



Action for Animal Health

The case for investing in animal health
to support One Health





Action for Animal Health

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Action for Animal Health (A4AH) was launched in 2021 and advocates for more investment in strong and resilient animal health systems that protect people, animals, and the planet. It is a coalition of partners, including African Union Interafrican Bureau for Animal Resources, Brooke, Compassion in World Farming, Dogs Trust Worldwide, GALVmed, Global Alliance for Rabies Control, International Livestock Research Institute, Ripple Effect, Soi Dog Foundation, SEBI-Livestock, Vétérinaires Sans Frontières International, and World Veterinary Association.

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Glossary

A4AH	Action for Animal Health
AFROHU	Africa One Health University Network
AMR	antimicrobial resistance
CAHW	community animal health worker
CDC	Centers for Disease Control and Prevention
DCA	Dutch Committee for Afghanistan
EWCA	Ethiopian Wildlife Conservation Authority
FAO	Food and Agriculture Organization of the United Nations
FELTP	Field Epidemiology and Laboratory Training Programs [Pakistan]
HEAL	One Health for Humans, Environment, Animals and Livelihoods
ILRI	International Livestock Research Institute
KII	key informant interview
LMIC	low and middle-income country
NBW	National Bridging Workshop
NGO	non-governmental organisation
NOHSC	National One Health Steering Committee [Ethiopia]
PPE	personal protective equipment
PVS	Performance of Veterinary Services
UNEP	United Nations Environment Programme
VPP	veterinary paraprofessional
WHO	World Health Organization
WOAH	World Organisation for Animal Health
WVA	World Veterinary Association

A note on methodology

A mixed methods approach was used to explore the current state of A4AH's five pillars of animal health systems and what resources are needed to support operationalisation of One Health. Data were collected from open sources and during interviews. Primary data collection consisted of 22 semi-structured key informant interviews (KII) with multilevel and multisectoral stakeholders, including donors, United Nations agencies and programmes, and international and national non-governmental organisations (INGOs and NGOs) across Eastern Africa, Europe, South Asia, the United Kingdom, and the United States of America.

Ethiopia and Pakistan were chosen as case studies because of their LMIC status, high dependence on animal livelihoods, and as areas of concern for emerging and endemic zoonotic diseases.

1 Executive summary

The Covid-19 pandemic has spotlighted the deep connection between animals, humans, and the wider environment (including ecosystems). As a result, the One Health approach is receiving increased political attention as a solution to some of the greatest health threats we face today – including increasing zoonotic disease emergence, antimicrobial resistance (AMR), and food safety and security.

Yet weaknesses in animal health systems will hinder the implementation of One Health. Underinvestment in animal health systems has led to critical shortages in animal health workforces, medicines and vaccines, barriers to service delivery and access, poor disease surveillance, and worsening welfare issues.

The Action for Animal Health (A4AH) coalition advocates for five pillars of action to secure animal health and welfare. This report outlines the current state of these five pillars of animal health systems in low-and middle-income countries (LMICs), with a particular focus on Ethiopia and Pakistan. It sets out the case for why we need to pay closer attention to the health of the animals we depend on to implement One Health and for sustainable development.

Key messages:

- 1) Strong animal health services
are essential to sustainable development
- 2) Better legislation, regulation and implementation
of animal health services are essential
- 3) Communication and connection are key
to One Health
- 4) Animal health needs equitable status in
One Health approaches





1 Strong animal health services are essential to sustainable development

Strengthening animal health systems will have a cascading impact for sustainable development. Communities across LMICs live closely together with animals and this increases their vulnerability to the impact of poor animal health and welfare.

More than 75 per cent of emerging infectious diseases originate in animals. Just 13 of over 200 known zoonotic diseases affect more than 2 billion people and cause 2.4 million human deaths annually. Poor livestock care and misuse of antimicrobials in the animal health sector are a major contributor to growing global AMR. And many animal owners face threats to their income because of animal disease, poor welfare, and the inaccessibility of quality animal health services.

Improving animal health and welfare through quality animal health services is vital to global health security, livelihoods, and food security and safety, and will also provide employment opportunities. Livestock, including production animals and working animals, also support communities' resilience to the impacts of climate change and environmental and disease threats. Improvements in animal welfare and health can play a further role in reducing livestock sector emissions through improving efficiency.



2 Better legislation, regulation and implementation of animal health services are essential

Implementing the One Health approach for effective animal and zoonotic disease prevention and control requires better legal and regulatory frameworks, and the human and financial resources to enforce these. Gaps in the veterinary workforce, animal health services, disease surveillance infrastructure, laboratory capacity, and vaccine and medicines availability and accessibility result in poor animal health, with increased risk of zoonotic disease transmission.

There is a shortage of skilled animal health practitioners and support staff at the grassroots level in LMICs. Communities cannot access quality primary animal health services, negatively affecting trust and demand. Animal health practitioners have varying levels of qualification, including people who have no training or qualifications. Effective regulatory frameworks are essential for quality animal health services.

Animal health practitioner education does not always result in graduates meeting basic competencies, and needs to involve more practical training. More effective regulation of veterinary education is necessary to enable this. Once qualified, animal health practitioners lack resources, transportation, and communication tools to effectively conduct their roles.

Practitioners need to gain an understanding of community needs to create demand for animal health services. Where there are low ratios of veterinarians per animal, veterinary paraprofessionals (VPPs) and community animal health workers (CAHWs) play critical roles in providing animal health and extension services. These roles and their integration in the animal health system are often not well defined or regulated, and communication between animal health practitioners is often limited. This results in gaps in the quality of services (limited training, quality control, limited activity monitoring, etc.).



3 Communication and connection are key to One Health

Communication gaps and a lack of data sharing are major challenges across the human health, animal health, and environment sectors and governance levels. National and international animal health systems databases are often decentralised across sectors and stakeholders, and are not always publicly accessible, hampering communication among sectoral stakeholders. The quality of the information in these databases depends on a skilled workforce and laboratory capacity for effective passive and active surveillance of diseases. Also essential is the motivation among farmers and animal health practitioners to report animal disease outbreaks.

Especially in countries with insufficiently staffed animal health services, communities play a key role in disease prevention, surveillance, and control.

There are promising examples of increased integration of human and animal disease participatory epidemiology at grass-roots level, through the inclusion of communities living in close proximity to animals. However, community agency and capacity for engagement must be enhanced through training on participatory surveillance and appropriate incentives for reporting.

Establishing sustainable business models through grass-roots public–private partnerships will increase accessibility of animal health services. Incentives could be provided to animal health practitioners to work in remote locations.



4 Animal health needs equitable status in One Health approaches

Although focus on One Health has increased at high level, there remain significant policy and implementation gaps due to a lack of awareness of the public health and economic benefits of addressing animal and environmental health.

While One Health has long been advocated for by the animal health sector, this report shows that within new government-led One Health

alliances, many public health stakeholders lack awareness of the role and importance of animal health. This leads to chronic underfunding of animal health systems. Resource sharing and decision-making powers under the One Health paradigm remain concentrated amongst human health stakeholders, undermining the collaborative benefits of these approaches.

2 Introduction

Animal health underpins many of the greatest global health threats we face in the twenty-first century. But despite its importance to our health and to sustainable development, animal health systems remain under-resourced. In this report, the Action for Animal Health (A4AH) coalition sets out the case for why governments, donors, and implementing agencies need to invest in the health and welfare of the animals that billions of people depend on every day.

The Covid-19 pandemic has put a sharp focus on the inextricable relationship between people, animals, and the wider environment (including ecosystems). Human activity has contributed to rapidly accelerating climate change, environmental degradation, and biodiversity loss. Climate change affects the geographic distribution of animals and human populations, with potential for additional disease and pathogen evolution and spillover.¹

Rising demand for animal products has seen significant growth in livestock production; however animal health systems have struggled to keep up, which contributes to many of the global health threats we face today.²

Humans and animals increasingly live in closer proximity, which is driving the rise in zoonotic disease spillover (i.e. the transmission of diseases between animals and humans).

- An estimated 60 per cent of globally emerging infectious diseases are zoonoses.³
- Among the 30 new human pathogens detected in the last three decades, 75 per cent originated in animals.⁴
- Just 13 zoonoses are estimated to affect over 2 billion people, causing 2.4 million human deaths annually.⁵
- Zoonoses caused direct losses of more than US\$20 billion and indirect losses surpassing US\$200 billion over 10 years alone.⁶ Many of these diseases spill over from livestock and other domestic animals.⁷

Animal diseases that do not spill over to people, such as peste des petits ruminants (PPR) and African swine fever – which continues to spread worldwide – devastate livelihoods and food security.^{8,9}

Food-borne diseases cause 600 million cases of illness worldwide annually.¹⁰ It is estimated that these result in an annual loss of US\$17 billion in productivity and US\$2.5 billion in treatment costs. Many of these diseases have their roots in animals and animal-sourced foods.

Growing antimicrobial resistance (AMR) – which occurs where microbes no longer respond to drugs, making infections harder to treat – is estimated to be responsible for 700,000 deaths a year.¹¹ This is driven by many factors, including the misuse and overuse of antimicrobials in animals.

One Health

“

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.¹²

One Health High Level Expert Panel

”

The pandemic has underscored the impact of zoonoses and highlights the linkages between animal, human, and environmental health. The One Health approach is receiving increased political attention to tackle these health threats.

Since the Covid-19 pandemic began:

- The One Health High-Level Expert Panel has been established.
- The Quadripartite (World Health Organization (WHO), United Nations Environment Programme (UNEP), World Organisation for Animal Health (WOAH), and Food and Agriculture Organization of the United Nations (FAO)) has agreed a definition of One Health.
- The Quadripartite has released a One Health Joint Plan of Action.
- One Health has been extensively discussed and featured in the outcomes of the G7 and G20 summits.
- One Health has been a key part of deliberations in the intergovernmental process to draft a pandemic treaty under the constitution of WHO, and in discussions on a World Bank Financial Intermediary Fund for pandemic prevention, preparedness, and response.

Despite this significant political interest, there remains a lack of integration in the implementation of One Health. Human health often remains prioritised over animal and environmental fields when constructing One Health systems. This inequity is short-sighted, as the animal health sector makes a substantive contribution to One Health.

Investing in animal health

Current levels of underinvestment in animal health systems have led to critical shortages in animal health workforces, medicines and vaccines, barriers to service delivery and access, poor disease surveillance, and worsening welfare issues. To realise the potential and power of animal health for sustainable development, these services need to be included in One Health initiatives equitably.

Healthy animals are essential to human health and wellbeing. Improvements in animal health systems directly enhance human health, food safety and security, and poverty alleviation, and can contribute to job creation, employment, and education opportunities.

Globally, animals contribute to food security by providing 14 per cent of the total calories and 33 per cent of the protein consumed in people's diets.¹³ Working animals provide essential draught power and transport for small-scale farmers in LMICs, and contribute to other income-generating activities¹⁴ – and companion animals and wildlife animals are tightly bound to many communities through sociocultural connections.¹⁵

As 60–80 per cent of the total food in LMICs is produced by women, strengthening animal health systems has the potential to promote gender equality.¹⁶

Investment in animal health simultaneously represents front-line defences against zoonotic disease spillover and supports communities' resilience to the increased impact of climate change (see Box 1). Improvements in animal welfare and health, productivity, and production can play a role in reducing livestock sector emissions through reduction in herd sizes.

There are strong economic rationales for public investment in national animal health services. Not only would this help prevent and respond to disease, but also it would increase private sector confidence in further investment and development in infrastructure.¹⁷

Improved animal welfare is a driver of animal health and reduces the susceptibility of animals to disease.¹⁸

Disease prevention is proven to be more cost-effective than treatment.¹⁹ Prevention through better surveillance of diseases, the development of global databases of virus genomics and serology, better management of the wildlife trade, and substantial reduction of deforestation combined would cost less than one twentieth of the value of lives lost each year to emerging viral zoonoses.²⁰

The burden of animal diseases is exacerbated by underinvestment in animal health services in general, and is a particular challenge in LMICs.^{21,22} Continuous and (re-)emerging outbreaks of animal and zoonotic diseases are a tangible effect of this lack of investment. At national level, animal health is often not a priority within already limited agriculture government spending.²³ The animal health sector receives little funding compared to government contributions to the agriculture sector and broader economy.²⁴

Despite the importance to global health and sustainable development, animal health services in many countries are under-resourced. Across LMICs, livestock contributes 40 per cent of agricultural gross domestic product (GDP),²⁵ yet contributions to the livestock sector, for instance, make up less than 0.25 per cent of Overseas Development Assistance (ODA) – with even fewer resources allocated to animal health.²⁶

It is vital that better economic analysis is done to estimate required levels of investment in animal health. The Global Burden of Animal Diseases²⁷ (GBADs) programme is one initiative aiming to fill this gap.



Box 1.

The environment, climate change, and animal health

The role of the environment is often omitted from the One Health narrative.²⁸ And yet, the health of the wider environment and ecosystems directly affects the health of animals and humans. For example, environmental degradation such as deforestation can heighten the emergence of zoonotic diseases, and the consumption of animal products can lead to humans being exposed to pollutants residing in the environment.

Biodiversity decline and climate change can also increase pathogen spread and infection rates, and antibiotic use in animals can contaminate land and water sources.²⁹ Climate change drives changes in the environment that directly impact immune responses in animals and people.³⁰

Intensive livestock production systems can contribute significantly to harmful greenhouse gases that cause climate change.

However, low-input extensive systems like pastoralism, which use a small amount of inputs, can offer a low-carbon food production system and contribute to protection and restoration of the local environment.³¹ Better animal health can reduce emission intensity: fewer animals die and efficiency is improved as fewer animals are needed to meet demands.³²

Healthy animals and sustainable methods of production help farmers adapt to a hotter and more unpredictable climate. Keeping livestock helps farmers adapt to conditions brought about by climate change.³³ Working equids contribute to sustainable agriculture techniques, and help build community resilience to climate shocks through their contribution to livelihoods and by helping communities collect water and access infrastructure from greater distances.³⁴



3 The Action for Animal Health coalition pillars

The case for strengthening the five A4AH pillars

This section presents an overview of the state of the five Action for Animal Health coalition priority areas in LMICs.

Figure 2. Action for Animal Health coalition pillars of animal health systems



The five pillars are underpinned by the principle that animals should have a life worth living, encompassing compassion and respect. Animals are sentient beings, and experience physical and mental states that are influenced by their living and working environment, human behaviour, resources, and service provision.³⁵



1



Support community engagement and access to services

Pillar 1: Support community engagement and equitable access to animal health services

Changes in animal health directly impact human lives and livelihoods. The One Health concept is implicit in the way people who live closely together with animals think about their lives and their interactions with animals and the environment. While communities may have some effective traditional knowledge and skills to prevent, mitigate, and treat animal diseases and zoonoses,³⁶ this may be insufficient when faced with increasing significant changes and novel challenges to health.

A strengthened animal health system is a key element to increasing people's resilience and adaptive capacity to environmental and disease threats. Effective and well-resourced animal health systems contribute to poverty alleviation, supporting food safety and security, people's nutrition, trade, and economic development. However, access to animal health services is often limited, particularly in remote and rural areas.³⁷

Sustainable animal health in Afghanistan

The Dutch Committee for Afghanistan (DCA) is a non-profit organisation that has been supporting animal health for production and animal welfare for over 32 years in Afghanistan, where 80 per cent of people rely on livestock and agriculture for their livelihoods.³⁸

Through establishing animal health field units in 412 districts that utilise a community-based, fee-for-service public-private partnership model, DCA has been able to create and support a sustainable supply chain of animal health services, medicines, and vaccines. Simultaneously, DCA supports surveillance and control of the most prevalent animal diseases, including brucellosis and peste des petits ruminants (PPR).

Faced with a shortage of animal health practitioners, and farmers lacking access to animal health services, DCA developed a training model consisting of a six-month course for veterinary paraprofessionals (VPPs). Using a participatory approach involving local elders and authorities, individuals are recruited in rural areas where there is a high demand for health services for its livestock population to receive comprehensive VPP training. Upon graduation, they receive a start-up kit including a motorbike, solar-powered cold storage, and materials to promote their services. This is followed up with one year of support covering medicines and vaccines, as well as continuing education and refresher courses.

The VPPs are expected to conduct their work on a fee-for-service basis. As many services are provided for free by foreign agencies, part of the VPP training is to resist community pressure and explain that they must charge a small fee to be sustainable. This supports the supply of medical equipment, and cold chain maintenance and sustainability. VPPs are licensed to work by the Ministry of Agriculture, Irrigation and Livestock. As VPPs are selected by their community, they enjoy high levels of trust. Retainment is high at 80 per cent.

By training women VPPs, women livestock keepers are also catered for. Outreach to women can be challenging so DCA involves teachers and school children to pass on messages within communities and households: 'We train volunteer teachers to spread the message, [school] children are literate and pass on the messages [in their household, they] are the best extension workers' (KII).

Between 2004 and 2022, DCA trained around 800 new VPPs. The model provides a pathway to higher education: one former trainee even became a member of parliament through their standing and trust within their community. Since the start of the programme, the number of universities training animal health practitioners has increased. However, the quality of education remains low and few graduates are willing to work in rural areas. Many choose to work for international agencies and NGOs rather than the public sector, hence the need to train VPPs.³⁹

DCA supports the One Health approach: it has developed three extension packages that disseminate the interface between livestock, public, and ecosystem health for herders and VPPs. During an outbreak of the zoonosis Crimean–Congo haemorrhagic fever (CCHF) in Western Afghanistan, butchers became infected through contact with the blood of infected sheep. DCA supported the health department in the provision of personal protective equipment (PPE), as well as tick control to prevent further transmission. During the Covid-19 outbreak, DCA's network was used for distributing PPE and the networks of VPPs were used to convey awareness messages to communities.

Based on the positive results of its approach, DCA uses local community groups to engage with community health workers, as its solar-powered fridges and cold chain network already provide support across sectors. These activities provide avenues for increased collaboration between human and animal health practitioners, and further the implementation of the One Health approach.⁴⁰

Communities remain largely excluded from participatory programme development.⁴¹ This is a loss for One Health, particularly in remote, conflict-affected, or disaster zones where authorities lack access. Here, communities can detect changes in animal, human, and environmental health conditions when supported with relevant knowledge and tools.⁴² Alongside this, disincentives for disease reporting, for instance culling people's animals (where culling is the only available solution) without compensation, would need to be eliminated.⁴³

A good practice example is the Rx One Health Summer Institute, jointly led by US and East African partners. It provides a field-based

One Health learning course across disciplines to work collaboratively with communities near wildlife areas to increase understanding of the interlinkages between human and animal health and welfare, livelihoods, and conservation.⁴⁴

Another is Conservation through Public Health who work to improve the health of wildlife, ecosystems, humans and their livestock in and around Africa's protected areas. For instance, they train village health and conservation teams in Uganda to reach out to households to prevent infectious diseases. Teams are responsible for reporting diseases so that interventions can be made.⁴⁵



Pillar 2: Increase the numbers and improve the skills of the animal health workforce

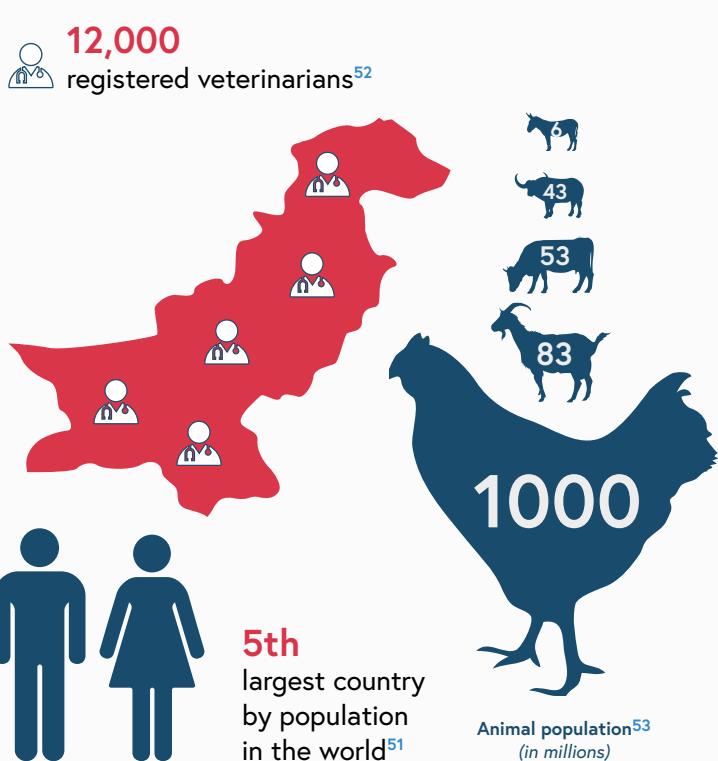
Effective animal health interventions rely on a strong, competent, and appropriately resourced workforce. There are no globally accepted minimum coverage standards for the number of animal health practitioners needed for a certain population of animals. This means the quantity of animal health practitioners varies significantly across regions and countries and impacts how animal health systems function.⁴⁶

Fig 1:
Comparison of animal health practitioner coverage in the UK and Pakistan

The UK



Pakistan



There is an array of animal health practitioners with varying levels of qualification, including people who are entirely unqualified. Differing educational quality standards affect the efficacy of the workforce.⁵⁴ The lack of skilled veterinarians means that available practitioners can only focus on a few priorities, leaving only a small proportion of animal health practitioners specialising in emerging infectious diseases for example.⁵⁵

A poorly trained workforce also increases risk of AMR. Elsewhere, gaps in quality and specialised skills of available animal health practitioners have led to a lack of demand for services, leading to underemployment of recent graduates.

“

Veterinary [graduates] cannot even express themselves or comprehend disease outbreaks, [as a result] many remain unemployed, with little opportunities in the private sector, [while there are] no public jobs, and the unemployment rate is high. There is a lack of demand and resources; [there is] no budget for fuel, clinics, or DSA [Daily Subsistence Allowance] for vaccination campaigns. [There is a] need to improve demand by [targeting] commercial farmers and upgrade the quality of service providers.

Research participant (KII)

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Global organisations working to strengthen the workforce

The World Organisation for Animal Health (WOAH, founded as OIE) supports the development of the animal health workforce and services of its 182 member countries. The organisation leads the development of international standards on animal health, providing principles of good governance and guidelines for the quality of animal health services. To that end, WOAH established the Performance of Veterinary Services (PVS) Pathway programme in 2007 as its flagship capacity-building platform for the sustainable improvement of national veterinary services.⁵⁶ Through PVS missions and reports, WOAH highlights gaps in national veterinary services, including in relation to the veterinary workforce regarding both numbers and types of personnel and their animal health qualifications (training).

National governments may also request WOAH to provide additional support around workforce development and planning. This includes workforce needs assessments as part of the PVS gap analysis, as well as support for the effective integration of VPPs into the workforce, encompassing support on drafting legal and regulatory frameworks and review of training curricula.

The integration between WHO International Health Regulations (IHR) and the WOAH PVS Pathway started in 2013 with a first pilot of a National Bridging Workshop (NBW), and since then, workshops have been implemented in more than 40 countries.⁵⁷ Starting in 2022, the NBW programme became a One Health Tripartite initiative (WHO, FAO, and WOAH) in the organisation and facilitation of the workshops. The cornerstone activity is a three-day workshop that brings together 60–90 stakeholders from the animal health and human health services from national, regional, and local levels, as well as representatives of other relevant sectors (the environment, wildlife, the media, police, etc.).

The objective is to support countries' intersectoral collaboration for preventing, detecting, and responding to zoonotic diseases and other health events at the animal–human interface. To foster greater impact, the Tripartite supports the implementation of activities derived from an NBW (e.g. an NBW Roadmap).

Photo: © VSF Germany



Gaps in the workforce

Due to a lack of resources, LMICs face gaps in animal health higher education, with locations of institutions and graduates unequally distributed across urban and rural areas. Practical training and training in animal welfare is minimal. The resulting scarcity of animal health graduates in rural areas means VPPs and community animal health workers (CAHWs) often provide animal health services. While not universally acknowledged, 'the reality is that community animal health workers are real and necessary' (KII).

A veterinary paraprofessional is defined by WOAH as a:

'person who, for the purposes of the Terrestrial Code, is authorised by the veterinary statutory body to carry out certain designated tasks in a territory, and delegated to them under the responsibility and direction of a veterinarian. The tasks for each category of veterinary paraprofessional should be defined by the veterinary statutory body depending on qualifications and training, and in accordance with need'.⁵⁸

Where veterinarians and VPPs are unable to meet farmers' needs (particularly in remote and/or conflict-affected areas), CAHWs are critical in delivering animal health services in hard-to-reach areas. CAHWs are usually chosen by their community to provide basic animal health services and husbandry advice to livestock keepers. CAHWs generally have shorter and less formal training than VPPs, often provided by NGOs.

Agrovets are also key to animal health service delivery in hard-to-reach areas. These are supply stores dealing in medicines, feed and other supplies. They are often the first people farmers go to when faced with animal sickness or injury.⁵⁹ However they are poorly regulated and are often not equipped with technical knowledge.

VPPs and CAHWs play an important role in animal disease surveillance.⁶⁰ For national veterinary services to take full advantage of

this for national animal disease control, VPPs and CAHWs need to be effectively integrated into the national veterinary services through the proper regulatory, legal, and training frameworks. Too often, training and practice occur outside of the knowledge or supervision of the veterinary authorities. This diminishes their effectiveness and creates tensions.

The inaccessibility and low quality of animal health services impacts people's trust in and demand for services.⁶¹ In many LMICs, CAHWs and VPPs fill gaps in the animal health workforce.⁶² Training CAHWs to support and conduct vaccination campaigns and surveillance has direct benefits to local economies, providing local employment and trusted services.⁶³ In some contexts, however, responsibility sharing between veterinarians, VPPs, and CAHWs remains hazy as clear regulatory frameworks are found lacking.⁶⁴

Key informants noted how training currently provided by a range of institutions and agencies is somewhat uncoordinated, resulting in varying skill sets among CAHWs, which in turn detrimentally impacts people's trust in, and demand for their services.

As few formal qualification and registration systems exist for VPPs and CAHWs, comprehensive, disaggregated data on the total animal health workforce is unavailable. WOAH addresses these issues through its veterinary legislation support programmes and other initiatives to support veterinary statutory bodies to regulate VPPs as well as veterinarians.⁶⁵ WOAH developed the competency and curricular guidelines for VPPs in 2018 and 2019, respectively, to support VPP training institutions to improve curricula and to develop training based on competencies required for specific jobs that VPPs might undertake.

Registration of all animal health practitioners will help indicate the availability and needs of the workforce, while increased recognition and status might boost numbers further.

Box 3.

Defining the role of community animal health workers

As the roles, registration requirements, and educational programmes for VPPs vary widely across the globe, WOAH identified minimum competencies and training requirements and published the competency and curricula guidelines for VPPs in 2018. While CAHWs may be considered in some contexts as a subcategory of VPPs, they were not considered within the scope of these VPP guidelines.

WOAH and VSF International are partnering to develop competency and curricula guidelines for CAHWs. This project will also identify and assess the factors that contribute to the long-term sustainability of CAHW programmes and will provide recommendations to training and implementing agencies. These guidelines will support the recognition, regulation and integration of CAHWs into animal health systems.

Many institutions across LMICs lack formal state accreditation and/or periodic review systems.⁶⁶ According to key informants, this can be attributed to the lack of national strategies in building an animal health workforce. Besides educating a larger animal health workforce, quality and retainment issues of animal health personnel were flagged. Key informants noted that veterinarians may wish to obtain a secure government position: 'Getting a job in government is the end goal for most [veterinary graduates]' (KII), whereas elsewhere a lack of resources in the public sector means they provide private services after hours.

Both higher-income countries and LMIC increasingly face animal health practitioner shortages.⁶⁷ Low salaries, combined with the lack of other incentives to work in remote areas, drive local private practice gaps.

Additionally, there is often a preference for the job security of the public sector. Any strategy for increasing the workforce therefore needs to enable the income-generating activities in both public and private sectors. Fee-for-service models and integrating public and private goods service provision have proven to be most sustainable and to achieve better coverage.⁶⁸

Animal owners are usually willing to pay for animal health services, if service quality and access is guaranteed through properly trained and supervised animal health practitioners,⁶⁹ indicating the need for improving both the quantity and quality of the animal health workforce.



Photo: © VSF-Netherlands



Photo: © Ellie Parravani / World Animal Protection



Pillar 3: Close the veterinary medicines and vaccines gap

Animal vaccines and medicines are important to protect animal health and welfare, food safety and security, and trade.

Their use makes sound economic sense to secure animal and public health. For instance, vaccinating dogs against rabies, rather than depending on costly prophylaxis for people bitten by a dog, is a cost-effective prevention strategy.⁷⁰

Vaccination campaigns are an important part of integrated animal disease control strategies,⁷¹ including regional programmes for transboundary animal diseases.⁷² One success story is the eradication of rinderpest, through a combination of vaccination, trade restrictions, and surveillance,⁷³ with CAHWs playing a critical role in the implementation and reach into remote rural and pastoral areas.

There are multiple barriers to livestock keepers and animal health workers' access to (quality) animal medicines and vaccines, including the lack of infrastructure, transportation, and fuel, and the absence of a cold chain.⁷⁴ LMICs face a persistent lack of supply and access to animal medicines and vaccines (see Box 4). Vaccine and medicine development in animal health medicine is much slower than those targeted at humans,

especially for neglected zoonoses only affecting LMICs.⁷⁵ The slow pace of development may be a result of lack of demand due to animal owners' limited resources to pay for unsubsidised vaccines and medicines, and experiences with low-quality vaccines and medication.⁷⁶ It may also be related to diseases not being diagnosed and reported, meaning the evidence of the burden of an animal disease is not available.

As vaccines have a small sales margin but high transaction costs for delivery to smallholders, particularly in remote areas, animal health practitioners may need to provide additional services to be cost-effective, rather than just selling this one product (KII).

Consequently, parallel animal health services are provided by private companies in many LMICs.

These services include providing medicines and vaccines, potentially without regulatory and supervisory oversight, which could increase disease risk and AMR, and threaten animal welfare.⁷⁷

The first essential veterinary medicines list for livestock and working equids

While there has been a list of essential human medicines and vaccines for over 40 years, there is none for the animal health sector.⁷⁸ Brooke and the World Veterinary Association (WVA) are jointly creating the first ever essential veterinary medicines and vaccine list for livestock. Designed to provide an evidence-based blueprint for countries to create their own context-specific list, it will include medicines and vaccines for eight food-producing animals as well as working equids.⁷⁹

A global survey of animal health practitioners reported:

- Eighty per cent of respondents felt their ability to address animal health was restricted due to issues in accessing essential veterinary medicines and vaccines.
- Thirty-four per cent of respondents mentioned a lack of access to vaccines for diseases such as foot-and-mouth, tetanus, and rabies.
- Fifteen per cent of respondents noted a lack of access to pain relief, with respondents in Afghanistan, Ethiopia, India, Kenya, Namibia, Nigeria, Pakistan, Senegal, Uganda, and Zimbabwe reporting unavailability.
- More than a third of respondents did not have access to the medicines they need to perform humane euthanasia.

Faced with poor access to veterinary medicines and poor regulation of antimicrobials, the actions of veterinarians and animal owners are putting the health of animals, people, and the wider environment and ecosystems at risk. Lack of access to medicines and essential vaccines threatens food safety and security, and it increases the risk of zoonotic disease emergence. Inappropriate use of antimicrobials leads to growing AMR.

Adoption of the list by international human and animal health organisations, national governments, and the global animal health community will contribute to One Health.

Owners may be hesitant to vaccinate their animals for three main reasons:

- Bad experiences with poorly skilled animal health practitioners may have put them off.
- They may have experienced vaccination side effects and/or lack of efficacy, including through gaps in the cold chain.
- They are not aware of the value of vaccinating against certain zoonotic diseases that produce no clinical signs in their animals.⁸⁰

Good quality animal vaccines need to be available and affordable for wide distribution, with regulatory processes ensuring safety and efficacy without increasing the cost of licensing and production,⁸¹ while supporting national and regional vaccine manufacturing,⁸² and improved forecasting for adequate supply.

Gaps in effective vaccine and medicine delivery, combined with a lack of legal provision and/or enforcement against over-the-counter sales of antimicrobials, increases the risk of AMR.⁸³

Acknowledging that enforcing legislation might be ineffective in remote, rural areas, key informants highlighted the need to provide effective animal health services and increase community awareness of the hazards of unregulated animal health medicines, and the impact to their own and their animals' health (KII).



Box 5.

The impact of vaccination

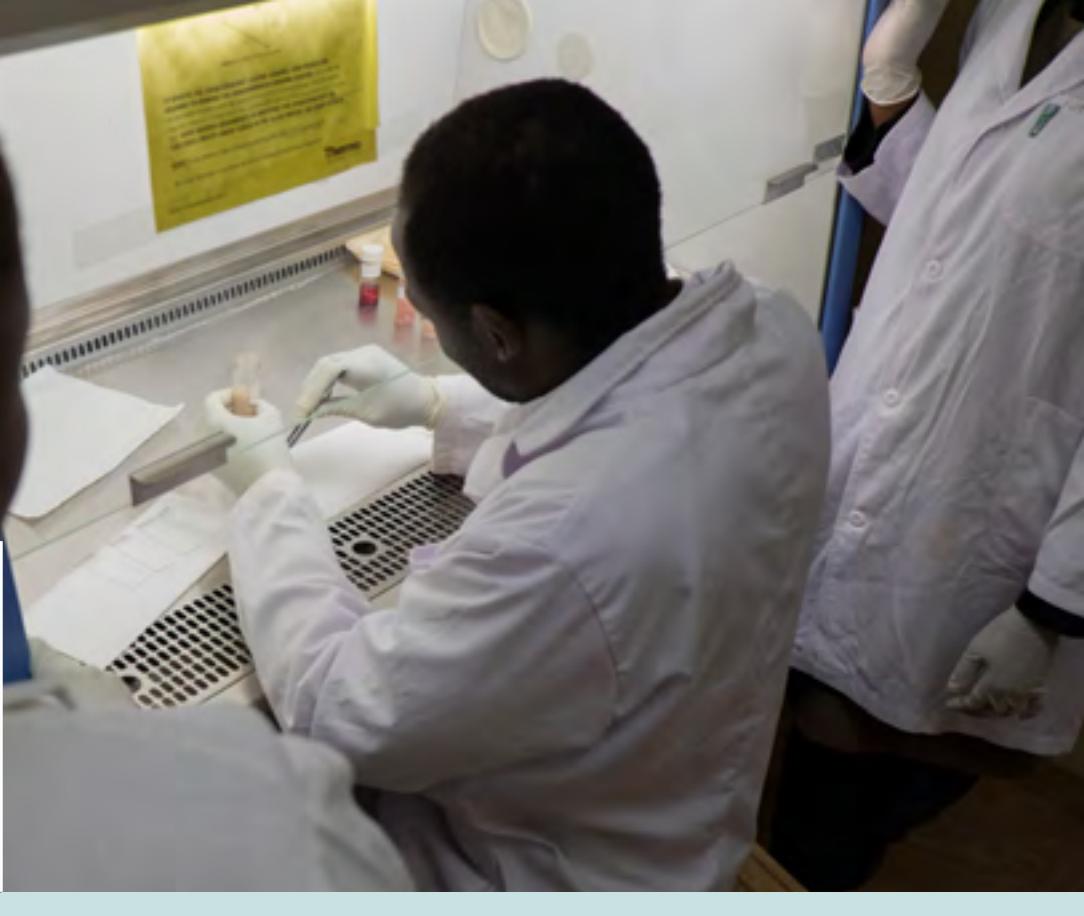
GALVmed is a global initiative to improve access for small-scale livestock producers to vaccines and medicines for major livestock diseases. It is a collaboration between academia, public research institutes, and the commercial pharmaceutical sector. This product development partnership (PDP) is based on models already in use for human neglected tropical diseases.

To make products widely available, GALVmed supports policy development and undertakes market development activities, including raising small-scale producers' awareness, improving vaccine distribution, and developing vaccinator networks to convince private vaccine manufacturers to produce at scale.⁸⁴

For example, GALVmed facilitated the selling of 264 million doses of a vaccine for Newcastle disease (ND) between 2010 and 2022 to approximately 3.1 million small-scale livestock

farmers in Africa and South Asia. ND is a highly infectious disease that can kill up to 90 per cent of unvaccinated chickens.

- Across Burkina Faso's 351 municipalities, 130 million poultry were vaccinated over a five-year period. About 1,200 people in local communities were trained and equipped to conduct the vaccinations, working under the supervision of local animal health practitioners, while earning an income for their services.
- Over one year, vaccinating households in India and Tanzania doubled their poultry flock size (from an average of 16 to 33 and 21 to 42, respectively) and significantly increased their incomes. This is clear evidence that as small-scale producers use vaccines, their productivity and income go up, contributing to improved livelihoods.



Pillar 4: Improve animal disease surveillance

Globally, animal disease data is collected through event-based and routine surveillance systems. There is a worldwide gap in the capacity of institutions to monitor for animal and zoonotic disease risk, and take appropriate action, due to insufficient health and animal health workforces and resources.⁸⁵

As a result, surveillance is often reactive to disease outbreaks (where it exists) – or misses outbreaks completely – which is more expensive to respond to than prevention.⁸⁶

The WOAH Terrestrial Animal Health Code defines surveillance as 'The systematic ongoing collection, collation, and analysis of data, and the timely dissemination of information to those who need to know so that action can be taken.'⁸⁷ This requires good communication and subsequent action through collaboration between multilevel stakeholders, including communities, animal health practitioners, and laboratories, as well as other sectors involved in One Health approaches in the case of zoonotic diseases. WOAH member states' national veterinary services are responsible for early detection and rapid response to outbreaks

of animal diseases,⁸⁸ and are required to report annually on the status of a notifiable disease in their country and the measures being taken to test, control, and/or eradicate it, and the areas designated as disease-free.⁸⁹

Global surveillance data systems related to animal health are:

- The WOAH World Animal Health Information System (WAHIS) includes data on WOAH-listed diseases in domestic animals and wildlife, emerging diseases, and zoonoses. The effectiveness and adequacy of WAHIS depends on the quality of data gathered by the animal health services in a region or country.⁹⁰
- The Global Early Warning System for Major Animal Diseases including zoonosis (GLEWS). Through this system, the FAO facilitates information sharing and verification between FAO, WOAH, and WHO on health threats and events of potential concern.
- The WHO Global Health Observatory collects data on human diseases, including some zoonoses such as rabies.

Regional systems include the African Union – Interafrican Bureau for Animal Resources (AU-IBAR) disease reporting and knowledge base system, the Animal Resources Information System (ARIS). However, not every country reports all disease outbreaks and responses in a timely manner. Missing data for animal and zoonotic diseases affects the accuracy, reliability, and effectiveness of these systems.

The information that comes out of these global systems is only as good as the information that goes in. Due to under-resourcing of animal health systems there may not be a sufficiently qualified animal health practitioner or a sufficiently resourced laboratory where a disease outbreak occurs. Diseases could spread undetected or not be diagnosed and reported.

Faced with gaps in the animal health workforce, VPPs and CAHWs play important roles in animal disease surveillance. CAHWs are usually trained to recognise and treat only the most common endemic diseases in their respective countries or regions so they may lack the skills to respond to novel disease threats: 'Countries don't train community animal health workers on diseases they don't have, even in border areas' (KII). Particularly in border regions, where novel diseases may spill across from other countries, combined with a general lack of diagnostic testing, diseases are often misdiagnosed and under-reported.⁹¹

In countries where government responsibilities are shared between federal states/provinces, decentralised reporting and data collation at different governance levels may hamper comprehensive surveillance. In these contexts, integrating animal and human disease surveillance through a One Health approach has the potential to improve reporting and efficiency.⁹² As an example of good practice to mitigate these gaps, Rwanda leveraged its decentralised network of community health workers, CAHWs, health-care facilities, park rangers, border agents, farmers, and domestic animal owners as sentinels for monitoring potential zoonotic disease outbreaks.⁹³

Beyond gathering comprehensive data through surveillance, efforts must ensure better use of existing data. For example, the Centre for Supporting Evidence-Based Interventions in Livestock (SEBI-Livestock) is generating new insights from hard-to-reach areas about disease prevalence and mortality.⁹⁴

Finally, there is a need for investment and commitment to improved data-sharing standards. This includes mechanisms and platforms for sharing knowledge on emerging diseases and treatments, which can be used by health-care providers, governments, and multilateral health agencies.



Photo: © Global Alliance for Rabies Control

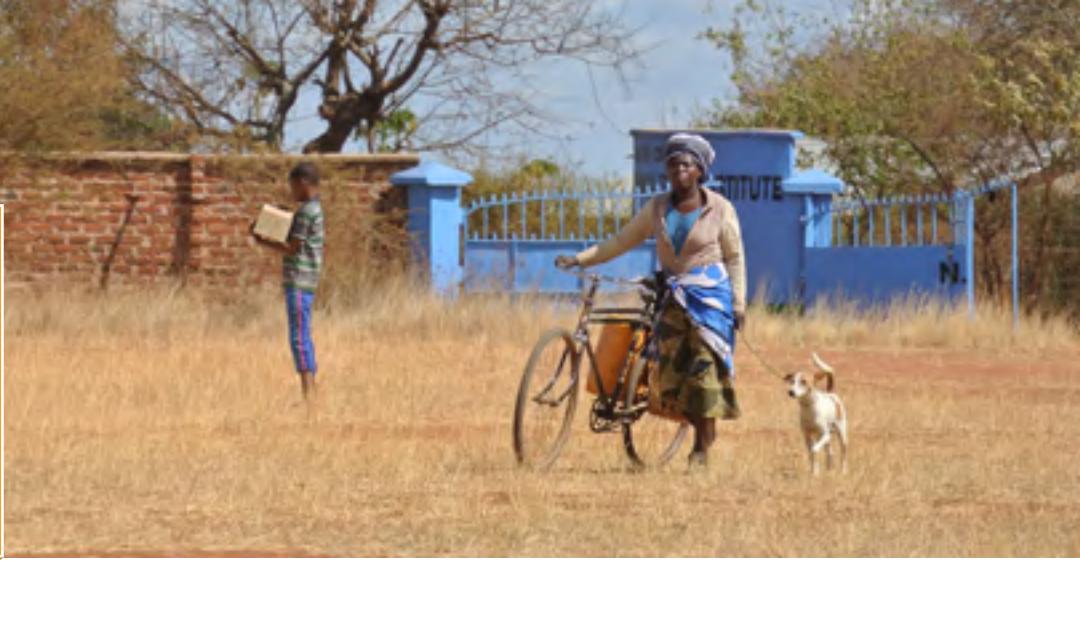


Photo: © VSF-Netherlands

5



Enhance collaboration for One Health



Pillar 5: Enhance collaboration for One Health

While interest and cooperation of animal, human, and environmental health stakeholders under the One Health approach increased following the Covid-19 pandemic, there remains a lack of shared collaborative instruments spanning the sectors.⁹⁵ Key informants noted that within some of the newly established government-led One Health alliances, public health and other non-animal health sector stakeholders lack awareness of the role and importance of animal health, translating into low budgets being allocated to animal health activities.

Pandemic-related allocations to public health interventions are not always shared with animal and environmental health institutions. In some cases, this was the result of an organisational barrier, as animal health services often fall under agricultural ministries which were overlooked (KII).

Government agencies and organisations face barriers to implementing One Health. Varying levels of fragmented and disconnected legal frameworks covering human, animal, and environmental health are compounded by a lack of formal coordination and collaboration between professionals, and inadequate training and workforce capacity building.⁹⁶

Key informants highlight that geopolitical barriers, such as trade regulations, conflict, the absence of regional and national legal frameworks, structural planning, and support, and knowledge gaps are major barriers for One Health implementation.

As animal diseases pose transboundary infection risk, international collaborations are vital for the uptake and implementation of One Health approaches.⁹⁷ Globally, One Health activities addressing health risks at the human–animal–ecosystems interface are coordinated by the Quadripartite (FAO, WOAH, WHO, and UNEP). In the African Union, AU-IBAR is the lead on animal health strategies, and Africa CDC on its One Health components.

Africa CDC developed an action-based framework for One Health practice in national public health institutes for zoonotic disease prevention and control, through a process involving external partners – namely, the US CDC, FAO, and Chatham House.⁹⁸ The framework aims to: guide member states in improving coordination and collaboration between national stakeholders across sectors; strengthen surveillance systems and data-sharing mechanisms; strengthen laboratory systems; establish effective and coordinated public health emergency preparedness; and create a strengthened workforce to prevent and control priority zoonotic diseases.⁹⁹

Bilateral donors and international organisations support governments in the establishment of One Health institutes and frameworks, including zoonotic disease prioritisation exercises driven by the Centers for Disease Control and Prevention (CDC) and USAID.¹⁰⁰

Regional academic One Health initiatives include:

- The Southeast Asia One Health University Network (SEAOHUN), which provides One Health education and research cooperation in Southeast Asia,¹⁰¹ and
- The Africa One Health University Network (AFROHUN), which has a focus on Eastern Africa and is currently expanding into Southern and Western Africa.¹⁰²

One Health initiatives generally include government bodies and academic institutions and UN and civil society organisations, but largely lack input from the private sector and community groups.¹⁰³

The One Health Research, Education and Outreach Centre in Africa (OHRECA) is another intra- and cross-regional initiative, targeting zoonoses, food-borne diseases, and AMR.

However, many of these initiatives prioritise specific animal diseases for trade and economic development, rather than holistically improving animal health systems and determining what diseases impact local communities. Structural adjustment programmes have further undermined public (animal) health services.¹⁰⁴

Examples of inclusive inter-regional collaborations showing how multilevel actions and frameworks can effectively be employed to support One Health through improved animal health include:

- The PREventing ZOonotic Diseases Emergence (PREZODE) initiative, which aims to involve all stakeholders, including communities, to improve prevention through characterising risks and practices, while retaining livelihoods and food security, and organising surveillance systems suitable for local contexts.
- The Stepwise Approach towards Rabies Elimination (SARE) tool, which unites stakeholders from all sectors, including beyond human, animal, and environment.¹⁰⁵

Box 6.

Eliminating rabies: One Health in action

Rabies is a deadly disease that results in the deaths of an estimated 59,000 people each year, and tens of thousands more animals.¹⁰⁶ It is most often transmitted to people through a dog bite. Many of those bitten are children.

The human health sector often bears most of the burden of expenditure for rabies control because of the disease's significant public health impact. This expenditure is focused on the reactive provision of human post-exposure prophylaxis (PEP), even though the most effective means to eliminate rabies in both humans and domestic dogs is to vaccinate the domestic dog population.

However, the animal health sector lacks the financial and programmatic resources to vaccinate the number of dogs needed to break the cycle. The resources allocated by the animal health sector to eliminate the disease are limited, as rabies is not of economic importance regarding international trade – unlike diseases that affect livestock.

In Latin America, the focus has shifted from expenditure on prophylaxis to dog vaccination, with a large portion of human health resources being allocated to the vaccination of domestic dogs.¹⁰⁷ Governments have significantly reduced overall rabies expenditure as they have progressed towards dog rabies elimination (and therefore the elimination of almost all human rabies cases). By sharing resources across sectors, the benefits to both human health and animal welfare are significant.

Rabies prevention provides a practical route to strengthening animal health systems and building One Health capacity.¹⁰⁸ It also builds a system for the early detection and prevention of other zoonotic disease spillover events and, therefore, can contribute to pandemic prevention.

4 Case study: Ethiopia

Ethiopia has a high dependency on domestic animals and has much to gain from effective animal health services and the implementation of the One Health approach. It has the second largest population in Africa – an estimated 118 million people (2021).¹⁰⁹ Despite rapid urbanisation, Ethiopia's economy remains largely dependent on agriculture, accounting for around 40 per cent of GDP,¹¹⁰ with livestock contributing up to 40 per cent to the agriculture sector.¹¹¹ As large parts of the country are unsuitable for permanent agriculture, pastoralist communities move seasonally, at times crossing the border with Kenya and Somalia.



2nd

largest population
in Africa at an estimated
118 million people¹⁰⁹

80%

of households
have contact with
domestic animals¹¹²

+233%

increase of working
equids in Ethiopia, from
5.7 million in 2004, to
13.3 million in 2020¹¹³

High

burden associated
with zoonotic
diseases¹¹²

Livestock population of Ethiopia^{115,116}

(in millions)



Ethiopia's domestic animal population includes millions of cattle, goats, sheep, camels, chickens, and equids (see above). The majority of farmers own small numbers of livestock, and almost half of livestock-owning households depend on their working equids for transportation and to support farming practices. Free-roaming dogs are ubiquitous, and there is a high risk of rabies infection to both animals and humans.

As the human population continues to grow, livestock resources are under pressure to increase production, employment opportunities, and income. The livestock sector is constrained by animal diseases, shortages in feed, poor market infrastructure, and institutional factors, resulting in production-related losses of up to 50 per cent annually.¹¹⁷ Animal diseases including zoonoses are a huge financial burden.¹¹⁸ Across rural Ethiopia, particularly in pastoral areas, access to animal health services is limited, while primary health-care units are often poorly equipped, understaffed, lack transportation, and face shortages of essential medicines and other medical supplies.¹¹⁹

Ethiopia is a federal state, with devolved powers and responsibilities to its regions and

administrative councils. The country is divided into four administrative levels: regions, zones, woredas (districts), and kebele (wards). Livestock production-level disease prevention and control is the responsibility of regional authorities, while notifiable diseases are monitored at federal level.¹²⁰ The country is experiencing increased inflation, and its state-controlled financial sector has limited foreign currency earnings capacity.¹²¹ As animal health supplies require input from abroad, funding towards the animal health sector has decreased in real terms (KII). The animal health system is almost entirely run and funded by the government so there are very few private animal health services; however, attempts are ongoing to improve public–private partnerships.¹²²



Community engagement

Around 14,000 CAHWs provide extension and other services to fill gaps in service delivery (KII). In principle, CAHWs are nominated, selected, and endorsed by community representatives and the kebele chairman. They receive training by regional livestock and health bureaus, and/or non-profit organisations.¹²³ To improve and ensure sustainability, public–private partnerships are established through a fee-for-service model, linking CAHWs with pharmacists (KII). Following their graduation, the local leaders who nominated, selected, and endorsed the CAHW continue to monitor their activities, which is essential to identify gaps in knowledge and capacity, while ensuring sustainable high-quality services.

While animal keepers are familiar with a range of animal and zoonotic diseases, including rabies, tuberculosis, and brucellosis, many are unaware of basic preventive measures or lack sufficient incentives or resources to put these into practice.¹²⁴ The CAHW training therefore includes 'community partnership skills', where students are taught to engage with the community to better understand local knowledge and traditions, raise awareness in the local language, and consolidate and support husbandry and animal health skills, including hygiene and simple treatments. It also includes human health activities, such as health insurance schemes for community members and supporting livestock keepers during emergencies (KII).



The importance of basic animal health care

Many of Ethiopia's livestock die young from preventable issues. For example, of the 5 million cattle born into the pastoralist systems every year, up to 2 million will die before they are weaned from their mothers.

The Young Stock Mortality Reduction Consortium, set up as a pilot study by the Ethiopian government, comprises organisations including SEBI-Livestock (University of Edinburgh), the University of California, Davis (UCD), Addis Ababa University, and the Ministry of Agriculture. The initiative was established to support smallholders to improve the health of calves and overall herd production.

- Epidemiological data was collected on the major causes of young stock morbidity and mortality constraining livestock production.
- Intervention strategies were developed and implemented to control young stock morbidity and mortality.
- Training of farmers and evaluation of interventions were carried out.

Nine hundred households were recruited from six different regions and three major production systems: peri-urban, mixed crop livestock, and pastoral.

For each system, interventions were selected through consultation with stakeholders and experts, aiming for targeted improvement in animal husbandry, management, and health. An evaluation found that by improving basic livestock husbandry, feeding, housing, and neonatal care practices:

- Calf mortality risk reduced by 31.4–71.4 per cent compared to baseline (between 10.5 and 32.1 per cent);
- Risk of diarrhoea reduced by 52.6–75.3 per cent (baselines 11.4–30.4 per cent); and
- Risk of respiratory disease reduced by 23.6–80.8 per cent (baselines 3.3–16.3 per cent).

This significant reduction shows that simple changes to basic care can have compelling results.

It demonstrates that as well as consideration given to major transboundary animal diseases and zoonotic diseases, attention applied to the impact of hygiene and sanitation, neonatal management, poor nutrition, and availability of primary animal health services is of great importance to small-scale farmers and the welfare of their animals.¹²⁵





Animal health workforce

Ethiopia produces 450-550 veterinary graduates a year, almost half of these from Addis Ababa University, with numbers rapidly increasing.¹²⁶ EVA's national mandate is to 'promote and strengthen the animal health profession, for an efficient, effective and competitive livestock industry',¹²⁷ rather than an all-inclusive response to other domestic animal and wildlife health.

In relation to the total animal population, there are few veterinarians. Yet many graduates cannot find a job due to a lack of investment in animal health services.¹²⁸ Of the veterinarians who are employed, most work in the public sector, followed by the private sector, NGOs, and UN agencies and organisations (KII). Barriers to employment include inadequate facilities, lack of emphasis on practical classes for applied skills development, and inadequate staff and faculty competencies.¹²⁹ As a result of low quality of services, there is a gap between what animal health practitioners expect to be paid for their services and what smallholders are prepared to pay. Key informants add that there is reduced demand for animal health services by smallholders lacking both financial resources to pay for them and trust in animal health practitioners.¹³⁰

Key informants noted that while there currently may be enough animal health practitioners, insufficient high-quality animal health services are available. The lack of focus on applied skills development and practical experience during training results in some veterinarians 'hardly leaving their offices' (KII), and there is high staff turnover in the sector. A PVS evaluation and gap analysis were conducted in Ethiopia in 2011 and 2012, respectively, but the results were not made public.¹³¹ According to EVA assessments conducted in 2011 and 2018, there is a lack of qualified faculty, and no veterinary statutory body. Animal health educational establishments have inadequate access abattoir and transportation facilities and some lack adequate library, clinical, and livestock farm facilities too.

Ultimately there remains a workforce shortage at the community level, especially in the public sector, which is responsible not only for animal health but also extension activities and rangeland management.¹³²

Facilities are not equally distributed and are often in poor structural condition, not having enough resources in terms of diagnostic kits, surgical and medical equipment, and water and electricity supplies.¹³³

Service delivery, particularly in rural areas, is hampered by a lack of knowledge of procedures, policies, and legal framework; personal incentives for animal health staff;¹³⁴ and fuel and transportation so that animal health practitioners are unable to visit animals. Practitioners are often based at static clinics that are difficult for people to access when they have large animals that are sick.

“

[There are few] professionals who can stay in harsh conditions, [they do] not receive enough pay and incentives.

*Research participant
(KII)*

”

Few animal health practitioners have access to an office space, computers and other communication tools, and PPE.¹³⁵ Sectoral cooperation between different public institutions and with private sector animal health service providers at lower levels is weak, with very limited communication between animal health officers and public health and environmental personnel.¹³⁶



Access to medicines and vaccines

Ethiopia faces shortages of quality and legitimate animal vaccines, medicines, and other medical supplies.¹³⁷ As a result, where vaccinations are available, these are primarily administered as part of targeted disease control following an outbreak, or during seasons and/or locations where outbreaks are expected to occur. Without a strong surveillance system in place, this is not a comprehensive disease control strategy.

Private sector companies supplying medicines and vaccines are primarily located in larger cities, and a lack of transport means distribution is limited. Access to animal health medicines and vaccines is a challenge in remote, pastoral areas, where the low quantities distributed centrally run out or expire due to gaps in the cold chain, before reaching these locations (KII).

Rural drug store supply is often limited to anthelmintic treatments, which are bought and administered by animal owners without knowing specific doses and courses of treatment:

“

Many livestock owners treat animals themselves with anthelmintics and antibiotics for weight gain.

Research participant (KII)

”

If people cannot access trained animal health practitioners, who have access to the right medicines, they may turn to unregulated markets, which often have poor quality medicines without appropriate advice on administration and use.

A lack of vaccines and medicines, in combination with gaps in diagnostic capacity, means there is a high dependence on broad-spectrum antimicrobials and anthelmintics, and consequently high levels of antimicrobials are found in animals.¹³⁸ As a result of increased AMR and shortages in medical resources and supply, a key informant noted that the country currently has no treatment available for mastitis, for instance (KII). There is also little access to pain relief, local anaesthetic and sedation, which has implications for animal welfare.¹³⁹

Where vaccines and medicines are produced locally, these still require external input of raw materials, which is hampered due to regulatory and monetary issues around imports. The gaps in availability of medicines and vaccines have led to the use of older-generation and unsuitable medicines, as well as the infiltration and proliferation of counterfeit low-quality medicines, affecting communities' trust in modern medicine.¹⁴⁰



Animal disease surveillance

There are significant gaps in animal disease surveillance in Ethiopia.¹⁴¹ While an electronic Animal Disease Notification System (ADNS) is in use in some areas,¹⁴² it is constrained by limited electricity supply, low internet connectivity, lack of necessary electronic equipment, and low technological capacity of the field staff. Disease surveillance remains mainly paper-based and passive.

With some exceptions – for instance, the rabies laboratory supported by the US CDC at the Ethiopian Public Health Institute – there is a general lack of diagnostic capacity for most animal and zoonotic diseases.¹⁴³ Regional livestock and public health laboratories can currently only diagnose targeted diseases, while anthrax can only be diagnosed in one laboratory in Addis Ababa (KII), thus impeding control of notifiable diseases. Diagnostic laboratories provide free disease testing services, but there is little incentive for livestock keepers to report diseased animals as the provision of treatment is often minimal due to lack of resources.

A key informant said that during the ongoing drought, animals have become too weak for blood samples to be taken (KII). Meanwhile, the lack of hard currency means that there are import challenges with the laboratory supplies that need to be purchased outside the country. Although universities run their own laboratories, there is little collaboration with animal and human health authorities, except for Jigjiga University animal health laboratory, which was used for Covid-19 diagnosis during the pandemic (KII).

Considering these gaps, CAHWs and VPPs play an important role in animal disease surveillance. The number of mobile animal health teams conducting treatment/vaccination campaigns as well as disease surveillance activities is increasing, but their numbers remain low and they face shortages of vehicles and skilled workers to cover much ground.¹⁴⁴





Collaboration for One Health

Ethiopia has made important progress in implementing the One Health approach. The National One Health Steering Committee (NOHSC) was established in 2017, supported by Technical Working Groups (TWGs) for specific challenges such as rabies control.¹⁴⁵ NOHSC objectives include integrated multisectoral surveillance systems, joint research projects, and enhancing multidisciplinary capacities for detecting and responding to disease.¹⁴⁶ The NOHSC consists of four key ministries (Ministry of Health, Ministry of Agriculture, the Ethiopian Wildlife Conservation Authority (EWCA) under the Ministry of Culture and Tourism, and the Ministry of Environment, Forest and Climate Change) and relevant non-governmental stakeholders.¹⁴⁷ This federal One Health structure is replicated at the region and zone levels. Bilateral and multilateral development partners, including FAO, WHO, USAID, universities, and NGOs, support activities under the five-year National One Health Strategic Plan (2018–2022).¹⁴⁸

According to key informants, these developments have increased interest and funding towards One Health programming in the country. However, there is a perception that the restructure of the Ministry of Livestock – previously independent and now under the Ministry of Agriculture, led by a State Minister Livestock Resources Development – negatively affects awareness of and funding towards animal health services.

The Ethiopian Public Health Institute at the Ministry of Health and the Ministry of Agriculture jointly lead the One Health programme, with the leadership (chair and secretary) rotating on a six-monthly basis, while the EWCA acts as co-chair. The Ethiopian Public Health Institute also led the US-funded Global Health Security Agenda (GHSA) zoonotic disease prioritisation workshops, involving stakeholders across sectors. Five zoonotic diseases were prioritised and control strategies for them were drafted.

However, the division of authority between federal and state level creates some confusion regarding roles and responsibilities, and unequal financial resource allocation.

The rabies prevention and elimination programme is jointly led by the Ministry of Agriculture and Ministry of Health at national level, in collaboration with regional states and city administrations; anthrax and brucellosis prevention and control are regional responsibilities; while the response to Rift Valley fever (RVF) is managed at federal level.¹⁴⁹

While priority disease outbreak investigation and response has improved, as well as communication among sectors, significant gaps in institutionalising and implementing the One Health agenda remain. These include a weak mechanism of information sharing between the animal health and human health sectors, lack in capacity and subject matter expertise at subnational level, and significant reliance on support/technical assistance from international organisations and external experts.¹⁵⁰ While some veterinary health data is available, it often remains 'stuck' at the Ministry of Agriculture rather than being shared with other One Health partners, which hampers investigations (KII).

A lack of formal and specified budget for implementing One Health activities has led to gaps in formal joint preparedness and response mechanisms, accessible and quality disease surveillance data, and limited laboratory diagnostic capacity especially at regional level.¹⁵¹ A major gap is the lack of animal health services in remote, rural, and in particular, pastoral areas, resulting in irregular disease surveillance and reporting and hence an incomplete overview of disease prevalence and burden.

Pilot projects are being implemented to restructure the animal health services using public–private partnerships to increase outreach. Under the One Health for Humans, Environment, Animals and Livelihoods (HEAL) project, the establishment of One Health units provides interdisciplinary training to teams of CAHWs and community health workers, working closely with public and private service providers.¹⁵² This has improved response speed.¹⁵³ There is a push to further integrate human and animal disease surveillance, and scale up activities to woreda level in collaboration with regional health bureaus.

The One Health for Humans, Environment, Animals and Livelihoods (HEAL) project

The collaborative multi-year HEAL project spans arid/semi-arid locations in Northern Kenya, Somalia, and East Ethiopia. It aims to improve the accessibility of health and animal health services; support livestock, people, and natural resources; and besides the development of mobile One Health units, includes environmental interventions to sustain the ecological processes of the rangeland ecosystem. The project is implemented by VSF Suisse, in partnership with the International Livestock Research Institute (ILRI), Comitato Collaborazione Medica (CCM), and Translate into Meaning (TRiM).

Aligned with the HEAL project, the Jigjiga University One Health Initiative is a research

and development partnership between Jigjiga University and the Armauer Hansen Research Institute (AHRI) in Ethiopia and the Swiss Tropical and Public Health Institute (Swiss TPH). It supported the establishment of the Somali Regional One Health Taskforce under the NOHSC, improving coordination and collaboration between the Regional Health Bureau, the Regional Livestock and Pastoralist Development Bureau, and the Bureau of Agriculture and Natural Resources.

Following the establishment of a molecular diagnostic laboratory in January 2020 at Jigjiga University, it became the only Covid-19 diagnostic centre in Somali Region, Ethiopia.¹⁵⁴

Photo: © ILRI



5 Case study: Pakistan

Pakistan is the world's fifth most populous country with an estimated 221 million people (2020).¹⁵⁵ Agriculture contributes a quarter of GDP, with livestock its largest subsector. The livestock sector contributed 14.04 per cent to GDP during financial year 2021/22.¹⁵⁶ Millions of working equids provide support to an estimated 36 million people.¹⁵⁷ Animal health services are therefore essential to not only public health, but also the country's economic development. Over 8 million rural families are engaged in livestock production in particular, from which they derive more than 35–40 per cent of their household income.¹⁵⁸



5th

largest population in the world with an estimated 225 million people.¹⁵⁵

36m

people supported by working equids in Pakistan¹⁵⁷

14%

of GDP is from the livestock sector (financial year 2021/22).¹⁵⁶

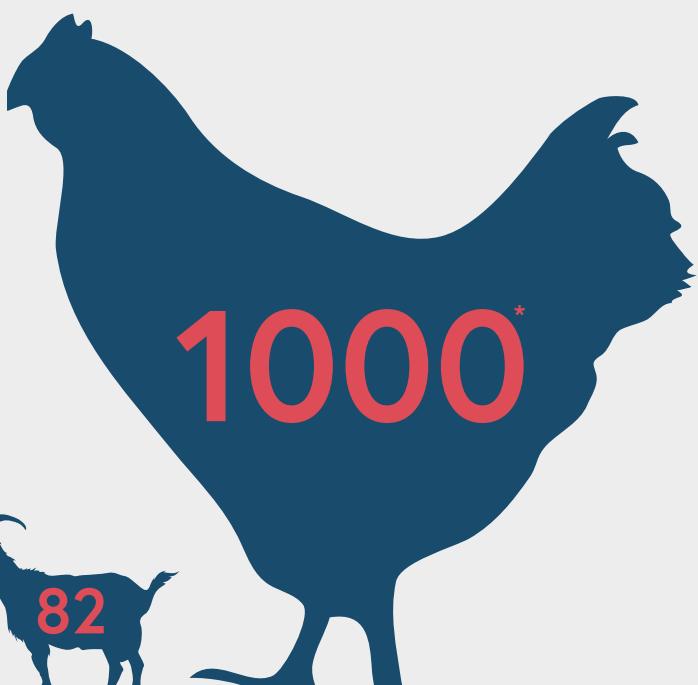
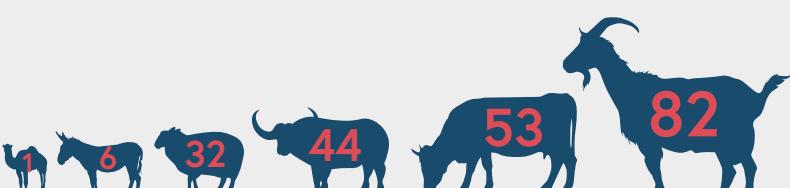
8m

rural families are engaged in livestock production from which they derive more than 35–40 per cent of their household income.¹⁵⁸

Livestock population of Pakistan

from *Pakistan Economic Survey 2021–22*¹⁵⁹ and *projected numbers based on livestock census 1996 and 2006¹⁶⁰

(in millions)



Pakistan is a federal parliamentary republic. Power and responsibilities for health and agriculture, including livestock, were devolved to the provincial governments since 2010. At the federal level, the livestock wing of the Ministry of Food Security and Research is responsible for the regulation of international trade of animals/products and cooperation/communication with livestock-related regional and international organisations, and it serves as the national WOAH focal point for notifiable animal diseases.¹⁶¹ At the provincial level, the animal health services are provided by the

provincial public sector livestock departments, in collaboration with the local governments at district, tehsil, and Union Council levels.

Animal diseases such as mastitis, foot-and-mouth disease, and haemorrhagic septicaemia are endemic, while zoonotic diseases including brucellosis, leishmaniasis, and rabies (there are an estimated 6,000 rabies deaths per year and over 50,000 reported cases of dog bites¹⁶²) are a high burden for the country, posing a threat to both animal and human health.



Community engagement

With most of the animal health services concentrated in urban areas, especially in Punjab province, access to services in rural areas in Pakistan is minimal. As a result, animal owners generally do one of two things. They either revert to traditional treatment methods before calling a veterinarian in late stages of disease, or those with sufficient resources administer medication directly to their animals, thereby increasing the risk of infectious disease and AMR.¹⁶³

To fill the gap in services, CAHWs provide animal health services including vaccination, nutritional support, treatment, artificial insemination, and deworming. CAHWs are selected by local community members, and are paid in cash and kind by the community in return for services.

Women VPPs have been trained in Punjab and Sindh, which enables women animal owners and caretakers to have easier access to animal health services.

Photo: © Brooke





Animal health workforce

Key informants estimate that there is on average one veterinarian per 100,000 animals. They attribute this high ratio to a lack of prioritisation for government funding to animal health (KII). There are 14 public sector institutions and one private veterinary college that train animal health practitioners and conduct animal health research focusing primarily on the livestock sector, at the expense of other domestic animals and wildlife. The majority of graduates are employed by private companies, whilst others are employed by international agencies. A small percentage remains in academia, with very few providing primary animal health services.

Veterinarians' interest in working in public animal health is low because the wages are low. Many animal owners distrust free services – partially because the limited services provided – and are therefore underused, so a lot of those working in the sector provide fee-for-services outside office hours.¹⁶⁴ A significant number of these veterinarians end up working in private sector animal health and extension services. To compensate, the public sector employs over 11,000 VPPs (out of over 15,000 in the country),¹⁶⁵ who primarily work in animal health clinics and hospitals.¹⁶⁶ Almost two-thirds work in Punjab, creating inter-provincial inequalities in the provision of animal health services.

International organisations sometimes request institutions to develop courses tailored to meet the specific needs of their organisation. For instance, the CDC implements Field Epidemiology and Laboratory Training Programs (FELTP) for public health and laboratory personnel.¹⁶⁷ While each cohort includes veterinarians, there is unfortunately little follow-up or demand for impact sharing of One Health implementation following the programme (KII).

The capacity and structure of the animal health services, workforce, educational institutions, and laboratories were assessed at federal and provincial levels through a WOAH PVS evaluation in 2014. In 2017 a National Bridging Workshop on the International Health Regulations (IHR) took place and the WOAH PVS Pathway was conducted.¹⁶⁸ It identified the need to increasingly focus on preventive rather than curative veterinary medicine, as well as to link training with the needs and expectations of employers. For instance, current curricula do not include species speciality training and focus on individual animals rather than on herd health.¹⁶⁹ Recommendations also include the integration of complementary and alternative veterinary medicine in the curriculum, as almost every case presented to a veterinarian has first been treated using indigenous therapies by the owners.¹⁷⁰

As the statutory regulatory authority, the Pakistan Veterinary Medical Council (PVMC) sets requirements in terms of quality standards. However, the quality of education at private colleges and universities is contested:¹⁷¹

“

Around 70 per cent of graduates are "good" vets, they have followed a standardised system to qualify, which includes six to nine months of training sessions across sectors; [however] there are still a lot of other challenges, including after qualifying, there is no [quality control] mechanism in the private sector.

Research participant (KII)

”



Access to medicines and vaccines

In theory, some animal health vaccines and medicines are available free of cost in the public sector (KII).¹⁷² The Provincial Veterinary Research Institutes produce limited vaccines and diagnostic reagents for targeted diseases, and where financial and human resources allow, they conduct limited research on certain infectious diseases.

Through the Provincial Veterinary Extension Directorates and District Livestock Officers, preventive vaccination is provided for free. Vaccination campaigns are implemented through field veterinarians and VPPs. Yet due to limited capacity and shortage of human and financial resources, access remains limited especially in remote rural locations. Vaccination coverage is estimated to be less than 25 per cent for important animal diseases including foot-and-mouth disease, PPR, pox, and rabies.¹⁷³

There are gaps in the cold chain, with varying scenarios across provinces. As a result, commercial farms directly procure vaccines from the private sector, which imports vaccines and medicines for provision to the poultry industry and medium- to large-scale corporate dairy farms.¹⁷⁴

The independent Drug Regulatory Authority of Pakistan (DRAP) was established following devolution to regulate the manufacture, import, export, storage, distribution, and sale of human and animal health medicines and vaccines.¹⁷⁵

However, there remain gaps in the monitoring system, not only impacting quality and safety of vaccines, but also demand and usage:

“

Good vaccinations are available, but there is a lack of capacity; the government provides free vaccinations to subsistence farmers, while commercial farms [can] easily [access vaccines and medicines] at the market. The main gaps [are that] people don't know the protocol [of administering these, and there are] cold chain issues.

Research participant (KII)

”



Photo: © Brooke



Animal disease surveillance

Pakistan lacks a comprehensive animal disease surveillance system: 'Data sharing is a problem: there is no formal mechanism [for data sharing] between human and animal health departments, and the surveillance system is incomplete' (KII). Most disease surveillance data is collated at the provincial livestock departments using paper forms, hampering rapid data collection and sharing, and inhibits an appropriate response. Although electronic systems are increasingly deployed, gaps in data collection persist, as animal health practitioners lack access to remote areas and/or the necessary resources to report.

Lack of response to outbreaks discourages farmers and animal health practitioners from reporting disease. Instead, international organisations set up their own passive and active surveillance mechanisms in support of national services during disease outbreaks and/or targeted projects, such as those implemented by FAO during the rinderpest eradication campaign.

The development of the National Strategic Framework on One Health, led by the provincial departments of health, increased the surveillance of major zoonoses.¹⁷⁶ Data collated at the federal Ministry of Health is not, however, subsequently shared with other stakeholders. To enhance comprehensive surveillance of zoonotic and other animal diseases, FAO and WOAH were requested to develop an online database for disease surveillance information (KII). However, key informants highlight that easy-to-use field-based solutions for surveillance are required, while primary animal health systems need to be strengthened for accurate information to be fed into the dashboards.

Animal health laboratory services at federal level are provided by three major laboratories.¹⁷⁷ These are supported by dozens of provincial and district laboratories, as well as academic and research institutions, providing diagnostic facilities and training of professional and paraprofessional staff. Regardless of this capacity, and the freely available diagnostic services in the public sector, laboratories are underutilised. This is due in part to low demand

for services by communities, attributed by key informants to not trusting free services, and the possibility that animals may be culled without compensation if disease is found.



Collaboration for One Health

The One Health approach is being adopted at the federal level; however, activities remain primarily driven by bilateral and multilateral donor agencies. Initiatives include the establishment of a One Health coordination committee, avian influenza prevention and control efforts, and prioritisation of zoonotic diseases.¹⁷⁸

In 2018, the National Institute of Health led a workshop for development of the National Strategic Framework on One Health for prioritising endemic and emerging zoonotic diseases, in collaboration with the US CDC and US Department of Agriculture (USDA).¹⁷⁹ Participants included stakeholders from the human health, environment, and finance sectors, and working groups on AMR, influenza, and laboratory capacity were established. While the national coordination mechanism includes stakeholders across sectors, key informants noted that the animal and environmental health sector are not equitably included in strategic decision-making structures, affecting human and financial resource allocation: 'Human health is the lead: [if] a donor funds One Health, human health takes priority' (KII).

Since the powers and responsibilities for health and agriculture were devolved to the provinces, the division of responsibility and authority between federal and provincial governments has remained unclear. There are significant differences in capacity between federal and provincial levels, as well as within and between provinces.¹⁸⁰ At the provincial level, departments are primarily responsible for food safety and quality, with food inspectors appointed by the provincial health departments, while veterinarians from the livestock department are not involved.¹⁸¹

Key informants highlighted the lack of collaboration and data sharing between human health and animal health sectors, with animal health practitioners often excluded from zoonotic disease responses and projects:

“

There is a lack of collaboration between human doctors and veterinarians... [while the] major health and animal health facilities are [located] close together, there is no collaboration.

”

Research participant (KII)

Federal and provincial funding allocations prioritise 'poverty reduction', ignoring the crucial role of animal health in achieving this goal. Meanwhile, One Health funding for zoonotic diseases is managed by the Ministry of Health, rarely sharing allocations with animal health services. Pooled project funding at the National Institute of Health to joint medical and animal health activities and professionals cannot be disaggregated to determine how much One Health funding is targeted towards the animal health sector.

Photo: © Ahmad Chaudhry/ Brooke



6 Conclusion and recommendations

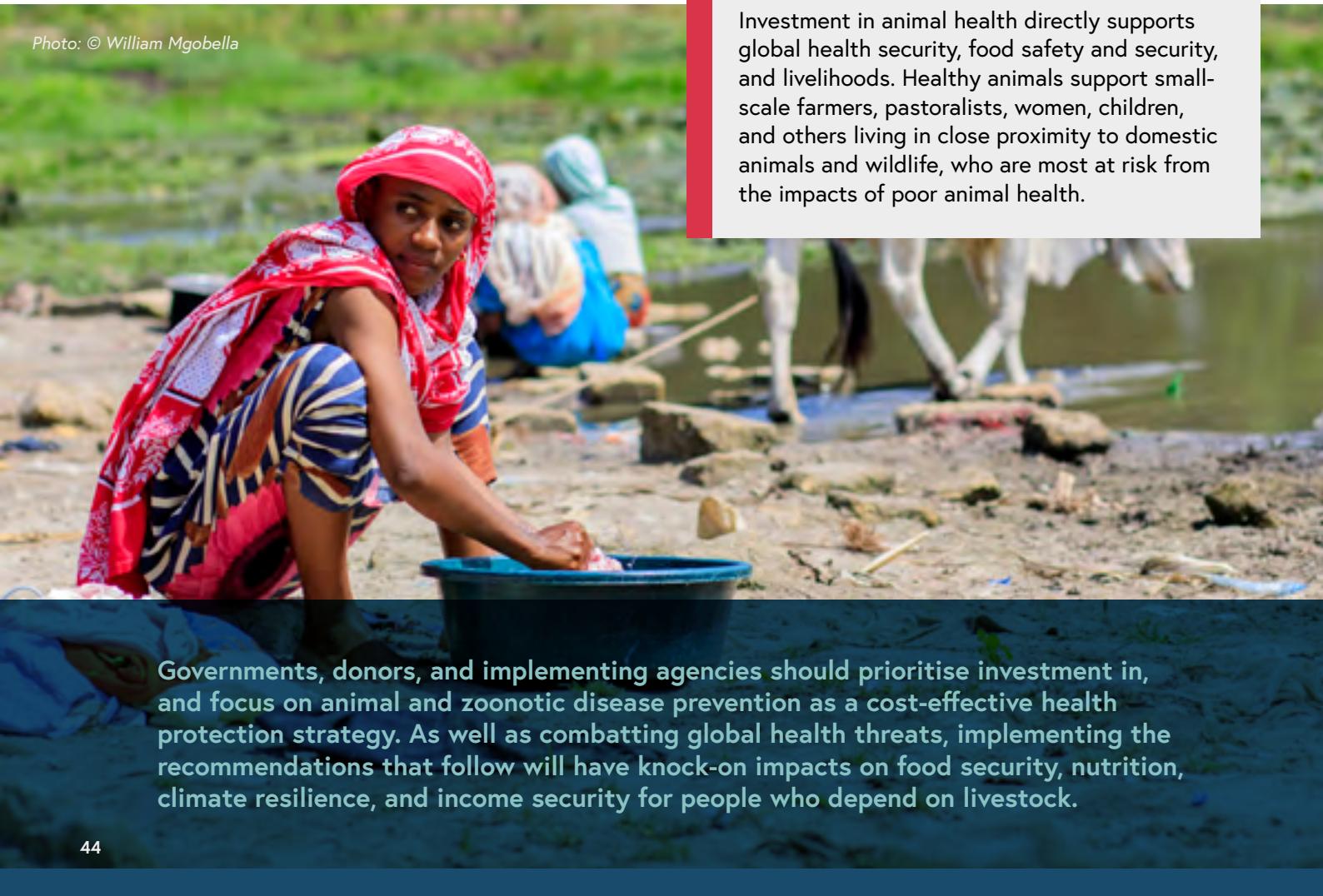
The Covid-19 pandemic has spotlighted the relationship between human, animal, and environmental health. One Health is being increasingly adopted as the leading approach to address these interconnected health challenges.¹⁸² However, multiple barriers must be overcome to enable animal health to fully play its part in this unified approach to combat global health threats. These include the inequitable division of funding, resources, and decision-making power between the sectors at global, national, and local levels.

At high level, the global health narrative has been expanded to include animal and environmental health, but the actual implementation of the One Health approach remains limited. Human health remains the primary paradigm across projects which largely focus on global health security and pandemic prevention, preparedness, and response, while funding towards animal health often focuses on trade and consumption, thereby missing opportunities for true One Health integration.

The animal health sector is subject to low levels of public investment and consequent weaknesses in animal health systems, as well as a lack of awareness of the relationship that animal health has to global health and sustainable development. This risks the emergence of infectious diseases that affect both animals and people, increase incidences of AMR, and threaten food safety and security.

The quality and control of animal health education, institutions, the workforce, surveillance, vaccines, and medicines need to be strengthened to deliver decent animal health services for all. This begins by developing appropriate legislation and regulatory frameworks, together with policies to promote these. Better communication and data sharing across the One Health sectors is essential to combat global health threats. Communities must be included in actions related to animal welfare, disease prevention, surveillance, and control.

Photo: © William Mgobella

A photograph showing a woman in a red and blue patterned headscarf and a blue and white striped dress crouching on a dirt ground, washing laundry in a large blue plastic tub. In the background, a white cow stands in a shallow water puddle. Another person is visible in the distance. The scene illustrates the close proximity of humans and animals in rural settings.

Investment in animal health directly supports global health security, food safety and security, and livelihoods. Healthy animals support small-scale farmers, pastoralists, women, children, and others living in close proximity to domestic animals and wildlife, who are most at risk from the impacts of poor animal health.

Governments, donors, and implementing agencies should prioritise investment in, and focus on animal and zoonotic disease prevention as a cost-effective health protection strategy. As well as combatting global health threats, implementing the recommendations that follow will have knock-on impacts on food security, nutrition, climate resilience, and income security for people who depend on livestock.

1

Support community engagement and access to services

- Acknowledge and leverage the knowledge, skills, and experience present in communities and co-design practical solutions inclusively from inception through to handover.
- Build quality animal health services, particularly in rural and pastoral areas, to support people to better care for their animals. Better care has a positive impact on animal and zoonotic disease control, and ensures animals have a life worth living.
- Boost trust in services by providing animal health practitioners with sufficient resources, technical competence, and knowledge.
- Integrate public and private animal health service provision through public-private partnerships and/or provide financial incentives for animal health practitioners to work in underserved areas.
- Involve communities in producing and sharing data through accessible technologies (e.g. SMS) to inform efficient and effective One Health interventions.

2

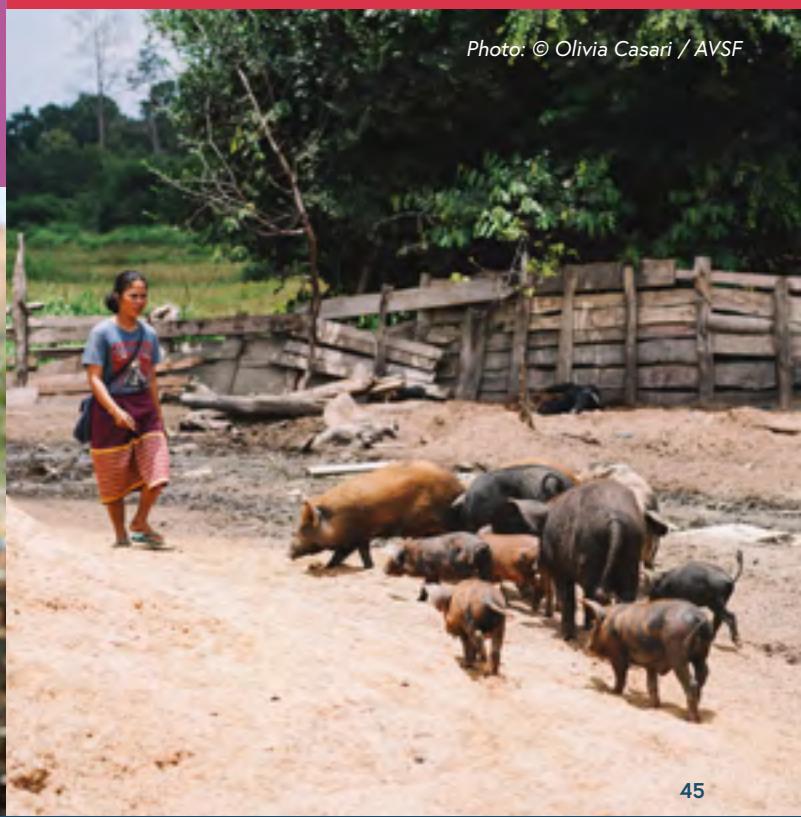
Increase and improve the animal health workforce

- Establish a veterinary statutory body to regulate animal health practitioners and ensure they meet WOAH competency guidelines for veterinarians, VPPS, and CAHWs.
- Assess the size, type, distribution, and level of training of the animal health workforce. Create a national workforce strategy for the recruitment, retention, and professional development of animal health practitioners.
- Improve data on the animal health workforce through the World Animal Health Information System (WAHIS) and the Performance of Veterinary Services (PVS) Pathway, and invest in following up on the results.
- Include One Health modules and courses at early stages across animal health and medical degree curricula, as well as engineering, science, social science, and humanities education.

Photo: © ILRI



Photo: © Olivia Casari / AVSF



3



Close the veterinary medicines and vaccines gap

- Address policy and regulatory gaps for importing medicines and vaccines, and/or the production of these in national and regional facilities, including financial barriers.
- Enforce quality control to prevent substandard, outdated, and counterfeit products from entering the market.
- Improve the medicine supply chain by incentivising entry and retainment of production and importing companies, including through legal and funding frameworks.
- Improve infrastructure through public-private partnership investments in cold chains, including collaborating with public health actors.
- Develop, update, and implement an essential veterinary medicines list. Where one does not exist, adopt the Brooke/WVA essential veterinary medicine list for livestock and the World Small Animal Veterinary Association (WSAVA) essential veterinary medicines list for cats and dogs.
- Improve veterinary medicine regulation through regional harmonisation. Ensure appropriate regulatory capacity, capability, and competence and facilitate dialogue with the pharmaceutical industry.

4



Improve animal disease surveillance

- Promote intelligence and data sharing across human health, animal health, and environment sector stakeholders at all levels, including: supporting communities' capacity in surveillance; improving practical data-sharing protocols and methodologies from community to national level; standardising data indicators; and reporting requirements across institutions.
- Using participatory epidemiology approaches, implement active and passive disease surveillance, including domestic animals and wildlife, through ongoing engagement of communities, including schoolteachers, CAHWs, and community health workers.
- Ensure animal disease surveillance at critical control points such as border crossings and markets by animal health, human health, and environment professionals.
- Build capacity of laboratory and field staff, allocate sufficient resources to improve diagnostic facilities and extent of sample collection, and enhance collaboration between private and public sector laboratories.
- Develop a practical web-based surveillance system to collect disease information in real-time for onward sharing, finding solutions for limited internet connectivity or electricity supply.
- Immediately report disease threats through the World Animal Health Information System (WAHIS). Report diseases outbreaks in real time, even before a confirmed diagnosis, for better preparedness and response.

Photo: © Régis Défurnaux / AVSF



5



Enhance collaboration for One Health

- Strengthen existing, and/or establish multilevel One Health platforms at national, subnational, and local levels that include government, private sector, and non-profit stakeholders, local communities, and international agencies.
- Consult the Quadripartite's One Health Joint Plan of Action and other policy frameworks (see Annex 1) to develop One Health initiatives, policies, and programmes.
- Bring environmental scientists, ecologists, sociologists and anthropologists to the One Health table – alongside health professionals and animal health practitioners – to acknowledge and address the role of the environment in the health of both humans and animals, and vice versa.
- Share resources equitably between human, animal, and environmental health services. Provide flexible funding that requires meaningful collaboration and equitable decision-making power between human health, animal health, and other stakeholders at all governance levels.
- Invest in long-term collaborations across multisectoral agencies and individuals to mitigate changes in policy focus and/or governments.
- Improve regional collaboration for comprehensive disease prevention, surveillance, and response to transboundary diseases using existing structures.
- Give equitable representation to animal health and include goals to strengthen animal health systems in the mobilisation of financial resources for One Health, including domestic and global funding, and private investments (e.g. the World Bank's Financial Intermediary Fund on pandemic prevention, preparedness and response).
- Include provisions to address weaknesses in animal health systems in any new international policies, frameworks, conventions, etc. (e.g. a new pandemic accord) that include a One Health approach.

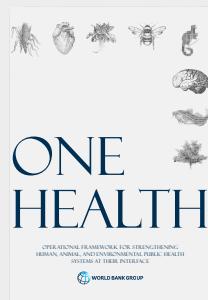
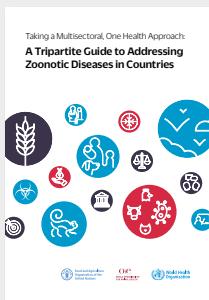
Photo: © FAO



The health of the animals we share the planet with and rely on for our survival is part of the solution to many threats we face today. It should be given the attention and investment it is due.



Annex 1: One Health publications



WOAH, FAO, and WHO jointly developed the Tripartite Guide to Addressing Zoonotic Diseases in Countries.¹⁸³

The World Bank offers a framework for strengthening human, animal, and environmental public health systems providing operational guidance for targeted investments to 'prevent, prepare, detect, respond to, and recover from issues like diseases with endemic, emerging, and pandemic potential'.¹⁸⁴

The WHO high-level paper 'One Health: Approach for Action Against Neglected Tropical Diseases 2021–2030' focuses not only on the human health, animal health, and environmental health sectors, but recognises the roles of education, tourism, and private sector stakeholders.¹⁸⁵

WHO has produced a report on the role of the environment, including animal-mediated disease, in One Health.¹⁸⁶

The Quadripartite produced the One Health Joint Plan of Action to act as a guide for the implementation and development of One Health initiatives, policies, and programmes.¹⁸⁷

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