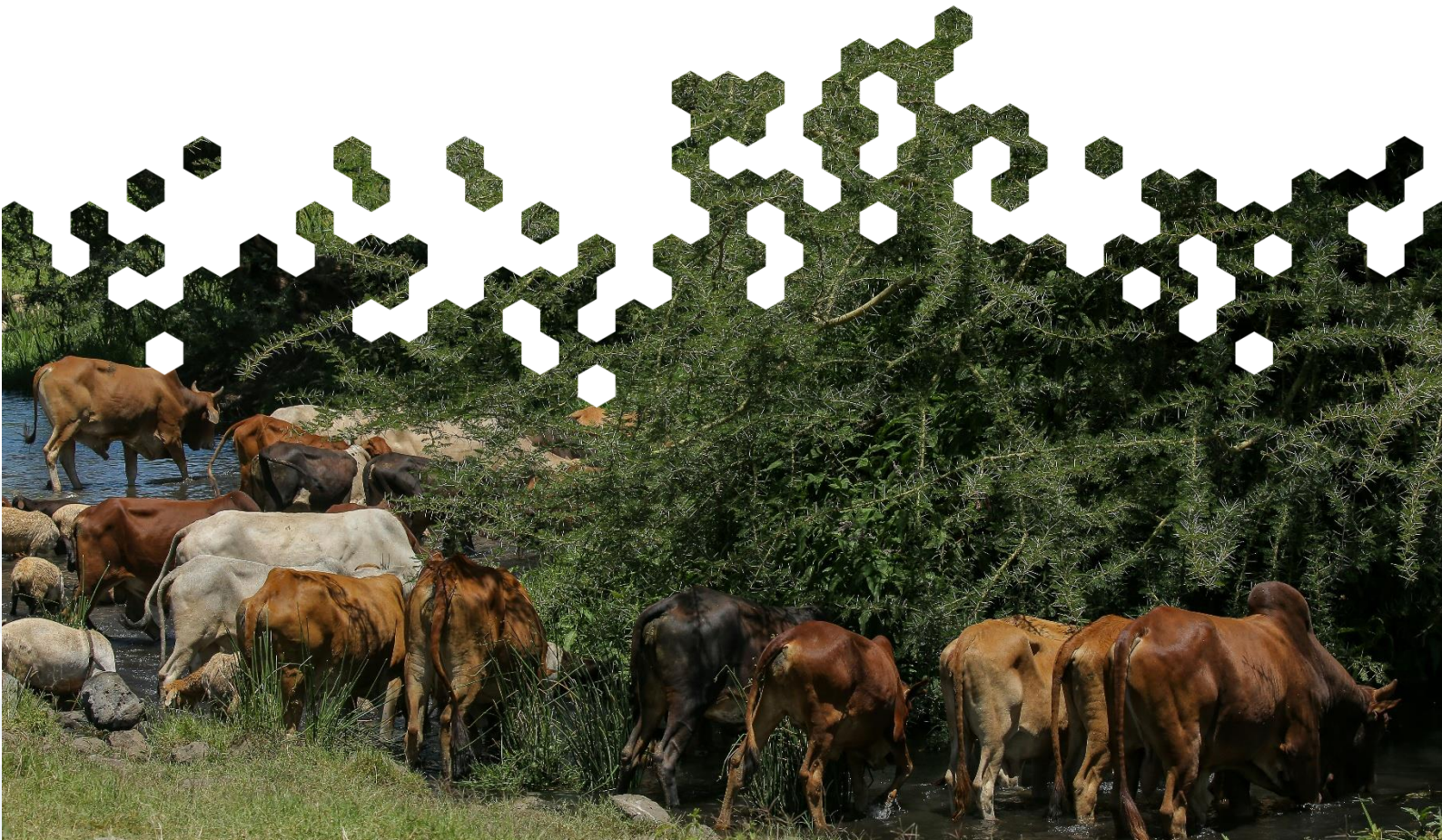
STAR IDAZ | International Research Consortium on Animal Health

Why One Health Matters for Animal Health



STAR IDAZ IRC is the 'Global Strategic Alliances for the Coordination of Research on the Major Infectious Diseases of Animals and Zoonoses - International Research Consortium'. It is a global consortium that brings together funders and programme owners for research on animal health to maximise funding for coordinated animal health research. To achieve its aim, STAR IDAZ facilitates networking among funders, researchers, industry experts, policymakers and other stakeholders to collaborate on research and innovation in the field of infectious animal diseases. This document was produced by SIRCAH, the Scientific Secretariat of the STAR IDAZ IRC.

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Disclaimer

This report has been written with existing and new STAR-IDAZ IRC partners and animal health researchers in mind. STAR-IDAZ IRC is a global network of animal health funders and programme owners that aims to coordinate animal health research funding, with a focus on infectious diseases and zoonoses. It does this through collaborating with partner organisations to coordinate funding on over 20 priority topics, including specific diseases (such as African Swine Fever, Brucellosis and Influenzas) and cross-cutting topics (such as Vector Transmission and Control, Alternatives to Antimicrobials and One Health). However, STAR-IDAZ IRC recognises that taking a One Health approach to animal health challenges, such as infectious diseases and zoonoses, requires a broader and more inclusive approach. Aspects of this report should therefore also be of interest for stakeholders working on the health of the environment, climate change and green finance.

Disclaimer on certain references

This report was prepared before recent global changes to international development funding. Several of the useful references used to write this report have been removed due to these changes. As a result, certain references may contain broken links. STAR-IDAZ IRC opted not to remove these references for transparency and apologises for any broken links in certain references.

What is One Health?

The One Health High-Level Expert Panel (OHHLEP) is an interdisciplinary initiative created by the United Nations Food and Agriculture Organization (FAO), the United Nations Environment Programme (UNEP), the World Health Organization (WHO) and the World Organisation for Animal Health (WOAH), collectively known as the Quadripartite (7). The OHHLEP was set up in response to the COVID-19 pandemic to provide an advisory service to the Quadripartite by improving our understanding of how diseases with the potential to trigger pandemics, emerge and spread (8). In 2022, the OHHLEP published a definition of One Health (9) (Box 1). It states that 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 interdependent." One Health approaches also promote several key principles (see Box 1) and the "4 Cs" - communication, collaboration, coordination and capacity-building.

Box 1 - One Health definition and key underlying principles (9)

Definition

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 interdependent.

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 healthy food, water, energy, and air, taking action on climate change and contributing to sustainable development.

Key underlying principles including

1. Equity between sectors and disciplines;
2. Sociopolitical and multicultural parity (the doctrine that all people are equal and deserve equal rights and opportunities) and inclusion and engagement of communities and marginalized voices;
3. Socioecological equilibrium that seeks a harmonious balance between human–animal–environment interaction and acknowledging the importance of biodiversity, access to sufficient natural space and resources, and the intrinsic value of all living things within the ecosystem;
4. Stewardship and the responsibility of humans to change behaviour and adopt sustainable solutions that recognise the importance of animal welfare and the integrity of the whole ecosystem, thus securing the well-being of current and future generations; and
5. Transdisciplinarity and multisectoral collaboration, which includes all relevant disciplines, both modern and traditional forms of knowledge and a broad representative array of perspectives.

The broad and inclusive OHHLEP definition is applicable for a wide range of stakeholders as it provides a shared understanding about what One Health means – both the concept and approach. Tangible examples of One Health initiatives to better grasp what its holistic approach means in practice are listed in Box 2.

Box 2 - Tangible examples of One Health initiatives

- Integrated efforts by both human health and livestock ministries to tackle zoonotic diseases such as rabies, Rift Valley Fever (RVF), brucellosis and Hendra virus
- Integrated efforts by human health and livestock ministries to address food-borne diseases such as salmonellosis, campylobacteriosis and cysticercosis
- Integrated approaches across human health, livestock and agriculture ministries to combat antibiotic resistance, such as through National Action Plans (NAPs), collecting and monitoring samples from hospitals, farms, soil and water
- Integrated prevention and treatment programmes for human health and animal health, such as joint vaccination and deworming of humans and livestock in a specific area or location, coordinated by health and livestock ministries
- Integrated efforts across human health, livestock and agriculture ministries to improve water safety and quality of lakes and rivers to benefit aquatic organisms, as well as humans who rely on them for food security and their livelihoods, and the environment more widely

The challenge of allocating scarce resources to address health threats to multiple species and the triple planetary crisis (pollution, biodiversity loss and climate change) often results in a pragmatic One Health approach in practice (10). One Health initiatives therefore tend to involve two or more sectors, two or more disciplines, and crucially, integration between sectors and disciplines using at least one of the 4 Cs above (11). The different sectors referred to are human health, animal health, wildlife health, plant health, and health of the environment. Disciplines involved in One Health initiatives might include medical doctors, nurses, veterinarians, ecologists, plant pathologists, economists and anthropologists. While many One Health advocates encourage One Health initiatives to include all the sectors above and multiple disciplines at some stage of the project, where possible, such strict criteria sometimes risk excluding valuable One Health initiatives. In some cases, it is not necessary or cost-effective for all sectors to be involved. For example, a joint vaccination project vaccinating both humans and livestock in remote areas would probably not require the plant health sector's involvement, nor would it be good use of the plant health sector's resources. In other cases, the animal health sector might not be required, for example a project on crop pest control and food security and nutrition might need collaboration between the plant health, health of the environment and human health sectors.

One Health promotes a whole-of-society and systems-thinking approach, which considers the wider potential societal and economic benefits, as well as trade-offs, of proposed interventions. Systems-thinking approaches try to consider the wider context of a One Health initiative, the initiative itself and interactions between different sectors, disciplines and stakeholders, as well as possible drivers, outcomes and feedback loops (12). For example, reducing deforestation in a particular area should result in environmental benefits and reduce the risk of zoonotic disease spillover through less frequent contact between humans and wildlife, however, it could also negatively affect livelihoods and local economies. By considering such trade-offs at the outset, plans can be made to mitigate against them, such as by providing alternative viable livelihoods through the creation of protected areas and sustainable tourism (13). From a research perspective, taking a One Health approach or applying a One Health lens to a specific research question or challenge helps to ensure that positive and negative externalities are considered early on, and that research is conceptualised in a holistic and integrated way, maximising co-benefits across sectors, disciplines and communities.

There is also a growing recognition that by moving towards a health-centric, rather than disease-centric, approach One Health can help to address multiple health challenges at once, using limited resources more efficiently and effectively, building strong and trusting relationships with affected communities along the way (14, 15).

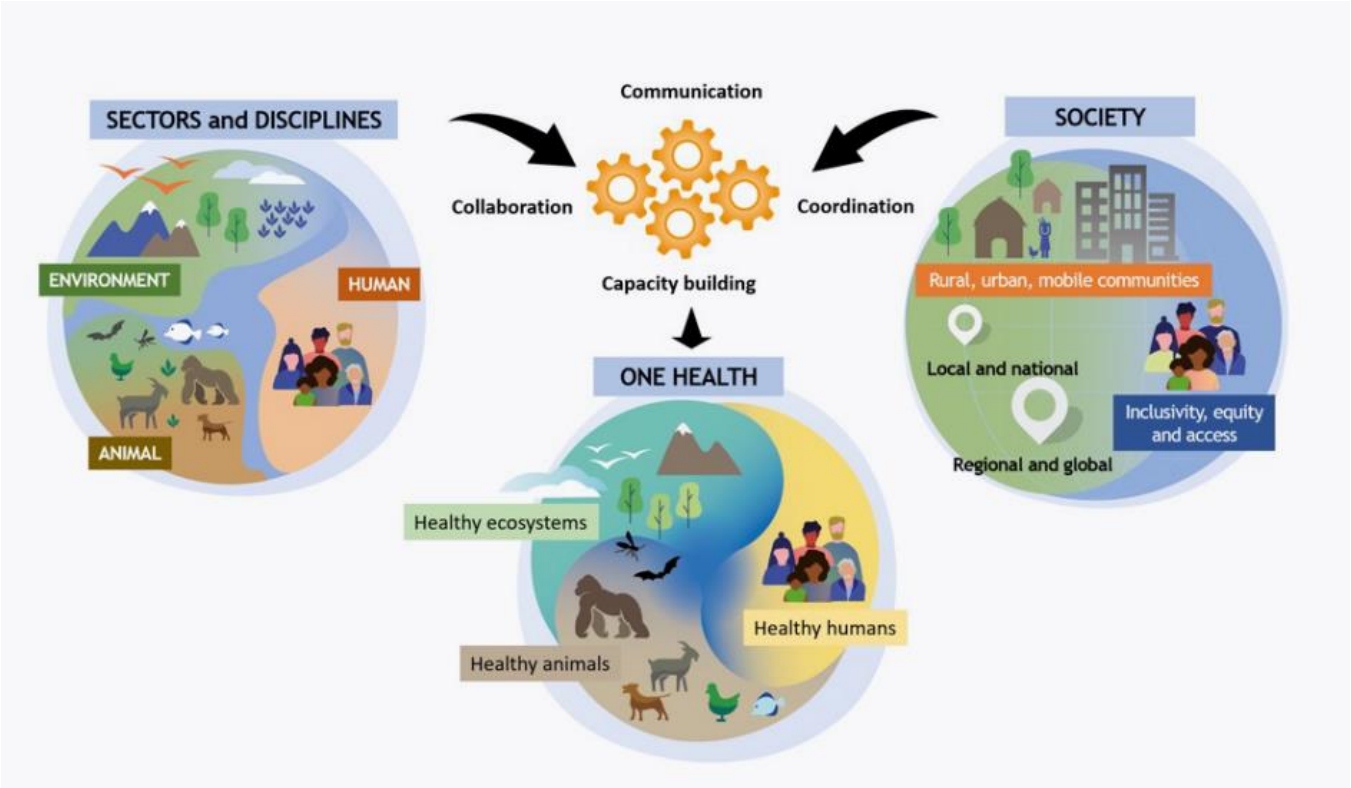
In practice, One Health initiatives therefore aim to strike a balance between ensuring and promoting inclusivity (of sectors, disciplines and communities), in line with the OHHLEP definition above, but also agreeing on the boundaries of One Health for specific projects and programmes. These boundaries will be context-specific and vary according to the project and programme objectives, available budget, non-financial resources (such as workforce capacity and expertise), duration, stakeholder priorities and political economy. In some cases, this might result in narrow One Health boundaries covering two out of the five sectors above, two disciplines and limited collaborative approaches. In others, there might be involvement of three or four different sectors, several different disciplines, community empowerment and broader collaborative approaches. Participatory approaches involving all the relevant stakeholders, alongside systems-thinking, especially during the early stages of project development can help to select appropriate boundaries and create buy-in by key partners early on. This is essential and helps to address the frequent argument that One Health is *too broad* and intangible and should make One Health approaches more attractive for decision-makers and potential investors.

There are also important governance and political economy aspects to consider when putting One Health into practice. Data-sharing agreements and coordination mechanisms between human health and livestock ministries for integrated zoonotic disease surveillance, for example, are essential for impactful One Health approaches. Yet these are often challenging to set up and formalise at the national level, requiring strong political will and close cross-sectoral collaboration. Their significance is emphasised in the Quadripartite One Health Joint Plan of Action (OH JPA) through the three cross-cutting pathways of change (16).

It should also be noted that terminology varies across different disciplines, for example veterinarians might refer to the five sectors above when considering One Health, whereas economists might use the term sectors to refer to health, agriculture, mining etc. Collaboration across disciplines therefore requires clear and effective communication and continuous curation of a One Health glossary, to ensure all stakeholders understand the challenges and can contribute to problem-solving.

Relevance of One Health to animal health

Figure 1: One Health promotes a sustainable and healthy future through collaboration, communication, coordination and capacity-building (from the Quadripartite One Health Joint Plan of Action) (16)



Zoonoses, food safety and antimicrobial resistance (AMR) often come to mind when considering the relevance of One Health for animal health and sustainable production. These are indeed important topics that benefit from One Health approaches, but there are also wider aspects that systems-thinking and whole-of-society approaches can help to highlight.

By recognising the interconnections between humans, animals and the environment (see Figure 1, above), One Health helps to better understand high-risk points within and across different sectors and systems. For example, high-risk points might include:

- Zoonotic disease risks for farmers who rear livestock close to their homes and workers at live animal markets and abattoirs
- Disease transmission risks between livestock and wildlife and vice versa, where they are living or grazing near each other
- Water pollution of streams and rivers, which negatively affects livestock, aquatic animal health and food safety, as well as human health, through drinking water and water for bathing
- Poor soil quality negatively affecting feed grown for livestock, with adverse impacts on livestock production and the environment (such as impacts on water cycles)

Although complex, issues like these can begin to be addressed through One Health research and interventions. Using a One Health lens can help to identify points within a system where interventions are likely to have the most impact, resulting in the most effective use of resources. Additionally, by using a holistic and participatory approach, and working closely with communities that are or will be affected, One Health helps to build trust and promote behaviour change where appropriate. Overall, this can lead to, and maintain, better health for animals and people, while also protecting the environment.

Healthier livestock and aquatic animals have better animal welfare, are more resilient more productive and provide better livelihoods, compared with those suffering from illness and disease. Livestock and aquatic animals play an important role in food security and poverty alleviation, while livestock are also used for draught power, providing manure for fertiliser and as "living banks". Depending on the context, livestock can also have cultural value and contribute to the well-being of humans (17, 18).

One Health approaches can benefit animal health through, for example, joint vaccination and deworming programmes for humans and animals in more remote or hard to reach areas, leading to higher uptake rates and healthier people and livestock (19, 20). Similarly, One Health initiatives that work with communities to understand the behaviour of both workers and consumers at live bird markets have a better chance of achieving improvements in biosecurity and reduced zoonotic risk of avian influenza, as well as better health and welfare of poultry (21).

The health of the environment is highly relevant for animal health. Land use changes, such as clearing forests for rearing beef cattle or growing fodder to feed livestock, might lead to short-term increases in animal production, but the longer-term impacts could ultimately reduce animal health, welfare and production. For example, over grazing can lead to soil erosion and loss of soil quality, subsequently affecting production (22, 23). The type of farming system can affect animal health, highlighting the role the environment plays in disease risk and control efforts. For example, evidence shows that free-ranging or backyard poultry are at increased risk of Avian Influenza compared with biosecure indoor commercial rearing units due to a higher risk of interactions with wild birds and waterfowl (24). On the other hand, intensive indoor farming systems can present high risks of disease transmission once a pathogen has entered a premises, due to close contact between animals and possible amplification and mutation (25). One Health approaches therefore promote safe and sustainable livestock keeping (using appropriate farming systems, stocking densities and being mindful of carrying capacities) to ensure healthy animals and strong productivity in the long-term, while supporting livelihoods, as well as protecting the environment and providing food security. Proximity and interactions between livestock and wildlife, exacerbated by habitat loss, can affect disease risks for both livestock (such as for Foot-and-Mouth disease, African Swine Fever and Brucellosis) and livestock-keepers (for example, Japanese Encephalitis, Brucellosis, and Rabies) (26). Considering the rapidly growing global human population and the associated increasing demand for animal-source foods, balancing healthy nutrition and food security with sustainable livestock practices and livelihoods presents a significant challenge.

Climate change is also affecting the distribution of vectors for some endemic and zoonotic livestock diseases, as referred to in the STAR-IDAZ IRC vector transmission control roadmap (lead summaries 12 and 16) (27). For example, the increasing frequency of severe floods and increasing temperatures in East Africa are favouring the mosquito vector and thereby increasing the disease risk of Rift Valley Fever (RVF) for both livestock and humans, with evidence suggesting the risk also varies according to lowland or highland terrain (28, 29). Models

also suggest that climate change will result in geographically separate vector habitat ranges for Bluetongue virus increasing and overlapping in future in Peru (30).

Livestock industries also contribute to climate change through greenhouse gas (GHG) emissions, leading many people in high-income countries (HICs) to advocate for a reduction in livestock numbers and a shift towards plant-based diets (31, 32). While this may be feasible and appropriate in HICs, in many LMICs, young, growing human populations require increasing amounts of animal-source foods to provide essential food security and nutrition, as well as livelihoods. Conversely, livestock can also help to combat climate change, such as through well-managed grazing on pasture (sequestering carbon) and producing manure, which can be used as fertiliser (33). Additionally, an often-overlooked aspect of reducing livestock GHG emissions is improving animal health and productivity (33-36). Livestock that suffer from illnesses, such as infectious diseases, are less productive but still contribute to GHG emissions. This highlights the importance of investing in animal health, (including animal genetics) as part of One Health interventions (37).

One Health considerations for some of the STAR-IDAZ Priority Topics:

- **African Swine Fever (ASF)**
  - Wildlife aspect to disease epidemiology – warthogs, bush pigs, giant forest hogs, wild boar
  - Food waste disease risk
  - Vector-borne disease element – Ornithodoros (soft ticks)
  - Significant production impacts – due to high mortality rates and/or culling of all pigs during outbreaks
  - Economic, trade and cultural impacts
- **Brucellosis**
  - Zoonotic – high risk through raw milk and handling of infected tissues (farmers, vets, abattoir workers)
  - Food-borne disease risk
  - Production losses due to abortions, reduced milk yield and spread between animals through infected tissue/fomites
  - Wildlife aspect to disease epidemiology - feral pigs, bison, elk and European hares
  - Economic and trade impacts
- **Foot-and-Mouth Disease (FMD)**
  - Wildlife aspect to disease epidemiology – African buffalo, deer, antelope, wild pigs, giraffe, Bactrian camels
  - Severe production losses – most affected animals recover but the disease often leaves them weakened and debilitated
  - Animal welfare concerns – some species suffer significant pain and distress
  - Severe trade and economic impacts

- **Vector transmission and control**
    - Substantial environmental element – temperature, climate, breeding sites, infrastructure affecting habitats
    - Potential negative effects on the environment and human health of vector treatments such as repellents, acaricides etc – lack of appropriate personal protective equipment when applying, risk of resistance developing, risk of environmental pollution
    - Some are zoonotic – e.g. Crimean-Congo haemorrhagic fever, West Nile Fever, Leishmaniasis and Trypanosomiasis (Trypanosoma brucei rhodesiense and Trypanosoma cruzi)
- **Antimicrobial resistance (AMR) and alternatives to antimicrobials**
    - Resistance genes can spread between humans and animals – animal health and agriculture sectors often blamed for high levels of AMR due to high volume of antimicrobials used historically, including as growth promoters
    - Access to clean water, sanitation and hygiene (WASH) for humans and animals essential to help prevent infections in the first place
    - Good animal husbandry and biosecurity practices, alongside vaccinations where available, important tools for reducing the need for antimicrobials such as antibiotics and anthelmintics
    - Access to effective antimicrobials also a big issue – counterfeit medications available over the counter in many contexts
    - Stewardship and behaviour change major aspects of tackling this issue

Some animal health stakeholders have raised concerns that promoting or collaborating on One Health approaches could lead to scarce resources being diverted away from animal health issues, for example, towards human health priorities. However, recent evidence suggests this is not the case, with India's successful Pandemic Fund proposal "Animal Health Security Strengthening for Pandemic Preparedness and Response Project" awarded a 25 million USD grant (38). One Health features even more prominently in the successful proposals for the second round of the Pandemic Fund, with several more projects having an animal health focus (39). This emphasises the recognition of the connectedness between human health and animal health and the support for a One Health lens at the global level. Alongside the current momentum for One Health, several green and climate funding mechanisms are also available, such as the Green Environment Facility (GEF) and the Green Climate Fund (GCF), providing important resource opportunities for the health of the environment (40) (41). By hesitating to engage in One Health funding opportunities, animal health stakeholders' risk being left behind and missing out, when the sector is often already stretched in terms of resources (37). Incorrect assumptions about the opportunities available can also influence One Health stakeholders, leading them to inadvertently miss out on vital funding.

The funding aspect of One Health is being increasingly recognised, with financing included in the AMR research agenda, the One Health Joint Plan of Action (OH JPA) and highlighted at the recent World One Health Congress 2024 in Cape Town, South Africa (4, 16, 42). Importantly, One Health approaches are also being encouraged through the global health funding architecture, with strong support from the G7 and G20, as well as via the Pandemic Fund (43, 44).

What is the added value of One Health?

Potential investors, funding organisations and resource partners are usually interested in the added value of One Health, or what One Health offers in comparison to other approaches. There is a small but growing body of evidence demonstrating that One Health approaches provide a positive economic value, when compared to more traditional, sectoral initiatives (45). Evidence shows that while it might not be cost-effective to implement a control strategy for one zoonotic disease alone, integrating control programmes for several different diseases (for example taeniasis/cysticercosis, soil-transmitted helminths and classical swine fever) can become good value (46). After action reviews can also help to show the added value of investing in One Health, for example a coordinated response to RVF outbreaks (47).

Yet beyond the economic argument for more integrated and holistic approaches to complex challenges, the added value of a One Health approach often lies in its multiple co-benefits, while minimising unintended consequences. In some cases, the added value derives from the more efficient use of resources, such as human health and animal health sectors sharing vehicles, equipment and labs, where appropriate and feasible (48). In other cases, the added value comes from the public good aspect of One Health and the overall societal benefit to communities. These co-benefits are not always straightforward to quantify, as suitable metrics for measuring and evaluating One Health are still being developed (49, 50). For animal health initiatives addressing zoonotic diseases for example, co-benefits might include improved human health, food safety and security, as well as poverty alleviation, job creation, employment, education opportunities and women's empowerment (37). These less tangible public good aspects of One Health are not always appreciated but help demonstrate the added value of One Health through their contribution to the sustainable development goals. A recently published climate investment case for the livestock sector outlines how the return on investment includes a multi-benefit, 'triple win', by strengthening livestock-dependent livelihoods, improving climate adaptation and reducing GHG emissions, as well as other co-benefits, including positively impacting food security (34). It explains how "if we take a holistic approach to assessing benefits, the investment profile of the livestock sector is favourable".

By applying systems-thinking to complex challenges, One Health can help to identify key leverage points; ensuring that multiple challenges are addressed through one intervention and thereby providing better value when compared to several separate interventions. Additionally, as capacity-building is a core component of One Health, once One Health initiatives are partway through, they should be less vulnerable to a loss of external resources, as strong national, sub-national or community capacity will be available to continue the work. This is an important but often overlooked aspect of the added value of One Health that contributes to more equitable collaborations between resource partners and communities in the longer-term.
Conceptualising research as One Health from the start is critical to ensure appropriate outcomes relevant for One Health are measured and described (45). Without embedding a One Health approach to research, opportunities to recognise, appreciate, and where feasible, quantify co-benefits can be missed. Yet this type of evidence is crucial for persuading potential funders and decision-makers that investing in One Health approaches represents good value for money.

One Health also adds value through knowledge sharing and co-creation. Integrated, holistic and whole-of-society approaches promote collaboration and learning between and across different sectors, disciplines and communities, and thereby encourage knowledge sharing and co-development of solutions. This aspect has been highlighted in a recent fact sheet, which lists four key One Health benefits; enhanced capacity to address complex challenges, sharing knowledge and resources across sectors, resource savings, and a unified voice

and message (48). Global networks such as STAR-IDAZ IRC and the Quadripartite-powered One Health Knowledge Nexus therefore play a vital role in supporting the added value of One Health research, policy and implementation (51, 52).

Investing in prevention is good value for animal health, One Health and the bottom line

Significant and growing evidence shows that the prevention of health threats is a much better value investment than response (47, 53-55). Vaccination, for example, is widely recognised as providing a good return on investment and cost savings for human health (56). For animal health, vaccination can also be an important part of prevention efforts, along with good animal husbandry and biosecurity practices. However, despite evidence demonstrating the good value of vaccination, there is also increasing vaccine hesitancy among livestock keepers. Research suggests there are a number of reasons for this, ranging from lack of trust in government, misinformation and lack of knowledge, to a perception that cultural or traditional practices are more effective than vaccines, and concerns about vaccine safety and possible side-effects (57, 58). For AMR, prevention includes improving access to WASH, as well as good animal husbandry practices, and not necessarily focusing only on developing new antimicrobials. Similarly, for many infectious diseases, access to clean water significantly reduces the risk of infection and transmission in humans and animals. However, when vaccination is used in response to disease outbreaks, such as ring vaccination for FMD, the benefits are often reduced due to serious trade and economic impacts affecting a country's disease-free status (59, 60). This highlights why prevention in the first place, addressing upstream drivers of disease emergence, provides better value. But this is challenging and involves trying to address many anthropogenic changes such as land use change, urbanisation, international trade, infrastructure developments and natural resource extraction (61). However, by collaborating across sectors and disciplines, and taking a systems-thinking perspective, One Health approaches can deliver significant co-benefits for animal health, while minimising trade-offs. A One Health approach is also being encouraged by the Lancet–PPATS Commission on Prevention of Viral Spillover, which is focusing on upstream disease prevention (62). Preventing Zoonotic Disease Emergence (PREZODE) is an innovative international initiative that aims to improve the understanding of the mechanisms leading to zoonotic disease emergence in complex socio-ecosystems, to identify the main biological, ecological, and socio-economic drivers influencing the risk of emergence and to strengthen the capacity of human societies to respond to them (63). PREZODE's primary focus is prevention, acting and intervening upstream on drivers of disease emergence.

Conclusion

Embedding One Health approaches into animal health research at the conceptualisation or project development stage can help to identify wider connections, co-benefits and potential trade-offs. Through participatory processes, stakeholders can then adjust their original plans as needed and work through challenges collaboratively. Growing evidence suggests that taking these integrated, holistic and whole-of-society One Health approaches can lead to positive economic outcomes, improved animal health and sustainable production, better human health and livelihoods, as well as protecting the environment (45). Beyond these health outcomes, One Health can also help to build better professional relationships across ministries, sectors and disciplines, as well as improving trust between communities and governments, and within communities (14). Considering the close interconnections between human health, animal health (domestic and wildlife) and the health of the environment, there are opportunities for many different stakeholders and groups to contribute to and benefit from One Health approaches.

Continued high-level momentum and support for One Health approaches from the Quadripartite via the OH JPA and the World Bank, indicate that One Health is more than a "buzzword" and has an important role to play in contributing to positive health outcomes for humans, animals and the environment (16, 53). One Health approaches not only consider technical solutions, but also factor in social, economic, environmental, cultural and other impacts, as well as governance issues, recognising that each context is unique and there is no one-size-fits-all solution. In this way, integrated One Health approaches can contribute towards tackling the sustainable development goals, as well as animal health, welfare and production, while protecting the environment.

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