



Viewpoint

Practice

The concept of One Health: Cultural context, background & prospects in India

Humans, animals and plants coexist, thrive and eventually succumb in a state of mutual interdependency. Various cultural traditions and lifestyles may either respect or disregard the balance among these interdependencies in different ways and to varying degrees. The concept of One Health, building on an earlier formulation of One Medicine, provides a framework for responding to ecological and zoonotic priorities. Current efforts to unify human, animal, social and environmental health interests were initially associated with work and achievements in Europe and North America¹. But the concept is also relevant for consideration and adaptation in India, where health and environmental challenges and a rich cultural history indicate the value of a One Health approach. To inform prospects and planning, we consider relevant cultural traditions in India and the historical background of the One Health concept.

Cultural concepts of place and health in India

Indigenous peoples influenced by their cultural traditions are typically more sensitive and attentive to their environment and more diligent in sustaining its ecological balance, both as a practical matter for protecting their livelihoods and as a matter of respect for the sanctity of special places. In coastal Maharashtra, sacred groves (*devrai*) are valued by virtue of such traditions. They may have a temple, shrine, monastery or a burial ground, and they have been havens for wildlife and biodiversity². Within the grove it is forbidden to cut plants or even the living branch of a tree, and the local population may feel responsible for protecting them. The preoccupation and compulsion to fulfil that responsibility was central to the delusional experience of a young man with schizophrenia in the plot of a Marathi film, titled *Devrai* (2004). Social, cultural and religious studies acknowledge the significance of various other places, especially settings where rivers and their waters have restorative and healing power³.

Commentaries on the literature of the *Mahānubhāv* religious sect, founded by Chakradhar in the thirteenth century, extol the salutary and psychological benefits of being in Maharashtra, not just that it fosters religious pursuits, but because it is good for one's health and morals⁴.

Effects on health and medical problems represent aspects of broader interests in environmental harmony that are rooted in culturally sanctioned ecological values. Places in the natural world offer conducive settings that may provide herbal and other remedies. A fundamental relationship between the individual and the world as microcosm and macrocosm, each identified and represented within the other, is elaborated in chapter 5 of the fourth of eight major sections of the *Charaka Saṃhitā*. This section on human embodiment (*Śārīrasthāna*) explains interests of the Ayurvedic medical tradition in health, sickness and healing of the body with reference to ultimate emancipation from the world (*Mokṣa*)⁵. Based on the authoritative Sanskrit texts and anthropological fieldwork, social and humanistic study of the ecology of varied wet and dry landscapes and nonherbal medicines shows how setting is related to health and remedies⁶. It explains how zoology and pharmacy are related, considering the nature of animals and their pharmaceutical properties.

Addressing health problems that result from interactions with animals, the major texts of Ayurveda devote sections to the effects of poisons and venoms from snakes, scorpions and spiders. Exposure from contact with the teeth, excreta or semen of various mammals may be toxic. They elaborate effects of poison in the semen of rats and mice and their treatment. In sections describing such animal bites, two of the three major texts of Ayurveda, the *Suśruta Saṃhitā* (chapter 7 of the *Kalpasthāna* section) and the *Aṣṭāṅghṛdaya Saṃhitā* (chapter 38 of the *Uttarasthāna* section), include accounts of rabies. They refer to it by a term

translatable as hydrophobia (*jaltrāsa*), based on well-known symptoms that include fear of water. The condition was attributed to the bites of dogs and jackals, as well as other species, including hyenas, bears and tigers. Affected persons may imitate behaviours of the biting animal, and for them the condition is fatal⁵.

Historical background in Europe and North America

As in the fields of pathology and social medicine, key features of the concept of One Health are traceable to seminal contributions of Rudolf Virchow in the nineteenth century. His studies of epidemic typhus and cholera in the mid-1800s highlighted social and political determinants of health problems, boldly presented in the 14 issues of his short-lived but influential weekly periodical, *Medical Reform*, which he established in 1848⁷. His interests and achievements in conceptualizing principles of social medicine, detailed in his report after investigating a typhus epidemic in upper Silesia earlier in that year, emphasized the definitive role of social conditions, rather than pathogens, for explaining and controlling that and other epidemics. His ideas and work in an activist medical reform movement motivated rethinking of disciplinary boundaries between biomedicine, politics and anthropology.

Virchow also highlighted the interdependencies of human and animal health. In 1855, he identified and discussed rabies, anthrax and glanders, using the term zoonoses⁸. He included these three in a list of causes of death that he had prepared in Berlin for use on death certificates. As a pathologist and scientist, he exhorted doctors in 1875 to document deaths more conscientiously for better statistics⁹. In a lecture in Brussels in 1877 on the prevention of animal epidemics, he further emphasized the need for research involving the collaboration of physicians and veterinarians, highlighting implications for controlling epidemic lung disease in animals, which he thought to be transmissible to humans⁹. He explained the need for legislation to ensure quarantine and/or culling livestock herds, with compensation for farmers, to prevent spread within Germany and across international borders from Austria and Russia:

“Now in my opinion it would be a matter of great importance for observers to direct more attention to ascertaining whether the disease arises spontaneously anywhere ... We would thereby obtain much more certitude for the legislative and

administrative measures that must be taken against the spread of this disease, one that affects an animal of great importance in human nutrition; we would perhaps proceed with more justice could science fill this gap ... by the combined activity of the physicians and veterinarians of Europe”⁹.

On further considering zoonotic transmission, Virchow suggested that bovine tuberculosis, which had been shown to be an infectious disease, was communicable to humans. “If so,” he explained, “it would follow that far more stringent sanitary measures must be directed against this disease than heretofore”⁹. With that in mind, he cautioned against human consumption of meat and milk from infected animals, especially milk because it posed a particular risk for newborns. As a politician seated in parliament, he was well-placed to advocate for regulating the movement of livestock across international borders.

A century later, Calvin Schwabe, a veterinary epidemiologist at the University of California, Davis, elaborated the concept of One Medicine in the 1980s, based on ideas he had been developing over the prior two decades. He argued that medicine and health science should not be compartmentalized according to species because advances from consideration of each inevitably contributed to the other. His ideas in the 1960s germinated from his experience in Lebanon as a consultant on parasitology for WHO and while working at the American University of Beirut¹⁰. He first used the term One Medicine to explain his views in the third edition of his textbook, *Veterinary Medicine and Human Health*, in 1984, though not in the earlier editions in 1964 and 1969¹¹.

Acknowledging the preventive, policymaking and research interests of public health beyond clinical medicine, the term One Health came into use in 2003. The concept of One Health strengthened a broader range of collaborations in teaching and research, and it led to the appearance of new journals and textbooks^{1,12}. The WHO and other international agencies have acknowledged the complementary relationship and lent their support to integrating development of human and animal health systems¹³.

Priority and current status

Pandemic diseases originating in animals regardless of whether they require animal vectors to sustain their spread - including COVID-19, Ebola and SARS in recent years have heightened awareness

and contributed to the current timely priority of the One Health framework. It is now clear that an exclusive focus on either humans or animals without considering the other will be inadequate to counter zoonotic threats and related concerns. Complementary challenges, notably the complexity of climate change, also demonstrate the need for a cross-disciplinary systems theory approach¹⁴. From a cultural historical perspective, ecosystems theory may be regarded as a secular complement to traditional cultural values, and a concerted approach is now required for effective responses to the most pressing challenges of our age.

To guide a joint initiative of the Government of India, Ministry of Health and Family Welfare and the Ministry of Agriculture and Wildlife Institute, a priority-setting exercise was initially undertaken in 2008. The activity involved the Public Health Foundation of India and international collaboration, enlisting a group of 17 experts to develop a Roadmap to Combat Zoonoses in India (RCZI) and establish a five-year strategic research agenda¹⁵. Though the research team concluded that multisectoral collaboration was required, the composition of the expert group and lack of community involvement was an acknowledged limitation. The group comprised only one environmental scientist and one social scientist working with eight veterinary scientists; the rest were trained in wildlife and public health sciences.

Other agencies of the Government of India have also been advancing a One Health agenda. The Indian Council of Medical Research (ICMR) and the Indian Council of Agricultural Research have jointly pursued efforts to establish One Health activities at the national level for over a decade. In August 2019, a Centre for One Health in Nagpur, Maharashtra, was approved as a satellite of the Pune-based ICMR-National Institute of Virology¹⁶. Another Centre for One Health was inaugurated on November 3, 2020 at the National Institute of Animal Biotechnology (NIAB) in Hyderabad, which is an autonomous research institute of the Government of India, Department of Biotechnology¹⁷. The NIAB is conducting translational research based on the theme “animal health for human welfare” to develop vaccines, diagnostics and molecular medicines for livestock¹⁸.

Establishing a national institute would provide an opportunity to rethink the scope and innovate a more interdisciplinary and systems-based approach that is sensitive to national and local environmental

and cultural contexts. The case of brucellosis control illustrates that need. The economic loss and broad impact of brucellosis in low- and middle-income countries is well documented¹⁹. Interventions based on sanitation, calfhood vaccination, testing, quarantine and slaughter are known to be efficacious. Acceptable and effective use of these interventions, however, involves considerations that extend beyond health system preparedness and economic and environmental priorities. Questions concerning the social and religious milieu and political commitment are also critical.

Rabies control has so far dominated One Health activities in India²⁰, and it is included among the 11 priority zoonotic diseases or classes of disease identified in the RCZI. Although global concerns focus on emerging and resurging infectious diseases, but various other aspects of human, animal and environmental health-related interactions have long been recognized, and remain relevant, for a One Health ecosystems approach, especially in India. The cultural mix of agricultural and pastoral practices has varied across regions of India and over time. For example, mechanized farming and economic incentives have favoured a shift towards rearing smaller animals—goats for mutton and sheep for wool—among farmers in northwestern India²¹.

Snake bites and other non-infectious toxic exposures are priorities that have been addressed by the indigenous medical system. Human-wildlife conflict is recognized as a serious problem that has been exacerbated both by rural land development encroaching on animal habitats and urban hazards resulting from expanding populations of monkeys in cities²². Such issues may be more likely to be acknowledged by community stakeholders than by biomedical health scientists. Repelling monkeys, which are regarded as a menace in the “urban jungle” of Lutyens’ Delhi, is central to the plot of a recent popular Hindi film, *Eeb Allay Ooo!* (2019)²³. Environmental and health effects of development, such as open mining activities, road construction and dam projects are also relevant for consideration on the One Health agenda. High-impact decisions may cause serious problems for beleaguered communities, and ecosocial considerations and ecosystem experts are, therefore, required to guide policy. Human health and livelihood effects of disrupted environments, constrained animal habitats and threats to the health of livestock have been mainstream interests of the One Health approach. Mental health, however, is also an important, though

relatively neglected, aspect of these considerations²⁴. Notably, research shows that climate change has substantial effects on suicide²⁵.

Prospects for One Health in India

A suitably adapted strategy for a National Institute for One Health in India should consider global, national and local priorities in formulating an appropriate policy for the country. Planning should be attentive to social, cultural, economic and technical issues, acknowledging needs, constraints and resources. Innovative opportunities should be developed to encourage multisectoral collaboration among experts from various relevant fields beyond human and animal health sciences, including basic sciences, social sciences, humanities and unique potential in India for advancing public health through performing arts and entertainment²⁶.

The proposed National Institute of One Health in India offers a welcome opportunity for a broad agenda to address needs and draw upon cultural, health and scientific resources. Though advancing health priorities by addressing human, animal and environmental interdependencies is a challenging task, doing so is critical both for reimagining India's future health system and to ensure that One Health contributes to global health.

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References

- Zinsstag J, Schelling E, Waltner-Toews D, Whittaker M, Tanner M. *One health: the theory and practice of integrated health approaches*. Wallingford, Oxfordshire, UK; Boston, MA: CAB International; 2015.
- The Hindu. *Sacred woods*. Available from: <https://www.thehindu.com/children/sacred-woods/article29373303.ece>, accessed on March 4, 2021.
- Feldhaus A. *Water and womanhood: religious meanings of rivers in Maharashtra*. New York: Oxford University Press; 1995.
- Feldhaus A. *Connected Places*. New York: Palgrave Macmillan US; 2003.
- Meulenbeld GJ. *A history of Indian medical literature*. Groningen: Egbert Forsten; 1999.
- Zimmermann F. The jungle and the aroma of meats: An ecological theme in Hindu medicine. *Soc Sci Med* 1988; 27 : 197–206.
- Brown TM, Fee E. Rudolf Carl Virchow: Medical scientist, social reformer, role model. *Am J Public Health* 2006; 96 : 2104-5.
- Rather LJ. *Commentary on the medical writings of Rudolf Virchow: Based on Schwalbe (bibliography series)*. San Francisco: Jerry Norman Co; 1990.
- Virchow R, Rather LJ. *Collected essays on public health and epidemiology*. Canton, MA: Science History Publications, U.S.A.; 1985.
- Cassidy A. Humans, other animals and 'One Health' in the early twenty-first century. In: Woods A, Bresalier M, Cassidy A, Mason Dentinger R. *Animals and the Shaping of Modern Medicine: One Health and its Histories*. Cham: Palgrave Macmillan; 2018 p. 193-236.
- Schwabe CW. *Veterinary medicine and human health*. 3rd ed. Baltimore: Williams & Wilkins; 1984.
- Rüegg SR, Häsler B, Zinsstag J, editors. *Integrated approaches to health: A handbook for the evaluation of One Health*. The Netherlands: Wageningen Academic Publishers; 2018.
- World Health Organization, Food and Agriculture Organization of the United Nations & World Organisation for Animal Health. *Taking a multisectoral, one health approach: a tripartite guide to addressing zoonotic diseases in countries*. Geneva: WHO; 2019.
- Zinsstag J, Schelling E, Waltner-Toews D, Tanner M. From "one medicine" to "one health" and systemic approaches to health and well-being. *Prev Vet Med* 2011; 101 : 148-56.
- Sekar N, Shah NK, Abbas SS, Kakkar M, on behalf of the Roadmap to Combat Zoonoses in India (RCZI) Initiative. Research options for controlling zoonotic disease in India, 2010–2015. *PLoS One* 2011; 6 : e17120.
- The Times of India. *Center for One Health approved for Nagpur: ICMR Director*. Available from: <https://timesofindia.indiatimes.com/city/nagpur/center-for-one-health-approved-for-nagpur-icmr-director/articleshow/68326643.cms>, accessed on March 24, 2021.
- Vigyan Samachar. *Inauguration of the "Center for One health" at DBT-NIAB*. Available from: https://vigyanprasar.gov.in/wp-content/uploads/vigyan_samachar_dbt_01BB_20Nov2020.pdf, accessed on March 24, 2021.
- National Institute of Animal Biotechnology. Available from: <http://www.niab.org.in/Default.aspx>, accessed on March 24, 2021.

19. Dadar M, Tiwari R, Sharun K, Dhama K. Importance of brucellosis control programs of livestock on the improvement of one health. *Veterinary Quarterly* 2021; 41 : 137-51.
20. Fitzpatrick MC, Shah HA, Pandey A, Bilinski AM, Kakkar M, Clark AD, *et al.* One Health approach to cost-effective rabies control in India. *Proc Natl Acad Sci USA* 2016; 113 : 14574-81.
21. Brara R. Ecology and environment. In: Das V, editor. *The Oxford India companion to sociology and social anthropology*. New Delhi : Oxford: Oxford University Press; 2003 p. 141-83.
22. Anand S, Radhakrishna S. Investigating trends in human-wildlife conflict: is conflict escalation real or imagined? *J Asia-Pacific Biodiversity* 2017; 10 : 154-61.
23. The Hindu. “*Eeb Allay Ooo!*” movie review: *The kingdom of monkeys*. Available from: <https://www.thehindu.com/entertainment/movies/eeb-allay-ooo-the-kingdom-of-monkeys/article31705096.ece>, accessed on May 30, 2020.
24. Zinsstag J, Weiss MG. Livestock diseases and human health. *Science* 2001; 294 : 477.
25. Lester D. The environment and suicide – why suicidologists should support climate change policies. *Crisis* 2021; 42 : 89-91.
26. Riley AH, Sood S, Mazumdar PD, Choudary NN, Malhotra A, Sahba N. Encoded exposure and social norms in entertainment-education. *J Health Commun* 2017; 22 : 66-74.