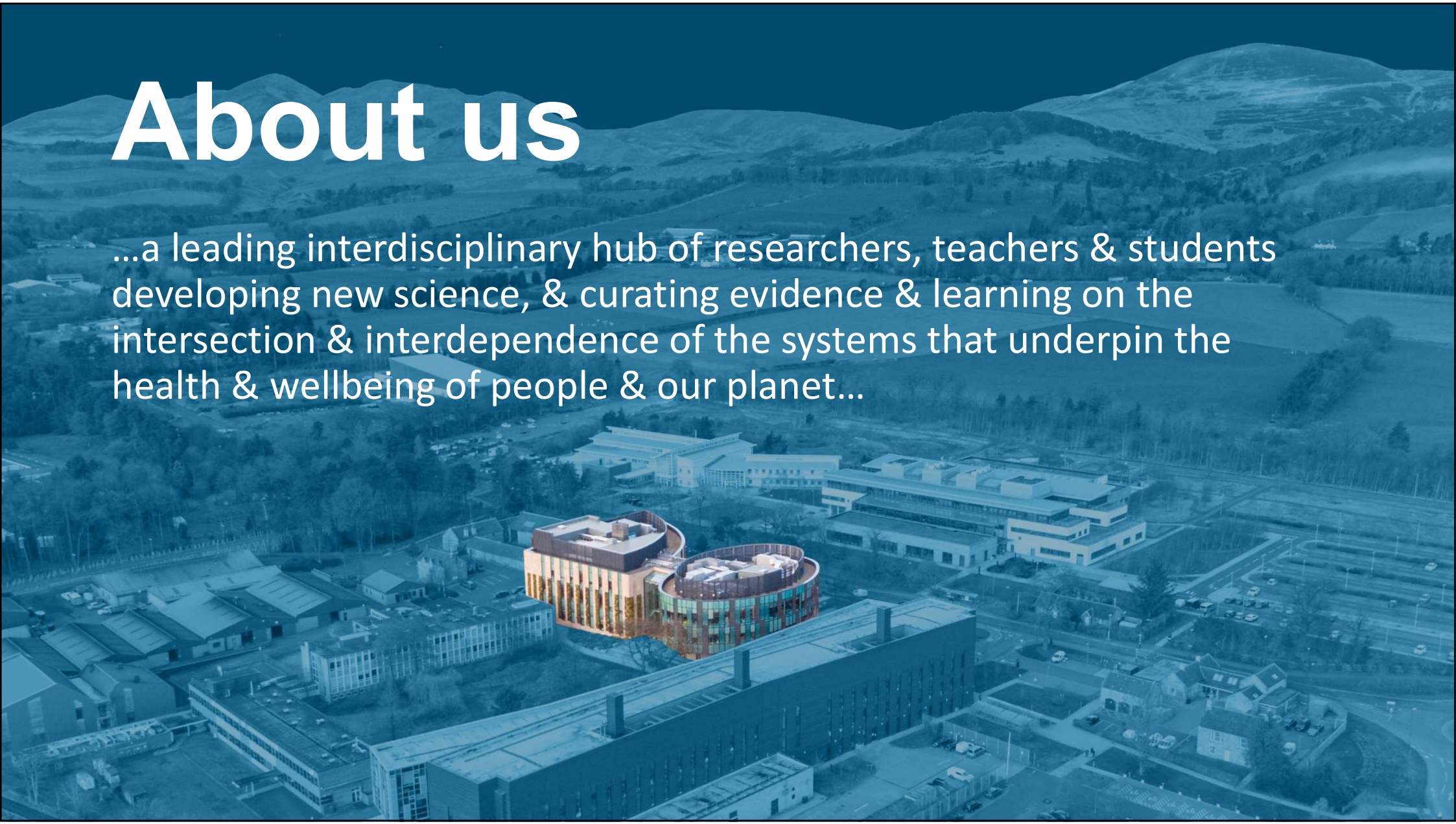

THE UNIVERSITY of EDINBURGH
Global Academy of
Agriculture and Food Systems
Welcome from
UoE/GAAFS
The Global
Academy of
Agriculture &
Food Systems
Geoff Simm, Dominic Moran,
& Carys Redman-White
Antimicrobial use and resistance in livestock production in a One Health context

About us

…a leading interdisciplinary hub of researchers, teachers & students developing new science, & curating evidence & learning on the intersection & interdependence of the systems that underpin the health & wellbeing of people & our planet…




Our Vision
Healthy people & a healthy planet, through regenerative & ethical food & land use systems

Our Mission

- Agenda-setting, impactful, trans-disciplinary research in
  - Food systems, nutrition & health
  - Sustainable land & environmental resource use
  - Planetary Health & One Health
- Inspiring, lifelong education & training for Planetary Health & Food Systems leaders, practitioners & advocates
- Partnership, engagement & co-creation to maximize the relevance & impact of our work & drive the development of solutions


Food System
Transformation
Science-policy-industry interface
Data driven innovation
Governance and ethics
Healthy People
and a Healthy Planet

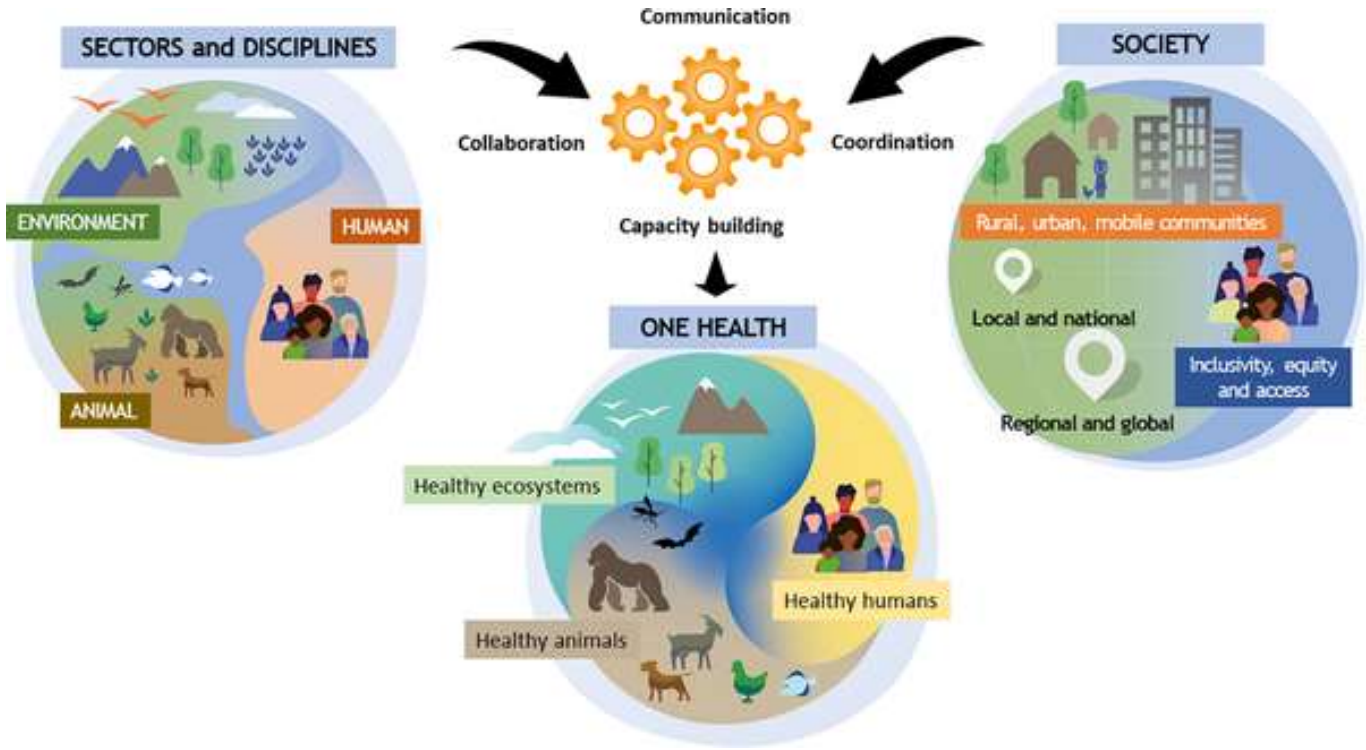
Our themes

Global crises with **food systems** role

- Climate
  - *#2 impact - 20-30% GHGs from food system*
- Biodiversity / environment
  - *#1 impact*
- Nutrition / health
  - *triple burden of malnutrition*
  - *6/10 causes of death diet-related*
  - *Food-borne pathogens*
  - *AMR*
- Inequality / livelihoods
  - *Global food insecurity growing again – conflict / covid / economic downturn*
- **Need systemic responses**

https://www.flickr.com/photos/nancydregan/5023325968/
Kate Evans / Center for International Forestry Research

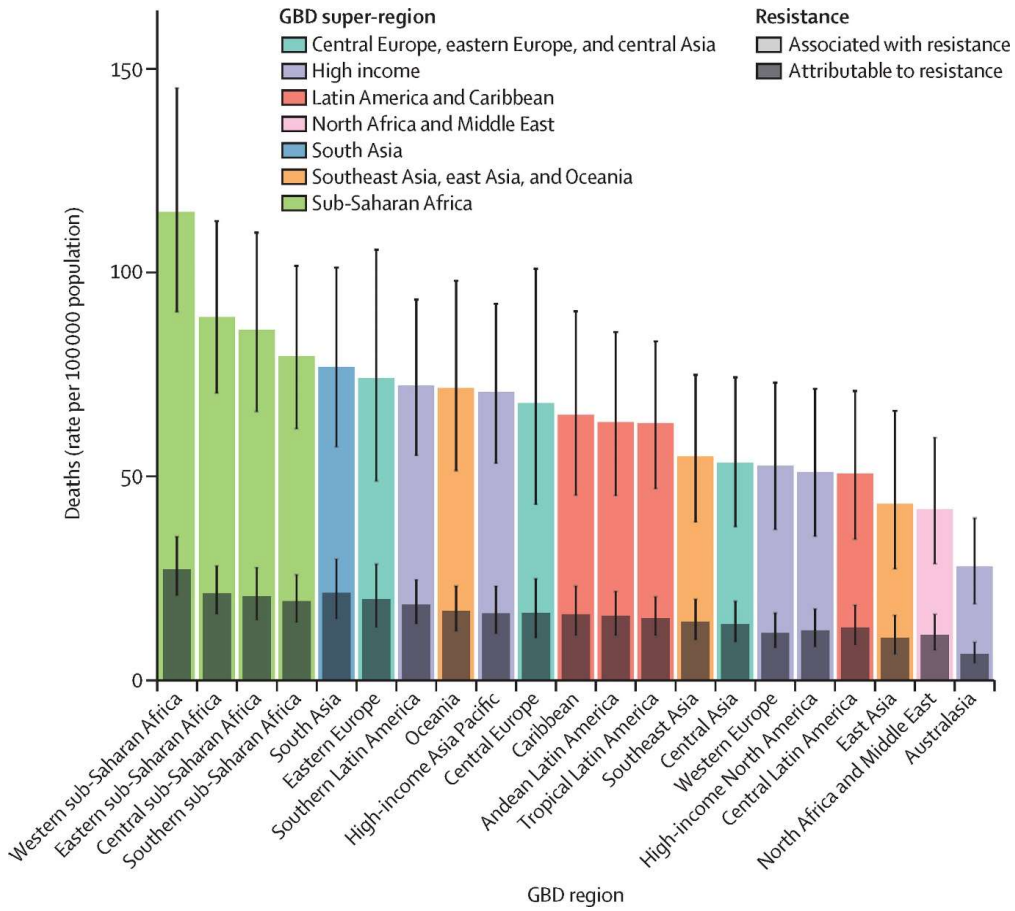
Challenges complex & inter-related – need holistic, interdisciplinary frameworks like One Health



One Health High-Level Expert Panel (OHHLEP), Adisasmito WB, Almuhairi S, Behravesh CB, Bilivogui P, et al. (2022) One Health: A new definition for a sustainable and healthy future. PLOS Pathogens 18(6): e1010537. https://doi.org/10.1371/journal.ppat.1010537
https://journals.plos.org/plospathogens/article?id=10.1371/journal.ppat.1010537

Antimicrobial resistance

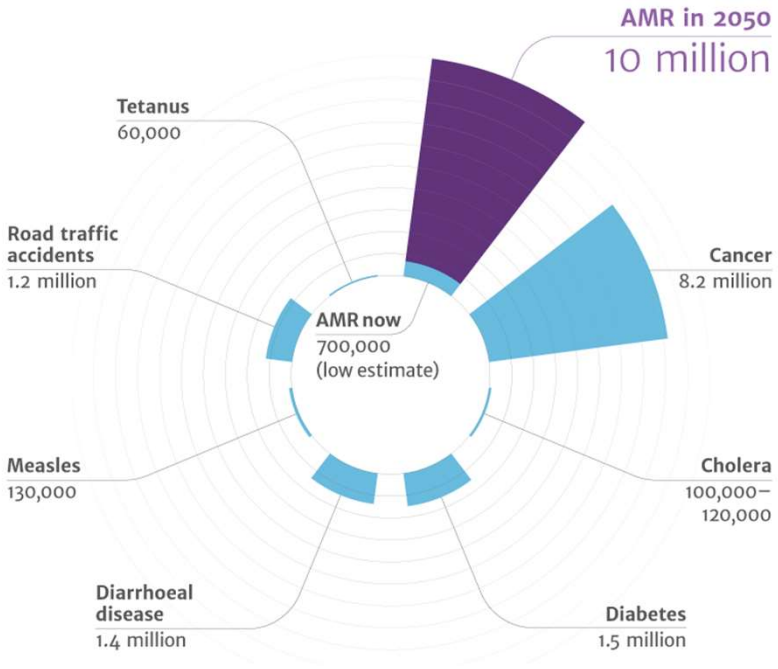
- Antimicrobial resistance (AMR) - major challenge to global health
- People in LMICs are particularly vulnerable



Deaths associated with or attributable to AMR in 2019 by study region (Murray *et al.*, 2022 - CC BY 4.0)

Antimicrobial resistance: a silent pandemic

- AMR 1 of top 10 global health threats - WHO
- AMR infections significantly more deadly and expensive to treat
- Resistance worldwide, even to last-resort drugs
- Challenges in development of new antibiotics
- Surveillance is key

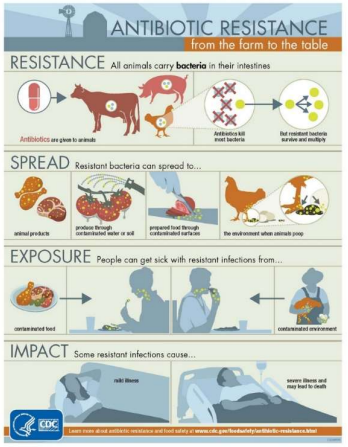


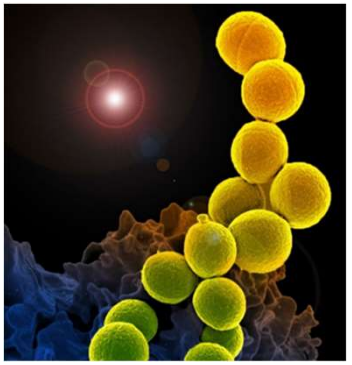
Global AMR-related deaths in 2016, and projected figure for 2050

Figure: O'Neill report 'Tackling drug-resistant infections globally: Final report and recommendations' https://amr-review.org/ CC BY 4.0

One Health & AMR

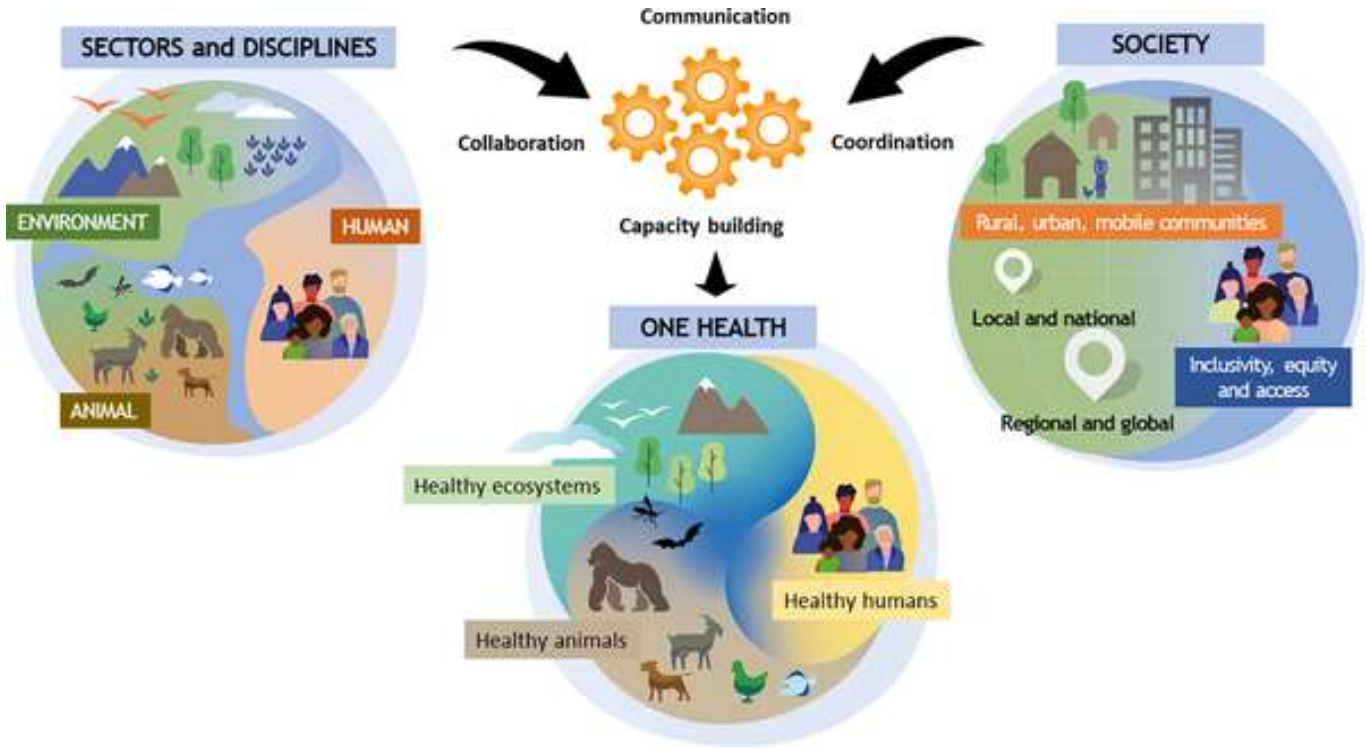
- The majority of pathogen species causing disease in humans are zoonotic (>60% according to Taylor et al, 2001)
- Antibiotics in agriculture: same pathogens, same drugs, same resistance mechanisms
- USA: >70% (by weight) of medically important antibiotics are consumed by animals (O'Neill et al, 2016)
  - Global-scale equivalent estimates difficult to reach due to surveillance gaps – many layers of inference required
- 25% of nations reporting their antibiotic use in animals in 2020 stated that antimicrobials were used for growth promotion in livestock in their country (OIE/WOAH, 2022)





Images: https://www.cdc.gov/foodsafety/from-farm-to-table.html; https://www.flickr.com/photos/niaid/11853984805 NIAID CC BY 2.0; *WHO; needpix.com; Health.mil; UNEP/ILRI*

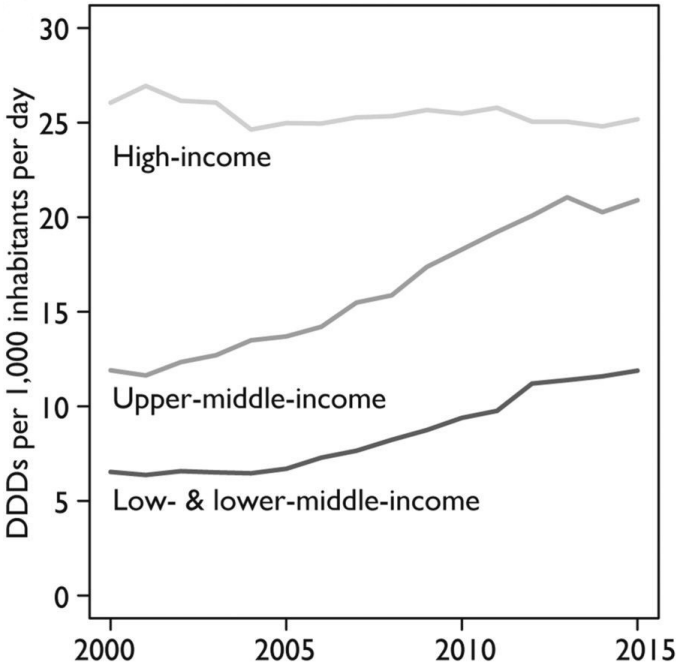
AMR: Quintessential One Health challenge!



One Health High-Level Expert Panel (OHHLEP), Adisasmito WB, Almuhairi S, Behravesh CB, Bilivogui P, et al. (2022) One Health: A new definition for a sustainable and healthy future. PLOS Pathogens 18(6): e1010537. https://doi.org/10.1371/journal.ppat.1010537
https://journals.plos.org/plospathogens/article?id=10.1371/journal.ppat.1010537

Key knowledge gaps

- Surveillance is expensive - data disproportionately scarce in LMICs
- Increasing antimicrobial use (AMU) in these countries
- Most surveillance focuses on humans
- National action plans leave much to be desired
- WHO Global AMR/AMU Surveillance System (GLASS) has only 15 countries providing “Tricycle” One Health data
- Human-focused studies use WHO Defined Daily Doses – no such standardisation for livestock



Changes in antibiotic consumption based on pharmaceutical sales data, measured in defined daily doses (DDDs).
Figure: Klein et al, 2018 CC BY 4.0

THE UNIVERSITY of EDINBURGH
Global Academy of
Agriculture and Food Systems

Thanks for listening

sustainable, ethical food systems for healthy people and a healthy planet

/GlobalAgEd

@GlobalAgEd