University of Glasgow

Bacterial Zoonoses & One Health

Jo Halliday

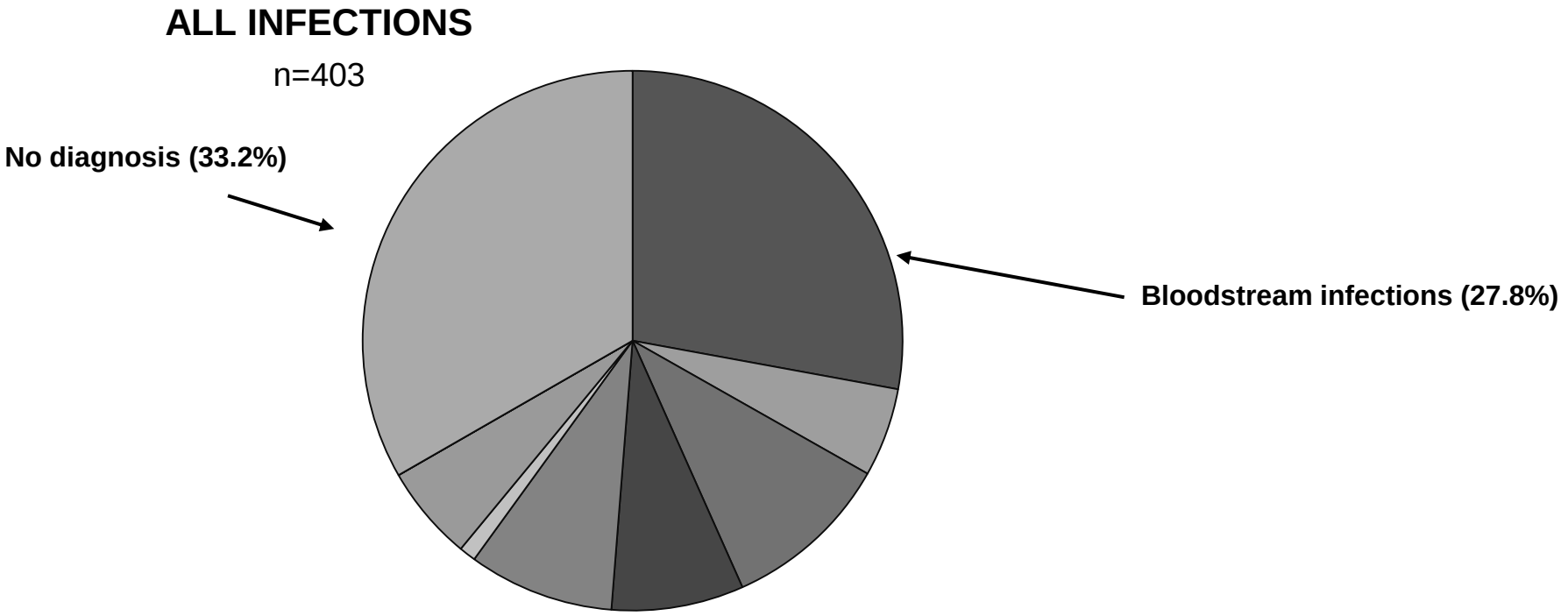
University of Glasgow

Jo.Halliday@glasgow.ac.uk

People & Acknowledgements

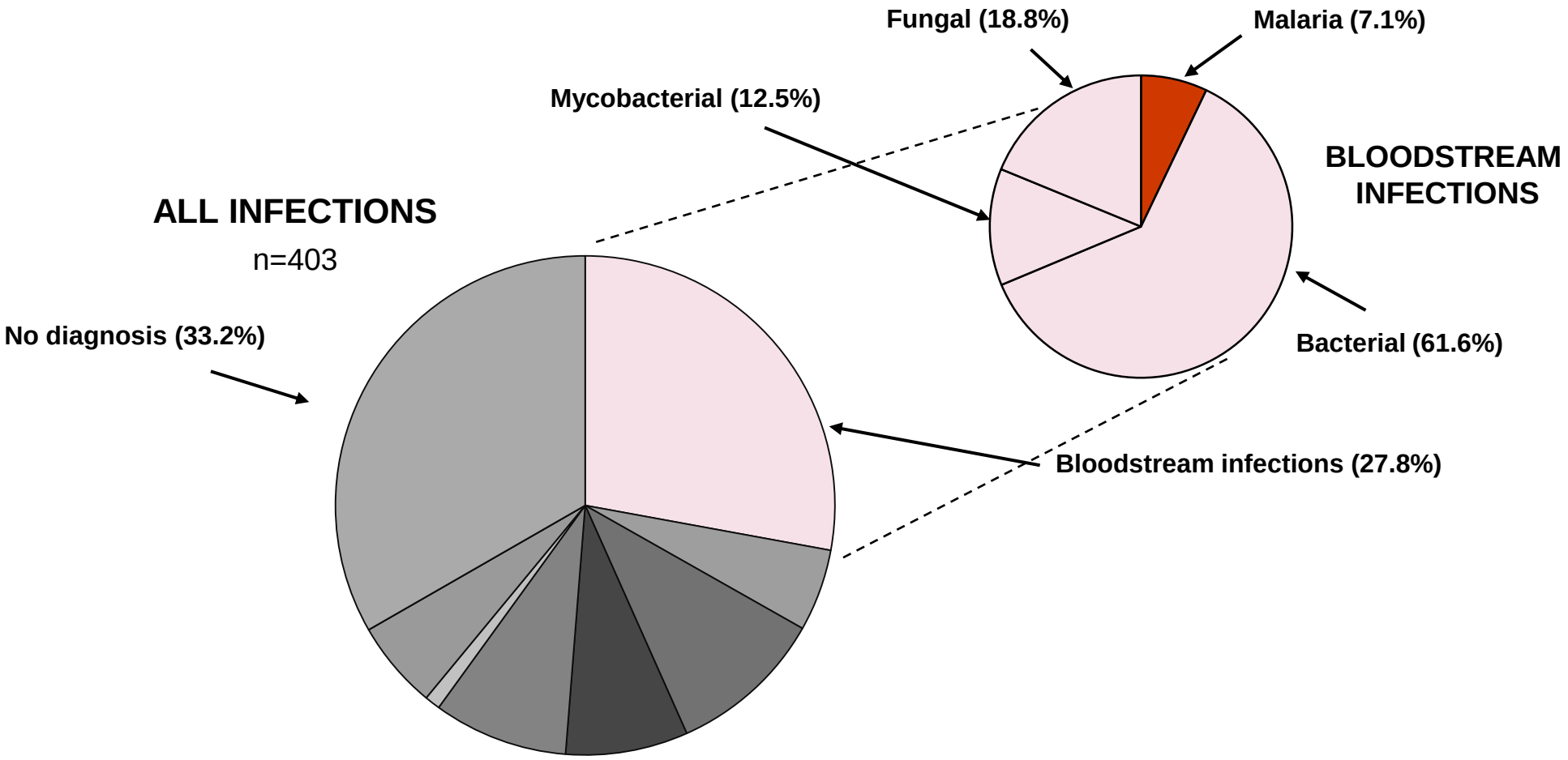
- Sarah Cleaveland
- John Crump
- Jo Sharp
- Dan Haydon
- Rudovick Kazwala
- Moshi Ntabaye
- Venance Maro
- Gibson Kibiki
- Holly Biggs
- Matthew Rubach
- Kathryn Allan
- Georgia Ladbury
- Tito Kibona
- Denice Luwumba
- Kunda Mnzava
- Nchai Lazaro
- Matayo Lazaro
- Rigobert Tarimo
- Euphrasia Mariki
- Bora Almasy
- Theonest Ndyetabura

Data informing the study Fever Etiology Study in Moshi Adolescents and Adults



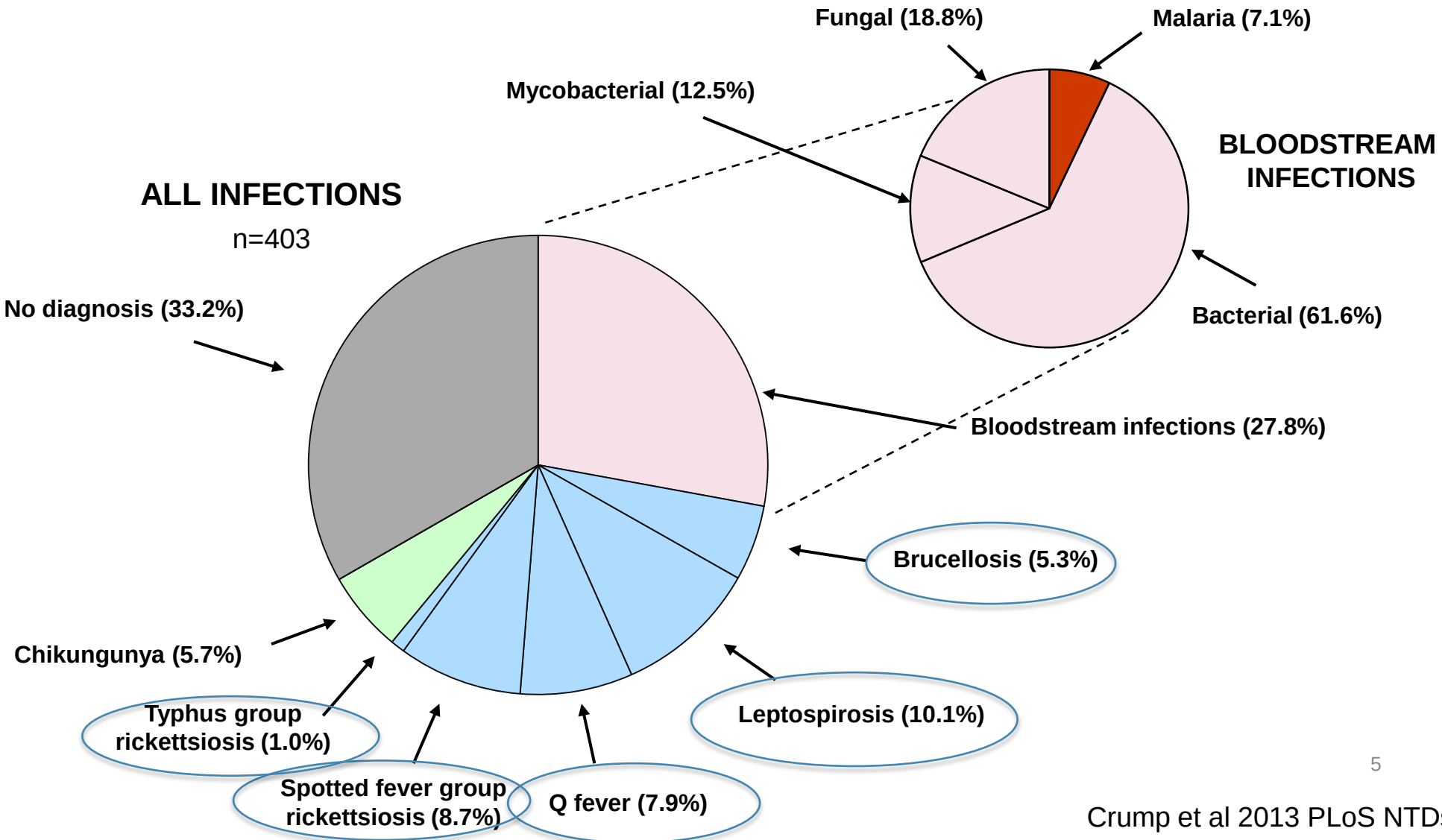
Crump et al 2013 PLoS NTDs

Fever Etiology Study in Moshi Adolescents and Adults



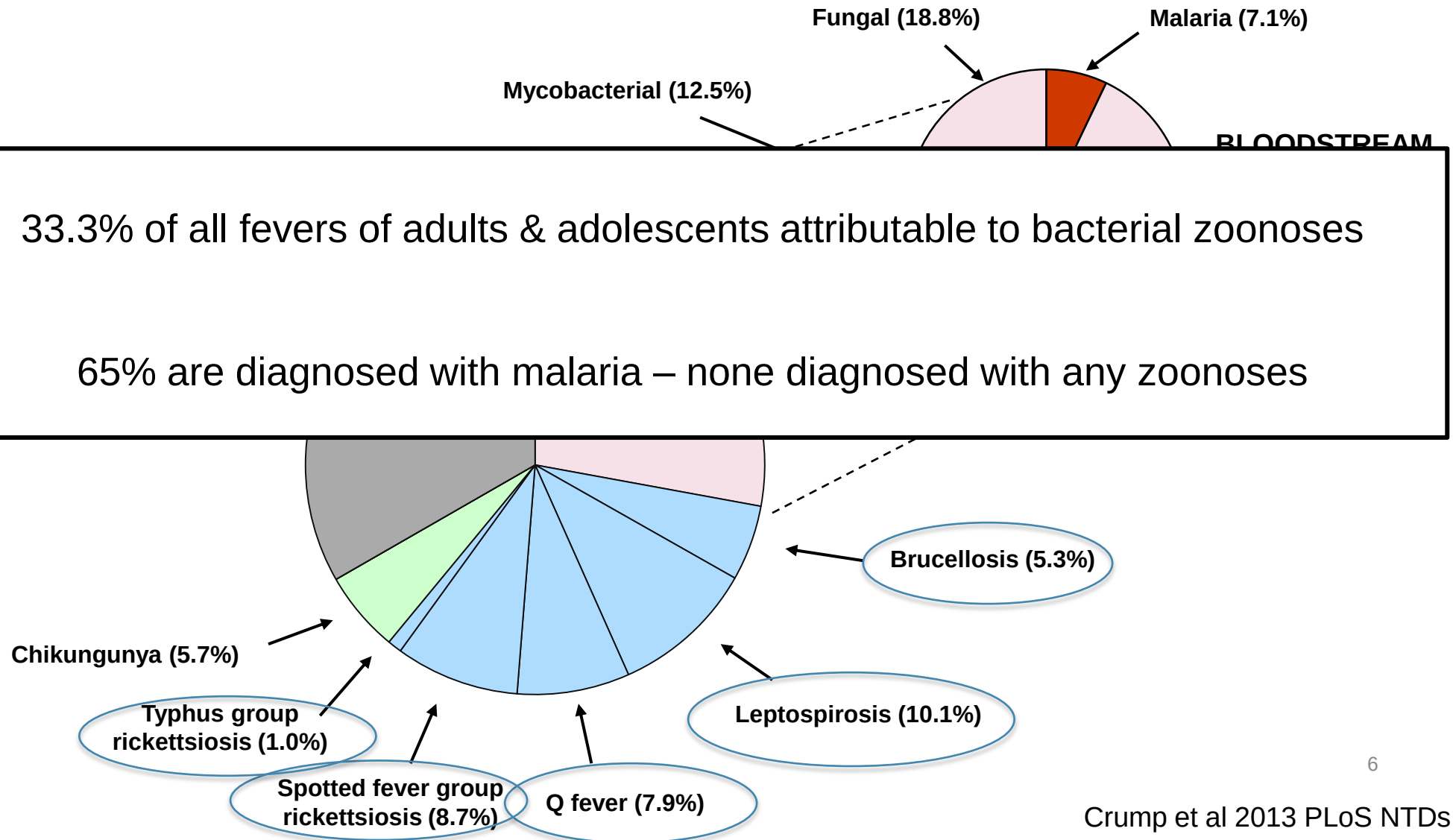
Crump et al 2013 PLoS NTDs

Fever Etiology Study in Moshi Adolescents and Adults



Crump et al 2013 PLoS NTDs

Fever Etiology Study in Moshi Adolescents and Adults



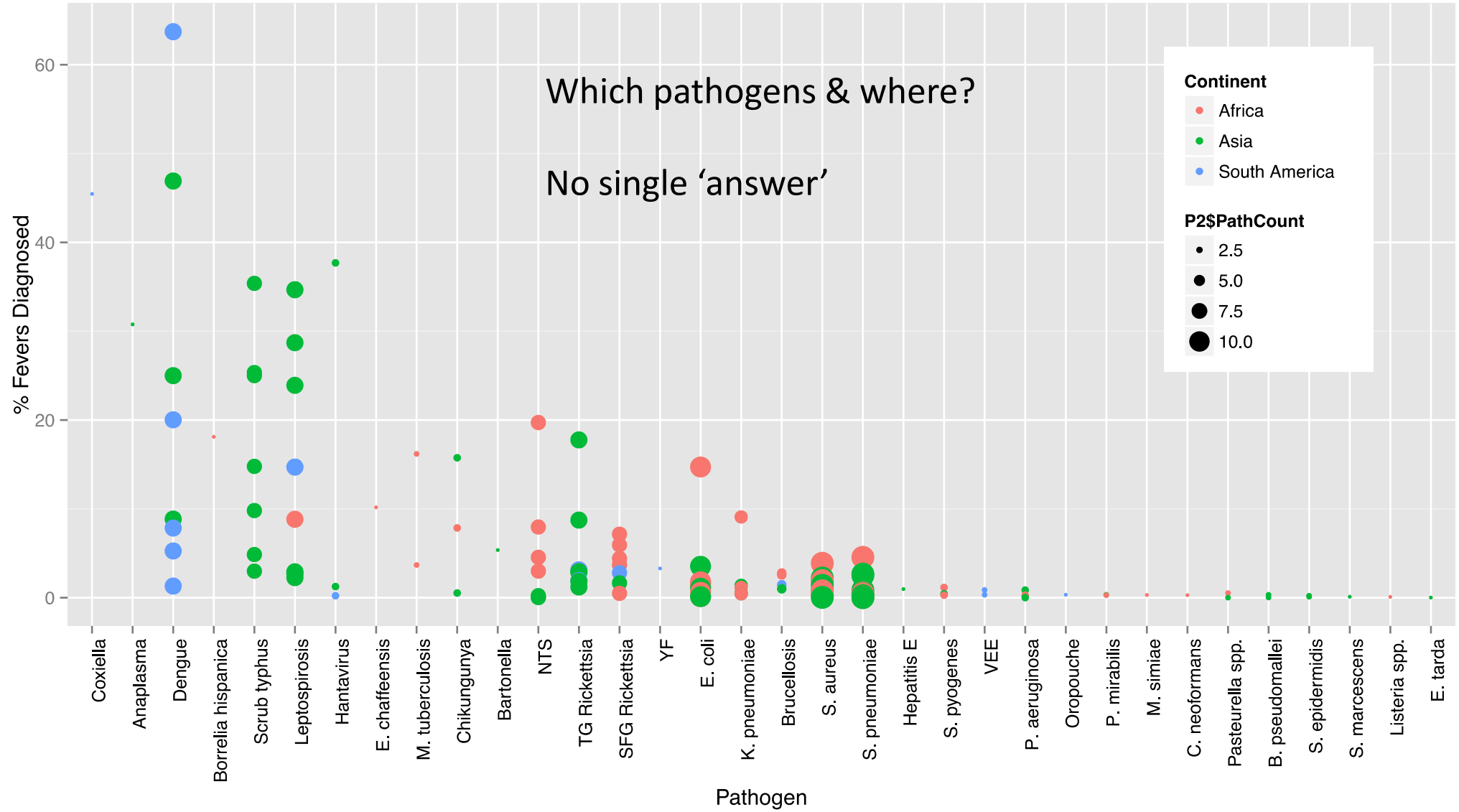
33.3% of all fevers of adults & adolescents attributable to bacterial zoonoses

65% are diagnosed with malaria – none diagnosed with any zoonoses

Crump et al 2013 PLoS NTDs

University of Glasgow

Zoonotic Causes of Fever
Review of Data from Malaria Endemic Countries



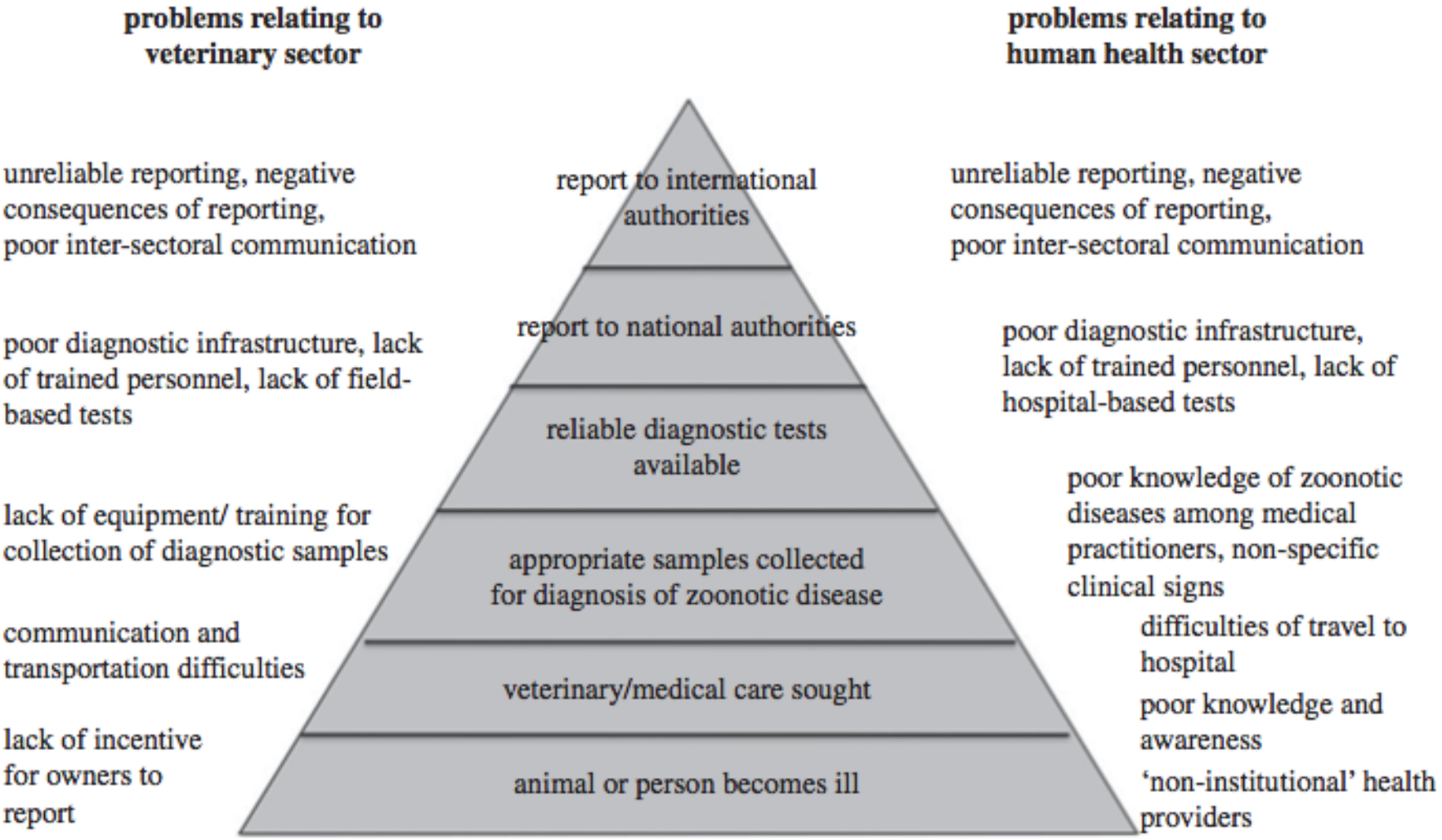
Impact of zoonoses in livestock

- Livestock are crucial for the livelihoods of over 1 billion people worldwide

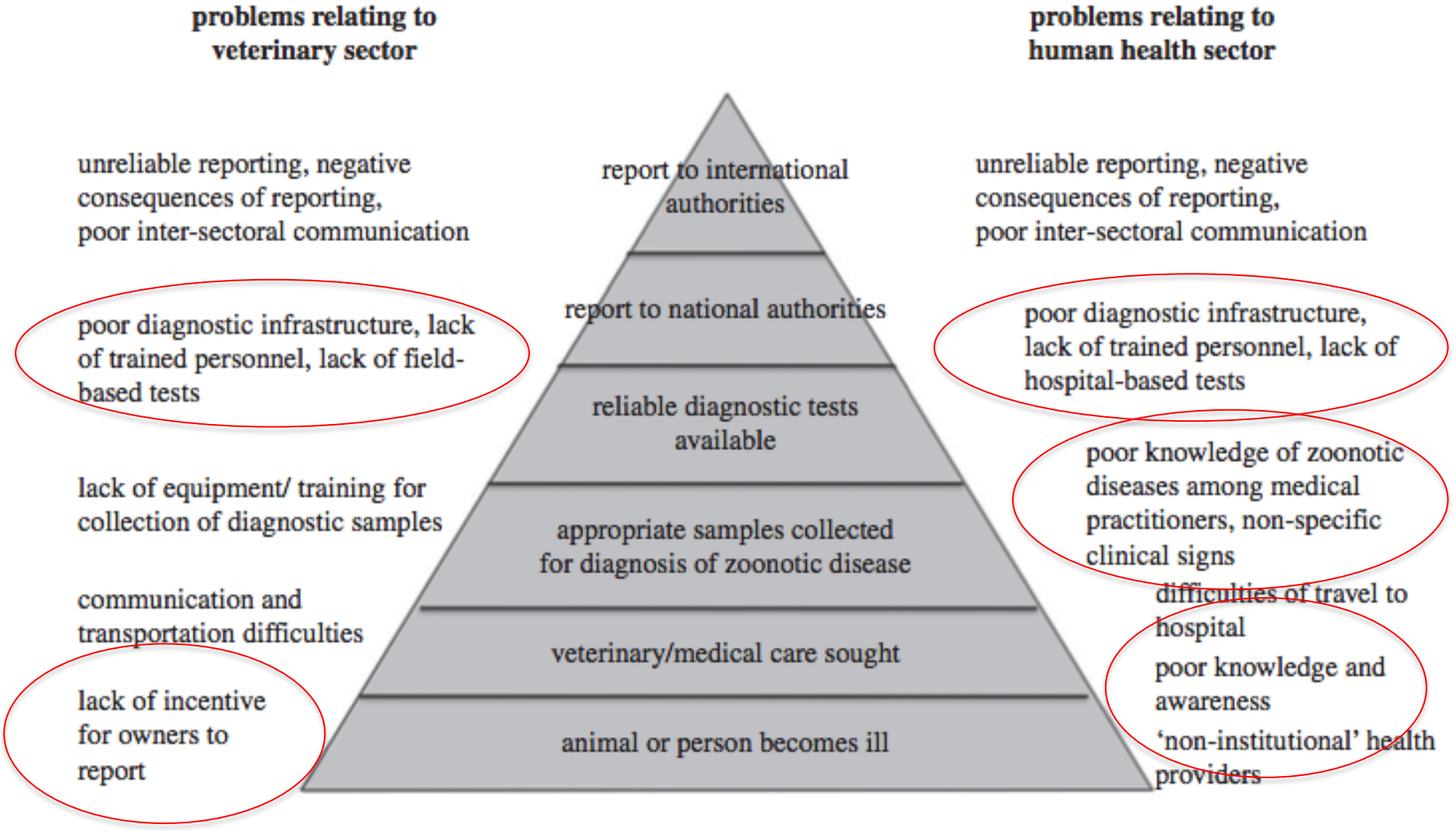
- As well as the human health impacts, many zoonoses have considerable productivity impacts in livestock
  - Reduced animal condition/weight
  - Milk drop
  - Reproductive failure and abortions

- Health impacts in humans and animals (and knock-on) economic impacts are under-reported…..

Under-reporting of zoonotic diseases



Under-reporting of zoonotic diseases



Bacterial Zoonoses Project: Study Rationale

- Several bacterial zoonoses are major but underappreciated causes of febrile illness requiring admission in northern Tanzania
  - Brucellosis
  - Leptospirosis
  - Q fever

- Many also have considerable impacts on livestock productivity and knock-on socio-economic impacts in livestock dependent societies…

- **Where and how are people getting these infections?**

- **Understanding the epidemiology and full range of impacts of these bacterial zoonoses (and informing their control) requires a 'One Health' approach…**

Q fever, brucellosis and leptospirosis

- Caused by various species/subtypes of *Coxiella*, *Brucella* and *Leptospira* bacteria

- Broad range of clinical manifestations in humans. Fever +

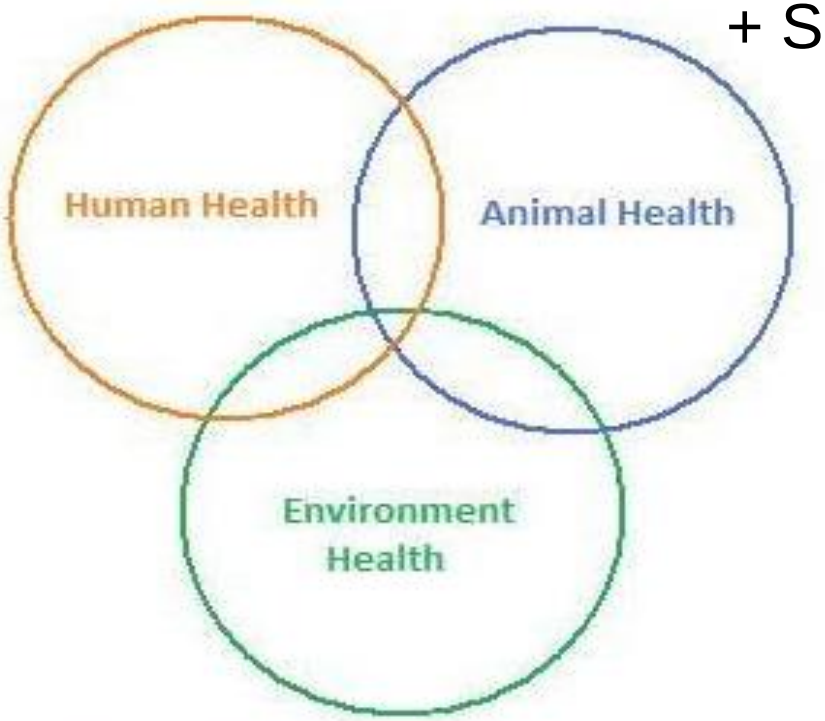
- All infect people, cattle, sheep and goats…
  - Rodents also important for *Leptospira* epidemiology in many areas
- All occur in most countries/regions worldwide

- Transmission routes often associated with contact with livestock, livestock products and/or environmental variables

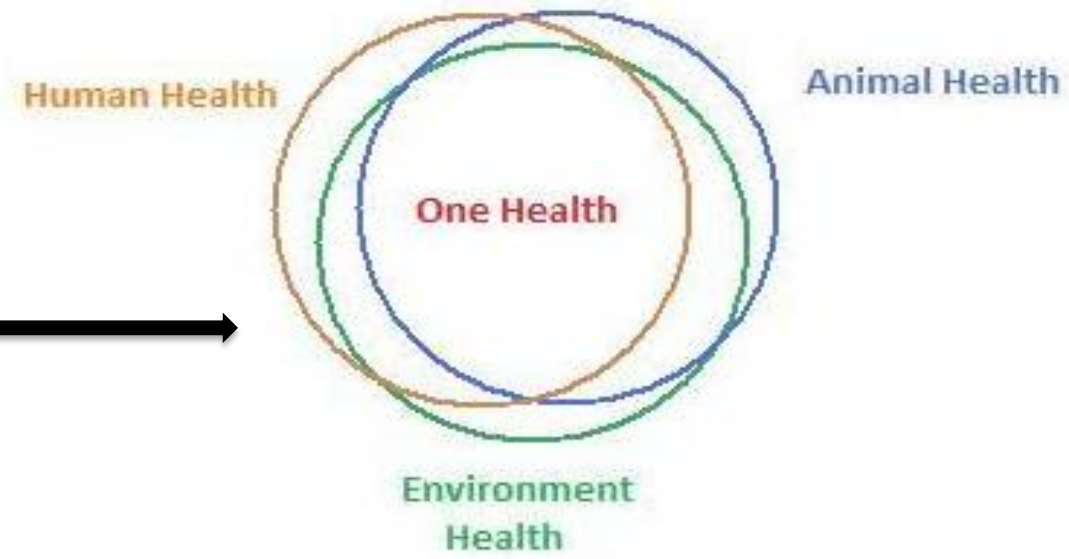
- Common questions:
  - Roles of different species in maintenance and transmission?
  - Which animal hosts represent the greatest risk for humans?
  - Severity of impacts?

How: One Health

Integration of disciplines & perspectives
+ Social sciences?



Traditional perspective of public health



One Health approach

Gaël Lamielle ©

University of Glasgow

One Health Research Tanzania

- Close associations between people and livestock create circumstances in which zoonoses can have huge impacts.
- However, these circumstances also create the opportunities for One Health approaches to have their greatest impacts.
- Intuitive understanding of the associations between human, animal and ecosystem health.
- Relative lack of disciplinary boundaries to overcome e.g. between medical and veterinary professionals
- > Opportunity for Tanzania and other countries to lead in the practice of One-Health.

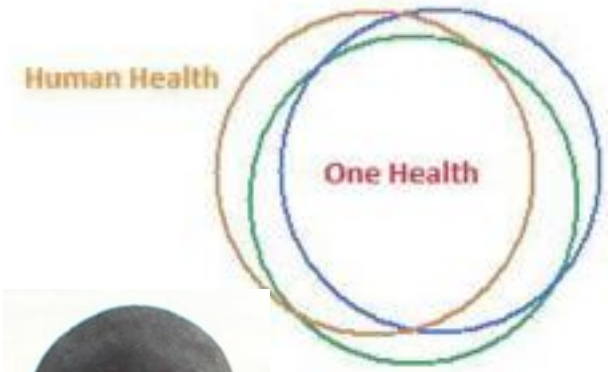
Bacterial Zoonoses Project Field Team

Euphrasia Mariki

Tito Kibona &
Denice Luwumba

Beata Valerian

Kunda Mnzava



Matayo Lazaro

Nchai Lazaro

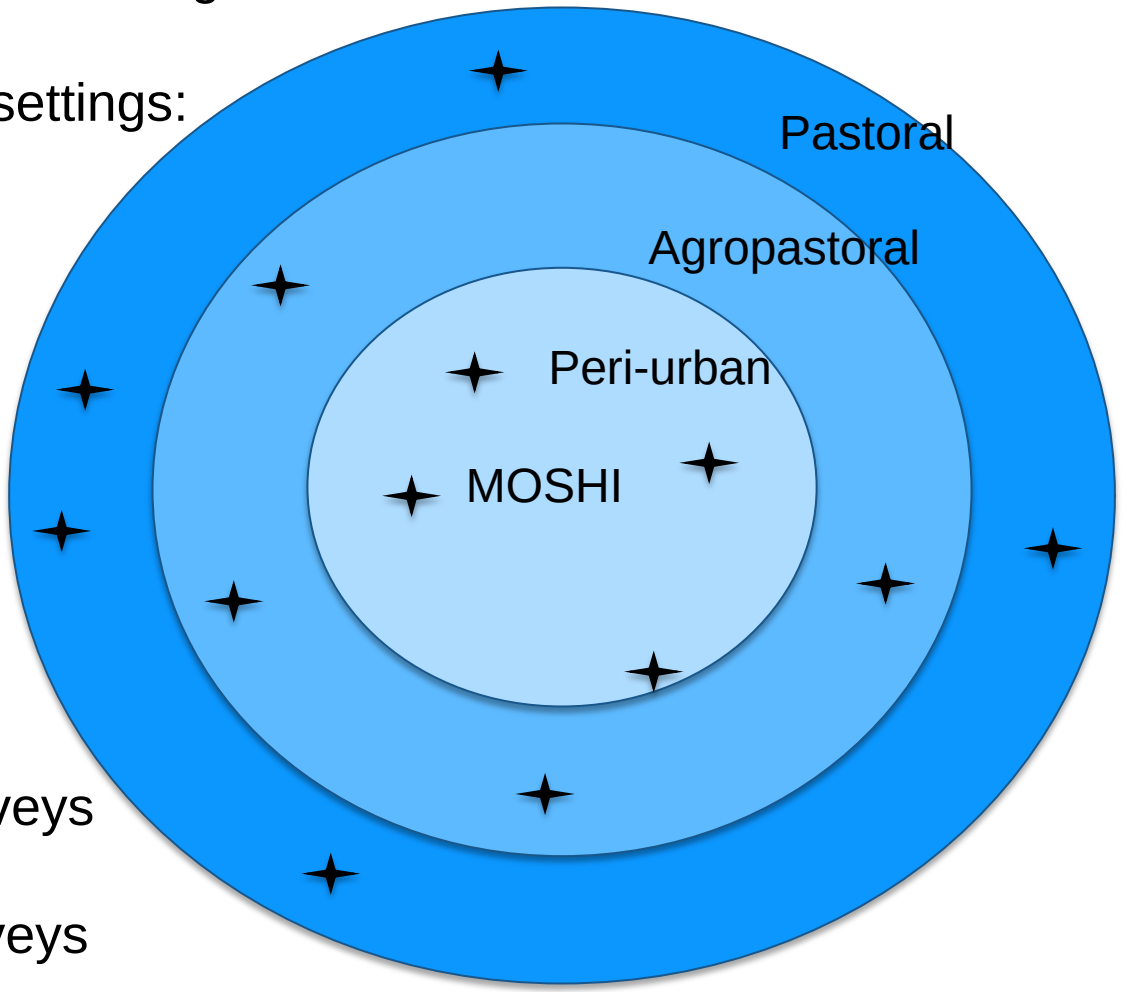
Zanuni Kweka

Rigobert Tarimo

Cross-Sectional Study Overview

Random selection of wards/ subvillages & villages

Villages selected in 3 agro-ecological settings:
Peri-urban / Agropastoral / Pastoral



‘Sample’ one village at a time

- Focus group discussion
- Household visits

Household visits:

- Household questionnaire survey
- Human sampling
- Individual human questionnaire surveys
- Livestock sampling
- Individual animal questionnaire surveys

Ongoing Research






- People acquiring these zoonoses. Who, where and how?
- Quantifying impacts (human and animal health)
- Identification of high risk populations and intervention points for targeted control
- Interventions aimed at animal populations – multiple benefits

Bacterial Zoonoses Study Outputs & Next Steps...

- Evidence of importance & impacts

- Improved understanding of transmission processes
  - Where & from which species (& individuals) are people acquiring their infections?
  - Structure of the animal reservoir populations?....

- What are the (realistic) options for controlling these diseases and reducing their impacts?
- What impact would potential control measures have?

- Promoting awareness of these pathogens and their impacts...

Research (and education) priorities

- Improved awareness among medical clinicians about possible zoonotic aetiologies of common human disease syndromes
- Improved diagnostic tools for effective clinical management
- Linked human-animal health studies to quantify impact, identify risk factors and critical points for targeting interventions
- More effective measures for reducing infection in animals and preventing zoonotic transmission to people

University of Glasgow

Jo Halliday
University of Glasgow
Jo.Halliday@glasgow.ac.uk