

**ONE HEALTH APPROACH AS APPLIED IN CONTROL AND MANAGEMENT
OF SLECTED ZONNOSES: A CASE OF LEISHMANAISES, HYDATIDOSES-
DOG TAPEWORM AND RIFT VALLEY FEVER –A VIRAL VECTOR BORNE
ZONNOSIS**

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Leishmaniasis

- Leishmaniases are zoonotic vector-borne diseases caused by protozoan parasites of the genus *Leishmania* that affect millions of people around the globe.
- There are various clinical manifestations, ranging from self-healing cutaneous lesions to potentially fatal visceral leishmaniasis, all of which are associated with different *Leishmania* species.
- Transmission of these parasites is complex due to the **varying ecological relationships between human and/or animal reservoir hosts, parasites, and sand fly vectors.**
- **.**

Why one health

- Vector-borne diseases like leishmaniases are intricately linked to environmental changes and socioeconomic risk factors, advocating the importance of the One Health approach to control these diseases.
- The development of an accurate, fast, and cost-effective diagnostic tool for leishmaniases is a priority, and the implementation of various control measures such as animal sentinel surveillance systems is needed to better detect, prevent, and respond to the (re-)emergence of leishmaniases

Sand fly vector- Leishmania

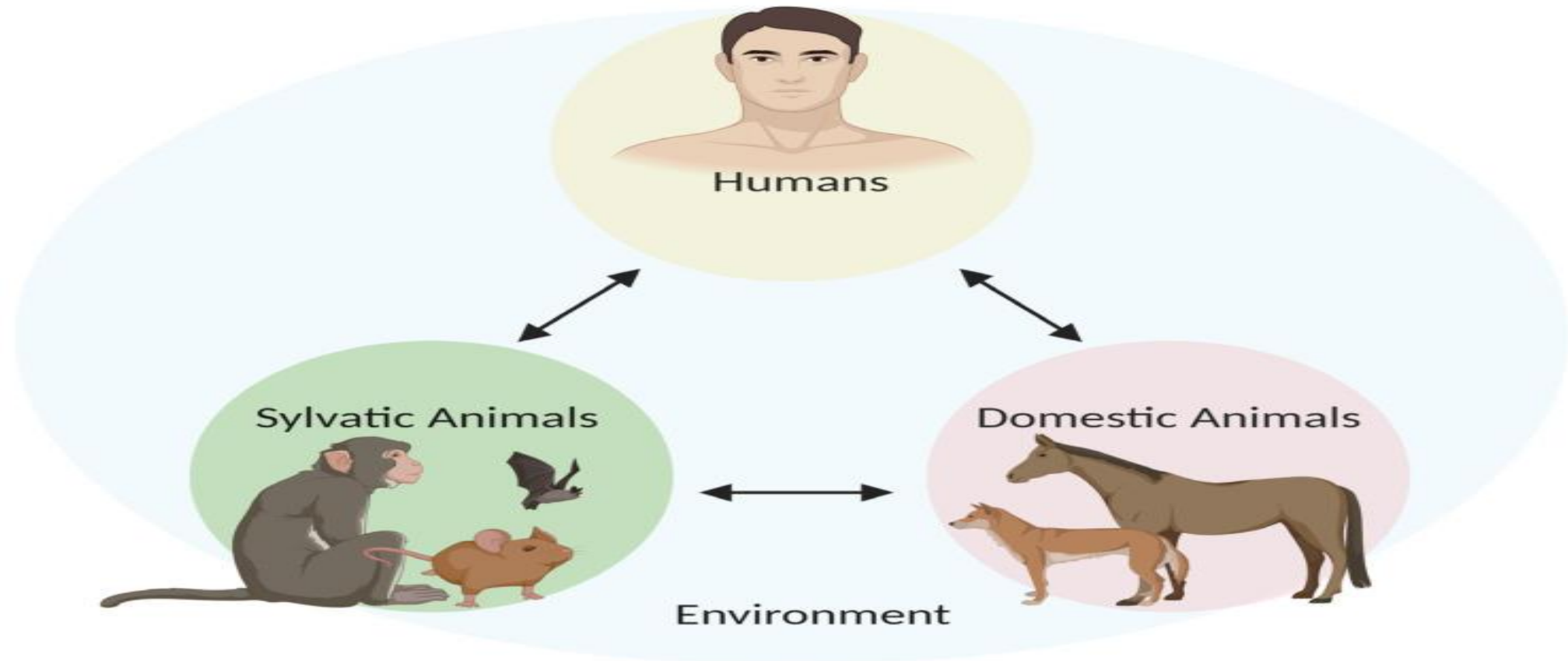


Technologies for vector management- traps, spray pumps, chemicals etc etc

Who is at risk of Leishmaniasis

People of all ages are at risk for leishmaniasis if they live or travel in areas where it occurs and are exposed to infected sand flies. Children, the elderly, and people who are immunocompromised are more likely to develop the disease

Interconnection of the disease in man and environment



Cutaneous leishmaniasis (CL)

- CL is the most common form of leishmaniasis. CL causes skin sores, which typically develop within a few weeks or months after a sand fly bite. The sores
 - Can change in size and appearance over time.
 - May start out as papules (bumps) or nodules (lumps).
 - May go on to become ulcers (similar to the shape of a volcano, with raised edges and a central crater). The ulcers may be covered in a scab or crust.
 - Are usually (but not always) painless.
- Some people may have swollen glands near the sores (e.g., under the arm if the sores are on the arm or hand).

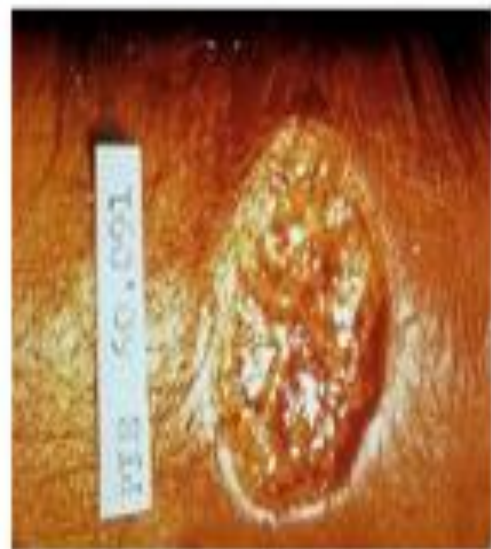
Visceral Leishmaniasis (VL)

- VL is a very severe form of leishmaniasis that can affect internal organs (usually the spleen, liver, and bone marrow) and can be life threatening.
- People with VL usually become sick within months (though it can be years) after they were bitten by sand flies.
- Those who develop symptoms usually have
 - Fever
 - Weight loss
 - Enlargement (swelling) of the spleen and liver
 - Abnormal blood tests
- People may also have
 - Low blood counts
 - Low red blood cell count (anemia)
 - Low white blood cell count (leukopenia)
 - Low platelet count (thrombocytopenia)

Mucosal leishmaniasis (ML)

- ML is an aggressive form of CL that can affect the mucous membranes.
- It is caused by certain types of *Leishmania* parasites that cause CL in Central and South America and, rarely, other places. Certain types of the parasite might spread from the skin and cause sores in the
 - Mucous membranes of the nose (the most common location)
 - Mouth
 - Throat

Clinical leishmaniases



Places with increased risk

- Leishmaniasis occurs in approximately 90 countries in the tropics, subtropics, and southern Europe.
- The ecologic settings range from rain forests to deserts. Leishmaniasis is usually more common in rural than in urban areas, though it is found in the outskirts of some cities.
- Climate and other variations in the environment have the potential to expand the geographic range of sand fly vectors, and thus areas of the world where leishmaniasis occurs.

Distribution of leishmaniases

- In the Eastern Hemisphere, leishmaniasis occurs in parts of
 - Asia- india subcontinent
 - The Middle East
 - Africa (particularly in Northeastern Africa, with some cases elsewhere)
 - Southern Europe
- In the Western Hemisphere, leishmaniasis occurs in parts of
 - Mexico
 - Central America
 - South America
 - The southwestern United States
- Leishmaniasis is not found in Australia, the Pacific Islands, Chile, or Uruguay

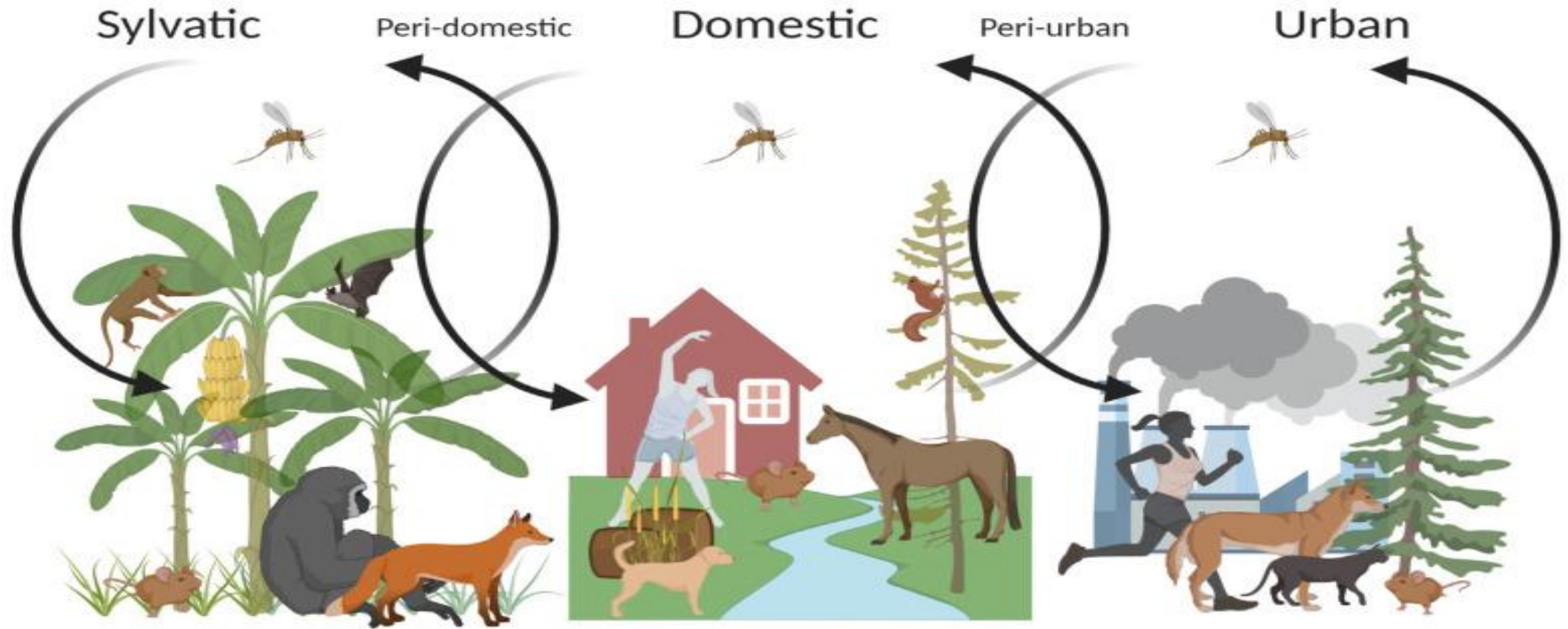
One health approach regarding leishmaniasis

- A One Health approach to leishmaniasis integrates human, animal, and environmental data to control this zoonotic disease, addressing transmission at the intersection of infected sand flies, **animal reservoirs** (like dogs or rodents), and humans.
- It involves collaborative surveillance, vector management, and intersectoral action (medical, veterinary, and environmental sectors) to reduce disease burden.

Key elements of a One Health strategy for leishmaniasis include

- **Integrated Surveillance & Mapping:** Tracking the disease in both human populations and animal reservoirs (e.g., canine visceral leishmaniasis) to identify hotspots.
- **Environmental Management:** Monitoring environmental changes, such as climate change and deforestation, which affect sand fly vector habitats.
- **Vector Control:** Implementing insecticide spraying in residential and animal shelter areas.
- **Collaborative Intervention:** Engaging, for instance, the [WHO](#), [veterinary services](#), and community leaders to enhance, for instance, [diagnosis and treatment in remote areas](#).
- This approach addresses the complexity of transmission, recognizing that human, animal, and ecosystem health are deeply interconnected.

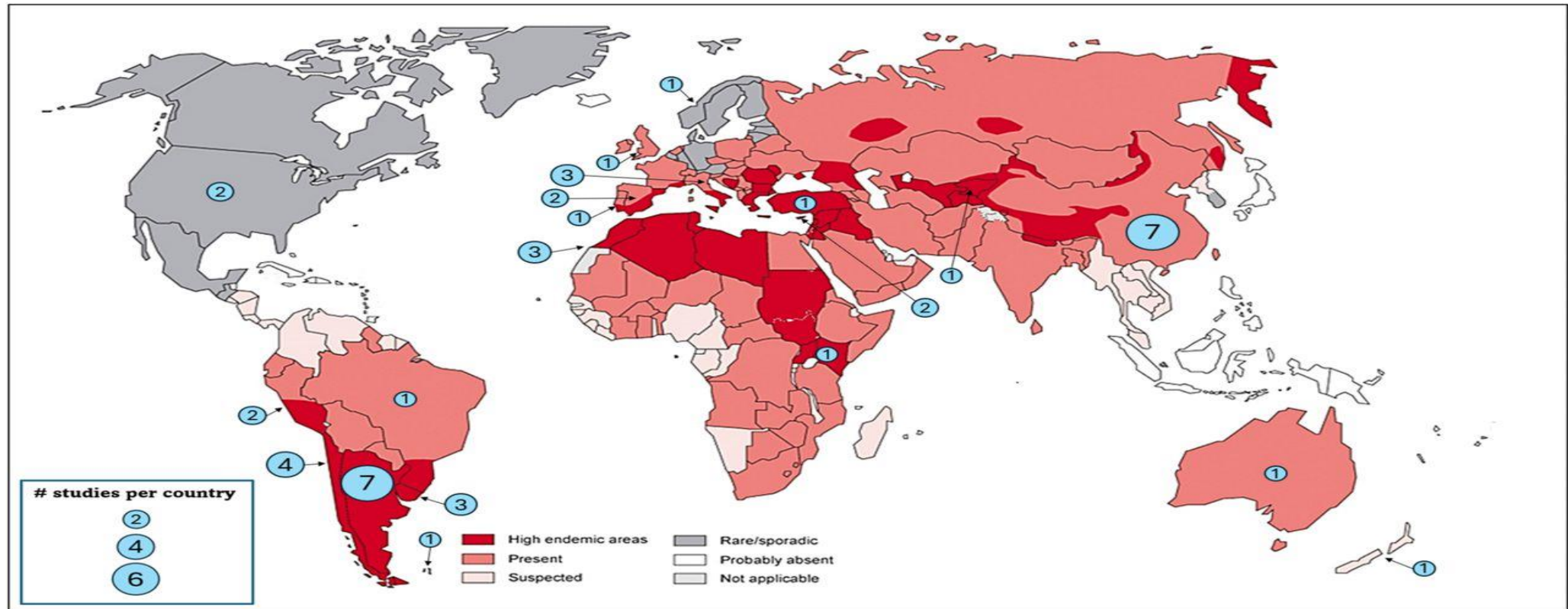
Leishmania- in different environmental setting



One health approach as applied for Dog Tapeworm

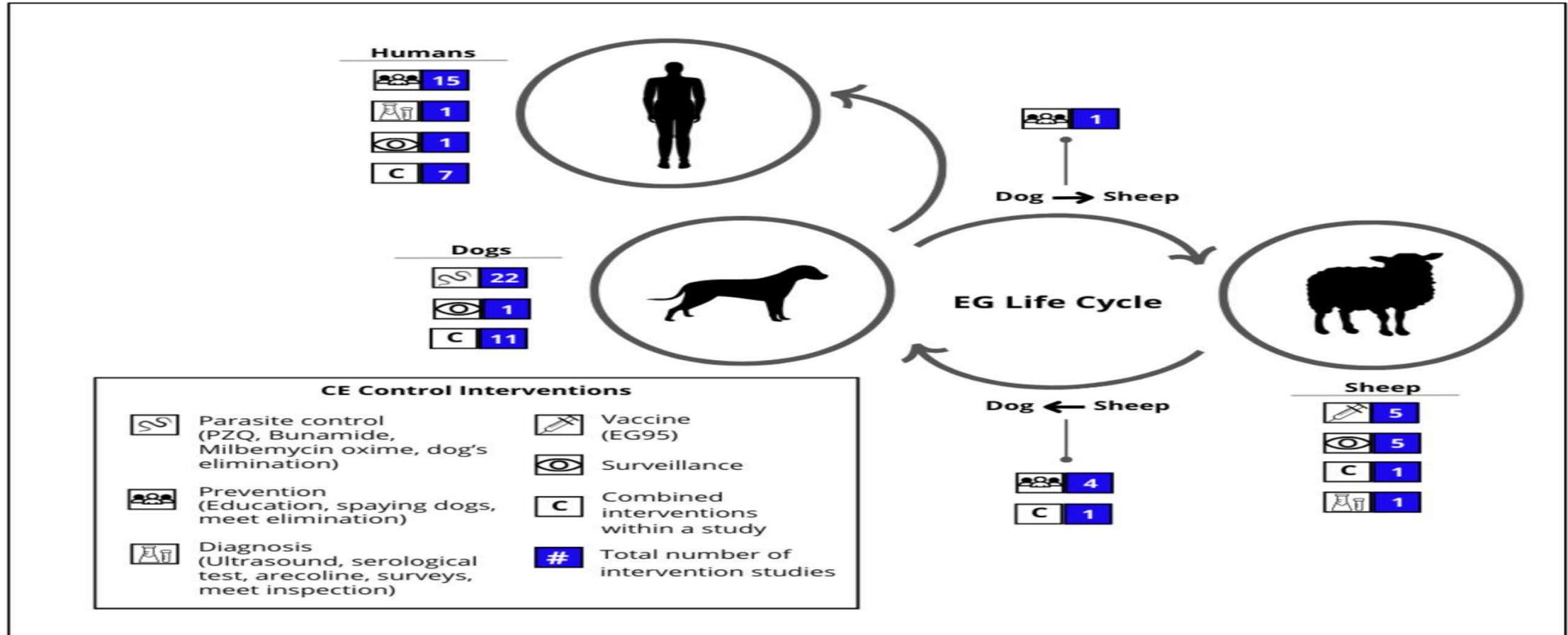
- HYDATIDIOSIS *Echinococcus granulosus* One Health approach integrates human, animal, and environmental health to control cystic echinococcosis (CE), a zoonotic tapeworm infection.
- Effective control strategies include regular dog deworming (definitive host), vaccinating livestock (intermediate host), and improving surveillance and slaughterhouse hygiene.
- This collaborative effort reduces parasite transmission between dogs, livestock, and humans.
- Livestock hydatidoses- **intermediate host and disease causes** economic losses due to condemned organs; liver, lungs, heart, spleen etc
- In human it causes a serious health burden- disease associated with hydatid cyst- manifested as space occupying object can occur on any part of the body- cyst bursting and spilling over its content- may cause anaphylactic shock

Global distribution of hydatidoses



Map Source: WHO 2011¹³⁹

Transmission hydatidoses



^a Intervention results are not included.

Key components of the One Health approach for *Echinococcus granulosus* include:

- **Animal Health Interventions:** Regular treatment of dogs with praziquantel (PZQ) to kill adult worms and implementing vaccination programs (e.g., EG95 vaccine) for sheep and goats to prevent infection.
- **Public Health Surveillance:** Monitoring human cases and, critically, conducting surveillance of slaughterhouses to identify and destroy infected offal.- **meat inspection**
- **Environmental and Educational Measures:** Controlling stray dog populations, regulating home slaughter, and promoting health education to minimize human exposure to parasite eggs.

One health approach

- **Collaborative Action:** Combining expertise from veterinary, medical, environmental, and social sectors to break the parasite's life cycle.
- This multisectoral approach is crucial for achieving long-term control and reducing the **high economic** and **health burden** caused by this parasite, particularly in rural and **pastoralist areas**

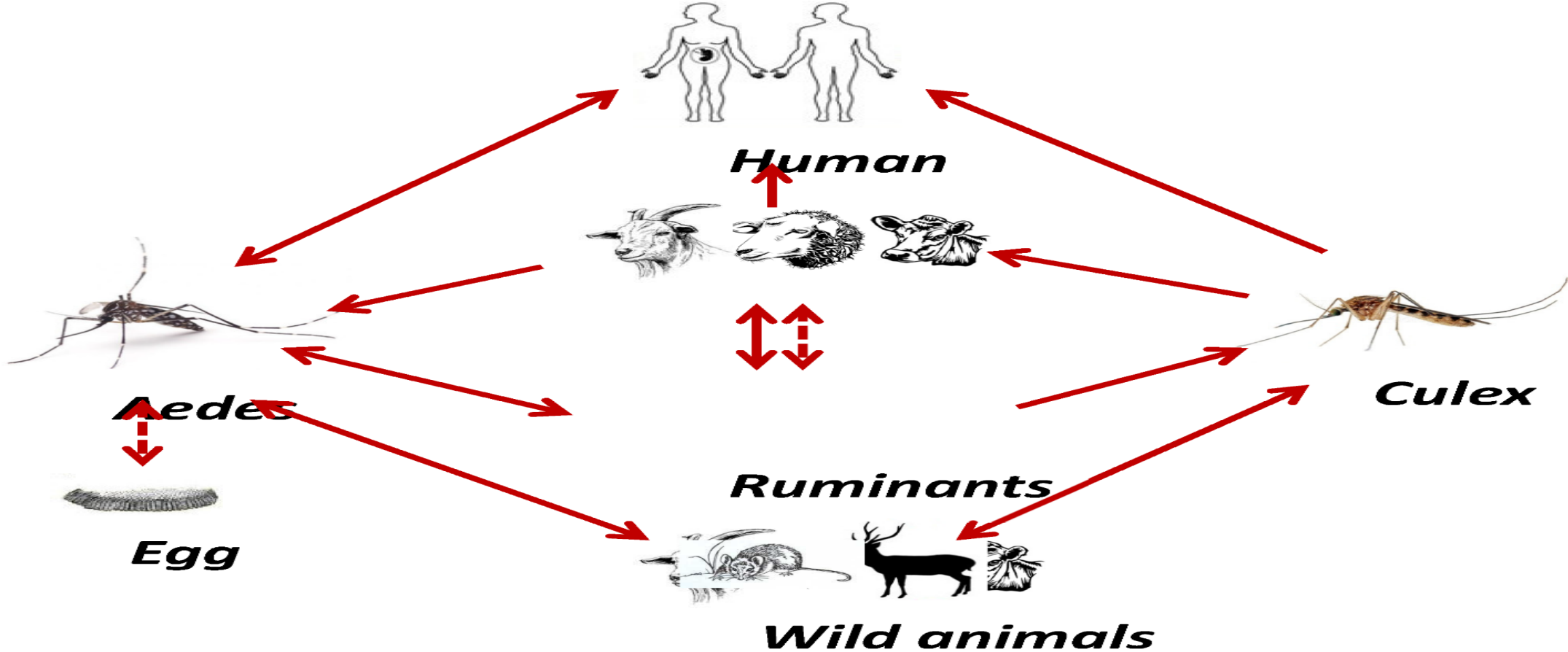
RIFTVALLEY FEVER

- One Health approach to: [Rift Valley Fever \(RVF\)](#) (RVF) integrates human, animal, and environmental health sectors to manage outbreaks, as the virus spreads from animal, to vector (mosquitoes), to human.
- It focuses on joint surveillance, vaccination of livestock, environmental management to control mosquito vectors, and community education to prevent spillover.
- This collaborative strategy enhances rapid response times, reduces socio-economic losses, and improves overall preparedness

The life cycle of the RVF virus and the role of the mosquito vectors.

- There are two transmission cycles for RVFV in nature:
 - (1) an enzootic cycle that can occur during the normal rainfall and involves the *Aedes* mosquitoes, which transmit the virus vertically to their offsprings, and
 - (2) an epidemic-epizootic cycle that occurs during abnormally heavy rainfall and flooding of dams or during the warm season. The virus is transmitted transovarially and the *Culex* mosquitoes distribute the virus and induce the emergence of outbreaks.
 - (3) The transmission of the virus to humans occurs by direct contact with infected animals.

Transmission of RVF



Key components of the One Health approach for RVF

- **Integrated Surveillance and Data Sharing:** Joint surveillance systems (animal, human, and entomological) allow for early detection of the virus in livestock (e.g., **abortion storms**) **before** it spreads to humans.
- **Livestock Vaccination Strategy:** Vaccination is the most effective way to prevent RVF outbreaks and human infection, as human infections are largely caused by contact with infected livestock fluids.
- **Environmental and Vector Management:** Monitoring climate patterns (e.g., increased rainfall/flooding) to predict and mitigate mosquito population surges.

One health approach to RVF

- **Joint Risk Assessment and Response:** Collaboration between **veterinary services**, **public health professionals**, and **ecologists** ensures that interventions are coordinated, such as restricting animal movement, managing slaughterhouse practices, and implementing vector control.
- **Community Involvement and Education:** Educating, and involving, farmers and the local community **in identifying, preventing, and reporting suspicious cases acts as a critical first line of defense.**
- **This multi-sectoral approach helps overcome the limitations of working in silos, enabling a more effective response.**

Current practice

- Currently, the One Health approach, an integrated approach for the understanding and management of animal, human, and environmental determinants of disease, is used in part for the prevention and control of RVF infection and transmission .
- This approach is thought to be very strategic in that risk factors for RVF transmission are increasingly recognized to be interlinked: expansion of human and animal populations, ecological changes, climate variations, etc.
- Hence, there is a critical need for close One Health-oriented collaborations among professionals working in diverse sectors such as animal health, human health, public health, entomology, and animal production.
- The risk of human infection with RVF has increased in several occupational groups such as veterinarians, farmers, butchers, and animal handlers