



# A One Health Approach to Zoonotic Diseases in Extraordinary and Ordinary Circumstances

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Both in everyday life and extraordinary situations such as wars and natural disasters, humans are at risk of zoonotic diseases. These diseases originate in animals but can be transmitted to humans. Whether endemic or newly emerging, bacterial zoonotic diseases can significantly threaten public health, individual livelihoods, national economies, and food security.<sup>1,2</sup> Infectious diseases originating from wildlife have always been a particular risk for human epidemics, particularly when first transmitted between the species. Because the human immune system does not have an established defense against the disease at this point, it can spread rapidly. Direct or indirect contact between humans and animals and their bodily fluids is necessary for interspecies transmission. While humans have coexisted with domestic and wild animals for thousands of years, various anthropogenic factors have recently intensified the animal-human interface, increasing our interactions with animals and the risk of disease transmission between them.<sup>3</sup>

The risk of zoonotic diseases is higher in densely populated areas, among displaced groups such as immigrant refugees, when there are changes in social structures or human behaviors, in overcrowded and unhygienic camps and housing, and in regions with poor or deteriorating health infrastructures. Zoonotic diseases, such as brucellosis, rabies, human immunodeficiency virus, and the recently emerged severe acute respiratory syndrome coronavirus 2 can lead to large-scale epidemics and pandemics that spread exponentially as they are transmitted from person to person.<sup>4</sup>

Natural disasters can lead to infectious disease outbreaks, including zoonotic diseases. This occurs when they cause significant population displacement and exacerbate risk factors for disease transmission such as increased vulnerability to existing pathogens, changes in the environment, and changes in human living conditions. Disease outbreaks following disasters such as floods, tsunamis, earthquakes, tropical cyclones, hurricanes, typhoons, and tornadoes have included diarrheal diseases, acute respiratory infections, malaria, leptospirosis, measles, dengue fever, viral hepatitis, typhoid fever, meningitis, tetanus, and cutaneous mucormycosis. The increase in

the spread of infectious diseases and increased risk of epidemics after natural disasters is primarily attributable to the longer-term, less immediate effects of the disaster. The downstream impacts that mediate the relationship between natural disasters and zoonotic disease outbreaks include displaced populations (both internally displaced and refugees), environmental changes, proliferation of disease vectors (rodents, mosquitoes), increases in vector breeding grounds, increased human exposure to disease vectors, unplanned settlements and overcrowded housing, unclean water, poor sanitation conditions and personal hygiene, malnutrition, low levels of immunity to vaccine-preventable diseases or inadequate vaccination coverage, and limited access to healthcare. Changes in human living conditions, the pathogen ecosystem, and the environment are known as the epidemiological triad (agent, host, environment) as they facilitate the emergence and transmission of infectious diseases.<sup>5</sup> Table 1 lists notable outbreaks of zoonotic diseases associated with wars and natural disasters.<sup>6</sup>

The One Health approach brings together experts from various fields to work synergistically to optimize health internationally, nationally, regionally, and within every human community. The application of this approach to the reduction and prevention of zoonotic disease outbreaks among humans has brought together the knowledge, expertise, and practical skills of professionals from a wide range of fields, including human and veterinary medicine, epidemiology, ecology, and environmental science. Detecting and reporting disease outbreaks early is essential and interventions must be implemented immediately to prevent further spread. The One Health approach aims to understand disease origins, transmission dynamics, and prevention strategies. It also develops strategies for the prevention, control, and treatment of zoonotic diseases. These include the promotion and execution of animal vaccination programs, controlling disease vectors, improving hygiene practices within human communities, and improving biosecurity measures in livestock production.<sup>7</sup> Clinical studies of COVID-19 have shown that vaccines are highly effective in preventing symptomatic diseases and reducing disease transmission, mortality rates, and related



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**TABLE 1.** Selected EIDs/REIDs Outbreaks Associated with Wars (W) and Natural Disasters (ND), Year Continent/Region, Emerging Infectious Diseases/ Re-Emerging Infectious Diseases (EID/REID) respectively.<sup>6</sup>

<b>W-Africa;</b>	1991 USA Drought <b>Leptospirosis,</b>	1999 Japan Heavy rainfall <b>Leptospirosis</b>
1998 Democratic Republic of the Congo (DRC) <b>African trypanosomiasis,</b>	1993 USA Flood <b>Leptospirosis,</b>	2000 India Flood <b>Leptospirosis</b>
2005 Angola Marburg, 2006 DRC <b>Plague,</b>	1994 USA 1994 Northridge California Earthquake <b>Coccidioidomycosis</b>	2003 Iran December 2003 Bam city Earthquake <b>Cutaneous leishmaniasis</b>
2020-2021 DRC Plague,	1996 Brazil Flood <b>Leptospirosis,</b>	2003 Iran July 2003 Fars Earthquake <b>Cutaneous leishmaniasis,</b>
2020 Guinea <b>Yellow Fever A,</b>	1998 Nicaragua and Guatemala Hurricane Mitch <b>Cholera</b>	2003 Iran December 2003 Bam city Earthquake Cutaneous <b>leishmaniasis</b>
2022 DRC Ebola,	Leptospirosis and <b>Malaria,</b>	2004 Indonesia Tsunami <b>Melioidosis</b>
2022 Malawi <b>Polio,</b>	2001-2003 USA Drought West <b>Nile virus,</b>	2007 China Flood Malaria,
<b>Asia;</b>	2003-2011 USA Drought West <b>Nile virus,</b>	2009 Taiwan Typhoon <b>Leptospirosis, melioidosis</b>
1994 Tajikistan <b>Malaria,</b>	2004 Dominican Republic Flood <b>Malaria,</b>	2011 Sri Lanka Flood <b>Leptospirosis</b>
1997-1998 Pakistan <b>Cutaneous Leishmaniasis</b>	2004 USA Flood Leptospirosis	2015 Nepal Earthquake Scrub <b>Typhus</b>
2002 Afghanistan <b>Malaria,</b>	2005 Guyana Flood <b>Leptospirosis,</b>	<b>Europe;</b>
2012 Lebanon <b>Leishmaniasis.</b>	2010 Haiti Earthquake on January 12 <b>Malaria,</b>	1997 and 2002 Czech Republic Flood <b>Leptospirosis</b>
<b>Europe;</b>	2011 USA Tornado <b>Mucormycosis,</b>	1999 Türkiye 17 August 1999 Earthquake <b>Tularemia</b>
2000 Kosovo Tularemia	2016 Ecuador Earthquake on April 16, 2016 <b>ZIKV,</b>	2004 Finland Tsunami <b>Melioidosis</b>
<b>ND-Africa;</b>	<b>Asia;</b>	2010 Austria Flood <b>Leptospirosis</b>
1987-1988 South Africa Flood <b>Poliomyelitis,</b>	1997-1998 Indonesia Drought <b>Malaria,</b>	
2000 Mozambique Flood <b>Malaria,</b>		
<b>America;</b>		
1991 Costa Rica 22 April 1991 <b>Earthquake Malaria,</b>		

EID, emerging infectious disease; REID, re-emerging infectious disease; DRC, Democratic Republic of the Congo.

hospital and intensive care admission rates.<sup>8</sup> In addition, the One Health approach recognizes that the environment conditions and the health of ecosystems are vital considerations in the prevention of diseases. Experts working within the One Health paradigm have studied the effects of environmental factors such as deforestation, climate change, and biodiversity loss on the emergence of diseases. Protecting natural habitats and promoting sustainable practices can help reduce disease risks.<sup>7</sup> Increasing awareness, more rapid identification of outbreaks, public health information campaigns, education, research, and a multidisciplinary approach coordination by national health departments are all necessary factors in disease control and epidemic prevention. This is an issue that directly concerns national populations and economies and the implementation of the above measures should be prioritized to

ensure effective management of disease outbreaks and minimize their long-term effects. The longer an epidemic continues, the more difficult it becomes to meet healthcare needs, particularly in low- and middle-income countries with large populations. Epidemics are a considerable drain on fiscal and medical resources and workforce loss can further impede economic recovery. Therefore, this issue needs to be addressed in detail by the World Health Organization and governments.<sup>9</sup>

When wars and natural disasters occur, human nutritional resources often become sparse. Those in affected areas may find themselves living in crowded, unsuitable conditions with inadequate hygiene. Following such events, emergency action plans must be created and implemented by governments and relevant stakeholders.

While these should focus on meeting the survival needs of those affected, the prevention of zoonotic disease outbreaks and epidemics must also be incorporated into these plans. Meeting some of these survival needs will contribute somewhat to disease prevention through access to clean water, shelter, and healthy food. Nevertheless, it is vital that additional measures are taken to reduce the risk of disease as the detrimental effects of epidemics following closely on the heels of another national crisis are much higher as financial resources and healthcare are already stretched to their limit. Prevention is more easily implemented than treatment and minimization of the speed and extent of disease dissemination.

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## REFERENCES

1. Arredondo-Rivera M, Barois Z, Monti GE, Stekete J, Daburon A. Bridging Food Systems and One Health: A key to preventing future pandemics? *One Health*. 2024;18:100727. [\[CrossRef\]](#)
2. Zhang T, Nickerson R, Zhang W, et al. The impacts of animal agriculture on One Health-Bacterial zoonosis, antimicrobial resistance, and beyond. *One Health*. 2024;18:100748. [\[CrossRef\]](#)
3. Magouras I, Brookes VJ, Jori F, Martin A, Pfeiffer DU, Dürr S. Emerging Zoonotic Diseases: Should We Rethink the Animal-Human Interface? *Front Vet Sci*. 2020;7:582743. [\[CrossRef\]](#)
4. Oakley R, Hedrich N, Walker A, et al. Status of zoonotic disease research in refugees, asylum seekers and internally displaced people, globally: A scoping review of forty clinically important zoonotic pathogens. *PLoS Negl Trop Dis*. 2024;18:e0012164. [\[CrossRef\]](#)
5. Kouadio IK, Aljunid S, Kamigaki T, Hammad K, Oshitani H. Infectious diseases following natural disasters: prevention and control measures. *Expert Rev Anti Infect Ther*. 2012;10:95-104. [\[CrossRef\]](#)
6. Topluoglu S, Taylan-Ozkan A, Alp E. Impact of wars and natural disasters on emerging and re-emerging infectious diseases. *Front Public Health*. 2023;11:1215929. [\[CrossRef\]](#)
7. Adnyana IM, Utomo B, Eljatin DS, Sudaryati NL. One Health approach and zoonotic diseases in Indonesia: Urgency of implementation and challenges. *Nara J*. 2023;3:e257. [\[CrossRef\]](#)
8. Gül F, Kasapoğlu US, Sabaz MS, et al. The Impact of CoronaVac Vaccination on 28-day Mortality Rate of Critically Ill Patients with COVID-19 in Türkiye. *Balkan Med J*. 2023;40:435-444. [\[CrossRef\]](#)
9. Nune A, Iyengar KP, Barman B, Manzo C. Post-COVID-19 Condition and Its Recognition in Low- and Middle-income Countries: Working Notes from the United Kingdom Experience. *Balkan Med J*. 2022;39:303-304. [\[CrossRef\]](#)