)

ANTIMICROBIAL RESISTANCE (AMR)

Needs ONE HEALTH Approach

Antimicrobial resistance best epitomises the principles of One Health more than any other present issue does. It perfectly links all the three domains of One Health viz., **Animal, Human** and **Environment**



Use of similar antimicrobial agents in human and animal health practices as well as in agriculture for crop protection drives the emergence and spread of antibiotic resistant organisms between animals and people, either directly or via the environment

PREVENT Emergence, **STOP** Spread
and **PRESERVE** Antibiotics

Next-generation antibiotics are vital for humanity, but – right now – there are not enough new antibiotics in development. However, drug resistant bacteria are developing at a fast pace than the invention of new antibiotics.

No single discipline can alone solve the AMR issue. But together with the collaborative efforts from veterinarians, physicians, ecologists, and agricultural professionals we can fight antimicrobial resistance.

Given the crucial interlinking between the human, animal, and environmental determinants of antimicrobial resistance, it is insightful to consider a **One Health** strategy to address AMR problem

ANTIMICROBIAL RESISTANCE

an important global health concern

If AMR is not tackled **now**

By **2050**

Globally **10 million** deaths per year



3 Seconds

Costing **\$100 trillion** economic loss

Antimicrobial resistance is a hanging sword over the entire world killing around 700,000 people every year

AMR is a **PREDICTABLE** and **PREVENTABLE**
We must **ACT NOW** to **PROTECT** the future

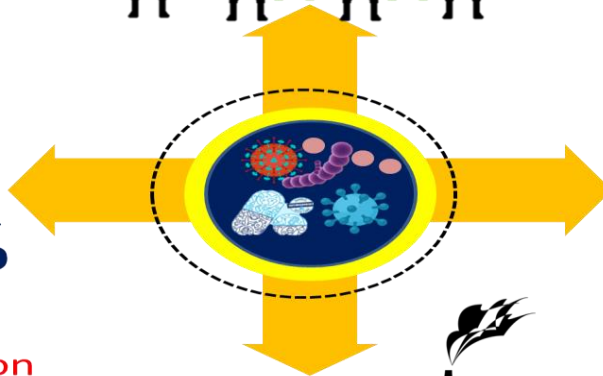
By **2050**

28 MILLION PEOPLE
Projected to fall into poverty due to AMR



UP TO **7.5 %**

Decline in global livestock production



UP TO **1 TRILLION US \$**

Global increase in healthcare cost



UP TO **3.8 %**

Decline in global exports

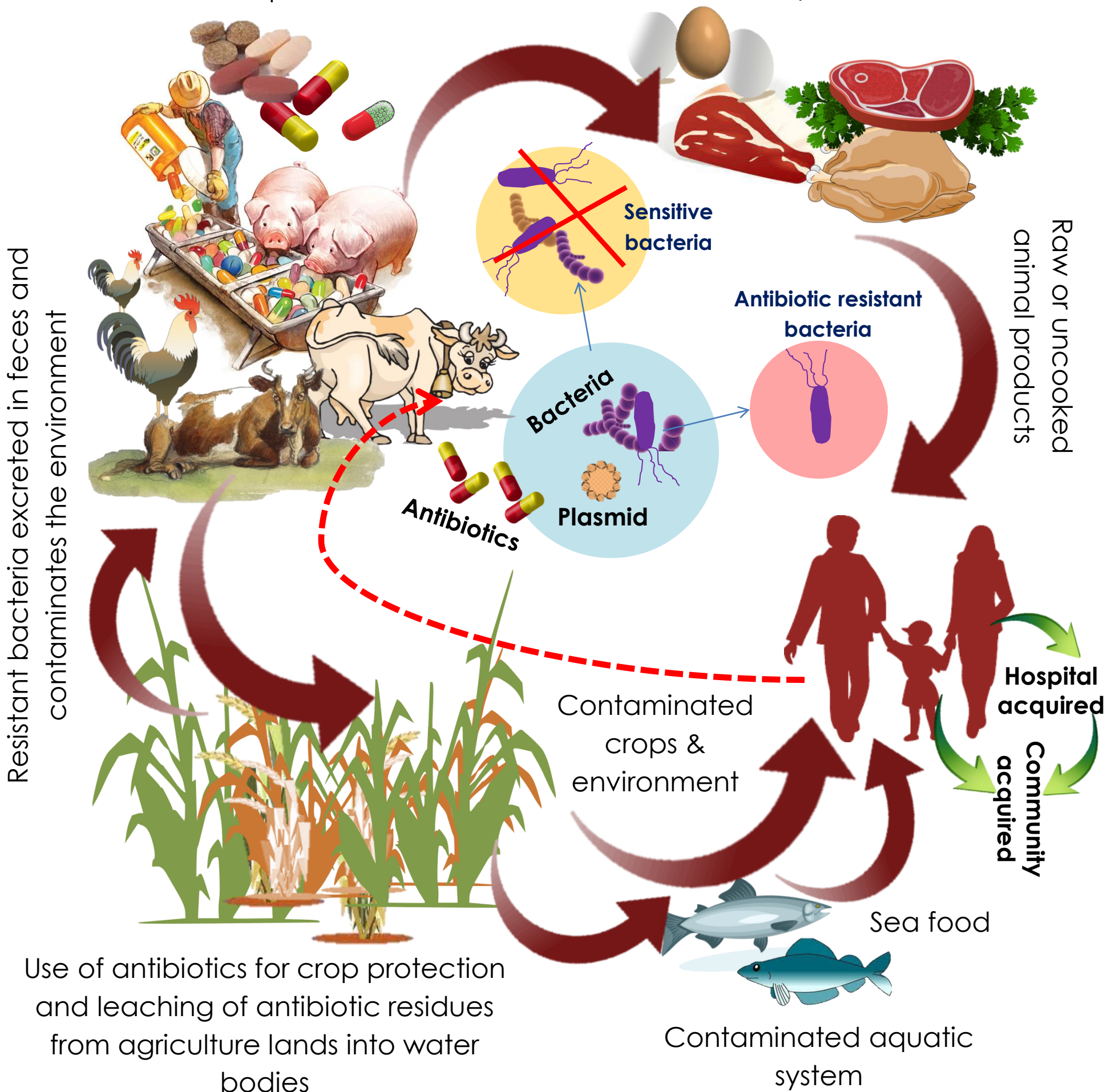
Many modern medicines could become obsolete, turning even common infections into deadly threats

Source: World bank group

The spread of **ANTIBIOTIC RESISTANCE** and its **ONE HEALTH** relevance

Use of antibiotics in livestock's as growth promoters, for therapeutics and disease prevention

Antibiotic residues and resistant bacteria in animal products

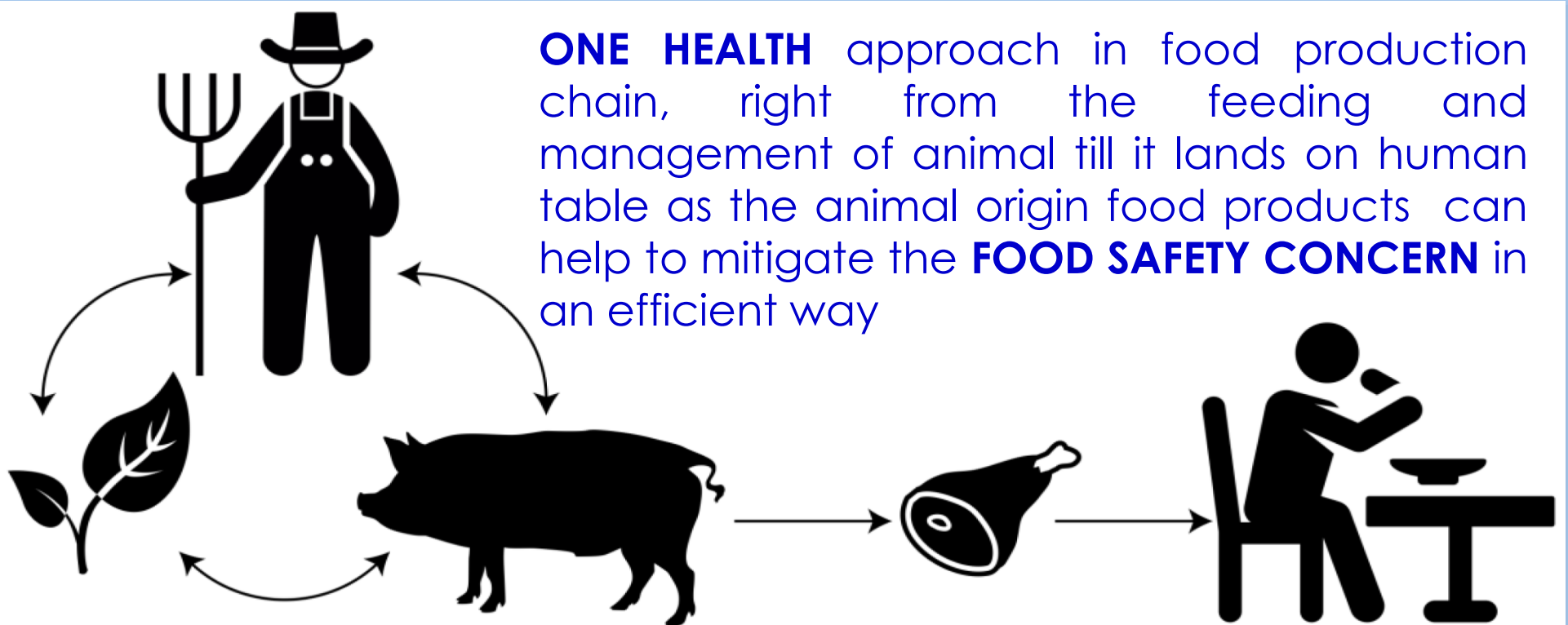


Use of antibiotics for crop protection and leaching of antibiotic residues from agriculture lands into water bodies

Contaminated aquatic system

FOOD SAFETY is a ONE HEALTH Problem

Food is probably the most important gateway for vast majority of zoonotic pathogens, such as *Salmonella enterica*, *Campylobacter*, *Listeria monocytogenes*, *Yersinia enterocolitica*, *E.coli*, *Trichinella*, *Taenia solium*, *Toxoplasma gondii*, *rota viruses* and *noro viruses* etc. as most of these pathogens have animals as their reservoir.



'FARM-TO-PLATE' make food **SAFE**

The interconnectedness between the public health, environment health, food animals and wildlife demands for the shift, away from a reactive to a more anticipatory, proactive approach to food safety

COLLABORATE FOR A COMMON VISION

THE BURDEN OF FOODBORNE DISEASES

1 in 10
people
fall ill

After eating contaminated food
worldwide

4.2 lac
people
die every
year

Due to eating
contaminated food
globally. Of which 1.25
lakh are children under
5yrs of age

US\$ 110
billion
Lost every
year

In productive and medical
expenses resulting from
unsafe food in low- and –
middle income countries

Source: WHO & World Bank Report

FOODBORNE DISEASES are **PREVENTABLE**
Everyone has a **ROLE TO PLAY** in **FOODSAFETY**



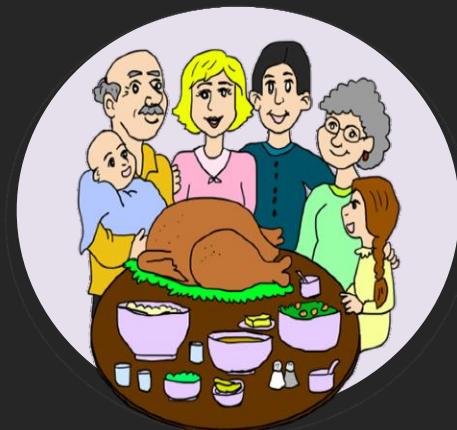
Food processing



Packaging



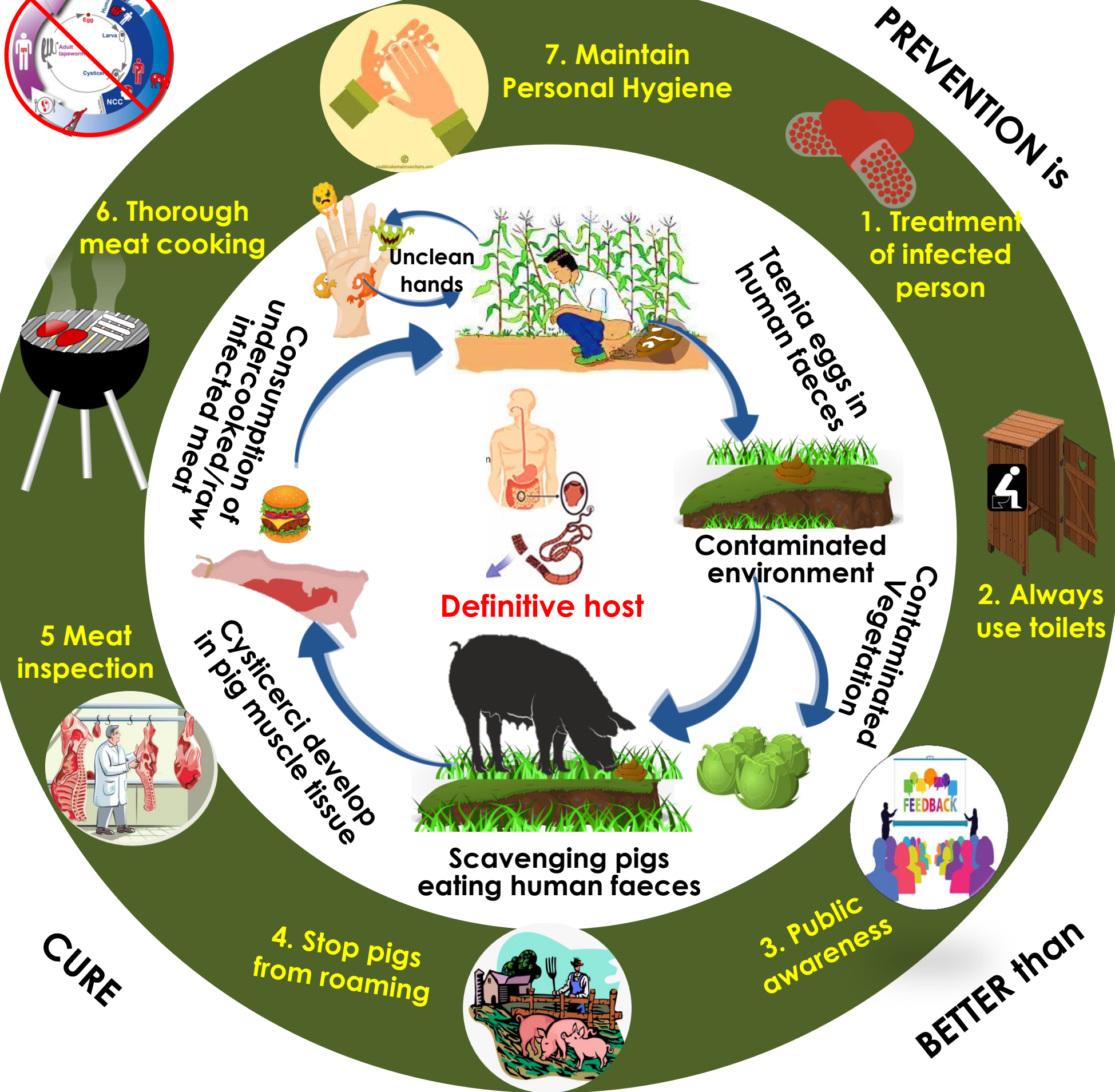
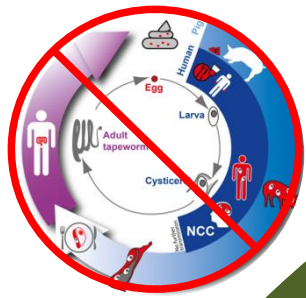
Point of sale



Preparing meal

Reduce FOOD SAFETY RISK through shared responsibility

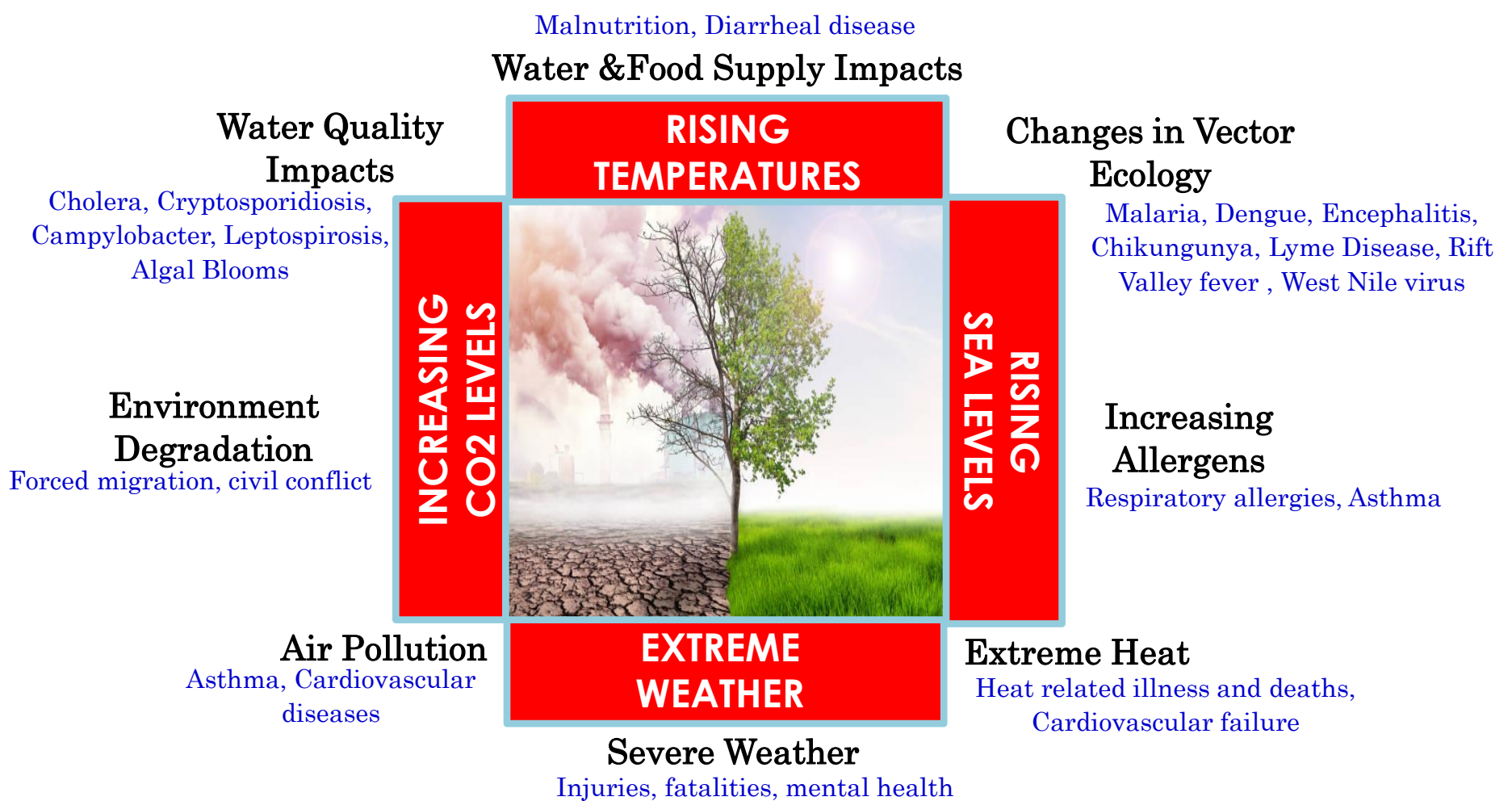
ONE HEALTH intervention to break the pork tapeworm cycle



ONE HEALTH in relation to ENVIRONMENT and CLIMATE CHANGE

The impacts of climate change is not just limited to increase in average temperatures of earth and the melting of glaciers, rather it has a major role in influencing the human and animal migration, extreme weather conditions, emergence of vector-borne and waterborne diseases, spread of allergens, and increasing air and water pollution.

THE PROTECTION OF HUMAN HEALTH begins with the protection of **ENVIRONMENT HEALTH**

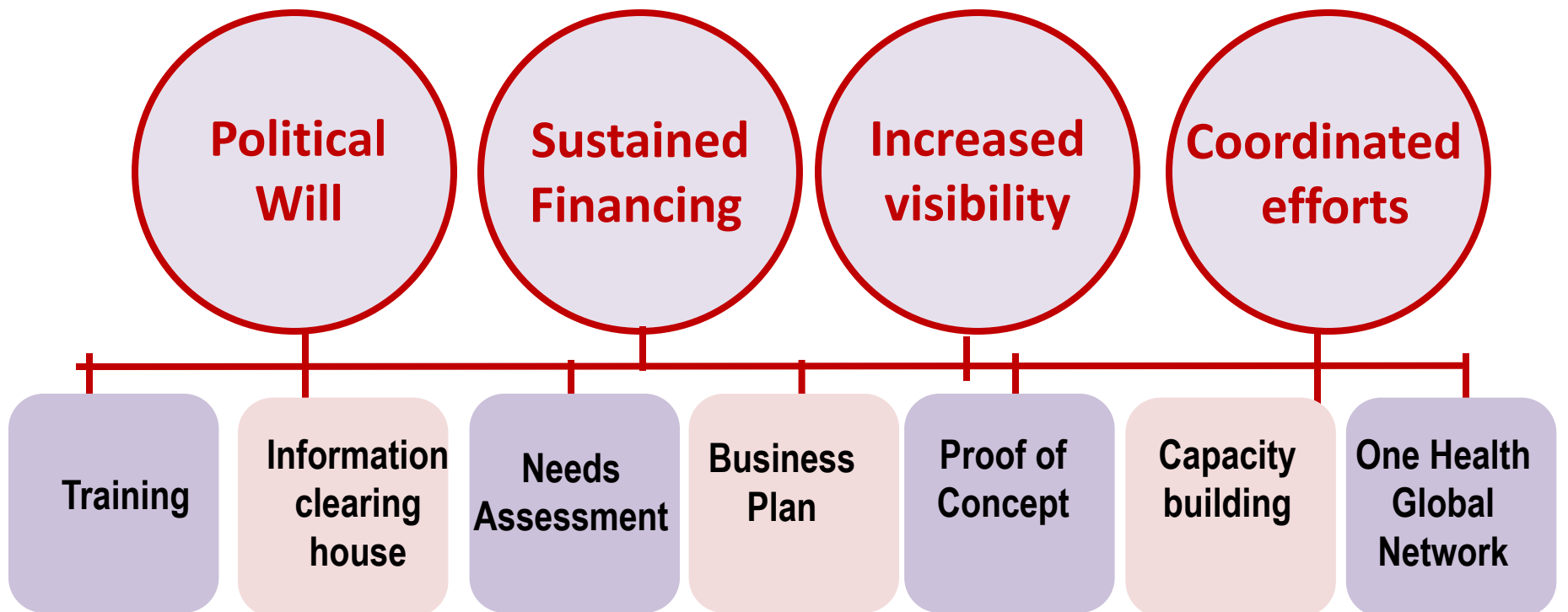


The change in environmental conditions and habitats creates new possibilities for the infectious pathogens such as Rabies, Nipah, SARS, Ebola, and COVID-19 etc. to transmit from environment to animals and from animals to humans which indicates that the environment health is equally important for protecting human and animal health.

Climate change is expected to cause 250,000 additional deaths per year between 2030 and 2050, with 144,000 due to viral diarrhea and malaria and 95,000 due to childhood under nutrition.

Framework for One Health

FAO-OIE-WHO 2008



The primary focus is to avoid any disruption in the global efforts to better human lives.

Key outcomes of One Health



Essential drivers of One Health

One Health implementation shall be driven through **3 Ps – policies, programme and people**



INDIA'S ONE HEALTH VISION

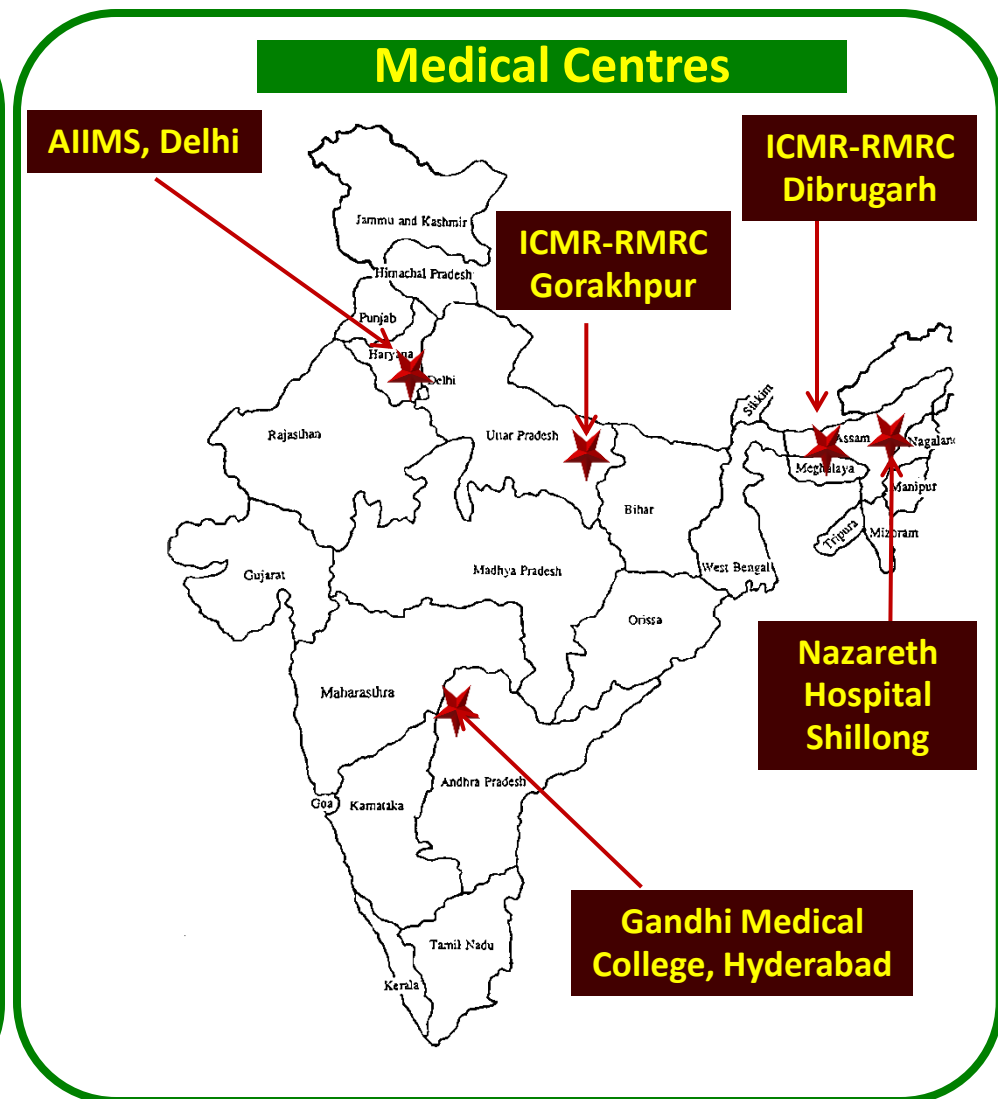
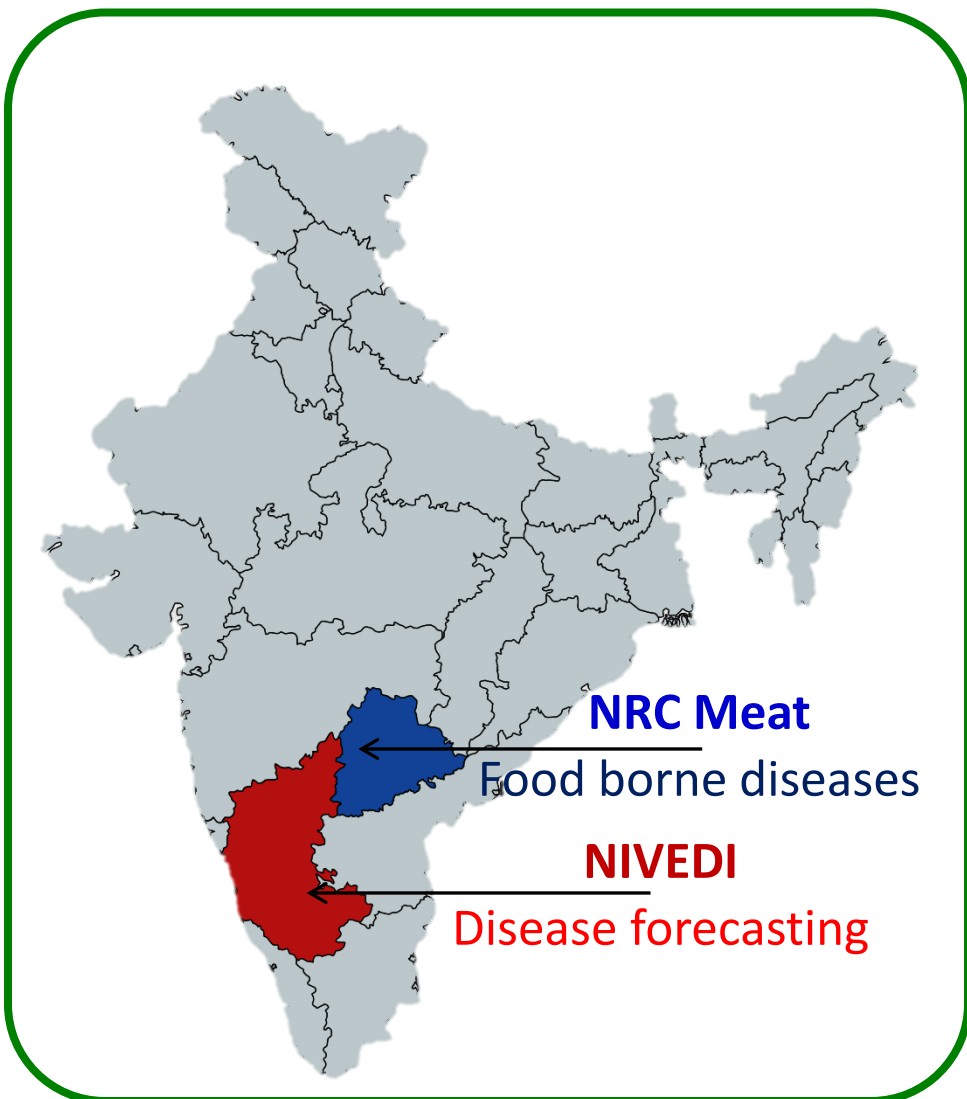
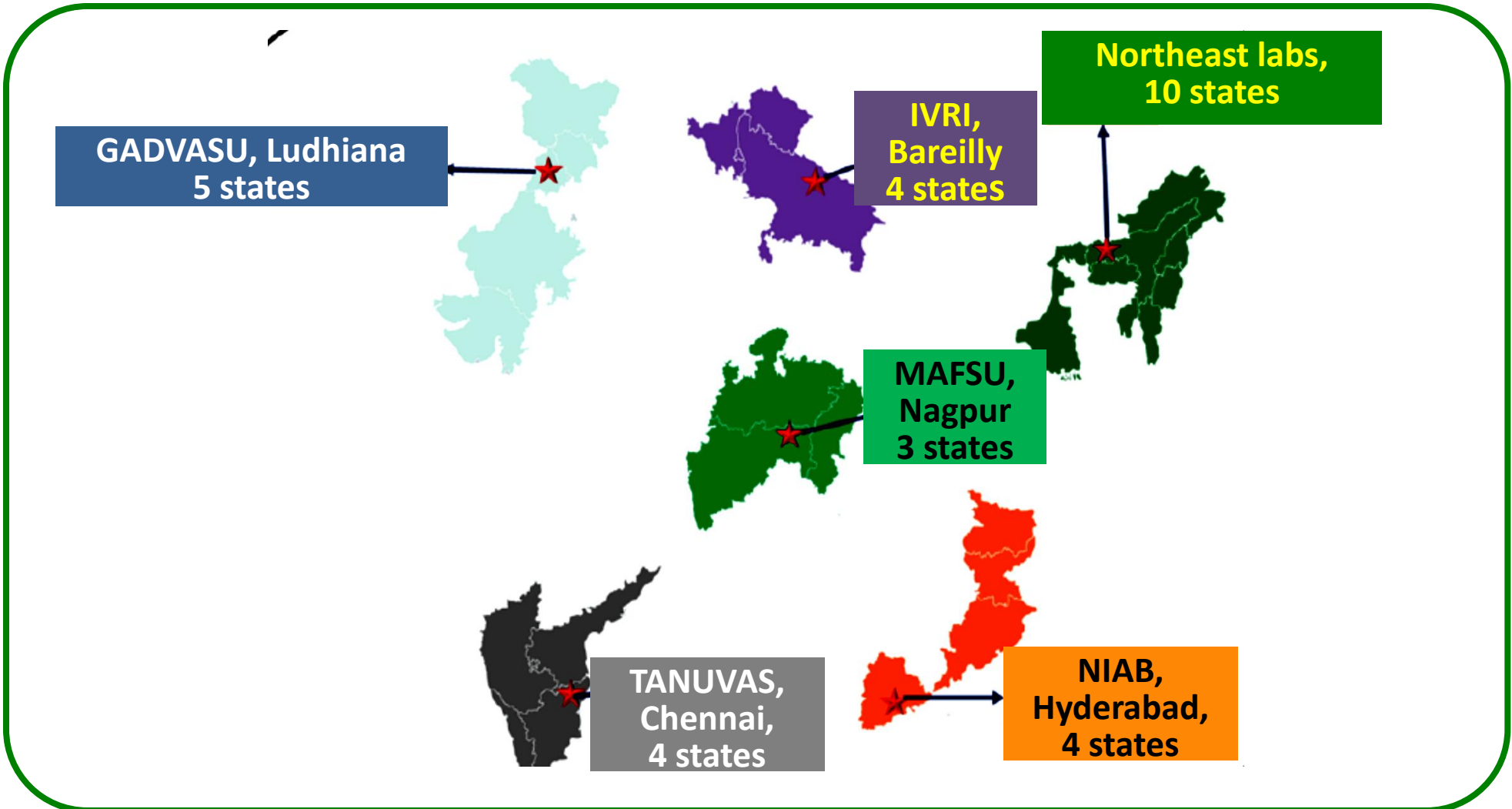
India's 'One Health' vision derives its blueprint from the agreement between the **tripartite-plus (FAO-OIE-WHO-UNEP)** alliance - a global initiative supported by the **United Nations Children's Fund (UNICEF)** and the **World Bank** under the overarching goal of contributing to '**One World, One Health**'.

In keeping with the long-term objectives, India established

- National **Standing Committee on Zoonoses** as far back as the 1980s
- **National Centre for Disease Control:** The Inter-sectoral Coordination for Prevention and Control of Zoonotic Diseases was approved in the 12th Five year plan
- Funds sanctioned for '**National Institute of One Health at Nagpur, Maharashtra**
- DAHD will soon establish a '**One Health**' unit within the **Ministry**
- India Animal Health System Support for Improved One Health (**AHSSOH**)
- **The Union Budget** of 2021 allocated budget for '**One Health**'
- National Action Plan for **Eliminating Dog Mediated Rabies**
- The Department of Biotechnology's **National Institute of Animal Biotechnology (NIAB), at Hyderabad, launched the Centre for One Health** on November 3, 2020
- The DBT's initiative for a mega **consortium on 'One Health'**
- DBT's "**One Health India Conference 2019**" in collaboration with national & international agencies on 18-19th February, 2019
- DBT's joint meeting on "One Health" with BMGF on 4th October, 2019
- DBT constituted a "**Regional Expert Group on One Health**" in November, 2019 comprising experts from **medical, veterinary, basic, agriculture and environment** to identify priorities

DBT's consortium on 'ONE HEALTH'

Division of Responsibility and Networking



Investigators : Consortium on 'ONE HEALTH'

Centre	Centre Coordinator & Principal Investigator	Co-Principal Investigators
NIAB	Coordinator: Dr Subeer Majumdar PI: Dr Nagendra Hegde	(Drs) Ravi Gandham, Girish Radhakrishnan, Madhuri Subbiah, Pankaj Suman
ICAR-NRC on Meat	PI: Dr Sukhdeo B Barbuddhe	(Drs) Deepak Rawool, Vishnuraj MR, Laxman Chatlod, Yogesh Ghadekar
MAFSU	Centre Coordinator: Dr Nifin Kurkure PI: Dr Sunil W Kolte	Sandeep P Chaudhari, Shipshri V Shinde, Sunil W Kolte, Megha P Kaore
TANUVAS	Centre Coordinator: Dr Dhinakar Raj PI: Dr P Azhahianambi	(Drs) DhinakarRaj, RP Aravindh Babu, TMA Senthilkumar, K Karthik, A Raja
GADVASU	Centre Coordinator: Dr JPS Gill PI: Dr Jasbir Singh Bedi	(Drs) Simranpreet Kaur, Randhir Singh, Lokesh KM, Pankaj Dhaka, Deepali Kalambe
ICAR-IVRI	PI: Dr P Dhar	(Drs) Himani Dhanze, Hira Ram
ICAR-RCNEH	PI: Dr Arnab Sen	(Drs) Sandeep Ghatak, Samir Das, Arun Prince Milton
AAU	PI: Dr Nagendra Nath Barman	(Drs) Saidul Islam, Pankaj Deka, Biswajit Datta, Sarat Sonowal, Rupam Dutta, Arfan Ali
CAU	PI: Dr Tapan Kumar Dutta	(Drs) P Roychoudhury, H Lalrinkima, RS Arya, JM Gali
ICAR-NRC on Pig	PI: Dr Swaraj Rajkhowa	(Drs) Ajay Kumar Yadav, SR Pegu, Rajib Deb, J Doley, Souvik Pal
ICAR-NIVEDI	PI: Dr KP Suresh	(Drs) SS Patil, Diwakar Hemadri, V Balamurugan
AIIMS, New Delhi	PI: Dr Vikram Saini	Dr Shyam S Chauhan
AIIMS, Jodhpur	PI: Dr Kuldeep Singh	(Drs) Pankaj Bhardwaj, Ravi Shekhar Gadepalli, Gopal Bhhra, Vidhi Jain, Deepak Kumar
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Gandhi Medical College	PI: Dr K Nagamani	Dr GJ Archana
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WWF-I	PI: Dr Parikshit Kakati	Dr Amit Sharma
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AH&VD, Khanapara	PI: Dr Jiten Ch. Bordoloi	Dr Moonmi Khaund
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AH&VD, Shillong	PI: Dr DI Kjam	Dr H Kylla
AH&VD, Aizawl	PI: Dr M Zohmingthangi	(Drs) Esther Laizoliani, C Neihthangpuli, Lalriuhlui, Lalramdintluanga
DAH&VS, Kohima	PI: Dr Keduzol Ltu	(Drs) Khrisamhazo Rhetso, Samen Jamir, Tsilise Sangtam, Pamingchuba
DAH&VS, Tadong	PI: Dr Sem Sem Bhutia	(Drs) TB Ghatani, Yangchen Gurung, Ekta Pradhan, Rinchen O.Bhutia, Hissey Lepcha
DARD, Agartala	PI: Dr Mrinal Kanti Dutta	Dr Bina Saikia

ORGANIZATIONS working for “ONE HEALTH”



**One Health
Commission**



**Wildlife
Conservation
Society**



**FOOD AND AGRICULTURE
ORGANIZATION
OF THE UNITED NATIONS**



**World
Organisation
for Animal
Health**



**World Health
Organization**



icmr
INDIAN COUNCIL OF
MEDICAL RESEARCH
Serving the nation since 1911



**United Nations
Environment Programme**



**National Centre for Disease Control,
Govt. of India**



सत्यमेव जयते

**Department of
BioTechnology,
Government
of India**



National Institute of Animal Biotechnology



**Centre for One Health,
GADVASU, Ludhiana**



ONE WORLD - ONE HEALTH

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