



Action  
for Animal  
Health

# The case for investing in animal health to support One Health in India

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## Background and abstract

Collaboration between human, animal, and environmental health systems is essential to tackle global health threats, as well as to make progress towards income security, food security and to end environmental destruction. Yet, the historic underinvestment of animal health systems hinders the operationalization of One Health. India has embraced the One Health concept, and the same was exemplified in its agenda of the One Health One World concept during its recent leadership of the G20.

This study was commissioned by Action for Animal Health Coalition to provide an overview of available evidence in the form of a case study to describe and make recommendations for further improving India's animal health system. It shares insights about policy implementation and institutional reforms focusing on the animal health dimension of One Health. The discussion, in the form of situational analysis and recommendations, is based on a desk review and an experience survey.

## Introduction

### Importance of animals in India

The livestock census (2019) estimates India's livestock population at 536 million. The poultry population is around 850 million. The livestock population includes 544,000 working equines and 203.31 lakh stray cattle and dogs[1]. Commonly cited statistics indicate that about 20.5 million people in India depend upon livestock for their livelihood. Though Animal Source Food (ASF) intake in India (as of 2018) is one of the lowest at 0.7 servings per day[2], ASF plays a multifaceted role in the Indian diet, contributing to nutrition, health, cultural heritage, livelihoods, and food security. The livestock sector employs 8.8 percent of the population and contributes 16 percent to the income of small farm households. Livestock ownership in India provides wealth accumulation and risk diversification, helping families cope with economic shocks and build resilience to poverty. The gross value added (GVA) of the livestock sector is about Rs.12,27,766 crore, which is about 30.19% of the agriculture and allied sector's GVA and 5.73% of the total GVA at current prices during the financial year 2021-22. (BAHS 2023).

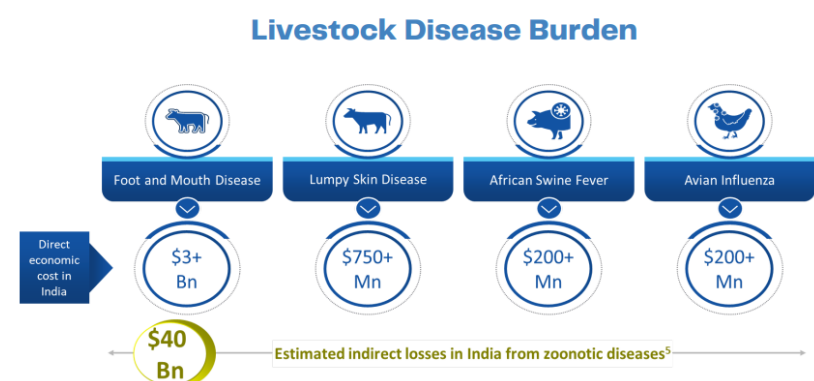
As of 2022, there were 32 million pets in India, and the population is expanding at more than 12% annually.[3]. Between 2021 and 2022, the pet industry attracted investments totaling \$ 77 million [2].

According to IUCN, India is a megadiverse country with 2.4% of the world's land area, accounting for 7-8% of all recorded species, including species of plants and species of animals. The wildlife habitat covers approximately 1.5 million square kilometers, about 4.6% of the country's total land area. Wildlife in India immensely contributes to the national economy through ecosystem services, tourism, livelihood, and employment.

Bullocks, horses, and camels in India have historically served as draught animals in agriculture and for transportation. Animals hold deep cultural and spiritual significance in Indian society, reflected in religious beliefs, festivals, and rituals.

### Animal health and welfare

Animal diseases in production and subsistence environments negatively affect consumers, producers, and economies. A recent (2020) World Trade Organization (WTO) paper quoted the World Organization for Animal Health (WOAH) 2016 estimate of a worldwide 20% loss of livestock production yearly due to diseases. It noted that specific trade concerns related to animal diseases and zoonoses, including emerging diseases, account for 35 percent of all trade concerns raised in the Sanitary and Phytosanitary (SPS) Committee. [4]. In India, a 2023 news publication[5] quoting experts indicated that pests and diseases account for 35% of economic losses in the livestock sector in the country. India is at high risk of animal disease outbreaks and, in recent years, has suffered immensely from outbreaks of diseases like Foot-and-mouth disease (FMD), Lumpy skin disease (LSD), and African swine fever (ASF). The following is a visual presentation of the burden of livestock disease in India reproduced from a 2023 publication by the Department of Animal Husbandry and Dairying, Government of India.[6]



Animal health is crucial for maintaining trade and, as such, the growth of the livestock sector. A growing demand for animal-sourced food requires safe and efficient production systems. Focusing on animal health can improve public health and food safety. Healthy animals are more productive, and the spread of disease can devastate the livelihood of those dependent on livestock (including working livestock) and poultry for their income. Ensuring the health and well-being of pets is essential for their quality of life and the bond they share with their human companions. Similarly, wildlife health is crucial in maintaining the ecological balance and biodiversity of India's rich natural landscapes. Investment in animal health and welfare can also help reduce the greenhouse gas emissions from livestock farming in India. Healthy animals raised with standard welfare practices digest feed more efficiently, reducing methane emissions from enteric fermentation. Also, healthy animals grow faster and produce more milk or meat, lowering emissions per product unit.

As per India's third report to the United Nations Framework Convention on Climate Change (Dec 2023), Greenhouse gas emissions in India in 2019 under the categories of enteric fermentation (which accounts for 2,23,251 GgCO<sub>2</sub>e) and manure management (accounted for 27,511 GgCO<sub>2</sub>e) increased by 0.27% and 1.04%, respectively, from 2016 to 2019.[7] The indicated greenhouse gas emissions figures are high, but the growth rate is modest. The report does not indicate any projected figures for livestock emissions for the next few years.

### Animal health and welfare as a component of One Health

The One Health approach underscores the interconnection of humans, animals, plants, and the environment and emphasizes that one domain's well-being leads to everyone's health. The weakness in animal health and welfare systems essentially hinders the implementation of the One Health approach.

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*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.*

*One Health High Level Expert Panel (OHHLEP)*

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In India, where millions rely on animals for their livelihoods and well-being and where close interactions between humans and animals are regular, the importance of animal health and welfare as a component of One Health cannot be overstated. Zoonotic diseases pose significant public health risks in India. For example, the country accounts for about 35 percent of the global burden of rabies[8].

Activities within the animal health domain are an essential driver of Antimicrobial Resistance (AMR), and better animal welfare often leads to lower antimicrobial use[9]. As per the National Action Plan for Antimicrobial Resistance launched in 2017, the emergence of AMR from antibiotic overuse in the animal sector is likely to be an unmeasured burden in India.

Improvements in animal health and welfare can potentially reduce on-farm risks to food safety, principally through reduced stress-induced immunosuppression, reduced incidence of infectious disease on farms, and decreased shedding of human pathogens by farm animals[10]. Cruelty to animals is a cross-cutting cultural risk factor for human psychological health and security[11].

## Study objective and expected outcome

The case study aims to give an overview of animal health systems in India and how animal health contributes to implementing One Health in India. It will share insights about policy implementation and institutional reforms focusing on the animal health dimension of One Health. The report will inform newly elected policymakers in India and assist other stakeholders in advocating for recognition and increased investment in animal health systems to support One Health.

## Methodology

The methodology includes reviewing relevant publications (including grey literature, published news, documents on existing One Health-related projects, parliament discussions, reports, social media/blog posts, etc.), online administration of an experience survey, and one-to-one consultation with select experts who raised vital pointers during the online experience survey for in-depth, nuanced insights into relevant issues. The learning supported the background discussion on India's animal health and welfare system and a situational analysis of observed action for One Health across five pillars advocated by the Action for Animal Health coalition. It also helped suggest recommendations accordingly. The background discussion on India's animal health and welfare system focused on a 5 'I' framework: Infrastructure, Institutions, Investments, Impediments, and Initiatives.

The experience survey targeted veterinarians, academicians, administrators, and other related professionals with experience working within the Indian animal health and welfare sector. It received the voluntary participation of 100 experts representing 76 organizations.

# Overview of Animal Health Systems in India

## Infrastructure

India has one of the world's largest publicly funded animal health infrastructures, with 22823 veterinary dispensaries, 33337 veterinary aid centers, and 13042 veterinary hospitals (BAHS 2023). To provide referral diagnostic services, the Central Government, through the Department of Animal Husbandry and Dairying (DAHD), supports one Central and five Regional Disease Diagnostic Laboratories. These laboratories essentially network with several other laboratories of the State Governments (>250 in number), the Indian Council of Agricultural Research (ICAR), and Universities[12]. In this context, one of the critical laboratories under ICAR is the National Institute of High-Security Animal Diseases. DAHD supports six animal quarantine stations<sup>1</sup> nationwide and the Chaudhary Charan Singh National Institute of Animal Health (CCSNIAH). CCSNIAH is mandated as a nodal institute to recommend licensing veterinary vaccines in the country. To improve the accessibility of veterinary services at farmers' doorsteps, the central government<sup>2</sup> is currently assisting state governments in commissioning Mobile Veterinary Units (MVUs) (including through contractual engagement of private companies), with an ambitious goal of 1 MVU for every lakh livestock population[13].

The animal health system nationwide receives support from digital infrastructure for disease reporting, surveillance, and forecasting.

Though the public sector is predominant in animal health service provision in India, private sector infrastructure has emerged in recent years. There are chains of clinics, laboratories, and infrastructure of NGOs and companies active in animal health and related service provisions, e.g., technology-based herd health management. India is self-sufficient in producing vaccines and therapeutics for most animal diseases, where private sector infrastructure plays a crucial role.

## Institutions

Animal health management is considered a state subject in the Indian Constitution, with the inter-state transmission of diseases a concurrent responsibility for both states and the federal (Central) Government (Article 246, Seventh Schedule). The state governments regularly invest in animal health infrastructures and service provisions. Still, a sizable proportion of the country's financial outlays for animal health management come from central sector schemes. The Department of Animal Husbandry and Dairying (DAHD) is the nodal government department responsible for animal health and welfare, besides other responsibilities, e.g., production and trade at the federal level.

The Veterinary Council of India (VCI) is the veterinary statutory body supported by DAHD that regulates veterinary practice in India and the standard of undergraduate veterinary education and veterinary service delivery. The Animal Welfare Board of India (AWBI), also funded by DAHD, is a statutory advisory body on Animal Welfare Laws and promotes animal welfare in the country. The National Institute of Animal Welfare operates with a research, education, and public outreach mandate under the aegis of AWBI. The Department of Agricultural Research and Education (DARE) coordinates and promotes Agricultural Research and Education in the country and supports autonomous bodies like the Indian Council of Agricultural Research (ICAR) and three Central Agricultural Universities (CAUs). Animal Health Management and Veterinary Education is one of the 28 central government schemes of DARE implemented through ICAR.

The scheme supports research activities related to preventive health care, vaccine production and handling of emerging diseases, surveillance, and forecasting of diseases through multiple national institutes. A vast research, education, and extension-related institutional network comprising 16 national research institutes of animal health importance under ICAR, 68 veterinary colleges (55 fully

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<sup>1</sup> Delhi, Mumbai, Chennai, Kolkata, Bengaluru and Hyderabad

<sup>2</sup> Under the scheme "Livestock Health and Disease Control (Component: ESVHD-MVUs -Establishment & Strengthening of Veterinary Hospitals & Dispensaries – Mobile Veterinary Units)

recognized and 13 provisionally), and 731 Krishi Vigyan Kendra (KVK) contributes immensely to animal health management and welfare in India.

## Investments

The Cabinet Committee on Economic Affairs has approved a special livestock sector package consisting of several activities by revising and realigning various components of the Government of India's schemes for five years, starting from 2021-22. This package envisages the Central Government's support amounting to Rs.9800 crore (98000 million) over five years. The proposed investment would leverage a total investment of Rs.54,618 crore (546180 million) in the livestock sector, including the share of investments by State Governments, State Cooperatives, Financial institutions, External funding agencies, and other stakeholders. [14]

As per the 54<sup>th</sup> report of the Parliamentary Standing Committee on Agriculture, Animal Husbandry and Food Processing[15], DAHD has been allocated Rs. 4687.85 crores (46879 million) at the Budget Estimate (BE) stage for the financial year 2023-24. The BE for the livestock health program and Animal welfare institutions is Rs 2349.71 crore or 23497 million (50.12% of the total department budget) and Rs 13.51 crore or 135.1 million (0.29% of the total departmental budget), which shows an increase of 17.49% and 2.04%, respectively, over the previous year. The fund allocation at the BE stage is reduced compared to what was proposed (Rs 4913.26 Crore or 49133 million). It is worth mentioning that for three years, from 2019-20 to 2021-22, the Department has surrendered an amount of Rs.1545.78 crore or 15458 million, which it claims to be due to a reduction in revised budget estimates. The surrender of allocated funds restrains the Department from making a compelling case before the Ministry of Finance for enhancing budgetary allocation.

The Budget Estimate of the Animal Science Division of DARE, which complements the animal health activities of DAHD and the State governments for 2023-24, is Rs 300 Crore (3000 million) against previous years' estimates of Rs 224.41 Crore or 2244 million.[16].

As per the Economic Survey 2022-23, the animal husbandry, dairy, and fisheries sectors are increasingly recognized as emerging sectors by way of performance relative to the crop sector. The percentage share of the Department of Agriculture and Farmers Welfare in the Total Central Outlay is nearly 2.5% in the year 2023-24. However, the percentage share of the Department of Animal Husbandry and Dairying in the Total Central Outlay at the BE Stage has declined from 0.12% in 2020-21 to 0.10% in 2023-24[15].

The animal health sector in India is all set to get \$25 million under the G20 Pandemic Fund for investment in strengthening animal health security as a part of pandemic preparedness and response. The Pandemic Fund in India will leverage \$25 million in co-financing and an additional \$257 million in co-investment.[17] The World Bank is all set to initiate its \$82 million committed investment through a project called Animal Health System Support for One Health Program (AHSSOH), approved in May 2023 [18].

Asian Development Bank committed in 2021 to invest up to \$10 million in its first private-sector venture in animal health with Zenex Animal Health India Private Limited[19]. The company also attracted a total investment worth \$52 million from the International Finance Corporation and Emerging Asia Fund[20].

The above discussion indicated an increase in allocation (2023-24) for animal health and welfare at 17.49% and 2.04%, respectively, from the previous year, which seems adequate considering public finance constraints. The committed external funding on animal health or, as such, on One Health appears encouraging compared to earlier years. Interestingly, the percentage share of the Department of Animal Husbandry and Dairying in the Total Central Outlay at the BE Stage has declined marginally from 0.12% in 2020-21 to 0.10% in 2023-24. A more detailed analysis is needed to understand the reason behind this.

As animal health is a state subject in India, the various state government budgets also support infrastructure development and other programs. A detailed public expenditure survey is needed to assess the general trend of budgetary allocation and utilization for animal health across various states. The surrender of allocated funds indicates inadequate project management capacity and the need for financial reforms. One-to-one consultations indicated an increasing focus within the government on improving public expenditure, ensuring the result of investment, and mobilizing resources through public-private partnerships.

## Impediments

Several impediments or barriers hinder the effective delivery of animal health and welfare services. These barriers stem from various factors, including geographical, logistic, and socioeconomic challenges, infrastructure, institutional constraints, societal beliefs and norms, and financial and human resource limitations.

Barriers	No. of Entries
Limited awareness and education impacting preventive interventions or early reporting.	80
Inadequate availability and use of point-of-care diagnostics and connection to labs	78
Financial limitations both for animal owners and service providers (affordable services)	71
Infrastructure and logistics challenges to reach out / provide rapid response to remote areas.	70
Poor availability and inadequate skill of the veterinary workforce in rural areas	68
Difficulties in ensuring proper documentation and supervision of health events by a registered veterinarian	55
Inadequate occupational certification and legal framework for veterinary assistants/CAHWs	54
Difficulties in ensuring the supply of personnel in any area ensuring sustainability.	35
The rules related to the dispensing of veterinary medicines that restrict doorstep dispensing by animal health personnel	25
Competition from subsidized government services (for private providers)	11

Figure 1 Barriers faced in delivering animal health and welfare services in India.

A review of the submissions beyond the given options and one-to-one discussion with a select few participants of the experience survey indicated the following as additional impediments to delivering adequate animal health and welfare services in India. This can be grouped as related to:

### A. Geography and logistics

- Geographically scattered farm households with only a few animals per household.

### B. Socioeconomic factors

- Limited availability of service provision for small ruminants, backyard poultry, and working animals.
- High feeding costs restrict investment in health care and related measures, e.g., farm housing and biosecurity.

### C. Infrastructure

- There is an inadequate dynamic system to get an accurate picture of the disease situation at any time.
- Inadequate system for referral, specialized and handholding support to veterinary personnel working in remote rural areas
- Poorly equipped publicly funded laboratories with limited bio-safety practices, more particularly at district levels

### D. Institutions

- Inadequate institutional prioritization of animal health and welfare in contrast to the priority given to livestock production and trade-related issues.



- Excessive curative, single animal focus, and predominant symptomatic treatment not based on laboratory evidence or poor use of laboratory services.
- Weak animal health extension system
- Poor record keeping of health data, prescriptions at the farm level, and their use in herd health management.
- Poor understanding of the community's animal and human health needs, particularly pastoral and nomadic communities, and targeting of services thereof.
- Large stray animal population
- Inadequate quality continuous training and clear job /situation-specific operational guidelines for field health care personnel
- Over-the-counter availability of scheduled drugs and their misuse
- Inadequate focus on biosecurity at the farm level
- Insufficient communication and collaboration by service providers with local authorities, ongoing public/private development activities, and community organizations for improved acceptability and outreach of services
- Limited use of public-private partnership arrangements as an option for service delivery
- Engagement of field veterinarians in government duties and administrative functions that are not related to service delivery
- Inadequate prioritization of wildlife health and disease surveillance /preventive health care of domestic animals in forest fringe areas

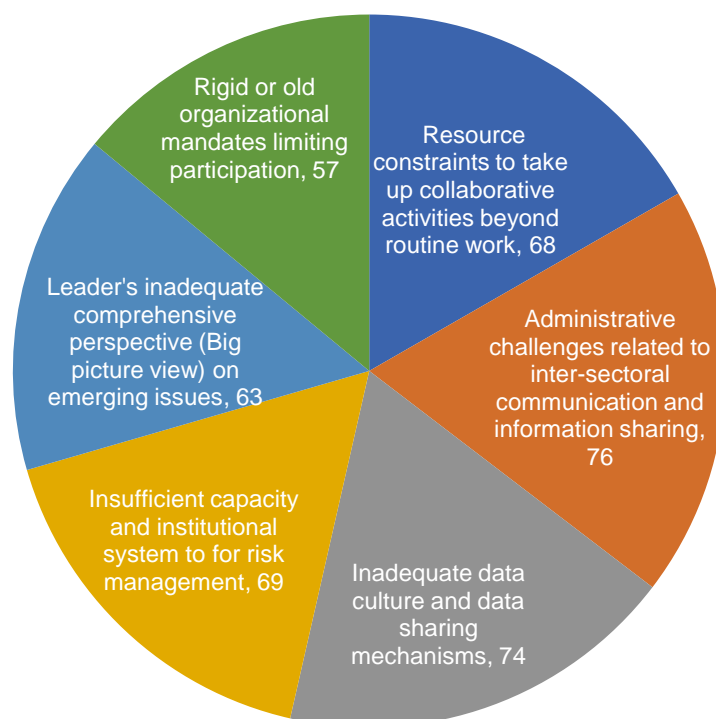
#### E. Social beliefs

- Societal and religious constraints related to culling of diseased animals
- Social beliefs and taboos of specific communities against scientific health and husbandry practices

#### F. Resources

- Inadequate motivation, managerial abilities, and professional leadership of personnel associated with service provision

To participate in One Health initiatives designed to combat AMR, zoonotic, vector, and foodborne diseases, besides other health threats due to changes in environments, Indian institutions within animal health and welfare often face many constraints.



*Figure 2 Constraints animal health and welfare organisations face when participating in One Health initiatives as per experience survey responses.*

A review of the submissions beyond the given options and one-to-one discussion with a select few participants of the experience survey indicated the following as additional constraints for Indian institutions in animal health and welfare to participate in One Health initiatives:

- Inadequate interdisciplinary skills, knowledge, and exposure to working in multidisciplinary setup among animal health and welfare professionals
- The association of animal health and welfare institutions in the One Health projects is ad-hoc or temporary.
- Work plans that are not clear about the role of each partner and are not coherent, time-bound
- Inadequate objective work assessment for equitable fund distribution amongst institutional partners.
- Personal ego and leadership deficiency of institutional decision-makers prevent the exchange of information and collaboration.

A program appraisal document of the World Bank dated April 18, 2023[18], while highlighting the need to strengthen the core capacity for preventive animal health management, indicated that the management of diseases in India has primarily been reactive. The same document also mentioned inadequate awareness of good animal husbandry practices and women facing multiple barriers in accessing animal health services. The report noted the predominance of the scheme-based (arrangements or directives to achieve specific purpose) and input-focused (distribution of tangible benefits or farm/infrastructure input) approach against the systems-based approach (considering the interactions between its various elements of the animal health system and with other related systems taking care of the broader impact of decisions and interventions) in addressing animal health challenges. It also noted inadequate project implementation capacity at the Centre and in the states

and the practice of not directing efforts at high-risk diseases and geographic hotspots to use available resources better.

Women are the major force responsible for caring for animals in India, and the fact that service delivery strategies are often not gender-sensitive is a critical impediment.

Climate change impedes the effectiveness of animal health and welfare initiatives, resulting in low productivity, increased disease incidence, and death. Extreme weather events such as floods, droughts, and cyclones in India have caused direct harm to livestock through injury or death and indirectly by destroying food and water resources.

Economic and market conditions in India also often force animal owners to prioritize costs while deciding on products, practices, and services needed for better animal health and welfare.

India has stable animal health and welfare-related institutions supported by a solid legal framework, and it is unlikely that political instability can impede animal health and welfare services delivery as an external factor.

## Initiatives

The Livestock Health and Disease Control Program (LHDCP) of DAHD primarily consists of initiatives aimed at the nationwide upgradation of veterinary facilities (Hospitals, dispensaries, and Mobile Veterinary Units), training of veterinary personnel, and control of diseases like Foot and mouth diseases (FMD), Brucellosis, *Peste des petits Ruminants* (PPR) and Classical Swine Fever (CSF) through vaccination. The program supports states in strengthening disease diagnostic laboratories and biological production units. States can utilize support under the program to control emerging and exotic diseases and conduct research, publicity, and awareness-related training. Another aspect of the program is the improvement of extension systems to promote Good Animal Husbandry Practices (GAHP). It also supports states in compensating farmers for culling infected animals.

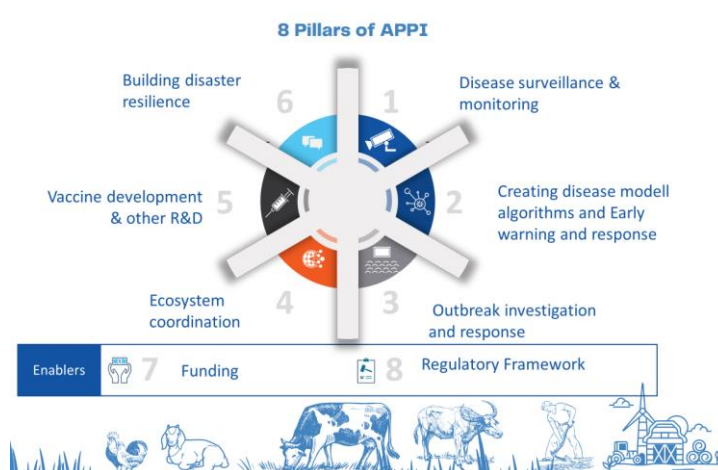
According to the program appraisal document of the World Bank dated April 18 2023,[18] animal health management schemes have achieved some results with variability between states. However, key challenges remain, including institutional strengthening to enhance the 'results orientation' of such programs and adopting a One Health framework.

A few one-to-one discussions were conducted during the study regarding the need for institutional strengthening, as mentioned in the document above. Participants indicated that animal health-related institutions need leadership and project management capacity at all levels. The institutions have inadequate capacity to design quality projects and programs that attract funding and ensure smooth implementation. Similarly, an institution needs to demonstrate the optimum use of current human resources in public service to justify fresh recruitments. The first WOAHPVS India mission 2018 suggested rigorous independent evaluation of programs' effectiveness and efficiency, focusing on outcomes rather than merely reporting activities undertaken.[21] India has institutional systems in place for the regular review of public-funded initiatives within the animal health sector, and recently, there has been an increased investment across states for digital data collection and improvement of monitoring systems.[22] and [23]and [24]

The following are significant initiatives in recent years related to One Health, where animal health and welfare institutions play leading roles.

The DAHD collaborated with the Bill and Melinda Gates Foundation and the Confederation of Indian Industries to set up a One Health Support Unit (OHSU). The unit is mandated to conduct One Health Gap assessment at the federal level and for selected states. Currently, OHSU is implementing the pilots of the One Health platform in Karnataka and Uttarakhand, focusing on strengthening select state laboratories. The unit is also assisting DAHD in One Health-related strategy development and communication.[25]

The Animal Pandemic Preparedness Initiative (APPI) of DAHD with the One Health approach has focused on the following eight pillars.



Source: Leaflet on Animal Pandemic Preparedness Initiative (APPI) published by DAHD

The Prime Minister's Science, Technology, and Innovation Advisory Council (PM-STIAC), in its 21st meeting (7-07-2022), approved the setting up of a National One Health Mission with a cross-ministerial effort that will serve to coordinate, support, and integrate all the existing One Health activities in the country and fill gaps where it is appropriate. The mission architecture encompasses animal health-related institutions like DAHD and the Indian Council of Agricultural Research. It also envisages partnerships with animal health-related NGOs and the private sector[26].

A National Institute of One Health is all set to function in full capacity in Nagpur, Maharashtra, with the collaborative initiative of the Indian Council of Medical Research and the Indian Council of Agricultural Research. The Union Cabinet has approved the creation of the post of Director of the institute, who will also serve as mission director of the National One Health Mission[27].

A few externally funded One Health-related projects are all set to support DAHD and its counterparts in a few select states for the next few years. These include projects under the Global Health Security Program titled- "Strengthen National One Health Program for Prevention and Control of Priority Zoonoses and Antimicrobial Resistance (AMR) in India" [28] and Animal Health System Support for One Health Program (AHSSOH) initiated by the World Bank[18]. The DAHD will also benefit from the activities under the World Bank-supported concurrent project Transforming India's Public Health Systems for Pandemic Preparedness Program (PHSPP)[29].

DAHD, select veterinary educational establishments, and other animal health experts regularly collaborate with the National Centre for Disease Control, which has a Centre for One Health working on projects related to the prevention and control of zoonoses, focusing on rabies and leptospirosis.[30]

The Indian Veterinary institutions have promoted leading centers such as the Centre for One Health Education, Advocacy, Research and Training (COHEART) under Kerala Veterinary and Animal Sciences University and the Center for One Health under Guru Angad Dev Veterinary and Animal Sciences University (GADVASU).

Asian Development Bank is also implementing an AMR-related initiative working with a leading Indian pharmaceutical company, Zenex Animal Health Pvt Ltd. [19]. The One Health Poultry Hub[31] is also active in Gujarat and Tamil Nadu.

Many private organizations active in community engagement and equitable access to animal health services within India, such as Heifer International and Brooke India, have already integrated One Health principles into their daily activities. [32]and [33]

# Situational analysis of animal health and One Health in India

## Community engagement and access to animal health services.

To improve community engagement and to ensure equitable access to animal health services, veterinary services-related government departments nationwide work with community-level self-help groups (SHGs) promoted under the National Rural Livelihood Mission (NRLM). The initiatives got the needed boost after DAHD signed a memorandum of understanding (MoU) with the Department of Rural Development in 2021[34]. As per the MoU, DAHD now engages select women members of the SHGs earlier trained by NRLM as livestock resource persons or *Pashu Sakhis* by further training and certifying them as "A-HELP" (Accredited Agent for Health and Extension of Livestock Production) for primary service provision including vaccination and animal identification. DAHD envisages A-HELP to bridge the gap between local veterinary institutions and livestock owners.

DAHD follows the government of India's budget guidelines for inclusive development and earmark funds for the Northeastern areas, scheduled caste sub-plan, and tribal sub-plan. It also practices gender budgeting. Under the Azadi Ka Amrit Mahotsav -inclusive development initiative ( *Samaveshi Vikaas* ), DAHD conducts community-level awareness camps ( *Pashudhan Jagriti Abhiyaan* ) in various underdeveloped aspirational districts nationwide, focusing on Janbhagidari ( community participation)[35]

In recent years, DAHD has established a 'Pastoral cell' to prioritize the enabling policy for the pastoral communities. A Pastoral Convention organized in Bhuj, Gujarat, during January 2023 documented various issues of pastoral communities, including the need to ensure last-mile service delivery at the high land and low land pastures along the migratory route[36].

The state governments have commissioned Mobile Veterinary Units and embraced technology, utilizing call centers, mobile applications (e.g., the 1962 Farmers app), and telemedicine to extend veterinary services to remote regions. In 2023, NITI Aayog ( National Institution for Transforming India, the apex public policy think tank of the Government of India ) published the framework and guidelines of Telemedicine for Livestock Health and Safety[37].

Several leading organizations in India, such as Aga Khan Foundation, Anthra, Brooke India, GALVmed, Heifer International, Goat Trust, Pradan, etc., have prioritized community engagement and equitable access to animal health services.

Availability and access to animal health services for various excluded communities still need much improvement. Discussion indicated that public veterinary services are more inclined towards large ruminants. Private Veterinarians and Veterinary Paraprofessionals (VPPs) who provide services at the last mile also see service provision for large animals as more lucrative. Community Animal Health Workers (CAHWs) trained by public and privately funded initiatives mentioned above are increasingly reaching out to farmers rearing small ruminants, pigs, and poultry.

Service availability and access are also inadequate for work animals reared by relatively poor communities, and nonprofits are making efforts to facilitate service provision for them primarily by building the capacity of community institutions and training animal health workers close to these communities. Maintaining sustainable community-driven service provision while taking care of affordability and adequacy of service provision demands careful design and execution of projects essentially involving community institutions. Stakeholders consulted during the study raised the issue of inadequate legal clarity for service provisions within communities using CAHWs. There is a need for consensus amongst stakeholders for an acceptable framework of effective supervision of service provision by registered veterinarians and enforcement of measures to address quackery and exploitation and to minimize the potential public health and animal welfare risks associated with inappropriate and unaccountable animal health service delivery. Another important area is the design of the services based on the community's immediate needs, focusing on preventive health care with a One Health approach.

The context-specific project-level studies have documented the impact of government and private initiatives on community engagement in animal health service provision. The general economic and social upliftment of targeted groups, particularly through reduced animal mortality, improved animal productivity and market access, women's empowerment, etc., is being recorded as a positive impact. Discussion conducted during the study indicated poor monitoring of interventions and the need for a thorough risk mapping associated with current project operations at the community level to design better future programs to support community engagement and equitable access to animal health services.

*"We must endeavor to understand the health needs of local communities to direct service provisions properly"* --Experience survey feedback

### Increasing the number and improving skills of the animal health workforce

India faces the challenge of ensuring enough veterinary personnel and an enabling environment for them to work to their optimal capacity. Per the final electoral roll 2023 published by the Veterinary Council of India (VCI) on 04-03-2024 (As per Indian Veterinary Practitioners Register updated up to 31-3-2023), there are 69,148 registered veterinarians in India[38]. Stakeholders consulted indicated a likely gap in the database as many veterinarians are not renewing their registration regularly, and the VCI data collection system is inefficient. A growing number of veterinary educational establishments, including private-sector ones, are likely to largely improve the supply situation. However, there are concerns related to the capacity of VCI (the Veterinary Statutory Body in India) to maintain the quality of teaching and competency of day -1 veterinarians. The total number of annual veterinary graduate supply has already crossed 4300 marks in recent years. As per a report presented to parliament in December 2022 [39], the actual strength of field Veterinarians in the public sector in India is 28,328 against an approved job position of 36,623.

*"Government policy and programs should facilitate the engagement of the veterinary workforce based on a systematic review of ground needs and situations. There should not be a uniform country-level yardstick. The government should address the challenges of hill regions with rugged terrain and scattered livestock populations through careful workforce planning. Moreover, a single point reporting system for projects funded by different agencies can reduce workload and improve data quality."* – Experience survey feedback.

The growth of private-practicing veterinarians is mainly limited to companion animal practice. The Government's Agri-Clinic and Agri-Business Center scheme, which has been ongoing for the last several years, has provisions to support private-practicing veterinarians in setting up facilities related to private farm animal veterinary services. However, the demand for the scheme amongst private veterinarians is limited, and during the last 22 years ( record updated till February 9, 2024), the project has supported only 955 veterinary clinic-related activities.[40]. The study could not record any documented report evaluating the functioning of the current private farm animal practice setup being supported under the scheme.

A one-to-one discussion indicated a predominance of government-discounted service, the poor capacity of farmers to pay, and inadequate skill and motivation amongst veterinarians for entrepreneurial journeys in farm animal practice as a few prominent factors responsible for the negligible uptake of the scheme for setting up farm practice-related private clinics. The poor availability of private farm animal practitioners with skill and entrepreneurial zeal limits innovation in service delivery. A few emerging start-ups are working with private veterinarians to promote data-based herd health management services to client farmers, and they are trying to scale up operations, mostly in the organized farm sector.

Besides veterinarians, the National Classification of Occupations 2015 [27] in India mentions paraprofessional occupations related to animal health and welfare services, such as veterinary technicians or assistants and vaccinators (veterinary).

For 2017, India reported to WOA-H-WAHIS 1,02,000 public and private Veterinary Paraprofessionals (VPPs). However, there is no credible database of VPPs as they are not registered or regulated except in the state of Himachal Pradesh. Per a report presented to parliament in December 2022, there is a shortage of VPPs in public veterinary services ( 54,928 against the requirement of 78,013)[39].

*Government policy should ensure practical and distant monitoring of health events attended by paraprofessionals and CAHWs as their actions are directly related to public health and animal welfare. They should be trained with a standardized curriculum and get access to the facility for virtual consultation with expert veterinarians. – Experience survey feedback*

One-to-one discussions with a few selected participants of the experience survey indicated recent initiatives in some states to recruit fresh veterinarians and VPPs in full-time public service against vacancies. There is also recruitment under contractual arrangements to support development projects, e.g., Mobile Veterinary Clinic. As per the Management Information System of the National Rural Livelihood Mission (NRLM), 1,60,925 *Pashusakhis* ( Friends of Animals, a category of short-term trained Community Animal Health Workers or CAHWs) are working under NRLM in India during 2022-23[41]. Species-specific CAHWs, known as *Goatsakhis* (Friends of Goats), Pig *Bandhu* (Friends of Pigs), and *Ashwa Mitra* (Friends of working Equids), are also being trained by various public and private agencies nationwide.

The growth of CAHWs has been substantial in recent years. However, there are limited studies on understanding the impact and implementation of strategies in mitigating potential public health and animal welfare risks associated with permitting less trained people to treat animals. India publishes National Occupational Standards and Qualification packs for CAHWs (Livestock Service Providers) and related occupations such as Companion Animal Groomer, Zoo Animal Keeper, Stray Animal Catcher, and Laboratory Animal Attendant[42]. More than 20,000 people have received skill certifications under the Livestock Service Provider (LSP) Qualification Pack since the first adoption of the standard in 2015 (Source: Agriculture Skill Council of India). However, aligning existing training provider curricula to the developed standards is not forthcoming along the expected lines. In 2023, the Agriculture Skill Council of India (ASCI) initiated an assignment to prepare occupational standards for training paraprofessionals on the One Health approach, and the same is under industry validation (Prakash Priyanka, Personal communication Sept 2023).

The DAHD has launched an initiative in 2022 through an MoU with the NRLM to train select *Pashusakhis* further and certify them as "A-HELP" (Accredited Agent for Health and Extension of Livestock Production). The program is currently ongoing in various Indian states[43]. The accreditation of existing *Pashusakhis* with further training is primarily intended to facilitate the use of the cadre in organized government disease control efforts. However, not much information is available in the public domain regarding any intended objective to bring the cadre under an elaborate system of veterinary supervision to safeguard against potential risk.

A general observation indicates that the veterinary workforce database in India's animal health sector is not credible for quality workforce analysis and planning. Moreover, no attempt has been made to assess the workforce requirements of public veterinary services based on workload and need for various expertise, ensuring needed geographical distribution. The public veterinary services in India still largely focus on private good functions such as curative care. There are limited attempts to optimize workforce utilization through service and organizational restructuring, essentially permitting the growth of the private sector, at least in developed belts, to provide curative care. The discussion during the study indicated ongoing efforts to map government veterinarians who will be required to register themselves digitally to perform any online certification-related services. Though government reports mention demand and supply gaps in various categories of personnel, there is a need for scientific assessment and exploration of the scope of innovation for the optimal use of personnel in public veterinary services. Similarly, there is ample opportunity to engage with and incentivize the

private sector personnel for targeted service delivery in developed belts, including under public-private partnerships. This can permit government services to focus more on less developed and economically weaker sections of society.

Continuing Education (CE) is vital for improving workforce skills. The Veterinary Council of India (VCI) Act and Rules do not yet have any provisions for a mandatory CE requirement for the five-year renewal of veterinarian registration. However, some states are introducing compulsory CE for re-registration. For instance, Punjab has introduced a need for a minimum of 15 credit points equivalent to three or four CE courses for registration renewal. The absence of a CE requirement can be linked to the inadequate professional development of registered veterinarians and the quality of services in general.

Since 2017-18, ICAR has been embarking upon an ambitious step in further strengthening the National Agricultural Education system in the country through the National Agricultural Higher Education Project (NAHEP) with the financial assistance of the World Bank. The NAHEP project focuses on investment in infrastructure, competency, and faculty commitment. It also aims to attract talented students to agriculture. NAHEP supports Veterinary Educational Establishments (VEEs) to provide international exposure to faculty and students through exchange, twinning, sandwich, and dual degree programs with reputed global universities[44]. In recent years, many VEEs in India have started providing need-based postgraduate diplomas and short certificate courses, which have played a significant role in skilling the workforce and facilitating career progressions. Few VEEs in India have started investing in learning and skilling centers with simulation-based learning tools.

CE has received much attention in recent years, both in the public and private sectors. The focus is primarily on Veterinarians, and access to courses and certifications within the country has increased in recent years. Not much information is available on CE programs directed at VPPs. One-to-one interaction with select participants of the experience survey indicated the need to link training programs to specific jobs and tasks that focus on competencies identified through a proper needs assessment. Dedicated social media channels and discussion groups are also quickly emerging in India to meet the need for continuing education of field personnel.

### Closing the veterinary medicine and vaccine gap

To create an enabling environment, the National One Health Mission of India aims at targeted research and development activities to provide quality vaccines, therapeutics, and other disease prevention tools. Another area of intervention toward enabling the environment is streamlining the regulatory and approval process.[26]

Announced in the year 2020, the Animal Husbandry Infrastructure Development Fund (AHIDF), the flagship program of DAHD under Prime Minister's *Atma Nirbhar Bharat Abhiyan* stimulus package, is currently supporting private sector proposals related to setting up and strengthening GMP-compliant veterinary vaccine and drug production facilities. As of 05-06-2024, the program received 18 applications nationwide and sanctioned three with a project cost of Rs 179.5 Cr (1795 million)[45]

India has no separate Drug and Cosmetic Act for veterinary medicine and diagnostics. The dedicated veterinary cell at the Central Drugs Standard Control Organization (CDSCO), under the Directorate General of Health Services, Government of India, maintains a database of approved veterinary drugs[46] According to the India report of the global benchmarking survey 2020 supported by Health for Animals[47], the overall regulatory policies for veterinary drugs are becoming more stringent, policy-driven, and in favor of public health. The cost of bringing new products to market has become costly. The report indicated that veterinary-specific guidelines can help minimize the duration and cost of the regulatory process. In November 2020, a government committee submitted a report on preparing a National List of Essential Medicines (NLEM) for animal use[48]. The report, which the government accepted, suggested a guideline for including veterinary medicines (Drugs and Biologicals) under the essential list for animal use, which state governments can use to prepare their list of essential veterinary medicines. It highlighted the dynamic nature of NLEM and recommended



two vaccines for animal use to be included under NLEM: Foot and Mouth Disease (Trivalent) Oil Adjuvant Vaccine and Brucella Abortus (S19 strain) Vaccine, Live freeze-dried. India released the latest NLEM for human health use in September 2022, with 384 drugs representing 27 therapeutic categories. According to a 2021 study, veterinary drugs in India are more expensive than human drugs, except doxycycline, chlorpheniramine, aspirin, and clotrimazole[49].

The availability and access to vaccines for animal owners in India have improved in recent years, primarily due to organized vaccine distribution under national animal disease control programs and increasing awareness amongst animal owners for preventive care.

Over-the-counter access to antibiotics without prescription and direct marketing of drugs to farmers are common in India. A paper[50] published in 2020 described several drug-use practices with the potential to cause antimicrobial resistance. While ensuring availability and access to a good assortment of veterinary medicine and vaccines, particularly in the last mile, it remains imperative to address risky practices.

The DAHD signed a MoU with the Ministry of AYUSH on April 7, 2021, to develop a regulatory mechanism for using Ayurveda in the veterinary sector to benefit animal health and livestock owners' communities. The collaboration envisages exploring marketing possibilities for herbal veterinary medicines on a sustainable basis and providing services including cultivation, preservation, and conservation of medicinal plants. The initiative will likely help increase veterinary medicine's availability, acceptability, and access[51].

The WOA -PPP handbook[52] documented a transformative Public Private Partnership (PPP) in India where Hester Biosciences Limited and GALVmed collaborated with Jharkhand State Livelihood Promotions Society (JSLPS) under the aegis of the Rural Development Department, Government of Jharkhand to create a sustainable supply chain of appropriate and affordable veterinary vaccines.

### Improving animal disease surveillance

Strong animal disease surveillance as a component of One Health surveillance is crucial to strengthening countries' ability to detect, prevent, and control emerging and re-emerging diseases and other health threats. Like many other countries in the post-COVID era, the Indian government is also increasingly emphasizing the value of monitoring pathogens circulating in wildlife, livestock, and domestic animals that have the potential to spill over to the human population.

Disease surveillance and monitoring is one of the eight pillars of the Animal Pandemic Preparedness Initiative (APPI) of DAHD. India has highly skilled laboratory facilities for animal disease diagnosis and surveillance. A forewarning system for animal diseases already exists[53]. However, the most significant constraints are the spread and capacity of laboratories and the quality of data feeding into systems. Moreover, more efforts are needed to orient and incentivize ground-level workers for disease reporting and participation in surveillance. Many parts of the country suffer from logistic issues regarding sample collection, appropriate packaging, and dispatch. Another bottleneck is inadequate livestock and farm premise identification and risk mapping for targeted surveillance. The predominance of informal livestock trade in India makes surveillance in markets and across the value chain challenging.

The animal disease reporting system has been evolving rapidly in India since the launch of the National Animal Disease Reporting System in 2013. In recent years, DAHD promoted another system -the Information Network for Animal Productivity and Health (INAPH). The *Bharat Pashudhan* application developed under the National Digital Livestock Mission (NDLM) replaces INAPH. The NDLM of DAHD aims to help further streamline the reporting, monitoring, and forecasting of livestock disease situations within the country. The blueprint of the Mission is currently in the public domain[54]. The national One Health Mission, where DAHD is a crucial partner, envisages investments in analytics such as disease modeling, Artificial intelligence, Machine learning, and real-time dashboards to drive data-based decision-making[26]. DAHD plans to utilize the forthcoming pandemic fund grant

primarily to shape activities related to strengthening surveillance (disease, environmental), early warning, risk analysis, and laboratory information/ quality systems[55].

The role of Veterinary Services in India in wildlife disease surveillance is traditionally weak. Implementation of integrated disease surveillance is one of the core areas of India's ongoing One Health Mission[26]. The Mission aims to encompass efforts at NDLM for livestock diseases and the National Referral Centre for Wildlife (NRCW) for wildlife diseases.

Promoted by the Department of Biotechnology (DBT) in 2021, a consortium project of 27 institutions in India envisages surveillance of significant bacterial, viral, and parasitic infections of zoonotic and transboundary pathogens in India.[56]

### Enhancing collaboration for One Health

Health challenges are multifaceted and require coordinated efforts across disciplines, sectors, and geographical boundaries. Collaboration is fundamental to the One Health approach, and it allows for a holistic understanding of various interconnections and facilitates coordinated responses to health challenges.

A 2023 published study[57] conducted a literature review to assess the landscape of One Health activities at local levels in India and found that intersectoral collaboration primarily occurs through specific research activities, during outbreaks, and for community outreach efforts. However, there is limited formal coordination among veterinary, medical, and environmental professionals on the day-to-day prevention and detection of zoonotic diseases at district/subdistrict levels in India.

The program appraisal document of the World Bank published in 2023 indicated the following regarding the status of operationalization of the One Health approach:

*"The operationalization of One Health activities and coordination on the technical level between Animal and Human Health has been weak. There is little sharing of information and data between relevant institutions. For example, both rabies control and AMR management are fragmented between Human Health and Animal Health services, limiting their effectiveness."* – Experience survey participant

The following are some experience survey feedback related to collaboration among institutions for One Health.

*"There is poor coordination between Government agencies and departments responsible for implementing One Health policies. Coordination between government and nongovernment agencies is also inadequate."*

*A One Health approach demands a better understanding of human and ecological health, including land use pattern changes, etc. One should envisage an interdisciplinary service delivery system. Agencies are working in silos.*

However, efforts to increase integration are gaining momentum. The National One Health Mission, approved by Prime Minister's Science, Technology and Innovation Council (PM-STIAC) on July 7, 2022, envisages better information sharing between different departments and integration of the efforts into existing programs to prevent further silo[26].

There are a few examples of One Health-related collaborations in India in recent times:

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Brooke India, with the primary mandate of ensuring animal health and welfare service provision for working equids, collaborated with ILO, the South Asia Initiative to End Violence Against Children (SAIEVAC), ICIMOD, etc., to improve the welfare of both human and animals and condition of the immediate environment while working with communities and areas linked to brick kilns industries of select Indian states.

Example of a development collaboration with One Health approach in a specific industry/community context. Source: Brooke website

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GADVASU – a leading Veterinary University, collaborated with two medical colleges during the COVID pandemic. The University provided knowledge of testing COVID on PCR machines. A viral testing laboratory within the university premises tested up to 3000 human samples per day.

Example of collaboration through sharing of infrastructure and resources  
Source: GADVASU e-Newsletter, July-September 2020 (3)

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The intersectoral collaboration featuring the MoHFW, Directorate of Health Research, Indian Council of Agricultural Research (ICAR), State Health Department, State Animal Husbandry, and District Administration during a 2018 Nipah virus outbreak in Kerala led to zero spread and no mortality in a subsequent outbreak the following year. The latest outbreak in September 2023 was contained within just a week.

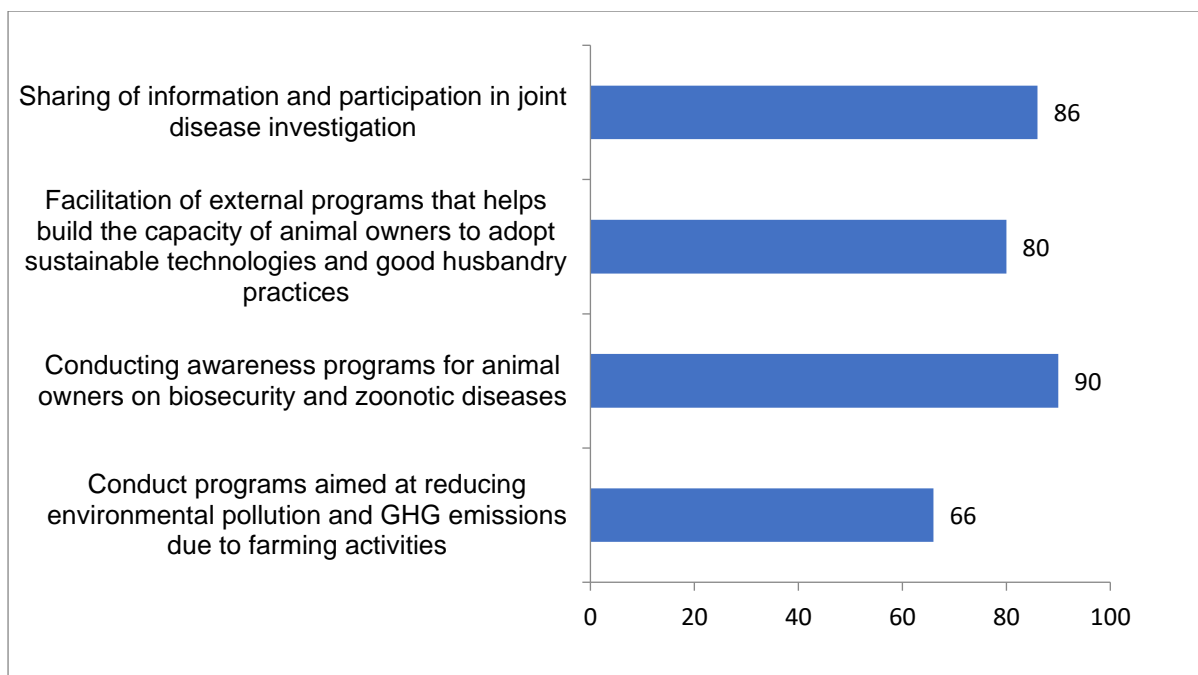
Example of One Health Operational Collaboration during a disease outbreak  
Source: Singhai M et al. Nipah virus disease: recent perspective and One Health approach 2021 and GAVI blog 'How Kerala curtailed Nipah Virus')

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The benefits of collaboration are increasingly being recognised, with more and more documented experiences as above. One-to-one discussions indicated that India's National One Health Mission is a step towards establishing the much-needed interagency coordination mechanism. The mission is likely to align policy frameworks to incentivize collaboration, remove barriers to cooperation, and promote cross-sectoral coordination.

Most institutions in animal health and welfare in India restrict the scope of their operation to curative care. Inadequate work within the domain of public health is one of the prime reasons for the poor media visibility of animal health institutions. To implement the One Health approach, institutions should essentially review their scope of work and plan for programs and projects accordingly. Where necessary, the public veterinary services in various Indian states can initiate the process of redefining their mandate by appropriately amending the allocation of business rules to highlight veterinary services' responsibilities in the broader area of veterinary public health / One Health. The institutions should also explore needed changes in organizational structures, hire people with the required expertise, and adopt key result areas for various organizational divisions to achieve the One Health outcome.

Figure 3 shows the participants' views of the experience survey, indicating the possible scope of work for Indian institutions (Public and Private) in animal health and welfare to support One Health implementation.



*Figure 3 Possible scope of work for Indian institutions in animal health and welfare to support One Health implementation.*

While commenting on additional points related to scope of work, the participants highlighted the needed support of animal health and welfare institutions to prevent antimicrobial resistance, bio-threat reduction, health-related technology innovation, and natural resource use efficiency, e.g., water and land use.

The participants also expressed that the institutions, besides their traditional core curative animal health and animal welfare activities should devote appropriate resources to the following areas of work depending on expertise and aligning with organizational strategy.

- Animal disease monitoring, prevention, and control of outbreaks
- Herd Health Management and Farm Productivity improvements
- Food security through sustainable animal production and safe trade
- Implementation of food safety norms across the value chain
- The well-being and livelihood support of animal owners
- Sustainable breeding and conservation of animal resources
- Capacity building, communication, and extension

## Recommendations

### Support for community engagement and equitable access to animal health services

Before deciding on action areas, planners and service providers should involve the community members in analyzing their problems and the potential for a change in the situation.

Figure 4 shows the experience survey results exploring possible action areas at the community level for equitable access to animal health services.

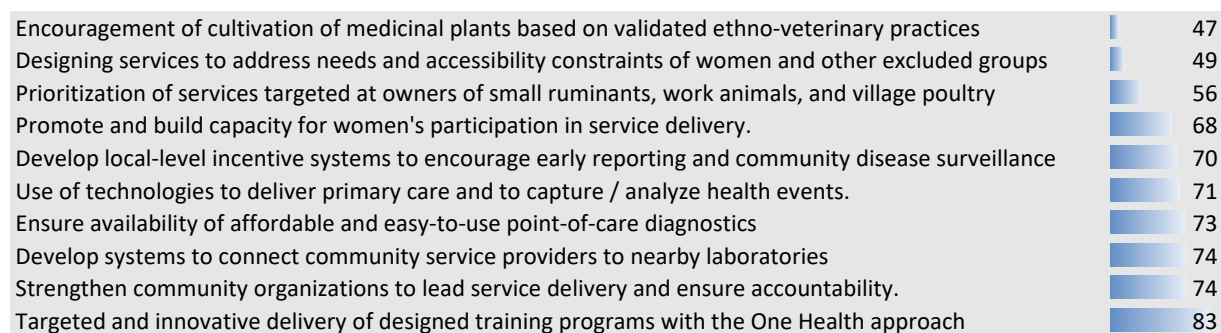


Figure 4 Possible action areas at the community level for equitable access to animal health services.

A review of the submissions beyond the given options and one-to-one discussion with a select few participants of the experience survey indicated the following as additional possible action areas at the community level for enhanced community engagement and equitable access to animal health services:

- Build the capacity of last-mile public and private veterinary institutions for animal health and welfare-related extension services with a One Health approach. Field workers should be skilled in using tools like Participatory Rural Appraisals.
- Veterinary institutions should proactively involve themselves in village-level development planning, including plans for disaster management. This helps prioritize animal health-related interventions in village development plans.
- Local-level studies should inform ways for village institutions to integrate animal health and welfare-related activities within existing support programs. At the national level, the One Health Mission should review synergy with programs under the National Health Mission, such as the *Pradhan Mantri-Ayushman Bharat Infrastructure Mission*, which aims to strengthen the public health infrastructure at all levels. The government can explore the feasibility of converting the village-level health sanitation and nutrition committee under the national rural health mission into a One Health committee.
- Government and private development programs should earmark funds to outsource services from animal health personnel representing any community. Institutions should create mechanisms to incentivize community workers for their performance.
- Animal Health and welfare support at the community level should also encompass pet and work animals.

### Increasing the number and improving skills of the animal health workforce

The study suggests the following to enhance the supply and skilling of the animal health workforce, ensuring an enabling environment for optimal workforce performance.

- India should conduct a detailed state-wise veterinary workforce assessment based on the immediate context, the workload at the field level, and administrative and other related work processes of institutions mandated with responsibilities related to animal health and welfare

services. Such assessment should also explore possible service innovation, the working environment, and the reporting framework for optimal workforce use.

- The training institutions in India should focus on ensuring an appropriate mix of people ready for the market with knowledge and skills aligned with the job/task at different levels of animal health and welfare services (Public / Private), essentially considering the One Health-related competencies. National and international collaboration should support the commissioning of a competency-based Learning Management System (LMS) to build India's animal health and welfare-related professional and paraprofessional workforce capacity. Such LMS, if moderated by the veterinary statutory body in every Indian state, can help develop a database of qualified veterinary personnel with specific competencies. Such data can help veterinary services ensure the right people are in the right place at the right time.
- The Veterinary Council of India (VCI) should initiate comprehensive registration of experts, e.g., epidemiologists, microbiologists, veterinary services management and preventive medicine experts, etc. The need is to incentivize veterinary personnel who strive to acquire competencies in general management and the One Health domain. VCI should guide the government and other stakeholders to ensure the country has the correct number and appropriate mix of experts.
- Leadership, collaboration, and systems thinking related to capacity building of the animal health workforce are crucial, and stakeholders should prioritize this alongside the capacity building in technical domains.
- Cooperation between the Veterinary Service, Veterinary Educational Establishments, and the private sector should be encouraged for initial education and continuous skilling of the animal health and welfare-related workforce. Skill training in the private sector can benefit from alignment and certification of training as per available national occupational standards promoted by the agriculture sector skill council.
- Veterinary paraprofessionals (VPPs) in India should be regulated to ensure the adequacy and accountability of veterinary services. Regulation is also needed to create an environment that enables them to contribute optimally. The 45th report of the Parliamentary Standing Committee on Agriculture, Animal Husbandry and Food Processing (2022-23) has already recommended establishing a capacity within the Veterinary Council of India or an alternative body to regulate Veterinary paraprofessionals.[39] .
- The VPP training should be aligned with available national occupational standards.
- The government should conduct a study to understand the constraints related to the participation of private veterinarians in farm animal clinical service provisions and the feasibility of outsourcing selected public services from private veterinarians as a win-win proposition.

## Closing the veterinary medicine and vaccine gap

The experience survey recorded the following feedback to help close the veterinary medicine and vaccine gap:

*A separate Drug and Cosmetic Act for veterinary medicine and diagnostics in India can provide numerous benefits, including regulatory clarity, enhanced safety and efficacy, promotion of innovation, and alignment with international standards. A separate act will ultimately contribute to closing the gap in veterinary medicine, diagnostics, and vaccines for improved animal health and welfare -Experience survey feedback*

*We need more translational research to develop point-of-care, user-friendly tools suitable for the Indian context. An efficient regulatory process and industry partnership are essential for their field deployment. -Experience survey feedback*

*We must ensure that promoted ethnoveterinary practices and herbal products available at the community level are scientifically validated. -Experience survey feedback*

*Stakeholders in the animal health industry should ensure that innovation drives product assortment, quality, and affordability for small-scale farmers. -Experience survey feedback*

The participants mentioned the following to close the veterinary medicine and vaccine gap:

- Facilitate an enabling environment for private sector innovation in animal health products, diagnostics, and biologicals to address emerging challenges.
- Continue to facilitate investment in technology-driven GMP-compliant plants for enhanced supply of quality animal health products and biologicals.
- The state governments can explore public-private partnership options to set up veterinary pharmacies within rural veterinary institutions or stock products in Mobile Veterinary Vehicles for commercial dispensing.
- Farmer Field Schools and experienced farmers should be encouraged to demonstrate the benefits of animal health products to drive demand in rural areas.

Targeted and designed policy support for the veterinary pharmaceutical sector can go a long way toward ensuring a good assortment of affordable products at the last mile of service delivery. The essential veterinary medicine list should be reviewed from time to time. More awareness is needed to address risky veterinary medical product distribution and use-related practices. The empowerment of farmers is required to prevent exploitation through substandard products. One such tested empowerment strategy is QR code-based product labeling that permits anyone to verify a product's authenticity and retrieve video instructions for use in the chosen language.

### Improving animal disease surveillance

The forthcoming One Health projects in India essentially focus on improving the capacity and credibility of laboratories, risk-based surveillance of diseases, and antimicrobial resistance within the animal health sector.

The study recommends the following:

- The smooth implementation of the National Digital Livestock Mission (NLDM) will be crucial for ease of reporting and improved data quality. The NDLM is likely to enhance the capacity of mandated agencies to monitor and assess the effectiveness of intervention measures. More targeted investments, incentives, and an enforced legal framework (e.g., Prevention and Control of Infectious and Contagious Diseases in Animals Act, 2009 and corresponding rules) will help ensure the success of animal identification besides the geo-location-based identification of farms and other risky premises, e.g., Livestock markets, trade points, etc.
- Considering the predominance of informal livestock trade and associated risk, states must continue to focus on improving the activities related to livestock trade intelligence gathering, communication, mapping of animal movement routes, and engagement with players across the livestock value chain, including pastoral communities. The ongoing investments in digital livestock trade platforms will significantly assist in understanding crucial market and animal movement routes.
- The veterinary service's role and involvement in wildlife disease surveillance (including domestic animals in forest fringe areas) should be encouraged with necessary resource support.
- State governments should prioritize animal husbandry departments' disease outbreak investigation capacity and regular surveillance of livestock markets and slaughter facilities.
- Measures to orient, empower, and incentivize field personnel should be initiated for effective disease reporting and quality output of various surveillance activities.

### Enhancing collaboration

Veterinary institutions should ensure visibility for their work and participate proactively in result-oriented collaboration with One Health partners for overall health governance in India.

The participants additionally suggested the following to facilitate inter-sectoral coordination and collaboration:

- Develop and deliver courses that help orient learners to the One Health concept and the benefits of coordinated actions and collaboration. Additionally, such courses should cover concepts of community participation for collaborative actions at the community level.
- Support for local-level studies that aim at identifying the scope of project or program-level synergy between departments.
- Institutionalization of One Health committees at the village level as an extension of the village health sanitation and nutrition committee promoted under the National Health Mission.



## Conclusion

Animal health services are increasingly playing an important role in the operationalization of One Health in India. There are instances of inter-sectoral information sharing and formal collaboration to address issues like zoonotic disease control, AMR, food safety, etc. Policy and institutional mechanisms at the central level for the operationalization of One Health are in place. However, it remains imperative for animal health services to address the impediments highlighted in the report and strengthen the administrative, operational, and regulatory framework within the veterinary domain in alignment with the One Health agenda.

There are encouraging investments that target improvement in animal health service provision, particularly focusing on public good functions such as disease control, food safety, etc. However, the result largely depends on need-based institutional restructuring, increased awareness of risky practices, enforcement of regulations, human resource strengthening, and capacity building for effective project design and implementation. Improved center-state administrative relationships and inclusive actions covering all sections of the farming community, different species of animals, and different farming systems will be paramount.

Infrastructure investments and facilities like mobile services will likely improve last-mile service provision with access to laboratories and assorted veterinary medical products. However, the strategy for service delivery must evolve from a better understanding of farmers' needs, socio-economic constraints, and possible innovations. An efficient data-driven system to prevent, detect, and respond to disease outbreaks and other threats in line with international standards remains a crucial goal to be achieved. The current public sector budget provision and support from donor agencies are likely to pave the way for more investments. However, strong result-based monitoring of the ongoing and committed investments and more research evidence will be needed for prioritization and sustained budgetary support.

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