

Veterinarians and One Health: Bridging Boundaries

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Introduction

Global population, which surmounts to 8.1 billion and already projected to reach 9.7 billion by 2050, is expected to significantly impact the global public health status (United Nations). There can be no better example than the recent Covid-19 pandemic which crumbled the entire world resulting in significant breakdown of economy, and global health urging the world to have a better preparedness for the upcoming pandemic, which is already predicted by the World Health Organisation

Role of Veterinarian in One Health

Rudolf Virchow an eminent pathologist once stated “Between animal and human medicine there are no dividing lines, nor there should be”. When we see a veterinarian treating an animal, what just apprehends to us, is his contributions towards animal health care and animal welfare. What remains oblivious, is his/her role in human health and wellbeing, while achieving an overall food security and ensuring food safety, elevating hygienic and safe food production from livestock, and



Fig. 1: Public health related function of a veterinarian, Source: IVA poster competition

(WHO) (WHO, 2022). Therefore, in addition to strengthening existing health infrastructures, the present era demands an alternative approach to the traditional health care system, where each stakeholder of health functions independently to achieve their goal. In contrast, the current situation needs a collaborative effort from all the relevant parties, to obtain optimum health for all, which is the basis of One Health.

protecting human health from emergence of highly contagious, and deadly zoonotic diseases.

Public health related functions of a veterinarian have been broadly placed under three categories, namely animal related functions, biomedical functions, and generalist functions. Animal related functions can be summarised as all the activities undertaken by a veterinarian towards protection of human health, which includes production of safe and hygienic foods of animal

origin, prevention and control of zoonotic diseases, safe disposal of animal cadavers and wastes, safeguarding human health from toxic, venomous, and hazardous creatures, and supervision of laboratory animals in the human health laboratories. Whereas biomedical functions include production and evaluations of biological products (E.g., vaccines, drugs, and diagnostics), health laboratory services, epidemiology, protection from environmental and food-borne hazards. While generalist function includes role of a veterinarian as a planner, coordinator, and administrator for protection of human health.

21st Century, & the Era of Epidemics & Pandemics

Our researchers have found that for each five new diseases emerging every year, three of these come from animal. Moreover, 60% of these existing infections have origins from animal sources. Some of the typical examples of such diseases include anthrax, brucellosis, leptospirosis, tuberculosis, Q fever, and many more. Recently, zoonotic diseases epidemics and pandemics with a high morbidity and mortality rate, such as ebola, covid-19, SARS, MERS, nipah, H5N1 highly pathogenic avian influenza, and lyme disease are emerging and re-emerging across several continents (Rahman et al., 2020).

Moreover, infections associated with emerging food-borne pathogens such as enterohaemorrhagic *Escherichia coli* (EHEC), viral hepatitis, *Salmonella*, *Campylobacter* are showing an upward trend. One in every ten people fall ill annually due to food-borne disease, accounting for around 4,20,000 deaths from such hazards. Children, particularly those under five years of age, get disproportionately affected where food-borne diseases cause around 1,25,000 deaths in the age group. Animal origin foods, holds a lion's share among the major food-borne outbreaks across the world (WHO, 2024).

The following list (Table 1) present some important epidemics and pandemics in the 21st century so far with significant public health implications.

Table 1: Large scale epidemics and pandemics in the 21st century

| | | | |
|-----------|--|--|---|
| | | | huge death toll (~ 7 million worldwide), breakdown of public health infrastructure, economic recession |
| 2009 | Q fever (<i>Coxiella burnetii</i>) | | Netherlands, around 4000 human cases and culling of more than 50000 goats |
| 2022-23 | Monkey Pox (<i>Poxviridae</i>) | | In non-endemic countries viz. North America, Europe, and India |
| 2001-2023 | Nipah (<i>Paramyxoviridae</i>) | | India, six outbreaks so far and four outbreaks following the 2018 outbreak (18 confirmed cases, 17 deaths) in Kozhikode, Kerala |
| 2017 | Plague (<i>Yersinia pestis</i>) | | Madagascar, 2417 number of confirmed cases and 209 deaths |
| 2014-2016 | Ebola (<i>Filoviridae</i>) | | West Africa, more than 28000 confirmed cases and more than 11000 deaths |
| 2003 | Severe Acute Respiratory Syndrome (<i>Coronaviridae</i>) | | Spread over 30 countries, more than 8000 clinical cases, and at least 774 deaths |
| 2012 | Middle East Respiratory Syndrome (<i>Coronaviridae</i>) | | Reported from 26 countries since 2012, and 858 confirmed deaths |
| 2011 | Crimean Congo Haemorrhagic Fever (CCHF) | | First time ever reported from India in Gujarat, ever since sporadic cases are |

| Year | Pandemic/Outbreak | Impact |
|-----------------|-----------------------|----------------------------|
| 2019- till date | Covid-19 (SARS-CoV-2) | Global scale impact with a |

| | | reported every year | |
|-----------|---|--|--|
| 2015-2016 | Zika virus epidemic | So far 86 countries and territories have confirmed zika virus disease, including India. Typically associated with microencephaly in infants. | |
| 2017-2018 | Listeriosis (<i>Listeria monocytogenes</i>) | South Africa, more than 1000 clinical cases and over 200 deaths associated with consumption of processed meat products | |

sustainable balance between human health, animal health, and protection of ecosystem to obtain an optimum health for all. Moreover, a complex transmission dynamic of these infectious diseases, warrants collaborative efforts from multiple stakeholders for a sustainable approach for control and preventions of these diseases. Veterinarians are an important part in One Health since animals have an influence on people along with environment. Being epidemiologists, ecological experts, or clinical practitioners, veterinarians are critical in ensuring the safety and health of its three components: people, animals, and environment in developing One Health. Therefore, professionals from veterinary and medical sector, and other relevant sectors should join hands to extend a collaborative effort towards prevention of emergence of such diseases control and elimination of existing diseases (Rahman et al., 2020).

One Health Initiatives

One Health is based on two similar concepts: Firstly, the idea that animals, humans, and environment co-exists and are intricately linked. Secondly, the joint efforts of several disciplines at the global, national, as well as local levels to achieve ideal health for animals, people, along with the environment. The concept of One Health has existed since millennia. However,

Role of One Health in Combating Emergence of Novel Pathogens

Several factors behind emergence of these zoonotic diseases include intensification of animal farming; destruction of natural ecosystem; international trading of livestock and livestock

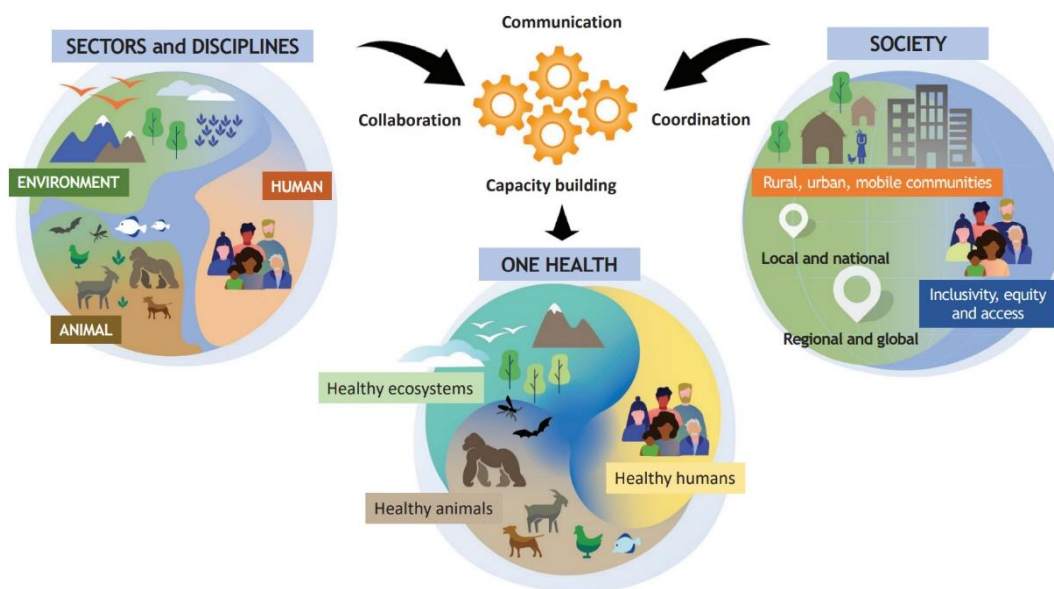


Fig. 2 Interdependence of animal, human, and environment health, Source: OHHLEP

products; climate change and alterations in vector dynamics; and ultimately adaptation and natural evolution of the pathogens to changing ecosystem. Therefore, the present situation demands a

investigations in animal, human, and environmental disciplines are still generally undertaken individually, and obvious linkages are ignored unintentionally. Along with growth in

human population, the animals -human relationships evolve. Understanding the interdependence of animals, humans, and the environment has become increasingly important for our collective safety and health (Figure 2).

Currently, four leading global organisations, World Health Organisation (WHO), World Organisation for Animal Health (WOAH), Food and Agriculture Organisation (FAO), and United Nations Environment Programme (UNEP) has joined hands and formed a quadripartite One Health advisory group, namely One Health High-Level Expert Panel (OHHLEP). Several initiatives have already been adopted by India, fostering collaborations between multiple stakeholders. Some of the examples include, constituting 'National Expert Group on One Health' and 'One Health Consortium'; establishment of 'Integrated Public Health Laboratories (IPHL)', 'National Institute of One Health (NIOH)'. Moreover, government has initiated flagship programmes such as 'National One Health Mission' and 'One Health Support Unit' for successful implementation of One Health related schemes (Tripathy and Barbuddhe, 2023).

Conclusion

Effective implementation of 'One Health' needs meticulous planning, communication, collaboration, and response efforts from government officials, policymakers, researchers, and practitioners to join hands and work together at various levels, contribute collaboratively to achieve the goal. An "One Health" approach can only be brought to the ground reality through an integrated and unifying approach, establishing effective collaboration at local, regional, national, and global level.

In the recent past, India has already surpassed China to become the most populous country in the world. Amidst rising demand for food security, agriculture which was earlier a familial occupation in the rural community, is currently seeing a shift in trend from traditional practices towards intensification of agriculture, particularly in livestock sector. At one end such practices become essential to meet the rising food demand, while on the other hand comes with several inherent risks for emergence of zoonotic diseases, food-borne pathogens, and superbugs resistance to most of the essential antibiotics. Therefore, this era demands a collaborative One

Health approach from all the stakeholders of health, to come forward unitedly for protection of health & well-being. Amidst, a looming risk of a large-scale pandemic threatening the public health status at a global scale, a veterinarian stands at the forefront in this war.

Further Readings

On personal request