



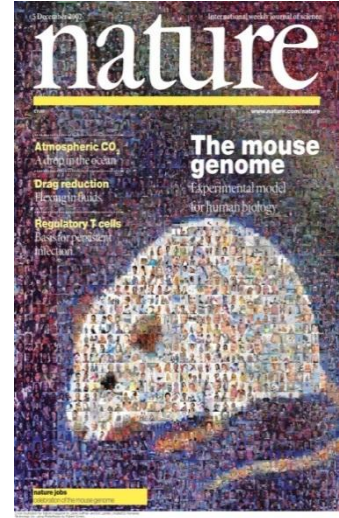
Introduction to Neglected Zoonotic Diseases *One Health, One Medicine*

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Learning Objectives

- Importance of animal disease to human health and wellbeing
- Emerging diseases and factors influencing transmission
- Collaboration between human and veterinary public health





- ▶ [Medical Alert Dogs](#)
- ▶ [How to Apply](#)
- ▶ [Personal stories](#)
- ▶ [Cancer Detection](#)

Medical Alert Dogs

These dogs are trained to assist individuals who manage complex medical conditions on a day to day basis. The dogs are taught to identify the odour changes that are associated with certain medical events. For example for someone living with diabetes, hypoglycaemia (low blood sugar) or the avoidance of it can be a daily problem. This condition is frightening and very distressing, symptoms can vary from confusion, seizures to comas and be life threatening.

Our Medical Alert Dogs are trained to recognise low blood sugar levels, as these levels give off a different scent compared with blood sugars that are within the normal range. When outside the normal range our dogs, once trained, can warn and get help before the symptoms are felt. Depending on their 'owners' need the dogs will alert in a variety of ways eg. by barking, jumping up, licking or pawing. They will bring their owner any necessary medical supplies such as glucose and blood testing kits and get help if necessary. They can also be trained to push alarm buttons.



The same process applies to someone with Addison's disease. Characteristics during an Addisonian crisis include severe pain, vomiting, confusion, convulsions, loss of consciousness life threatening and serious rapid drop in blood pressure. Our Alert Dogs quickly bring vital medical supplies and get help.

We are now working with Cardiff and Vale NHS Trust & Bristol University to try and establish exactly what it is the dogs are detecting.

We continue to investigate other debilitating and life threatening conditions which our dogs may have the potential to detect. These include, severe pain seizures which lead to collapse and hospitalisation, severe allergic responses and narcolepsy, a malfunction of the sleep/wake regulating system which causes sleep attacks and paralysis.

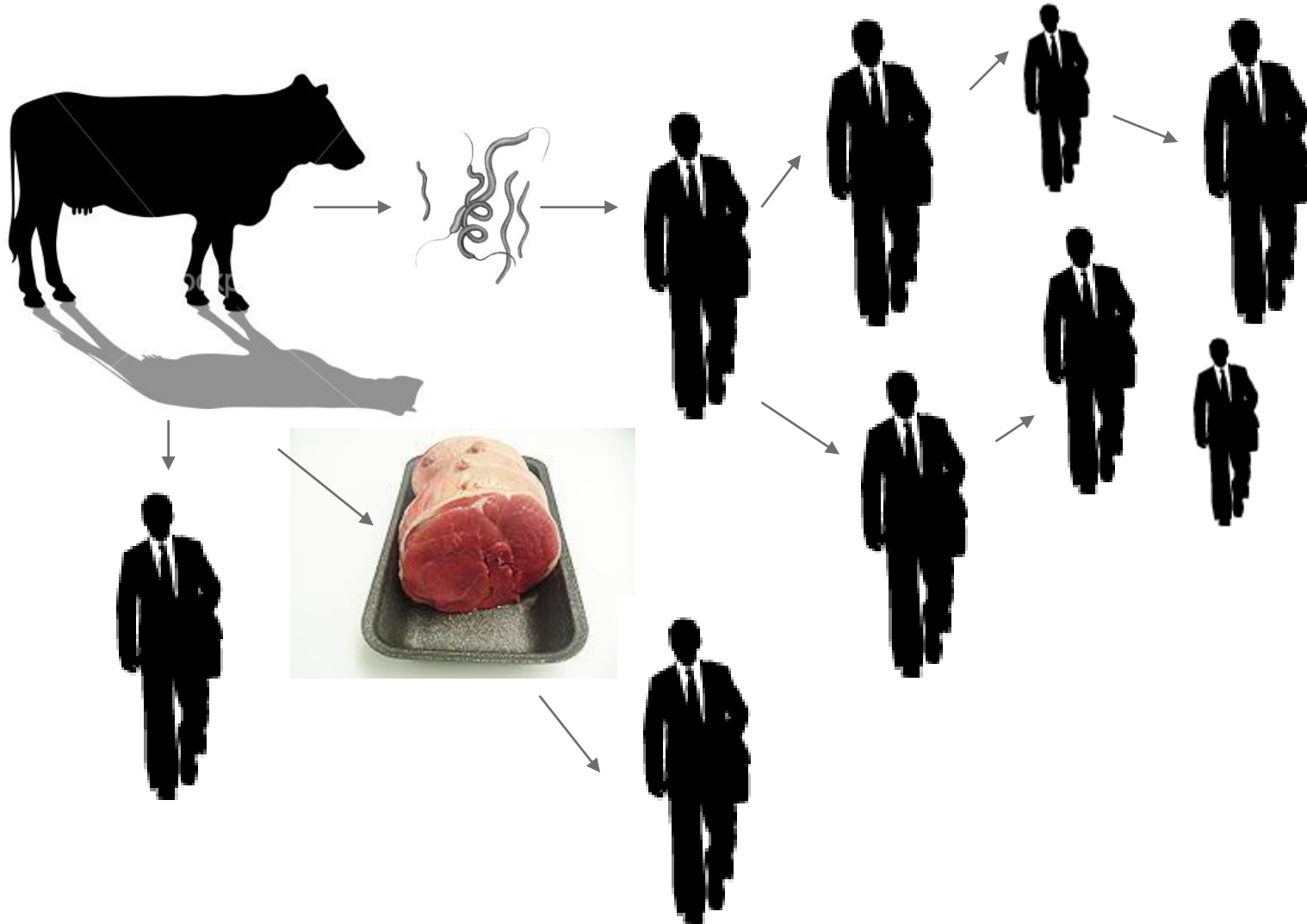




Scenario

1. You are carrying out your BSc in Global Health summer project in Laikipia on disease surveillance
2. You hear that at a local dispensary a patient has had to be referred to the local hospital (3 hour drive away) with very severe abdominal pain
3. Conservation group from a UK university has reported a reduction of endangered wild hunting dogs in the area
4. 3 Maasai cattle two calves and a cow died in last week these were left in the bush
5. One sick animal with bloated abdomen possible blood in faeces

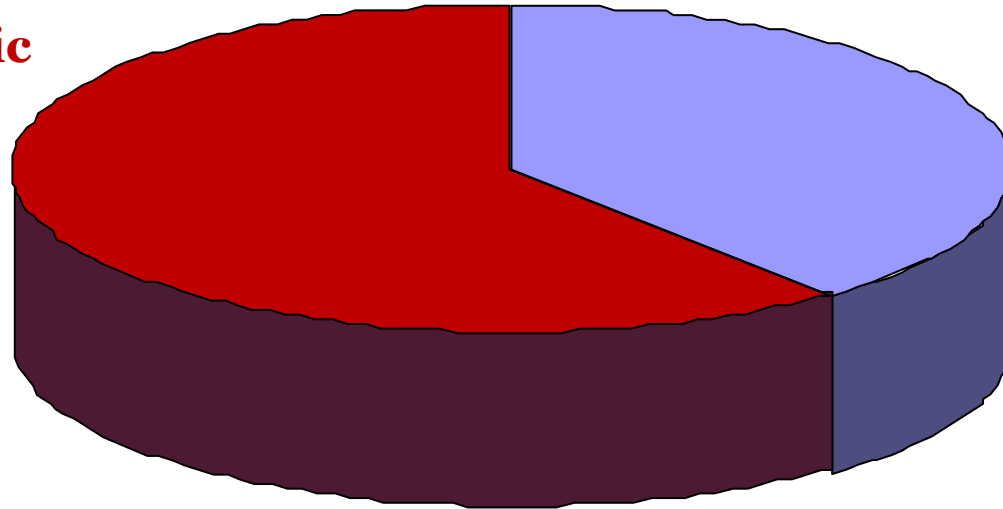
There are multiple route of zoonotic disease transmission



Majority of human pathogens are zoonotic

1415 species of infectious organism known to be pathogenic
to humans

61% zoonotic



Is this a emerging disease ?

have been newly discovered

HIV and Ebola

have recently increased in incidence or prevalence

Tuberculosis

have recently expanded in geographic range

SARS

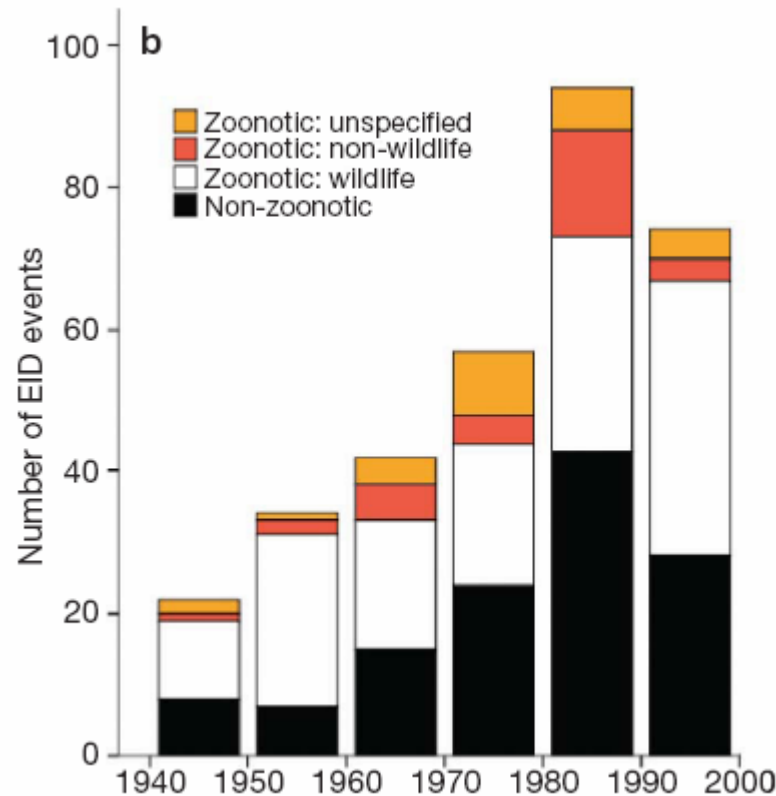
have jumped from animal populations into humans

Avian Influenza

newly evolved pathogens

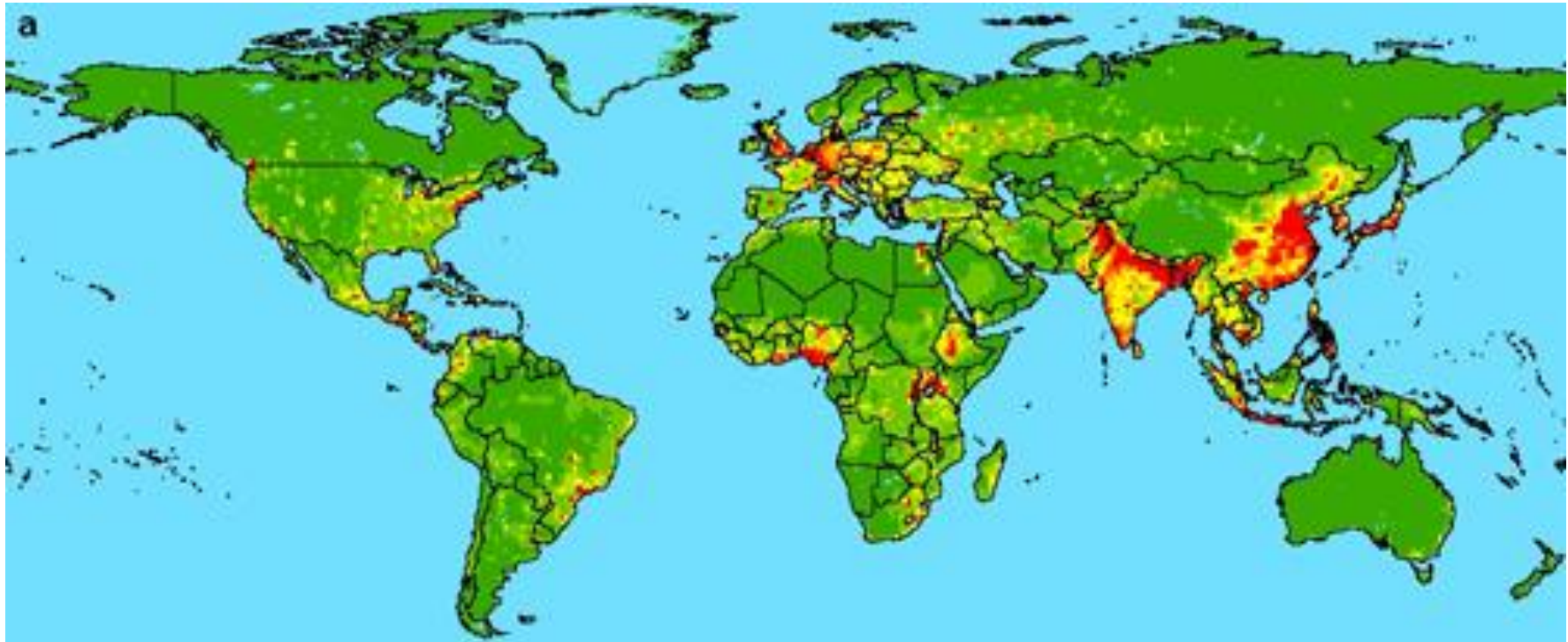
Cholorquine-resistant malaria

Majority of emerging diseases are zoonotic



60 % of the diseases that are said to be emerging are zoonotic
72% caused by pathogen from wildlife origin

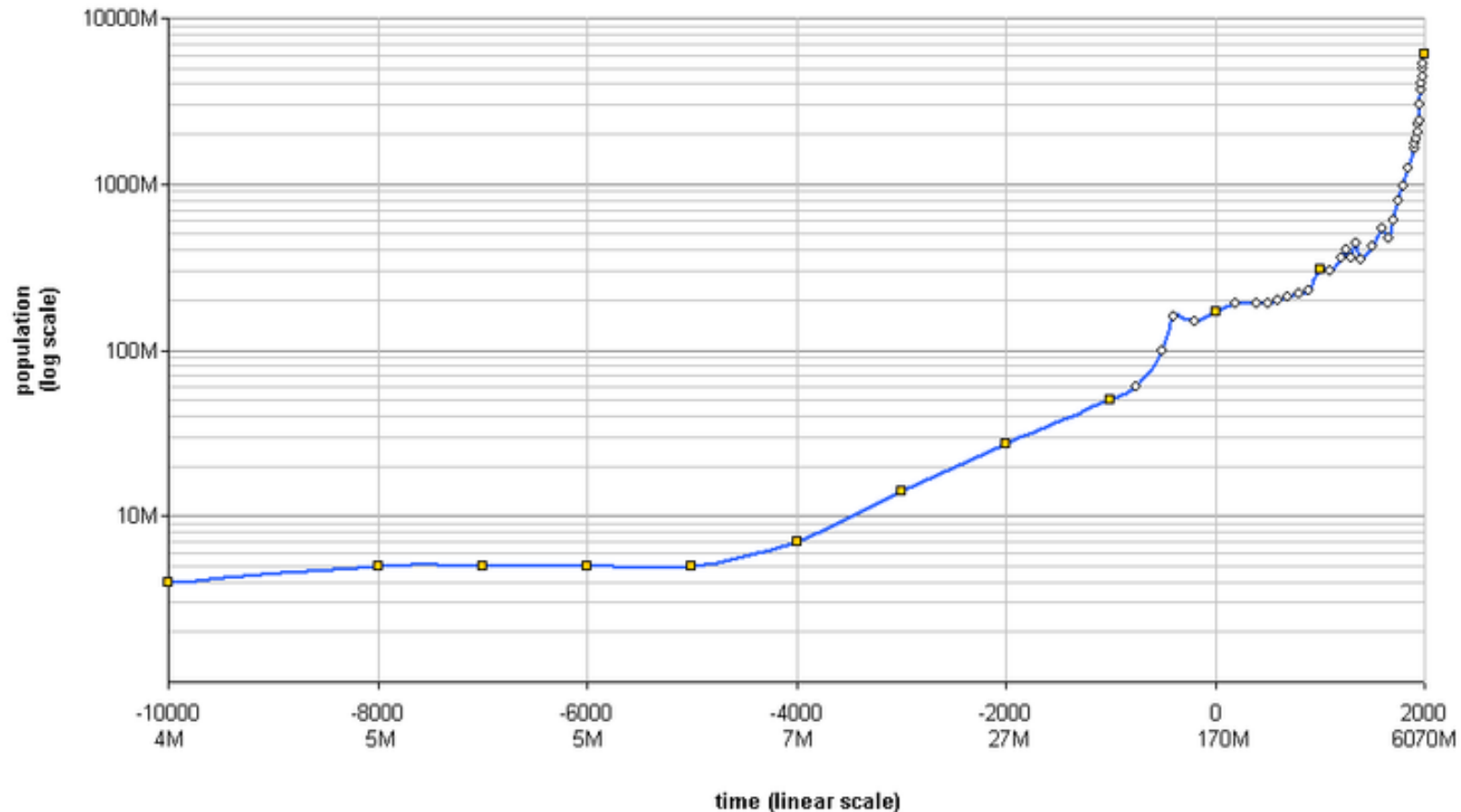
Global distribution of relative risk of an emerging disease event



- Relationship between spatial pattern of disease and socioeconomic, environmental and ecological variables
- Population density was a common and significant predictor

Jones et al Nature 2008, 451 990-3

Human population density was a common significant independent predictor of risk of emerging disease



Population expected to reach 9.2 billion people by 2050

Regional differences in the rates of population growth

Annual rate 1.1 % about 75 million new people per year



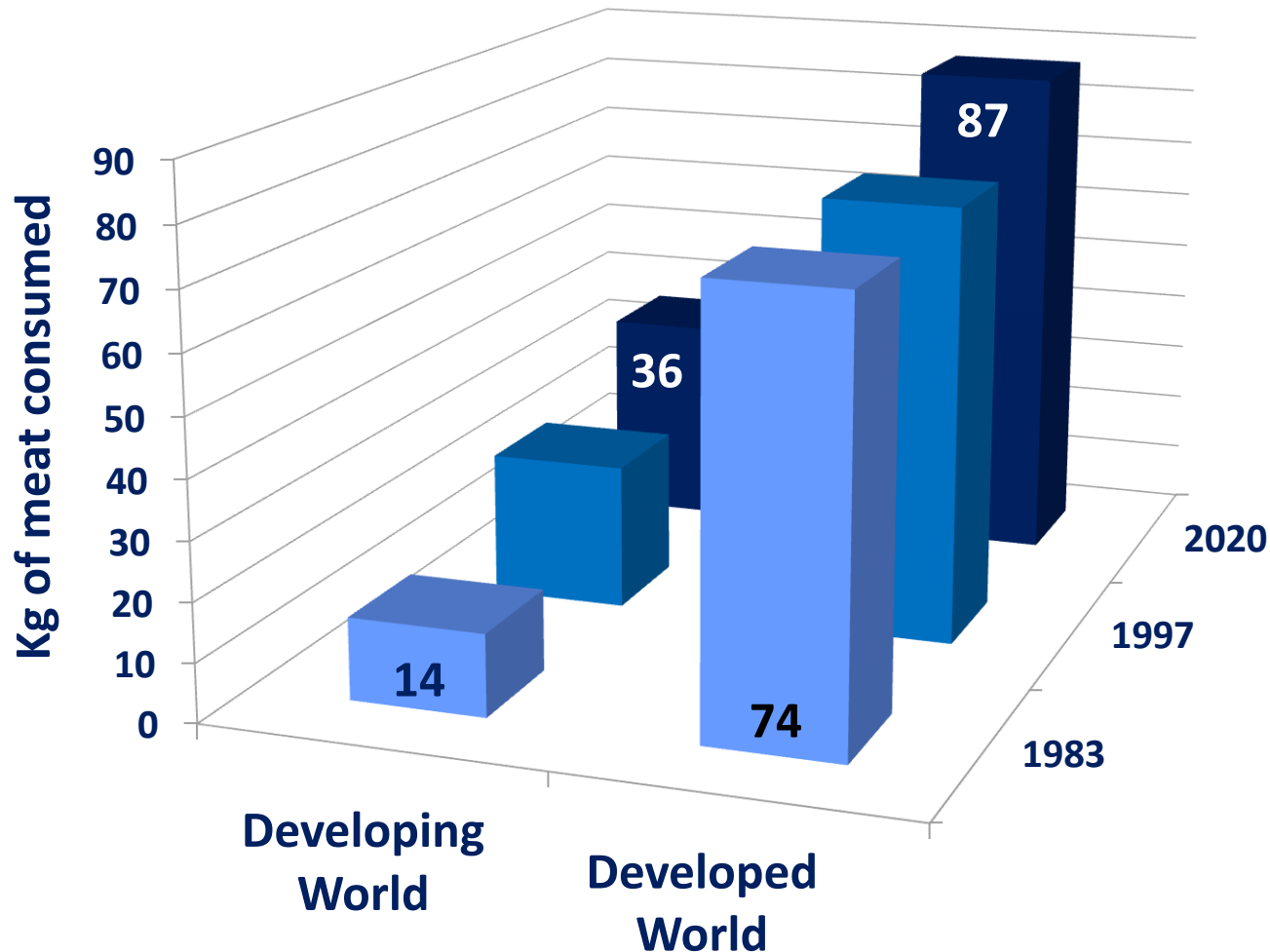
Annual population growth rate in percent, as listed in the CIA World Factbook (2006 estimate)

Population growth has significant effect on zoonotic disease transmission



1. Movement of people into animal habitats

2. Increasing demand for meat and milk



3. Intensification of livestock production especially in peri-urban areas



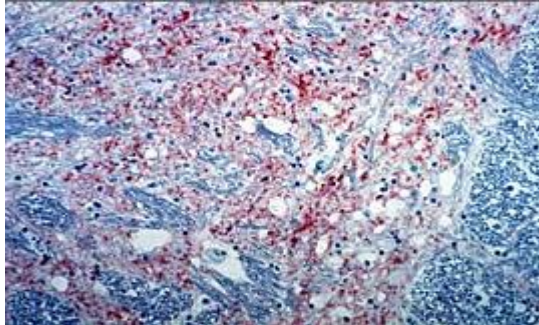
Kawangware slum in Nairboi – trend towards urbanisation

Displaced from political unrest or moved from urban area

Pigs particularly kept as a source of protein

Essential feral scavenging on human waste

3. Intensification of livestock production



Bovine spongiform encephalitis, recognised in 1986

Changes in the rendering process of meat and bone meal for economic reasons



180,000 cattle in the UK have developed the disease and 1–3 million are likely to have been infected



1,647 people died since 1990

Cost of epidemic in the UK estimated at £4 billion

4. Livestock and meat markets unregulated

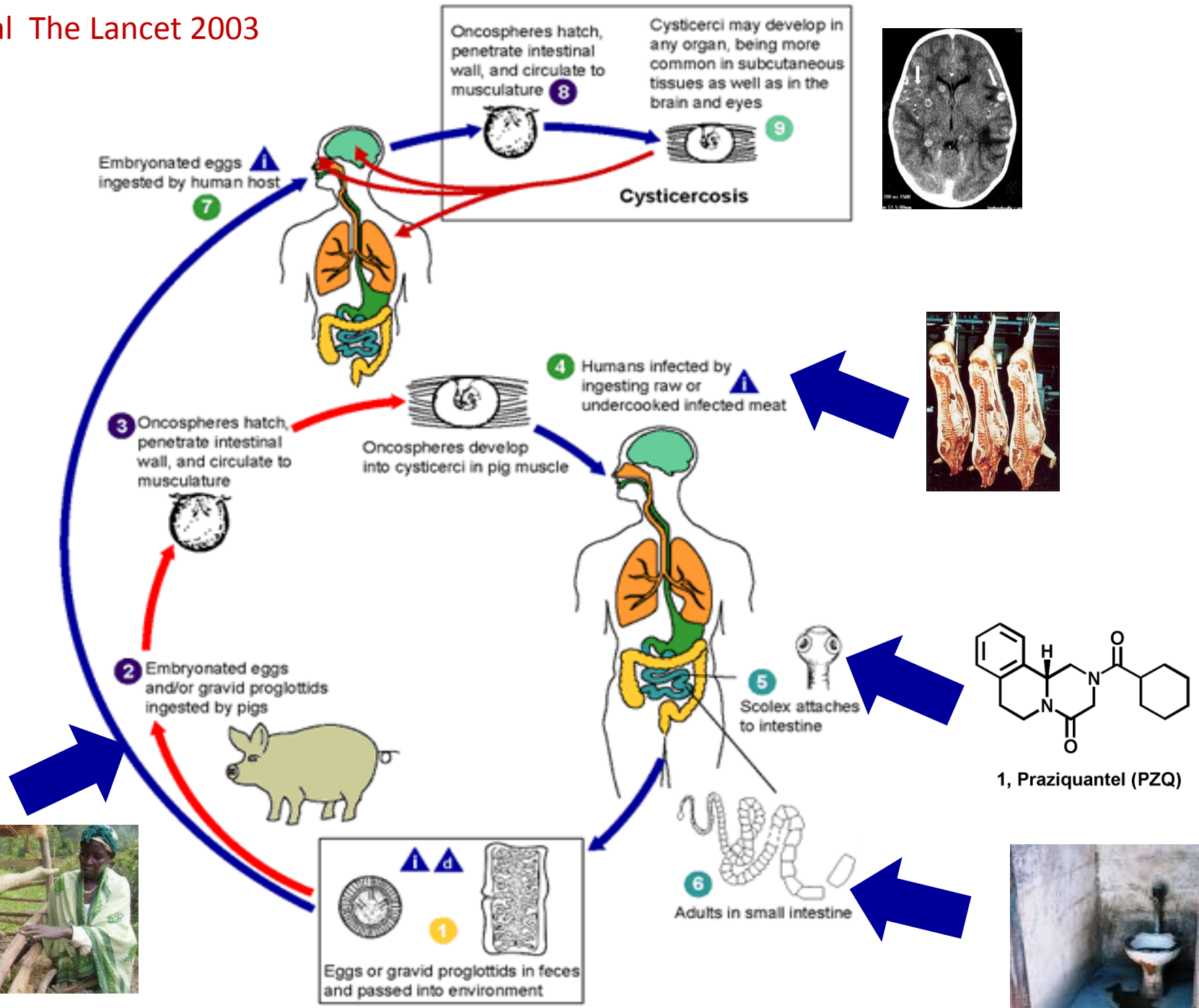


Meat seller in Lilongwe District,
Malawi

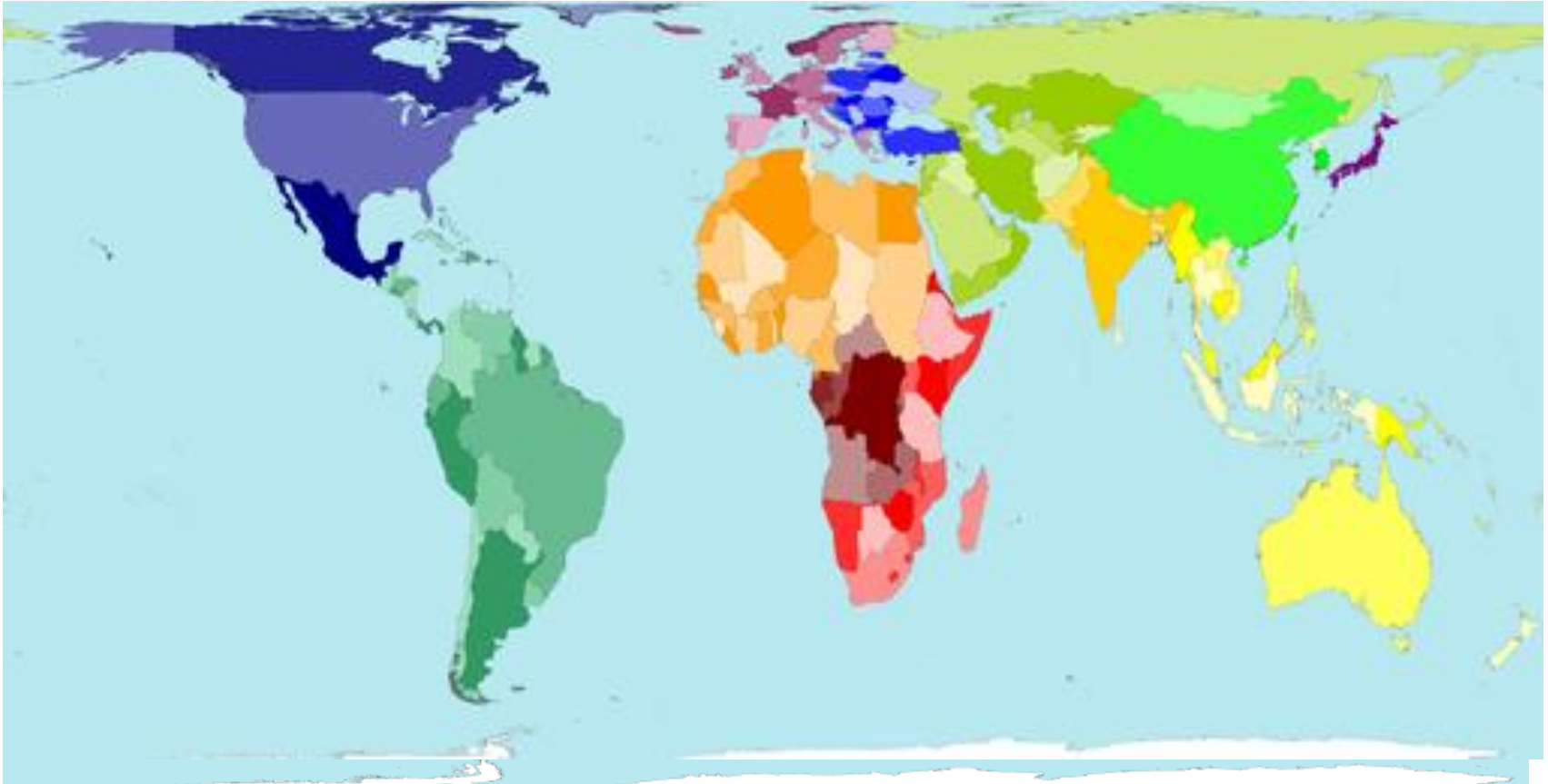
Meat sold primarily through
informal markets

Poor channels for reporting
findings at meat inspection

*Lues, J.F., et al., Int J Environ Health
Res, 2006. 16(5): p. 319-28.*



40% of the world population do not have access to basic sanitation



"... none of us should tolerate a world in which over 1 million children are, in a perversely literal sense, dying for a glass of water and a toilet." Kevin Watkins, 2006

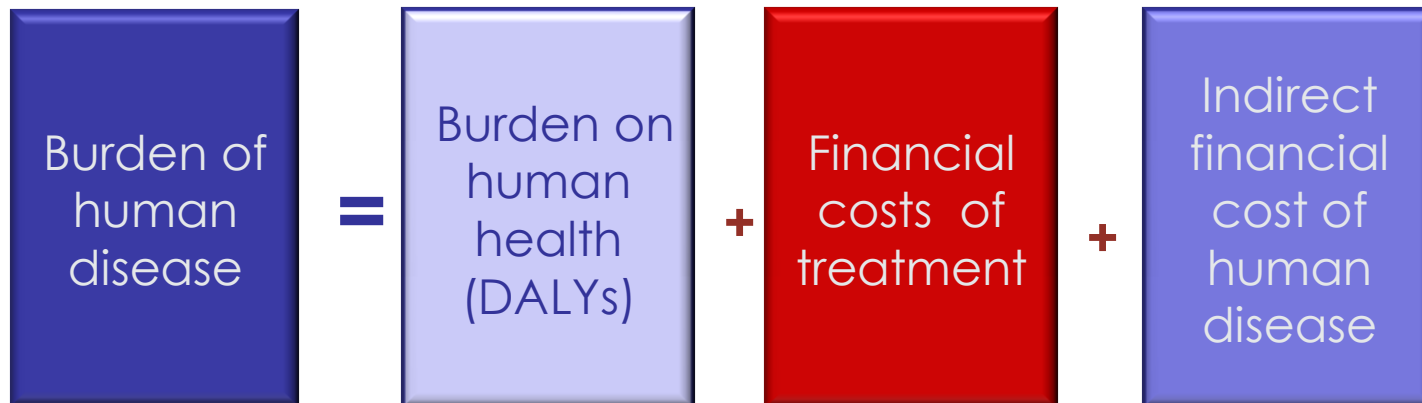


Zoonotic disease has a significant economic impact

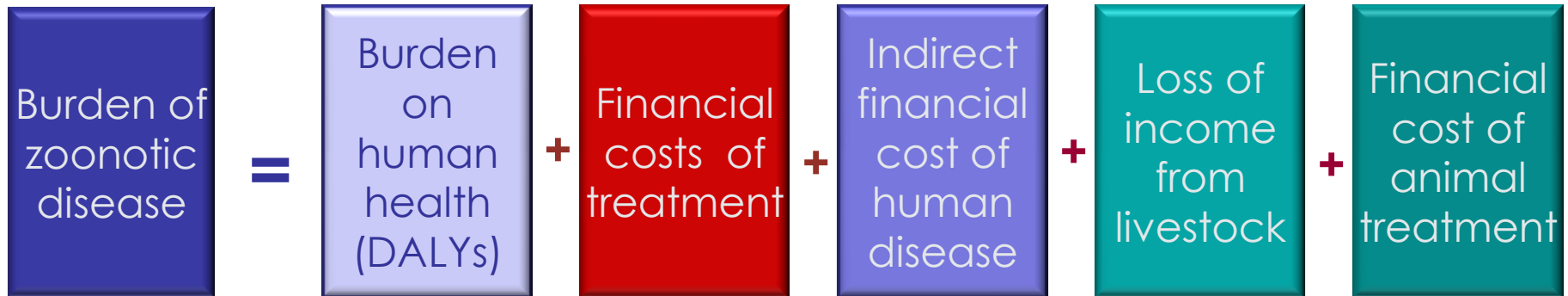


- 75% of African women are involved in agriculture
- Livestock accounts for approximately 30% of GDP in developing country economies
- Animal represent major asset to many families

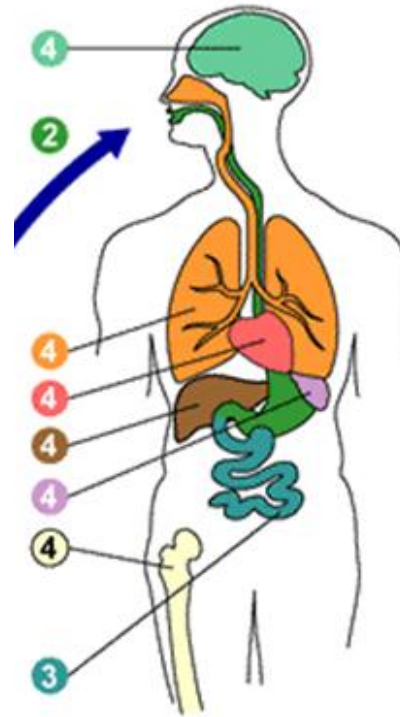
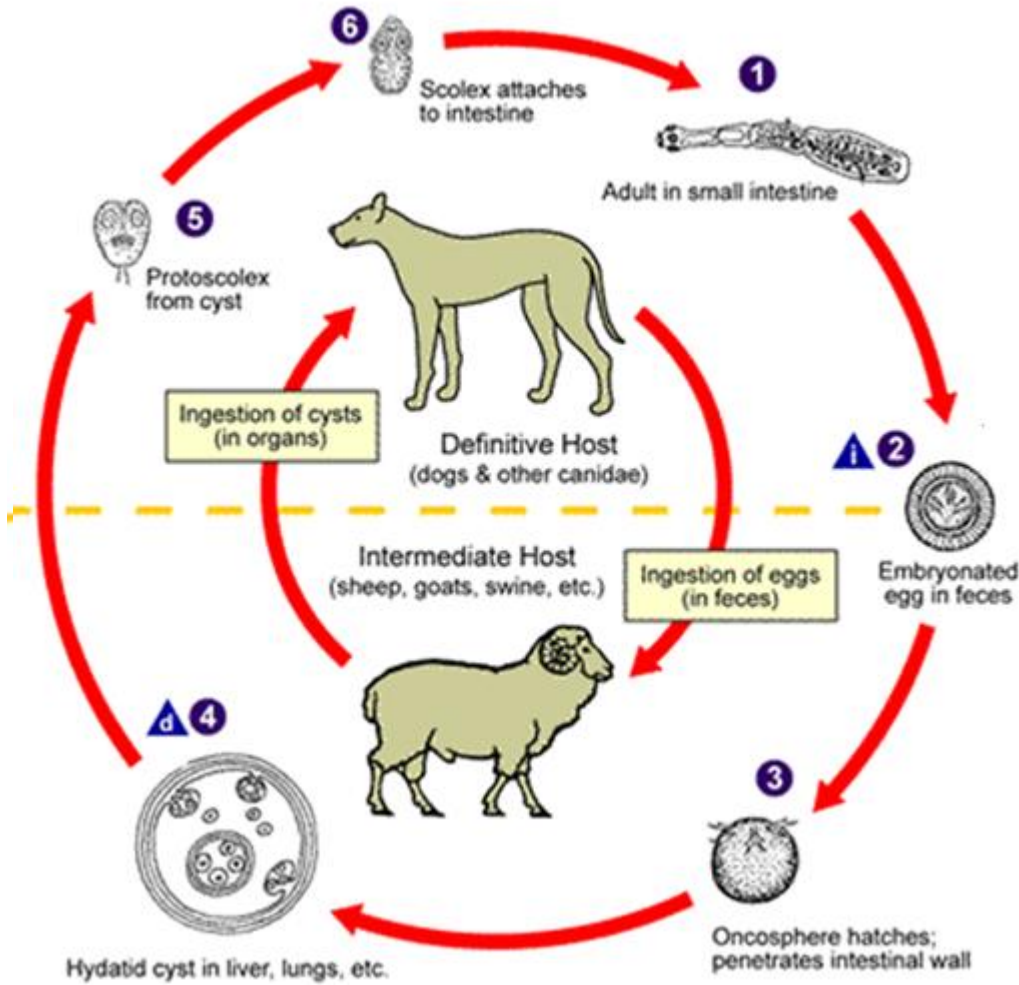
Measuring the impact of Diseases



Zoonotic diseases impose an additional burden on communities



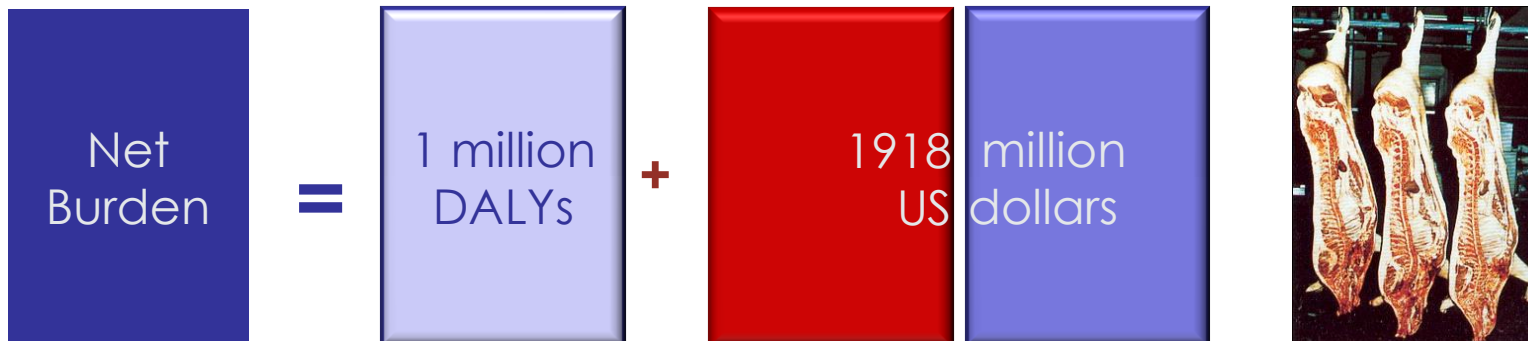
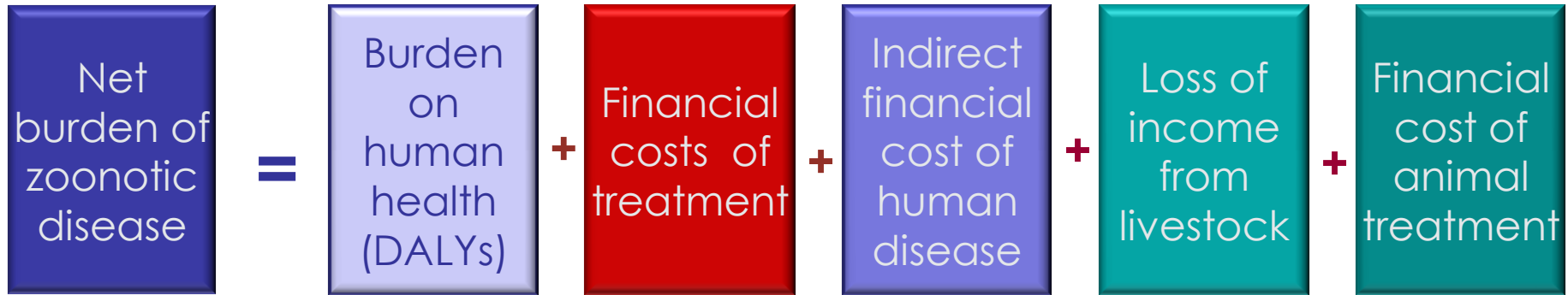
Echinococcus granulosa causes significant morbidity



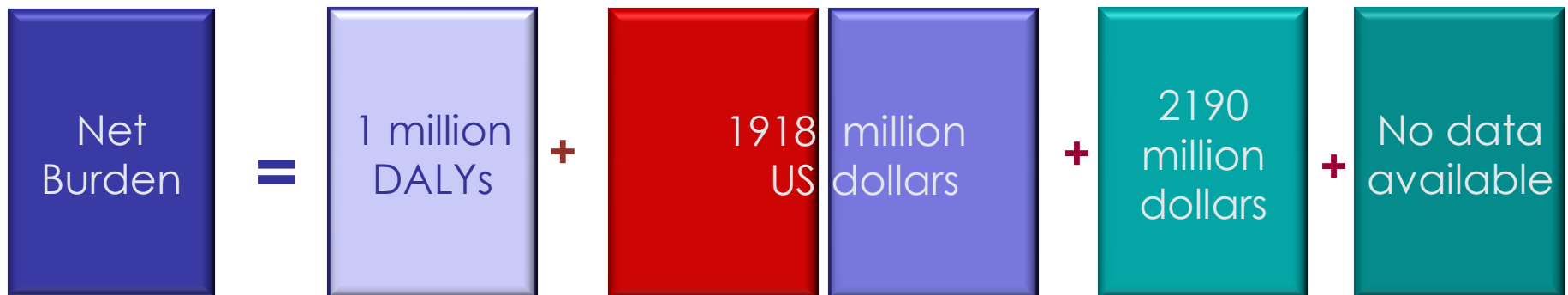
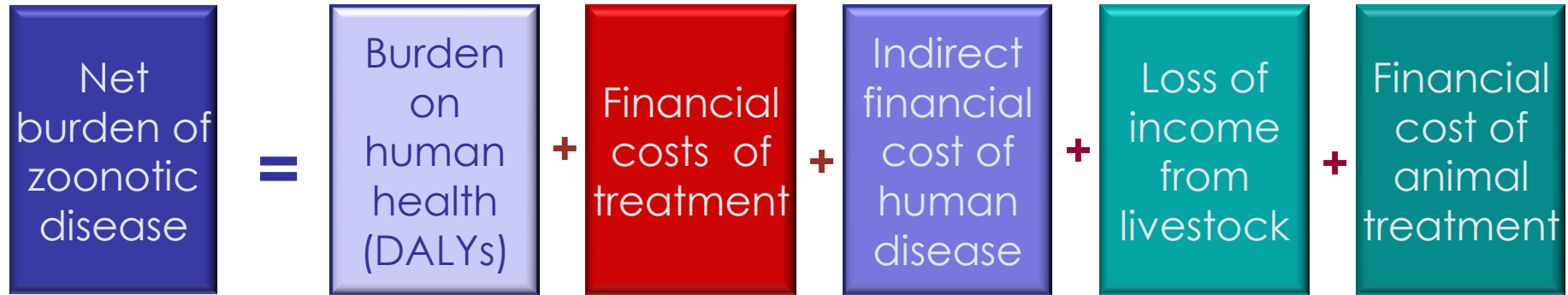
i = Infective Stage
d = Diagnostic Stage



Echinococcus granulosa causes significant morbidity and human costs



Echinococcus granulosa causes significant morbidity, human and animal costs





Health system strengthening HSS

THE WHO HEALTH SYSTEM FRAMEWORK

SYSTEM BUILDING BLOCKS

SERVICE DELIVERY

HEALTH WORKFORCE

INFORMATION

MEDICAL PRODUCTS, VACCINES & TECHNOLOGIES

FINANCING

LEADERSHIP / GOVERNANCE

ACCESS
COVERAGE

QUALITY
SAFETY

OVERALL GOALS / OUTCOMES

IMPROVED HEALTH (LEVEL AND EQUITY)

RESPONSIVENESS

SOCIAL AND FINANCIAL RISK PROTECTION

IMPROVED EFFICIENCY

Animal health sector have a significant role in the delivery of medical services



Simultaneous vaccination program targeting both livestock and children

Approximately 10% of nomadic children were fully immunized for the first time

More children and women were vaccinated per day during joint vaccination rounds.

Schelling, E., et al., *Synergy between public health and veterinary services to deliver human and animal health interventions in rural low income settings*. BMJ, 2005.

331(7527): p. 1264-7

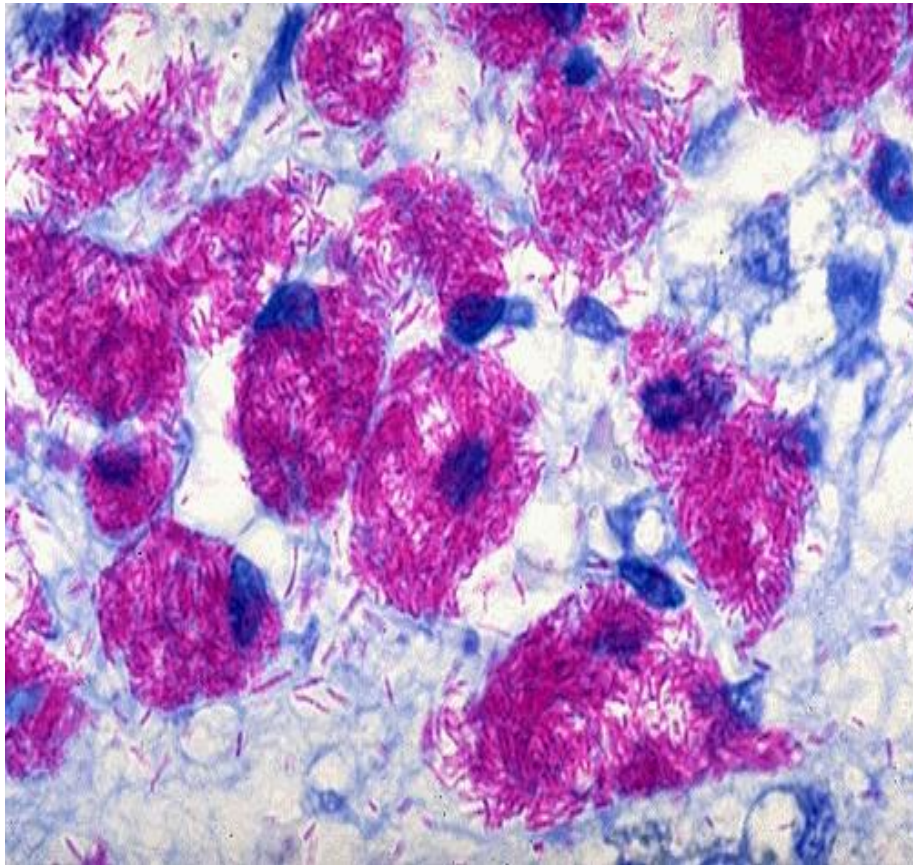
Vets contribute to the health work force



Photo: International Livestock Research Institute

With minimal training veterinarians can be incorporated in public health initiatives and may help to alleviate staff shortages seen in many remote rural areas that often hamper service provision

Example misdiagnosis of Human Tuberculosis



- 23 million DALYs ¹
- Casual agent in Africa
Mycobacterium tuberculosis ²
- Contribution of *M. bovis*
unknown ²
- *M.bovis* indistinguishable
symptoms from
*M.tuberculosis*³

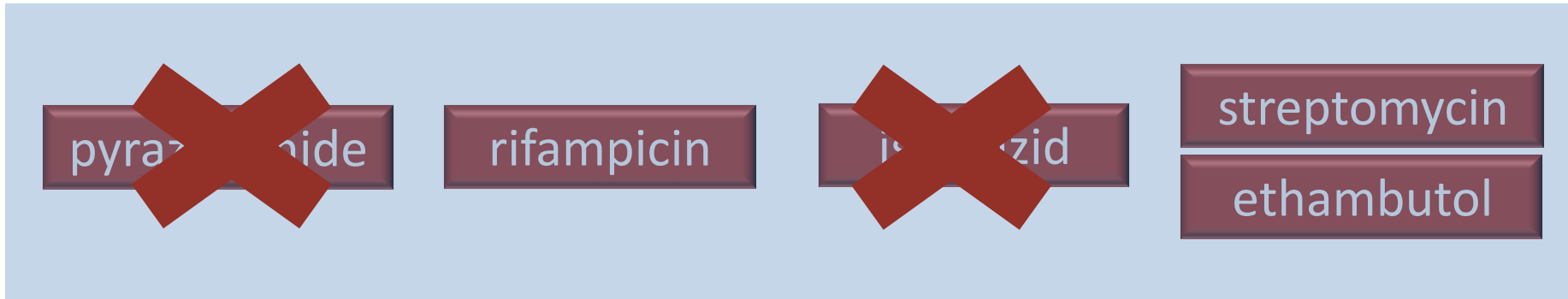
Human Tuberculosis



- Rural communities inhalation
Urban communities ingestion
- 36 % of tuberculosis in Tanzania due to *M.bovis* ¹
- 30- 40% of farm workers infected with *M.bovis* in Egypt ²

Implications for treatment of Tuberculosis

WHO recommended :



- Drug Resistance ¹
- HIV/AIDS alters susceptibility

Control strategies for bovine TB

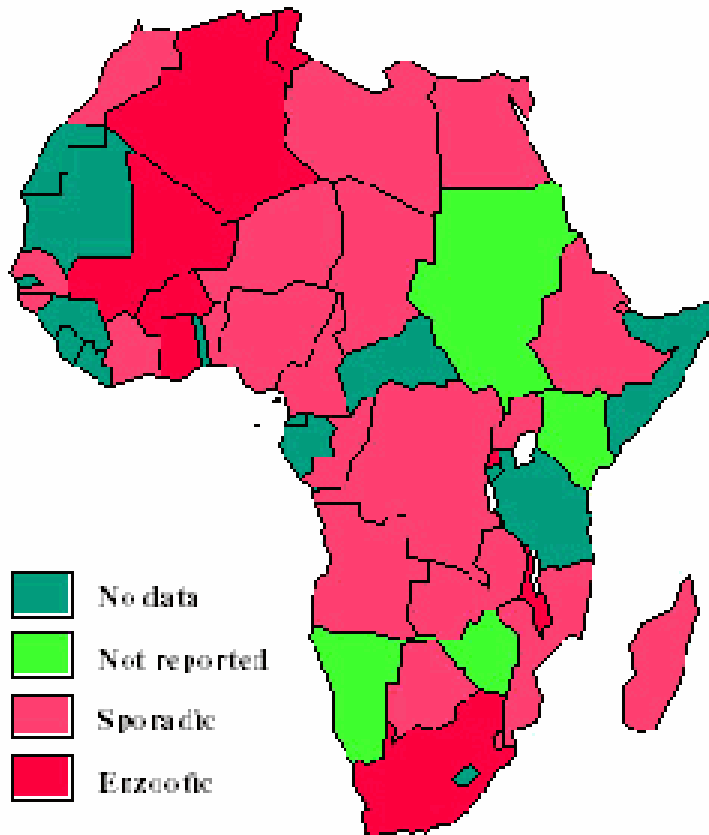
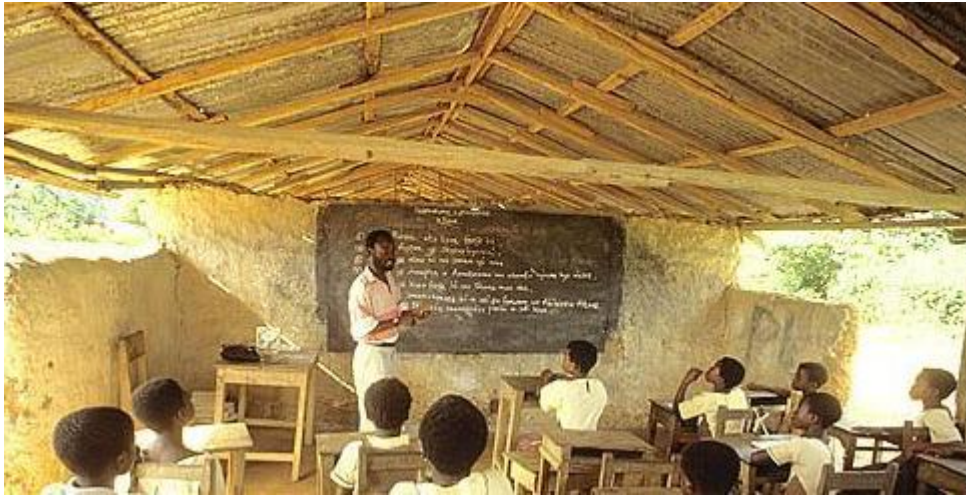


Figure 1 : Occurrence of *M. Bovis*



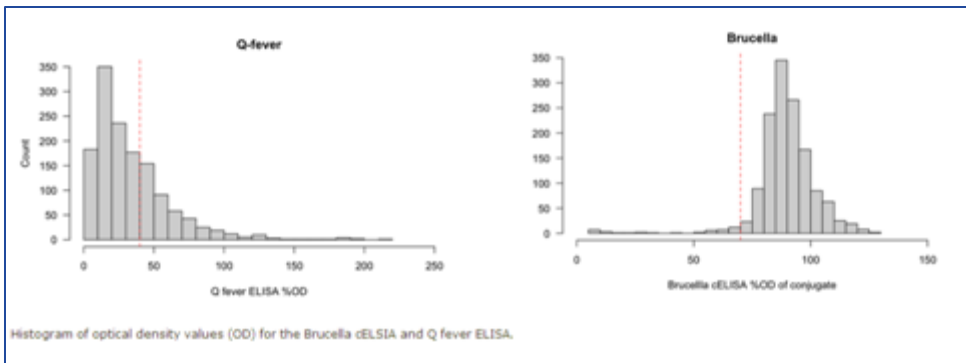
Figure 2 : *M. Bovis* control measures

Information and Data Collection

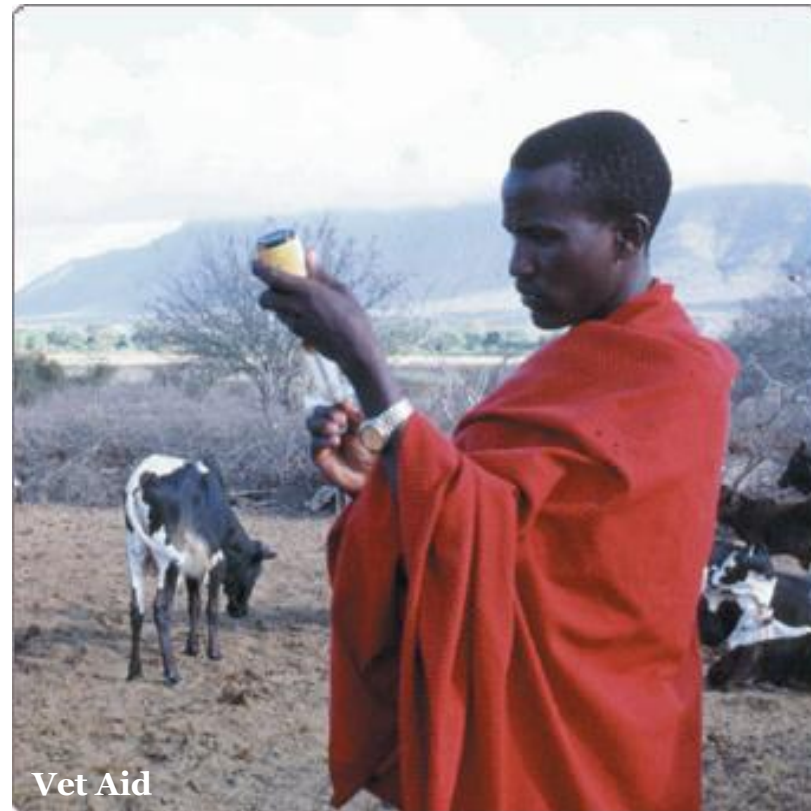


Raise awareness of disease control and hygiene measures, in “Information-Education-Communication” (IEC) campaigns

Timely and reliable collection of data on determinants of health as and performance of the health system.



Medical Products



In addition joint teams were able to develop a market for drugs of assured quality and efficacy

Health system Financing

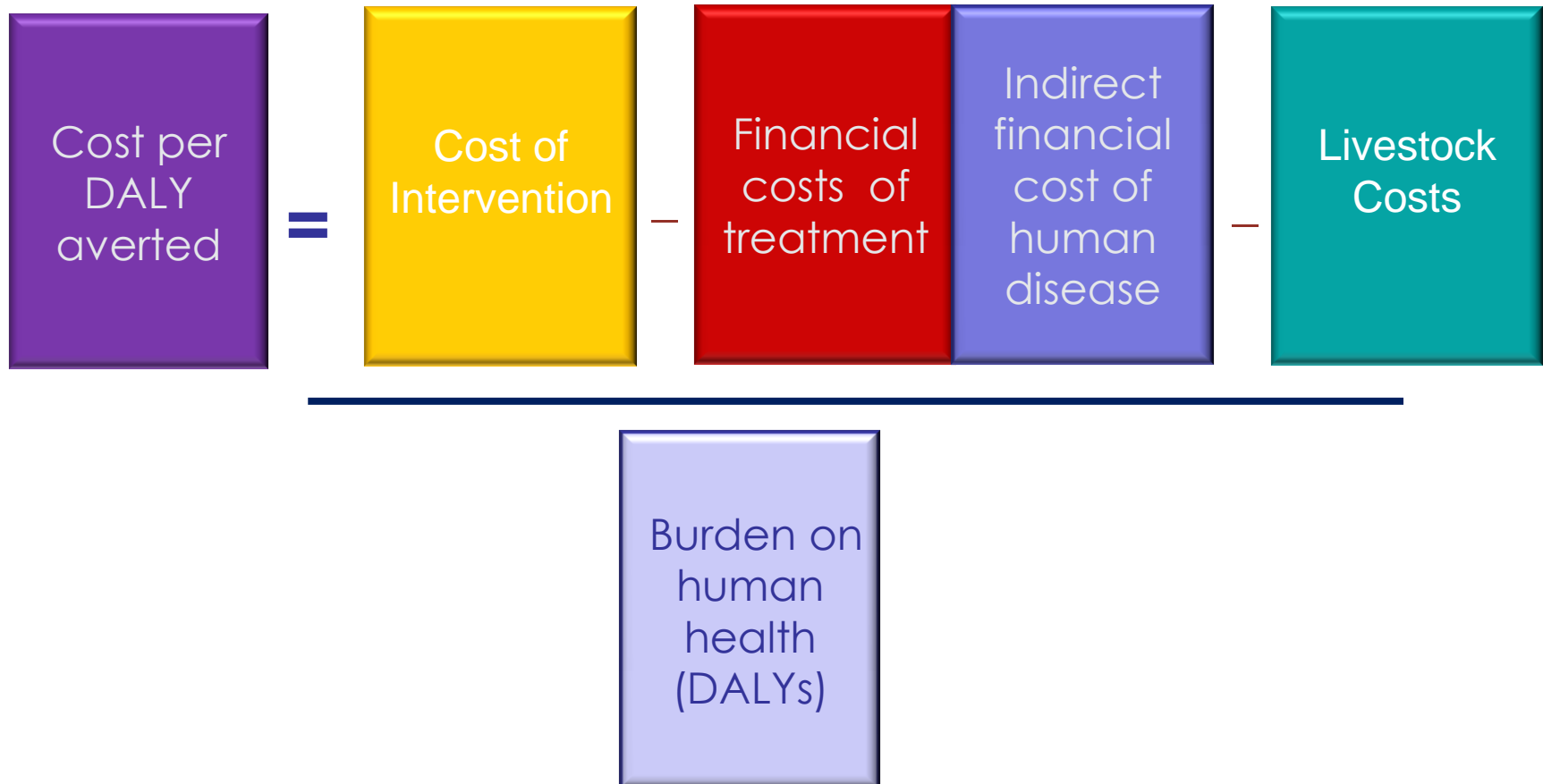


Sharing of logistics costs
(i.e., personnel,
transportation and cold
chain costs)

15% cost reduction in
some regions in Chad

Cost effectiveness studies
for brucellosis and rabies

Cost effectiveness of animal interventions



Rabies vaccination of dogs as human health intervention



Vaccination of cattle for brucellosis as a human health control program



US\$ 10

US\$ 10- 12

US\$ 19-85

US\$ 32-58

US\$ 19

Disease	Intervention	Cost per DALY averted
Rabies	Dog vaccination	
Brucellosis	Cattle vaccination	
Echinococcosis	De-worming domestic and stray dogs	
Malaria	Provision of nets & insecticide treatment	
Malaria	Residual spraying (two rounds per year)	

Comparison of cost per DALY averted for interventions for brucellosis in Mongolia, rabies in two districts in Tanzania, Echinococcosis globally and malaria in very low income settings.





Thank you for your attention

Human and Veterinary Medicine

- ***Verb . to vet, vett·ed, vett·ing***
to investigate carefully and pass as satisfactory
- ***Verb . to doctor , doc·tored, doc·tor·ing,***
To falsify or change in such a way as to make
favourable to oneself: *doctored the evidence.*