

Zoonotic Diseases in India

INTRODUCTION

Animals have played an important role in the evolution of humans. The hunter-gatherers started settling down and domesticating animals for food, transportation, agriculture, security, war or recreational activities, etc. This resulted in increased contact with humans and sharing of habitat. With this, the transmission of diseases from animals to man and man to animals became common. Industrialization needed the mass breeding of animals for food, sports or recreation, etc. Due to technological developments and fast communication, humans, animals, and animal products started moving from one part of the world to the other in a short period, many times carrying infections in the globalization era.

The World Health Organization (WHO) has defined Zoonotic diseases, as those diseases and infections, which are naturally transmitted between vertebrate animals and man, and infections that are shared between vertebrates and man.^[1] The zoonotic diseases include viral (rabies, yellow fever, influenza, Kyasanur forest disease, etc.), bacterial (anthrax, brucellosis, plague, leptospirosis, salmonellosis, etc.), rickettsial (tick typhus, scrub typhus, murine typhus, etc.), protozoal (toxoplasmosis, leishmaniasis, trypanosomiasis, etc.), helminths (hydatid disease, taeniasis, schistosomiasis, leishmaniasis, etc.), fungal (histoplasmosis, cryptococcus, etc.), and ectoparasites (scabies, myiasis, etc.). According to the WHO, zoonotic diseases in South East Asia are grouped as endemic, re-emerging, and emerging diseases with epidemic potential.^[2]

The risk factors precipitating the occurrence of emerging zoonotic diseases are many, and are in a state of continuous evolution. This evolution moves alongside the changing societal and demographic patterns across the country. The development projects are also found to influence disease spread patterns world over.^[3] The pressure on land increases due to population explosion, expansion of the residential area, industry, agriculture, building of highways, rail road, etc. As a result, deforestation increases the contact between wild animals and humans. The habitat of the wild animals is disturbed increasing contact between man and animals. There is evidence that global warming increases population of insects that harbor the organisms which spread various diseases. In India, population pressure is a major factor contributing to deforestation because of the expansion of residential areas, urbanization, industrialization, highways across the country. India went for massive irrigation projects since independence contributing to increase in food grain production from 51 million tons (1951) to 200 million tons (2000). This has resulted in massive ecological/habitat tumult with impact on host, agents and vectors of infections/zoonotic diseases.^[4] The

other factors include natural migration of animals especially migratory birds, travel and tourism, climate change, disasters, political conflicts, and pathogen adaptation.^[5]

MAGNITUDE OF THE PROBLEM

Zoonotic diseases have been increasing globally as well as in India. Of 1407 human pathogens, 816 were zoonotic, i.e., capable of being transmitted naturally between animals and humans. These include 538 bacteria and rickettsia, 317 fungi, 208 viruses, 287 helminths, and 57 protozoa. The study also highlighted that as many as 177 (13%) of the total pathogens were emerging or reemerging, and of these 130 (75%) were classified as zoonoses.^[4] Therefore, host range, emerging and reemerging pathogens are caused many infections to human health. Emerging infections usually prove more threatening because humans have little information about their origin and many of their epidemiological features remain unknown. The economic impact is also not too well delineated.^[3] It is likely to be in billions of dollars.

Many of these have the potential to travel a long distance and affect the world. The WHO claims to engage in cross-sectorial activities to address health threats at the human-animal ecosystem interface effectively.^[6] Many of these diseases often catch health authorities unprepared. Examples include Plague, Nipah virus outbreaks, Ebola hemorrhagic fever, Zika virus, and Corona virus (COVID-19). The recent COVID-19 outbreak in China is the sixth global health emergency in the past decade which killed around 3500 people and more than 100,000 people affected so far.

In India, the major public health zoonotic diseases are rabies, brucellosis, toxoplasmosis, cysticercosis, echinococcosis, Japanese Encephalitis (JE), plague, leptospirosis, Scrub typhus, nipah, trypanosomiasis, Kyasanur forest disease (KFD), and Crimean-Congo hemorrhagic fever. The CBHI provisionally reported around 110 cases of rabies, 1674 cases of JE, 14971 cases of H1N1, 57813 cases of chikungunya, 4380 cases of kala-azar and 101,192 cases of dengue during 2018.^[7]

Plague which has killed 12 million Indians keeps resurfacing regularly in different parts of India. About 1.8 million receive anti-rabies vaccine, and 20,000 die of rabies every year. Brucellosis alone has contributed to loss of 30 million man days and economic loss of Rs. 24 crores a year. Japanese Encephalitis is endemic in many districts in Bihar and Uttar Pradesh. India reports 70% of global 58,200 kala azar cases.^[8] In India According to an International Livestock Research Institute study, 13 zoonoses are cause of 2.4 billion cases of human disease and 2.2 million deaths per year. The highest zoonotic diseases burden with wide spread diseases burden are in Ethiopia, Nigeria, Tanzania, and India.^[9]

A systematic review of zoonotic diseases in India concluded that new zoonotic diseases such as cutaneous leishmaniasis, Japanese Encephalitis, leptospirosis, and scrub typhus are spreading to a much wider area at an alarming rate. The reemergence of neglected zoonotic diseases such as KFD can be problematic due to the unavailability of strategies and policies to fight against them.^[3]

WHAT IS BEING DONE?

Zoonotic diseases, being a global problem have received priority attention of the WHO and other international organizations such as Food and Agricultural Organization of the UN, the World Organization for Animal Health. Since zoonosis involves animals and humans, they show case “one health” approach to both address both animal and human health in an integrated manner. These agencies work closely together, prepare joint plan, and share responsibility for multi sectorial action.

In India, there is an active effort to strengthen surveillance for early diagnosis and effective, timely containment. The National Centre for Disease Control plays an important role in strengthening capacity across the country and bringing together epidemiologists, microbiologists, veterinarians, entomologists, etc., to effectively launch required multi-sectorial action to address zoonotic diseases.

AREA NEEDS ATTENTION

In India, the huge human and animal population increases the probability of human-animal contact and spread of zoonoses. One of the areas where research is required is behavioral aspects of zoonotic diseases for safe handling of animals by humans. This requires a close collaboration between various sectors especially veterinarians and health personnel to put in place effective preventive practices among animal breeders and rearers. There is also a need for strengthening surveillance with a strong laboratory network to pick up diseases both in animals and humans early to launch prompt containment action before an outbreak becomes an epidemic. The “one health” approach bringing veterinarians, health-care providers, and other sectors. Apart from that, it also requires robust public health facilities, trained frontline workers, IEC activities, early diagnosis, treatment, prevention, control, and management of zoonotic diseases. The current special supplement is an effort to address this gap. The measures of prevention, early detection, and containment need to be integrated into planning at local level, i.e., state program implementation plans starting from district level upward under the National Health Mission.

Sanjiv Kumar, Sumant Swain, Preetha G S, B. S. Singh, Divya Aggarwal

Department of Academic and Research, International Institute of Health Management Research, New Delhi, India

Address for correspondence: Dr. Sanjiv Kumar, International Institute of Health Management Research, Plot No. - 3, HAF Pocket, Sector-18 (A), Phase-II, Dwarka, New Delhi - 110 075, India. E-mail: drsanjivkumardixit@gmail.com

REFERENCES

- Wallace R. Public Health and Preventive Medicine. 15th ed. USA: McGraw Hill Company; 2007.
- World Health Organization. Regional Meeting on Zoonotic Diseases. Jakarta, Indonesia: Report of the Meeting; 2007.
- Kumar R, Singh SP, Savalia CV. Overview of emerging zoonosis in India: Areas of concern. *J Trop Dis* 2015;3:165-8.
- Woolhouse ME, Gowtage-Sequeria S. Host range and emerging and reemerging pathogens. *Emerg Infect Dis* 2005;11:1842-7.
- Tiwari Dhiman R. Emergence of zoonotic diseases in India: A systematic review. *Med Rep Case Stud* 2018;3:163-70.
- World Health Organization. Cross-Sectoral Activities to Reduce Health Threats at the Human-Animal-Ecosystems Interface. Available from: <https://www.who.int/zoonoses/activities/en/>. [Last accessed on 2019 Aug 14].
- CBHI, DGHS, Ministry of Health and Family Welfare. Government of India. National Health Profile: 2019. CBHI, DGHS, Ministry of Health and Family Welfare. Government of India; 2019.
- Zoonotic Diseases of Public Health Importance. Zoonotic Division. 3rd ed. National Centre for Disease Control, Directorate General of Health Services, Ministry of Health and Family Welfare, Government of India. 2016.
- Varma, GB. India needs ‘One Health’ policy to eradicate zoonotic diseases. *Nature India* 2014. [Doi: 10.1038/nindia.2014.97]. Available from: <https://www.natureasia.com/en/nindia/article/10.1038/nindia.2014.97/>. [Last accessed on 2019 Aug 25].

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

Access this article online

Quick Response Code:



Website:

www.ijcm.org.in

DOI:

10.4103/ijcm.IJCM_360_19

How to cite this article: Kumar S, Swain S, Preetha GS, Singh BS, Aggarwal D. Zoonotic diseases in India. *Indian J Community Med* 2020;45:S1-2.

Received: 26-08-19, **Accepted:** 24-02-20