World Organisation for Animal Health
Founded as OIE

2nd Meeting of the Eastern Africa Sub-Regional Network for Rabies Control

10 – 12 October 2023 Addis Ababa, Ethiopia

Title:

Name:

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MINISTRY OF AGRICULTURE

PC-TAD

BMZ Federal Ministry for Economic Cooperation and Development

Research to support the control of Neglected Zoonotic Diseases

Lian Thomas

International Livestock Research Institute & University of Liverpool

World Organisation for Animal Health
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BMZ Federal Ministry for Economic Cooperation and Development
MINISTRY OF AGRICULTURE

Presentation Outline

- An introduction to ILRI & The BMZ One Health Research Outreach & Education Centre in Africa
- Rabies: A Neglected Tropical Disease
- Implementation research relevant to rabies control in East Africa
- The Economics of a One Health Approach to Rabies Control
- Critical gaps in rabies research in the region

Who is ILRI?

https://www.cgiar.org

CGIAR global partnership for a food secure future

- Poverty alleviation through agricultural research
- 15 research centres
- More than 8,000 scientists, researchers, technicians and support staff

ILRI

- Transforming lives through livestock
- co-hosted by both the governments of Ethiopia and Kenya
- Offices in 8 other countries in Africa (Burking Faso, Burundi, Mali, Nigeria, Senegal, Tanzania, Uganda and Zimbabwe); 4 countries in Asia (China, India, Nepal and Vietnam).
- Approximately **600 permanent staff** (40% female and 60% male)

ILRI INTERNATIONAL LIVESTOCK RESEARCH INSTITUTE

CGIAR

ILRI One Health Strategy

A holistic approach to preventing pandemics/epidemics and other microbial threats from animals/environment

Vision

- To improve the lives, livelihoods and well being of people in the global south by building healthy, sustainable and resilient systems at the intersection of humans, animals and the environment.

Key thematic areas

- Epidemics and pandemics caused by (re)-emerging viruses & Endemic zoonoses
- Food safety
- Antimicrobial Resistance

https://hdl.handle.net/10568/125264

https://www.ilri.org/one-health

One Health Research & Capacity Strengthening

OHRECA
One Health Centre in Africa

COHESA
Capacitating One Health in Eastern and Southern Africa

BUiLD
Boosting Uganda's Investment in Livestock Development

CGIAR
Protecting Human Health Through a One Health Approach

OH 4 HEAL

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BMZ One Health Research, Education & Outreach Centre in Africa (OHRECA)

In Africa, human pressure on the environment is jeopardizing the health of humans, livestock and wildlife, a problem worsened by underfunded and poorly performing health services.

CAPACITY DEVELOPMENT

WP1
Hazards: Evidence that counts

WP2
Interventions, implementations and assessments

WP3
Networks and Partnerships

OUTCOME

Evidence generated on hazards of interest, quantification, prevalence, risk-based control

Technical interventions using a One Health approach are tested and documented by OHRECA and partners

Public and private sector cooperative mechanisms are reviewed and improved, enabling the adoption of evidence based One Health policies and practices

CAPACITY DEVELOPMENT

IMPACT

Strengthen evidence-based policies and practices in 8 countries in Sub-Saharan Africa implemented through improved national and regional One Health capacities in sub-Saharan Africa

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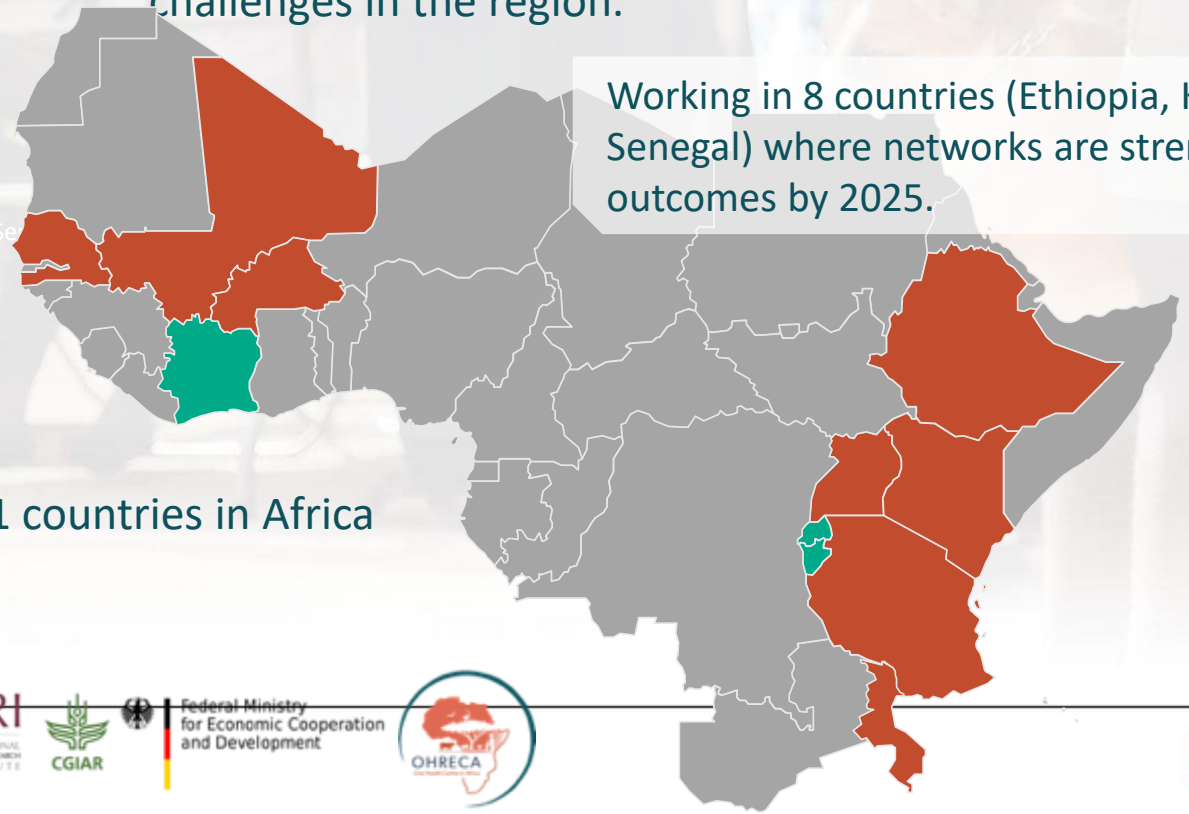
BY 2025

- Food safety benchmarking will be implemented by EAC across 7 countries in Africa
- Updated National Action plans on AMR in Uganda, Kenya and Malawi
- National One Health platforms strengthened in 8 OHRECA countries
- One Health approaches are adopted for Key One Health challenges in Kenya, Uganda, Mali and Burkina Faso

OHRECA aims to **support applied research and build capacity** to **generate new knowledge**, **develop skills** and **identify incentives that would strengthen One Health policies and practices** for the prioritized health challenges in the region.



Working in 8 countries (Ethiopia, Kenya, Tanzania, Uganda, Malawi, Burkina Faso, Mali and Senegal) where networks are strengthened, and new partnerships are built to achieve outcomes by 2025.

11 countries in Africa

OHRECA Focus Areas

NZD | Food safety | AMR | EID's

ILRI | CGIAR | Federal Ministry for Economic Cooperation and Development | OHRECA | World Organisation for Animal Health Founded as OIE | PC-TAD | BMZ Federal Ministry for Economic Cooperation and Development | Ministry of Agriculture

WOAH – ILRI Memorandum of Understanding

- Signed at the 90th General Assembly
- Strategic Collaboration to protect animal health and promote sustainable agriculture
- Commitment to work together to tackle emerging challenges through a One Health approach

Appolinaire Djikeny (ILRI DG) & Monique Eloit (WOAH DG)
25th May 2023

Neglected Zoonotic Diseases Theme

Expected Outcome:

- Sustainable & scalable control strategies for NZDs utilizing a One Health approach identified, supported by empirical evidence

Expected key outputs:

- Quantitative & Qualitative **evidence generation** on cost-effectiveness, feasibility and acceptability of control and surveillance interventions
- One Health **capacity strengthening** through graduate fellowships and engagement of implementation partners within government and non-governmental institutions
- Strengthened **One Health Networks** in the region for advocacy and action

Rabies: A Neglected Tropical Diseases

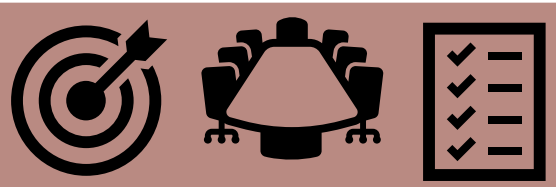
- Neglected Tropical Diseases:
  - disproportionately affect poor and marginalized populations
  - Are relatively neglected by scientific research and public/private funding, compared to the magnitude of the health problem
- 20 NTDs recognized with control/elimination targets in the WHO Roadmap for NTDs of which 10 are zoonoses/have a zoonotic component
- WHO roadmap for NTD control supports SDG indicator 3.3 ‘“end the epidemics of HIV, tuberculosis, malaria and neglected tropical diseases” through 75% reduction in DALYs from NTDs by 2030
- Key Pillars: Accelerate Action, Integration, Country ownership

Understanding the context of NTD control

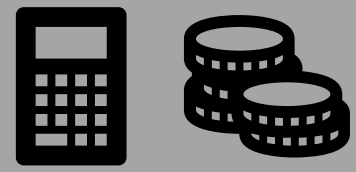
Epidemiological, Soco-cultural-economic factors

Geographical & Environmental factors

Intervention



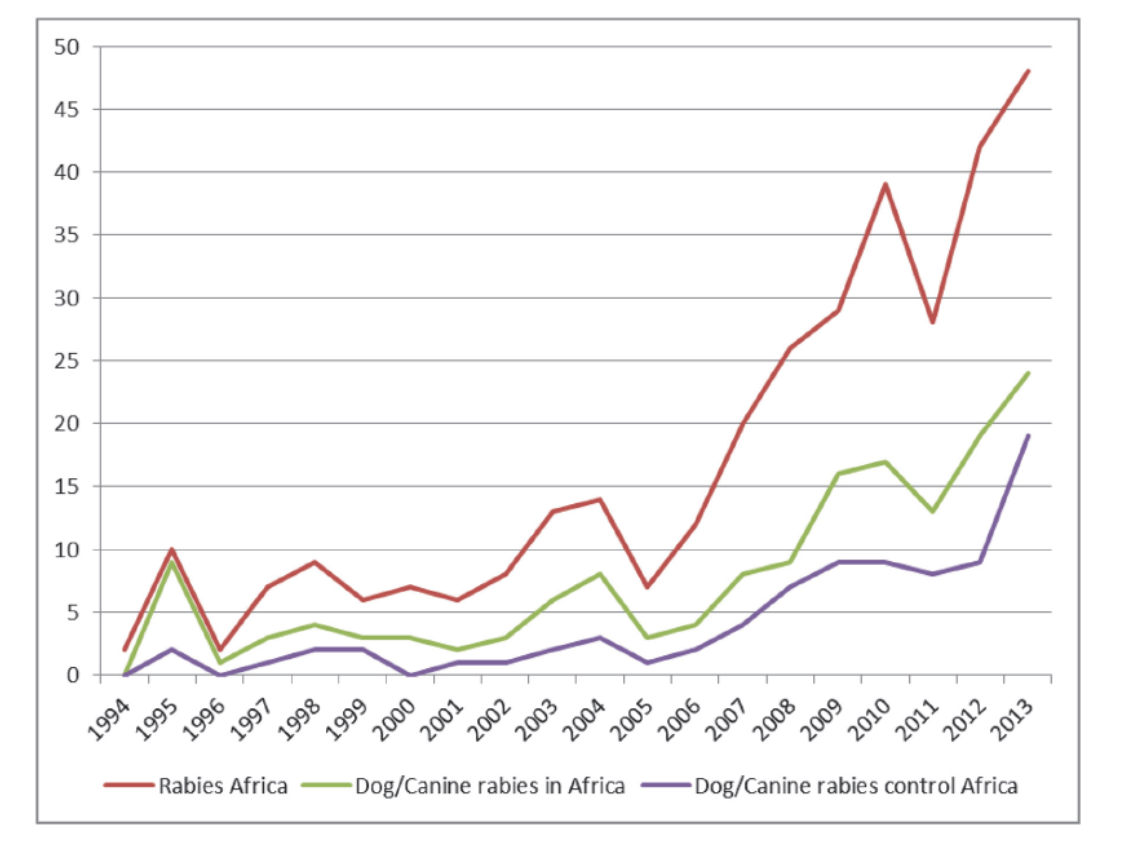
Governance & Operational factors



Economics of Control

Adapted from Ngwili et al., 2021 https://doi.org/10.1371/journal.pntd.0009470

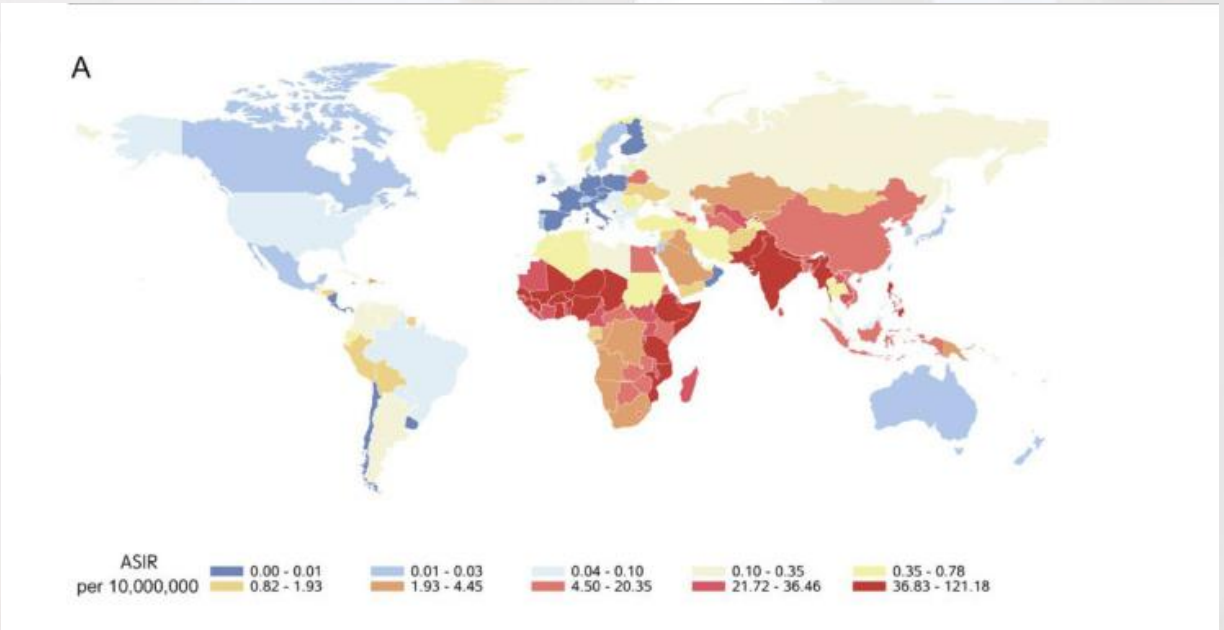
Trend of Rabies Research in Africa



Jibat et al., 2015 DOI:10.1371/journal.pntd.0003447

Global Burden of Rabies 2019

- 2019 update of Global Burden of Rabies
- 14,076 indecent cases (95% UI 6,124-21,618)
- 13,743 deaths (95% UI 6,019-17,938)
- 782,052 DALYS (95%UI 320,289-1,081,217)
- Low Socio-Demographic Index (SDI) regions burden 581 x high SDI
- Demonstrated 45% decline in DALY burden from 1990
- Zero deaths in 34/204 countries
- 2030 prediction 5810 deaths



Age Stangardised Incidence Rate (ASIR) per 10,000,000 2019 Gan et al., 2023
https://doi.org/10.1016/j.ijid.2022.10.046

Challenges in Burden Estimation

- Barriers to accessing health care
- Lack of confirmatory diagnostics of human cases
- Poor reporting structures
- Burden estimates use non-statutory data sources
  - Hampson 2015 136 experts
  - GBD 2019 3348 sources globally
  - ONLY 13 from Eastern SSA

Governance & Operational Factors

- Strategic Plans & legislation
- Capacity
- Dog Vaccination Campaigns
- Surveillance
- Access to PEP
- Community engagement & education

Mass Dog Vaccination Campaigns

- Examples of interventional roll out under different organizational structures ('top down', government owned, 'grass-roots')
- Free-of-charge → higher coverage vs cost-recovery (Jibat et al, 2015)
- Demonstration of feasibility for mass dog vaccination in Southern Tanzania through government officers, but elimination was not achieved. Average cost/dog vaccinated US$7.3 (Mopolya et al., 2017)
- Integrated STH and Rabies control in Ngorogoro District Tanzania was well perceived and reduced costs but did not reach 70% coverage (Lankaster et al., 2019)
- Data driven approaches to improve cost-effectiveness by changing static-point locations for improved access(Mazeri et al., 2021)
- No one model has demonstrated consistent achievement of elimination and sustainability

Surveillance & Targeting of PEP

- Positive experiences with Integrated Bite Case Management in Tanzania to improve rabies detection, appropriate targeting of PEP and ability to monitor intervention success (Lushasi et al., 2020)
- Development of rapid test kits for field based diagnostics (Lechenne et al., 2016)
- What are the barriers & drivers for integrated surveillance? (Thomas et al., 2021)

Community Engagement & Education

Collecting quantitative & qualitive data on communities knowledge, attitudes & practices enables control to be designed in a contextually relevant way

Eg

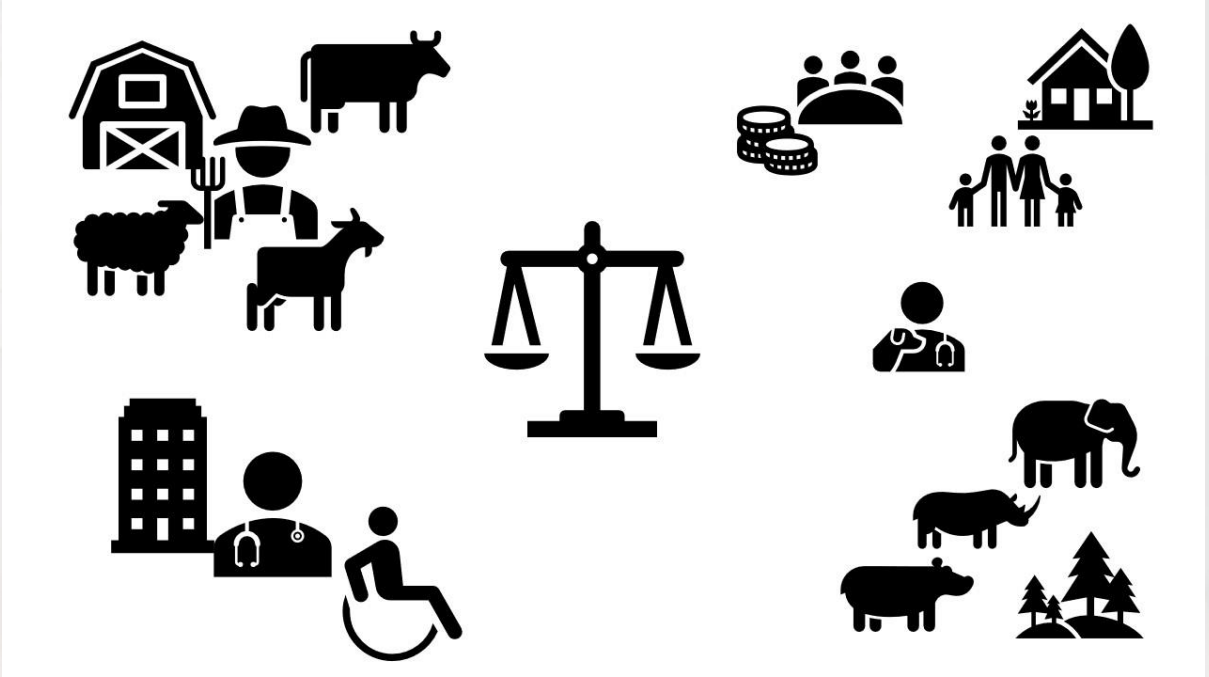
[Sambo et al., 2014]

[Kankya et al., 2022]

[Mazeri et al., 2018]

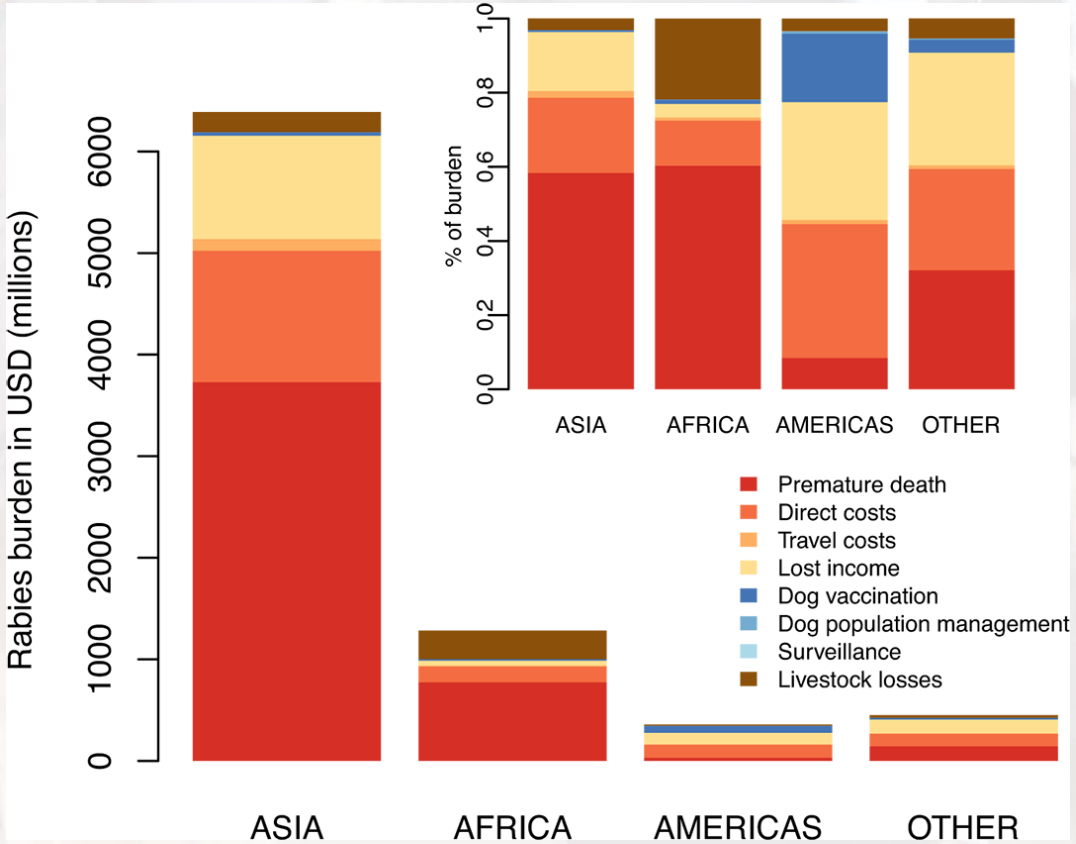
Economics of Control

- Optimal use of scare resources
- Multiple competing interests
- Decision support frameworks
- Economic data needed to:
  - Set an agenda (which diseases are important?)
  - Evaluate the efficiency of control strategies



Agenda setting: Economic Burden of Disease

- Direct Medical Costs
- Travel costs
- Lost income (during PEP treatment)
- Productivity costs (due to premature death)
- Dog Vaccination
- Dog Population Management
- Livestock losses
- Surveillance



Hampson et al., 2015
https://doi.org/10.1371/journal.pntd.0003709

Demonstrating economic efficiency

Costs($)

Dog vaccination Campaigns

PEP provision

Surveillance/monitoring

Benefits ($/non-monetary)

Human Mortality & Morbidity (DALYs/VSL)

Averted Cost-of-illness

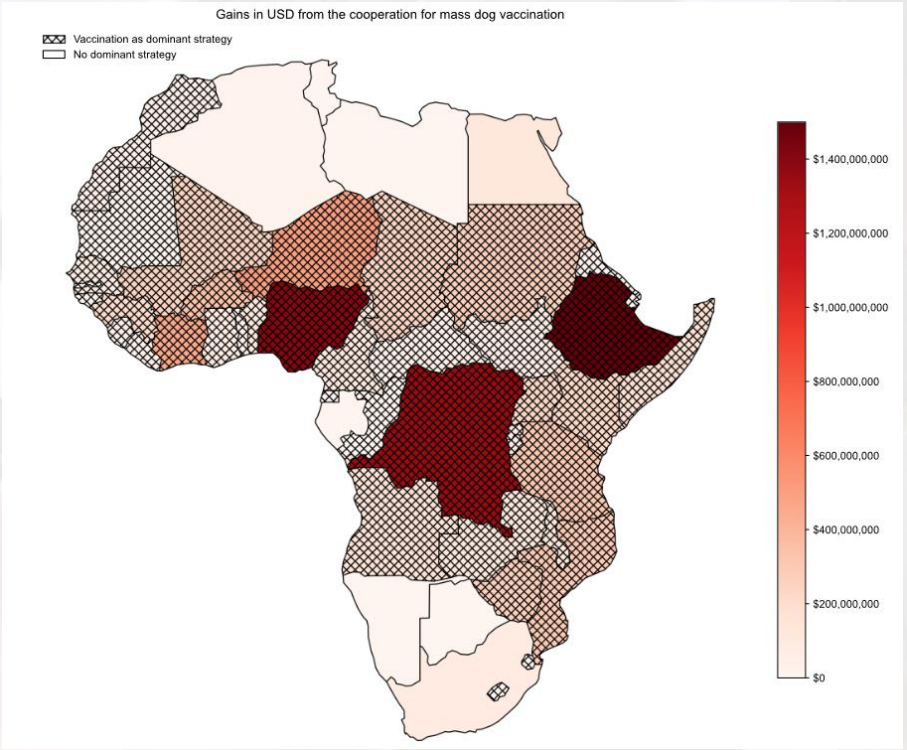
Averted livestock losses

Intangibles

Outputs: Net Present Value, Return on Investment, Benefit-Cost Ratio, Cost-effectiveness Ratio, Incremental Cost-Effectiveness Ratio

Benefit-Cost Analysis of Co-ordinated Vaccination & PEP across Africa

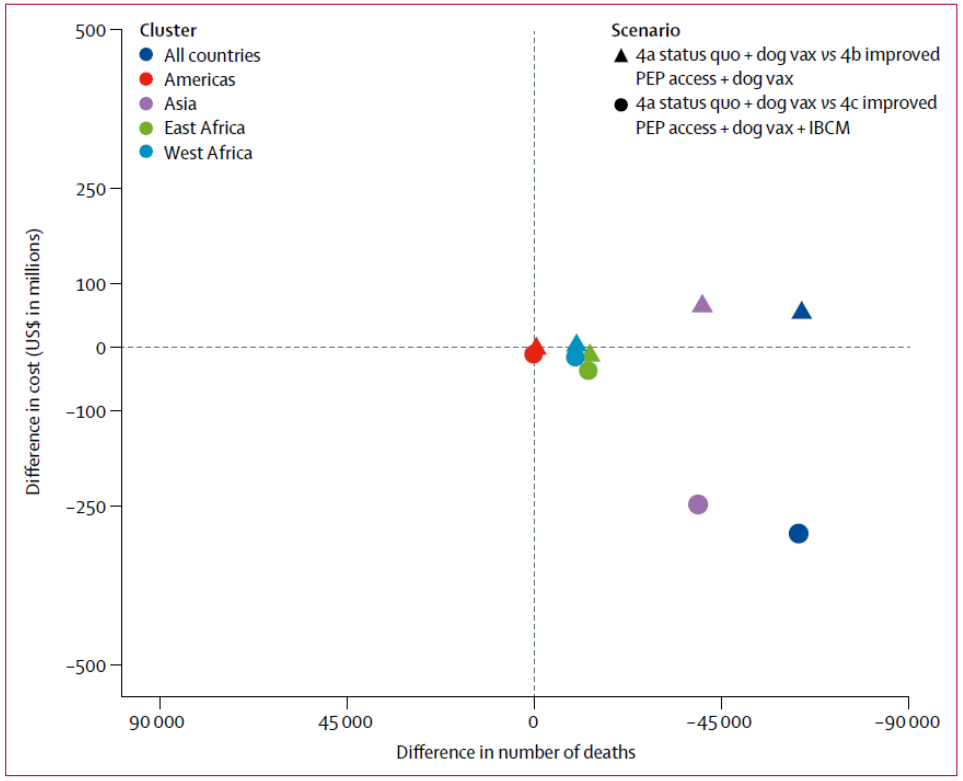
- Estimated continent dog population of just over 141,000,000
- Human exposure ~15m → ~2m deaths over 30yrs → each loses 25.6yrs of productive life
- Estimated average costs/dog vaccinated 4.5usd (1.8-13.1usd)
- Attached value of productive life lost $32,993
- Co-ordinated campaign → Net gain of ~$9,500m over 30yrs



Bucher et al., 2023
https://www.nature.com/articles/s41467-023-41110-2

GAVI- PEP Assessment

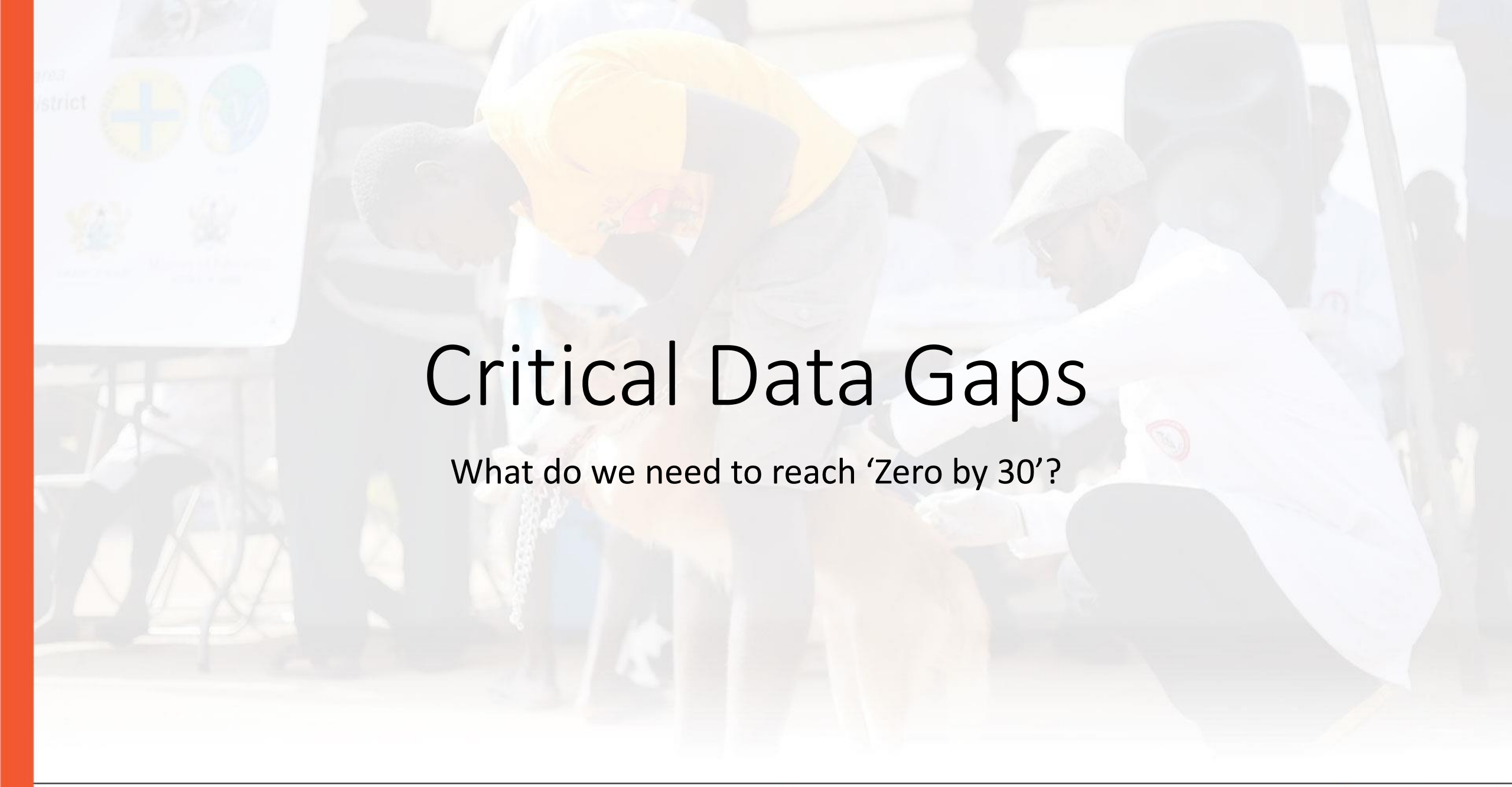
- Status Quo ~1m deaths over 15yrs in 67countries (GAVI-eligible/endemic)
- Free expanded Intradermal PEP provision saves ~489,000 deaths
- $635/death averted $33/DALY averted (highly cost-effective)
- Under dog-vaccination scenarios PEP provision has a positive incremental cost-effectiveness



WHO Rabies Modelling Group
https://doi.org/10.1016/S1473-3099(18)30512-7

What can we learn from these studies?

- Rabies Control appears to be economically efficient using either net gains or standard cost-effectiveness thresholds (1-3x GDP/capita)
- BUT we need more data!
  - Number of human cases
  - Health seeking behaviour
  - Dog population estimates
  - Assessment of coverage
  - Cost of interventions



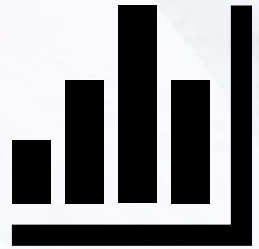
Critical Data Gaps

What do we need to reach ‘Zero by 30’?

Understand the magnitude of the problem

Why?

- To effectively target resources (PEP, Dog Vaccination)
- To determine economic efficiency of our interventions
- To advocate



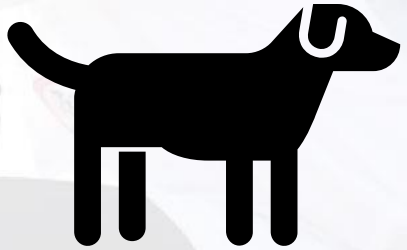
How?

- Improve community & health system awareness
- Diagnostic capacity
- Strengthening Animal Health & Human Health Surveillance systems
- Multi-sectoral data sharing (eg ICBM etc)

Understanding Dog Population Dynamics

Why?

- For improved transmission modelling
- To improve targeting of vaccination campaigns
- To target dog population management activities
- To educate dog-owners



How?

- Advocate for dog numbers in national census's
- Pre-campaign dog population studies
- Post-coverage surveys

Better data on costs and coverage of vaccination campaigns

Why?

- To quantify resource needs
- To undertake economic evaluations – determine best strategies To present a business case to Ministries of finance & donors

How?

- Appropriate data collection in the field; vaccine numbers & fully costed accounts
- Post-coverage surveillance
- Reporting: internally & sharing through networks

Regional Collaboration

Why?

- Rabies doesn't respect borders
- Optimize our approaches
- Reduce duplicating (expensive) mistakes

How?

- Meetings such as this
- Ongoing active communication & collaboration
- Social media/Email/newsletters/publications

Thanks for your attention & Good Luck!