COMMENTARY

COVID-19: should forestry extension pay attention to new emerging threats?

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Increasing frequency of zoonotic diseases put the human populations in and around the biodiversity-rich tropical forests under constant risk of epidemic outbreak. However, an integrated strategy for awareness and development and real-time data gathering from among the susceptible localities are wanting. We suggest widening the scope of forestry and wildlife extension programmes to address this challenge by adopting the principles of One Health approach in combating zoonosis.

The disastrous outcome of the COVID-19 on the human life and economy worldwide points to the urgent need for an early warning system for prediction of epidemic and control of zoonotic diseases based on the epidemiological intelligence[1]. Even in the absence of COVID-19, the zoonotic diseases transmitted to human populations from animal reservoirs of livestock, companion and wild animals, were cause of increasing mortality and morbidity in India as elsewhere[2–4]. Though studies and assessments have suggested the need for introducing surveillance and forecasting of zoonotic diseases along with capacity building and augmentation of preparedness of stakeholders against outbreaks of zoonosis[2,5,6], the institutional preparedness for early detection and containment of zoonosis is found to be inadequate. The availability of data on the zoonosis spreading from the wild vertebrates in India is also found to be inadequate[7].

Epidemiological data suggests that about 75% of emerging infectious diseases are zoonotic and they originate mainly from wildlife. Thus, it is not a surprise that incidences of zoonotic emerging infectious diseases (EIDs) are higher in forested tropical regions as demonstrated by Allen *et al.*[8], where correlates for the global distribution of zoonotic EID risk (and the presence of EID 'hotspots') is concentrated in tropical regions rich in wildlife diversity and has rapid largescale land-use change. Although the exposure of human population proximate to forests with respect to EID risk is not specifically explored in detail, the results of the exercise suggest that EID risk within regions and countries might be higher in populations that are close to the large land-use change programmes such as logging and mining concessions, dam-building and road development in the proximity of forest.

These activities carry an intrinsic risk of disease emergence, by increasing human or livestock contact with wildlife or by disrupting disease dynamics in reservoir hosts, and have been repeatedly linked to outbreaks of novel EIDs. Cursory observations on the probable origins of COVID-19 point at yet another zoonotic EID risk factor that defies the proximity hypothesis as an urban wet market with wild animal trade is suspected as the epicentre of the disease outbreak. In this context, the biodiversity-rich regions of the Western Ghats pose multiple challenges in managing the possible exposure of forestry professionals, forest dwellers and others who frequent forest areas to potential zoonotic diseases[9] besides the veterinary professionals and livestock farmers who could also function as carriers of pathogens to populations dwelling away from forest areas. The pan Indian scene is much more complex considering the challenges posed by climate change, occurrence of diverse migratory bird populations and increasing human wildlife conflicts, which are probable sources for emergence and re-emergence of zoonosis. This raises a serious concern for a human population of approximately 350–400 million in India who live close to the forests with their livelihoods critically linked to the forest ecosystem[10].

The detection, prediction and control measures of zoonosis thus would require collaboration of professionals with trans-disciplinary expertise across the human and animal sciences and social sciences. Very often, the experts in certain knowledge areas, which are institutionalized in a compartmentalized manner fail to take account for the factors beyond their disciplinary bounds in building strategy to contain zoonosis. This is true in all aspects of containment such as research, policy and practice and makes it an intricate issue demanding (re)conceptualization of the systems for visualizing the interfaces of animal and human health[11]. This re-visualization for a comprehensive health strategy against zoonosis calls for integration of the perspectives on the life across the professions, expertise and stakeholders to inform the idea of One-health model. In the larger scheme of One-health model, the role and responsibility of wildlife and forestry professionals would extend well beyond the bounds of forests and its proximity into the agrarian landscapes where equally intense human–wildlife interactions take place. As the early detection and containment require comprehensive, multidisciplinary and multi-sourced information, the role of the forestry and wildlife professionals in One-Health strategy should be development of awareness on EIDs among the local population in biodiverse regions, especially among those dwelling in and around the forest regions. A more pertinent question is, what are the possibilities of expanding such an outreach programme for shaping a more comprehensive early warning and containment strategy for EIDs as part of forestry and wildlife extension activity?

Traditionally most people who live close to the forests and those who routinely visit the forests as part of their livelihood activities have their options limited, and their dependency on forests for their livelihood is mostly unavoidable. Many intricate historical, social, economic and ecological factors influence and shape the local patterns of forest dependency. Knowledge of these factors plays a crucial role in shaping an informed and effective outreach and extension activity among these communities. Awareness of EIDs and zoonosis may help reduce risks from zoonotic EIDs for local people living in and around forests, professionals visiting

such areas, by augmenting personal and community alertness, besides helping to institutionalize the responses to zoonotic EIDs. This could also prove important in controlling diseases while generating data for identification of hot spots of zoonotic EIDs. This information would also help in prioritizing of zoonotic diseases that are probable at the local level, which is essential for development of 'One Health' strategies[12]. This study hints that strategies such as organizing local level awareness workshops on EIDs is helpful in generating information on zoonotic EIDs and understanding EID possibility of that particular area. This will help to segregate the nature of each area by providing information on transmitting type, pathogen, symptoms, etc. This data is also helpful to suggest preliminary precautions for avoiding contacts to host and also for transmitting diseases, like wearing masks and washing hand as in the case of COVID-19.

In this context, forestry and wildlife extension needs to expand into new areas in addition to its traditional activities like, establishing plantation, preparing seedlings, organizing outreach activities on biodiversity conservation and for reducing human–wildlife conflict, etc. It is proposed that in changed scale and scheme of control of zoonotic EIDs, forestry extension has a crucial role in reducing the risks of zoonotic EIDs originating from wildlife areas by increasing awareness among the local people in the susceptible regions and by generating relevant real-time multisource data for identifying and implementing zoonosis hot spots for effective control.

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