

## One Health as Research Priority: Revisiting Common Perceptions

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# One Health Research Priorities

- (Comparatively) neglected research areas
- Requiring or highly profiting from a One Health approach
- I.e. not yet sufficiently covered by an existing disciplinary or inter-/transdisciplinary approach
- I.e. avoiding pure re-labelling

# One Health as Research Priority: Revisiting Common Perceptions

1. Shaping the profile of One Health
2. The Quadripartite MoU and OHHLEP
3. AMR and One Health
4. Environment and One Health
5. Back to the classics? Zoonoses, Spill-over and Water as One Health issues

# One Health as Research Priority

Health Governance: Evidence for decision-making and planning

Research Governance: What studies are needed for this evidence?

# 1. Shaping the Profile of One Health

STELLUNGNAHME

**VENRO**  
VERBAND ENTWICKLUNGSPOLITIK  
UND HUMANITÄRE HILFE

## One Health is

- A highly compelling concept
- Raising urgently needed awareness
- Politically very desired
- Much used in advocacy work
- Required in up-to-date proposals
- Already deserted by animal rights activists and vegans

• • • • •  
**ONE HEALTH**

Die Bundesregierung muss diesen Ansatz in allen Politikbereichen umsetzen

Mai 2021

**MISEREOR**  
IHR HILFSWERK

**Brot**  
für die Welt

**GPF**  
Global Policy Forum

**Wege aus der  
globalen Gesundheitskrise**

Mit dem One Health Ansatz für gesunde Menschen,  
gesunde Tiere und eine gesunde Umwelt weltweit

# Confusing Uses of „One Health“ in Academia

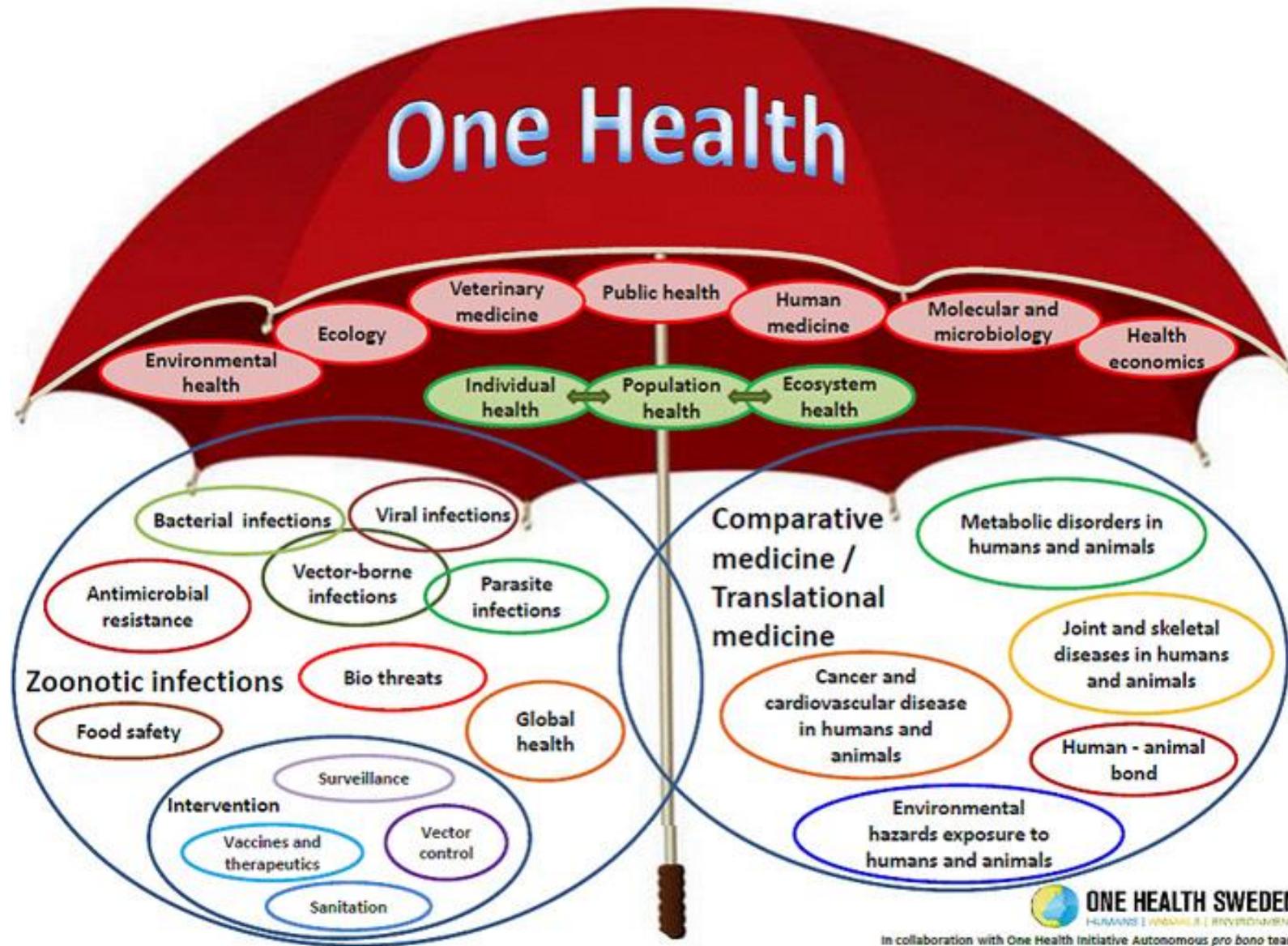
- Applications for funding
- Selection for Awards



Verleihung des internationalen Preises „One Health“

[www.dfh-ufa.org](http://www.dfh-ufa.org)

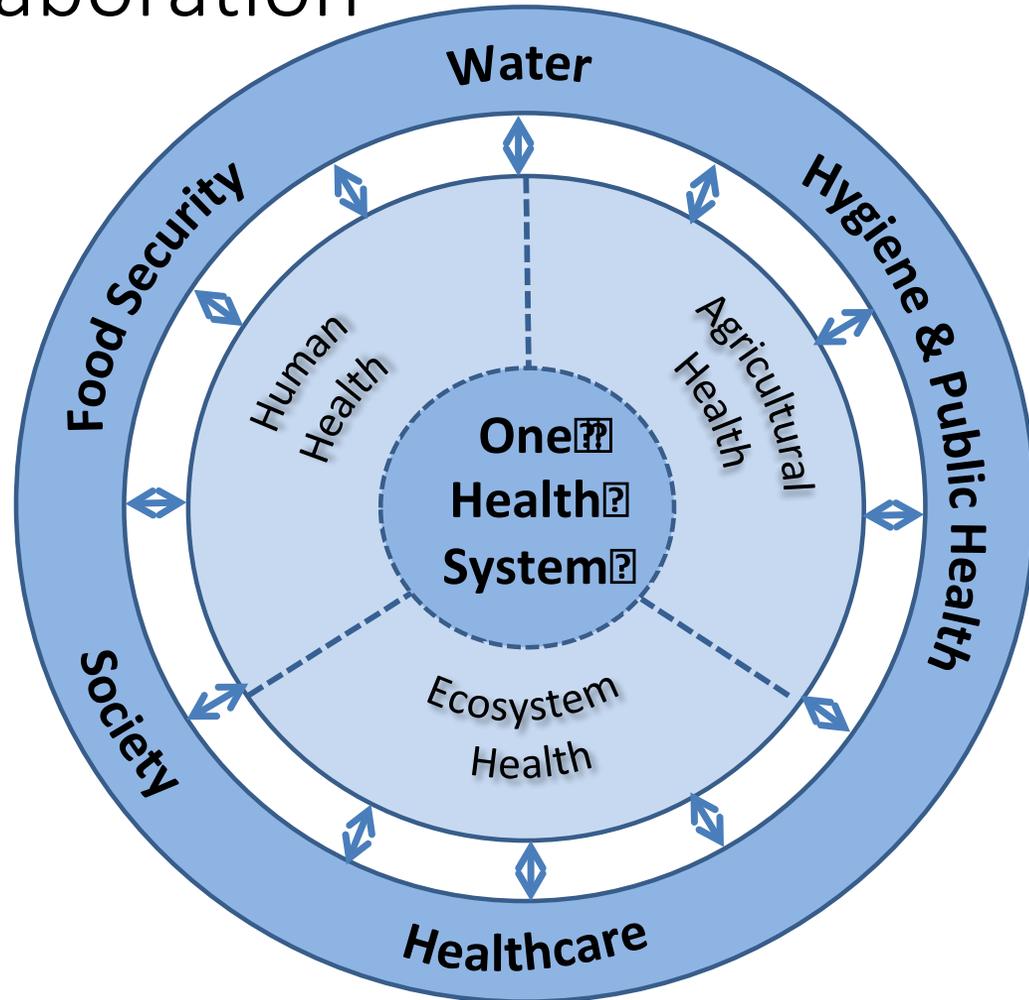
# Is One Health an Umbrella term?



(One Health Initiative, <http://www.onehealthinitiative.com/about.php>)

# One Health (Research) at Bonn University

ZEF: Intersectoral collaboration



IHPH: AMR in Humans, Animals and Environment

Geography and GeoHealth: Water

Agriculture: Food safety & security

## 2. The Quadripartite MoU and OHHLEP



Food and Agriculture  
Organization of the  
United Nations



World Health  
Organization



**MEMORANDUM OF UNDERSTANDING**

**REGARDING**

**COOPERATION TO COMBAT HEALTH RISKS AT THE ANIMAL- HUMAN-  
ECOSYSTEMS INTERFACE IN THE CONTEXT OF THE “ONE HEALTH”  
APPROACH AND INCLUDING ANTIMICROBIAL RESISTANCE**

The objectives of this MoU will be achieved, *inter alia*, through the Work Plan referred to in article 3, paragraph 2, and through:

1. Supporting the joint secretariat of the Interagency Coordination Group on AMR, established by the political declaration adopted by the United Nations General Assembly in 2016 as well as continuing the coordinated implementation of the AMR Global Action Plan and respective global strategies of the Parties.
2. Reinforcing of national and regional services in human health, animal health and food safety through the assessment of these services.
3. Improving collaboration in foresight, risk assessment, preparedness and response to emerging, reemerging and neglected infectious diseases at the animal-human ecosystems interface.
4. Addressing food safety challenges requiring a multi-sector approach in the context of reinforcing food security.
5. Adopting a common communication strategy in order to raise awareness and foster coordinated participation in forums of joint interest.
6. Preparing a Voluntary Code of Conduct to reinforce implementation of international standards on responsible and prudent use of antimicrobials.



Food and Agriculture  
Organization of the  
United Nations



World Health  
Organization



## MEMORANDUM OF UNDERSTANDING

Initial areas of cooperation will include:

- (i) Antimicrobial Resistance.
- (ii) Emerging and endemic zoonotic diseases (including foodborne diseases) and information sharing.
- (iii) Strengthening of health systems.

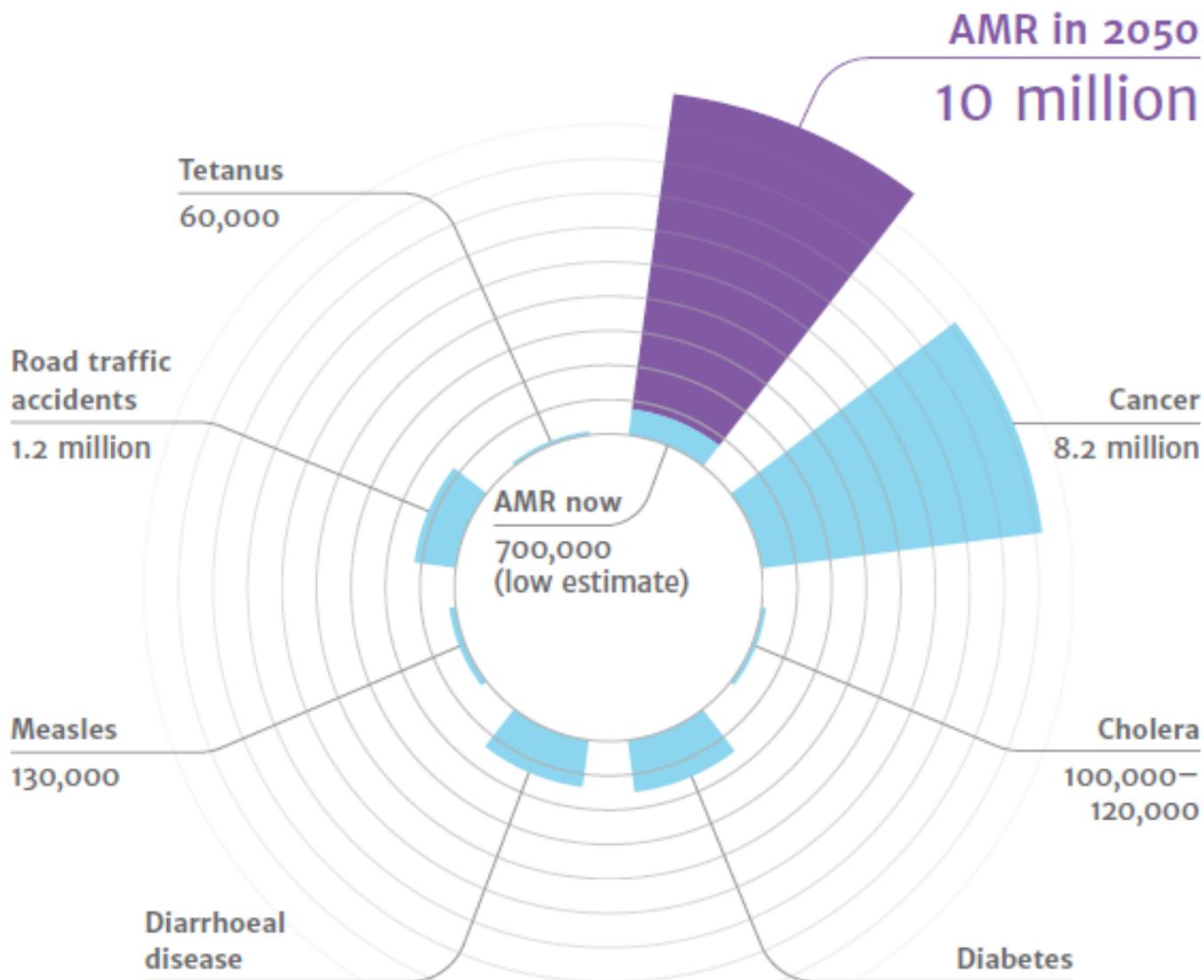
# One Health High-Level Expert Panel (OHHLEP)

“One Health is an integrated, unifying approach that aims to sustainably balance and optimize the health of people, animals and ecosystems.

It recognizes the health of humans, domestic and wild animals, plants, and the wider environment (including ecosystems) are closely linked and inter-dependent.

The approach mobilizes multiple sectors, disciplines and communities at varying levels of society to work together to foster well-being and tackle threats to health and ecosystems, while addressing the collective need for clean water, energy and air, safe and nutritious food, taking action on climate change, and contributing to sustainable development.”

# 3. AMR and One Health



**TACKLING DRUG-RESISTANT INFECTIONS GLOBALLY: FINAL REPORT AND RECOMMENDATIONS**

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**THE REVIEW ON ANTIMICROBIAL RESISTANCE**  
*CHAired BY JIM O'NEILL*

MAY 2016

**Sources:**

Diabetes: [www.whi.int/mediacentre/factsheets/fs312/en/](http://www.whi.int/mediacentre/factsheets/fs312/en/) Cancer: [www.whi.int/mediacentre/factsheets/fs297/en/](http://www.whi.int/mediacentre/factsheets/fs297/en/)  
Cholera: [www.whi.int/mediacentre/factsheets/fs107/en/](http://www.whi.int/mediacentre/factsheets/fs107/en/) Diarrhoeal disease: [www.sciencedirect.com/science/article/pii/S0140673612617280](http://www.sciencedirect.com/science/article/pii/S0140673612617280)  
Measles: [www.sciencedirect.com/science/article/pii/S0140673612617280](http://www.sciencedirect.com/science/article/pii/S0140673612617280) Road traffic accidents: [www.whi.int/mediacentre/factsheets/fs358/en/](http://www.whi.int/mediacentre/factsheets/fs358/en/)  
Tetanus: [www.sciencedirect.com/science/article/pii/S0140673612617280](http://www.sciencedirect.com/science/article/pii/S0140673612617280)



# WHERE IS AMR: PATHWAYS INTO THE ENVIRONMENT



Antimicrobial usage in humans, animals and agriculture, and resulting dispersion of antimicrobial residues into aquatic and terrestrial environments (●●) (Berkner et al., 2014)

# AMR – a „proto-typical One Health issue“?

- AMR can be transmitted between humans and animals and into the environment
- The major reasons are the same: avoidable contact of bacteria with antibiotics and each other (HGT)
- Avoidance in one field can avoid occurrence in others fields.
- The most important counter-strategies do not require intersectoral collaboration
- Antibiotic use for human health and animal breeding are largely different (reasons and products)
- The impact of environmental AMR (ARB and ARG) on human health is not yet clear

## TACKLING ANTIMICROBIAL RESISTANCE ON TEN FRONTS



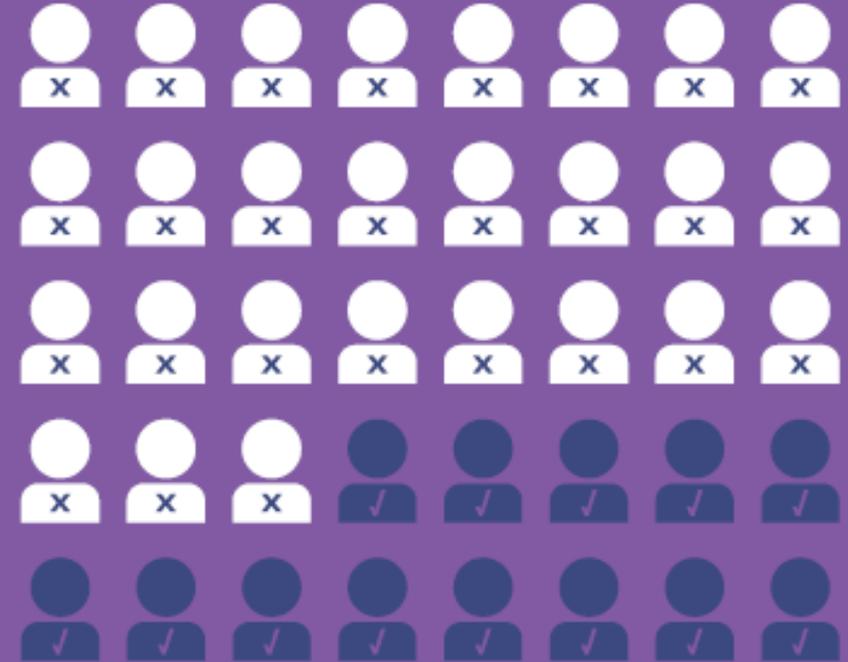
Review on Antimicrobial Resistance

## E.g. Antibiotic Stewardship

AMR:  
„10 Fronts“

Out of 40m people who are given antibiotics for respiratory issues, annually in the US:

27m get antibiotics unnecessarily      13m who need antibiotics get them



Data extracted from: Shapiro D J, Hicks L A, Pavla A T, Hersh A L. Antibiotic prescribing for adults in ambulatory care in the USA, 2007–09. *Journal of Antimicrobial Chemotherapy* 2013.

Review on Antimicrobial Resistance

„One Health“ mentioned in „AMR (molecular) surveillance“<sup>16</sup> only



## DART

### German Antimicrobial Resistance Strategy

# AMR: Antibiotic Stewardship

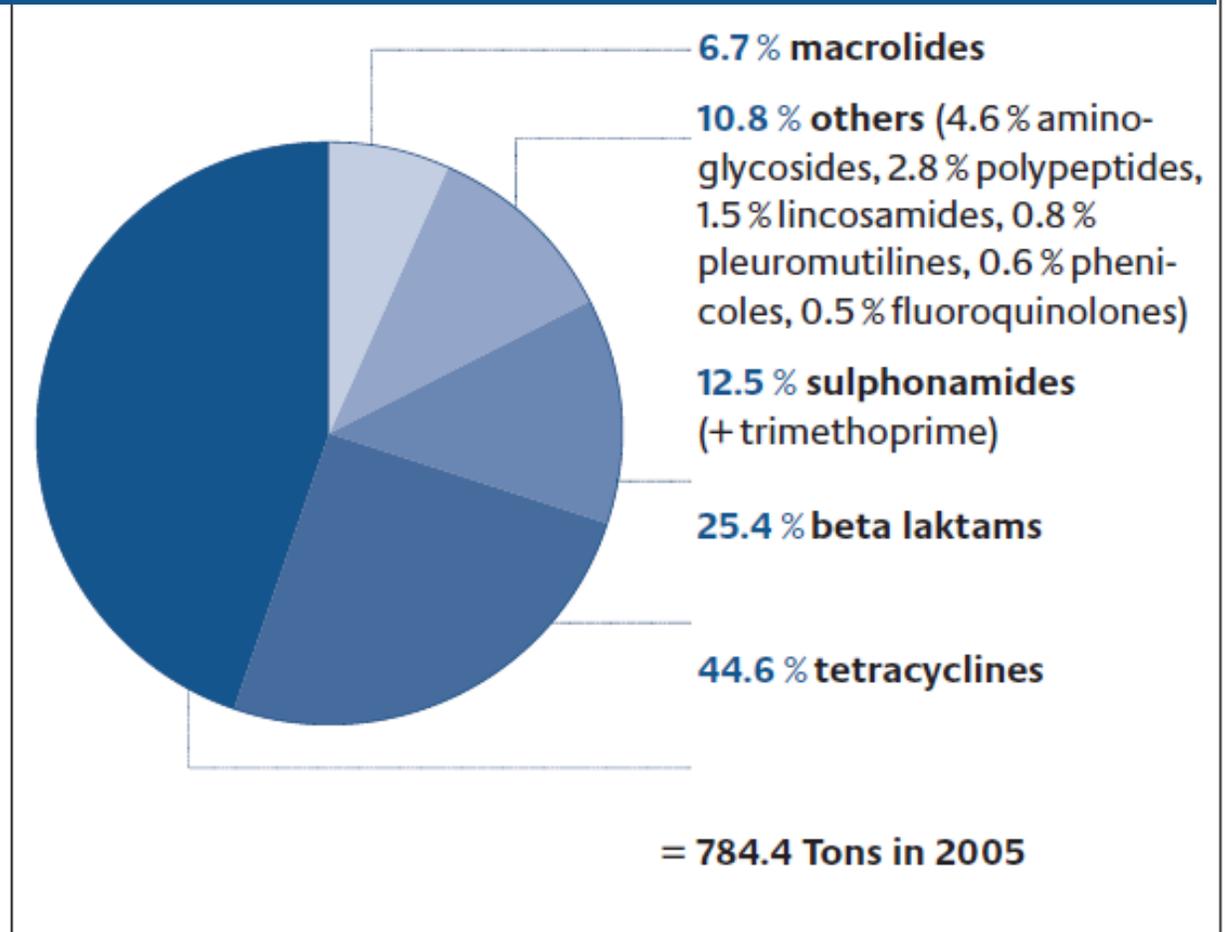
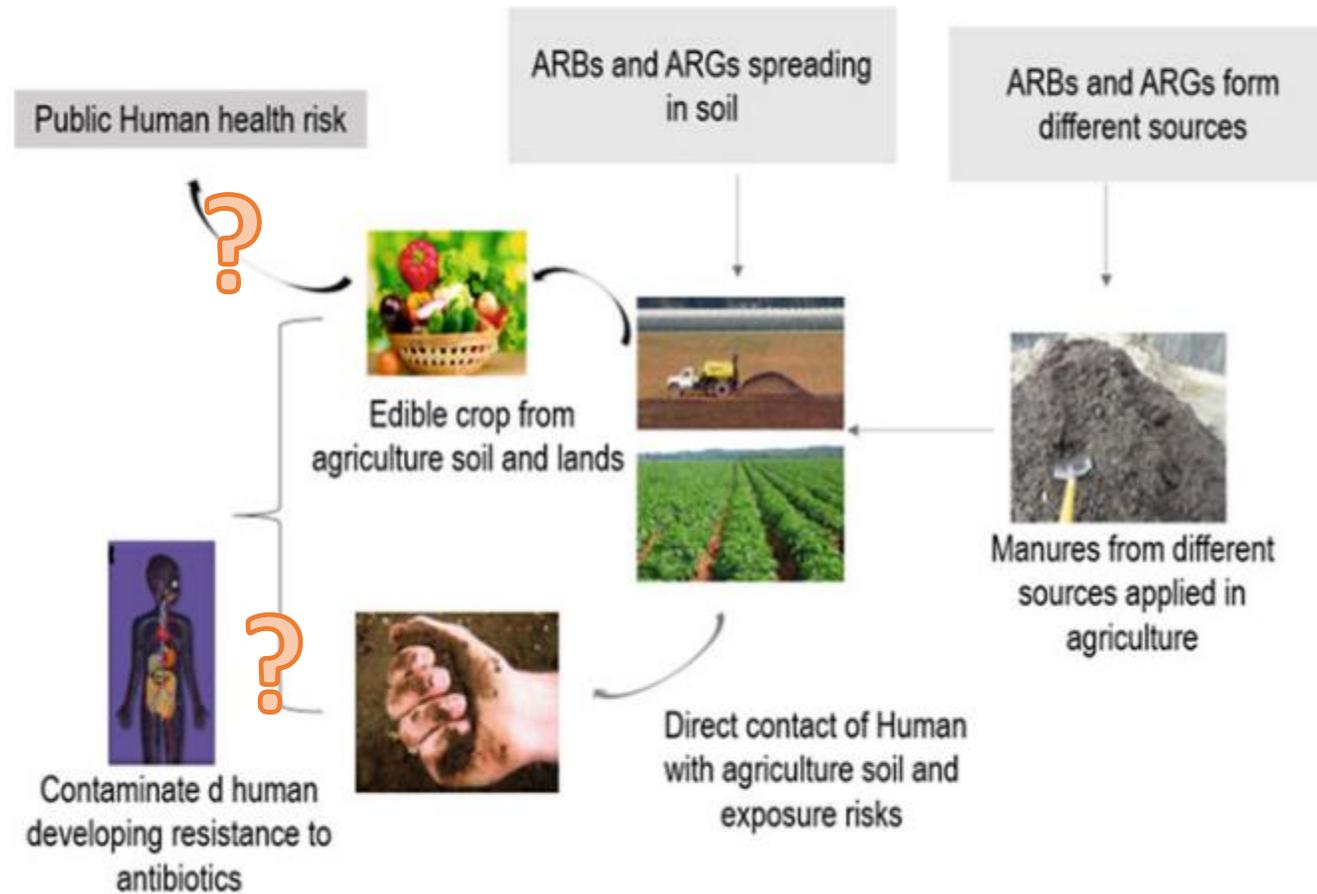


Fig. 2 Sales figures for antibiotics in veterinary medicine in Germany<sup>21</sup>

# Environmental AMR and Human Health#

Sources of Antibiotic Resistant Bacteria (ARB) and Antibiotic Resistance Genes...

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**Fig. 7** Occurrence of ARGs in agricultural soil and relative impact on human health

# 4. Environment and One Health

## Healthy Environments



Source: WHO, 2016



## PREVENTING DISEASE THROUGH HEALTHY ENVIRONMENTS

A global assessment of the burden of disease from environmental risks

A Prüss-Ustün, J Wolf, C Corvalán, R Bos and M Neira



2016

Source: James Creswick, Interlinkage of SDGs in the work of the WHO on environment and health (2022)



PREVENTING DISEASE THROUGH  
HEALTHY ENVIRONMENTS  
A global assessment of the burden of disease from  
environmental risks

A. Pöysä-Uusiluoma, J. Wolf, C. Corvalán, R. Bose and M. Neira



## Box 1. The definition of “environment” used in this study

*The environment is the congregation of all the physical, chemical and biological factors external to a person, and all related behaviours, but excluding those natural environments that cannot reasonably be modified.*

This definition excludes behaviour not related to the environment, as well as behaviour related to the social and cultural environment, genetics and parts of the natural environment.

# What does One Health beyond Environmental Health, Healthy Environment, Environment and (Human) Health?

Does One Health replace them?

Is One Health only required when the animal component is relevant?

What about

- (urban) green and blue infrastructures?
- food safety and security of vegan nutrition?

Is One Health Human, Animal „and“ or „or“ Environment?

## 5. Back to the classics:

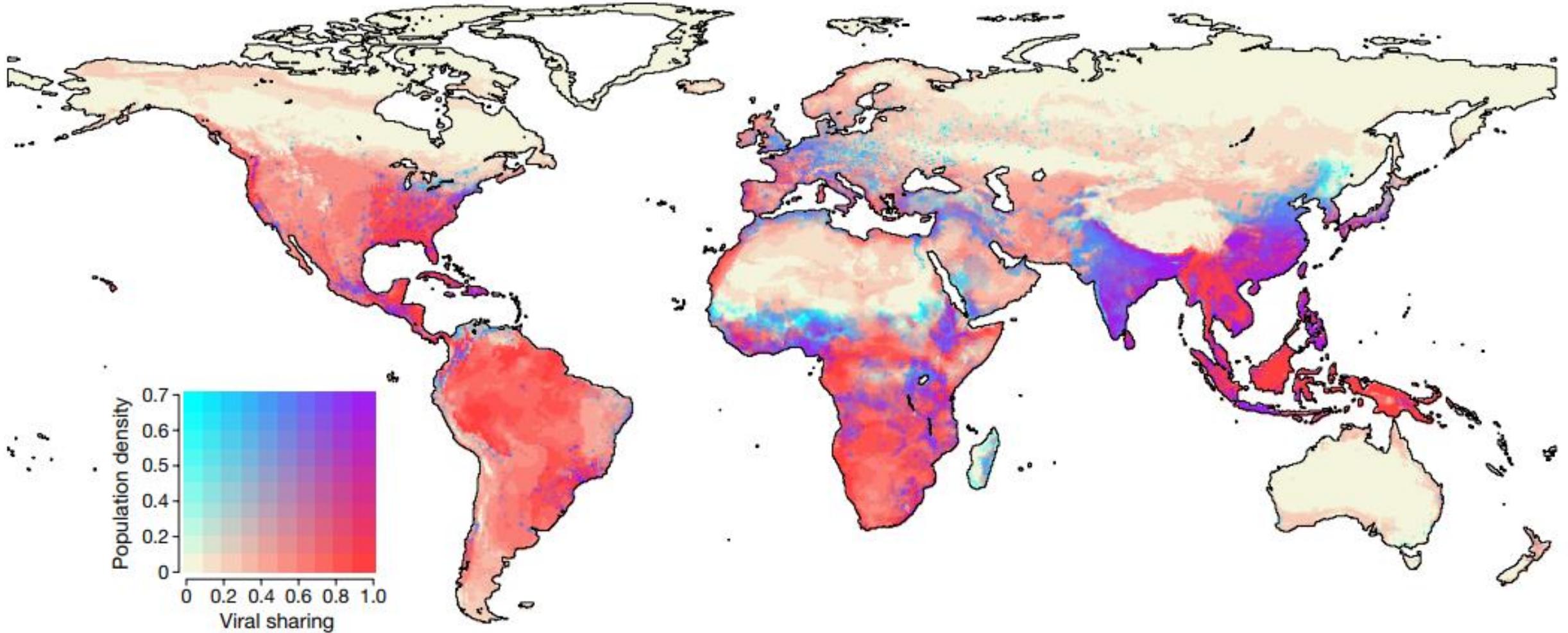
### Zoonoses, Spill-over and Water as One Health issues

What research is needed in classical zoonoses?

Implementation research on

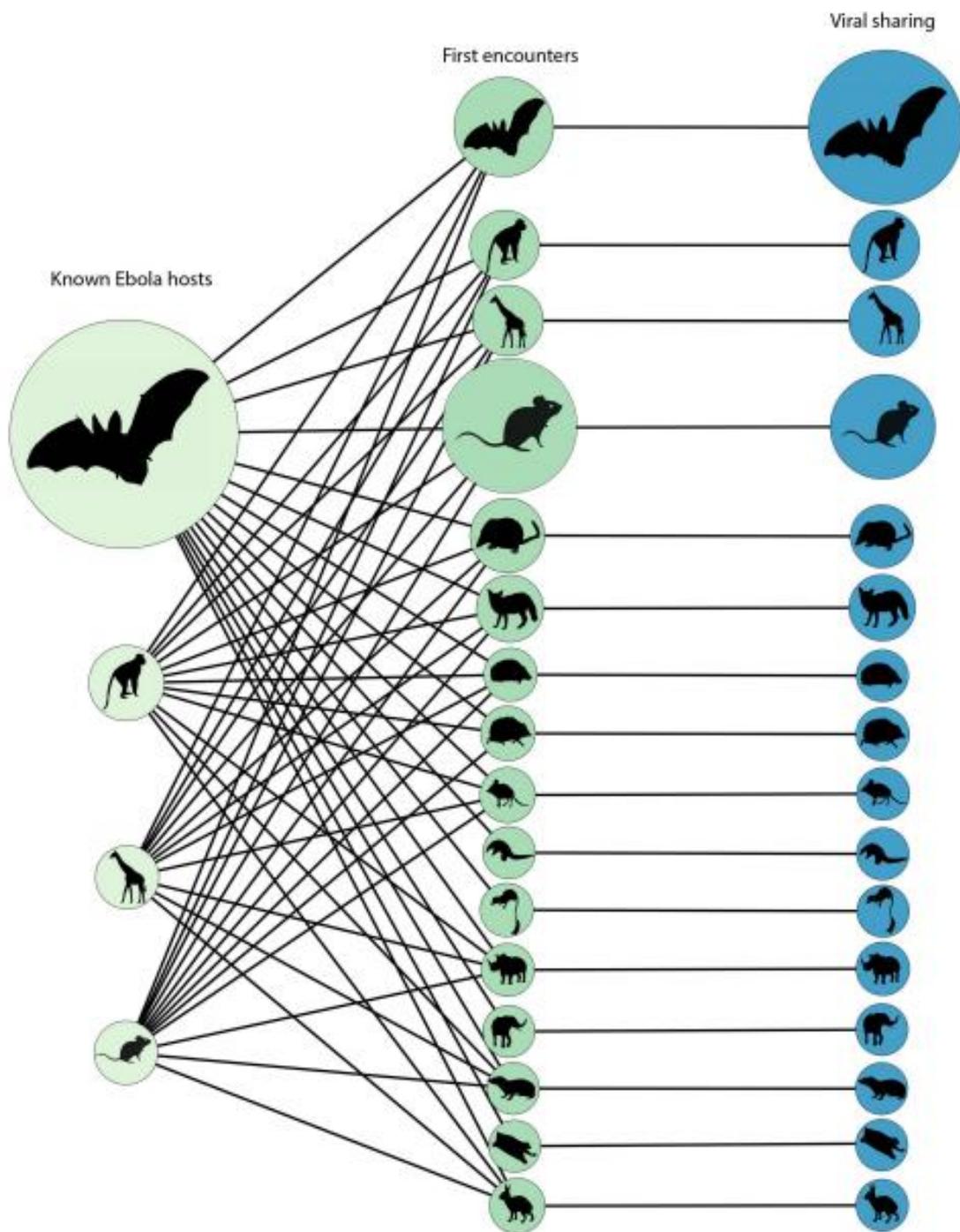
- Inter-sectoral collaboration
- Food safety
- Surveillance systems
- Elimination programmes

# Spill-over



**Fig. 4 | Novel viral sharing events coincide with human population centres.** In 2070 (SSP 1–RCP 2.6; climate only), human population centres in equatorial Africa, south China, India and southeast Asia will overlap with projected

hotspots of cross-species viral transmission in wildlife. Both variables were linearly rescaled to 0 to 1. The results were averaged across nine GCMs.



Animal to animal spill-over –  
and what about the humans?

Carlson et al. (2022) Climate change increases cross-species viral transmission risk, Nature

# Spill-over

What research is needed on spill-over?

Empirical data (instead of pure modelling with insufficient figures) on

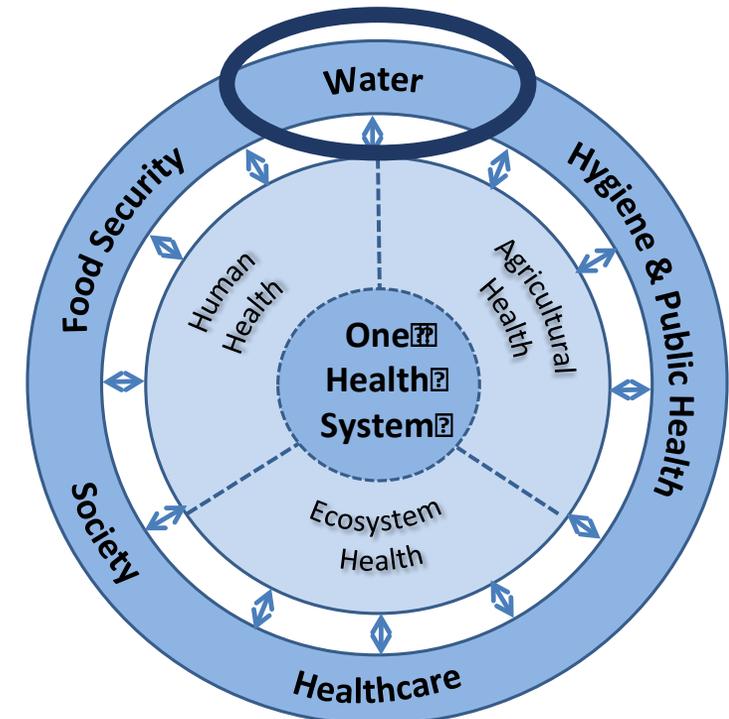
- Frequency of new animal-human transmission
- Biological traits of the most common transmitted pathogens
- Human behaviour and its reasons leading to actual transmission

# Water safety

What research is needed on water safety in a One Health approach?

Empirical data on the impact on drinking water by

- agricultural practices?
- household animals?
- ...?



## 6. Conclusions: One Health as Research Priority

What research areas require a one health approach (differing from e.g. environmental health)?

- Transmission of AMR between humans, animals and the environment (not: drug development, hospital infection)
- Spill-over (not: a whole pandemic of animal origin)
- Control of zoonotic diseases (not: individual treatment) – and vector-borne diseases?
- Food and water safety: impact of agricultural practices – or regarding biological and chemical contamination in general?
- Food security: (Micro-)Nutrient deficiencies – and threats by animal and plant diseases?